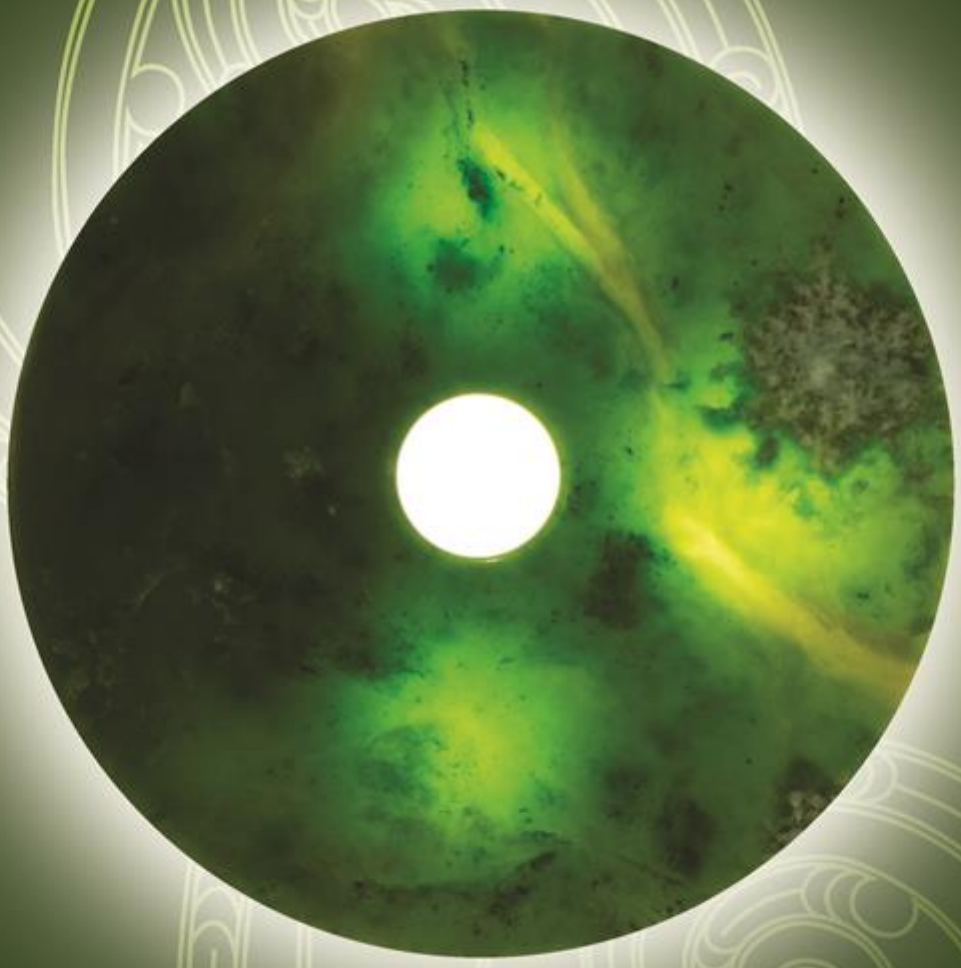
# National Women's Annual Clinical Report 2017



**Welcome** *Haere Mai* | **Respect** *Manaaki* | **Together** *Tūhono* | **Aim High** *Angamua*

AUCKLAND DISTRICT HEALTH BOARD
*Te Toka Tumai*

MPG | JUN18 | CC6768

## Acknowledgements

### Steering Committee

| | |
|---|---|
| Peter van der Weijer | Director National Women's Health |
| Melissa Brown | Midwifery Director |
| Mariam Buksch | Clinical Director Newborn Service |
| Lois Eva | Clinical Director Regional Gynaecology |
| Cindy Farquhar | Clinical Director Secondary Gynaecology |
| Claire McLintock | Clinical Director Regional Maternity |
| Jenny McDougall | Clinical Director Secondary Maternity |
| Megan Tahere | Clinical Director Primary Maternity |
| Lesley McCowan | Professor Lesley McCowan |

### Project Team

| | |
|---|---|
| Marjet Pot | Project Coordinator |
| Lynn Sadler | Epidemiologist |
| Nancy Li | Data Management/Analyst |
| Azmeena Sajid | Administrative support |
| Emily Clark | Women's Health Information Officer |

The project team would like to thank the many people who have assisted in the production of this publication.

Special thanks to all who provide, enter and check data used in this Annual Clinical Report, especially to Coralee Jones, Preji Venu, Cindy Ou, Anne Shaw, Debbie Greenwood, Sabine Huth, Janet Gorrell, Emily Clark.

Thanks also to those who have provided data and chapter comments, especially Dr Janet Rowan, Dr Lesley McCowan, Dr Jenny McDougall, Pauline Fakalata, Janice Taylor, Ines Blaj, Dr Katie Groom, Dr Michelle Wise, Dr Lois Eva, Dr Mariam Buksch, Dr Cindy Farquhar, Dr Carolyn Bilbrough, Dr Deralie Flower, Dr Gillian Gibson, Dr Audrey Long, Kelleigh Embers, Ann Hanson, Raksha Kumar, Shirley Wilson, Isis McKay, Margaret Merrilees, Dr Monique Stein-de Laat, Dr Tin Lok Chiu, Peter Jackson, Kate Bukowski, Dr Nick Walker, Dr Martin Minehan, Sarah Devine, Lisa Mackey, Ehsan Ullah, Leah Broughton-Couch, Kathy Lowe, Dr Erika Hunter, Ian Kando, Angela Cross, Peter Melville, Anna Barley, Tracey Senior, Jeanette MacKenzie, Raffaela Slight.

Thank you to all the women and families who agreed to have their photos put in the Annual Clinical Report.

Cover artwork by Chris Charteris.



ISSN 1175-6667
This document is available on the National Women's Health website http://nationalwomenshealth.adhb.govt.nz

# TABLE OF CONTENTS

**CHAPTER 2 OUR SERVICES**



**CHAPTER 3 QUALITY**



**CHAPTER 4 MATERNAL DEMOGRAPHY**



**CHAPTER 5 ANTERNATAL COMPLICATIONS**

**CHAPTER 6 LABOUR AND BIRTH**

**CHAPTER 7 LABOUR AND BIRTH OUTCOMES**

**CHAPTER 10 PERINATAL AND MATERNAL MORTALITY**

**CHAPTER 11 GYNAECOLOGY**

**CHAPTER 1 EXECUTIVE SUMMARY**



**CHAPTER 2 OUR SERVICES**



**CHAPTER 3 QUALITY**



**CHAPTER 4 MATERNAL DEMOGRAPHY**



**CHAPTER 5 ANTENATAL COMPLICATIONS**

**CHAPTER 11 GYNAECOLOGY**


**National Women's**
Annual Clinical Report 2017

# CHAPTER 1

# EXECUTIVE SUMMARY

## 1.1 Director's Comment

I am proud to present the 2017 National Women's Annual Clinical Report.

National Women's Health has an established reputation in women's health in its dual roles of providing care for the Auckland District Health Board population, as a referral centre for the wider region and as a centre of expertise and guidance for certain maternal fetal medicine conditions requiring a highly specialized multi-disciplinary approach for the rest of New Zealand. One of the particular characteristics of our service has been its willingness to accept accountability for the care that the service delivers and to present the outcomes of care in an open and public manner.

We are committed to our mission of "Excellence in Women's Health through empowerment and partnership". This recognizes that our ability to continue to provide appropriate care is dependent upon our ability to work collaboratively across the community of stakeholders and providers with whom we share the responsibility of care for the women, their babies and families that we serve. It also reminds us that providing health care is the embodiment of our values: respect, working together, kindness and compassion with a profound commitment to access and equality.

Specific areas of interest in this report include the steady decrease of women giving birth at Auckland City Hospital (ACH) who live in the Auckland DHB area (65.7%) and a significant increase in the proportion of women under the care of a private obstetrician (29%) with 46% being non-ADHB residents. The increase in the proportion of births at 38 and 39 weeks has continued with mothers under high risk DHB maternity care and private obstetrician LMCs delivering earlier at term than those under low risk DHB care and self-employed midwifery LMC care. Obstetric interventions showed some increase in 2017. The overall (emergency and elective) caesarean section rate was 40%. 832 babies were admitted to the Neonatal Intensive Care Unit. The incidence of stage 3 hypoxic ischaemic encephalopathy (HIE) was 0.32/1000 term births (2/6342) which is significantly lower than the national incidence for 2010-2016 of 1.21/1000 term births (PMMRC 2018). The perinatal related mortality rate for women resident in the ADHB area and birthing at ACH in 2017 was 48/4571 (10.5/1000).

You will note a steady increase in our laparoscopic hysterectomy rate as we build up laparoscopic surgical competencies in our team. Demands on our gynaecological oncology service continue to grow and we have become effectively the provider of these services for the northern half of the North Island. Performance against the Faster Cancer Treatment target of 90% compliance with 62 days from referral to definitive treatment improved from 73% to 83% from 2016 to 2017. Diagnostic delays are often responsible for breaches. There will be further changes in service delivery in this area in the coming years as part of the introduction of National Tumour Standards and a need to meet faster cancer timeframes.

The preparation of the data for this report is the consequence of an extremely hard working and dedicated multidisciplinary team of epidemiologist, data specialists and clinicians who recognise the value of high quality data which we can then use to enable continuous quality improvement. On behalf of the service I wish to sincerely thank this team for once again producing a detailed and comprehensive report.

Dr Peter van de Weijer

Director Women's Health

## 1.2 Consumer Comment

It is our pleasure to again provide a consumer commentary on the clinical outcomes achieved in National Women's Maternity, Neonatal and Gynaecology services in 2017. It is to be commended that these services continue to present their clinical outcomes for scrutiny and critique, and we believe this is evidence of the commitment to quality and excellence at National Women's. As the clinical data is placed under scrutiny, our role as consumer advisors is to remind you that behind the numbers are people undergoing some of the most significant experiences of their lives and that the experience of care at National Women's will linger for far beyond they time they are discharged back to community care. National Women's services are accessed by a wide diversity of women and families representing multi-cultural New Zealand and the changing demographics of birth. Ensuring services are planned and delivered in ways that are inclusive of, and responsive to, all people/families regardless of their ethnicity, culture, age, religion, sexuality, gender identity, socio-economic circumstances, and place of domicile is a core quality challenge at National Women's both now and in the future.

Having reviewed the clinical outcomes data we are pleased to note continued improvements across several indicators. In particular we applaud the work done to ensure faster gynaecological cancer treatment but note with concern that time to treatment is still below national targets. We note the excellent outcomes for women birthing, or commencing birthing at Birthcare, but it is an on-going disappointment that the number of women choosing Birthcare for labour remains low.

Despite these improvements there are a number of challenges facing National Women's. We are

concerned to note the high and growing rate of induction of labour and caesarean section, including elective/pre-labour caesarean section, and decreasing rate of vaginal birth after caesarean (VBAC). We note the significant difference in interventions between different providers, i.e. LMC midwives and private obstetricians. Clearly provider preference, as well as evidence and informed decision making, is shaping clinical outcomes at National Women's. We also note with concern the highest ever rates of both episiotomy and significant perineal tears and growing rates of PPH.

Our work as consumer advisors in the service continues, however we are disappointed to report that the Strengthening Consumer Voice Project has stalled due to leadership and funding changes. We believe that strong commitment to building capacity and sustainability in consumer representation and participation is critical to the achievement of excellence at National Women's and to support the services to address the challenges we have identified.

Isis McKay and George Parker

Consumer Advisors

## 1.3 Summary of Findings 2016

### 1.3.1 MATERNITY

### Chapter 4: Demography

1. In 2017, 65.7% of women giving birth at NWH were women who lived in the Auckland DHB area. This proportion has dropped significantly from 70.7% in 2006. The increase in births to non-ADHB residents is comprised of births to Counties Manukau residents. There has been no change in the proportion of births to Waitemata residents.

2. In 2017, 291 (4.3%) of mothers birthing at NWH were aged over 40 years and 100 (1.5%) under 20 years.

3. In 2017, mothers giving birth at NWH 435 (6.4%) identified as Māori, 733 (10.7%) Pacific peoples, 703 (10.3%) Indian, 1743 (25.5%) Other Asian, 327 (4.8%) MELAA, 799 (11.7%) Other European, and 2106 (30.8%) NZ European.

4. Among women birthing at NWH in 2017, 4.4% reported smoking at booking and 3.6% at birth.

5. Rates of smoking have reduced by similar amounts among NZ European, Pacific and Māori, however the percent reduction in smoking is highest for NZ European (51% from 2010 to 2017), 31% for Pacific, and lowest for Māori (17% from 2010 to 2017). These data suggest that the initiatives to assist smokers at NWH have worked well for NZ European women and to some extent Pacific women, but have worked less well for Māori women.

6. From 2009 to 2017, there was a significant increase in the proportion of mothers with BMI<25 and a significant decrease in mothers with BMI 30-34 and ≥35kg/m2. However, this does not accurately represent the change in BMI over time among mothers birthing at NWH, as from 2009 there has been a significant change in the demography of the population with an increase in Asian mothers and a relative reduction in Māori and Pacific mothers. From 2009 to 2017, there was a significant reduction from 76% to 69% in the proportion of Asian mothers with BMI<25, and a significant increase in Asian mothers with BMI 25-34 (22.0% to 28.8%) and ≥35 (1.3% to 1.8%).

7. There was a significant increase in the proportion of women under the care of a private obstetrician in 2017 (29%), from 27% in 2015 and 2016, and 24% in 2006. This is the highest proportion of women choosing private obstetrician care and birthing at NWH since 2006. Of women under private obstetrician care, 46% were non-ADHB residents, up from 34% in 2006 and 44% in 2016. This compares to 34% non-ADHB resident births at NWH overall in 2017 and 29% overall in 2006.

8. There has been a 12% reduction in the number of women resident in ADHB area birthing at NWH since 2006, and an 11% increase in the number of women residing outside ADHB birthing at NWH.

### Chapter 5: Antenatal Complications

#### Preterm

1. The preterm birth rate was 7.9% in 2017 compared to 9.7% 10 years ago. There has been a significant reduction in preterm birth at <32 and 32-36 weeks gestation; and in iatrogenic and spontaneous preterm birth.

#### Multiple pregnancy

2. The rate of NICU admission for ≥2 days is over five times higher in twins compared to singletons at NWH (37.7% of twins versus 7.0% of singletons).

3. The perinatal mortality rate is over five times higher in twins compared to singletons at NWH (55.6/1000 twin births versus 9.5/1000 singleton births in 2017) and appears to be fairly stable.

#### Hypertensive disease

4. The rate of hypertensive disease has decreased among nulliparous and multiparous women in the past 10 years.

5. Women of Māori, Pacific or European ethnicities had higher overall rates of hypertensive disorders in pregnancy compared to women of Asian ethnic groupings (Figure 61). There has been a decrease in hypertensive disease among European and Asian ethnic groupings ($p<0.0001$) but not among Māori and Pacific ($p=0.7$).

### Chapter 6: Labour and Birth

1. There has been a significant change in gestation at birth in the past 10 years. Especially noticeable is an increase in the proportion of births at 38 and 39 weeks and the reduction in the proportion of births at 40 weeks and over. On average mothers under MFM/Diabetes DHB maternity and private obstetrician LMCs are born earlier at term than those under Community DHB care and self-employed midwifery LMC care.

2. The spontaneous onset of birth rate at term in 2017 for nulliparous women was 42%, for multiparous women without previous Caesarean 57%, and for multiparous women who have had at least one previous Caesarean section 16%.

3. The most frequent indications for induction of labour in 2017 were term premature rupture of membranes, SGA, and diabetes.

4. There was a rise in elective Caesarean section births at 37-39 weeks in 2017 which requires further investigation.

5. Among multiparous women, 70% of elective and pre-labour Caesareans are for previous Caesarean. The most common indication for elective/prelabour Caesarean among nullipara is maternal request (22% of elective/prelabour Caesareans).

6. Fourteen percent of term induced first time mothers have a prelabour Caesarean (failed induction).

7. First time mothers who labour spontaneously have a nearly 80% chance of vaginal birth, and also have a 35% rate of requiring augmentation with syntocinon.

8. The overall Caesarean section rate in 2017 was 40%. This was an increase for both nulliparous and multiparous women. Operative vaginal birth has also increased in 2017 with a corresponding reduction in spontaneous vaginal birth.

9. The elective repeat Caesarean section rate among parity 1 singleton cephalic term pregnancies was the highest in a decade at 70%. Among the 25% who had a trial of vaginal birth, 61% had a successful vaginal birth. The elective repeat Caesarean section rate varied by LMC: in 2017, it was 54% for women under the care of self-employed midwifery LMCs, 57% for women under the care of NWH maternity services, and 89% for women under the care of private obstetrician LMCs. The rate of successful trial of labour in 2017 (among both spontaneous and induced labours) also varied by LMC: 67% for women under the care of self-employed midwifery LMCs, 61% for women under the care of NWH maternity services, and 46% for women under the care of private obstetrician LMCs.

10. The overall vaginal birth after Caesarean (VBAC) rate was only 15.8% in 2017.

11. In 2017, a total of 95 women (43% of breech babies at term) were referred for ECV. The ECV success rate was 48%. Ninety-six percent of successful ECVs remained cephalic at term and 70% had a vaginal birth.

12. Among all women birthing in 2017, 67.5% had an epidural, combined epidural-spinal or spinal anaesthetic. Among women in spontaneous labour, 43% had an epidural or combined spinal epidural in 2017 and among women whose labour was induced, 72% had an epidural or combined spinal epidural.

13. Pethidine use in labour has continued to decline. Pethidine was used by 3.2% of women in labour in 2017 compared to 15% in 2010.

14. Three hundred and eighty women commenced labour at Birthcare in 2017 and there were 306 births. The transfer in labour rates were 29% for nulliparous and 10% for multiparous women. Of women commencing labour at Birthcare Auckland, 90% achieved spontaneous vaginal birth, 5% had an operative vaginal and 5% an emergency Caesarean birth.

### Chapter 7: Labour and Birth Outcomes

1. Rates of episiotomy (35% of vaginal births) and third or fourth degree perineal tears (3.3% of vaginal births) are the highest ever reported at NWH.

2. The primary PPH rates at both ≥500mls and ≥1000mls appear to have increased in 2017. The rate of PPH ≥1000mls was 11.0% in 2017. The postpartum transfusion rate in 2017 was 3.1%.

3. Admissions of term infants to NICU increased from 2006 to 2011 but have been stable since that time. The rate of admission to NICU of term infants in 2017 was 5.8%.

### Chapter 8: Postnatal Care

1. In 2017, the exclusive breastfeeding rate on discharge from hospital following birth was 73.8%, below the NZ Breastfeeding Authority (NZBFA) target of 75%. The exclusive breastfeeding rate rose to over 75% for the second half of 2017.

2. The rate of exclusive and fully breastfeeding, combined, at discharge from National Women's Homecare (at approximately 6 weeks) among women receiving postnatal care from the NWH service was 60%.

3. There has been a reduction in the number of women who have gone directly to Birthcare from Labour and Birthing Suite.

### 1.3.2 Chapter 9: Newborn Services

1. There were 832 admissions to the Neonatal Intensive Care Unit (NICU) in the 2017 calendar year. The average occupancy was 85% (34 babies/day).

2. The rise in term infant admissions to NICU seen from 2008 until 2011 has plateaued over the last 5 years. The two most common reasons for admission at term are respiratory distress and congenital abnormality.

3. The number of babies admitted to NICU with hypoglycaemia as the main reason for admission has continued to fall over the years, with only 3.3% of term admissions being secondary to hypoglycaemia in 2017 compared to 11% in 2015 and 7.5% in 2016.

4. In 2017, 92% of NWH babies admitted to NICU at <32 weeks gestation received some antenatal corticosteroids before birth and 61% received a course starting between 24 hours and seven days before birth.

5. Two inborn babies developed significant stage 3 hypoxic ischaemic encephalopathy (HIE) in 2017, giving an incidence of 0.32/1000 term births (2/6342). The incidence was 0.76/1000 term births for the period 2006-2017, which is significantly lower than the national incidence for 2010-2016 of 1.21/1000 term births (PMMRC 2018).

6. A total of six babies received therapeutic hypothermia, four of whom were outborn.

7. Since 2010, the number of babies receiving ventilation (IPPV and HFOV combined) has remained fairly stable but there has been an increase in the number of babies receiving CPAP and HiFlow, which has resulted in an overall rise in the number of babies receiving any respiratory support compared with a decade ago.

8. The use of humidified high flow air/oxygen (HiFlow) as a method of weaning off CPAP or sometimes as an alternative to CPAP has been well received by parents and staff, and is now becoming the primary method of respiratory support for some babies. There is a need to review this on an ongoing basis.

9. The rates of chronic lung disease in all babies born less than 32 weeks' gestation has shown a sustained increase since 2010.

10. In 2017, there were 15 deaths in NICU of inborn babies and three deaths of outborn babies.

11. Follow-up data were available for 99 (74%) of 133 children born in 2015 weighing less than 1500g. Four (4%) children were assessed as having severe disability (Category I), 6 (6%) moderate (Category II), and 89 (90%) normal development.

12. Follow-up data were available for 92 (69%) of 133 children born in 2013 weighing less than 1500g. Three (3%) children were assessed as having severe disability (Category I), 15 (16%) moderate (Category II), 5 (5%) mild (Category III), and 69 (75%) normal development.

13. Six children at four year follow-up, after birth in 2013 weighing less than 1500g, had been diagnosed with Autistic Spectrum Disorder, and a further two have been referred for assessment; at 6 (4.5%) the incidence appears to be slightly higher than the 1:100 incidence thought to occur in the wider New Zealand population.

### 1.3.3 Chapter 10: Perinatal and maternal mortality and maternal morbidity

1. The perinatal related mortality rate among women birthing at NWH in 2017 was 12.3/1000 births. Thirty-five percent of all perinatal related deaths occurred at NWH were to women who did not reside in ADHB area. The perinatal related mortality rate for women resident in the ADHB area and birthing at NWH in 2017 was 48/4571 (10.5/1000).

2. There were 71 women birthing at NWH admitted to the Department of Critical Care Medicine (DCCM) or the Cardiovascular Intensive Care Unit (CVICU) in 2017 compared to 22-26 in the three previous years due to difficulties staffing the maternity High Dependency Unit on level 9.

### 1.3.4 GYNAECOLOGY

#### Colposcopy

1. All c-QuIP standards were achieved except for ≥95% of women with high grade cytology have a histological biopsy, but this improved from 88.6% in 2016 to 93.6% in 2017.

2. Significantly fewer initial colposcopies and cervical treatments were undertaken in 2017. This may be an impact of HPV vaccination. It will be important to ensure that colposcopists continue to maintain their diagnostic and therapeutic skills as the incidence of cervical dysplasia reduces.

3. An audit of compliance with referral to MDM of women with a high grade referral smear who did not have high grade histology found compliance of 70% against a standard of 100%. All cases were reviewed and no patient was discharged with high

grade cytology. All cases were managed appropriately but clinicians were reminded of the pathway to MDM review.

### Gynaecologic oncology surgical services

1. Performance against the Faster Cancer Treatment target of 90% compliance with 62 days from referral to definitive treatment improved from 73% to 83% from 2016 to 2017. Diagnostic delays are often responsible for breaches. This knowledge led to development of a Rapid Access Clinic within general gynaecology.

2. Numbers of cancer surgeries performed per year has increased each year from 2014 to 2017 with increasing surgical FTE. However, time to surgery is still falling short of NZGCG recommendations. During this time the proportion of malignant surgeries (80%) has remained the same.

3. Infection is the most common cause of return to theatre and of readmission among cancer surgeries and it is hoped that the increasing use of minimally invasive surgery with reduce the risk.

4. Increase in the radicality of ovarian cancer surgery does not seem to have led to increased complications, as rates are stable despite a more aggressive surgical policy. Debulking rates are compatible with other units.

### Termination of pregnancy

1. The general abortion rate (the number of abortions per 1,000 of the mean estimated population of women aged 15-44 years) in New Zealand has declined from 21.1 to 13.5 in the last decade.

2. Māori and Pacific women are over-represented among women having a first trimester termination compared to European women although the proportion of terminations for Indian and Asian women continues to increase steadily every year.

3. There was an increase in the proportion of medical first trimester terminations in 2017 from 8% in 2016 to almost 10% but this is low compared to rates as high as 65% in community clinics in the UK. Rates of medical termination are lower among Māori and Pacific women and women under 25 years of age.

4. The Abortion Supervisory Committee is calling on healthcare providers in Auckland to consider setting up a local first trimester service in South Auckland.

### General Gynaecology

1. There were 161 hysterectomies performed by the general gynaecology team in 2017, with increasing numbers of hysterectomies performed by the laparoscopic approach and fewer by vaginal and abdominal approaches.

2. The number of hysterectomies is low for the population we serve. A review may be necessary to determine if more women should be offered a hysterectomy rather than non-invasive therapy in those situations where there is a higher likelihood of failure.

3. Fewer urogynaecology procedures are undertaken as inpatients at ACH in recent years with increased numbers of cases performed at the Greenlane surgical unit, where it is possible now to offer an overnight stay.

4. Prolapse repair, with mesh placed abdominally, is still provided for those patients where other methods of prolapse repair have failed. Eight women had mesh augmented repair in the 2017 year. There have been no vaginally placed meshes used since 2014. In 2017, 11 operations for mesh complications were completed, ranging from complete excision of vaginal mesh to release of mid-urethral slings.

### Faster cancer treatment (FCT)

1. Two initiatives have been set up at ACH to address capacity issues to meet FCT targets: a High Suspicion of Cancer (HiSCan) patient pathway, and a Rapid Access Clinic (RAC). The RAC offers FSA within 7-14 days of referral and a range of outpatient diagnostic procedures.

2. Almost 11% of HiSCan referrals from January to June 2017 were diagnosed with gynaecological malignancy. FCT performance (unadjusted for clinical or patient issues) against the 62 day referral to treatment target was 58%. In the second 6 months of 2017 the malignancy rate of HiSCan referrals was 9% and adjusted FCT performance against the target was 100%.

## 1.4 Data tables: Summary statistics

| Table 1: Mother and baby numbers: NWH 2017 | |
|---|---|
| Total number of mothers birthing at National Women's | 6809 |
| Mothers birthing before arrival (BBA) | 37 |
| **Total number of mothers** | **6846** |
| Total number of babies born at National Women's | 6937 |
| Babies born before arrival (BBA) | 37 |
| **Total number of babies** | **6974** |

BBA = Baby born before arrival and is defined as those babies who were born at home or en route to hospital where the intention was to be born in a hospital.

| Table 2: Contribution of multiple births to mother and baby numbers: NWH 2017 | | | |
|---|---|---|---|
| | | **Mothers** | **Babies** |
| National Women's births | Singletons | 6682 | 6682 |
| | Twins | 126 | 252 |
| | Triplets | 1 | 3 |
| BBA | Singletons | 37 | 37 |
| | Twins | 0 | 0 |
| | Triplets | 0 | 0 |
| **Totals (including BBA)** | | **6846** | **6974** |

| Table 3: Mode of onset of birth NWH 2017 | | |
|---|---|---|
| | **Birthing Mothers N=6846** | |
| | **n** | **%** |
| **Spontaneous onset of labour** | 2924 | 42.7 |
| **Iatrogenic onset of birth** | 3922 | 57.3 |
| CS Elective | 1332 | 19.5 |
| Emergency CS before onset of labour | 278 | 4.1 |
| Induction of labour | 2312 | 33.8 |

| Table 4: Mode of birth by parity NWH 2017 | | | | | | |
|---|---|---|---|---|---|---|
| | **Birthing Mothers N=6846** | | **Nullipara N=3343** | | **Multipara N=3503** | |
| | **n** | **%** | **n** | **%** | **n** | **%** |
| **Spontaneous Vertex Birth** | 3123 | 45.6 | 1131 | 33.8 | 1992 | 56.9 |
| **Vaginal Breech Birth** | 35 | 0.5 | 19 | 0.6 | 16 | 0.5 |
| **Operative Vaginal Birth** | 979 | 14.3 | 769 | 23.0 | 210 | 6.0 |
| Forceps | 327 | 4.8 | 260 | 7.8 | 67 | 1.9 |
| Ventouse | 652 | 9.5 | 509 | 15.2 | 143 | 4.1 |
| **Caesarean Section** | 2709 | 39.6 | 1424 | 42.6 | 1285 | 36.7 |
| CS Elective | 1332 | 19.5 | 403 | 12.1 | 929 | 26.5 |
| CS Emergency | 1377 | 20.1 | 1021 | 30.5 | 356 | 10.2 |

**Table 5: Neonatal outcomes among babies born at NWH in 2017**

| | Babies born N=6974 | |
|---|---|---|
| | n | % |
| **Gender** | | |
| Male | 3591 | 51.5 |
| Female | 3383 | 48.5 |
| **Preterm birth** | | |
| 20-27 weeks | 93 | 1.3 |
| 28-31 weeks | 74 | 1.1 |
| 32-36 weeks | 465 | 6.7 |
| **Term birth** | | |
| 37-41 weeks | 6295 | 90.3 |
| ≥42 weeks | 47 | 0.7 |
| | **SGA (by Customised Centile)** | |
| Preterm | 204 | 2.9 |
| Term | 813 | 11.7 |
| | **Live births N= 6885** | |
| | n | % |
| **Apgar at 5 min <7** | | |
| Preterm | 76 | 1.1 |
| Term | 85 | 1.2 |
| **Admission to NICU** | | |
| Preterm | 358 | 5.2 |
| Term | 367 | 5.3 |
| | **Live births excluding admissions to NICU N=6179** | |
| | n | % |
| **Infant Feeding at discharge from NW facility** | | |
| Exclusive breastfeeding | 4559 | 73.8 |
| Fully breastfeeding | 248 | 4.0 |
| Partial breastfeeding | 1234 | 20.0 |
| Artificial feeding | 138 | 2.2 |

**Table 6: Perinatal related mortality NWH 2017**

| | Babies N | n | Rate |
|---|---|---|---|
| **Fetal deaths** | 6974 | 52 | 7.5/1000 births |
| **Early neonatal deaths** | 6922 | 26 | 3.8/1000 live births |
| **Late neonatal deaths** | 6922 | 8 | 1.2/1000 live births |
| **Neonatal death** | 6922 | 34 | 4.9/1000 live births |
| **Perinatal deaths (fetal & early neonatal)** | 6974 | 78 | 11.2/1000 births |
| **Perinatal related deaths (fetal & all neonatal)** | 6974 | 86 | 12.3/1000 births |

**Table 7: Maternal postpartum outcomes NWH 2017**

| | Birthing mothers | n | % |
|---|---|---|---|
| **PPH ≥1000mls** | 6846 | 750 | 11.0 |
| Spontaneous Vaginal Birth | 3158 | 271 | 8.6 |
| Instrumental vaginal birth | 979 | 138 | 14.1 |
| Caesarean section | 2709 | 341 | 12.6 |
| **Episiotomy among vaginal births** | 4137 | 1458 | 35.2 |
| **Third / fourth degree tears among vaginal births** | 4137 | 137 | 3.3 |
| **Postpartum blood transfusions** | 6846 | 211 | 3.1 |

**Table 8: Numbers of mothers and babies 2007-2017**

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mothers** | 7695 | 7589 | 7735 | 7709 | 7523 | 7695 | 7223 | 7400 | 6933 | 7241 | 6846 |
| **Babies** | 7875 | 7753 | 7897 | 7866 | 7690 | 7863 | 7377 | 7551 | 7074 | 7368 | 6974 |

**Table 9: Mode of birth NWH 1998-2017**

| Year | Total births | Spontaneous vertex birth | | Vaginal breech | | Operative vaginal | | Caesarean section | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **1998** | **7492** | 4645 | 62.0 | 75 | 1.0 | 922 | 12.3 | 1850 | 24.7 |
| **1999** | **7501** | 4635 | 61.8 | 83 | 1.1 | 945 | 12.6 | 1838 | 24.5 |
| **2000** | **7827** | 4650 | 59.4 | 87 | 1.1 | 1010 | 12.9 | 2080 | 26.6 |
| **2002** | **7775** | 4327 | 55.7 | 66 | 0.8 | 1081 | 13.9 | 2301 | 29.6 |
| **2003** | **7611** | 4269 | 56.1 | 58 | 0.8 | 1065 | 14.0 | 2219 | 29.1 |
| **2004** | **7491** | 4073 | 54.4 | 54 | 0.7 | 1171 | 15.6 | 2193 | 29.3 |
| **2005** | **7194** | 3845 | 53.4 | 54 | 0.7 | 1022 | 14.2 | 2273 | 31.6 |
| **2006** | **7212** | 3815 | 52.9 | 51 | 0.7 | 956 | 13.3 | 2390 | 33.1 |
| **2007** | **7695** | 4212 | 54.7 | 70 | 0.9 | 975 | 12.6 | 1428 | 31.7 |
| **2008** | **7589** | 4218 | 55.5 | 62 | 0.8 | 937 | 12.3 | 2372 | 31.3 |
| **2009** | **7735** | 4313 | 55.8 | 61 | 0.8 | 947 | 12.3 | 2414 | 31.2 |
| **2010** | **7709** | 4217 | 54.7 | 59 | 0.8 | 942 | 12.2 | 2491 | 32.3 |
| **2011** | **7523** | 4183 | 55.6 | 60 | 0.8 | 832 | 11.1 | 2448 | 32.5 |
| **2012** | **7695** | 4173 | 54.2 | 45 | 0.6 | 907 | 11.8 | 2570 | 33.4 |
| **2013** | **7223** | 3828 | 53.0 | 56 | 0.8 | 833 | 11.5 | 2506 | 34.7 |
| **2014** | **7400** | 3928 | 53.1 | 64 | 0.9 | 849 | 11.5 | 2559 | 34.6 |
| **2015** | **6933** | 3556 | 51.3 | 38 | 0.5 | 871 | 12.6 | 2468 | 35.6 |
| **2016** | **7241** | 3658 | 50.5 | 50 | 0.7 | 925 | 12.8 | 2608 | 36.0 |
| **2017** | **6846** | 3123 | 45.6 | 35 | 0.5 | 979 | 14.3 | 2709 | 39.6 |

**Table 10: Term births by gestation NWH 2007-2017**

| Gestation | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **37 wks** | 628 | 648 | 638 | 630 | 626 | 616 | 608 | 643 | 591 | 675 | 605 |
| **38 wks** | 1405 | 1488 | 1565 | 1546 | 1539 | 1536 | 1550 | 1595 | 1501 | 1677 | 1527 |
| **39 wks** | 1847 | 1802 | 1965 | 1983 | 2078 | 2172 | 2055 | 2078 | 1989 | 2109 | 2103 |
| **40 wks** | 1841 | 1827 | 1813 | 1810 | 1664 | 1744 | 1575 | 1585 | 1540 | 1489 | 1459 |
| **41 wks** | 1083 | 943 | 992 | 977 | 864 | 877 | 754 | 818 | 702 | 690 | 601 |
| **≥42 wks** | 167 | 182 | 150 | 133 | 132 | 98 | 61 | 73 | 60 | 48 | 47 |

# CHAPTER 2

# OUR SERVICES

## 2.1 Women's Health Vision and Strategic Goals

Our vision is ***Excellent Women's Health through Empowerment and Partnership***.

The critical elements to achieving our vision are outlined in the "**Excellence in Women's Health**" strategic document:

- Ensuring that our models of care are based on best available evidence and reflect the social, mental, spiritual, cultural and physical needs of women.
- Where care may be best delivered in settings outside National Women's Health we will ensure care pathways are structured to support optimal communication between us and the various healthcare providers.
- Where separating out primary, secondary and tertiary/quaternary level services has the potential to improve care we will seek to do this.
- Wherever possible we will support primary care in the community to deliver care to the top of practitioners' scope within safe limits. This includes directing patients to appropriate providers and/or settings and providing clear evidence based guidelines around safe models of care.
- Working with the Ministry of Health and other DHBs to ensure funding for tertiary and quaternary care is appropriate and supports optimal care pathways.
- All women accessing our maternity services will be supported to birth well. This includes ensuring that low risk women are given the opportunity to birth in a midwifery led unit.
- Ensuring that we have fully functioning and embedded clinical governance across the service with representation that includes consumer, cultural and private practitioner perspectives. Within clinical governance structures we will embed a culture of responsibility so that clinicians are fully engaged and take individual and collective ownership of the quality of care provided.
- Critically evaluating the care we provide both at the individual and the team level in order to achieve outcomes that benchmark well against internal and external quality maternity and gynaecological standards and reduce variation in practice and outcomes. Addressing over and under delivery of care to ensure that we optimize outcomes and reduce harm.
- Delivering care sensitively and in a culturally appropriate manner, recognizing the importance of Whānau Ora, so that it meets the needs of women and their families.
- Having an engaged and productive workforce who work together to achieve a shared vision. We need to develop career paths that are attractive and build commitment. We believe that our links with the University of Auckland and the Auckland University of Technology along with our focus on research are strengths we can further develop to attract and fully engage high quality clinicians.
- Empowering our staff by creating a positive culture and supportive working environment. This will be built on our shared values and documented individual goals and accountabilities for all staff. Accountabilities will be supported through meaningful performance and professional development processes. We also need to plan for the future by embedding succession planning practices.
- Ensuring that time and resources are appropriately allocated to support the growth and development of our workforce. Clinicians within the service will value lifelong learning and openly share their skills and knowledge with their students and peers. We support and encourage clinical and systems innovation in the context of research or a quality improvement cycle.
- We believe we can achieve financial stability by working together to look at the way we deliver care. This will be achieved through ensuring we develop sustainable models of care from primary, through secondary and tertiary care. Improving our production planning and managing our elective volumes to ensure that access to elective surgical procedures is equitable for our population.

## 2.2 Women's Health Leadership and Structure

In 2017 our Women's Health Service was grouped into 5 groups led by Service Clinical Directors:

- Judy Cottrell, Service Clinical Director, Primary Maternity Services
- Dr Jenny McDougall, Service Clinical Director, Secondary Maternity (& Acute) Services
- Dr Claire McLintock, Service Clinical Director, Regional Maternity Services
- Dr Cindy Farquhar, Service Clinical Director, Secondary Gynaecological (& Elective) Services
- Dr Lois Eva, Service Clinical Director, Regional Gynae-oncology Services.

This leadership structure aligns with our overall governance and clinical governance structure across the directorate.

## 2.3 Service Provision

### 2.3.1 Maternity services

National Women's provides national and regional services, as well as primary, secondary and tertiary maternity services to women who reside in the ADHB region and to women who reside outside the region who have been referred to the High Risk service.

#### National Services

##### Maternal

- Management of major maternal cardiac disease – pregnant women who are likely to require bypass or valve surgery during pregnancy, or who require cardiac monitoring in labour. NWH also cares for women with cardiac disease who reside in the Pacific Islands.
- Management of women with major liver disease in pregnancy

##### Fetal/Neonatal

- In utero fetal blood transfusions. NWH has a relationship in place to obtain irradiated blood from the National Blood service.
- Management of fetal cardiac anomalies.
- Management of fetal abnormalities that will require admission to Starship Hospital following delivery.
- National service for fetoscopic selective laser photocoagulation of fetal vessels in twin to twin transfusion syndrome (TTTS).
- Fetal reduction including selective reduction in multiple pregnancy requiring cord occlusion or interstitial laser.
- Other complex fetal procedures including fetal shunting.
- Postnatal midwifery care of mothers whose babies are under the care of Starship Hospital

#### Regional Services

##### Maternal

- Care of those women living in the WDHB area with Type 1 or 2 diabetes, GDM with poor control, diabetes complications and/or co-morbidities. Pre-pregnancy counseling for high risk women.
- Care for pregnant women with HIV infection from CMDHB and WDHB. With the rollout of the "National HIV screening in pregnancy" programme, these caseloads have increased but absolute numbers remain small.

##### Fetal/Neonatal

- Diagnosis of major fetal abnormalities with management plan for ongoing care in local DHB. If this is not possible due to the severity of the abnormality, care remains with ADHB.

#### Wards and clinics in the maternity service

The following wards and clinics make up the maternity service:

##### Labour and Birthing Suite

- National Women's Labour and Birthing suite is a 16 bed unit including a 2 bed Complex Care Unit providing care for obstetric high risk cases.
- One to one midwifery care is provided for women in labour. Pain relief options include water, entonox, morphine, and epidural anaesthesia. NWH also provides facilities for women wanting a waterbirth.
- Care is provided to women by a multidisciplinary team of midwives, including midwives specialised in high risk obstetrics, obstetricians, anaesthetists, obstetric physicians, independent lead maternity carers (LMCs), hospital aides and ward clerks. To ensure midwives maintain their competency in intrapartum care provision, midwives are encouraged to rotate through the antenatal/postnatal wards to Labour and Birthing Suite and the community service.
- Labour and birth care is provided by Labour and Birthing Suite (Core) midwives to women whose Lead Maternity Carer is the Community Midwifery Clinic service or the High Risk Maternity and Diabetic Service, to women under the care of private obstetricians who do not have a self-employed midwife contracted to provide midwifery care, and to women transferred to National Women's secondary and tertiary services. Care is available to mothers under self-employed midwifery care when their midwife needs relief.
- The Labour and Birthing Suite midwives liaise closely with independent lead maternity carers.

##### High Dependency Unit (HDU)

- HDU is a 2 bed unit. It was open for 100 days and managed 139 admissions in 2017. CCU provides care for obstetric high risk cases when one to one midwifery care is clinically indicated. The majority of admissions are for PPH, pre-eclampsia, sepsis and women requiring cardiac monitoring. The midwifery and nursing staff in this unit work hard to maintain a strong focus on the woman's experience to ensure healthy mother and baby bonding and to encourage breastfeeding.

### Women's Assessment Unit (WAU)

- This service is open 24 hours a day, 7 days a week and provides acute care for women experiencing pregnancy and gynaecologic complications.
- Inductions of labour are booked through WAU and inductions performed in this unit. Women are transferred to Labour and Birthing Suite at the onset of labour.
- WAU provides a service for women from 20 weeks gestation requiring second trimester termination of pregnancy and for women who have suffered an intrauterine death.
- Day Assessment Unit (DAU) is a service provided from within WAU, providing appointment based care for women with complex pregnancies, managing 1500 or more referrals in 2017. DAU has 4 chairs for simultaneous care of up to 4 women. Most common referral reasons are hypertensive disorders, small for gestational age babies and post term assessment.
- An external cephalic version (ECV) clinic is provided at the DAU twice weekly.

### Antenatal and Postnatal Wards

- There are 59 antenatal and postnatal beds (with the ability to flex up to 64 beds) at National Women's for women and babies requiring secondary and tertiary care. All primary births, where the mother and baby are well, are transferred to Birthcare Auckland, who holds the contract to provide these services.

### High Risk Medical Service (including Diabetes Service)

- The High Risk Medical, Fetal Medicine and Diabetes services are provided from the Maternity Outpatients Department located on level 9 in the support building at Auckland City Hospital's (ACH) Grafton site. This facility is also used by Newborn Services, the Child Development Unit and the Anaesthetic Service.
- The High Risk Medical and Diabetes services provide antenatal and postnatal visits in the clinic at ACH and postnatal midwifery community visits to patients at home and at Starship Hospital. Two ADHB pool cars are available to assist this service.

### Community Services

- Community clinics are held at Green Lane Clinical Centre, along with antenatal clinics in 9 General Practice facilities in the ADHB catchment area.
- Community midwifery clinics and postnatal home visits provide continuity of midwifery care during the antenatal and postnatal period with labour and birth midwifery services provided by core midwives in Labour and Birthing Suite.
- Clinics staffed by ADHB obstetricians are held four times a week at Greenlane Clinical Centre seeing women under community midwifery care and reviewing secondary referrals from private LMCs.
- Clinics staffed by obstetric physicians are held two times per week.
- The midwifery-led Walk in Centre which acts as a first point of contact for women via email, phone or person was temporarily restricted by staff shortages in 2017 resulting in an inability to accept women for face to face consultations. This centre is responsible for the triage of referrals for women needing a LMC or a secondary consultation. Referrals come from both ADHB and community referrers such as GPs and self-employed midwives.
- Virtual appointments with an obstetrician are completed for women who are postdates with a low risk pregnancy or where a face to face consultation is not required.
- The Whānau Ora multidisciplinary team provides a midwifery-led fortnightly forum for midwives, maternal mental health staff, and Women's Health social workers to plan and coordinate clinical and social care for women with high social acuity. These women are more likely to need the services of statutory child protection services, adding a further layer of complexity. The increased coordination of service has resulted in outcomes such as fewer traumatic uplifts of newborn babies from the hospital; increasing numbers of babies remaining in their parents' care with intensive social service support in place at the time of birth; increasing numbers of babies being placed in kin care without the disruption to attachment inherent in protracted foster placements and reduced interdisciplinary and interagency conflict.
- The PBAC (Positive Birth after Caesarean) clinic was started in February 2011 to promote informed decision making and patient satisfaction. Women are encouraged to attend this obstetric/midwifery clinic 4-6 weeks after a Caesarean section, pre-pregnancy, or in the first half of their next pregnancy to discuss the options for their next birth. Women can be referred by their LMC, via the maternity Walk-in Centre at NWH or can refer themselves. Most women attend the clinic twice during their pregnancy and obtain the remainder of their care from their usual LMC. The service has produced a short film clip on VBAC, and this can be accessed online at:

http://nationalwomenshealth.adhb.govt.nz/services/maternity/pregnancy-advice/vaginal-birth-after-Caesarean

### 2.3.2 Gynaecology service

The gynaecology department is represented by the following services:

#### Secondary Gynaecology

The general gynaecology service provides care to women residing within the ADHB catchment of Central Auckland (population - approximately 500,000). The service is comprised of:

- Ward 97 (inpatient ward) at Auckland City Hospital (ACH).
- Women's Assessment Unit (WAU) at ACH for acute gynaecology.
- Outpatient clinics at Greenlane Clinical Centre.

#### Gynaecologic Oncology

- NWH has the largest Gynaecological Oncology Cancer Centre in New Zealand. The NWH Gynae-oncology service offers comprehensive cancer care for women with gynaecological malignancies, and hosts the weekly supra regional Multi-Disciplinary Meeting with videoconferencing links to the eight referring DHBs.

#### The Female Multidisciplinary Clinic (FMC)

This clinic is for women with multifaceted endocrine and anatomical conditions. A multidisciplinary team including a reproductive endocrinologist, gynaecologist, psychologist and gynaecology physiotherapist work together to provide collective complex treatment plans for girls and women with complicated hormonal and gynaecologic concerns.

#### Regional Gynaecology Day Service

- The First trimester termination of pregnancy service is an Auckland regional service offered at Epsom Day Unit, Greenlane Clinical Centre.
- The Second trimester termination of pregnancy service is undertaken at ward 97 or Women's Assessment Unit at Auckland City Hospital.

### Wards and Clinics in the Gynaecology Service

#### Inpatient Services – Ward 97, Auckland City Hospital

- Ward 97 is a 22 bed ward providing care for women with acute gynaecology problems, gynaecologic oncology and women requiring breast surgery. Ward 97 also provides care to women with other medical conditions or complications resulting from early pregnancy, fertility treatment or termination of pregnancy.
- Radiology assisted procedures, such as fibroid embolisation, management of AV malformation and image guided biopsy are part of the Gynaecology caseload.

  In preparation for a major surgery women can be admitted to Ward 97 for administration of preoperative iron or blood transfusion.
- Gynaecology has access to the Level 8 High Dependency Unit (HDU) and the Critical Care Unit for those women that require a more intensive level of care and monitoring.
- Quality improvement projects such as Releasing Time to Care and Enhanced Recovery After Surgery (ERAS) have contributed to the high standard of care to patients and improved recovery time.

#### Outpatient clinics

The gynaecologic outpatient clinics are held at the Greenlane Clinical Centre and include:

- General gynaecology (i.e. menstrual disorders, pelvic floor dysfunction, sterilisation)
- Hormone replacement therapy and family planning
- Endometriosis and pelvic pain
- Uro-gynaecology
- Colposcopy
- Gynaecologic Oncology
- Vulval Clinic
- Pre admissions clinic
- Abnormal uterine bleeding clinic, offering outpatient hysteroscopy
- Early Pregnancy Assessment Unit (EPAU)
- Abnormal uterine bleeding clinic
- Rapid access clinic
- Female multidisciplinary clinic

#### Early Pregnancy Assessment Unit (EPAU)

EPAU is a nurse-led outpatient service, based at Greenlane Clinical Centre for women referred for the management of miscarriage and early pregnancy complications such as ectopic and molar pregnancy. Women requiring surgical management of miscarriage have their procedure at the Greenlane Surgical Unit also based at Greenlane Clinical Centre.

#### Fertility Plus

Fertility Plus offers a range of secondary and tertiary reproductive endocrinology, infertility and sub-fertility services to the women of the Northern Region. Fertility Plus is one of three public providers

in the Auckland region. Private investigation and treatment is also available. Fertility Plus is accredited by the Reproductive Technologies Accreditation Committee (RTAC).

Publicly funded fertility treatment is available to women under 40 years of age, who are non-smokers and have a BMI under 32. If couples do not meet the criteria for publicly funded fertility treatment, private treatment is available.

#### Women's Assessment Unit (WAU)

WAU is located on Level 9, Auckland City Hospital. It is open 24 hours a day, 7 days a week and cares for acute admissions for gynaecology and obstetrics.

### 2.3.3 Newborn Service

The Newborn Service located on the 9th Floor of Auckland City Hospital (ACH) provides neonatal healthcare for premature and sick newborns and their families/whānau.

#### National,Regional and District Services

The Newborn Service is contracted to provide:

- Level 3 neonatal intensive care to Northland, Central Auckland and West and North Auckland areas – 18 cots (tertiary service).
- Level 2 neonatal high dependency care to Central Auckland area – 30 cots (secondary service). Babies admitted to ADHB Newborn Service and who are domiciled in the Waitemata DHB catchment area will be transferred back to North Shore Hospital or Waitakere Hospital to complete the Level 2 component of their care closer to home. Babies domiciled in Northland area will also be transferred back to Whangarei Hospital when stable to complete their level 2 neonatal care closer to home.
- A regional service for babies requiring laser treatment for retinopathy of prematurity from Northland, Central Auckland and West and North Auckland areas (tertiary service).
- A national service for babies diagnosed antenatally with congenital cardiac lesions which would require input in the newborn period from Paediatric Cardiology services (quaternary service).

The Newborn Service also provides intensive care to babies from other New Zealand DHBs, particularly if their units are at capacity. Inter-regional transfers may also occur for cardiology and surgical services or for complex metabolic diseases and where there is a need for access to subspecialty services.

#### The Newborn Services support services include:

- Neonatal Homecare Service
- Child Development Unit
- Newborn Outpatient Follow-up Service
- Specialist Lactation Service
- Neonatal Emergency Transport Service

There is a close relationship with tertiary services at Starship Hospital, with approximately 10% of neonates being transferred from the NICU to Starship Hospital each year for ongoing medical care (general paediatrics, respiratory paediatrics, paediatric metabolic and neurology services) and surgical care (paediatric cardiac, general surgery and gastroenterology services).

#### University Links

There are close research links with the University of Auckland School of Medicine, particularly the Department of Paediatrics and Child Health, and the Liggins Institute. Senior medical staff, University medical staff and the neonatal fellows are involved in clinical research and audit.

There continues to be an arrangement between the Newborn Service and Auckland University of Technology for the Neonatal Nursing Programme. These courses attract students locally and nationally.

### 2.3.4 Women's Health Workforce

Women's Health Directorate workforce is made up of a large number of diverse professional roles which provide care to both gynaecology and maternity patients. In addition to the NWH employed workforce, self-employed LMCs (both midwives and obstetricians) provide care for a significant proportion of our maternity population.

#### 2.3.4.1 Maternity services

#### Self-employed Lead Maternity Carer services

The provision of maternity care in New Zealand is funded by the Ministry of Health, which sets policy, through 20 District Health Boards (DHBs). In 1996 significant changes to the way that maternity care was funded, and therefore provided, were outlined in Section 88 of the Public Health and Disability Act. The Section 88 notice requires all women to have a Lead Maternity Carer (LMC), who is chosen by the woman and has responsibility for ensuring provision of maternity services throughout her pregnancy and postpartum period. Maternity services, apart from the services provided by a private obstetrician, are free.
LMCs are required to obtain access agreements with any maternity facility where they intend to provide care. To ensure the woman receives continuity of care all LMCs are required to have back up arrangements with another self-employed

practitioner who the woman has met. A range of LMC models of care are available in New Zealand. At National Women's the following models are available:

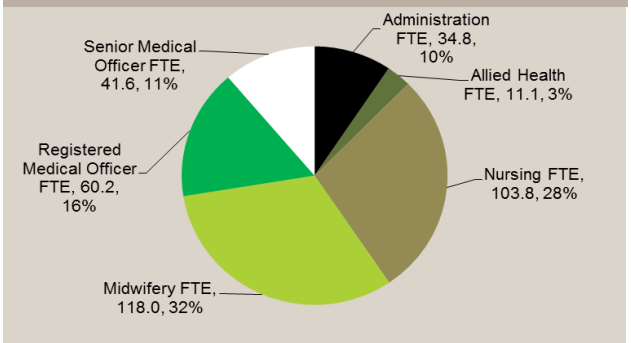
- Self-employed midwife. These midwives generally provide continuity of care in the antenatal, intrapartum and postnatal period. Antenatal visits are usually provided through a midwifery clinic in the community and postnatal visits are provided in the woman's home. If the woman's pregnancy and or labour become complicated then the midwife and woman can refer to a private obstetrician or NW secondary services to provide care.
- General Practitioner (GP). Antenatal care is based in the GP's rooms. Midwifery care intrapartum and in the postnatal period for women who choose a GP LMC is provided by either a hospital midwife or a self-employed midwife. If the woman's pregnancy and or labour become complicated then the GP and woman can refer to a private obstetrician or NW secondary services to provide care. There is now only one GP providing LMC care at NW.
- Private Obstetrician. Private obstetricians provide antenatal care in their rooms. Midwifery care when the woman goes into labour and postnatal care can be provided by either the hospital or a self-employed midwife.

As shown in the report LMCs provide primary care for approximately 75% of total births at NWH. Currently 130 Independent Midwives and 30 Private Obstetricians hold access agreements with the service.

### 2.3.4.2 Employed workforce

National Women's employed 454 staff in 2017 as midwives, nurses, specialist medical officers (SMOs), junior doctors (RMOs), administrative, allied health professionals including technical staff.

**Figure 1: Women's Health staff full time equivalents (FTE) by occupational group 2017**




As shown in **Figure 1**, the largest workforce in NWH sits within midwifery and nursing roles, both in the inpatient and outpatient settings.

Within the NWH midwifery workforce we also provide primary maternity services to women not able to access care from a self-employed LMC. The teams of midwives provide antenatal and postnatal maternity care. Two groups provide care in this way:

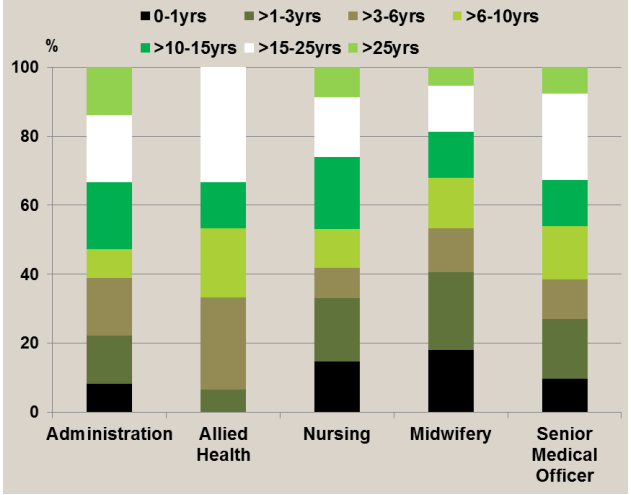
- NW Community Midwives. These midwives are employed by the hospital and provide continuity of antenatal and postnatal care to medically low risk, but often socially high risk, women.
- High Risk Medical and Diabetes Midwives. The High Risk service is a multidisciplinary team of midwifery, medical and obstetric practitioners who provide care for women who have diabetes or other medical conditions. If the woman is transferred to NWH care, she will have a named midwife from this service who is her LMC and who provides continuity of antenatal and postnatal care. Some women receive secondary care from NWH and retain their self-employed LMC.

Where NWH staff provide primary maternity services, labour care is provided by the hospital core midwives in Labour and Birthing Suite.

The majority of NWH employed staff work 0.8 FTE or more.

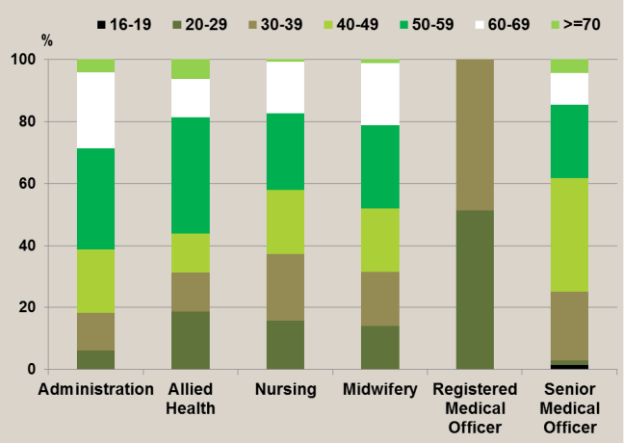
National Women's has a loyal and committed workforce. The average length of service across all of the occupational groups is 10 years. Within the workforce we have 41.3% of staff who have worked at National Women's for more than 10 years.

**Figure 2: Length of tenure by NWH occupational group among permanent staff 2017**



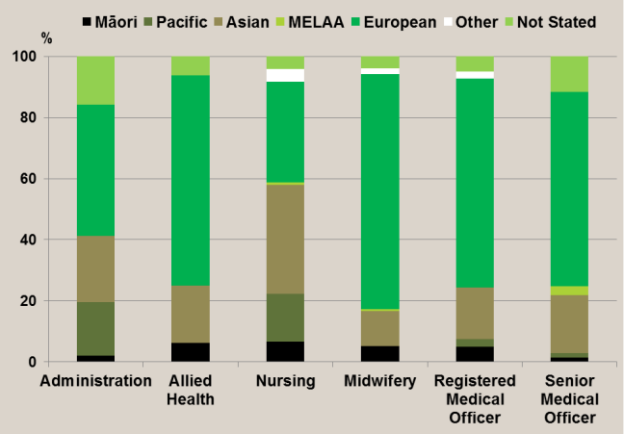

NWH has a mature workforce with almost half of the SMO, midwifery and nursing workforce over the age of 50. The majority of our staff identify as European. It is noted that there are a small percentage of Māori, Pacific, MELAA and Asian staff and it is recognized that in order to provide more culturally responsive care, strategies need to be developed to attract staff from a diversity of cultures to the service.

**Figure 3: Age of staff by occupational group 2017**



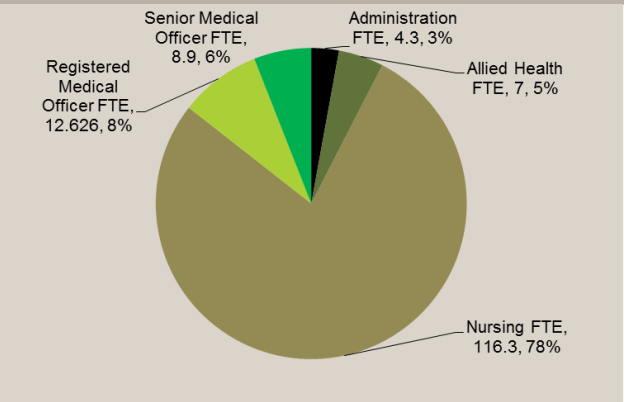

We wish to acknowledge the crucial role both our DHB workforce and LMC workforce have played in ensuring that we deliver a high standard of care to our wahine/women and their families. It is our goal to further invest in our workforce to enable us to continue to improve our outcomes of care.

**Figure 4: Ethnicity of NWH staff by occupational group 2017**




### 2.3.5 Neonatal Intensive Care Unit (NICU) Workforce

**Figure 5: NICU full time equivalents (FTE) by occupational group 2017**

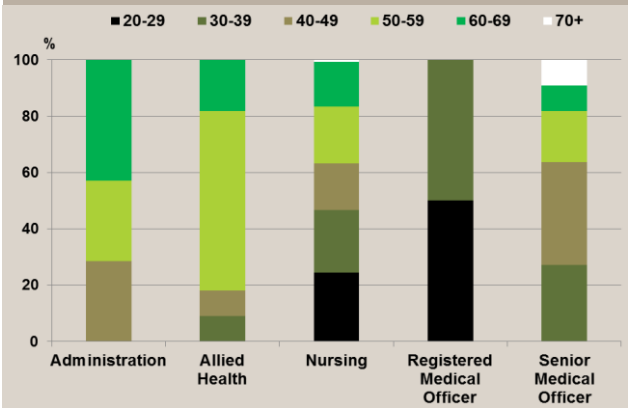



The neonatal workforce operationally belongs to the Child Health Directorate. However, from a care delivery perspective the neonatal services form a critical part of our bundle of care delivery groups. We regard the neonatal service as functionally part of the spectrum of Women's Health Services.

The NICU workforce is 149 FTE provided by 178 staff. As shown in the figures below, the majority of staff are nursing staff. Seventy eight percent of the staff work 0.7 FTE or more and 39% are aged 50 or more. Thirty seven percent of staff have worked 10 years or more in the NICU.

Overall the neonatal clinical workforce is younger than the maternity and gynecological workforce.

**Figure 6: Age of NICU staff by occupational group 2017**




## 2.4 Funding of Maternity Services

### 2.4.1 Independent LMC Maternity Services

Funding for Maternity services is complex and underwent significant changes in 2007. Funding for primary maternity care from self-employed midwives, general practitioners and private obstetricians comes directly from the Ministry of Health and is claimed via Section 88. It is module based, with first, second and third trimester, labour and birth, and postnatal modules, and is a fixed payment per woman per module.

### 2.4.2 DHB delivered services

DHB provided maternity care, gynaecological care and neonatal care, both outpatient and inpatient care, is funded by the DHB using vote health, population based funding models. Outpatient maternity clinics, whether based at Greenlane Clinical Centre or Auckland City Hospital, are funded through "purchase unit codes (PUC)", the value of which are determined nationally by the Ministry of Health. The payment associated with each PUC for an outpatient visit is dependent on the type of visit and who is providing the care e.g. midwife, obstetrician or physician. Midwifery home visits are also funded via PUCs. Inpatient care is funded on case mix based funding, which looks at the diagnostic related group (DRG) and adjusts for

complexity to calculate a Weighted Inlier Equivalent Separation (WIES). WIES has a standardised value, which is adjusted annually, and the WIES weight multiplied by the WIES value gives the funding associated with each unit of inpatient care.

### 2.4.3 Out of area funding

In New Zealand women can choose where they wish to birth their baby if it is a primary birth. The funding for the care provided by self-employed LMCs follows the women.

However, funding for care provided by the DHB remains associated with the DHB of residence. Agreements between DHBs determine how funding is transferred between DHBs for care provided to women and babies who receive care out of area.

### 2.4.4 Birthcare Auckland

Birthcare Auckland is a primary maternity unit providing birthing facilities for women who choose to birth there. It also holds a contract with ADHB to provide postnatal facilities to well women and babies born at NWH. This is funded under a contractual arrangement with ADHB Funding and Planning.

## 2.5 Data tables: NWH Staffing

**Table 11: Distribution of NWH and NICU staff by individual full time equivalents (FTE) 2017**

| FTE | Total NWH staff members N=454 | | Total NICU staff N=178 | |
|---|---|---|---|---|
| | n | % | n | % |
| 0-0.2 | 35 | 8 | 6 | 3 |
| 0.3-0.4 | 20 | 4 | 12 | 7 |
| 0.5-0.6 | 81 | 18 | 21 | 12 |
| 0.7-0.8 | 92 | 20 | 26 | 15 |
| 0.9-1.0 | 226 | 50 | 113 | 63 |

**Table 12: Number of NWH and NICU staff and total FTE by occupational group 2017**

| Occupational Group | NWH staff members | Total NWH FTE | NICU staff members | Total NICU FTE |
|---|---|---|---|---|
| | n | n | n | n |
| Administration | 51 | 34.8 | 7 | 4.3 |
| Allied Health* | 16 | 11.1 | 11 | 7 |
| Nursing | 121 | 103.8 | 139 | 116.3 |
| Midwifery | 156 | 118.0 | 0 | 0 |
| Registered medical officer | 41 | 60.2 | 10 | 12.6 |
| Senior medical officer | 69 | 41.6 | 11 | 8.9 |
| **Total*** | **454** | **369.6** | **178** | **149.1** |

*Includes Technical staff

**Table 13: Ethnicity of NWH staff by occupational group 2017**

| Occupational Group | Total Staff | Māori | | Pacific | | Asian | | MELAA | | European | | Other | | Not Stated | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Administration | 51 | 1 | 2.0 | 9 | 17.6 | 11 | 21.6 | 0 | | 22 | 43.1 | 0 | | 8 | 15.7 |
| Allied Health | 16 | 1 | 6.3 | 0 | | 3 | 18.8 | 0 | | 11 | 68.8 | 0 | | 1 | 6.3 |
| Nursing | 121 | 8 | 6.6 | 19 | 15.7 | 43 | 35.5 | 1 | 0.8 | 40 | 33.1 | 5 | 4.1 | 5 | 4.1 |
| Midwifery | 156 | 8 | 5.1 | 0 | | 18 | 11.5 | 1 | 0.6 | 120 | 76.9 | 3 | 1.9 | 6 | 3.8 |
| Registered medical Officer | 41 | 2 | 4.9 | 1 | 2.4 | 7 | 17.1 | 0 | | 28 | 68.3 | 1 | 2.4 | 2 | 4.9 |
| Senior medical Officer | 69 | 1 | 1.4 | 1 | 1.4 | 13 | 18.8 | 2 | 2.9 | 44 | 63.8 | 0 | | 8 | 11.6 |
| **Total** | **454** | **21** | **4.6** | **30** | **6.6** | **95** | **20.9** | **4** | **0.9** | **265** | **58.4** | **9** | **2.0** | **30** | **6.6** |

**Table 14: Length of tenure by NWH occupational group among permanent staff 2017**

| Occupational Group | Total Staff | 0-1 | | 2-3 | | 4-6 | | 7-10 | | 11-15 | | 16-25 | | >25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Administration | 36 | 3 | 8.3 | 5 | 13.9 | 6 | 16.7 | 3 | 8.3 | 7 | 19.4 | 7 | 19.4 | 5 | 13.9 |
| Allied Health | 15 | 0 | | 1 | 6.7 | 4 | 26.7 | 3 | 20.0 | 2 | 13.3 | 5 | 33.3 | 0 | |
| Nursing | 115 | 17 | 14.8 | 21 | 18.3 | 10 | 8.7 | 13 | 11.3 | 24 | 20.9 | 20 | 17.4 | 10 | 8.7 |
| Midwifery | 150 | 27 | 18.0 | 34 | 22.7 | 19 | 12.7 | 22 | 14.7 | 20 | 13.3 | 20 | 13.3 | 8 | 5.3 |
| Senior medical Officer | 52 | 5 | 9.6 | 9 | 17.3 | 6 | 11.5 | 8 | 15.4 | 7 | 13.5 | 13 | 25.0 | 4 | 7.7 |
| **Total** | **368** | **52** | **14.1** | **70** | **19.0** | **45** | **12.2** | **49** | **13.3** | **60** | **16.3** | **65** | **17.7** | **27** | **7.3** |

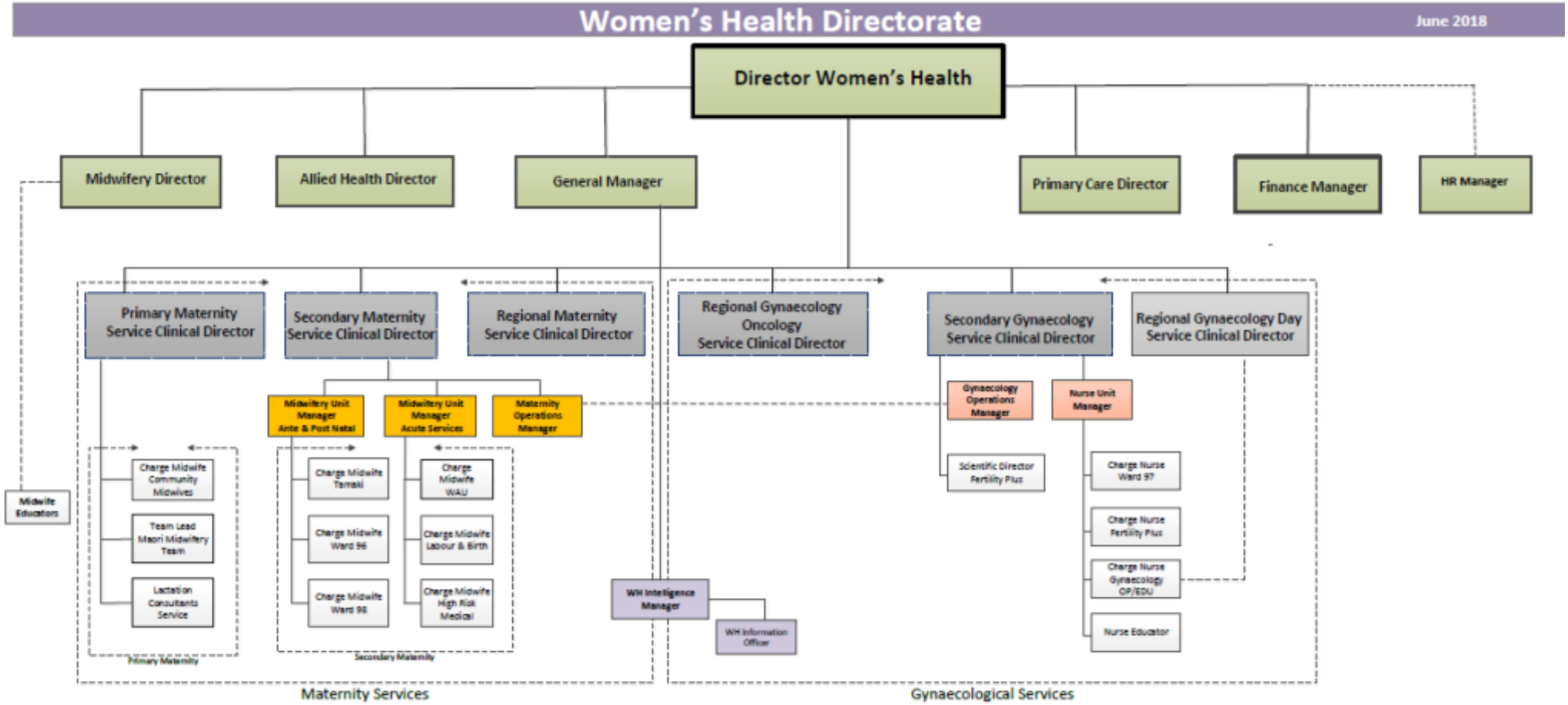
**Table 15: Length of tenure by NICU occupational group among permanent staff 2017**

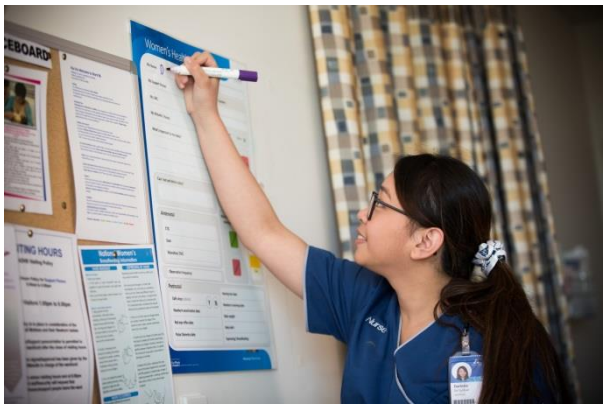
| Occupational Group | Total Staff | 0-1 | | 2-3 | | 4-6 | | 7-10 | | 11-15 | | 16-25 | | >25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Administration | 7 | 0 | | 3 | 42.9 | 1 | 14.3 | 1 | 14.3 | 1 | 14.3 | 1 | 14.3 | 0 | |
| Allied Health | 11 | 1 | 9.1 | 3 | 27.3 | 2 | 18.2 | 3 | 27.3 | 2 | 18.2 | 0 | | 0 | |
| Nursing | 135 | 18 | 13.3 | 23 | 17.0 | 20 | 14.8 | 16 | 11.9 | 17 | 12.6 | 24 | 17.8 | 17 | 12.6 |
| Senior medical Officer | 6 | 0 | | 1 | 16.7 | 1 | 16.7 | 1 | 16.7 | 2 | 33.3 | 0 | | 1 | 16.7 |
| **Total** | **159** | **19** | **11.9** | **30** | **18.9** | **24** | **15.1** | **21** | **13.2** | **22** | **13.8** | **25** | **15.7** | **18** | **11.3** |

**Table 16: Ethnicity of NICU staff by occupational group 2017**

| Occupational Group | Total Staff | Māori | | Pacific | | Asian | | MELAA | | European | | Other | | Not Stated | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Administration | 7 | 0 | | 0 | | 2 | 28.6 | 0 | | 5 | 71.4 | 0 | | 0 | |
| Allied Health | 11 | 0 | | 0 | | 2 | 18.2 | 2 | 18.2 | 6 | 54.5 | 0 | | 1 | 9.1 |
| Nursing | 139 | 4 | 2.9 | 2 | 1.4 | 31 | 22.3 | 0 | | 93 | 66.9 | 2 | 1.4 | 7 | 5.0 |
| Registered medical Officer | 10 | 1 | 10.0 | 0 | | 2 | 20.0 | 0 | | 7 | 70.0 | 0 | | 0 | |
| Senior medical Officer | 11 | 0 | | 1 | 9.1 | 0 | | 0 | | 9 | 81.8 | 1 | 9.1 | 0 | |
| **Total** | **178** | **5** | **2.8** | **3** | **1.7** | **37** | **20.8** | **2** | **1.1** | **120** | **67.4** | **3** | **1.7** | **8** | **4.5** |

Figure 7: NWH Clinical Leadership Structure






**National Women's**
Annual Clinical Report 2017

# CHAPTER 3

# QUALITY

## 3.1 Context

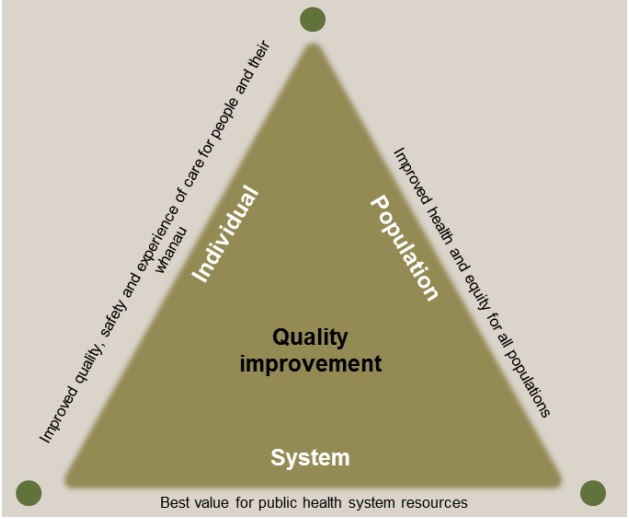
Women's Health has a well embedded quality improvement framework implemented across the service. The Quality Programme brings together clinical staff, consumers, and wider stakeholders to collaboratively monitor and improve the care provided to women. The programme builds on existing review systems, while at the same time driving a shift in maternity and gynaecological services through quality improvement. The programme aims to be:

1. Safe
2. Effective
3. Patient-centred
4. Timely
5. Efficient
6. Equitable

*IOM (2001) Crossing the Quality Chasm: A New Health System for the 21st Century.*

In 2017, Women's Health reignited its quality programme with a new quality programme lead and a focus of improved quality, safety, patient experience, health equity and value for health system resources.

**Figure 8: The Triple Aim of Quality Improvement (Health Quality and Safety Commission)**




**Vision:** Excellent Women's Health through Empowerment and Partnership

**Mission:** To deliver gold standard care based upon 8 principles;

- Women-centered and empowered care
- Evidence-based practice
- Education and training
- Partnership with other healthcare and social service providers
- Engaged staff
- Governance and Leadership
- Efficiency
- Innovation

**Goals**

- Deliver the best possible outcomes for women and their families
- Provide demonstrably safe care
- Continually improve the quality of care provided
- Value, support and hold the workforce to account
- Take care of resources and become sustainable

The Quality Programme in 2017 focused on:

- Coordinating and supporting Women's Health quality processes with specific responsibilities within the Maternity Quality and Safety Programme (MQSP)
- Implementing and maintaining a monitoring and audit process for the safety and quality of clinical care and to ensure relevant standards are met
- Collaborating with Consumer Liaison regarding patient experience and consumer feedback and reviewing processes, policies and guidelines related to consumer feedback
- Supporting staff to report risks appropriately, ensuring that identified actions are achieved and learning takes place
- Implementing a quality feedback loop to ensure recommendations and priority improvements are progressed within the service
- Work in the areas of the consumer voice, supporting staff to deliver best care, improving patient safety, increasing access to services and strengthening support for vulnerable women. There will be a new focus on aligning work streams and models of care.

### 3.1.1 Women's Health Directorate Priorities

Each year the Women's Health Service at ADHB sets clearly defined priorities for the year which align with the broader priorities of the DHB. In 2017 calendar year these were:

1. Demonstrably safer care (*After-hours Inpatient Safety*)

2. Enhanced outcomes for vulnerable populations *(Vulnerable women pathways, Markers of vulnerability)*

3. Strengthened leadership for both operational matters and clinical quality and safety (*Leadership development, Excellence programme, Consumer forum established*)

4. An engaged, empowered and productive workforce (Strengthen employee engagement, *efficient rostering of medical staff, maternity workforce plan developed and implemented*)

5. Develop pathways of care that are patient focused, and maximize value *(Pathways review for acute gynaecology patients, collaborative primary birthing project, Induction of labour pathway review, postnatal pathway redesign)*

6. Develop sustainable delivery models for all services *(Develop sustainability plan for genetics, Fertility Plus, Gynae Oncology)*

*Note: Italics show alignment to Provider Arm work programmes and/or productivity and savings priorities.*

These priorities together with key Ministry of Health targets and priorities and the New Zealand Maternity standards drive quality activities and improvement projects for the year.

### 3.1.2 The Maternity Quality and Safety Programme

The New Zealand Maternity Quality and Safety Programme (MQSP) is a national programme which establishes and builds upon both national and local maternity quality improvement activities. It seeks to ensure the highest possible safety and best possible outcomes for all new mothers and their babies. The programme takes a women-centred approach, acknowledging pregnancy and childbirth as normal life events.

The elements of the Maternity Quality and Safety Programme at ADHB are:

- Clinical governance and leadership
- Systems for sharing information
- Data monitoring
- Clinical networking
- Consumer engagement
- A commitment to continuous quality improvement as business as usual
- A culture of transparency through:
  - performance measuring / transparency
  - analysing and comparing
  - improving
  - sharing and learning.

Supporting the programme are:

- ADHB quality department and consumer liaison team
- Patient experience
- The Monitoring Triage and Follow-up Committee (MOTIF)
- The Rapid Multidisciplinary Review Panel (RAMP) and Gynaecological Rapid Multidisciplinary Panel (GRAMP) who review adverse clinical events in order to identify systems failures and inform quality improvement
- Women's Health Intelligence
- Women's Health Excellence groups
- Policy and guideline updates and reviews
- Education and training supported by Women's Health educators
- Consumer representatives

A number of the improvement projects and work streams detailed in this chapter have been driven and funded as MQSP initiatives.

#### Performance against New Zealand Maternity Clinical Indicators

The maternity clinical indicators are part of the Maternity Quality and Safety Programme. The Ministry of Health uses the national maternity dataset (MAT), which is compiled from LMC early pregnancy data and hospital discharge outcome data to produce indicator data for each DHB and facility and for New Zealand. In 2016, there were 20 indicators in the clinical indicator report as listed in **Table 17** (The full report is available on the **Ministry of Health website** or the **Women's Health intranet** under Quality and Audit).

**Table 17** includes the indicator rates for NWH compared to rates for all secondary and tertiary facilities. The indicators where NWH is significantly outside average national rates and which are cause for concern are shaded in the table.

National and NWH data for these indicators for 2009-2016 are included in the sections of the report to which they relate e.g. indicators 2-5 and 10 can be found in **Chapter 6** indicators 6-9 and 11-12 in **Chapter 7**.

### 3.1.3 Health Round Table

2017 saw Women's Health being involved in the Health Round Table (HRT). The HRT provides a Rapid Screening Tool, search for variation, focusses on there being no right or wrong and identifies exemplary services for learning, celebrating innovation and sharing. The HRT improvement group provides reporting, holds collaborative events where services design an action plan to guide improvement activities. Sue Fleming, the outgoing Director presented in November 2017 on Value Driven Outcomes in Health.

**Table 17: New Zealand Maternity Clinical Indicators 2016 (NWH and NZ Facility rates for all secondary and tertiary facilities)**

| Indicator | | NWH 2016 | NZ 2016 | Comment |
|---|---|---|---|---|
| 1 | Registration with a LMC in the first trimester of pregnancy | 74.5 | 72.3 | No concern |
| 2 | Standard primiparae who have a spontaneous vaginal birth | 54.4 | 61.0 | Concern |
| 3 | Standard primiparae who undergo an instrumental birth | 22.4 | 18.9 | Concern |
| 4 | Standard primiparae who undergo Caesarean section | 22.3 | 19.0 | Concern |
| 5 | Standard primiparae who undergo induction of labour | 10.2 | 7.3 | Concern |
| 6 | Standard primiparae with an intact lower genital tract (no 1st- to 4th-degree tear or episiotomy) | 8.7 | 20.5 | Concern |
| 7 | Standard primiparae undergoing episiotomy and no 3rd or 4th degree perineal tear | 39.7 | 27.4 | Concern |
| 8 | Standard primiparae sustaining a 3rd or 4th degree perineal tear and no episiotomy | 3.0 | 4.1 | No concern |
| 9 | Standard primiparae undergoing episiotomy and sustaining a 3rd or 4th degree tear | 3.1 | 2.3 | No concern |
| 10 | Women having a general anaesthetic for caesarean section | 6.2 | 8.5 | Excellent |
| 11 | Women requiring a blood transfusion with caesarean section | 2.3 | 2.9 | No concern |
| 12 | Women requiring a blood transfusion with vaginal birth | 2.2 | 2.1 | No concern |
| 13 | Diagnosis of eclampsia at birth admission | 0.07 | 0.06 | No concern |
| 14 | Women having a peripartum hysterectomy | 0.07 | 0.05 | No concern |
| 15 | Women admitted to ICU and requiring ventilation during the pregnancy or postnatal period | 0.06 | 0.02 | No concern |
| 16 | Maternal tobacco use during postnatal period | 1.6 | 11.0 | Excellent |
| 17 | Preterm birth | 8.3 | 8.5 | No concern |
| 18 | Small babies at term (37 - 42 weeks' gestation) | 3.6 | 3.2 | No concern |
| 19 | Small babies at term born at 40 – 42 weeks' gestation | 27.0 | 34.0 | Excellent |
| 20 | Babies born at ≥37 weeks' gestation requiring respiratory support | 2.8 | 2.2 | Concern |

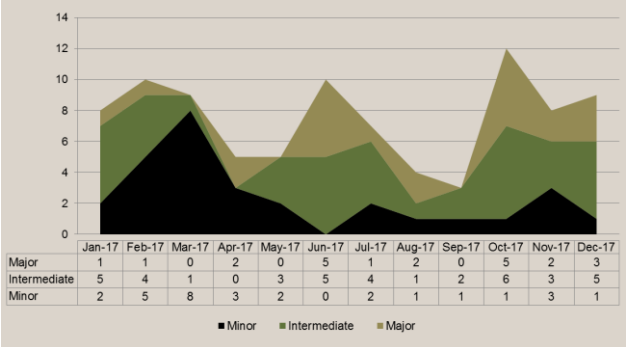
## 3.2 Patient Complaints

Complaints are an important source of information about patient care. Complaints are received by the Consumer Liaison Service, where they are recorded and processed to the relevant stakeholders, i.e. the senior management team, for further management of the complaint and resolution.

Issues related to care and treatment and communication remain the most common themes. A new theme which emerged was around expectations of care provided. A higher proportion of South Asian women and families made complaints about the care provided.

In 2017 a total of 90 formal complaints were received. Figure 9 shows distribution by time period and severity.

**Figure 9: Number of complaints by severity NWH 2017**




| | Jan-17 | Feb-17 | Mar-17 | Apr-17 | May-17 | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct-17 | Nov-17 | Dec-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Major | 1 | 1 | 0 | 2 | 0 | 5 | 1 | 2 | 0 | 5 | 2 | 3 |
| Intermediate | 5 | 4 | 1 | 0 | 3 | 5 | 4 | 1 | 2 | 6 | 3 | 5 |
| Minor | 2 | 5 | 8 | 3 | 2 | 0 | 2 | 1 | 1 | 1 | 3 | 1 |

### 3.2.1 Incident Management

Women's Health incidents are reviewed and triaged at the weekly MOTIF (Monitoring, Triage, and Follow up) meeting.

- All incidents are reviewed by the relevant area charge nurse, midwife or clinical lead
- Severity Assessment Code (SAC) 1 & 2 incidents are subject to a formal review process, using the Root Cause Analysis methodology
- SAC 3 and 4 maternity incidents are reviewed using the Rapid Multidisciplinary Panel (RAMP)
- Gynecological incidents, where there are opportunities for system improvements, including those related to surgical care, are now referred to the Gynecology Rapid Multidisciplinary Panel (GRAMP) process, which was set up in 2016 to provide systems review in the Gynaecology Department
- Incidents where there is considered to be an individual practitioner issue are managed as appropriate by the individual's line manager using a "Just Culture" framework.

The following table highlights the reported events in Women's Health in the year 2017.

**Table 18: Reported events in Women's Health 2017 by Severity Assessment Code (SAC) score**

| SAC score | Number of reported events |
|---|---|
| 1 | 2 |
| 2 | 2 |
| 3 | 86 |
| 4 | 189 |
| Not completed | 29 |
| **TOTAL** | **308** |

### 3.2.2 Patient Experience Survey

In addition to direct patient feedback through complaints and compliments, patient feedback is received from anonymous patient surveys.

#### Goal

The goal of the Auckland DHB Patient Experience Survey programme is to gather feedback from people about what matters to them and to act on the feedback they provide. Using an online method enables us to efficiently reach many more people and receive their feedback quickly. Using post discharge/visit surveys enables people to reflect not just on the visit but also any follow up and their experience of coordination of care across the system. Separate surveys are run, covering both inpatient and outpatient attendances.

#### Progress

Survey invitations are sent to people with a validated email address in CMS. Technical issues with the collection of email addresses in the National Women's computer system have been resolved and an increased number of responses for Maternity Services received. The reach of the survey has continued to extend across Women's Health.

#### Outcomes

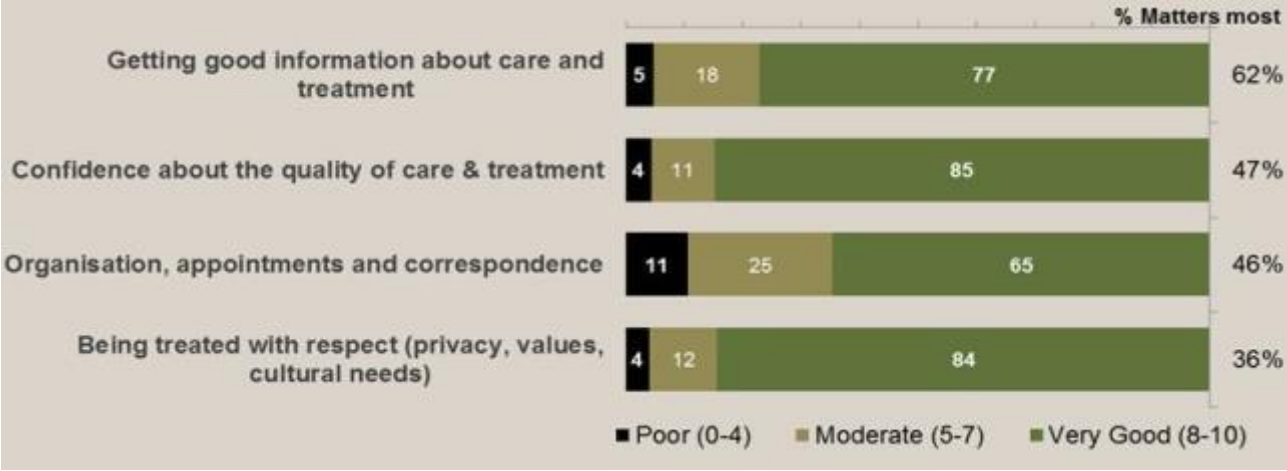
Respondents are asked to choose up to three dimensions of care that make the most difference to their experience.

They are then asked to rate the dimensions that make the most difference to them. The tables below show the percentage of women who have chosen the dimension, alongside the rating that they gave their chosen dimension.

Note: Questions are not mandatory and there is slight variation between numbers of respondents completing each question.

**Figure 10: Patient Experience Feedback - Inpatient (Jan to Dec 2017) (n=813)**

**Figure 11: Patient Experience Feedback – Outpatient (Jan to Dec 2017) (n=812)**




## Overall ratings

**Figure 12: Inpatients - Very good and Excellent ratings against 90% Target (Jan to Dec 2017)**

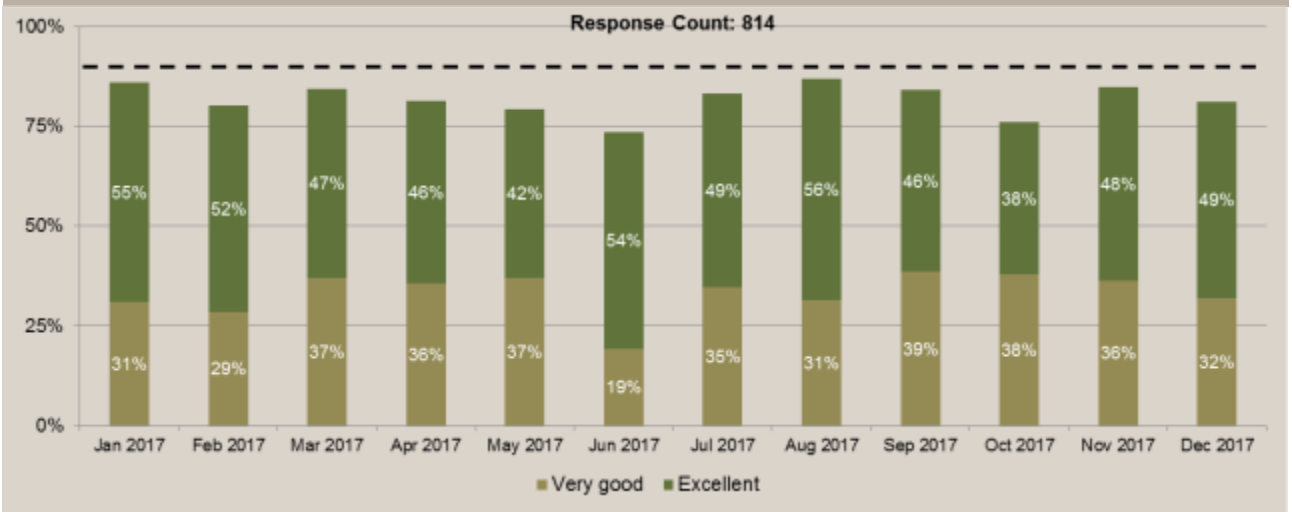
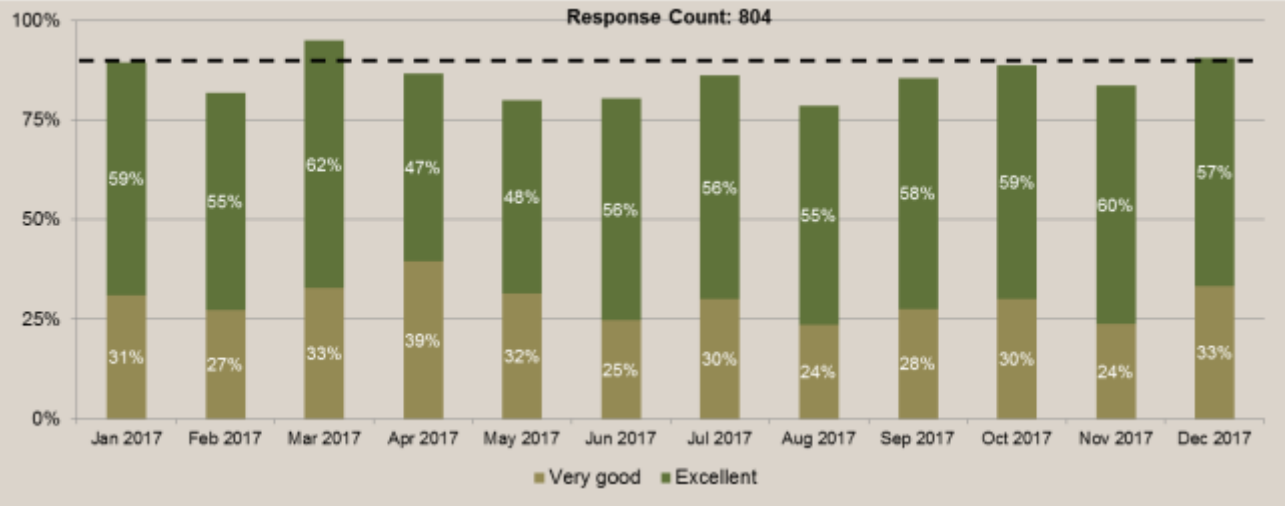



**Figure 13: Outpatients - Very good and Excellent ratings against 90% Target (Jan to Dec 2017)**



### What is most important to the women who use National Women's services?

For women who are inpatients**, communication, feeling confident about the quality of care and treatment, getting consistent and coordinated care while in hospital and being treated with dignity and respect** are the most frequently chosen dimensions (**Figure 10**).

Half of all inpatients said that communication is one of the three things that most matter to their care and treatment.

For outpatients in Women's Health, **getting good information about their condition and treatment, feeling confident about the quality of care and treatment, organisation, appointments & correspondence and being treated with dignity and respect** are the top dimensions (**Figure 11**).

Sixty-two per cent of outpatients said that getting good information about their condition and treatment is one of the three things that make the most difference to their care and treatment.

### Comment

The organisational target is for overall care to be rated at 90% Very Good or Excellent. Women's Health overall ratings for both inpatients and outpatients are lower than overall Auckland DHB ratings (**Figure 12** and **Figure 13**).

For the 2017 year, Women's Health inpatients gave an overall rating of 82% while the Auckland DHB rating was 85%. For outpatients over the same period, Women's Health ratings were 85% Very Good or Excellent while the organisational rating was 89%.

Patient experience surveys allow insight into what women say makes the most difference to their care and treatment. Their responses can also be used to understand the dimensions where making improvements would have the most positive impact. A driver analysis of Auckland DHB data (March 2016 - April 17) identified areas most highly correlated to an excellent experience and where respondents say there is some room for improvement. Of the dimensions highlighted above as important for women in this directorate, two in particular are strongly correlated to overall ratings.

For inpatients, consistent care (Getting consistent and coordinated care while in hospital) is strongly correlated to overall ratings (.601).

Information (Getting good information about my condition and treatment) is strongly correlated to overall ratings (.615) for outpatients.

Both of these areas warrant a focus on improvement and have the potential to impact overall ratings and the experience for women.

**Patient responses on getting consistent and coordinated care while in hospital:**

*"While in hospital there are many doctors and nurses who care for the patient. It is good that they are all on the same page regarding a patient. The nurses were great in that they would say when their shift was ending and would say who was taking over from them when their shift ended."*

*"Every new person I encountered had read my notes and repeated back to me my concerns so I didn't have to re-explain which was nice. Felt like they had taken time to understand my needs."*

*"I found it remarkable how every member came into my room knowing EXACTLY how I might be feeling at that time; be it nausea or pain I had around 6-8 nurses care for me over the 4 nights I spent at the hospital. The effort they put into getting to know my case history and being there whenever I needed help, is something I will cherish forever!"*

**Patient responses on getting good information about care and treatment:**

*"I felt very comfortable speaking with the doctors about my health issues and therefore not afraid to ask the doctors to explain again anything I did not understand. I feel it is due to how staff approach my situation, with sincerity and concern. I like that and that I come away well informed and am able to explain to my family which in turn they understand in regards to my health issues."*

*"The doctor I had was amazing. She answered every question honestly in ways I could understand. I felt more positive and felt that she had given me more information than I'd ever had before which made my decisions easier."*

*"Information was explained clearly, and didn't feel rushed to move onto the next patient. I felt important - not like a number."*

## 3.2.3 The Consumer Voice

An underpinning and critical factor necessary to truly assess the value of care delivered is measuring the degree to which consumers' expectations of care including their experience of care are met. In 2017, National Women's Health continued to partner with Women's Health Action to increase consumer representation. In 2017 Consumer representation continued on key excellence groups and improvement projects.

## 3.3 Multidisciplinary governance

### 3.3.1 Women's Health Clinical Excellence Groups

In 2015 National Women's Health expanded on its well-developed clinical governance framework and a strong quality improvement focus to reflect the new clinician-led leadership structure within the directorate and across the ADHB. In addition alignment was sought against the ADHB wide Management Operating System (MOS) to better ensure decision making was more fully integrated and considered in concert with clinical decision making, operational factors, and cost implications.

#### Women's Health Excellence Group

This group is chaired by the Director of Women's Health and is responsible for overall monitoring of the quality of care delivered by National Women's Health services and for setting strategic and clinical priorities.

#### Maternity Excellence Group

This group is chaired by a lead Maternity Service Clinical Director and is responsible for monitoring the quality of maternity care, setting key priorities and for oversight of the Maternity Quality and Safety program.

#### Gynaecology Excellence Group

This group is chaired by a lead Gynaecology Service Clinical Director and has responsibility for matters of quality and safety across general gynecology, urogynaecology, fertility, abortion services and gynaecological oncology.

#### Level 4 Clinical Governance Groups

Specific groups are focused around particular clinical service areas (such as Labour and Birth, MFM, Diabetes) with membership relevant to the area of focus. Much of the output, such as development of guidelines, comes from the level four groups.

#### Research Governance Group

This group works in collaboration with the ADHB research office to:

- Support a culture of research excellence in all aspects of women's health, including neonatology, at Auckland DHB Women's Health
- Enable research at Women's Health
- Promote integration of research into the clinical service
- Provide a safe research environment for staff and women
- Coordinate research to avoid duplication and burden on staff and women

#### Teaching and Training Governance Group

This group with multi-disciplinary membership was established to:

- Facilitate teaching, training and continuing professional development (CPD) of medical, nursing and midwifery professional groups
- Monitor the content and quality of teaching, training and CPD
- Promote a culture of lifelong learning
- Identify learning opportunities with other professional groups.

## 3.4 Learning from Care delivery outcomes

#### Perinatal Mortality Review

The National Women's Health Perinatal Mortality meetings are held monthly, are multidisciplinary, and are regarded as valuable educational opportunities due to the open discussion following each case. Time does not allow for discussion of all cases of perinatal mortality, however, those discussed are chosen for educational or special interest. From these meetings educational points raised are circulated to the wider Women's Health community. A summary of the educational points from the 2017 meetings can be found in Chapter 10.

#### Rapid Multidisciplinary Panel Review Process (RAMP)

The multidisciplinary RAMP review group meets up to twice per month for one hour to review a case of perinatal mortality, neonatal or maternal morbidity. Cases are referred by clinicians, from perinatal mortality review, and by the MOTIF (monitoring triage and followup) group who triage Datix incidents, complaints, HDC and ACC notifications.

In 2017, 18 cases were reviewed, 8 mostly aligned with neonatal outcome and the remainder maternal, although often some overlap exists. Cases are reviewed from antenatal to postnatal and neonatal care, with both issues around care improvement and quality care highlighted.

Table 18 provides an overview of the primary morbidity triggering review in these cases.

Approximately half of the reviews identified areas where improvement was required. Contributory factors identified (using the PMMRC review tool) were most often around organisation and management. Specifically, organisation and management contributory factors related to education and training, policies, protocols or guidelines, numbers of staff, communication between services, and delay to procedures were identified in at least 4 to 5 of the 18 cases.

| Table 19: Women's Health Rapid Multidisciplinary Panel (RAMP) cases 2017 | |
|---|---|
| **Primary clinical diagnosis** | **No. of cases** |
| Postpartum morbidity | 6 |
| Neonatal encephalopathy | 6 |
| Other neonatal morbidity/mortality | 3 |
| Delay to surgery | 2 |
| Other | 1 |
| **TOTAL** | **18** |

The issues identified from the RAMP process are logged in a database which was reviewed regularly in 2017 by the SCD Maternity and the MQSP co-ordinator. Some cases are presented at multidisciplinary morbidity meetings.

### Gynaecology Rapid Multidisciplinary Panel (GRAMP)

The Gynaecology Rapid Multidisciplinary Panel (GRAMP) is a multidisciplinary team, which reviews gynaecologic cases in order to support best clinical practice and inform quality improvement.

In 2017 the panel met regularly and reviewed a total of 31 gynaecologic cases with adverse events which include adverse intraoperative events, complications in the postoperative period, women who need to return to theatre and women who are readmitted. A summary is written by one of the medical staff involved in the case and then medical staff may come to the GRAMP meeting to discuss the case.

Further discussion occurs without the medical staff who were involved in the case. Contributory factors and potential avoidability are discussed and recorded.

Common themes were staff not seeking assistance when faced with an adverse event, staff failing to recognise that observations were abnormal, staff failing to escalate concerns when observations become abnormal, lack of recognition of complexity of clinical cases, lack of policy for routine postoperative blood tests. A summary of the cases was presented to medical and nursing staff at the Aspiring to Excellence meeting on two occasions.

The learnings from this review of cases included encouraging staff not to normalize their observations, asking for assistance from other colleagues, development of new clinical protocols, training and good documentation.

### Trainee Intern audits

The School of Population Health and the Department of Obstetrics and Gynaecology at the University of Auckland together run a program to teach year 6 medical students to undertake audit for quality improvement. This involves students selecting a project and completing part of the RANZCOG audit cycle during their four week attachment in Obstetrics and Gynaecology. At the end of their attachment the audit is presented to the department.

In 2017, seven gynaecology and nine maternity audits were completed. These can all be accessed by NWH staff on the internal website at https://adhb.hanz.health.nz/site/women/SitePages/Quality%20and%20Audit.aspx

A brief summary of the topics, findings and recommendations of these audits is provided in **Table 20**.

## 3.5 Consumer Information

National Women's provides a variety of information resources for consumers.

### 3.5.1 Online Resources

#### National Women's Health website

The history of healthcare is rooted in communication – with caregivers going out into the community to inform, educate and share. Digital media is an increasingly utilised method of healthcare delivery, as a medium that many people interact with every day. Popular communication methods are used to encourage the community to have greater health awareness and adopt self-care. It also offers the opportunity to listen and assist people with healthcare needs.

The National Women's Health website is the main form of online communication for women, their whānau, and health professionals.


The community is able to contact National Women's through an online query form, offering feedback or asking questions. The website covers a variety of topics - maternity, gynaecology, termination of pregnancy, fertility, and sexual health. Women and whānau often require information and advice on navigating their way through the health care system and require a personalised, in depth response.

### Women's Health Facebook page

The 'Pregnancy and Early Family Care' Facebook page has been an additional way to engage and interact with the community. This method of sharing has helped raise awareness of all sorts of information that is relevant to followers, including interactive live chat sessions run by Plunket, events and current health news. This is aided by weekly themes and working in collaboration with other organisations. It has also been a great way to celebrate the generosity of the community for their knitted donations.

The Pregnancy and Early Family Care page reach is completely organic with no paid posts. There are currently 453 page followers, which is an increase of 16% from the previous year. The page reaches up to 800 people a month through page posts, likes, shares and comments. Users are able to post to the page or send private messages

### Healthpoint website

National Women's Health has four ADHB maternity pages on Healthpoint: Community Team Midwives, Labour & Birthing Suite, Maternity/Pregnancy Care, and Auckland DHB Pregnancy and Parenting Education. Women and their whānau can use the web queries email address or Women's Health Information Unit phone number to make contact.

### 3.5.2 Paper-based Resources

A selection of up to date paper resources is available from the Women's Health Information Unit. These have recently been reviewed and redesigned to align with the ADHB brochure formatting for greater aesthetic appeal and uniformity. Each ward is also well stocked with paper resources.

### 3.5.3 Face to face service

Women and whānau visiting or staying in the hospital have visited the office for specific information and resources. Phone communication is also frequently utilised by people desiring further information about the services provided.

## 3.6 Investing in the Workforce

Investing in and developing the current and future National Women's workforce is a critical part of ensuring the aspired to level of excellence in care delivery. Considerable effort has been invested in strengthening existing initiatives and development of new programs. The Teaching and Training Governance Group (**Section 3.3.1**) has played a pivotal role in these improvements.

### 3.6.1 Midwifery Education team

2017 began with the ADHB Midwifery Education Team achieving accreditation as an education provider with the Midwifery Council of New Zealand. Prior to 2017, approval had to be sought and gained from Midwifery Council for each planned component of education prior to delivery. Having achieved accreditation, the Midwifery Education Team is deemed suitable to provide midwifery education that is appropriate for National Women's.

Work is based around the Annual Midwifery Education Plan, clustered under the following headings:

- Midwifery Council Education Provider Accreditation Requirements
- Education and Training
- Midwifery Practice Development
- Guidelines and Policies
- Audit and Effectiveness
- Clinical Governance
- Management Responsibilities

Key priorities for 2017 were:

- The Combined Emergency Skills Refresher for midwives. The 2017 content for this day included adult and neonatal resuscitation, postpartum haemorrhage, cord prolapse and shoulder dystocia.
- Development of a comprehensive orientation programme for new graduate midwives, with three graduate intakes each year. This requires a significant investment in planning, coordination and support. As well as our wonderful NZ educated graduate midwives, we have begun to take advantage of the Trans-Tasman Mutual Recognition Agreement and recruited two Australian graduate midwives in August 2017.
- A revised COMBO study day which, in 2017, focused on fetal wellbeing; topics including maternal sleep position, Growth Assessment Protocol (GAP) and decreased fetal movements.

- The introduction of two important education packages:
  - K2 - an online fetal surveillance education programme to enable clinicians to maintain their skills in CTG interpretation and labour management, it also covers physiology, underlying intrapartum fetal monitoring and perinatal asphyxia; and
  - GAP teaching package for detection of small for gestational age babies using the GROW customised growth chart.
- Participation in:
  - Rapid Multidisciplinary Panel (RAMP) reviews
  - The Teaching and Training Clinical Governance Committee
  - Labour and Birthing Clinical Governance Committee
  - The Resuscitation Committee
  - The development of maternity guidelines and policies.
- Management of the MERAS Quality and Leadership Programme (QLP) for midwives
- Supporting midwives to undertake audit projects to meet practice and service needs including:
  - Supporting the introduction of the Admission to Discharge Planner and
  - The Maternity Early Warning System
- Face-to-face education sessions in an outreach capacity to other departments; in particular DCCM and Adult ED/Triage.

In summary, the total number of face-to-face education sessions was 868.

The Women's Health Midwifery Education team has grown in strength and numbers since the beginning of 2017 and National Women's looks forward to future growth and the provision of ongoing successful education.

### 3.6.2 Aspiring to Excellence Programme

In 2017 National Women's Health continued the Aspiring to Excellence programme. The aim of this was to provide a monthly session, free of clinical commitments for the majority of staff, for service-wide education. Several adjustments were made to clinical schedules to accommodate this. The Aspiring to Excellence programme is open to all staff within National Women's Health. It is well-attended by medical students and by resident and senior medical staff, and by nurses and midwives where relevant and when clinical commitments allow.

In 2017, topics included

- outcomes from GRAMP (gynaecology rapid multidisciplinary panel) and gynaecology consumer feedback
- maternal morbidity
- combined sessions with anaesthesia (pathway for spinal anaesthesia for ECV, the FibUpFront PPH study, the WOMAN trial for management of PPH, mobile epidurals, antibiotic dosing for prolonged surgery)
- salpingectomy at the time of gynaecological surgery for benign disease
- minimally invasive surgery for gynaecological cancers
- the effect of place of birth on maternal and neonatal outcomes for low risk women
- breastfeeding education (including a journal club and panel discussion about tongue tie).

Final year medical student quality improvement project presentations were also regularly incorporated into the Aspiring To Excellence programme.

Aspiring To Excellence will continue to provide education that responds to the needs of the service, highlights achievements within Women's Health, and where necessary draws attention to areas for improvement within the service. This is to encourage working together to provide excellent care for women.

National Women's Health is accredited by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) to provide specialist training to 16 trainees. In addition to the RANZCOG trainees, National Women's Health, in collaboration with the University of Auckland, provides the opportunity for non-vocational training doctors to meet their requirements for the Postgraduate Diploma in Obstetrics and Medical Gynaecology. RANZCOG trainees have weekly protected teaching sessions, facilitated by the Chief Resident, aimed at providing teaching relevant to the RANZCOG curriculum. These sessions are presented by the registrars, with consultant input.

## 3.7 Quality Improvement Projects

### 3.7.1 Reducing Interventions and Supporting Normal Birth

#### Promote Primary Birthing

In 2017 the plan was to:

- Identify LMC midwives who do not offer Birthcare as place of birth for low risk women and collaboratively seek to understand the barriers and find solutions

- Review all resources produced so far for the project
- Seek additional resources for women about birthplace evidence i.e. Apps
- Review ADHB booking confirmation letter and information for women to include positive messages around place of birth for low risk women
- Seek Auckland NZCoM support for messaging with LMCs re physiological birth in primary maternity units for low risk women
- Identify additional supports required for the Community Midwifery Team in promoting Birthcare as place of birth for low risk women.

### 3.7.2 Modified Early Obstetric Warning Score (MEOWS)

During 2017 the maternity service at National Women's continued the transition from a generic whole-hospital adult early warning score system to the Modified Early Obstetric Warning Score (MEOWS). Use of a maternity-specific vital signs chart has been recommended in the UK confidential enquiry into maternal deaths, since early recognition and response to acute illness should reduce its overall severity by providing an objective structure to detect physiological deterioration early, coupled with an effective escalation pathway that ensures the woman is reviewed by skilled staff within an appropriate timeframe. Maternity-specific vital signs charts adjust for differences in the way young healthy women compensate for acute illness, and include observation parameters that are more important to maternity than the general adult hospital population.

Women's Health designed an in-house MEOWS chart with input from all members of a multidisciplinary project team. Feedback from staff has been very positive because the chart is more relevant to the women they are caring for. Use of the chart can prevent over-medicalisation of normality, with a normal set of vital signs in low risk women preventing more frequent vital sign observations than necessary.

#### Maternity Early Warning Score

National Women's is one of three test sites for the Health Quality and Safety Commission's new national maternity early warning score (MEWS) chart and escalation pathway. NWH had significant input into the design of this national chart from experience with a local MEOWS chart. Future work will involve testing and reviewing the final draft from July 2018 ahead of its planned national implementation in late 2018.

### 3.7.3 External Cephalic Version (ECV) including spinal anaesthesia

In 2016 239 singleton pregnancies underwent caesarean section for breech presentation. External cephalic version (ECV) aims to turn a baby from breech presentation to cephalic. Doing so potentially leads to a vaginal birth instead of caesarean section. International and local guidelines recommend that women with persistent breech presentation at term be referred for ECV. A total of 92 women were referred for ECV in 2016, however the success rate was only 34% which is lower than international rates. Recent evidence from randomised controlled trials overseas suggest that adding a spinal anaesthetic to an ECV attempt will approximately double its success rate, as well as improving comfort for the woman.

During 2017, Women's Health trialed a service where women who had previously had an unsuccessful ECV attempt were offered a spinal anaesthetic for their second ECV attempt. This was set up as a day stay procedure, aiming to improve current rates of conversion of breech to cephalic presentation. So far seven ECVs have been performed with the assistance of a spinal anaesthetic, on women who had previously had a failed ECV attempt without anaesthesia. Two were successfully converted to a cephalic presentation, and one had a vaginal birth, the other underwent a caesarean for unsuccessful induction of labour.

### 3.7.4 Obstetric Admission to Discharge Planner

NWH implemented an enhanced recovery programme after elective caesarean section in 2014. This aimed to accelerate recovery to normal function after caesarean section and so enhancing ability to care for their newborn. This was partially successful however audit data suggested that measurable targets for the enhanced recovery programme such as mobilising within 6-8 hours of birth and removal of urinary catheters within 12 hours of birth were not being met. Documentation of care as prose in clinical notes could make finding key information difficult for other team members.

An admission to discharge planner has been developed, trialed and implemented for all women who have birthed by caesarean section. It brings together most documentation for the woman's postnatal stay, from operation note, thromboprophylaxis assessment, acute pain service review and postnatal care plan through to discharge planning and breastfeeding. This was a paradigm shift for postnatal documentation, and required some time for staff to become familiar, however it has significantly improved written communication between staff.

### 3.7.5 Induction of Labour

A review of the elective induction of labour pathway was undertaken in 2017 with the aim to have an agreed and consistent elective IOL booking process and criteria, to reduce bottle necks and waiting times for women and to improve patient experience. The objective was to reduce variation in booking of induction numbers so that they were balanced with staffing volumes and bed numbers. A focus of the improvement project was also that induction indications meet guideline criteria.

The outcomes from the pilot project were that more requests for elective induction of labour were submitted, signed and completed and fewer deferrals needed to occur. The delivery unit and NICU worked together to ensure beds for newborns when required were planned ahead. SMOs supported the midwives with prioritisation of inductions and there were no patient complaints about the induction of labour process.

### 3.7.6 Increasing access to services, including vulnerable populations

#### 3.7.6.1 Māori Community Midwives – Te Manawa o Hine

There is persistent inequity in access to care and in health outcomes for Māori and other vulnerable women accessing ADHB maternity services. In July 2015, the ADHB Māori Community Midwifery team, Te Manawa o Hine, was established.

The Māori Midwifery Team, ADHB community midwives, ADHB's Pregnancy and Parenting Programme, and Ngāti Whātua o Ōrākei Health Services worked collaboratively to ensure women in the most vulnerable populations received appropriate and timely care. Women living in Glen Innes are less likely to have a self-employed LMC. These women are also more likely to register later in pregnancy with a hospital employed LMC. Referrals of Māori women to Ngāti Whātua o Ōrākei Health Services for their antenatal and postnatal care is important. It is recognised that women also need to be given choice in care provider. This requires LMC midwives to be aware of available services in the community.

In 2016 a new model of care for the delivery of antenatal and postnatal services in the community was developed in collaboration with Ngāti Whātua o Ōrākei Health Services. Service objectives were to:

- Improve access to maternity services for Māori, their whānau and other vulnerable populations
- Improve access to social services for Māori women, their whānau and other vulnerable populations
- Improve ability for whānau to self-manage their health and wellbeing
- Improve cultural appropriateness of health services for Māori and their whānau
- Improve the experience of women and whānau of care
- Improve relationships between ADHB and Māori health providers
- Improve information sharing between ADHB and Māori health providers
- Improve multiagency assessment, collaboration and care planning with Māori health providers
- To test the feasibility of providing secondary obstetric consultations in a community clinic
- To provide a secondary obstetric clinic service at a more convenient location than Greenlane Clinical Centre and thereby reduce potential barriers with regards to transportation for resource-limited women.
- To provide closer support for the existing Māori midwifery clinic at Ngāti Whātua Health Centre in Glen Innes.
- To strengthen the relationship between ADHB and Ngāti Whātua o Ōrākei Health Services in general.

In 2017 secondary obstetric consultations were carried out at the Ngāti Whātua o Ōrākei Health Centre in Glen Innes as a pilot project.

The hub's Māori specific care provisions included:

- Te Manawa o Hine midwifery care
- Obstetric care
- Social work support
- Pregnancy and Parenting Education
- PHO support.

Attendances at the obstetric consultation clinics were low, (three or fewer women per clinic). Quantitatively, only 'numbers of women seen' can be noted. Clinic time was also spent in reviewing 'virtual obstetric consultations' and performing other non-clinical tasks. Qualitatively, the team believed several women benefitted highly from this particular service.

Low clinic attendance numbers were likely due to several factors, most notably the reduction in Te Manawa o Hine referring midwives from four down to two (resignation and maternity leave). The team felt it was important to continue to limit the accessibility of this service to women being cared for by the Māori midwifery team despite the reduction in the team. It is possible the benefit of geographical convenience was not as great as

expected. It was unknown at the start of the project how many women would be expected to attend the community clinic. The numbers forced cancellation of this service in 2018.

Te Manawa o Hine continued to provide antenatal and postnatal care and education to women and whānau in the community. Visits take place either in women's homes or in the community clinics at Glen Innes, Pakuranga and Greenlane. The team works closely with Ngāti Whātua o Ōrākei Health Services and other social support services to provide culturally safe and appropriate care. The philosophy of the team aligns with Te Tiriti ō Waitangi and acknowledges Ngāti Whātua as mana whenua. The goals for Te Manawa o Hine in 2018 and beyond are to increase the number of team members, further develop model of care and continue to provide culturally safe outpatient and inpatient care for women and whānau.

### 3.7.6.2 Women's Health Family Violence Intervention Programme

The ADHB Family Violence Intervention Programme is part of the Ministry of Health Violence Intervention Programme (VIP). This programme is run nationally in New Zealand with standardised management, training and evaluation systems. In 2016, the Ministry of Health guidelines on Family Violence were refreshed and some changes introduced. The overall goal of the programme remains the same, this is to reduce the harm and the health impact associated with family violence.

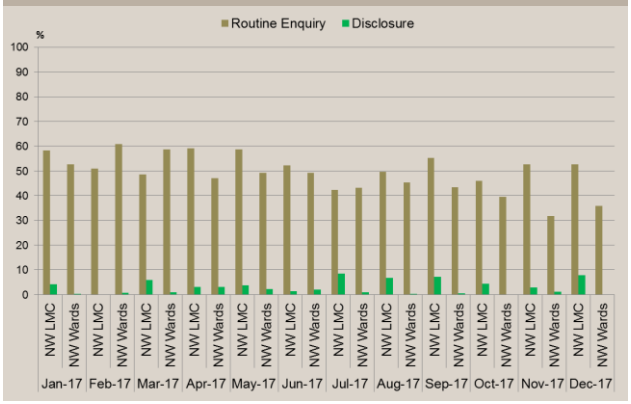
It is recognised that NWH staff are extremely busy and there are some very real barriers and challenges associated with undertaking routine enquiry around family violence on a regular basis.

There are many staff in National Women's who continue to work hard to implement the programme. This is evident in the screening rates. Now that family violence is recognised as a significant health issue with serious health consequences for many women, it is important that health professionals do all that is possible to help prevent and detect family violence. The way National Women's can demonstrate commitment to reducing the harm associated with family violence is to routinely and consistently ask the family violence questions in a quality manner. The number of women disclosing violence, following routine enquiry, is recognised as a marker for how well the questions may have been asked and how safe the woman feels to disclose. The data in **Figure 14** show that there is a need to continue to focus on both asking the questions, and ensuring they are asked in a manner which is encouraging of openness.

The ADHB Family Violence Intervention Steering Group set the targets for routine enquiry and that they should rise by 5% each year. For 2017, the target was 55%. In the graph below, data on routine enquiry and disclosure rates are given.

The ongoing plan is to constantly evaluate, monitor and explore new ideas to reduce the impact, harm and health consequences of family violence. Champions from each National Women's Health ward and clinic meet to discuss ways to improve routine enquiry and promote family violence prevention messages. These are working well and will continue in 2018.

**Figure 14: Women's Health Family Violence Routine Enquiry**




### 3.7.6.3 Safe Sleep

The purpose of the Safe Sleep Programme is to reduce the incidence of SUDI in the Auckland DHB domicile. The network of Safe Sleep champions includes primary and tertiary settings within maternity, and Newborn and Child Health services across the central Auckland region. Quarterly meetings provide networks to ensure clear safe sleep messaging, safe sleep modeling, and that implementation of safe sleep policies are aligned with the Northern Regional strategy and the Northern Region DHB SUDI prevention plan 2017-2018.

**Safe Sleep Day 2017**

Auckland District Health Board was honoured to recognise National Safe Sleep Day 2017 at both Auckland City Hospital and Greenlane Clinical Centre.

This year the Safe Sleep Champions team wanted to support the exciting movement of wahakura, so it was fantastic to have both Mero Cooper and Adrienne Castle share their wisdom and wairua on this special day, weaving their beautiful wahakura on Level 5 at Auckland City Hospital.

The team utilised different learning mediums, including a video presentation about safe sleep practices, sharing new breastfeeding app and immunisation information, in addition to offering printed material for families to take home. They were also joined by the Auckland DHB Smokefree Service team.

The champions support the sustained access to safe sleep devices to families in need (according to established criteria), managed by the Community Midwife Manager at ADHB. Community Safe Sleep champions frequently attend Wahakura wananga offered by Ngati Whatua o Orakei in the ADHB area. In addition, the SUDI champions actively participated in the annual Safe Sleep Day.

#### 3.7.6.4 Smoking cessation

Reducing smoking rates in the population, particularly the women under maternity care, remained a critical priority in 2017. Smoking cessation support was a key priority for wards with performance metrics being displayed in public and staff facing areas. Smokefree Services worked with staff on Smokefree messaging and smoking cessation champions met regularly to support one another's activities on the wards. The rate of mothers who report being smokers is very low for National Women's Health, however the service works hard to engage and discuss the importance of smoking cessation and to support options with new mothers.

Refer to Section 4.3.1 and 4.3.2 for further commentary about ADHB Smokefree Services.

### 3.7.7 Pregnancy and Parenting Programme

Following its launch in May 2016, the Pregnancy and Parenting Education Programme underwent ongoing development and implementation. An external formative evaluation of the programme commenced in July 2017 to inform ongoing programme development.

This evaluation by Synergia highlighted the challenge for District Health Boards of expanding reach to key target groups and the importance of appropriate resourcing to ensure DHBs are able to meet target group demand for services. The executive summary of the report provided a list of key considerations which ADHB wishes to address in future service delivery. Essentially, these are:

1. Continue to increase capacity to respond to the needs of Māori, Pasifika, migrant, teen and young parents. This could include increasing the availability of kaupapa Māori classes, and culturally appropriate education for Pasifika parents.
2. Continue to use opportunistic approaches to delivering pregnancy and parenting education.
3. Expand opportunities for social interaction and the development of social networks.
4. Capture the perspectives of women who have received opportunistic education and home visits.

The purpose of the Pregnancy and Parenting programme is to provide fully funded information, education and support to pregnant women and expectant fathers/partners, parents of new babies including adoptive parents and, where appropriate, their whānau, to meet their pregnancy and early parenting information, education and social support needs.

The Service objectives are to:

- Provide parents with pregnancy and early parenting information, education and support to help prepare them for pregnancy, childbirth and parenthood, and for making informed choices
- Provide opportunities to share their experiences and form new social networks with other expectant parents
- Increase access to pregnancy and parenting education for high need groups, progressing to 30% of these population groups accessing pregnancy and parenting education, while maintaining 30% coverage for the total Auckland resident birthing population.

The Programme is available for all first time ADHB domiciled parents, with a particular focus on meeting the needs of pregnant women with high needs. This includes young/teenage parents, Māori, Pasifika, Asian, parents with limited health literacy, and other women with identified needs.

Access to the programme is via self-referral or referral from a registered health professional or other allied health, education, or social service professional. An online electronic process is available for community courses with a confirmation receipt for all online bookings. A follow-up letter confirming course details and a reminder text closer to the class date is also provided.

A variety of strategies are used to provide education. Community courses are provided in six community based venues. Additionally Ngāti Whātua Ōrākei Whai Maia Ltd offers a unique Kaupapa Māori Wānanga, and Health Star Pacific Trust provides classes with a Pasifika cultural focus. Opportunistic education continues to be provided at Greenlane Clinical Centre and Auckland City Hospital and successfully, albeit brief at times, engages with many women who would otherwise not receive pregnancy and parenting education. Home visits are also offered for women, and whānau/family or support people, who meet strict criteria.

Mokopuna Ora Healthy Pregnancy and Baby, the Pregnancy and Parenting Information and Education Curriculum, is available online to all women, together with the Mokopuna App.

For the period 1 January to 31 December 2017 a total of 90 courses (community, Kaupapa Māori, Pasifika) were offered and 867 registrations were

received. Of those registrations, 81% attended. Of those who attended courses, 90% completed at least 75% of the course. Ninety-one percent (91%) of those attending courses were first time parents. Classes remain ethnically diverse.

By ethnicity, Asian and Indian registrations combined represent the majority of all registrations (43%) and attendance (52%). Māori and Pasifika engagement in ADHB community courses is very low. However, of those Māori/Pasifika women who do register for an ADHB community course, 80% attend. Registration numbers for Kaupapa Māori and Pasifika focused delivery is good, however attendance sits at around 51%. Opportunistic education provides good opportunities to engage with these and other priority groups. Importantly, of those ADHB domiciled women seen opportunistically, approximately 60% fall within the priority groups.

### 3.7.8 Lactation and Breastfeeding Service

The Baby Friendly Hospital Initiative (BFHI) encourages hospitals, particularly maternity wards, to adopt practices that fully protect, promote and support exclusive breastfeeding from birth. Nationwide exclusive breastfeeding rates, especially for Māori and Pasifika women, decline following discharge from hospital and there is a significant decline in the exclusive breastfeeding rates at three months. BFHI facilities work to ensure that all women, regardless of their feeding method, receive unbiased information, support and professional advice on decision making and feeding of their baby. With the introduction of a dedicated BFHI coordinator role, the lactation and breastfeeding service worked hard towards BFHI accreditation preparation activities for their audit in April 2018. As part of that, the ADHB Breastfeeding Policy was updated and ten breastfeeding guidelines have been published to support the policy.

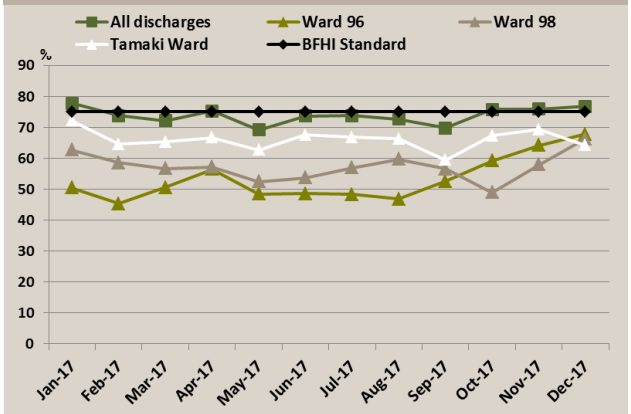
ADHB's exclusive breastfeeding rates from May to September 2017 were under the required standard of 75% exclusive breastfeeding rate on discharge. From October to December 2017 the lactation consultants worked exceptionally hard to increase exclusive breastfeeding to over 75%.

An increase in community support is required to enable the provision of a service that can better respond to the needs of breastfeeding families and to assist them to overcome breastfeeding difficulties.

The breastfeeding and lactation service's goals are to:

- Improve referral pathways to the service and response to these referrals
- Collect comprehensive data from referrals into the service to capture the level of service being provided
- Grow the service so the highest standard of care to support breastfeeding families is provided
- Provide a comprehensive tongue tie clinic
- Continue promoting, supporting and protecting breastfeeding as outlined by the World Health Organisation's Ten Steps to Successful Breastfeeding
- Maintain BFHI accreditation.

**Figure 15: Exclusive breastfeeding rates on discharge at NWH 2017**




### 3.7.9 Strengthening Diabetes in Pregnancy Care

In 2016 NWH Maternity Diabetes service established the Diabetes Clinical Governance Group, with multi-professional representation from the Auckland and Community Diabetes teams. Meeting regularly since April 2016, the formation of this group has fostered teamwork and supported staff, in addition to its overall aim of continuously improving the quality of care. In 2017 the group has:

- Designed and implemented new documentation for the weekly management of type 1 diabetes to make it easier to document the necessary information and to work as a prompt to ensure no vital information is omitted. Updated patient information leaflets.
- Designed a consumer feedback evaluation form for the service in line with the NZCoM survey
- Initiated diabetes in pregnancy training days; run "short sharp" training sessions on the wards about the treatment of adult hypoglycemia
- Refined the service's antenatal breastfeeding education information for 2018 BFHI training sessions.

### 3.7.10 Pregnancy and First year of Life program

#### Goal

Auckland and Waitemata DHBs have a shared Child

Health Improvement Plan whose key objectives are that:

- Infants have the highest attainable standard of health and equity of life expectancy and
- Parents are confident, knowledgeable and supported to nurture.

#### Progress

The Pregnancy and First Year of Life Service Level Alliance worked to identify the health services gaps and remove barriers that prevent NWH achieving the health and wellbeing vision. They are working collaboratively to build systems that allow delivery of services that best meet needs of every family or whānau.

Key evidence and information has been gathered and presented. A workshop has been held and project plans have been developed in alignment with the key objectives.

#### Ongoing plan

Work is underway to address current gaps and improvement areas to inform the Supporting Vulnerable Pregnant Women Project. The first 1000 days are recognised as the most important in terms of achieving identified goals. Three projects are under development.

- Facilitating information flow between healthcare providers
- Increasing access to long acting reversible contraception
- Development and adoption of a screening tool for risk factors associated with poor childhood outcomes, including maternal mental health, family violence, social isolation, housing or social work related needs, parenting skills and mother-craft sensitivity for infant's secure attachment.

## 3.8 ADHB Wide Projects

### 3.8.1 After-hours patient safety

An increased focus on patient safety across the globe has identified after-hours safety as an area of particular risk. After-hours is defined as 5pm to 8am weekdays and throughout the weekend.

Auckland DHB is a large and complex inpatient hospital offering a full range of services across 24 hours of operation.

ADHB services, including National Women's Health, agree there is a need to develop and implement a robust and reliable after-hours inpatient safety function across all inpatient settings. This is a cross directorate issue that is of significant importance.

#### Objectives

After-hours safety for women is equivalent to daytime safety by ensuring:

- Easily accessible information for all after-hours staff
- A sustainable after-hours staffing model; appropriate resources effectively shared across the inpatient settings
- Out of hours theatre model enables resource sharing and increased access
- Consistent and reliable access to and sharing of agreed process and measures for monitoring after-hours patient safety
- Information to ensure patient safety.

#### Progress

An intranet site is now established where all information necessary and relevant to providing after-hours care is available.

A new ADHB-wide model for supporting deteriorating women has been established. A Patient at Risk (PAR) outreach nursing role has been established to provide support to all services, including the maternity service. This will strengthen support to the maternity high dependency unit in delivery unit. This role was introduced in July 2017.

Formal interconnected multidisciplinary safety huddles will become standardised.

Structured handover between clinical teams will be established building on the work already undertaken within National Women's Health.

A detailed analysis of demand and risk has been completed. A business plan is underway to support enhanced after-hours theatre access for Maternity and Gynaecological services.

## 3.9 Quality Priorities for 2018

### 3.9.1 Women's Health Directorate Priorities

Women's Health Directorate Priorities for 2018 have been defined as:

1. Safe and quality services
2. Enhanced outcomes for vulnerable populations
3. Strengthened leadership for both operational matters and clinical quality and safety
4. Safe staffing
5. Develop models of care that are patient focused, and maximise value
6. Sustainable delivery models for Fetal Medicine, Fertility Plus and Gynae Oncology

These priorities align with the broader ADHB Strategies and priorities.

### 3.9.2 Project Priorities for 2018

#### 1. Safe and Quality Services

- After-hours Inpatient Safety Model implemented (Clinical Quality and Safety)
- Agreed plan for enhanced access to theatres after-hours (Clinical Quality and Safety)
- Maternity Early Obstetric Warning Scores (MEOWS)
- The pathway for ECV under spinal is working well, however the numbers of women referred to the service are small with many failed ECVs having either a second ECV attempt without anaesthesia or proceeding directly to planned caesarean section. Plans for 2018 are to ensure all women with a breech presentation at 34 weeks' gestation are offered an ECV, with those that are most likely to benefit from the addition of spinal anaesthesia being offered this for their first attempt. The service will continue to be audited and reviewed to ensure it is both clinically and cost effective to include spinal anaesthesia in an ECV attempt.
- Hypertension Guideline

In 2018 Women's Health will continue to implement changes to align processes and procedures to the Ministry of Health Hypertension Guideline. This will include a series of quick cards for ward, a standardised box on all resuscitation trollies and an updated ADHB hypertension guideline that will be published on the ADHB website.

#### 2. Enhanced outcomes for vulnerable populations

- Vulnerable women pathways and markers of vulnerability determined
- Work is underway to address current gaps and improvement areas to inform the Supporting Vulnerable Pregnant Women Project
- Pregnancy and Parenting Programme

In 2018-19 the Programme will place a greater focus on reaching and meaningfully engaging high priority population groups in pregnancy and parenting education.

#### 3. Strengthened leadership for both operational matters and clinical quality and safety

- Women's Health Excellence Programme

The Women's Health Excellence Group will continue to steer the Excellence Programme and decide on directions for continuous quality improvement activities

- Consumer Forum Established

In partnership with Women's Health Action, a consumer forum will be established to strengthen consumer voice. It will support NWH to design pathways and new services with a focus on patient experience.

- Develop confident and competent NWH leaders.

#### 4. Safe staffing

- Ensure Trendcare and Care Capacity Demand Management is fully implemented within inpatient wards/departments to ensure appropriate response to patient acuity and nursing staffing requirements
- Strengthen employee engagements and succession planning
- Efficient rostering of medical staff
- Maternity Workforce Plan developed and implemented
- Māori Midwives.

#### 5. Develop models of care that are patient focused, and maximise value

- Review pathways for acute gynaecological patients
- Collaborative primary birthing project.

The agreed directions include:

The project partners have offered primary birthing workshops and these continue throughout the year for LMC midwives and the midwives working for Birthcare.

A new LMC partnership of three midwives with clinic rooms at Birthcare and support from the project partnership as required.

Recruitment of midwives with recent primary birthing experience to work at Birthcare.

- Redesign the postnatal pathway (primary and community programme)

Based on the Length of Stay data, technologies transitions, and the discharge planner (A2D planner) for caesarean section, work will continue in this area with a vaginal birth admission to discharge planner for women admitted to the ward in the postnatal period.

**Table 20:Trainee Intern audit topics, findings and recommendations 2017**

| Service Area | Audit Title | Findings and Recommendations |
|---|---|---|
| **General Gynaecology** | Antimicrobial regime for pelvic inflammatory disease – are we following protocol? | **Findings**: 59% of women were treated for PID as per protocol.<br>**Recommendations:** educate clinicians about the guideline; standardise the guideline across the DHB and primary care to reduce variation in antibiotics prescribed. |
| | Intravenous iron infusions on ward 97 | **Findings:** 100% of women that received an iron infusion met the Hb criteria as set by ADHB guidelines but 37% did not have ferritin tested as recommended by protocol.<br>**Recommendations**: clarify "checklist" for iron infusion pre-op GYN with Ward 97 consistent with WAU and L8 (compare to maternity Iron in Pregnancy guideline) and develop criteria for "clinical indications". |
| | Management of patients receiving methotrexate for ectopic pregnancy | **Findings:** 40% of patients being followed up as per protocol, the drop in success rate is largely due to failure to perform one particular blood test at the recommended times.<br>**Recommendations**: update guideline especially clarifying follow-up from WAU; reminder text message for Day 4 and Day 7 βHCG; develop electronic record for medical management of ectopic. |
| **Gynaecological Oncology** | Follow-up of molar pregnancies 2012-2015 | **Findings**: from 2012-2015 (guideline change start of 2014), 118 women were included in the final sample. Following guideline change, a higher proportion of patients completed follow-up (from 37% to 66%), however percentage of missed follow-up βhCGs have not changed.<br>**Recommendations**: reminder written in pathology report so accepting clinician can begin patient on serial βhCGs; investigate evidence/outcomes for fortnightly βhCG versus weekly. |
| **Urogynaecology** | Urinary assessment questionnaires in urogynaecology outpatient clinic | **Findings**: no clinical guidelines were found regarding use of urinary assessment questionnaires. Of 256 patient sampled, 92% received forms at first specialist appointment; 28% of patients were given forms at first follow-up.<br>**Recommendations**: review use of AQUA/UAQ; validation of AQUA data; corroborate symptoms in clinical letters versus questionnaire to further assess usefulness. |
| **Termination of pregnancy services** | Are women E-referred to EDU for surgical termination seen in a timely manner? | **Findings**: in June 2017, 274 women received STOP via successful e-referral. 49% received treatment within the standard of care. (20% in 2015 audit)<br>**Recommendations**: modifying referral system to "fill in the blanks" checklist to ensure all required information is in referral. |
| | Audit of further intervention in women post medical termination of pregnancy at EDU | **Findings:** 170 women underwent MTOP from 1st Jan – 30th June 2017. 4 women (2%) required further intervention.<br>**Recommendations:** continue strict adherence to guideline; review of TOPs over 9 weeks; documentation of medicines required for termination; protocol for patient with advice and mental preparation for MTOP. |
| **Maternity: Antenatal** | Administration of thiamine to women admitted with hyperemesis gravidarum | **Key learning points** were the need to ensure that thiamine is prescribed AND administered prior to administration of glucose, in order to prevent the rare but catastrophic complication of Wernicke's encephalopathy. It was felt that a lack of understanding as to the reasons for thiamine administration may have contributed to the low rates of administration. In patients admitted with hyperemesis, consideration should be given to IV thiamine administration. |

| | | |
|---|---|---|
| | | The medication stickers for hyperemesis management will be reviewed and possibly amended to include this change. |
| | Are we monitoring & treating anaemia in the first trimester appropriately | **Findings:** 86% of women delivering at ACH had an Hb done. 90% of women were treated appropriately with regards to second standard according to ADHB guidelines.<br>**Recommendations:** review policy with regards to routine screening with ferritin; develop card that states required blood tests; develop/audit guidelines regarding iron deficiency screening. |
| | Assessment and management of obstetric cholestasis | **Findings:** Of the 87 women who fit the inclusion criteria, 4(4%) were fully investigated, 2(2%) had no investigations, 38 (44%) had only LFTs and bile salts investigated, 84 (97%) had bile salts tested.<br>**Recommendations:** make guidelines accessible to staff; mandatory teaching at orientation; consider adding "obstetric cholestasis" tick box on bloods form; add cholestasis to risk sheet. |
| | Serial growth scans for SGA risk pregnancies | **Findings:** Of the included women, 74% had at least two scans in their 3rd trimester of pregnancy, and 79% has a scan in their final four weeks of pregnancy.<br>**Recommendations:** make guidelines accessible to staff; mandatory teaching at orientation; consider adding "obstetric cholestasis" tick box on bloods form; add cholestasis to Healthware risk sheet. |
| | Completeness of processing an elective induction of labour (IOL) form | The importance of document completion and storing in the clinical record was once again highlighted by this presentation. |
| | Management of Hepatitis B during pregnancy | **Findings:** 55 women were confirmed to be Hepatitis B positive between 01/01/2015 – 31/12/2016. Patients managed in various ways according to different standards; some medications were dispensed unnecessarily and some tests were ordered unnecessarily.<br>**Recommendations:** one standard of care implemented at ACH to avoid confusion and wasting resources. |
| **Maternity: Intrapartum** | Are we logging out of Concerto after use | **Findings:** WAU, Ward 96 and 91 contributed to 14 (88%) unoccupied login incidents compared to ward 97 and 98 which contributed to 2 (13%). Incidents were most prevalent in the morning.<br>**Recommendations:** implement of an automatic logout after a set period; re-audit. |
| | Surgical antimicrobial prophylaxis in lower segment caesarean section with blood loss ≥1500ml | **Findings:** of the 102 women who were included in the analysis, 99 received the first dose of cefazolin as per guidelines. 1 patient received the 2nd dose of cefazolin as per guideline. 8 patients received a second dose of cefazolin but were not given per guideline.<br>**Recommendations:** education of surgical and anaesthetic staff; posters on Level 9; blood loss/antibiotic check as part of sign out; addition of check box/sticker to documentation/notes. |
| **Maternity: Postpartum** | Postpartum contraception after caesarean section at NWH | **Findings:** of the 95 women who fit the inclusion criteria for this audit, 39 (41%) were offered contraception. 6 had the contraceptive administered or prescribed by a doctor prior to discharge from National Women's.<br>**Recommendations:** education of staff; clarify clinical staff responsibilities with regards to offering/administering contraception prior to hospital discharge; clarify processes in offering Jadelle and IUD insertion while inpatient; tick box in clinical notes; providing patients with leaflets. |





# CHAPTER 4

# MATERNAL DEMOGRAPHY

This chapter describes the demographic characteristics of the women giving birth at NW in 2017. Some tables pertaining to this chapter can be found in the text and the remainder at the end of the chapter.

## 4.1 Maternal domicile

In 2017, 65.7% of women giving birth at NWH were women who lived in the Auckland DHB area. This proportion dropped significantly from 70.7% in 2006 (**Table 23**). The increase in births to non-ADHB residents is comprised of births to Counties Manukau residents. There has been no change in the proportion of births to Waitemata residents. Consistently about 2% of births are to mothers from DHBs outside of the 3 Auckland DHBs.

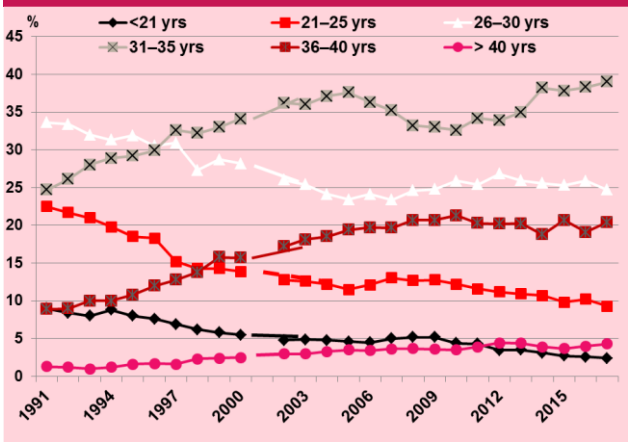
Some of the 35% of mothers who lived outside ADHB area and birthed at NWH required tertiary services, but others may have made a personal choice to birth at NWH.

## 4.2 Maternal age, parity, and ethnicity

The age of mothers who birthed at NWH has changed considerably over time. Since 1991 (**Figure 16**) there has been a steady reduction in mothers aged up to 25 birthing at NWH as a proportion of all mothers, and a steady rise in mothers aged 31 to 35 years old. Mothers aged 26 to 30 years old also reduced as a proportion of all births up to about 2006 and have since remained as a steady proportion. After a rise from 1991 to about 2006, births to mothers 36 and older have also remained as a steady proportion of all births (**Table 24**).

In 2017, 291 (4.3%) of mothers birthing at NWH were aged over 40 years and 100 (1.5%) under age 20 years.

**Figure 16: Maternal age distribution among women birthing at NWH (1991-2017)**




The ratio of multiparous to nulliparous women has remained fairly constant over recent years at close to 1:1. This is a significant change from the 1990s when the ratio of multiparous to nulliparous mothers was 1.2-1.3:1.

**Figure 17: Parity distribution among women birthing at NWH (1992-2017)**

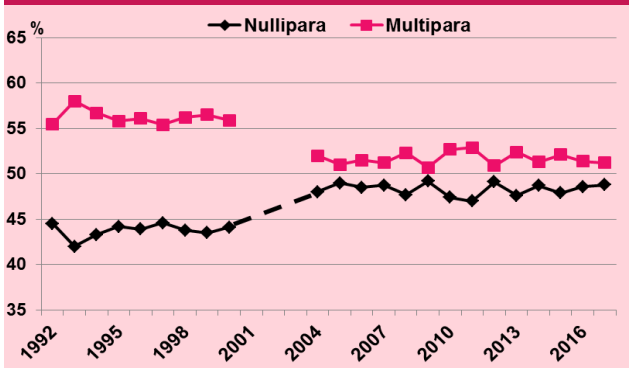
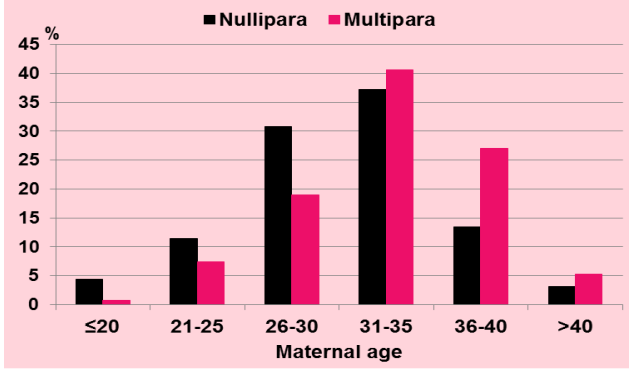
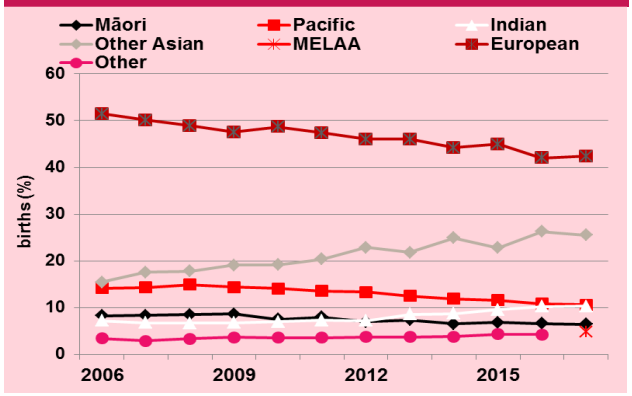



**Figure 18: Maternal parity by age NWH 2017**




While parity and age are highly correlated, 16.6% of nullipara in 2017 were aged over 35. This is a group of women with increased risk due to a combination of their parity and their age (**Table 25**).

**Figure 19: Ethnicity of mothers giving birth at NWH 2006-2017**




Reported ethnicity is prioritised. This means that when more than one ethnicity is identified by a mother, her ethnicity is assigned according to the following hierarchy: Māori, Pacific peoples, Indian, Other Asian, MELAA (Middle Eastern, Latin American or African), European, Other.

In 2017, of mothers giving birth at NWH 435 (6.4%) identified as Māori, 733 (10.7%) Pacific peoples, 703 (10.3%) Indian, 1743 (25.5%) Other Asian, 327 (4.8%) MELAA, 799 (11.7%) Other European, and 2106 (30.8%) NZ European.

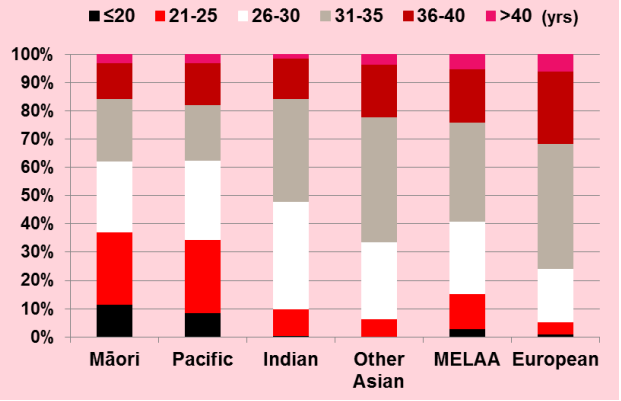
**Table 21: Prioritised ethnicity of women giving birth at NWH 2017** (for information on assigning ethnicity and prioritising ethnicity (Appendix 1 - Methodology)

| Prioritised ethnicity | Birthing mothers 2017 N=6846 | |
|---|---|---|
| | n | % |
| Māori | 435 | 6.4 |
| New Zealand European | 2106 | 30.8 |
| Samoan | 274 | 4.0 |
| Tongan | 248 | 3.6 |
| Cook Island Māori | 88 | 1.3 |
| Niuean | 45 | 0.7 |
| Fijian | 54 | 0.8 |
| Other Pacific Peoples | 20 | 0.3 |
| Tokelauan | 4 | 0.1 |
| Chinese | 1032 | 15.1 |
| Indian | 703 | 10.3 |
| Other Asian | 427 | 6.2 |
| Southeast Asian | 237 | 3.5 |
| Asian NFD | 47 | 0.7 |
| European NFD | 99 | 1.4 |
| Other European | 700 | 10.2 |
| Middle Eastern | 144 | 2.1 |
| African | 100 | 1.5 |
| Latin American | 83 | 1.2 |
| Other Ethnicity | 0 | |

NFD=Not further defined

The proportion of women birthing at National Women's who identified as Indian, Chinese or other Asian increased from 22.7% in 2006 to 35.7% in 2017. This change in the population ethnic demography may have implications for how our services and patient information are provided.

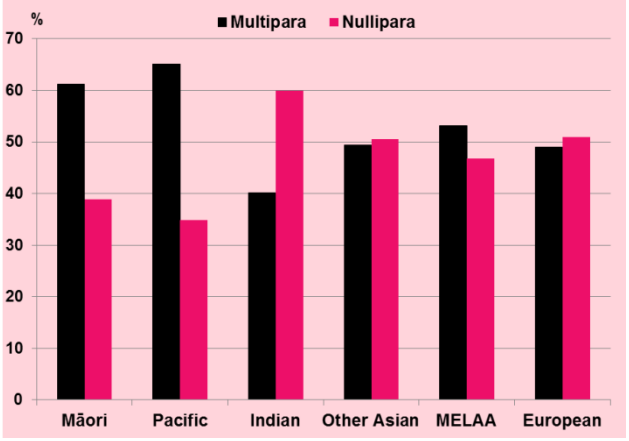
**Figure 20: Maternal age by maternal ethnicity NWH 2017**




There is a strong association between ethnicity and maternal age. Māori and Pacific mothers are younger than mothers of other ethnicities, and European mothers are older (**Figure 20**).

While approximately one half of Indian (60%), other Asian (51%) and European mothers (50%) are giving birth at NWH are having their first baby, fewer Māori (39%) and Pacific Island mothers (35%) are giving birth to their first baby. Parity and age need to be considered in analyses of obstetric interventions by ethnicity.

**Figure 21: Parity distribution by maternal ethnicity NWH 2017**



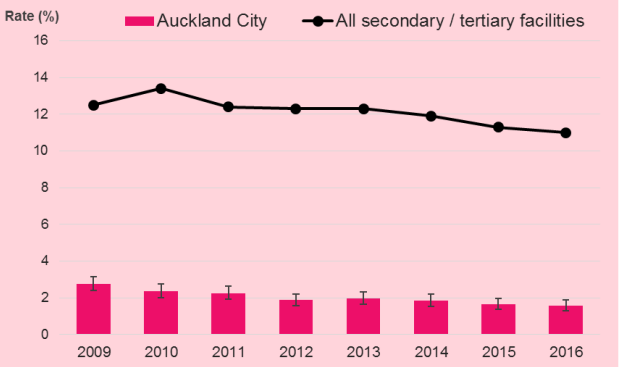

## 4.3 Smoking

Among women birthing at NW in 2017, 4.4% reported smoking at booking and 3.6% at birth.

**Table 22: Smoking status of women at booking and at birth NWH 2017**

| Smoking Status | Smoking at booking N=6846 | | Smoking at birth N=6846 | |
|---|---|---|---|---|
| | n | % | n | % |
| Yes | 303 | 4.4 | 248 | 3.6 |
| No | 6543 | 95.6 | 6597 | 96.4 |
| Missing data | 0 | | 1 | |

**Figure 22: NZ Maternity Indicators 2009 - 2016: Smoking status at 2 weeks after birth (NWH and NZ secondary/tertiary facilities 2009-2016)**




Error bars represent the 95% confidence interval for the facility rate.

The smoking rate among mothers birthing at NW reduced from 8.1% in 2006 even allowing that approximately 10% of the data were missing in the years up until 2009.

The smoking rate among women birthing at NWH is low at 2 weeks postpartum compared to women birthing in secondary and tertiary facilities in NZ (1.6% compared to 11.0% at two weeks after birth) (MOH Clinical Indicator Report 2017).

However, mothers under 26 years old (15%), women living in areas of high socioeconomic deprivation, and Māori (33%) and Pacific (11%) mothers have significantly higher smoking rates than this indicator depicts for the NWH population.

There are increasing smoking rates with increasing deprivation quintile (**Figure 23**), although this trend is most prominent among Māori mothers. There is also an association between smoking and age, with reducing rates with increasing age, although this is not apparent among Pacific mothers (**Figure 23**).

Seventy five percent of all smoking mothers at NWH in 2017 identified as Māori or Pacific peoples, although mothers of these ethnicities made up only 17% of the birthing population.

Fifty percent of smoking mothers were cared for by the NWH Community Clinic, which provided primary maternity care for 18% of all mothers in 2017. A further 14% of smokers were cared for by NWH high risk clinics (MFM and diabetes).

These data help to identify the populations who need help with this important modifiable risk factor.

**Figure 23: Smoking rates at booking by deprivation quintile and maternal ethnicity NWH 2017**

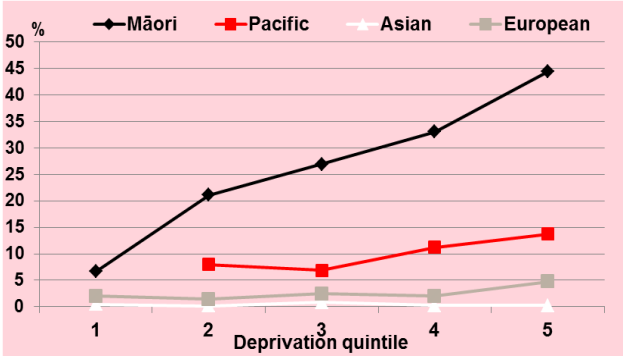



**Figure 25** shows smoking rates and absolute numbers of smokers from 2010 (since fewer than 1% of smoking data were missing) by ethnicity for Māori, Pacific and New Zealand European mothers. Smoking rates are low among other ethnic groupings not represented (**Table 31**).

The figure demonstrates higher smoking rates among Māori and Pacific, but also that while rates of smoking have reduced by similar amounts (and thus the trend lines are parallel), the percent reduction in smoking is highest for NZ European (51% from 2010 to 2017), 31% for Pacific, and lowest for Māori (17% from 2010 to 2017). It also shows that although Māori and Pacific make up respectively 6.4% and 10.7% of the birthing population compared to 30.8% for NZ European, they contribute considerably more of the smokers among mothers birthing at NWH.

**Figure 24: Smoking rates at booking by age and ethnicity NWH 2017**

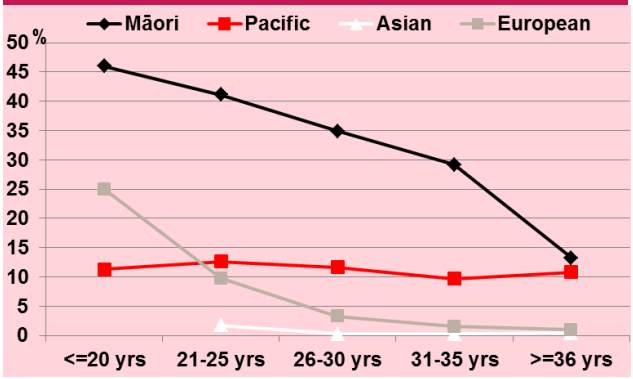
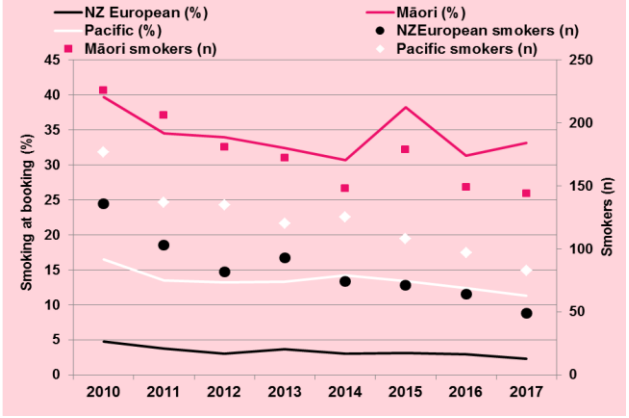



**Figure 25: Smokers (n) and smoking rates (%) at booking by ethnicity 2010-2017**




These data suggest that the initiatives to assist smokers at NWH have worked well for NZ European women and to some extent Pacific women, but have worked less well for Māori women.

### 4.3.1 Health Targets

ADHB Smokefree Services works with National Women's Health to achieve two Ministry of Health tobacco Health Targets:

1. Over 95% of current smokers that attend National Women's Health are given documented brief advice to stop smoking and an offer of help to do so.
2. Over 90% of pregnant women who identify as smokers at registration with a DHB-employed midwife or Lead Maternity Carer are offered brief advice and support to quit smoking.

In the 12 months 01/04/2017 to 31/03/2018, NWH achieved 92.3% towards the first target, a decline compared to last year's positioning. NZ midwifery shortages and increased discharges have put workforce pressures on Women's Health impacting the first target. However these constraints are being covered by bureau and additional shifts until resolved. Smokefree Services continue to support when able. National Women's Health achieved 100% for the second target.

### 4.3.2 Stop Smoking Service

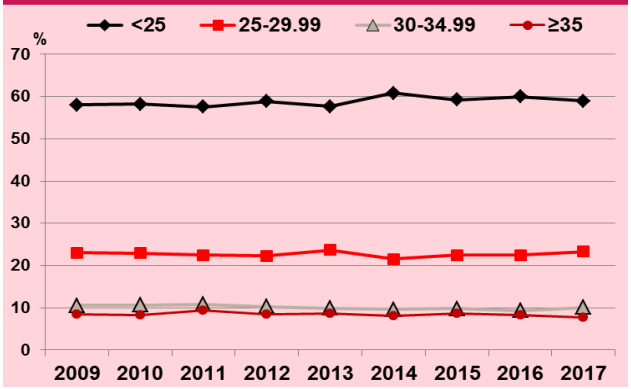
Smokefree Services bid farewell to Karen Stevens, long standing Smokefree Manager and welcomed her replacement Kelleigh Embers in August 2017.

Plans are underway to introduce a partnership with ADHB Smokefree Services, supporting women's health clinics at Greenlane Clinical Centre and clinics in the community.

New interactive Midwifery Smokefree Training is currently under development to be launched in May 2018. The training is focused on providing midwives with efficient culturally appropriate examples of how to have those difficult conversations around Smokefree.

## 4.4 Body mass index (BMI)

**Figure 26: BMI over time NWH 2009-2017 (missing data removed)**




Forty-one percent of the maternity population birthing at NWH were overweight or obese in 2017 (BMI ≥25), with 7.7% morbidly obese (BMI ≥35) (**Table 72, Chapter 5**). From 2009 to 2017, there was a significant increase in the proportion of mothers with BMI<25 (p=0.003) and a significant decrease in mothers with BMI 30-34 (p=0.003) and ≥35kg/m$^2$ (p=0.003) (**Figure 26**). However, this does not accurately represent the change in BMI over time among mothers birthing at NWH, as from 2009 there has been a significant change in the demography of the population with an increase in Asian mothers and a relative reduction in Māori and Pacific mothers. From 2009 to 2017, there was a significant reduction from 76% to 69% in the proportion of Asian mothers with BMI<25 (p<0.0001), and a significant increase in Asian mothers with BMI 25-34 (22.0% to 28.8%) and ≥35 (1.3% to 1.8%) (p<0.0001). There was a non-significant reduction in BMI <25 and 25-34 among Māori and Pacific mothers (p=0.1, p=0.07) and a non-significant increase in BMI >35 (p=0.1). Among European mothers, there was a non-significant increase in BMI <25 (p=0.12) and a non-significant reduction in BMI 25-34 (p=0.05) and BMI >35 (p=0.12).

**Figure 27: BMI <25 by ethnic groupings 2009-2017 (excluding missing data)**

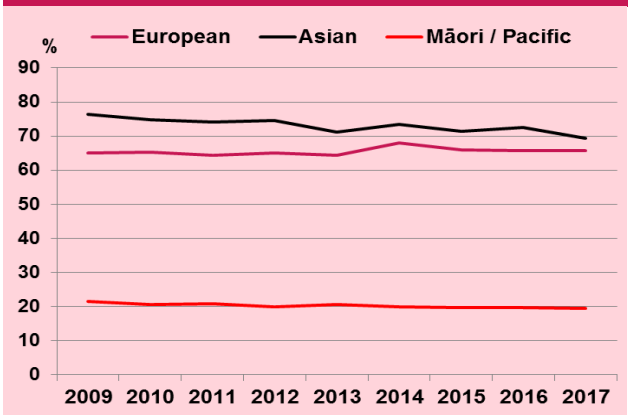



**Figure 28: BMI 25-34 by ethnic groupings 2009-2017 (excluding missing data)**

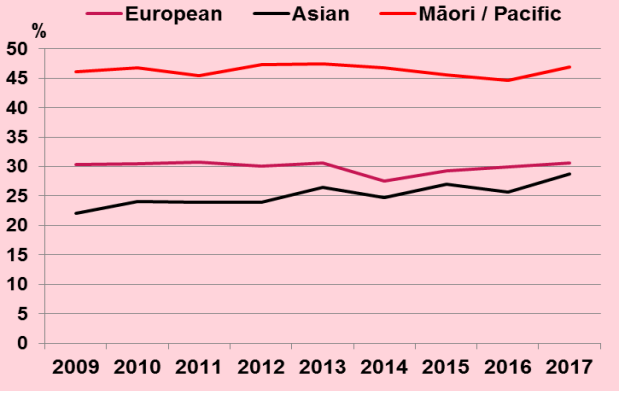
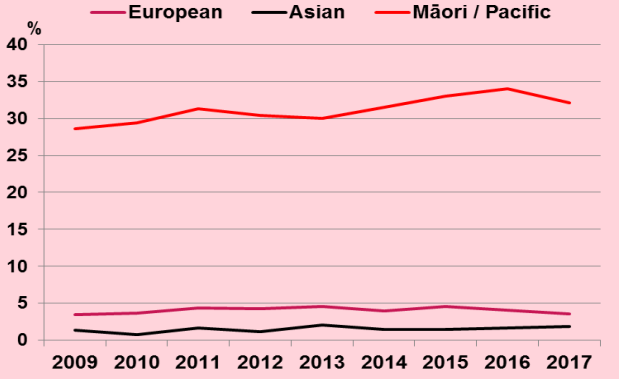



**Figure 29: BMI ≥35 by ethnic groupings 2009-2017 (excluding missing data)**

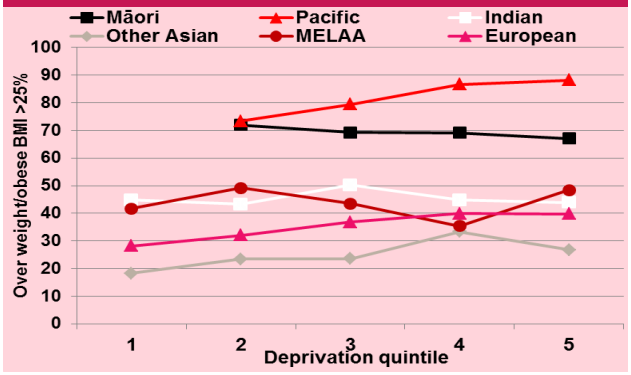


Pacific mothers have the highest rate of overweight or obesity (64%), followed by Māori mothers (50%). Forty-five percent of Indian mothers were also overweight or obese, even using this standard definition of over-weight/obese (BMI≥25), although there is evidence from pregnancy outcome data that an ethnic specific definition might be more appropriate in Indian and Asian women. **Figure 30** shows the strong association between ethnicity and prevalence of overweight or obesity (BMI>25).

There is an increase in the rate of overweight/ obesity with increasing socio-economic deprivation within some ethnic groupings (**Figure 30**). Eighty eight percent of Pacific mothers living in deprivation quintile 5 neighbourhoods were obese.

However, **Figure 30** also demonstrates that ethnicity is a stronger predictor of obesity than socioeconomic status.

**Figure 30: Over weight/obese (BMI ≥25) by ethnicity and deprivation quintile NWH 2017**



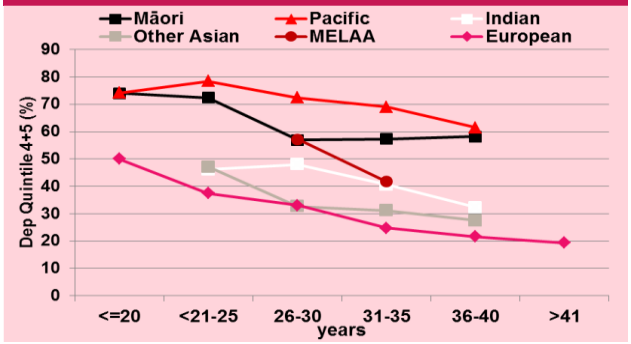

Rates suppressed if denominator <30 women

Analyses of BMI and maternity outcomes can be found in **section 5.15**.

## 4.5 Socio-economic status

Socio-economic status is measured by deprivation score (NZDep13) within Census area units (CAU). The decile score has been compressed to quintiles in the figures. Quintile 1 includes the least deprived two deciles and quintile 5 the most deprived two deciles.

**Figure 31: Deprivation (quintile 4 or 5) by age and ethnicity 2017**




Rates suppressed if denominator <30 women

**Figure 31** shows that age and ethnicity have independent associations with socioeconomic deprivation. As age increases the proportion of women living in areas of high socioeconomic deprivation decreases. Socioeconomic deprivation varies by ethnicity, with Pacific most likely and European and other Asian least likely to be living in areas in the top two quintiles of deprivation.

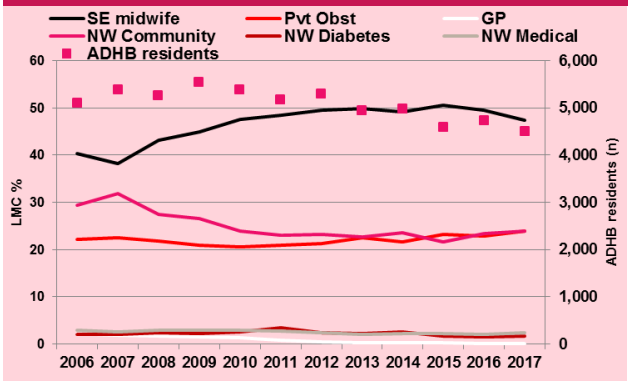
## 4.6 Lead Maternity Carer (LMC) at birth

The data given throughout this report for LMC relate to LMC at birth. LMC at birth is reported because the hospital does not collect data on the first LMC for all women. Collection of these data would require a joined up database for the entirety of a woman's pregnancy episode.

In 2017, 46% of women birthing at NWH were registered with a self-employed (or independent) midwife at birth, 29% with a private obstetrician, 18% with the National Women's Community clinic service, and 6% with National Women's specialist medical and diabetes clinic services. Overall 75% of women who gave birth at NWH in 2017 were under the care of a self-employed LMC compared to 65% in 2006.

There was a significant increase in the proportion of women under the care of a private obstetrician in 2017 (29%), up from 27% in 2015 and 2016, and 24% in 2006. This is the highest proportion of women choosing private obstetrician care and birthing at NWH since 2006. Of these women, 931 (46%) of the 2,004 under private obstetrician care were non-ADHB residents, up from 581 of 1710 (34%) in 2006 and 835 of 191 (44%) in 2016. This compares to 34% non-ADHB resident births at NWH overall in 2017 and 29% overall in 2006.

**Figure 32: ADHB resident births and LMC for ADHB resident women birthing at NWH 2006-2017**

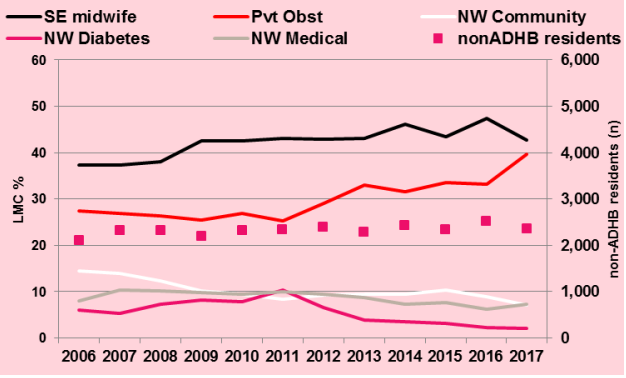



Women under GP, other DHB and unbooked women not represented

**Figure 32** and **Figure 33** show the numbers of women birthing at NWH who were ADHB residents and residents of other DHB areas from 2006-2017

and the LMCs caring for them. These figures show that there has been a reduction in women resident in ADHB area birthing at NWH (of 12% from 2006); and an increase in women residing outside ADHB birthing at NWH (11%). Among women residing in ADHB area, fewer women received care from the Community Clinic and there was an increase in the proportion of women receiving care from LMC midwives from 2006 to 2017. There was also a small increase in the number of women receiving LMC care from private obstetricians. Among women not resident in ADHB area, there has been a decrease in women receiving care from all DHB run clinics; and an increase in women receiving care from LMC midwives and from private obstetricians.

**Figure 33: Number of births and LMC for women residing outside ADHB and birthing at NWH 2006-2017**




Women under GP, other DHB and unbooked women not represented

There is only one GP who has an access agreement to birth babies at NWH, who was the LMC at birth for 11 women (0.2%) again in 2017 as in 2016. Because of small numbers, these data are not represented in the figures in this section.

Thirty-five women were not registered for antenatal care in 2017, of whom 13 were Māori and 16 Pacific.

**Figure 34: LMC at birth and maternal age NWH 2017**

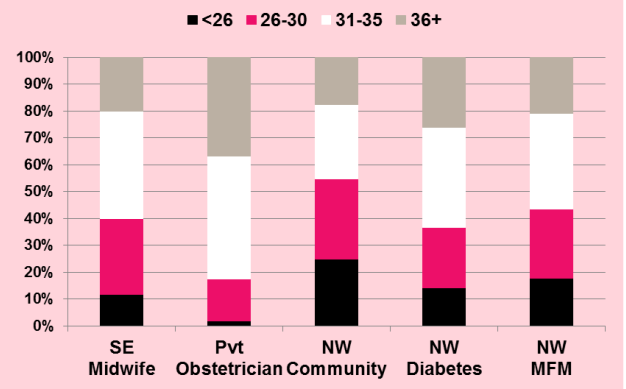
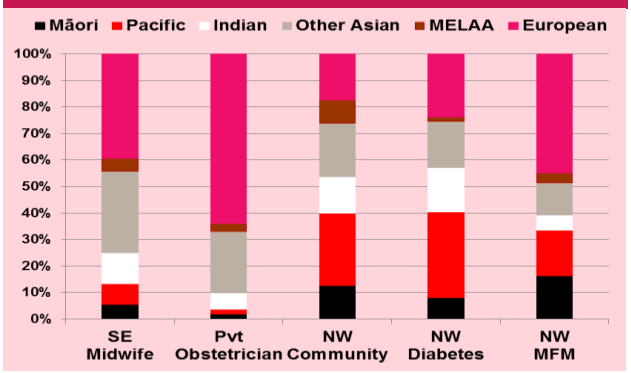



**Figure 35: LMC at birth and maternal ethnicity NWH 2017**

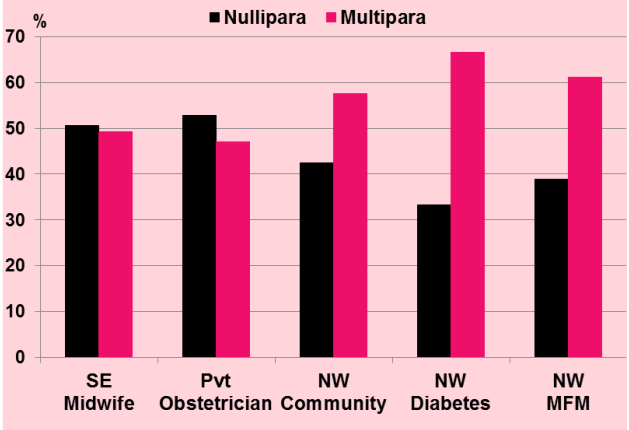



Women booked with a private obstetrician were more likely to be older, European, and more likely to be living in areas of lesser socioeconomic deprivation compared to women booked with other LMCs.

Māori and Pacific mothers were less likely than European and Other Asian mothers to register for antenatal care with a self-employed LMC (either a midwife or a private obstetrician).

Women receiving primary maternity care from DHB services (NWH Community, Diabetes and Medical clinics) were more likely to be multiparous than women under the care of self-employed LMCs (midwives and private obstetricians).

**Figure 36: LMC at birth and parity NWH 2017**




## 4.7 Standard primipara

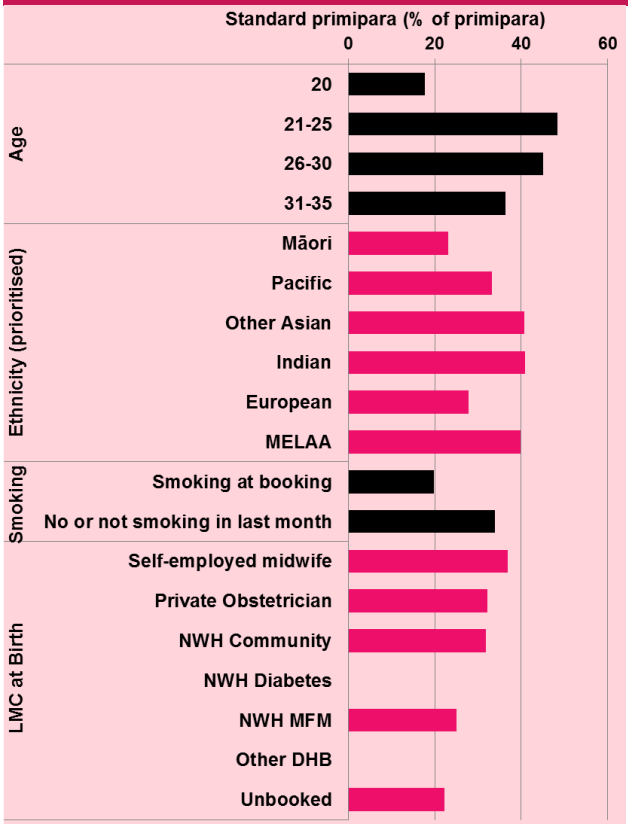
A standard primiparous mother is defined at NWH as a woman with no prior birth at 20 or more weeks gestation, aged 20-34 years at birth, with a singleton pregnancy, cephalic presentation, gestation 37-41 weeks at birth, with a normally grown baby (customised birthweight centile $\geq 10^{th}$), without medical disease (cardiac disease, renal disease, mental health disorder, SLE, HIV infection, CVA/TIA, diabetes or hypertension), gestational diabetes, pregnancy associated hypertensive

disease, or antepartum haemorrhage. This differs from the current definition used by the Ministry of Health in the NZ Maternity Clinical Indicators report because of the data limitations of the national database.

The objective of reporting outcomes for this tightly defined sub-group is to permit comparisons of similar risk profile women between individual caregivers and with other institutions.

In 2017, 34% of primiparous women were defined as standard by the NWH definition. Mode of birth at term for standard primipara by LMC is presented in **Figure 104** and outcomes for standard primipara at NWH compared to secondary/tertiary units in New Zealand (using the MOH definition in the Maternity Clinical Indicators report 2016) are presented where applicable in **Chapter 6**.

**Figure 37: Characteristics of standard primipara 2017**




## 4.8 Data tables: Maternal demography

**Table 23: DHB of domicile of mothers giving birth at National Women's 2012-2017**

| DHB | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Auckland** | 5302 | 68.9 | 4937 | 68.4 | 4979 | 67.3 | 4587 | 66.2 | 4723 | 65.2 | 4496 | 65.7 |
| **Waitemata** | 1126 | 14.6 | 1057 | 14.6 | 1070 | 14.5 | 996 | 14.4 | 1107 | 15.3 | 998 | 14.6 |
| **Counties** | 1113 | 14.5 | 1079 | 14.9 | 1208 | 16.3 | 1177 | 17.0 | 1253 | 17.3 | 1187 | 17.3 |
| **Northland** | 39 | 0.5 | 38 | 0.5 | 38 | 0.5 | 40 | 0.6 | 41 | 0.6 | 27 | 0.4 |
| **Other North** | 91 | 1.2 | 88 | 1.2 | 76 | 1.0 | 99 | 1.4 | 70 | 1.0 | 104 | 1.5 |
| **South Island** | 14 | 0.2 | 13 | 0.2 | 15 | 0.2 | 18 | 0.3 | 29 | 0.4 | 20 | 0.3 |
| **Overseas** | 10 | 0.1 | 11 | 0.2 | 14 | 0.2 | 16 | 0.2 | 18 | 0.2 | 14 | 0.2 |

## Table 24: Maternal age distribution NWH 2000-2017

| | N | ≤20 yrs | | 21-25 yrs | | 26-30 yrs | | 31-35 yrs | | 36-40 yrs | | >40 yrs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % | n | % |
| **2000** | 7827 | 431 | 5.5 | 1091 | 13.9 | 2204 | 28.2 | 2670 | 34.1 | 1232 | 15.7 | 199 | 2.5 |
| **2002** | 7775 | 376 | 4.8 | 998 | 12.8 | 2018 | 26.0 | 2816 | 36.2 | 1335 | 17.2 | 232 | 3.0 |
| **2003** | 7611 | 372 | 4.9 | 959 | 12.6 | 1933 | 25.4 | 2738 | 36.0 | 1380 | 18.1 | 229 | 3.0 |
| **2004** | 7491 | 357 | 4.8 | 913 | 12.2 | 1809 | 24.1 | 2781 | 37.1 | 1384 | 18.5 | 247 | 3.3 |
| **2005** | 7194 | 330 | 4.6 | 828 | 11.5 | 1685 | 23.4 | 2702 | 37.6 | 1395 | 19.4 | 254 | 3.5 |
| **2006** | 7212 | 323 | 4.5 | 869 | 12.0 | 1735 | 24.1 | 2619 | 36.3 | 1421 | 19.7 | 245 | 3.4 |
| **2007** | 7695 | 386 | 5.0 | 1005 | 13.1 | 1798 | 23.4 | 2710 | 35.2 | 1514 | 19.7 | 282 | 3.7 |
| **2008** | 7589 | 394 | 5.2 | 963 | 12.7 | 1863 | 24.5 | 2519 | 33.2 | 1570 | 20.7 | 280 | 3.7 |
| **2009** | 7735 | 400 | 5.2 | 992 | 12.8 | 1916 | 24.8 | 2552 | 33.0 | 1600 | 20.7 | 275 | 3.6 |
| **2010** | 7709 | 335 | 4.3 | 943 | 12.2 | 1998 | 25.9 | 2516 | 32.6 | 1644 | 21.3 | 273 | 3.5 |
| **2011** | 7523 | 325 | 4.3 | 878 | 11.6 | 1918 | 25.4 | 2576 | 34.2 | 1534 | 20.3 | 292 | 3.9 |
| **2012** | 7695 | 267 | 3.5 | 862 | 11.2 | 2065 | 26.8 | 2606 | 33.8 | 1555 | 20.2 | 340 | 4.4 |
| **2013** | 7223 | 254 | 3.5 | 790 | 10.9 | 1874 | 25.9 | 2525 | 35.0 | 1463 | 20.3 | 317 | 4.3 |
| **2014** | 7400 | 227 | 3.1 | 783 | 10.6 | 1891 | 25.6 | 2824 | 38.2 | 1390 | 18.8 | 285 | 3.9 |
| **2015** | 6933 | 187 | 2.7 | 677 | 9.8 | 1756 | 25.3 | 2623 | 37.8 | 1435 | 20.7 | 255 | 3.7 |
| **2016** | 7241 | 185 | 2.6 | 736 | 10.2 | 1877 | 25.9 | 2773 | 38.3 | 1381 | 19.1 | 289 | 4.0 |
| **2017** | 6846 | 162 | 2.4 | 637 | 9.3 | 1692 | 24.7 | 2669 | 39.0 | 1395 | 20.4 | 291 | 4.3 |

## Table 25: Maternal age and parity NWH 2017

| | Total | | ≤20 yrs | | 21-25 yrs | | 26-30 yrs | | 31-35 yrs | | 36-40 yrs | | >40 yrs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=6846 | | n=162 | | n=637 | | n=1692 | | n=2669 | | n=1395 | | n=291 | |
| | n | % | N | % | n | % | n | % | n | % | n | % | n | % |
| **Nullipara** | 3343 | 48.8 | 135 | 83.3 | 380 | 59.7 | 1028 | 60.8 | 1245 | 46.6 | 449 | 32.2 | 106 | 36.4 |
| **Multipara** | 3503 | 51.2 | 27 | 16.7 | 257 | 40.3 | 664 | 39.2 | 1424 | 53.4 | 946 | 67.8 | 185 | 63.6 |

## Table 26: Time trends in nulliparity and multiparity NWH 2007-2017

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of** | 7695 | 7589 | 7735 | 7709 | 7523 | 7695 | 7223 | 7400 | 6933 | 7241 | 6846 |
| **Nullipara** | 3752 | 3623 | 3811 | 3650 | 3539 | 3778 | 3441 | 3604 | 3321 | 3517 | 3343 |
| **%** | 48.8 | 47.7 | 49.3 | 47.3 | 47.0 | 49.1 | 47.6 | 48.7 | 47.9 | 48.6 | 48.8 |
| **Multipara** | 3943 | 3966 | 3924 | 4059 | 3984 | 3917 | 3782 | 3796 | 3612 | 3724 | 3503 |
| **%** | 51.2 | 52.3 | 50.7 | 52.7 | 52.9 | 50.9 | 52.4 | 51.3 | 52.1 | 51.4 | 51.2 |

## Table 27: Maternal prioritise ethnicity and age NWH 2017

| Age | Total | Māori | | Pacific | | Indian | | Other Asian | | MELAA | | European | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (years) | N | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **6846** | **435** | **6.4** | **733** | **10.7** | **703** | **10.3** | **1743** | **25.5** | **327** | **4.8** | **2905** | **42.4** |
| **≤20** | 162 | 50 | 30.9 | 62 | 38.3 | 4 | 2.5 | 5 | 3.1 | 9 | 5.6 | 32 | 19.8 |
| **21-25** | 637 | 112 | 17.6 | 190 | 29.8 | 65 | 10.2 | 106 | 16.6 | 41 | 6.4 | 123 | 19.3 |
| **26-30** | 1692 | 109 | 6.4 | 206 | 12.2 | 269 | 15.9 | 474 | 28.0 | 84 | 5.0 | 550 | 32.5 |
| **31-35** | 2669 | 96 | 3.6 | 145 | 5.4 | 256 | 9.6 | 775 | 29.0 | 115 | 4.3 | 1282 | 48.0 |
| **36-40** | 1395 | 55 | 3.9 | 109 | 7.8 | 99 | 7.1 | 323 | 23.2 | 61 | 4.4 | 748 | 53.6 |
| **>40** | 291 | 13 | 4.5 | 21 | 7.2 | 10 | 3.4 | 60 | 20.6 | 17 | 5.8 | 170 | 58.4 |

## Table 28: Maternal prioritised ethnicity and parity NWH 2017

| | Total | Māori | | Pacific | | Indian | | Other Asian | | MELAA | | European | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n=435 | | n=733 | | n=703 | | n=1743 | | n=327 | | n=2905 | |
| | | n | % | n | % | n | % | n | % | n | % | n | % |
| **Nullipara** | 3343 | 169 | 38.9 | 256 | 34.9 | 421 | 59.9 | 881 | 50.5 | 153 | 47 | 1463 | 50.4 |
| **Multipara** | 3503 | 266 | 61.1 | 477 | 65.1 | 282 | 40.1 | 862 | 49.5 | 174 | 53 | 1442 | 49.6 |

## Table 29: Smoking and socioeconomic deprivation (NZ Dep13) NWH 2017

| Deprivation decile | Total | | Smoking at booking | |
|---|---|---|---|---|
| | N=6846 | | n=303 | |
| | n | % | n | % |
| 1 | 517 | 7.6 | 8 | 1.5 |
| 2 | 806 | 11.8 | 14 | 1.7 |
| 3 | 803 | 11.7 | 16 | 2.0 |
| 4 | 682 | 10.0 | 13 | 1.9 |
| 5 | 641 | 9.4 | 16 | 2.5 |
| 6 | 825 | 12.1 | 33 | 4.0 |
| 7 | 571 | 8.3 | 23 | 4.0 |
| 8 | 580 | 8.5 | 33 | 5.7 |
| 9 | 781 | 11.4 | 54 | 6.9 |
| 10 | 626 | 9.1 | 93 | 14.9 |
| Overseas resident | 14 | 0.2 | 0 | |

## Table 30: Prioritised ethnicity of women birthing at NWH 2011-2017

| | 2011 N=7523 | | 2012 N=7695 | | 2013 N=7223 | | 2014 N=7400 | | 2015 N=6933 | | 2016 N=7241 | | 2017 N=6846 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Māori** | 597 | 7.9 | 534 | 6.9 | 532 | 7.4 | 483 | 6.5 | 469 | 6.8 | 477 | 6.6 | 435 | 6.4 |
| **Niuean** | 95 | 1.3 | 74 | 1.0 | 82 | 1.1 | 76 | 1.0 | 58 | 0.8 | 69 | 1.0 | 45 | 0.7 |
| **Cook Island** | 112 | 1.5 | 123 | 1.6 | 105 | 1.5 | 117 | 1.6 | 98 | 1.4 | 86 | 1.2 | 88 | 1.3 |
| **Samoan** | 380 | 5.1 | 368 | 4.8 | 319 | 4.4 | 298 | 4.0 | 289 | 4.2 | 286 | 3.9 | 274 | 4 |
| **Tongan** | 342 | 4.5 | 346 | 4.5 | 312 | 4.3 | 304 | 4.1 | 271 | 3.9 | 251 | 3.5 | 248 | 3.6 |
| **Fijian** | 59 | 0.8 | 73 | 0.9 | 51 | 0.7 | 60 | 0.8 | 57 | 0.8 | 50 | 0.7 | 54 | 0.8 |
| **Other Pacific** | 29 | 0.4 | 39 | 0.5 | 35 | 0.5 | 23 | 0.3 | 32 | 0.5 | 39 | 0.5 | 24 | 0.4 |
| **Indian** | 548 | 7.3 | 553 | 7.2 | 620 | 8.6 | 643 | 8.7 | 660 | 9.5 | 735 | 10.2 | 703 | 10.3 |
| **Chinese** | 984 | 13.1 | 1171 | 15.2 | 962 | 13.3 | 1146 | 15.5 | 906 | 13.1 | 1189 | 16.4 | 1032 | 15.1 |
| **Other Asian** | 545 | 7.2 | 588 | 7.6 | 614 | 8.5 | 696 | 9.4 | 675 | 9.7 | 717 | 9.9 | 711 | 10.4 |
| **MELAA** | | | | | | | | | | | | | 327 | 4.8 |
| **Other European** | 851 | 11.3 | 847 | 11.0 | 776 | 10.7 | 852 | 11.5 | 827 | 11.9 | 842 | 11.6 | 799 | 11.6 |
| **Other** | 269 | 3.6 | 283 | 3.7 | 267 | 3.7 | 281 | 3.8 | 300 | 4.3 | 304 | 4.2 | 0 | |
| **NZ European** | 2712 | 36.0 | 2696 | 35.0 | 2548 | 35.3 | 2421 | 32.7 | 2291 | 33.0 | 2196 | 30.3 | 2106 | 30.8 |

## Table 31: Smoking status at booking by prioritised ethnicity and maternal age NWH 2017

| | N | Smoking at booking | | Not currently smoking | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| **Total** | **6846** | **303** | **4.4** | **6543** | **95.6** |
| **Ethnicity** | | | | | |
| Māori | 435 | 144 | 33.1 | 291 | 66.9 |
| Pacific | 733 | 83 | 11.3 | 650 | 88.7 |
| Indian | 703 | 2 | 0.3 | 701 | 99.7 |
| Other Asian | 1743 | 8 | 0.5 | 1735 | 99.5 |
| MELAA | 327 | 0 | | 327 | 100.0 |
| European | 2905 | 66 | 2.3 | 2839 | 97.7 |
| **Age** | | | | | |
| ≤20 | 162 | 38 | 23.5 | 124 | 76.5 |
| 21-25 | 637 | 85 | 13.3 | 552 | 86.7 |
| 26-30 | 1692 | 82 | 4.8 | 1610 | 95.2 |
| 31-35 | 2669 | 64 | 2.4 | 2605 | 97.6 |
| >35 | 1686 | 34 | 2.0 | 1652 | 98.0 |

## Table 32: Smoking status at booking by LMC at birth NWH 2017

| | Self-employed midwife | | Private Obstetrician | | GP | | NWH Community | | NWH Diabetes | | NWH MFM | | Other DHB | | Unbooked | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=3132 | | N=2004 | | N=11 | | N=1242 | | N=126 | | N=278 | | N=18 | | N=35 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Smoking at booking** | 85 | 2.7 | 5 | 0.2 | 0 | | 151 | 12.2 | 11 | 8.7 | 33 | 11.9 | 2 | 0.7 | 16 | 45.7 |
| **Not smoking** | 3047 | 97.3 | 1999 | 99.8 | 11 | 100.0 | 1091 | 87.8 | 115 | 91.3 | 245 | 88.1 | 16 | 5.8 | 19 | 54.3 |

## Table 33: BMI ≥25 by deprivation quintile and prioritised maternal ethnicity NWH 2017

| Ethnicities | Total | | | Dep Quintile 1 | | | Dep Quintile 2 | | | Dep Quintile 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | n | % | N | n | % | N | n | % |
| **All** | **6846** | **2792** | **40.8** | 1323 | 369 | 27.9 | 1485 | 518 | 34.9 | 1466 | 589 | 40.2 |
| **Māori** | **435** | **293** | **67.4** | 30 | 15 | 50.0 | 57 | 41 | 71.9 | 78 | 54 | 69.2 |
| **Pacific** | **733** | **616** | **84.0** | 25 | 16 | 64.0 | 75 | 55 | 73.3 | 102 | 81 | 79.4 |
| **Indian** | **703** | **322** | **45.8** | 67 | 30 | 44.8 | 141 | 61 | 43.3 | 195 | 98 | 50.3 |
| **Other Asian** | **1743** | **426** | **24.4** | 372 | 68 | 18.3 | 439 | 103 | 23.5 | 378 | 89 | 23.5 |
| **MELAA** | **327** | **144** | **44.0** | 48 | 20 | 41.7 | 59 | 29 | 49.2 | 62 | 27 | 43.5 |
| **European*** | **2905** | **991** | **34.1** | 781 | 220 | 28.2 | 714 | 229 | 32.1 | 651 | 240 | 36.9 |

| Ethnicities | Dep Quintile 4 | | | Dep Quintile 5 | | | Overseas | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | n | % | N | n | % |
| **All** | 1151 | 535 | 46.5 | 1407 | 774 | 55.0 | 14 | 7 | 50.0 |
| **Māori** | 94 | 65 | 69.1 | 176 | 118 | 67.0 | 0 | 0 | |
| **Pacific** | 134 | 116 | 86.6 | 387 | 341 | 88.1 | 10 | 7 | 70.0 |
| **Indian** | 136 | 61 | 44.9 | 164 | 72 | 43.9 | 0 | 0 | |
| **Other Asian** | 279 | 93 | 33.3 | 273 | 73 | 26.7 | 2 | 0 | |
| **MELAA** | 65 | 23 | 35.4 | 93 | 45 | 48.4 | 0 | 0 | |
| **European*** | 443 | 177 | 40.0 | 314 | 125 | 39.8 | 2 | 0 | |

* Includes NZ European and Other European

## Table 34: Deprivation Quintile (NZDep13) by prioritised maternal ethnicity NWH 2017

| Quintile | Māori | | Pacific | | Indian | | Other Asian | | MELAA | | NZ European | | Other European | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=435 | | N=733 | | N=703 | | N=1743 | | N=327 | | N=2106 | | N=799 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 1 | 30 | 6.9 | 25 | 3.4 | 67 | 9.5 | 372 | 21.3 | 48 | 14.7 | 557 | 26.4 | 224 | 28.0 |
| 2 | 57 | 13.1 | 75 | 10.2 | 141 | 20.1 | 439 | 25.2 | 59 | 18.0 | 516 | 24.5 | 198 | 24.8 |
| 3 | 78 | 17.9 | 102 | 13.9 | 195 | 27.7 | 378 | 21.7 | 62 | 19.0 | 491 | 23.3 | 160 | 20.0 |
| 4 | 94 | 21.6 | 134 | 18.3 | 136 | 19.3 | 279 | 16.0 | 65 | 19.9 | 319 | 15.1 | 124 | 15.5 |
| 5 | 176 | 40.5 | 387 | 52.8 | 164 | 23.3 | 273 | 15.7 | 93 | 28.4 | 222 | 10.5 | 92 | 11.5 |
| Overseas Resident | 0 | | 10 | 1.4 | 0 | | 2 | 0.1 | 0 | | 1 | 0.05 | 1 | 0.1 |

## Table 35: Deprivation Quintile (NZ Dep13) and maternal age (yrs at birth) NWH 2017

| Deprivation quintile | ≤20 | | 21-25 | | 26-30 | | 31-35 | | 36-40 | | >40 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=162 | | N=637 | | N=1692 | | N=2669 | | N=1395 | | N=291 | |
| | n | % | n | % | n | % | n | % | n | % | n | % |
| 1 | 5 | 3.1 | 56 | 8.8 | 243 | 14.4 | 587 | 22.0 | 353 | 25.3 | 79 | 27.1 |
| 2 | 20 | 12.3 | 71 | 11.1 | 339 | 20.0 | 641 | 24.0 | 343 | 24.6 | 71 | 24.4 |
| 3 | 27 | 16.7 | 122 | 19.2 | 384 | 22.7 | 571 | 21.4 | 290 | 20.8 | 72 | 24.7 |
| 4 | 32 | 19.8 | 130 | 20.4 | 317 | 18.7 | 432 | 16.2 | 209 | 15.0 | 31 | 10.7 |
| 5 | 77 | 47.5 | 255 | 40.0 | 408 | 24.1 | 435 | 16.3 | 194 | 13.9 | 38 | 13.1 |
| Overseas resident | 1 | 0.6 | 3 | 0.5 | 1 | 0.1 | 3 | 0.1 | 6 | 0.4 | 0 | |

## Table 36: LMC at birth NWH 2011-2017

| | 2011 n=7523 | | 2012 n=7695 | | 2013 n=7223 | | 2014 n=7400 | | 2015 n=6933 | | 2016 n=7241 | | 2017 N=6846 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Self-employed midwife | 3552 | 46.8 | 3654 | 47.5 | 3446 | 47.7 | 3561 | 48.1 | 3341 | 48.2 | 3533 | 48.8 | 3132 | 45.7 |
| Private Obstetrician | 1672 | 22.2 | 1823 | 23.7 | 1862 | 25.8 | 1843 | 24.9 | 1854 | 26.7 | 1919 | 26.5 | 2004 | 29.3 |
| General Practitioner | 56 | 0.7 | 45 | 0.6 | 17 | 0.2 | 20 | 0.3 | 16 | 0.2 | 11 | 0.2 | 11 | 0.2 |
| NWH Community | 1387 | 18.4 | 1447 | 18.8 | 1336 | 18.5 | 1408 | 19.0 | 1234 | 17.8 | 1326 | 18.3 | 1242 | 18.1 |
| NWH Diabetes | 422 | 5.6 | 280 | 3.6 | 201 | 2.8 | 214 | 2.9 | 151 | 2.2 | 128 | 1.8 | 126 | 1.8 |
| NWH MFM | 377 | 5.0 | 354 | 4.6 | 300 | 4.2 | 281 | 3.8 | 276 | 4.0 | 255 | 3.5 | 278 | 4.1 |
| Other DHB | 50 | 0.7 | 42 | 0.5 | 33 | 0.5 | 36 | 0.5 | 32 | 0.5 | 29 | 0.4 | 18 | 0.3 |
| Unbooked | 37 | 0.5 | 50 | 0.6 | 28 | 0.4 | 37 | 0.5 | 29 | 0.4 | 40 | 0.6 | 35 | 0.5 |

## Table 37: LMC at birth and maternal age (years at birth) NWH 2017

| | Total | ≤20 | | 21-25 | | 26-30 | | 31-35 | | 36-40 | | >40 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **6846** | **162** | **2.4** | **637** | **9.3** | **1692** | **24.7** | **2669** | **39.0** | **1395** | **20.4** | **291** | **4.3** |
| Self-employed midwife | 3132 | 57 | 1.8 | 306 | 9.8 | 892 | 28.5 | 1249 | 39.9 | 546 | 17.4 | 82 | 2.6 |
| Private Obstetrician | 2004 | 4 | 0.2 | 31 | 1.5 | 317 | 15.8 | 913 | 45.6 | 587 | 29.3 | 152 | 7.6 |
| General Practitioner | 11 | 0 | | 1 | 9.1 | 0 | | 6 | 54.5 | 4 | 36.4 | 0 | |
| NWH Community | 1242 | 81 | 6.5 | 229 | 18.4 | 369 | 29.7 | 346 | 27.9 | 180 | 14.5 | 37 | 3.0 |
| NWH Diabetes | 126 | 4 | 3.2 | 14 | 11.1 | 28 | 22.2 | 47 | 37.3 | 23 | 18.3 | 10 | 7.9 |
| NWH MFM | 278 | 11 | 4.0 | 38 | 13.7 | 72 | 25.9 | 99 | 35.6 | 49 | 17.6 | 9 | 3.2 |
| Other DHB | 18 | 1 | 5.6 | 4 | 22.2 | 4 | 22.2 | 6 | 33.3 | 3 | 16.7 | 0 | |
| Unbooked | 35 | 4 | 11.4 | 14 | 40.0 | 10 | 28.6 | 3 | 8.6 | 3 | 8.6 | 1 | 2.9 |

## Table 38: LMC at birth and prioritised maternal ethnicity NWH 2017

| | Total | Māori | | Pacific | | Indian | | Other Asian | | MELAA | | European | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **6846** | **435** | **6.4** | **733** | **10.7** | **703** | **10.3** | **1743** | **25.5** | **327** | **4.8** | **2905** | **42.4** |
| **Self-employed midwife** | 3132 | 170 | 5.4 | 246 | 7.9 | 366 | 11.7 | 965 | 30.8 | 148 | 4.7 | 1237 | 39.5 |
| **Private Obstetrician** | 2004 | 35 | 1.7 | 37 | 1.8 | 128 | 6.4 | 463 | 23.1 | 59 | 2.9 | 1282 | 64.0 |
| **General Practitioner** | 11 | 0 | | 1 | 9.1 | 0 | | 8 | 72.7 | 0 | | 2 | 18.2 |
| **NWH Community** | 1242 | 157 | 12.6 | 340 | 27.4 | 171 | 13.8 | 250 | 20.1 | 107 | 8.6 | 217 | 17.5 |
| **NWH Diabetes** | 126 | 10 | 7.9 | 41 | 32.5 | 21 | 16.7 | 22 | 17.5 | 2 | 1.6 | 30 | 23.8 |
| **NWH MFM** | 278 | 45 | 16.2 | 48 | 17.3 | 16 | 5.8 | 34 | 12.2 | 10 | 3.6 | 125 | 45.0 |
| **Other DHB** | 18 | 5 | 27.8 | 4 | 22.2 | 0 | | 0 | | 0 | | 9 | 50.0 |
| **Unbooked** | 35 | 13 | 37.1 | 16 | 45.7 | 1 | 2.9 | 1 | 2.9 | 1 | 2.9 | 3 | 8.6 |

## Table 39: LMC at birth and parity NWH 2017

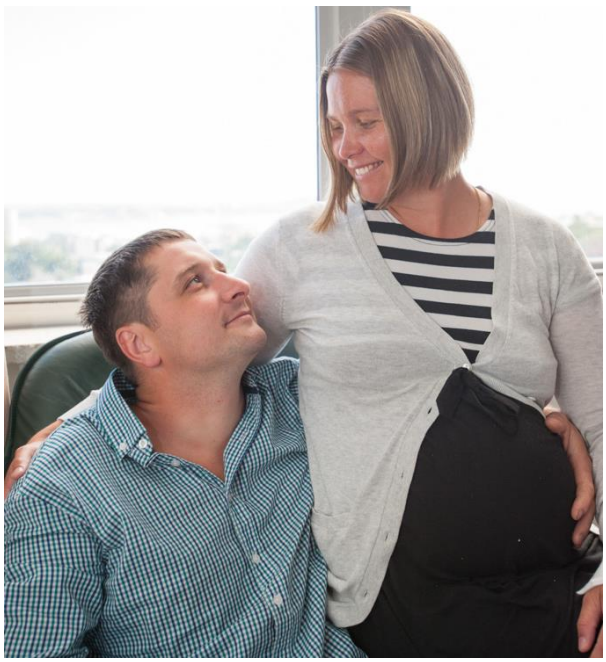
| | Total | Nullipara | | Multipara | |
|---|---|---|---|---|---|
| | N | n | % | n | % |
| **Total** | **6846** | **3343** | **48.8** | **3503** | **51.2** |
| **Self-employed midwife** | 3132 | 1587 | 50.7 | 1545 | 49.3 |
| **Private Obstetrician** | 2004 | 1060 | 52.9 | 944 | 47.1 |
| **General Practitioner** | 11 | 1 | 9.1 | 10 | 90.9 |
| **NWH Community** | 1242 | 527 | 42.4 | 715 | 57.6 |
| **NWH Diabetes** | 126 | 42 | 33.3 | 84 | 66.7 |
| **NWH MFM** | 278 | 108 | 38.8 | 170 | 61.2 |
| **Other DHB** | 18 | 9 | 50.0 | 9 | 50.0 |
| **Unbooked** | 35 | 9 | 25.7 | 26 | 74.3 |

## Table 40: Deprivation decile (NZDep13) by LMC NWH 2017

| Deprivation decile | Self-employed midwife | | Private Obstetrician | | General Practitioner | | NWH Community | | NWH Diabetes | | NWH MFM | | Other DHB | | Unbooked | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=3132 | | N=2004 | | N=11 | | N=1242 | | N=126 | | N=278 | | N=18 | | N=35 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **1** | 176 | 5.6 | 285 | 14.2 | 3 | 27.3 | 37 | 3.0 | 3 | 2.4 | 11 | 4.0 | 1 | 5.6 | 1 | 2.9 |
| **2** | 319 | 10.2 | 403 | 20.1 | 3 | 27.3 | 62 | 5.0 | 5 | 4.0 | 13 | 4.7 | 0 | | 1 | 2.9 |
| **3** | 363 | 11.6 | 324 | 16.2 | 1 | 9.1 | 84 | 6.8 | 9 | 7.1 | 22 | 7.9 | 0 | | 0 | |
| **4** | 321 | 10.2 | 224 | 11.2 | 2 | 18.2 | 92 | 7.4 | 12 | 9.5 | 30 | 10.8 | 1 | 5.6 | 0 | |
| **5** | 341 | 10.9 | 178 | 8.9 | 1 | 9.1 | 82 | 6.6 | 14 | 11.1 | 20 | 7.2 | 3 | 16.7 | 2 | 5.7 |
| **6** | 431 | 13.8 | 194 | 9.7 | 0 | | 148 | 11.9 | 16 | 12.7 | 34 | 12.2 | 0 | | 2 | 5.7 |
| **7** | 288 | 9.2 | 140 | 7.0 | 0 | | 98 | 7.9 | 15 | 11.9 | 28 | 10.1 | 0 | | 2 | 5.7 |
| **8** | 288 | 9.2 | 100 | 5.0 | 0 | | 141 | 11.4 | 13 | 10.3 | 27 | 9.7 | 2 | 11.1 | 9 | 25.7 |
| **9** | 363 | 11.6 | 96 | 4.8 | 1 | 9.1 | 236 | 19.0 | 25 | 19.8 | 44 | 15.8 | 6 | 33.3 | 10 | 28.6 |
| **10** | 240 | 7.7 | 57 | 2.8 | 0 | | 259 | 20.9 | 12 | 9.5 | 45 | 16.2 | 5 | 27.8 | 8 | 22.9 |
| **Overseas Resident** | 2 | 0.1 | 3 | 0.1 | 0 | | 3 | 0.2 | 2 | 1.6 | 4 | 1.4 | 0 | | 0 | |

**Table 41: Demographic characteristics of standard and non-standard primipara NWH 2017**

| | Total primipara | Standard primipara | | Non-standard primipara | |
|---|---|---|---|---|---|
| | N | n | % | n | % |
| **Total** | **3343** | **1124** | **33.6** | **2219** | **66.4** |
| **Age** | | | | | |
| ≤20 | 135 | 24 | 17.8 | 111 | 82.2 |
| 21-25 | 380 | 184 | 48.4 | 196 | 51.6 |
| 26-30 | 1028 | 464 | 45.1 | 564 | 54.9 |
| 31-35 | 1245 | 452 | 36.3 | 793 | 63.7 |
| 36-40 | 449 | 0 | | 449 | 100.0 |
| >40 | 106 | 0 | | 106 | 100.0 |
| **Ethnicity (prioritised)** | | | | | |
| Māori | 169 | 39 | 23.1 | 130 | 76.9 |
| Pacific | 256 | 85 | 33.2 | 171 | 66.8 |
| Indian | 421 | 172 | 40.9 | 249 | 59.1 |
| Other Asian | 881 | 359 | 40.7 | 522 | 59.3 |
| MELAA | 153 | 61 | 39.9 | 92 | 60.1 |
| European | 1463 | 408 | 27.9 | 1055 | 72.1 |
| **LMC at Birth** | | | | | |
| Self-employed midwife | 1587 | 586 | 36.9 | 1001 | 63.1 |
| Private Obstetrician | 1060 | 341 | 32.2 | 719 | 67.8 |
| General Practitioner | 1 | 0 | | 1 | 100.0 |
| NWH Community | 527 | 168 | 31.9 | 359 | 68.1 |
| NWH Diabetes | 42 | 0 | | 42 | 100.0 |
| NWH MFM | 108 | 27 | 25.0 | 81 | 75.0 |
| Other DHB | 9 | 0 | | 9 | 100.0 |
| Unbooked | 9 | 2 | 22.2 | 7 | 77.8 |
| **Smoking** | | | | | |
| Smoking at booking | 96 | 19 | 19.8 | 77 | 80.2 |
| Not currently smoking | 3247 | 1105 | 34.0 | 2142 | 66.0 |
| Missing | 0 | 0 | | 0 | |





# CHAPTER 5

# ANTENATAL COMPLICATIONS

## 5.1 Preterm birth

Preterm birth is defined as birth prior to 37 completed weeks. Since 2004, iatrogenic birth has been defined as induction of labour (including induction for preterm premature rupture of membranes (PPROM)), elective Caesarean section and emergency Caesarean before the onset of labour.

### Findings

National Women's Health has continued to see a significant downward trend in rates of preterm birth with only 7.9% of our population birthing before 37 weeks in 2017. This compares very favorably with a rate of 9.7% ten years ago (**Table 43**). This is a significant achievement at a time when rates of preterm birth nationally have remained static (**Figure 40**) and in many areas of the world rates of preterm birth are increasing.

**Figure 38 Preterm birth rate 32-36 weeks (mothers) NWH 2004-2017**

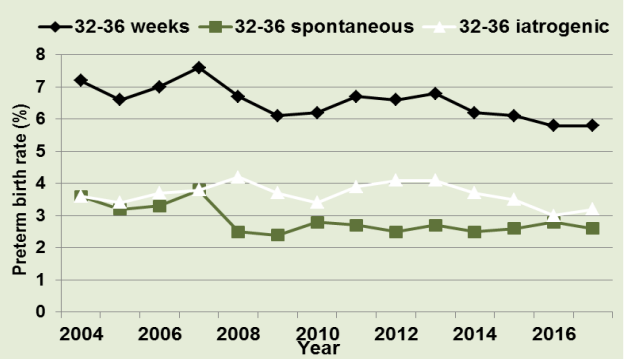
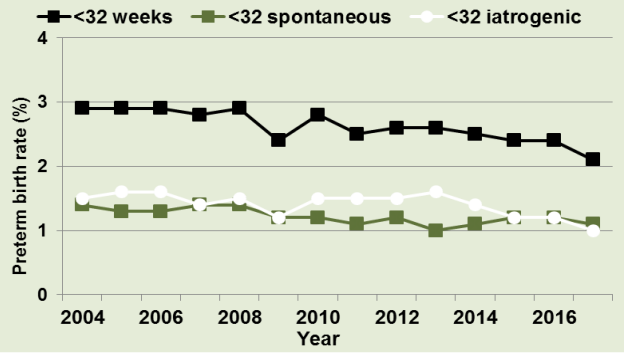



**Figure 39: Preterm birth rate < 32 weeks (mothers) NWH 2004-2017**




The reductions in the rates of preterm birth are seen across all groups, by gestational age and indication for birth with significant trends over time (2006-2017) for iatrogenic birth <32 weeks (p=0.005), iatrogenic birth 32-36 weeks (p=0.005), spontaneous birth <32 weeks (p=0.03) and spontaneous 32-36 weeks (p=0.0003) (**Figure 38** and **Figure 39**). It is therefore very likely that a number of different approaches and interventions are contributing to these changes. National Women's Health has promoted early adoption of practice change in a number of areas of antenatal care once supported by high quality evidence. Examples include; the use of aspirin (and calcium) from early in the second trimester of pregnancy for the prevention and amelioration of preeclampsia and small for gestational age pregnancy which may have impacted on both early and late iatrogenic preterm birth and the avoidance of unnecessary late iatrogenic preterm birth in cases of PPROM and hypertensive disease at 34-37 weeks. A number of factors may have also contributed to the reduction in spontaneous preterm birth including changes in smoking in pregnancy behavior, the introduction of a formalised preterm birth prevention clinic and an improved awareness and identification of risk factors for preterm birth.

National Women's Health continues to see more preterm births as a consequence of iatrogenic delivery rather than spontaneous birth (4.2% versus 3.9% respectively) which is the converse to that expected from a general pregnant population. This may in part reflect the inclusion of induction of labour after PPROM in the category of iatrogenic preterm birth within NWH data (27 babies, 0.4%) but is also likely to reflect our population. National Women's Health provides tertiary level care for women with significant medical and obstetric risk who would usually be resident in other DHB areas. By the nature of their pregnancy risk these women are more likely to require preterm birth on maternal and/or fetal grounds.

**Figure 40: NZ Maternity Indicators 2016: Preterm birth NWH and NZ secondary/tertiary facility rates 2009-2016**


Error bars represent the 95% confidence interval for the facility rate

The higher risk population cared for at NWH along with transfers of care for level 3 neonatal services just prior to birth would suggest that our rates of preterm birth should be higher than other secondary and tertiary units across the country With this in mind, it should be acknowledged and applauded that, by the 2016 New Zealand Maternity Clinical Indicator data, NWH has for the first time had a lower preterm rate than the national average of all

secondary and tertiary units across the country (**Figure 40**).

There appears to be little change in recent years in the demography of those delivering preterm although trends in reducing rates may be seen in some of these groups (**Figure 36**). Māori women continue to have rates of spontaneous and iatrogenic preterm birth that are almost twice the overall population rate; 14.9% in 2017 (16.1% in 2016). It is unlikely that Māori ethnicity itself is a significant risk factor for preterm birth but ethnicity may reflect other socio-economic risk factors. Interestingly these data do not support the concept that high rates of spontaneous preterm birth are solely related to higher deprivation scores. However, Māori are likely to be over-represented in the other two groups at highest risk of preterm birth; women who smoke in pregnancy and those who are young (≤20 years of age).

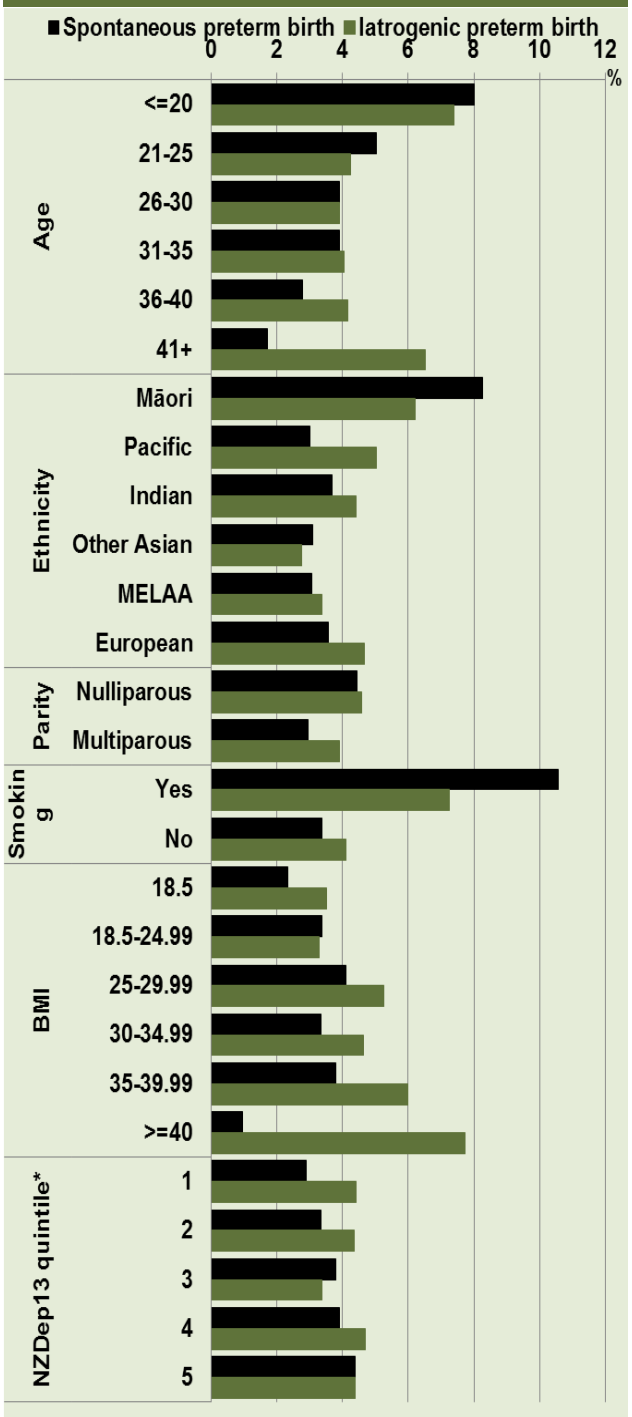
Fewer than 5% of our pregnant population are current smokers at the time of booking for pregnancy care, but for those that do continue to smoke the rate of spontaneous preterm birth is elevated; 10.6% compared to 3.4% for non-smokers. Continued efforts to help all women become smoke-free in pregnancy will positively impact on preterm birth prevention but more tailored efforts to support Māori women to change their smoking practices must be considered, for example, the use of incentive programmes.

Young mothers are more likely to experience both spontaneous and iatrogenic preterm birth (overall 15.4%). The reasons for this are multifactorial and although only representing a relatively small number of mothers birthing at NWH (n=162) still deserve consideration of the causes to allow for opportunity for prevention much of which is likely to involve education and engagement in antenatal care.

Almost 70% of twin pregnancies have given birth <37 weeks with two thirds of those being planned early births. Although mothers and fetuses of multiple pregnancy are at increased risk of complications that may necessitate earlier birth, the risks of preterm infant morbidity become two fold for each family and so even more careful consideration of the need for indicated birth should be made.

Early prediction of those at risk of spontaneous preterm birth remains an elusive but essential goal. Identifying those at risk early allows the best opportunity to offer surveillance and preventative therapies and to engage the most appropriate at risk groups in future research of potential therapies. A lack of staffing resources within the maternal fetal medicine and general obstetric services in 2016-2017 limited the expansion of the Preterm Birth Clinic. However, in 2018 two clinic sessions per week are now available allowing wider distribution of referral criteria and the opportunity to see more women within our region who have significant risk factors for spontaneous preterm birth.

**Figure 41: Demography of preterm birth (<37 weeks) NWH 2017**




*Missing data not included

Reported improved survival rates for babies born at peri-viable gestations has led to a change in the approach to the care offered to women giving birth at $23^{+0}$-$23^{+6}$ weeks at NWH. Until late 2015 the vast majority of mothers at imminent risk of birth $23^{+0}$-$23^{+6}$ weeks were not offered the opportunity to consider active intervention. Since that time we

have recommended that an individualised, multidisciplinary and family-centered approach is offered to all women and their families/whānau. In appropriately selected cases active intervention and resuscitation are offered but this is not considered to be standard routine care. This approach is likely to be reflected in a document soon to be released by a multi-disciplinary working group led by the New Zealand Newborn Network. This document provides national guidance for the antenatal, intrapartum and postnatal care of the peri-viable fetus and infant. Once this guidance is available across the country we may see a small but significant rise in 23 week births at NWH with more antenatal transfers from secondary units.

In 2017 we continued to see a very low number of births at peri-viable gestations with only seven of 10 births at $23^{+0}$-$23^{+6}$ weeks being live-born. There were 4/7 (43%) survivors at 28 days of age which compares favourably to 1/5 (20%) survivors in 2016 and supports the concept of improved survival with a more active approach to intervention. However, the number of annual births at this gestation is too small to make year-on-year comparisons and trends over time will be more meaningful.

In 2017 we released the ADHB guideline 'Preterm Labour (PTL) – Management of Threatened and Active PTL' to streamline and optimise the care of women presenting with signs and symptoms of preterm labour. In 2018 the guideline has been revised and updated to reflect new evidence, including that generated at NWH. Reporting of the Australian Placental Transfusion Study (APTS) and a systematic review including a further 17 randomised trials has confirmed that delaying cord clamping for 60 seconds after preterm birth reduces hospital mortality by more than 30% (OR 0.68, 95% CI 0.52-0.90). The more local Biomarkers for Preterm Birth Study has demonstrated that a transition from qualitative to quantitative fetal fibronectin testing in women presenting with symptoms of PTL and a change in threshold for interventions will reduce the need for antenatal admission without a compromise to care for those that deliver within one week of testing.

National Women's Health remains very committed to clinical trials research exploring ways to reduce spontaneous and iatrogenic preterm birth and to reduce the morbidity and mortality associated with it. In 2017 a number of multi-centre trials completed recruitment. The results of the STRIDER NZAus trial (a randomised placebo controlled trial of sildenafil in severe early onset fetal growth restriction) led by Auckland investigators were presented at the Perinatal Society of Australia and New Zealand (PSANZ) Annual Congress in Auckland in March 2018. National Women's Health made a significant contribution (100 babies recruited) to the largest single trial of delayed cord clamping in early preterm birth (APTS). Results were published in the New England Journal of Medicine in late 2017 and the trial was the winner of the Australian Clinical Trial of the Year Award (2017). MAGENTA (Magnesium sulphate at 30-34 weeks Gestational age Neuroprotection Trial) has completed recruitment (147 women recruited at NWH) with two year assessments underway.

## Summary and Implications

Being born too early continues to impose risks of death and life-long disability and disease. Excitingly National Women's Health preterm birth rates are reducing. Although some preterm births are unavoidable and in some cases essential when the mother or fetus is significantly compromised we must continue to work to reduce the rate of spontaneous preterm birth and improve the management of maternal and fetal conditions to safely reduce the need for iatrogenic preterm birth. Measures to do this include; a more targeted approach to smoke-change in pregnancy with a focus on developing effective ways to support Māori women, expansion of preterm birth prevention services, formalised education programmes for women and health care professionals that include early implementation of practice change supported by high quality published research and continued involvement in relevant clinical trials.

## 5.2 Data tables: Preterm birth

**Table 42: Perinatal outcome of preterm babies by gestation at birth NWH 2017**

| Gestation | Births | Fetal deaths | Live births | % Liveborn | Neonatal Death | % of live births surviving ≥ 28 days |
|---|---|---|---|---|---|---|
| **20** | 7 | 5 | 2 | 29 | 2 | 0 |
| **21** | 8 | 7 | 1 | 13 | 1 | 0 |
| **22** | 4 | 3 | 1 | 25 | 1 | 0 |
| **23** | 10 | 3 | 7 | 70 | 4 | 43 |
| **24** | 11 | 2 | 9 | 82 | 3 | 67 |
| **25** | 16 | 5 | 11 | 69 | 4 | 64 |
| **26** | 15 | 1 | 14 | 93 | 2 | 86 |
| **27** | 21 | 1 | 20 | 95 | 1 | 95 |
| **28** | 10 | 0 | 10 | 100 | 1 | 90 |
| **29** | 19 | 2 | 17 | 89 | 1 | 94 |
| **30** | 12 | 2 | 10 | 83 | 0 | 100 |
| **31** | 32 | 1 | 31 | 97 | 1 | 97 |
| **32** | 44 | 2 | 42 | 95 | 1 | 98 |
| **33** | 39 | 2 | 37 | 95 | 1 | 97 |
| **34** | 71 | 3 | 68 | 96 | 1 | 99 |
| **35** | 101 | 1 | 100 | 99 | 1 | 99 |
| **36** | 210 | 3 | 207 | 99 | 4 | 98 |
| **Totals** | 630 | 43 | 587 | 93 | 29 | 95 |

**Table 43: Rates of total, spontaneous and iatrogenic preterm birth NWH 2008-2017**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total birthing women** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| Women birthing preterm (<37) total | 733 | 658 | 689 | 684 | 709 | 673 | 647 | 592 | 597 | 542 |
| Incidence % | 9.7 | 8.5 | 8.9 | 9.1 | 9.2 | 9.3 | 8.7 | 8.5 | 8.2 | 7.9 |
| Women birthing <32 weeks | 222 | 185 | 212 | 190 | 203 | 185 | 185 | 168 | 172 | 144 |
| Incidence % | 2.9 | 2.4 | 2.8 | 2.5 | 2.6 | 2.6 | 2.5 | 2.4 | 2.4 | 2.1 |
| **Spontaneous and iatrogenic preterm birth** | | | | | | | | | | |
| Spontaneous 32-36 weeks | 188 | 184 | 218 | 200 | 194 | 193 | 187 | 179 | 205 | 176 |
| Incidence % | 2.5 | 2.4 | 2.8 | 2.7 | 2.5 | 2.7 | 2.5 | 2.6 | 2.8 | 2.6 |
| Spontaneous <32 weeks | 105 | 91 | 94 | 79 | 90 | 72 | 79 | 84 | 84 | 76 |
| Incidence % | 1.4 | 1.2 | 1.2 | 1.1 | 1.2 | 1.0 | 1.1 | 1.2 | 1.2 | 1.1 |
| Iatrogenic 32-36 weeks | 323 | 289 | 259 | 294 | 312 | 295 | 275 | 245 | 220 | 222 |
| Incidence % | 4.2 | 3.7 | 3.4 | 3.9 | 4.1 | 4.1 | 3.7 | 3.5 | 3.0 | 3.2 |
| Iatrogenic <32 weeks | 117 | 94 | 118 | 111 | 113 | 113 | 106 | 84 | 88 | 68 |
| Incidence % | 1.5 | 1.2 | 1.5 | 1.5 | 1.5 | 1.6 | 1.4 | 1.2 | 1.2 | 1.0 |
| **Total preterm babies** | **843** | **769** | **793** | **787** | **820** | **774** | **759** | **691** | **879** | **632** |
| Total babies 32-36 weeks | 590 | 555 | 547 | 573 | 592 | 568 | 554 | 505 | 680 | 465 |
| Total babies <32 weeks | 253 | 214 | 246 | 214 | 228 | 206 | 205 | 186 | 199 | 167 |

**Table 44: Preterm birth and maternal demographic characteristics NWH 2017**

| | Total | Total preterm birth | | Iatrogenic preterm | | Spontaneous preterm | |
|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % |
| **Total** | **6846** | **542** | **7.9** | **290** | **4.2** | **252** | **3.7** |
| **Age (years)** | | | | | | | |
| ≤20 | 162 | 25 | 15.4 | 12 | 7.4 | 13 | 8.0 |
| 21-25 | 637 | 59 | 9.3 | 27 | 4.2 | 32 | 5.0 |
| 26-30 | 1692 | 132 | 7.8 | 66 | 3.9 | 66 | 3.9 |
| 31-35 | 2669 | 205 | 7.7 | 108 | 4.0 | 97 | 3.6 |
| 36-40 | 1395 | 97 | 7.0 | 58 | 4.2 | 39 | 2.8 |
| >40 | 291 | 24 | 8.2 | 19 | 6.5 | 5 | 1.7 |
| **Ethnicity** | | | | | | | |
| Māori | 435 | 63 | 14.5 | 27 | 6.2 | 36 | 8.3 |
| Pacific | 733 | 59 | 8.0 | 37 | 5.0 | 22 | 3.0 |
| Indian | 703 | 57 | 8.1 | 31 | 4.4 | 26 | 3.7 |
| Other Asian | 1743 | 102 | 5.9 | 48 | 2.8 | 54 | 3.1 |
| MELAA | 327 | 21 | 6.4 | 11 | 3.4 | 10 | 3.1 |
| European | 2905 | 240 | 8.3 | 136 | 4.7 | 104 | 3.6 |
| **Parity** | | | | | | | |
| Nulliparous | 3343 | 302 | 9.0 | 153 | 4.6 | 149 | 4.5 |
| Multiparous | 3503 | 240 | 6.9 | 137 | 3.9 | 103 | 2.9 |
| **Plurality** | | | | | | | |
| Singleton | 6719 | 453 | 6.7 | 233 | 3.5 | 220 | 3.3 |
| Twins | 126 | 88 | 69.8 | 57 | 45.2 | 31 | 24.6 |
| Triplets | 1 | 1 | 100.0 | 0 | | 1 | 100.0 |
| **Smoking at booking** | | | | | | | |
| Currently smoking | 303 | 54 | 17.8 | 22 | 7.3 | 32 | 10.6 |
| No or not in past month | 6543 | 488 | 7.5 | 268 | 4.1 | 220 | 3.4 |
| **BMI** | | | | | | | |
| <18.5 | 257 | 15 | 5.8 | 9 | 3.5 | 6 | 2.3 |
| 18.5-24.99 | 3723 | 249 | 6.7 | 123 | 3.3 | 126 | 3.4 |
| 25-29.99 | 1578 | 148 | 9.4 | 83 | 5.3 | 65 | 4.1 |
| 30-34.99 | 690 | 55 | 8.0 | 32 | 4.6 | 23 | 3.3 |
| 35-39.99 | 317 | 31 | 9.8 | 19 | 6.0 | 12 | 3.8 |
| ≥40 | 207 | 18 | 8.7 | 16 | 7.7 | 2 | 1.0 |
| Missing | 74 | 26 | 35.1 | 8 | 10.8 | 18 | 24.3 |
| **Deprivation quintile (NZ Dep 13)** | | | | | | | |
| 1 | 1246 | 91 | 7.3 | 55 | 4.4 | 36 | 2.9 |
| 2 | 1490 | 115 | 7.7 | 65 | 4.4 | 50 | 3.4 |
| 3 | 1449 | 104 | 7.2 | 49 | 3.4 | 55 | 3.8 |
| 4 | 1148 | 99 | 8.6 | 54 | 4.7 | 45 | 3.9 |
| 5 | 1391 | 122 | 8.8 | 61 | 4.4 | 61 | 4.4 |
| Missing | 122 | 11 | 9.0 | 6 | 4.9 | 5 | 4.1 |

## 5.3 Small and large for gestational age babies

Customised birthweight centiles, which adjust size at birth for gestation, gender, maternal ethnicity, height, booking weight, and parity, are used to define size at birth in the maternity service at NWH.

From 2013, an updated algorithm based on more recent NWH data has been applied to the data to determine customised birthweight centiles (Anderson et al BJOG 2012; DOI: 10.1111/j.1471-0528.2012.03313.x.)

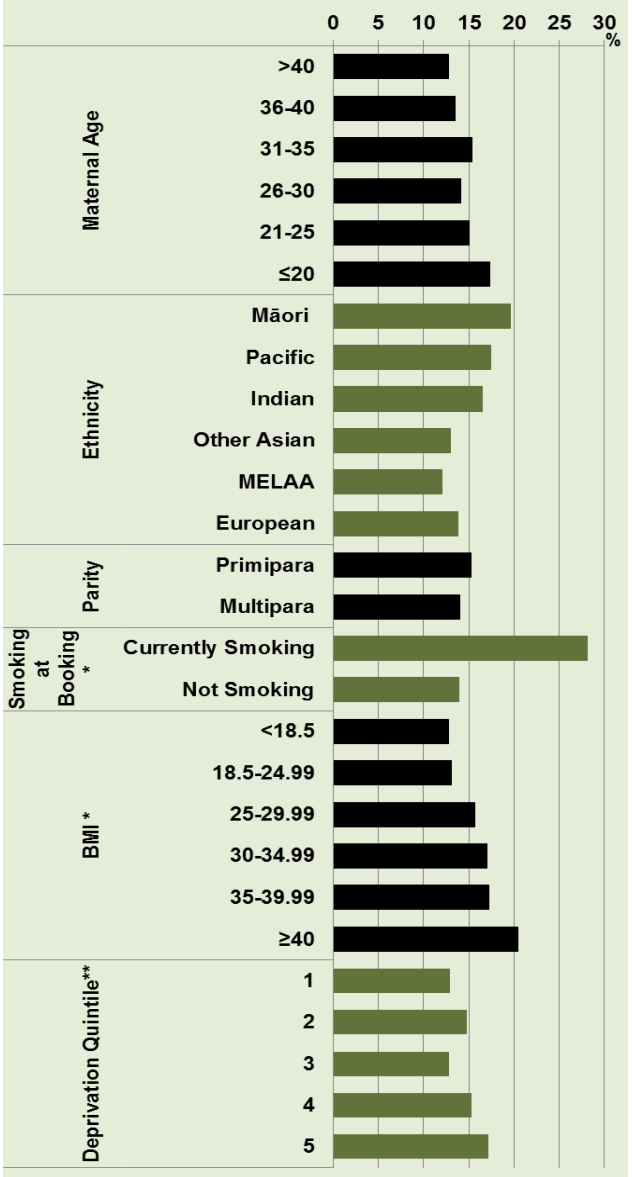
Small for gestational age (SGA) is defined as birthweight <10th customised centile. Customised centiles define 10% of the "normal" population as SGA with the consequence that rates of SGA in a complex population like National Women's are >10% (14.6% in 2017). LGA (large for gestational age) is defined as birthweight >90th customised centile with 7.6% of babies classified as LGA in 2017.

A customised centile was not calculated among perinatal deaths if gestation at death was less than 20 weeks, unknown, or death was suspected to have occurred more than one week prior to birth.

## Findings

Consistent with findings in previous reports, there are differences in ethnicity between mothers with SGA infants. Māori, and Pacific mothers appear to have an increased risk of SGA. In Māori women the elevated risk may be associated with higher rates of smoking and in Pacific women this may be related to associated factors such as obesity and hypertensive disorders. The increased risk of SGA among obese women (17.6%% (219/1243)) is clinically relevant as it is more difficult to detect these SGA infants before birth.

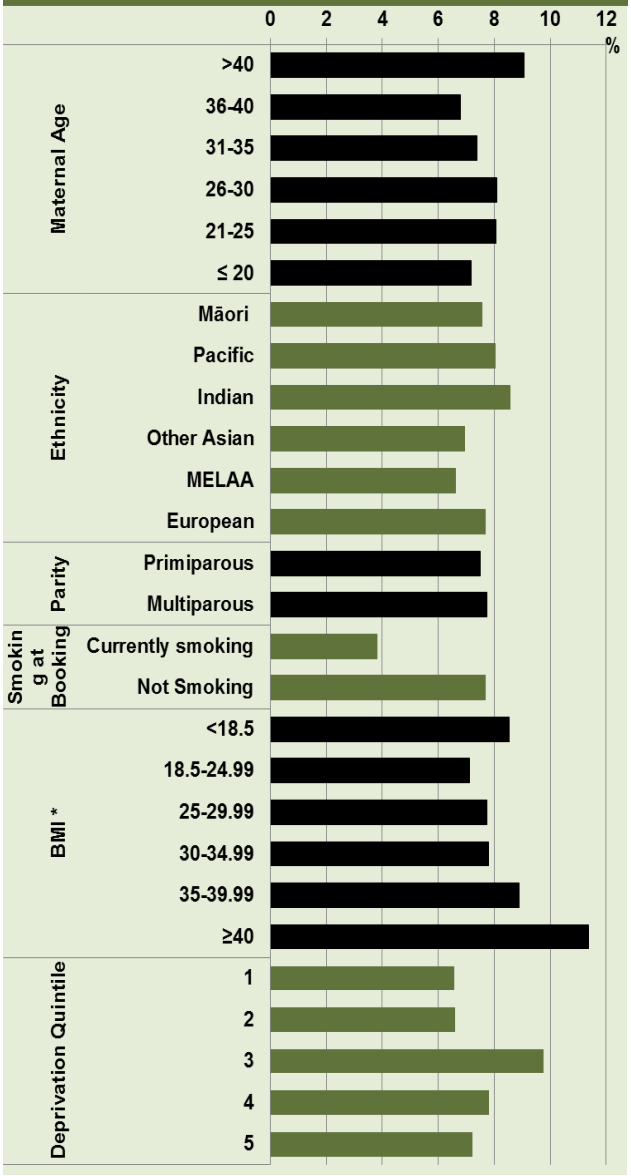
**Figure 42: Rates of SGA (customised) by demographic characteristics NWH 2017**




*missing excluded (n=94 BMI, n=1 Smoking at booking)
**overseas residents excluded (n=15)

The increased risk of SGA in obese women is also independent of other common confounders such as hypertensive disorders (Anderson et al Aust NZ J Obstet Gynecol 2012, DOI: 10.1111/ajo.12016). **Figure 42** suggests there is a likely dose dependent relationship between increasing BMI and SGA risk.

**Figure 43: Rates of LGA (customised) by demographic characteristics NWH 2017**




*missing excluded (n=77 BMI)

Consistent with other reports, women who smoke have a two-fold increase in risk of SGA infants. Ceasing smoking in early pregnancy can prevent this risk in smokers and is an important goal of antenatal care.

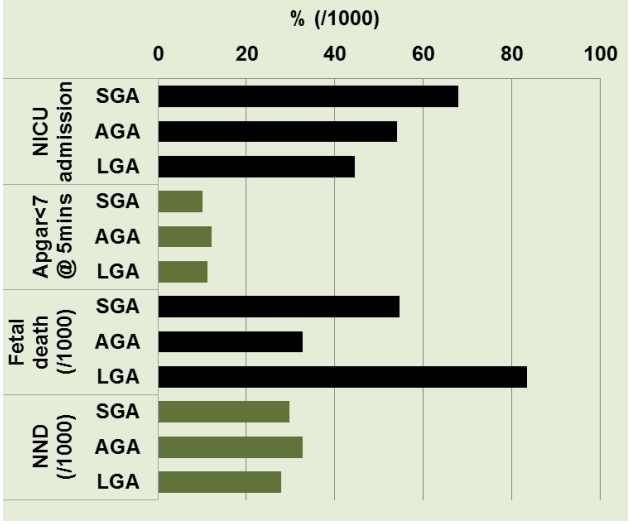
Consistent with findings in previous years, approximately one fifth of SGA infants were born preterm with 5.5% born <32 weeks. Rates of preterm delivery were not increased in LGA infants compared with AGA. Iatrogenic preterm birth (lower rates of spontaneous onset of preterm labour) is more common among SGA babies, compared with AGA or LGA babies. This is likely because of an association with preeclampsia, and antenatal

diagnosis of SGA in other "placental insufficiency" syndromes.

**Table 45: Birthweight and gestation at birth among SGA, LGA and appropriately grown (AGA) babies (n=babies) NWH 2017**

| | Customised Birthweight <10th% (SGA) N=1016 | | Customised Birthweight ≥10th% & ≤90th% (AGA) N=5421 | | Customised Birthweight >90th% (LGA) N=528 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Gestation at birth** | | | | | | |
| Term | 813 | 80.0 | 5044 | 93.0 | 485 | 91.9 |
| Preterm | 203 | 20.0 | 377 | 7.0 | 43 | 8.1 |
| <32 wks | 56 | 5.5 | 91 | 1.8 | 13 | 2.5 |
| **Median gestation (IQR) weeks** | | | | | | |
| | 38(37-39) | | 39(38-40) | | 39(38-40) | |
| **Median birth weight(IQR)g** | | | | | | |
| | 2670 (2305-2910) | | 3370 (3100-3650) | | 4120 (3830-4367) | |

**Figure 44: Outcomes among SGA, AGA, and LGA babies born preterm (<37weeks) NWH 2017 (excluding congenital abnormalities)**




After exclusion of babies with congenital abnormalities, preterm SGA infants were at higher risk of fetal death compared with AGA in 2017 but did not have an elevated risk of neonatal death.

After exclusion of babies with congenital abnormalities, there was only one death in an SGA baby born at term in 2017.

There were no statistically significant reductions in perinatal related mortality rate among SGA, AGA, or LGA non-anomalous singleton babies born from 26 weeks gestation but there appears to be a downward trend in SGA (chi square test for trend for SGA p=0.11).

**Figure 45: Outcomes among SGA, AGA and LGA babies born at term NWH 2017 (excluding congenital abnormalities)**

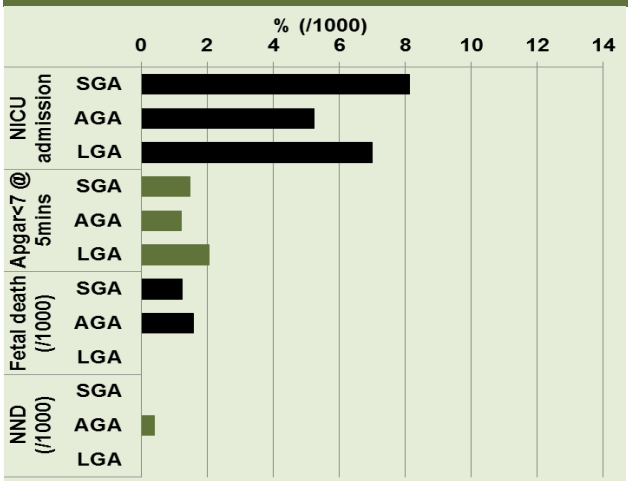
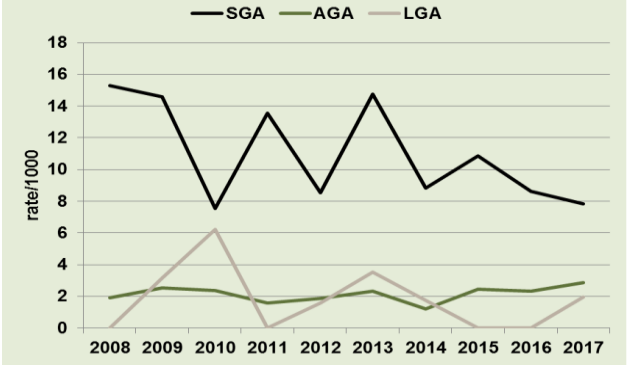
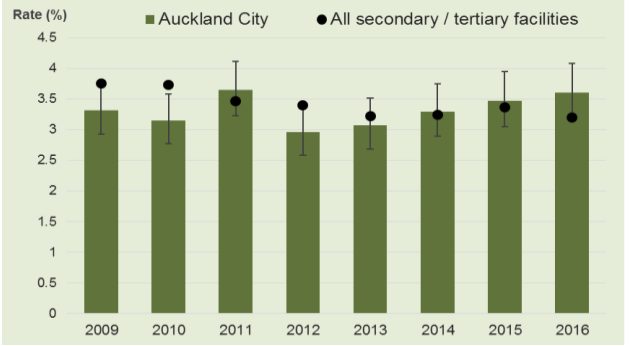



**Figure 46: Perinatal related mortality rate (/1000 births) among SGA, LGA, and AGA singleton non-anomalous babies born at ≥26 weeks 2008-2017**




## 5.4 Small babies at term

**Figure 47: NZ Maternity Indicators 2016: Small babies at term (37-42 weeks' gestation) using Intergrowth21 standard (NWH and NZ secondary/tertiary facilities 2009-2016)**




Error bars represent the 95% confidence interval for the facility rate.

Detection of poor fetal growth can reduce the risk of stillbirth by enabling enhanced surveillance and timely delivery. The small babies at term (37–42 weeks) national clinical indicators have been

developed to compare rates of SGA births at term between DHBs. SGA for this indicator is defined as birthweight <10th centile using INTERGROWTH-21 growth charts (Villar J Lancet 2014;384:857-68INTERGROWTH-21). A recent NZ publication using National Women's data (Anderson et al AMJOG 2015 DOI: 10.1016/j.ajog.2015.10.931.) showed that the rate of SGA using INTERGROWTH-21 was 4.5% and by customised standards was 11.6%. INTERGROWTH-21 detected fewer neonates with severe morbidity and therefore may not be the best standard to define SGA in NZ. However it does identify a severe sub-group of SGA babies and is useful as a clinical indicator. The rates of SGA babies by INTERGROWTH-21 born between 37 and 42 weeks at NWH in 2017 are similar to secondary and tertiary units in NZ.

## 5.5 Small babies at term born at 40–42 weeks' gestation

**Figure 48: NZ Maternity Indicators 2016: Small babies at term born at 40-42 weeks' gestation (NWH and NZ secondary/tertiary facility rates 2009-2016)**


Error bars represent the 95% confidence interval for the facility rate.

This indicator measures the proportion of SGA babies at term (37–42 weeks) who were born at 40–42 weeks'. Best practice recommends the expedited birth of babies identified as SGA by term, and generally before 40 weeks; this indicator is a measure of the proportion of unrecognised or sub-optimally managed cases. It is reassuring to see that the proportion of SGA babies who are born between 40 and 42 weeks is lower at NWH compared with all NZ secondary/tertiary facilities. This is likely to reflect increased detection and timely birth at NWH of these very small babies. This may reflect use of the GROW program, GAP training, the NZMFM SGA guideline and the NWH SGA pathway.

### Summary / Implications

These 2017 data again confirm that babies who are SGA by customised centiles have higher rates of morbidity and mortality compared with AGA babies. Women who smoke have higher rates of SGA than non-smokers. Cessation early in pregnancy with appropriate support should be the goal for all pregnant smokers. In future reports we will be interested to see whether the clinical indicator in **Figure 48** further reduces as we continue to implement the Growth Assessment Protocol of education in the DHB.

## 5.6 Data Tables: Small and large for gestational age babies

**Table 46: Rates of SGA and LGA as defined by customised birthweight centiles by demographic characteristics NWH 2017**

| | Total Babies | Customised Birthweight <10th% (SGA) | | Customised Birthweight ≥10th% & ≤90th% (AGA) | | Customised Birthweight >90th% (LGA) | |
|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % |
| **Total*** | **6974** | **1016** | **14.6** | **5421** | **77.7** | **528** | **7.6** |
| **Maternal Age** | | | | | | | |
| ≤20 | 167 | 29 | 17.4 | 126 | 75.4 | 12 | 7.2 |
| 21-25 | 646 | 97 | 15.0 | 496 | 76.8 | 52 | 8.0 |
| 26-30 | 1719 | 242 | 14.1 | 1336 | 77.7 | 139 | 8.1 |
| 31-35 | 2719 | 418 | 15.4 | 2097 | 77.1 | 201 | 7.4 |
| 36-40 | 1425 | 192 | 13.5 | 1134 | 79.6 | 97 | 6.8 |
| >40 | 298 | 38 | 12.8 | 232 | 77.9 | 27 | 9.1 |
| **Ethnicity** | | | | | | | |
| Māori | 449 | 88 | 19.6 | 327 | 72.8 | 34 | 7.6 |
| Pacific | 746 | 130 | 17.4 | 555 | 74.4 | 60 | 8.0 |
| Indian | 711 | 117 | 16.5 | 530 | 74.5 | 61 | 8.6 |
| Other Asian | 1759 | 229 | 13.0 | 1408 | 80.0 | 122 | 6.9 |
| MELAA | 332 | 40 | 12.0 | 270 | 81.3 | 22 | 6.6 |
| European | 2977 | 412 | 13.8 | 2331 | 78.3 | 229 | 7.7 |
| **Parity** | | | | | | | |
| Multipara | 3561 | 498 | 14.0 | 2786 | 78.2 | 273 | 7.7 |
| Primipara | 3413 | 518 | 15.2 | 2635 | 77.2 | 255 | 7.5 |
| **Smoking at booking** | | | | | | | |
| Currently smoking | 313 | 88 | 28.1 | 212 | 67.7 | 12 | 3.8 |
| Not smoking | 6661 | 928 | 13.9 | 5209 | 78.2 | 516 | 7.7 |
| **BMI** | | | | | | | |
| <18.5 | 258 | 33 | 12.8 | 203 | 78.7 | 22 | 8.5 |
| 18.5-24.99 | 3782 | 493 | 13.0 | 3016 | 79.7 | 269 | 7.1 |
| 25-29.99 | 1614 | 253 | 15.7 | 1232 | 76.3 | 125 | 7.7 |
| 30-34.99 | 706 | 120 | 17.0 | 530 | 75.1 | 55 | 7.8 |
| 35-39.99 | 326 | 56 | 17.2 | 241 | 73.9 | 29 | 8.9 |
| ≥40 | 211 | 43 | 20.4 | 144 | 68.2 | 24 | 11.4 |
| Missing | 77 | 18 | 23.4 | 55 | 71.4 | 4 | 5.2 |
| **Plurality** | | | | | | | |
| Singleton | 6713 | 904 | 13.5 | 5283 | 78.7 | 526 | 7.8 |
| Multiple | 252 | 112 | 44.4 | 138 | 54.8 | 2 | 0.8 |

* customised centile is not assigned to stillborn babies if gestation at death was less than 20 weeks, unknown, or death was suspected to have occurred more than one week prior to birth (n=9)

**Table 47: Onset of birth and neonatal outcomes among SGA, AGA and LGA babies at term NWH 2017 (excluding congenital abnormalities)**

| | Customised Birthweight <10th% (SGA) N=812 | | Customised Bwgt ≥10th% & ≤90th% (AGA) N=5042 | | Customised Bwgt >90th% (LGA) N=485 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Onset of birth – term** | | | | | | |
| Spontaneous labour | 245 | 30.2 | 2279 | 45.2 | 150 | 30.9 |
| Induced labour | 410 | 50.5 | 1664 | 33.0 | 172 | 35.5 |
| Elective and Prelabour Emergency CS | 157 | 19.3 | 1099 | 21.8 | 163 | 33.6 |
| **NICU admission** | | | | | | |
| Any stay | 66 | 8.1 | 264 | 5.2 | 34 | 7.0 |
| ≥2 days in NICU | 48 | 5.9 | 156 | 3.1 | 21 | 4.3 |
| **Apgar at 5 mins <7** | 12 | 1.5 | 61 | 1.2 | 10 | 2.1 |
| **Fetal death (n/1000 births)** | 1 | 1.2 | 8 | 1.6 | 0 | |
| **Neonatal death (n/1000 live births)** | 0 | | 2 | 0.4 | 0 | |

**Table 48: Onset of birth and neonatal outcomes among SGA, AGA, and LGA babies born preterm NWH 2017 (excluding congenital abnormalities)**

| | Customised Bwgt <10th% (SGA) N=202 | | Customised Bwgt ≥10th% & ≤90th% (AGA) N=367 | | Customised Bwgt >90th% (LGA) N=36 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Onset of birth** | | | | | | |
| Spontaneous labour | 59 | 29.2 | 198 | 54.0 | 22 | 61.1 |
| Induced labour | 30 | 14.9 | 46 | 12.5 | 5 | 13.9 |
| Elective and Prelabour Emergency CS | 113 | 55.9 | 123 | 33.5 | 9 | 25.0 |
| **NICU admission** | | | | | | |
| Any stay | 137 | 67.8 | 198 | 54.0 | 16 | 44.4 |
| ≥2 days in NICU | 135 | 66.8 | 187 | 51.0 | 14 | 38.9 |
| **Apgar at 5 mins <7** | 20 | 9.9 | 44 | 12.0 | 4 | 11.1 |
| **Fetal death (n/1000 births)** | 11 | 54.5 | 12 | 32.7 | 3 | 83.3 |
| **Neonatal death (n/1000 live births)** | 6 | 29.7 | 12 | 32.7 | 1 | 27.8 |

## 5.7 Multiple pregnancy

This section describes the characteristics and outcomes of mothers who gave birth to twins and triplets at NWH during 2017 and the outcomes of their babies. Our database does not enable us to differentiate between twins based on chorionicity and amnionicity.

### Findings

The rate of twin pregnancy remains stable at 1.9% of all pregnancies. In 2017 there was one set of triplets delivered at National Women's Health.

The rate of NICU admission for ≥2 days is over five times higher in twins compared to singletons at NWH (37.7% of twins versus 7.0% of singletons).

The perinatal mortality rate is over five times higher in twins compared to singletons at NWH (55.6/1000 births versus 9.5/1000 singleton births in 2017) and appears to be fairly stable. The rate of perinatal mortality has varied a great deal over the last 10 years and this probably reflects the small absolute numbers. Changes need to be interpreted with care.

In 2017 there was a range of reasons for perinatal mortality. Monochorionic diamniotic (MCDA) twins are at higher risk of fetal demise compared to dichorionic diamniotic (DCDA) twins.

Even though the majority of twins are DCDA, half of all demised twins were from MCDA twin pregnancies. In six out of eight demised MCDA twins the cause was twin to twin transfusion syndrome.

Twin to twin transfusion syndrome has a high mortality risk, and occurs in about 15% of MCDA twin pregnancies. Close monitoring and treatment by delivery or fetoscopic laser coagulation of the communicating vessels on the placental equator can reduce the risk of fetal demise, and is therefore of utmost importance. Nevertheless even with optimal management risks remain substantial.

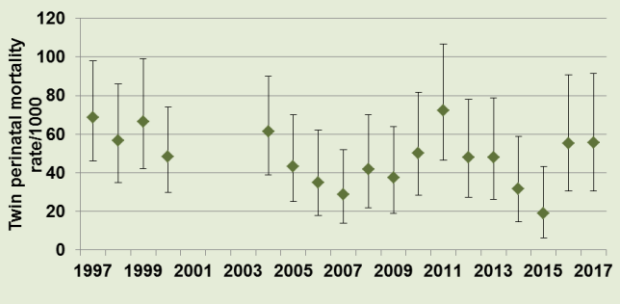
**Table 49: Mode of onset of birth among twin pregnancies (mothers) by gestation at birth NWH 2017**

| | Preterm births N=88 | | Term births N=38 | |
|---|---|---|---|---|
| | n | % | n | % |
| **Mode of onset of birth** | | | | |
| CS elective | 28 | 32 | 17 | 45 |
| CS emergency before labour | 16 | 18 | 1 | 3 |
| Induction of labour | 13 | 15 | 17 | 45 |
| Spontaneous labour | 31 | 35 | 3 | 8 |

The other half of the demised twins were from DCDA twin pregnancies. In five out of eight of these cases PPROM was either the cause of or a contributing factor to the death. Only 27% of all women with twin pregnancies go into spontaneous labour.

The policy of induction of labour by 37 weeks - as outcomes are shown to be improved with delivery around 36 weeks for MCDA twins and 37 weeks for DCDA twins - does not appear to have impacted significantly on caesarean section rates. Of all prematurely delivered twins only 35% go into spontaneous labour.

**Figure 49: Twin perinatal mortality rate (per 1000 twin babies) NWH 1997-2017 with 95% confidence intervals**




The caesarean section rate remains high at 66%, and is stable over the years.

Only 27% of all women with twin pregnancies go into spontaneous labour.

The policy of induction of labour by 37 weeks - as outcomes are shown to be improved with delivery around 36 weeks for MCDA twins and 37 weeks for DCDA twins - do not appear to have impacted significantly on caesarean section rates. Of all prematurely delivered twins only 35% go into spontaneous labour.

The caesarean section rate remains high at 66%, and is stable over the years

**Figure 50: Caesarean section rate among twin births (2004-2017)**

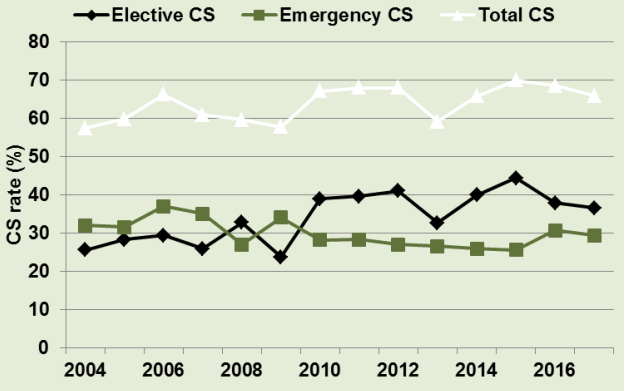



**Table 50: Perinatal-related deaths in twin pregnancies by gestation at birth NWH 2017**

| | Twin pregnancies | | | |
|---|---|---|---|---|
| | One twin died n=8 | | Both twins died n=8 | |
| Gestation at birth (weeks) | n | Outcome | n | Outcome |
| 20 – 23 | | | 4 | 2IFD; 2ENND |
| 24 – 27 | 2 | 1ENND; 1LNND | 4 | 2IFD; 1ENND; 1LNND |
| 28 – 31 | 2 | 1ENND; 1LNND | 2 | 2 IFD |
| 32 – 36 | 4 | 3LFD, 1ENND | | |
| 37 – 40 | 0 | | | |

FD=Fetal death; ENND=Early neonatal death; LNND=Late neonatal death

## Summary / Implications

Multiple pregnancy rates are steady. Perinatal mortality rates in twin pregnancies were five times higher than in singleton pregnancies in 2017. Multiple pregnancies are high risk pregnancies and should be managed in conjunction with an obstetrician. Section 88 guidelines recommend that the care of a multiple pregnancy is led by an obstetrician. Where there are monochorionic twins the risks are higher and closer monitoring is needed and regular ultrasound scanning should be instituted early at 16 weeks.

On reaching 37 weeks twin pregnancies should be delivered as the outcomes are improved. A randomised controlled trial in 2013 has not shown benefits of planned caesarean section, as compared to planned vaginal delivery, for the delivery of twins between 32 and 38 weeks gestation, if the first twin was in cephalic presentation.

## 5.8 Data tables: Multiple pregnancy

**Table 51: Multiple pregnancy rates NWH 2008-2017**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total number of multiple pregnancies** | 160 | 159 | 153 | 163 | 162 | 151 | 147 | 137 | 127 | 127 |
| **Incidence %** | 2.1 | 2.1 | 2.0 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.8 | 1.9 |
| **Number of twin pregnancies** | 156 | 156 | 149 | 159 | 156 | 147 | 143 | 133 | 127 | 126 |
| **Number of triplet pregnancies** | 4 | 3 | 4 | 4 | 6 | 4 | 4 | 4 | 0 | 1 |

**Table 52: Fetal/neonatal outcomes of multiple pregnancies NWH 2008-2017**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total number of babies born in a multiple pregnancy** | 324 | 321 | 310 | 330 | 330 | 305 | 298 | 278 | 254 | 255 |
| **Incidence %** | 4.2 | 4.1 | 3.9 | 4.3 | 4.2 | 4.1 | 4.0 | 3.9 | 3.4 | 3.7 |
| **Number of multiple pregnancies where one or more babies died** | 12 | 9 | 13 | 17 | 11 | 10 | 8 | 5 | 13 | 12 |
| **Incidence % (no. of multiple pregnancies where a baby died/number of multiple pregnancies)** | 7.5 | 5.8 | 8.5 | 10.4 | 6.8 | 6.6 | 5.4 | 3.6 | 10.2 | 9.4 |
| **Number of babies who died in a multiple pregnancy** | 16 | 13 | 16 | 26 | 18 | 16 | 10 | 6 | 15 | 16 |
| **Total number of babies born in a twin pregnancy** | 312 | 321 | 298 | 318 | 312 | 293 | 286 | 266 | 254 | 252 |
| **Twin perinatal deaths (<7 days)** | 13 | 12 | 15 | 23 | 15 | 14 | 9 | 5 | 14 | 14 |
| **Twin perinatal mortality rate*** | 41.7 | 37.4 | 50.3 | 72.3 | 48.1 | 47.8 | 31.5 | 18.8 | 55.1 | 55.6 |

*Perinatal twin deaths (<7 days)/1000 twin babies born

**Table 53: Mode of birth among twin pregnancies NWH 2010-2017**

| | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=149 | | N=159 | | N=156 | | N=147 | | N=143 | | N=133 | | N=127 | | N=126 | |
| | N | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **SVB/vaginal breech both twins** | 36 | 24 | 38 | 24 | 34 | 22 | 50 | 34 | 36 | 25 | 34 | 26 | 33 | 26 | 31 | 25 |
| **SVB 1st twin, operative vaginal 2nd twin** | 2 | 1 | 6 | 4 | 3 | 2 | 2 | 1 | 5 | 3 | 2 | 2 | 2 | 2 | 1 | 1 |
| **Operative vaginal 1st twin, SVB 2nd twin** | 7 | 5 | 5 | 3 | 9 | 6 | 3 | 2 | 4 | 3 | 1 | 1 | 4 | 3 | 4 | 3 |
| **Operative vaginal birth both twins** | 4 | 3 | 2 | 1 | 4 | 3 | 5 | 3 | 4 | 3 | 2 | 2 | 3 | 2 | 7 | 6 |
| **SVB 1st twin, Caesarean section 2nd twin** | 1 | 1 | 1 | 1 | 4 | 3 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **Operative vaginal birth 1st twin, Caesarean section 2nd twin** | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | 1 | 0 | | 0 | |
| **CS elective both twins** | 58 | 39 | 63 | 40 | 64 | 41 | 48 | 33 | 57 | 40 | 59 | 44 | 48 | 38 | 46 | 37 |
| **CS emergency both twins** | 41 | 28 | 44 | 28 | 38 | 24 | 38 | 26 | 34 | 24 | 32 | 24 | 37 | 28 | 35 | 28 |

**Table 54: Fetal / newborn outcomes of twin babies NWH 2017**

| | Singletons | | | Twin babies | | |
|---|---|---|---|---|---|---|
| | Total | | | Total twins | | |
| | N | N | % | N | n | % |
| **Admission to NICU ≥2days** | 6719 | 468 | 7.0 | 252 | 95 | 37.7 |
| ≤34 weeks | 228 | 181 | 79.4 | 90 | 77 | 85.6 |
| 35-36 | 225 | 63 | 28.0 | 86 | 15 | 17.4 |
| ≥37 weeks | 6266 | 224 | 3.6 | 76 | 3 | 4.0 |
| **Apgar <7 at 5 minutes** | 6719 | 139 | 2.1 | 252 | 22 | 8.7 |

## 5.9 Diabetes

The data in this section relates to women with a diagnosis of pre-existing diabetes (Type 1 and 2),

Type 2 diagnosed for the first time in pregnancy and gestational diabetes who birthed at National Women's in 2017.

This report includes women with a diagnosis of diabetes who delivered from 20 weeks' at National Women's. Twenty six women were cared for by the Community Diabetes Team which is based at Greenlane; 126 women were cared for by the Diabetes service based at ACH as their LMC; and the remainder of the women had their diabetes care

provided by the NWH Diabetes service while the LMC role remained with the self-employed midwife or private obstetrician. Of note, some women were transferred to National Women's just prior to delivery because of maternal or fetal complications requiring tertiary care. Each year, this factor contributes to the perinatal losses in the diabetes service.

## Findings

Almost all women delivering at NWH had some type of screening for GDM. However, it is not clear whether all women with risk factors were asked to perform a 75g OGTT, as recommended in our Guidelines. A 50g glucose challenge test may be appropriate for women without any risk factors, to see if they are at risk of GDM, or women with risk factors who decline to go straight to a 75g OGTT. It will be falsely negative, however, in 25-30% of women who have GDM. The prevalence of GDM is 9.3%.

### 5.9.1 Demographic characteristics of women with diabetes NWH 2017

The relationship between Type 2 diabetes and GDM incidence is the same as previous years, with unexpectedly low rates of GDM in Pacific and Māori women. We have not improved our detection of GDM in these high risk populations. This year, we see a slightly lower GDM incidence in European women compared with previous years. The reason for this is not clear. Overall, in New Zealand, rates of pre-diabetes and diabetes have been increasing, so the rates of GDM should increase in parallel.

**Figure 51: Prevalence of diabetes (% of all inborn and BBA births) NWH 1991-2017**

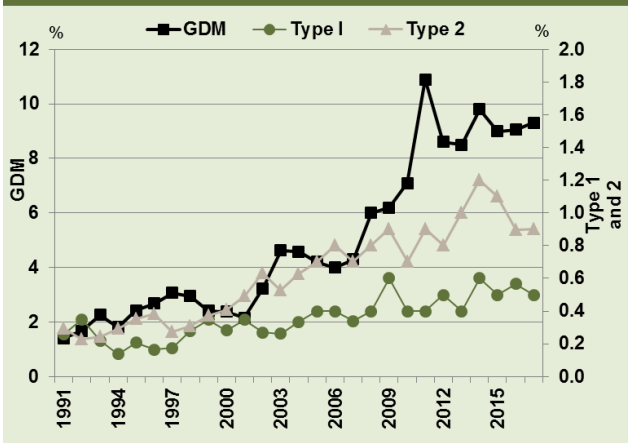



**Figure 52: Incidence of diabetes by maternal BMI NWH 2017**

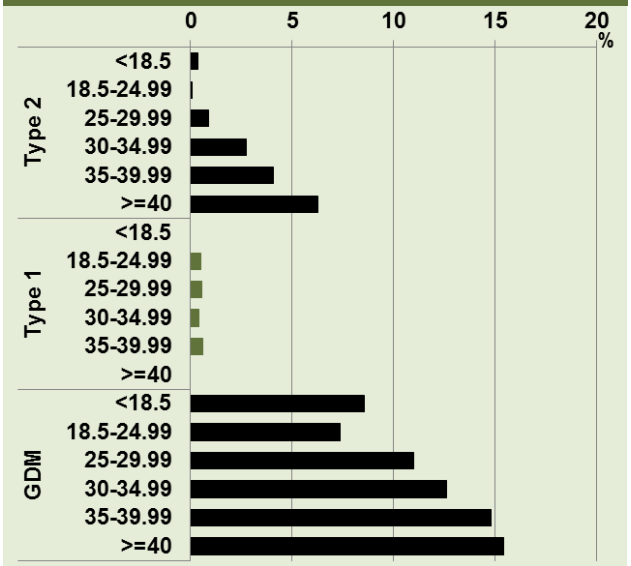
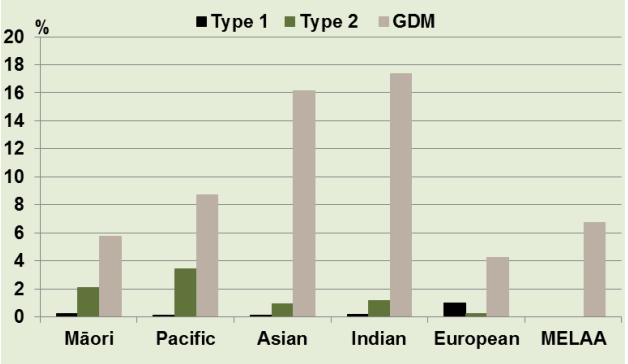



**Figure 53: Incidence of diabetes by ethnic group NWH 2017**




## Maternal interventions and outcomes of pregnancies complicated by diabetes

**Figure 54: Mode of birth among women with GDM NWH 1999-2017**

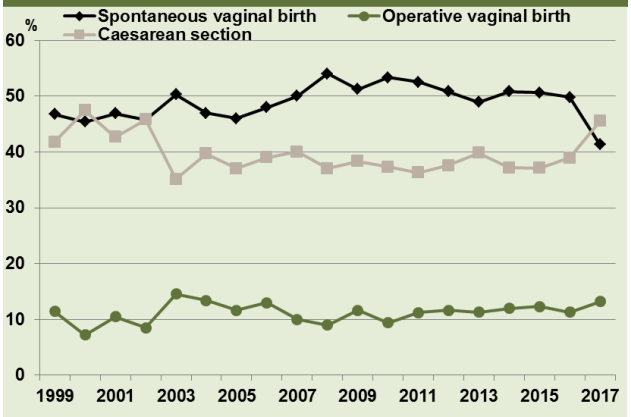
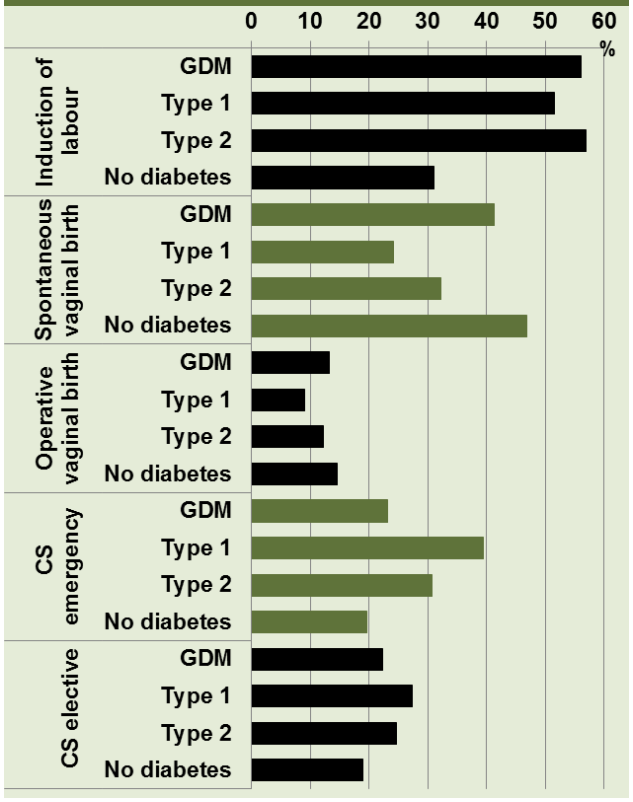


**Figure 55: Induction of labour and mode of birth by diabetes status 2017**




In women with GDM, the Caesarean section rate was higher during 2017, compared with previous years. If this persists over another year, it would be important to examine the reasons why.

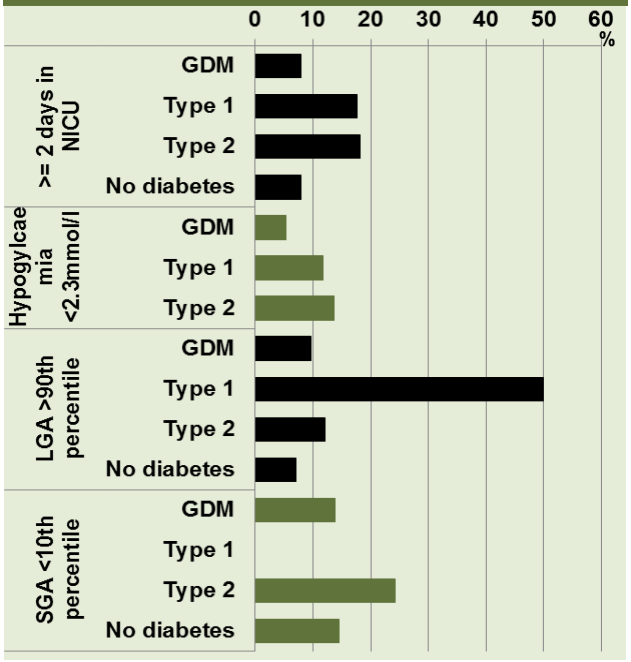
There has been no change in policy about timing of delivery in women with GDM. Delivery before 40 weeks is recommended to women if there are concerns about fetal growth, hypertensive complications or poor diabetes control. Often, the decision about timing of delivery also considers additional factors, such as maternal age and BMI. Our induction rate is similar to previous years. In previous years, our elective and emergency caesarean delivery rates were both under 20%.

### 5.9.2 Maternal postpartum glucose tolerance testing

It is pleasing to see the rate of postnatal screening for diabetes has improved over the previous couple of years. The responsibility for initial follow up moved from the hospital service to the community during 2014, with initial poor uptake of screening. Our data suggests that ongoing education and improving systems are likely to have contributed to this.

### Neonatal outcomes among babies of women with diabetes in pregnancy

**Figure 56: Neonatal outcomes by diabetes status 2017**




The neonatal outcomes of women with GDM are similar to the background population. We have persistently high rates of SGA according to our GROW charts in women with type 2 diabetes. This is an obese population, and this may be the main factor as to why they have higher rates than women with type 1 diabetes, as both groups have other risk factors for SGA, for example, hypertension.

The preterm birth rate in women with type 1 diabetes was up to 39% in 2016, which was not related to any changes in our practice. It was back at 30% during 2017 (usually between 20-30%). It is important to look at trends over several years in women with type 1 diabetes, as numbers each year are small.

### 5.9.3 Perinatal losses

There were 9 perinatal losses overall, 3 in women transferred from other centres. Two of these women had Type 1 diabetes and were transferred because of major fetal anomalies requiring tertiary care. The third was in a woman with GDM. She had a donor egg twin pregnancy complicated by severe early-onset fetal growth restriction, more marked in twin one. After counselling, there was a fetal demise of twin one at 31 weeks. The other twin survived and was delivered at 34 weeks 6 days.

There were two losses in women with Type 2 diabetes (one had not been diagnosed with diabetes prior to pregnancy), at 21 and 23 weeks. Both related to ruptured membranes. We see this pattern of loss in women with Type 2 diabetes each year.

There were four other losses, all in women with GDM. Two of these women were diagnosed by

screening in early pregnancy (one by OGTT and one by HbA1c of 47mmol/mol). One had a loss at 25 weeks after rupturing membranes at 20 weeks, the other delivered at 20 weeks. The other two losses were in women with GDM diagnosed by routine screening after 20 weeks. One loss was associated with major fetal anomalies and the other was an unexplained stillbirth, but fetal haemorrhage was suspected.

### Research within the service

We are continuing to collect data on pregnancy outcomes of women with an early pregnancy HbA1c of 41-47mmol/mol. Numbers are smaller than expected so far, as the laboratory changed its assay at the end of 2016 and reads 2-4mmol/mol lower than previously. We will also look at women with early HbA1c of 39-40mmol/mol. This research is being undertaken as an ongoing audit within the service. The Guideline at NWH recommends that women with an early pregnancy HbA1c of 41mmol/mol or greater are referred routinely to the Diabetes service at ACH. The National GDM Guideline notes that this option is followed by several centres. Data from several centres are being collated in Christchurch.

The GEMS trial continues, led by Caroline Crowther, comparing NZ diagnostic criteria for GDM with international/WHO criteria. Funding is currently available until 2019. We encourage LMCs to ask all their women to participate.

The 7-9 years old follow up data of offspring of women with GDM randomised to metformin or insulin (MiG TOFU) has been published. (Rowan J, Ruch E, Plank L et al. BMJ Open Diab Res Care doi: 10.1136/bmjdrc-2017-000456).

This is an important publication for us, as we use metformin in our service. The manuscript reports that total and abdominal body fat percent (as measured by DXA, BIA and MRI) and metabolic measures (including fasting glucose, insulin, insulin resistance, HbA1c, lipids, liver function, leptin and adiponectin) are no different between the offspring whose mothers were randomised to metformin vs. insulin at 7 years and 9 years. Metformin offspring were larger in several measures in the 9 years group, but the reason for this was not clear.

### Summary

- Outcomes for 2017 remain good in a higher risk population.
- We may need to examine the increase in caesarean delivery rates, if this persists.
- Research continues, as there are still unanswered questions about how to manage GDM, in particular.

### Objectives/Aims

- We are updating our Guidelines this year. A further update will be required when current studies underway are completed.
- We want to examine how we can improve our GDM detection for Polynesian women.

## 5.10 Data tables: Diabetes

**Table 55: Women with diabetes birthing at NWH at or beyond 20 weeks gestation 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Type I** | 26 | 31 | 47 | 30 | 33 | 40 | 29 | 42 | 34 | 41 | 33 |
| **Type 2** | 54 | 63 | 71 | 55 | 70 | 64 | 69 | 86 | 78 | 65 | 65 |
| **GDM** | 331 | 457 | 480 | 545 | 821 | 662 | 613 | 725 | 626 | 655 | 637 |
| **Total** | 411 | 551 | 598 | 630 | 924 | 766 | 711 | 853 | 738 | 761 | 735 |

**Table 56: Perinatal related deaths (2007 – 2017) among births complicated by diabetes**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total number of perinatal related losses** | 9 | 1 | 4 | 10 | 5 | 10 | 6 | 9 | 6 | 8 | 9 |
| **Perinatal related loss rate /1000** | 22 | 2 | 7 | 16 | 5 | 13 | 16 | 11 | 8 | 10 | 12 |

**Table 57: Demographic characteristics of women with diabetes NWH 2017**

| | N | Type 1 n=33 | | Type 2 n=65 | | GDM n=637 | | No Diabetes n=6111 | |
|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % |
| **Age** | | | | | | | | | |
| ≤20 | 162 | 1 | 0.6 | 1 | 0.6 | 9 | 5.6 | 151 | 93.2 |
| 21-25 | 637 | 3 | 0.5 | 6 | 0.9 | 41 | 6.4 | 587 | 92.2 |
| 26-30 | 1692 | 11 | 0.7 | 18 | 1.1 | 138 | 8.2 | 1525 | 90.1 |
| 31-35 | 2669 | 14 | 0.5 | 24 | 0.9 | 263 | 9.9 | 2368 | 88.7 |
| 36-40 | 1395 | 2 | 0.1 | 10 | 0.7 | 145 | 10.4 | 1238 | 88.7 |
| >40 | 291 | 2 | 0.7 | 6 | 2.1 | 41 | 14.1 | 242 | 83.2 |
| **Ethnicity** | | | | | | | | | |
| Māori | 435 | 1 | 0.2 | 9 | 2.1 | 25 | 5.7 | 400 | 92.0 |
| Pacific | 733 | 1 | 0.1 | 25 | 3.4 | 64 | 8.7 | 643 | 87.7 |
| Indian | 703 | 1 | 0.1 | 8 | 1.1 | 122 | 17.4 | 572 | 81.4 |
| Other Asian | 1743 | 2 | 0.1 | 16 | 0.9 | 281 | 16.1 | 1444 | 82.8 |
| MELAA | 327 | 0 | | 0 | | 22 | 6.7 | 305 | 93.3 |
| European | 2905 | 28 | 1.0 | 7 | 0.2 | 123 | 4.2 | 2747 | 94.6 |
| **BMI** | | | | | | | | | |
| <18.5 | 257 | 0 | | 1 | 0.4 | 22 | 8.6 | 234 | 91.1 |
| 18.5-24.99 | 3723 | 19 | 0.5 | 4 | 0.1 | 274 | 7.4 | 3426 | 92.0 |
| 25-29.99 | 1578 | 9 | 0.6 | 14 | 0.9 | 174 | 11.0 | 1381 | 87.5 |
| 30-34.99 | 690 | 3 | 0.4 | 19 | 2.8 | 87 | 12.6 | 581 | 84.2 |
| 35-39.99 | 317 | 2 | 0.6 | 13 | 4.1 | 47 | 14.8 | 255 | 80.4 |
| ≥40 | 207 | 0 | | 13 | 6.3 | 32 | 15.5 | 162 | 78.3 |
| Missing | 74 | 0 | | 1 | 1.4 | 1 | 1.4 | 72 | 97.3 |
| **Smoking** | | | | | | | | | |
| Smoking at booking | 303 | 3 | 1.0 | 4 | 1.3 | 18 | 5.9 | 278 | 91.7 |
| Not currently smoking | 6543 | 30 | 0.5 | 61 | 0.9 | 619 | 9.5 | 5833 | 89.1 |

**Table 58: DHB of domicile of women with diabetes birthing at NWH 2017**

| DHB | Type 1 N=33 | | Type 2 N=65 | | GDM N=637 | | No Diabetes N=6111 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| Auckland | 10 | 30.3 | 31 | 47.7 | 410 | 64.4 | 4045 | 66.2 |
| Waitemata | 18 | 54.5 | 27 | 41.5 | 84 | 13.2 | 869 | 14.2 |
| Counties Manukau | 1 | 3.0 | 6 | 9.2 | 135 | 21.2 | 1045 | 17.1 |
| Other | 4 | 12.1 | 1 | 1.5 | 8 | 1.3 | 152 | 2.5 |

**Table 59: Maternal outcomes among women with diabetes NWH 2017**

| | Type 1 N=33 | | Type 2 N=65 | | GDM N=637 | | No diabetes N=6111 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Induction of labour** | 17 | 51.5 | 37 | 56.9 | 358 | 56.2 | 1900 | 31.1 |
| **Mode of Birth** | | | | | | | | |
| Spontaneous vaginal birth | 8 | 24.2 | 21 | 32.3 | 263 | 41.3 | 2866 | 46.9 |
| Ventouse | 3 | 9.1 | 6 | 9.2 | 62 | 9.7 | 581 | 9.5 |
| Forceps | 0 | 0.0 | 2 | 3.1 | 22 | 3.5 | 303 | 5.0 |
| CS emergency | 13 | 39.4 | 20 | 30.8 | 147 | 23.1 | 1198 | 19.6 |
| CS elective | 9 | 27.3 | 16 | 24.6 | 143 | 22.4 | 1163 | 19.0 |
| **Gestation at birth** | | | | | | | | |
| <32 weeks | 2 | 6.1 | 2 | 3.1 | 10 | 1.6 | 130 | 2.1 |
| <37 weeks | 10 | 30.3 | 14 | 21.5 | 55 | 8.6 | 463 | 7.6 |
| **PPH ≥500mls** | 19 | 57.6 | 38 | 58.5 | 268 | 42.1 | 2200 | 36.0 |
| **PPH ≥1000 mls** | 8 | 24.2 | 8 | 12.3 | 95 | 14.9 | 639 | 10.5 |
| **Postpartum transfusion** | 1 | 3.0 | 0 | | 29 | 4.6 | 184 | 3.0 |

**Table 60: Rates of postnatal glucose tolerance testing (GTT/HbA1c) among women with GDM NWH 2009-2017**

| | 2009 N=480 | | 2010 N=548 | | 2011 N=821 | | 2012 N=662 | | 2013 N=613 | | 2014 N=725 | | 2015 N=626 | | 2016 N=655 | | 2017 N=637 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | N | % | n | % | n | % | n | % | n | % | n | % |
| **Postnatal GTT/HbA1c** | 324 | 68 | 369 | 67 | 480 | 58 | 401 | 61 | 328 | 54 | 361 | 50 | 286 | 46 | 375 | 57 | 400 | 63 |
| **No post-natal GTT/HbA1c** | 156 | 32 | 179 | 33 | 341 | 42 | 261 | 39 | 285 | 46 | 364 | 50 | 340 | 54 | 280 | 43 | 237 | 37 |

**Table 61: Neonatal outcomes among babies of women with diabetes NWH 2017**

| | Type 1 N=34 | | Type2 N=66 | | GDM N=647 | | No diabetes N=6227 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | n | % | n | % | n | % |
| **Birthweight (Median(IQR))** | 3185(2860-3550) | | 3150(2770-3580) | | 3175(2850-3470) | | 3345(3000-3690) | |
| <1500g | 0 | | 2 | 3.0 | 12 | 1.9 | 151 | 2.4 |
| <2500g | 3 | 8.8 | 13 | 19.7 | 58 | 9.0 | 502 | 8.1 |
| **SGA <10th percentile** | 0 | | 16 | 24.2 | 89 | 13.8 | 911 | 14.6 |
| **LGA >90th percentile** | 17 | 50.0 | 8 | 12.1 | 63 | 9.7 | 440 | 7.1 |
| **Admission to NICU** | | | | | | | | |
| Any admission | 12 | 35.3 | 13 | 19.7 | 66 | 10.2 | 634 | 10.2 |
| ≥2 days in NICU | 6 | 17.6 | 12 | 18.2 | 52 | 8.0 | 496 | 8.0 |
| **Hypoglycaemia < 2.3 mmol/l** | 4 | 11.8 | 9 | 13.6 | 34 | 5.3 | 0 | |
| **Hypoglycaemia 2.3 - 2.5 mmol/l** | 6 | 17.6 | 6 | 9.1 | 59 | 9.1 | 0 | |
| **IV Dextrose** | 6 | 17.6 | 7 | 10.6 | 19 | 2.9 | 0 | |
| **Perinatal related losses (/1000)** | 2 | 58.8 | 2 | 30.3 | 5 | 7.7 | 77 | 12.4 |

## 5.11 Antepartum Haemorrhage

Antepartum haemorrhage has been defined here to include vaginal bleeding from any cause at or beyond 20 weeks gestation, during pregnancy and labour, and includes placenta praevia without bleeding. While bleeding before 20 weeks is also important we do not routinely collect these data.

Data cleaning includes reconciling antenatal summary data and intrapartum complication data with indications for induction and operative birth. Data were also reconciled with inpatient coding data.

### Findings

In 2017, 533 women (7.8% of all women who birthed at ACH) had an antepartum haemorrhage or placenta praevia without bleeding (**Table 62**, **Table 63**). This proportion has remained unchanged at between 5 and 8 per cent for the last fifteen years. The underlying causes have also remained unchanged with APH of uncertain origin the most frequent "cause", accounting for 70-80% of cases every year. History taking, careful examination and clinical acumen are important when assessing women with bleeding in pregnancy.

**Table 62: Antepartum haemorrhage incidence NWH 2012-2017**

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| **Total APH** | 460 | 469 | 456 | 445 | 533 |
| **Incidence %** | 6.4 | 6.3 | 6.6 | 6.1 | 7.8 |
| **Proven abruption** | 50 | 37 | 35 | 44 | 38* |
| **Proven placenta praevia** | 66 | 54 | 69 | 69 | 50 |
| **APH (uncertain origin)** | 344 | 378 | 352 | 332 | 445 |

*Two women who had both placenta praevia and placental abruption are represented under abruption only

The number of cases with proven placenta praevia has remained similar since 1999. Placenta praevia is significantly more common with increasing maternal age (**Table 66**). There was an incidence of 0.5% (28 of 5160 women) in women aged 35 or under versus 1.3% in women aged >35 (22 of 1686 women), relative risk for placenta praevia in women over 35 years of age versus those under 35 years is 2.4 (95% CI 1.4-4.3). The incidence of placenta praevia in women with a previous Caesarean section was 1.2% (15 of 1204 women), compared to 0.6% among women without a previous Caesarean section (35 of 5642 women) Relative risk for placenta praevia in cases with versus without previous Caesarean section is 2.0 (95% CI 1.1-3.7),

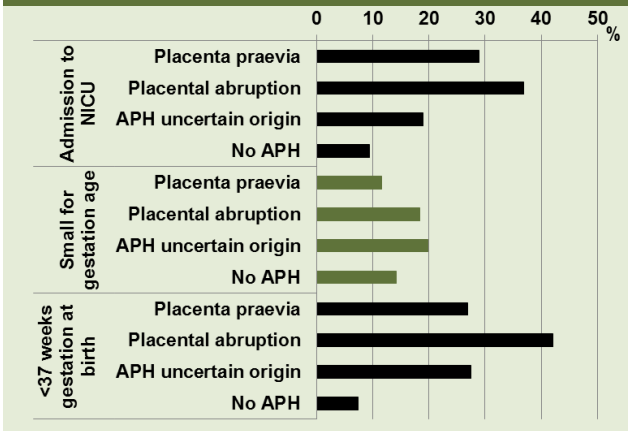
and therefore was a statistically significant risk factor for placenta previa in our cohort. We do not have information about whether the number of previous Caesarean sections influences this risk in our cohort. Smoking status, BMI and hypertensive disease were not associated with placenta praevia.

Nearly all women with placenta previa delivered via Caesarean section. Just over a fifth of these Caesarean sections needed to be done as an emergency procedure. Women with placenta praevia had a significantly higher requirement for blood products with 18% (9 of 50 women) of these women requiring transfusion during pregnancy or at birth, versus 3% (205 of 6796 women) of women without placenta praevia requiring transfusion (p<0.0001).

The risks of placenta praevia for the fetus are substantial; 27% of babies were delivered prematurely < 37 weeks gestation, 3.8 % very preterm < 32 weeks gestation. No perinatal deaths occurred in cases with placenta previa, versus 9 per 1000 births in patients without APH. There was a threefold increase in the risk of NICU admission (**Figure 57**).

A confirmed placental abruption is an uncommon diagnosis with an incidence of 0.6% in 2017 (38 of 6846 women). Hypertension and pre-eclampsia were found to be risk factors in our cohort. Our data need to be interpreted with caution due to small numbers.

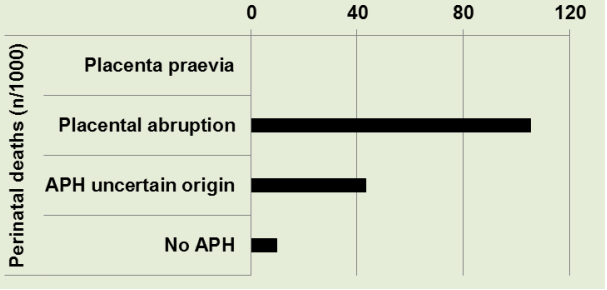
**Figure 57: Neonatal outcomes among pregnancies complicated by antepartum haemorrhage NWH 2017**




Placental abruption is associated with significant maternal morbidity with 58% requiring delivery by Caesarean section and 11% needing blood transfusion (**Table 64**). Fetal morbidity is also high with 42% preterm birth before 37 weeks gestation and 37% of babies admitted to neonatal intensive care unit (NICU) (**Table 65**). Risk of perinatal death is high. There were 4 perinatal deaths amongst 38 babies in this group (105 per 1000 births, versus 10 per 1000 in the group without APH).

The management of women with an antepartum haemorrhage of unknown origin remains challenging. These women have a higher rate of preterm birth (27%) and emergency Caesarean section (24%). (**Table 65**, **Table 66**) Twenty percent of babies born after APH of unknown origin are small for gestational age, and 19% need NICU admission. The perinatal mortality rate is over four times higher (at 43 per 1000 births) in pregnancies where an APH of unknown origin has occurred compared to women with no antepartum haemorrhage (**Figure 63**).

**Figure 58: Perinatal related deaths (n/1000) among pregnancies complicated by antepartum haemorrhage NWH 2017**




Women with an APH of uncertain origin make up the largest proportion of women presenting with antepartum haemorrhage (445 of 533 women). A proportion of the morbidities associated with APH of unknown origin will be related to preterm birth. The APH may either be a symptom of the start of preterm labour, or alternatively be a trigger for preterm labour or rupture of membranes. Ultrasound can be used to diagnose placenta praevia but is not suitable to exclude placental abruption, which remains a clinical diagnosis. A proportion of women with no firm diagnosis for their APH may have had unconfirmed small abruptions, and this may also have contributed to the increased perinatal morbidity and mortality associated with APH of uncertain origin.

## 5.12 Data tables: Antepartum haemorrhage

**Table 63: Antepartum haemorrhage incidence NWH 2006-2017**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total APH** | 411 | 533 | 424 | 438 | 438 | 455 | 511 | 460 | 469 | 456 | 445 | 533 |
| **Incidence %** | 5.7 | 6.9 | 5.6 | 5.7 | 5.7 | 6.0 | 6.6 | 6.4 | 6.3 | 6.6 | 6.1 | 7.8 |
| **Proven abruption** | 44 | 58 | 36 | 39 | 50 | 54 | 47 | 50 | 37 | 35 | 44 | 38* |
| **Proven placenta praevia** | 68 | 94 | 73 | 66 | 58 | 60 | 63 | 66 | 54 | 69 | 69 | 50 |
| **APH uncertain origin)** | 299 | 381 | 315 | 333 | 330 | 341 | 401 | 344 | 378 | 352 | 332 | 445 |

*Two women who had both placenta praevia and placental abruption are represented under abruption only

**Table 64: Maternal outcomes of pregnancies complicated by antepartum haemorrhage NWH 2017**

| | Placenta praevia N=50 | | Placental abruption N=38** | | APH uncertain origin N=445 | | No APH N=6313 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Mode of birth** | | | | | | | | |
| Normal vaginal | 1* | 2.0 | 10 | 27.8 | 215 | 48.3 | 2932 | 46.4 |
| Operative vaginal | 0 | 0 | 6 | 16.7 | 62 | 13.9 | 911 | 14.4 |
| CS elective | 38 | 77.6 | 5 | 13.2 | 63 | 14.2 | 1226 | 19.4 |
| CS emergency | 11 | 22.4 | 17 | 44.7 | 105 | 23.6 | 1244 | 19.7 |
| **Maternal transfusion** | 9 | 18.4 | 4 | 11.1 | 25 | 5.6 | 176 | 2.8 |

*Placenta praevia at time of bleed but placenta moved before time of birth

**Two women who had both placenta praevia and placental abruption are represented under abruption only

**Table 65: Fetal/neonatal outcomes of pregnancies complicated by antepartum haemorrhage NWH 2017**

| | Placenta praevia N=52 | | Placental abruption N=38* | | APH uncertain origin N=463 | | No APH N=6421 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Gestation at birth** | | | | | | | | |
| <37 weeks | 14 | 26.9 | 16 | 42.1 | 127 | 27.4 | 475 | 7.4 |
| <32 weeks | 2 | 3.8 | 6 | 15.8 | 63 | 13.6 | 96 | 1.5 |
| **Birthweight (g)** | | | | | | | | |
| Median(IQR) | 3185 (2580-3360) | | 3010 (1880-3540) | | 3100 (2460-3545) | | 3355 (3010-3670) | |
| <2500g | 13 | 25.0 | 10 | 26.3 | 121 | 26.1 | 432 | 6.7 |
| <1500g | 0 | | 6 | 15.8 | 57 | 12.3 | 102 | 1.6 |
| **Small for gestational age** | 6 | 11.5 | 7 | 18.4 | 92 | 19.9 | 911 | 14.2 |
| **Perinatal related deaths** | 0 | | 4 | 105.3 | 20 | 43.2 | 62 | 9.7 |
| **Any Admission to NICU** | 15 | 28.8 | 14 | 36.8 | 88 | 19.0 | 608 | 9.5 |
| **≥2 days stay in NICU** | 13 | 25.0 | 12 | 31.6 | 84 | 18.1 | 457 | 7.1 |

*Two women in tables 66 and 67 who had both placenta praevia and placental abruption are represented under abruption only

**Table 66: Characteristics of pregnancies complicated by antepartum haemorrhage NWH 2017**

| | Total | Placenta praevia | | Placental abruption | | APH uncertain origin | | No APH | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n=50 | | n=38* | | n=445 | | n=6313 | |
| | | n | % | n | % | n | % | n | % |
| **Maternal ethnicity** | | | | | | | | | |
| Māori | 435 | 3 | 0.7 | 4 | 0.9 | 44 | 10.1 | 384 | 88.3 |
| Pacific | 733 | 3 | 0.4 | 7 | 1.0 | 47 | 6.4 | 676 | 92.2 |
| Indian | 703 | 4 | 0.6 | 5 | 0.7 | 46 | 6.5 | 648 | 92.2 |
| Other Asian | 1743 | 12 | 0.7 | 9 | 0.5 | 130 | 7.5 | 1592 | 91.3 |
| MELAA | 327 | 2 | 0.6 | 3 | 0.9 | 20 | 6.1 | 302 | 92.4 |
| European | 2905 | 26 | 0.9 | 10 | 0.3 | 158 | 5.4 | 2711 | 9.3.3 |
| **Maternal age (years)** | | | | | | | | | |
| ≤20 | 162 | 0 | | 1 | 0.6 | 15 | 9.3 | 146 | 90.1 |
| 21-25 | 637 | 0 | | 3 | 0.5 | 36 | 5.7 | 598 | 93.9 |
| 26-30 | 1692 | 10 | 0.6 | 11 | 0.7 | 122 | 7.2 | 1549 | 91.5 |
| 31-35 | 2669 | 18 | 0.7 | 13 | 0.5 | 165 | 6.2 | 2473 | 92.7 |
| 36-40 | 1395 | 16 | 1.1 | 9 | 0.6 | 88 | 6.3 | 1282 | 91.9 |
| >40 | 291 | 6 | 2.1 | 1 | 0.3 | 19 | 6.5 | 265 | 91.1 |
| **Parity** | | | | | | | | | |
| Nulliparous | 3343 | 24 | 0.7 | 16 | 0.5 | 228 | 6.8 | 3075 | 92.0 |
| Multip previous CS | 1204 | 15 | 1.2 | 11 | 0.9 | 78 | 6.5 | 1100 | 91.4 |
| Multip no previous CS | 2299 | 11 | 0.5 | 11 | 0.5 | 139 | 6.0 | 2138 | 93.0 |
| **Multiple pregnancy** | | | | | | | | | |
| Multiple | 127 | 2 | 1.6 | 0 | | 18 | 14.2 | 107 | 84.3 |
| Singleton | 6719 | 48 | 0.7 | 38 | 0.6 | 427 | 6.4 | 6206 | 92.4 |
| **Smoking status at booking** | | | | | | | | | |
| Currently smoking | 303 | 2 | 0.7 | 3 | 1.0 | 38 | 12.5 | 260 | 85.8 |
| Not currently smoking | 6543 | 48 | 0.7 | 35 | 0.5 | 407 | 6.2 | 6053 | 92.5 |
| **BMI** | | | | | | | | | |
| <18.5 | 257 | 0 | | 1 | 0.4 | 18 | 7.0 | 238 | 92.6 |
| 18.5-24.99 | 3723 | 25 | 0.7 | 16 | 0.4 | 231 | 6.2 | 3451 | 92.7 |
| 25-29.99 | 1578 | 14 | 0.9 | 11 | 0.7 | 108 | 6.8 | 1445 | 91.6 |
| 30-34.99 | 690 | 4 | 0.6 | 2 | 0.3 | 46 | 6.7 | 638 | 92.5 |
| 35-39.99 | 317 | 3 | 0.9 | 2 | 0.6 | 20 | 6.3 | 292 | 92.1 |
| ≥40 | 207 | 3 | 1.4 | 4 | 1.9 | 13 | 6.3 | 187 | 90.3 |
| Missing | 74 | 1 | 1.4 | 2 | 2.7 | 9 | 12.2 | 62 | 83.8 |
| **Hypertensive disease** | | | | | | | | | |
| Gestational | 195 | 0 | | 1 | 0.5 | 9 | 4.6 | 185 | 94.9 |
| Chronic hypertension | 120 | 0 | | 2 | 1.7 | 12 | 10.0 | 106 | 88.3 |
| Chronic hypertension with superimposed | 16 | 0 | | 0 | | 1 | 6.3 | 15 | 93.8 |
| Preeclampsia | 187 | 0 | | 3 | 1.6 | 20 | 10.7 | 164 | 87.7 |
| | 6328 | 50 | 0.8 | 32 | 0.5 | 403 | 6.4 | 5843 | 92.3 |

## 5.13 Hypertensive disease

The following definitions of hypertension in pregnancy have been used in this report:

- **Gestational hypertension**: Gestational hypertension (GH) is a blood pressure systolic ≥ 140 and/or diastolic ≥ 90 mmHg on two or more consecutive occasions at least 4 hours apart or one measurement systolic BP ≥ 170 and or diastolic BP ≥ 110 mmHg, arising after 20 weeks gestation.
- **Preeclampsia**: Gestational hypertension accompanied by proteinuria measured as ≥ 2+ protein on one dipstick sample or Protein Creatinine Ratio (PCR) ≥ 30 on a spot urine sample, or a 24 hour collection ≥ 0.3g in 24 hours.
- **Chronic hypertension**: diastolic BP ≥ 90mmHg at booking or a medical history of essential hypertension. Includes women with superimposed pre-eclampsia if these are not categorised separately.

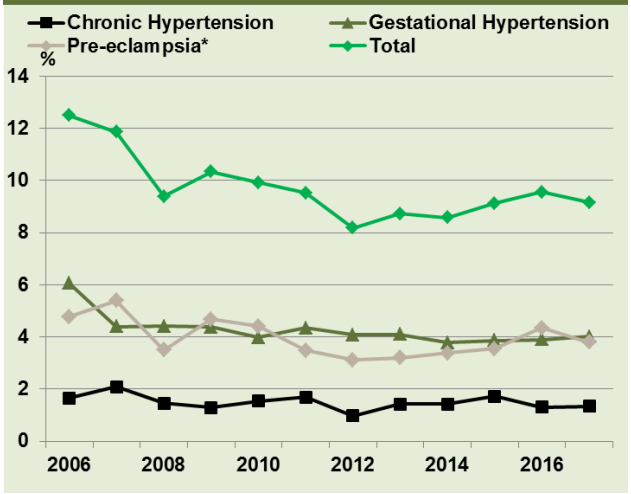
- **Super-imposed preeclampsia:** The development of preeclampsia in a woman with chronic hypertension.

The cleaning of hypertension data involves reconciling data from booking history, indication for induction and operative birth, reason for admission to the ward or to High Dependency Unit, and data collected at birth and coded data from the Business Intelligence Unit (BI).

In 2018, we will be updating the hypertension definitions in line with recent changes.

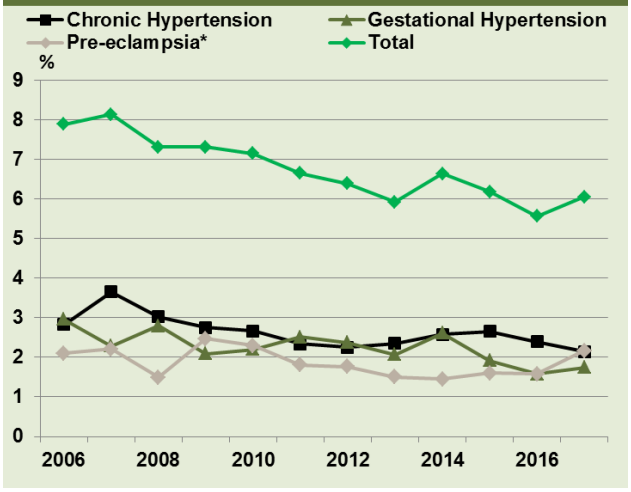
## Findings

**Figure 59: Rate of hypertensive disease in nulliparous women NWH 2006-2017**




*preeclampsia includes eclampsia, and superimposed preeclampsia

**Figure 60: Rate of hypertensive disease in multiparous women NWH 2006-2017**

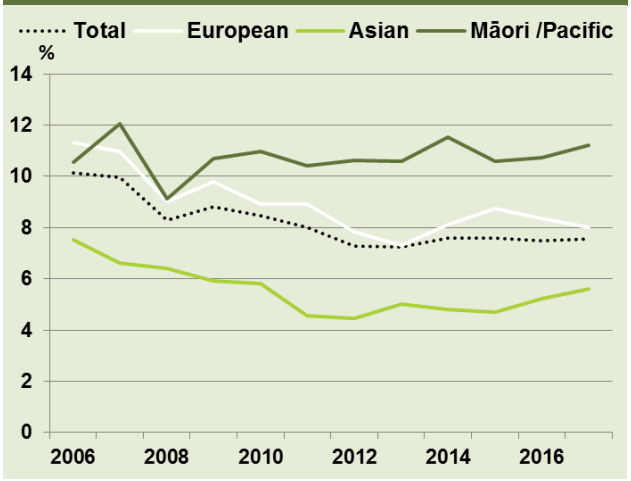



*preeclampsia includes eclampsia and superimposed preeclampsia

The rate of hypertensive disease has decreased among nulliparous and multiparous women in the past 10 years (**Figure 54** & **Figure 60**).

Women of Māori, Pacific or European ethnicity had higher overall rates of hypertensive disorders in pregnancy compared to women of Asian ethnic groupings (**Figure 61**). There has been a decrease in hypertensive disease among European and Asian ethnic groupings ($p<0.0001$) but not among Māori and Pacific ($p=0.7$)

**Figure 61: Rate of hypertensive disease (any) by ethnic grouping 2006-2017**



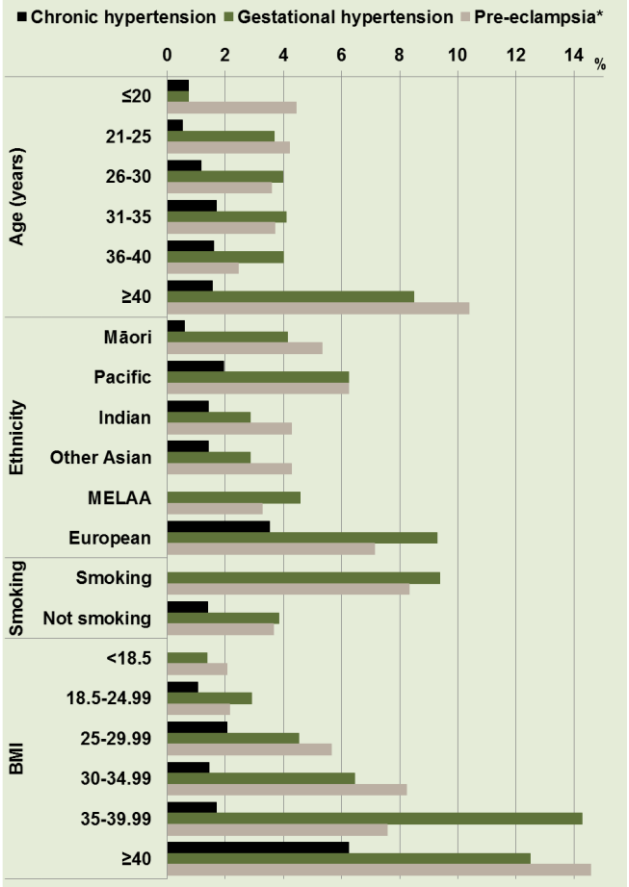

The risk of hypertensive disease in pregnancy increases with increasing body mass index (BMI) and maternal age. Women with a BMI ≥40 had an 18% risk of "any" hypertensive disease in pregnancy in 2017. Nulliparous women with an age >40 had a 9% risk of having a hypertensive disorder in 2017.

Hypertensive disease is associated with increased obstetric intervention. Forty-five percent of normotensive women went into labour spontaneously, compared with only 23%, 14% and 29% of the women with gestational hypertension, pre-eclampsia or chronic hypertension respectively. Women with hypertensive disease in pregnancy have higher rates of delivery by Caesarean section (gestational hypertension 53%, pre-eclampsia 64%, chronic hypertension 44%) compared with normotensive women (38%).

**Table 67: Hypertensive disease in pregnancy by parity NWH 2017**

| | All women N=6846 | | Nullipara N=3343 | | Multipara N=3503 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| Any hypertensive disease | 518 | 7.6 | 306 | 9.2 | 212 | 6.1 |
| Chronic hypertension | 120 | 1.8 | 45 | 1.3 | 75 | 2.1 |
| Superimposed pre-eclampsia | 16 | 0.2 | 4 | 0.1 | 12 | 0.3 |
| Gestational hypertension | 195 | 2.8 | 134 | 4.0 | 61 | 1.7 |
| Pre-eclampsia | 187 | 2.7 | 123 | 3.7 | 64 | 1.8 |
| Eclampsia | 0 | | 0 | | 0 | |

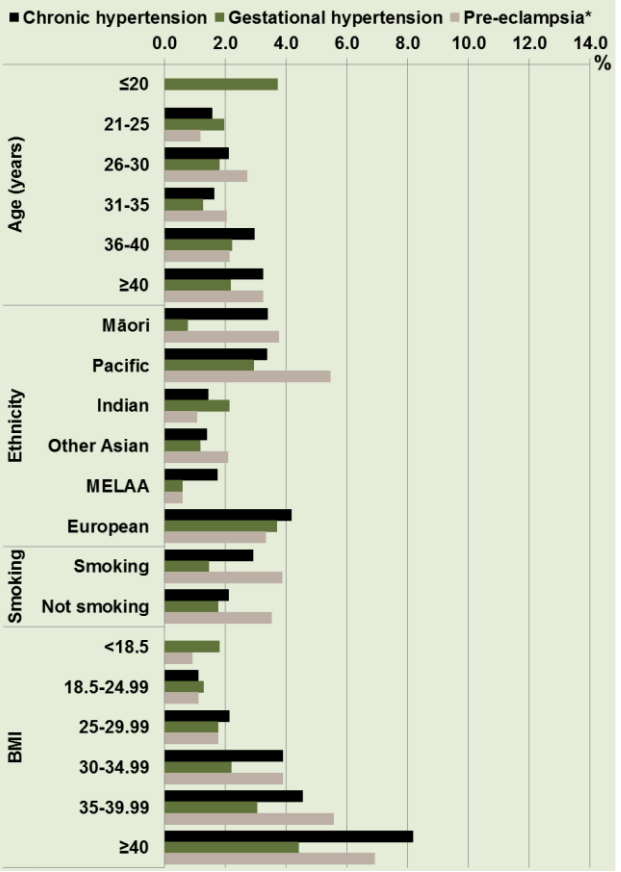
**Figure 62: Demography of nulliparous women with hypertensive disease in pregnancy NWH 2017**




*preeclampsia includes super-imposed preeclampsia

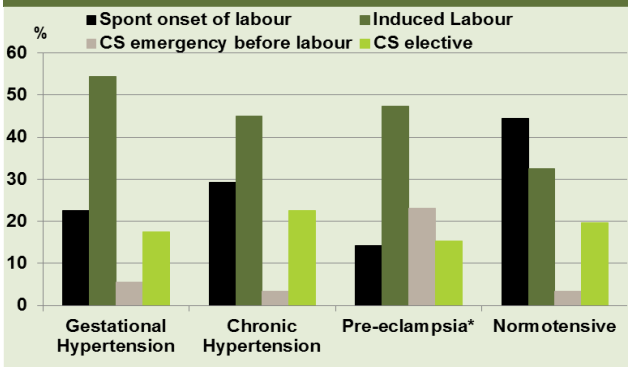
More than half of all women elected to have an epidural placed for their delivery. There were low rates of general anaesthetic use across all groups, however women with preeclampsia have four times the risk of requiring a general anaesthetic when compared to normotensive women.

**Figure 63: Demography of multiparous women with hypertensive disease in pregnancy NWH 2017**




*preeclampsia includes eclampsia and superimposed preeclampsia

**Figure 64: Onset of birth by hypertensive disease status NWH 2017**




*pre-eclampsia includes super-imposed pre-eclampsia

Women with hypertensive disease had increased rates of some poor perinatal outcomes. In particular, women with preeclampsia or superimposed preeclampsia had high rates of preterm birth (delivery <37 weeks), including significantly higher risks of very preterm birth (<32 weeks). Preterm birth occurred in 34%, 41%, 14% (preeclampsia, superimposed preeclampsia, chronic hypertension) compared to women without hypertensive disease (8%).

There were associated increased risks of NICU admission, prolonged NICU hospitalisation and low Apgar scores in babies born to mothers with pre-eclamptic hypertensive disease. Small for gestational age (customised birthweight <10th centile) rates were higher for all groups of hypertensive disease when compared to normotensive women.

It is difficult to be conclusive regarding perinatal mortality rates amongst hypertensive women as the overall numbers are small.

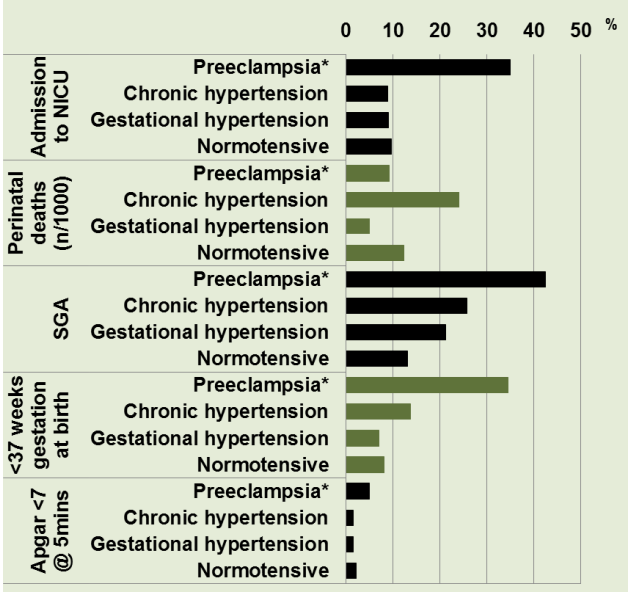
### Summary / Implications

Hypertensive disorders of pregnancy remain a common problem in obstetrics. The overall rate of hypertensive disease has reduced in the past 11 years, despite increasing maternal obesity.

It is known that hypertensive disease is associated with a significant risk of operative birth, growth restriction, prematurity and associated poor perinatal outcomes. There is an ongoing need to adequately screen for, diagnose, and treat hypertensive disorders in pregnancy to improve outcomes for both mother and neonate.

Long term health implications and risk factor modification should be discussed with all women with hypertensive complications in pregnancy.

**Figure 65: Perinatal outcomes and hypertensive disease in babies NWH 2017**




*pre-eclampsia includes super-imposed pre-eclampsia

## 5.14 Data tables: Hypertensive disease

**Table 68: Demographic characteristics of nulliparous women with hypertensive disease NWH 2017**

| | Total N=3343 | Chronic hypertension n=45 | | Gestational hypertension n=134 | | Superimposed preeclampsia n=4 | | Preeclampsia n=123 | | Normotensive n=3037 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % |
| **Ethnicity (prioritised)** | | | | | | | | | | | |
| Māori | 169 | 1 | 0.6 | 7 | 4.1 | 0 | | 9 | 5.3 | 152 | 89.9 |
| Pacific | 256 | 5 | 2.0 | 16 | 6.3 | 1 | 0.4 | 15 | 5.9 | 219 | 85.5 |
| Indian | 421 | 6 | 1.4 | 12 | 2.9 | 0 | | 18 | 4.3 | 385 | 91.4 |
| Other Asian | 881 | 9 | 1.0 | 17 | 1.9 | 1 | 0.1 | 21 | 2.4 | 833 | 94.6 |
| MELAA | 153 | 0 | | 7 | 4.6 | 1 | 0.7 | 4 | 2.6 | 141 | 92.2 |
| European | 1463 | 24 | 1.6 | 75 | 5.1 | 1 | 0.1 | 56 | 3.8 | 1307 | 89.3 |
| **Maternal age** | | | | | | | | | | | |
| ≤20 | 135 | 1 | 0.7 | 1 | 0.7 | 0 | | 6 | 4.4 | 127 | 94.1 |
| 21-25 | 380 | 2 | 0.5 | 14 | 3.7 | 0 | | 16 | 4.2 | 348 | 91.6 |
| 26-30 | 1028 | 12 | 1.2 | 41 | 4.0 | 0 | | 37 | 3.6 | 938 | 91.2 |
| 31-35 | 1245 | 21 | 1.7 | 51 | 4.1 | 2 | 0.2 | 44 | 3.5 | 1127 | 90.5 |
| 36-40 | 449 | 7 | 1.6 | 18 | 4.0 | 0 | | 11 | 2.4 | 413 | 92.0 |
| ≥40 | 106 | 2 | 1.9 | 9 | 8.5 | 2 | 1.9 | 9 | 8.5 | 84 | 79.2 |
| **Smoking** | | | | | | | | | | | |
| Currently | 96 | 0 | | 9 | 9.4 | 0 | | 8 | 8.3 | 79 | 82.3 |
| Not currently smoking | 3247 | 45 | 1.4 | 125 | 3.8 | 4 | 0.1 | 115 | 3.5 | 2958 | 91.1 |
| **BMI** | | | | | | | | | | | |
| <18.5 | 146 | 0 | | 2 | 1.4 | 0 | | 3 | 2.1 | 141 | 96.6 |
| 18.5-24.99 | 1991 | 21 | 1.1 | 58 | 2.9 | 3 | 0.2 | 40 | 2.0 | 1869 | 93.9 |
| 25-29.99 | 727 | 15 | 2.1 | 33 | 4.5 | 0 | | 41 | 5.6 | 638 | 87.8 |
| 30-34.99 | 279 | 4 | 1.4 | 18 | 6.5 | 0 | | 23 | 8.2 | 234 | 83.9 |
| 35-39.99 | 119 | 2 | 1.7 | 17 | 14.3 | 0 | | 9 | 7.6 | 91 | 76.5 |
| ≥40 | 48 | 3 | 6.3 | 6 | 12.5 | 1 | 2.1 | 6 | 12.5 | 32 | 66.7 |
| Missing | 33 | 0 | | 0 | | 0 | | 1 | 3.0 | 32 | 97.0 |

**Table 69: Demographic characteristics of multiparous women with hypertensive disease NWH 2017**

| | Total N=3503 | Chronic hypertension n=75 | | Gestational hypertension n=61 | | Superimposed preeclampsia n=12 | | Preeclampsia n=64 | | Normotensive n=3291 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % |
| **Ethnicity (prioritised)** | | | | | | | | | | | |
| Māori | 266 | 9 | 3.4 | 2 | 0.8 | 3 | 1.1 | 7 | 2.6 | 245 | 92.1 |
| Pacific | 477 | 16 | 3.4 | 14 | 2.9 | 3 | 0.6 | 23 | 4.8 | 421 | 88.3 |
| Indian | 282 | 4 | 1.4 | 6 | 2.1 | 0 | | 3 | 1.1 | 269 | 95.4 |
| Other Asian | 862 | 12 | 1.4 | 10 | 1.2 | 3 | 0.3 | 15 | 1.7 | 822 | 95.4 |
| MELAA | 174 | 3 | 1.7 | 1 | 0.6 | 0 | | 1 | 0.6 | 169 | 97.1 |
| European | 1442 | 31 | 2.2 | 28 | 1.9 | 3 | 0.2 | 15 | 1.0 | 1365 | 94.7 |
| **Maternal age** | | | | | | | | | | | |
| ≤20 | 27 | 0 | | 1 | 3.7 | | | | | 26 | 96.3 |
| 21-25 | 257 | 4 | 1.6 | 5 | 1.9 | | | 3 | 1.2 | 245 | 95.3 |
| 26-30 | 664 | 14 | 2.1 | 12 | 1.8 | 2 | 0.3 | 16 | 2.4 | 620 | 93.4 |
| 31-35 | 1424 | 23 | 1.6 | 18 | 1.3 | 4 | 0.3 | 25 | 1.8 | 1354 | 95.1 |
| 36-40 | 946 | 28 | 3.0 | 21 | 2.2 | 4 | 0.4 | 16 | 1.7 | 877 | 92.7 |
| ≥40 | 185 | 6 | 3.2 | 4 | 2.2 | 2 | 1.1 | 4 | 2.2 | 169 | 91.4 |
| **Smoking** | | | | | | | | | | | |
| Currently | 207 | 6 | 2.9 | 3 | 1.4 | 2 | 1.0 | 6 | 2.9 | 190 | 91.8 |
| Not currently smoking | 3296 | 69 | 2.1 | 58 | 1.8 | 10 | 0.3 | 58 | 1.8 | 3101 | 94.1 |
| **BMI** | | | | | | | | | | | |
| <18.5 | 111 | 0 | | 2 | 1.8 | 0 | | 1 | 0.9 | 108 | 97.3 |
| 18.5-24.99 | 1732 | 19 | 1.1 | 22 | 1.3 | 2 | 0.1 | 17 | 1.0 | 1672 | 96.5 |
| 25-29.99 | 851 | 18 | 2.1 | 15 | 1.8 | 1 | 0.1 | 14 | 1.6 | 803 | 94.4 |
| 30-34.99 | 411 | 16 | 3.9 | 9 | 2.2 | 6 | 1.5 | 10 | 2.4 | 370 | 90.0 |
| 35-39.99 | 198 | 9 | 4.5 | 6 | 3.0 | 1 | 0.5 | 10 | 5.1 | 172 | 86.9 |
| ≥40 | 159 | 13 | 8.2 | 7 | 4.4 | 2 | 1.3 | 9 | 5.7 | 128 | 80.5 |
| Missing | 41 | 0 | | 0 | | 0 | | 3 | 7.3 | 38 | 92.7 |

**Table 70: Onset and mode of birth among women with hypertensive disease NWH 2017**

| | Chronic hypertension N=120 | | Gestational hypertension N=195 | | Superimposed preeclampsia N=16 | | Pre-eclampsia N=187 | | Normotensive N=6328 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Spontaneous onset of labour** | 35 | 29.2 | 44 | 22.6 | 2 | 12.5 | 27 | 14.4 | 2816 | 44.5 |
| **Induction of labour** | 54 | 45.0 | 106 | 54.4 | 5 | 31.3 | 91 | 48.7 | 2056 | 32.5 |
| **CS emergency before onset of labour** | 4 | 3.3 | 11 | 5.6 | 5 | 31.3 | 42 | 22.5 | 217 | 3.4 |
| **Mode of birth** | | | | | | | | | | |
| Spontaneous vaginal | 51 | 42.5 | 56 | 28.7 | 4 | 25.0 | 48 | 25.7 | 2999 | 47.4 |
| Operative vaginal | 16 | 13.3 | 36 | 18.5 | 1 | 6.25 | 19 | 10.2 | 907 | 14.3 |
| CS elective | 27 | 22.5 | 34 | 17.4 | 4 | 25.0 | 27 | 14.4 | 1239 | 19.6 |
| CS emergency | 26 | 21.7 | 69 | 35.4 | 7 | 43.8 | 93 | 49.7 | 1183 | 18.7 |
| **Epidural** | 66 | 55.0 | 124 | 63.6 | 10 | 62.5 | 94 | 50.3 | 3219 | 50.9 |
| **General Anaesthetic*** | 5 | 4.2 | 5 | 2.6 | 1 | 6.3 | 25 | 13.4 | 204 | 3.2 |

*GA generally at time of Caesarean, but sometimes postpartum for management of PPH.

**Table 71: Perinatal outcomes and hypertensive disease (babies) NWH 2017**

| | Chronic hypertension N=124 | | Gestational hypertension N=197 | | Superimposed preeclampsia N=197 | | Preeclampsia N=200 | | Normotensive N=6436 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Gestation at birth** | | | | | | | | | | |
| <37 weeks | 17 | 13.7 | 14 | 7.1 | 7 | 41.2 | 68 | 34.0 | 526 | 8.2 |
| <32 weeks | 4 | 3.2 | | | 4 | 23.5 | 15 | 7.5 | 144 | 2.2 |
| **SGA** | 32 | 25.8 | 42 | 21.3 | 11 | 64.7 | 81 | 40.5 | 850 | 13.2 |
| **NICU Admission** | 11 | 8.9 | 18 | 9.1 | 6 | 35.3 | 70 | 35.0 | 620 | 9.6 |
| **≥2 days in NICU** | 8 | 6.5 | 16 | 8.1 | 6 | 35.3 | 65 | 32.5 | 471 | 7.3 |
| **Apgar <7 at 5 minutes** | 2 | 1.6 | 3 | 1.5 | 0 | | 11 | 5.5 | 145 | 2.3 |
| **Perinatal related deaths (n/1000)** | 3 | 24.2 | 1 | 5.1 | 0 | | 2 | 10.0 | 80 | 12.4 |

## 5.15 Body Mass Index (BMI)

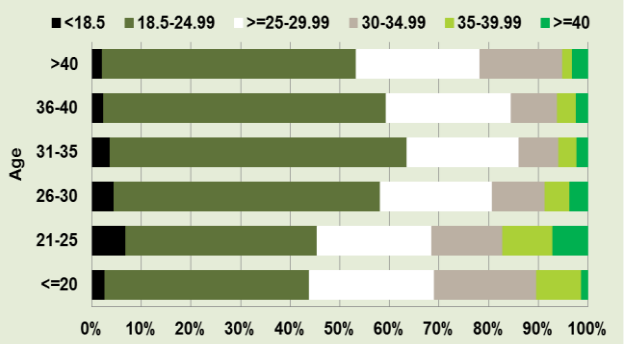
BMI is calculated as weight (kg) divided by height (m) squared. Weight used for this calculation is the first recorded weight in pregnancy. Out of range heights and weights are checked for accuracy.

### Findings

Rates of obesity, including morbid obesity (BMI≥35), have remained similar over the last 8 years overall among mothers birthing at NWH however there have been changes within some ethnicities. Over time, data collection has improved with only 1.1% of the data missing in 2017. For trends in prevalence of obesity at NWH, including by ethnicity, please see **Table 72** and **Table 74.**

It is unknown what proportion of pregnant mothers booked at NWH have their height and weight measured (strongly recommended and routine practice within ADHB) versus self-reported. A recent NZ publication showed discrepancies between measured and self-reported height and weight, which resulted in significant under-estimation of BMI. This has potential to impact on results of MSS screening and plotting of fundal height and estimated fetal weight on customised growth charts (Jeffs E 2014).

**Figure 66: Distribution of BMI by maternal age NWH 2017** (excludes missing data (n=74))




As observed in previous years, the relationship between BMI and maternal age is "U shaped" with a larger proportion of overweight and obesity in younger and older mothers. Higher rates of obesity in younger pregnant women are associated with higher rates of socio-economic deprivation and also with ethnicity.

Māori and especially Pacific women are over represented amongst the overweight/obese groups (72.2% and 86.8% respectively vs 34.5% among NZ European women). Overweight/obesity is more common amongst parous women (47.4% vs 36.1% in nullipara), perhaps reflecting weight gained during previous pregnancies and not lost postpartum, as well as increasing age. The prevalence of overweight/obesity among women who smoke in pregnancy is substantially higher than non-smokers (68.9% vs 40.6%). This high rate of smoking will also contribute to pregnancy complications in overweight and obese women.

**Figure 67: Distribution of BMI by ethnicity NWH 2017** (excludes missing data)

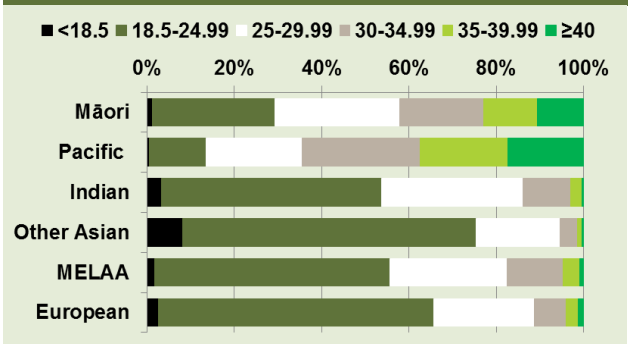
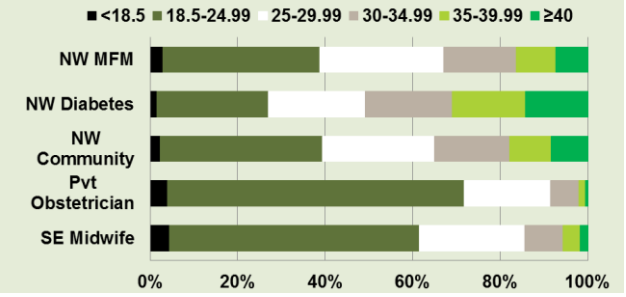


**Figure 68: Distribution of BMI by LMC at birth NWH 2017** (excludes missing data)




Rates of obesity are highest in the NW diabetes clinic, followed by NW community and MFM clinics. Rates are lowest amongst pregnant women booked with private obstetricians and self-employed midwives.

As has been shown in the international literature, rates of chronic hypertension and pregnancy hypertensive complications increase progressively with increasing BMI.

**Figure 69: Hypertensive disease rates by maternal BMI NWH 2017** (Pre-eclampsia includes superimposed pre-eclampsia) (excludes missing data)

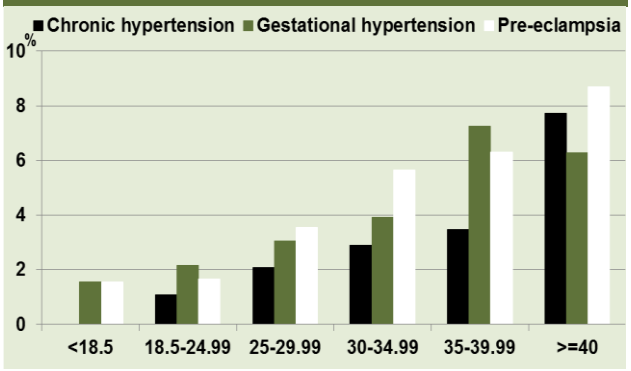
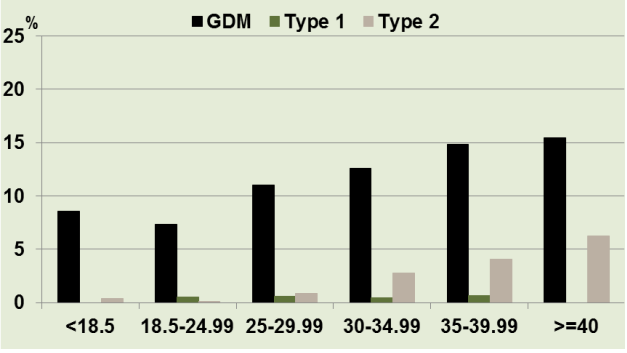



**Figure 70: Diabetes rates by maternal BMI NWH 2017**

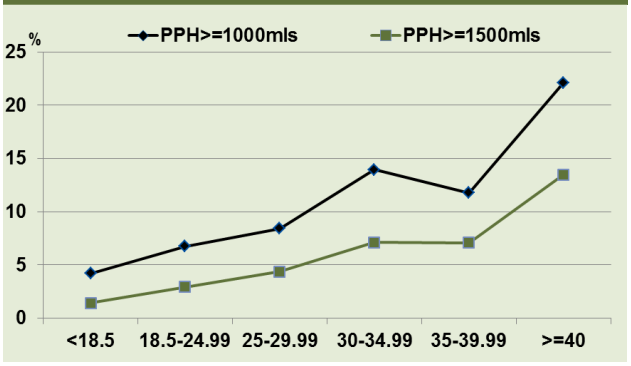



Increasing maternal BMI is also strongly associated with increasing rates of gestational diabetes (GDM) and Type 2 diabetes as shown above. GDM was diagnosed in 15.4% of women with a BMI ≥40. Obese women with GDM are also more likely than normal weight women to be subsequently diagnosed with Type 2 diabetes therefore follow-up testing with HBA1c at 3 months postpartum in primary care is crucial.

Rates of major PPH are increased in women with high BMI who have spontaneous vaginal births. The reasons for this are unclear, but a recent report from NWH data found that obese nulliparous women had an elevated risk of major PPH (≥1000mls) independent of other risk factors such as infant birthweight, induction of labour, etc. (Fyfe et al. BMC Pregnancy and Childbirth 2012, 12:112; doi:10.1186/1471-2393-12-112) It is recommended that women with high BMI should receive active management of the third stage.

Rates of major PPH are also increased in women with high BMI who have Caesarean births, especially in those with BMI ≥40. This finding may be partially explained by factors such as increased operation time, but reduced uterine contractility may also be a factor.

**Figure 71: Postpartum haemorrhage rate by BMI among spontaneous vaginal births NWH 2017** (excludes missing data)




Rates of SGA are increased in women with elevated BMI in a dose dependent fashion. Not surprisingly there is also an increased risk of iatrogenic preterm birth in heavier women. This is likely to at least partly explain the higher rates of NICU stay for ≥2 days in these women. Unlike findings from some international literature, there was not an increased risk of spontaneous preterm birth in obese women at National Women's Health in 2017.

**Figure 72: Postpartum haemorrhage rate by BMI among Caesarean sections NWH 2017** (excludes missing data)

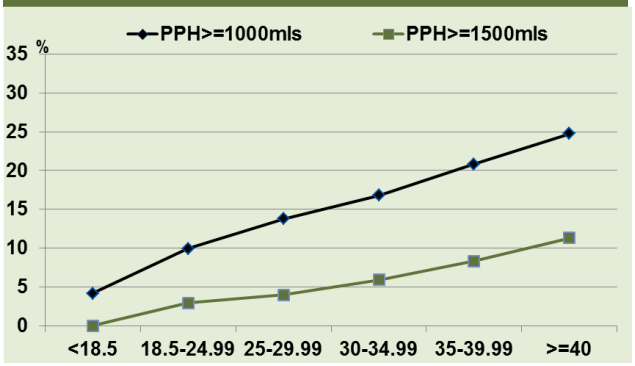
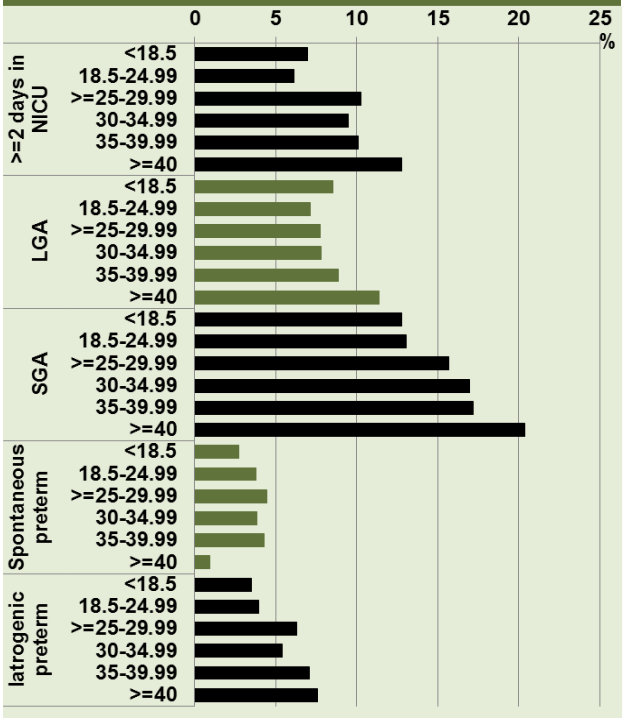



**Figure 73: Preterm birth and neonatal outcomes in relation to BMI NWH 2017**




## 5.16 Data tables: Body Mass Index

**Table 72: Maternal BMI using WHO categories NWH 2011-2017**

| | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=7523 | | N=7695 | | N=7223 | | N=7400 | | N=6933 | | N=7241 | | N=6846 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **<18.5** | 439 | 5.8 | 481 | 6.3 | 255 | 3.5 | 313 | 4.2 | 249 | 3.6 | 283 | 3.9 | 257 | 3.8 |
| **18.5-24.99** | 3790 | 50.4 | 3949 | 51.3 | 3826 | 53.0 | 4106 | 55.5 | 3791 | 55.5 | 4005 | 55.3 | 3723 | 54.4 |
| **25-29.99** | 1641 | 21.8 | 1678 | 21.8 | 1679 | 23.2 | 1565 | 21.1 | 1528 | 22.4 | 1601 | 22.1 | 1578 | 23.0 |
| **30-34.99** | 790 | 10.5 | 771 | 10.0 | 699 | 9.7 | 696 | 9.4 | 671 | 9.8 | 663 | 9.2 | 690 | 10.1 |
| **35-39.99** | 368 | 4.9 | 354 | 4.6 | 367 | 5.0 | 357 | 4.8 | 332 | 4.9 | 358 | 4.9 | 317 | 4.6 |
| **≥40** | 309 | 4.1 | 289 | 3.8 | 250 | 3.5 | 234 | 3.2 | 258 | 3.8 | 238 | 3.3 | 207 | 3.0 |
| **Missing** | 186 | 2.5 | 173 | 2.3 | 147 | 2.0 | 129 | 1.7 | 104 | 1.5 | 93 | 1.3 | 74 | 1.1 |

**Table 73: LMC at birth and BMI NWH 2017**

| Total | Total | <18.5 | | 18.5-24.99 | | 25-29.99 | | 30-34.99 | | 35-39.99 | | ≥40 | | Missing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6846 | n=257 | | n=3723 | | n=1578 | | n=690 | | n=317 | | n=207 | | n=74 | |
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **SE Midwife** | 3132 | 136 | 4.3 | 1775 | 56.7 | 750 | 23.9 | 274 | 8.7 | 122 | 3.9 | 53 | 1.7 | 22 | 0.7 |
| **Pvt Obst** | 2004 | 80 | 4.0 | 1352 | 67.5 | 395 | 19.7 | 130 | 6.5 | 30 | 1.5 | 10 | 0.5 | 7 | 0.2 |
| **NWH Comm** | 1242 | 29 | 2.3 | 454 | 36.6 | 313 | 25.2 | 210 | 16.9 | 117 | 9.4 | 102 | 8.2 | 17 | 0.5 |
| **NWH Diabetes** | 126 | 2 | 1.6 | 32 | 25.4 | 28 | 22.2 | 25 | 19.8 | 21 | 16.7 | 18 | 14.3 | 0 | |
| **NWH MFM** | 278 | 8 | 2.9 | 99 | 35.6 | 78 | 28.1 | 46 | 16.5 | 25 | 9.0 | 20 | 7.2 | 2 | 0.1 |
| **GP** | 11 | 1 | 9.1 | 6 | 54.5 | 3 | 27.3 | 1 | 9.1 | 0 | | 0 | | 0 | |
| **Other DHB** | 18 | 1 | 5.6 | 3 | 18.8 | 5 | 31.3 | 4 | 25.0 | 1 | 6.3 | 2 | 12.5 | 2 | 0.1 |
| **Unbooked** | 35 | 0 | | 2 | 5.7 | 6 | 17.1 | 0 | | 1 | 2.9 | 2 | 5.7 | 24 | 0.8 |

**Table 74: Demographic characteristics and BMI NWH 2016**

| | Total | <18.5 | | 18.5-24.99 | | 25-29.99 | | 30-34.99 | | 35-39.99 | | ≥40 | | Missing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **6846** | **n=257** | | **n=3723** | | **n=1578** | | **n=690** | | **n=317** | | **n=207** | | **n=74** | |
| | **N** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| **Ethnicity** | | | | | | | | | | | | | | | |
| Māori | 435 | 5 | 1.1 | 116 | 26.7 | 119 | 27.4 | 79 | 18.2 | 51 | 11.7 | 44 | 10.1 | 21 | 4.8 |
| Pacific | 733 | 4 | 0.5 | 93 | 12.7 | 157 | 21.4 | 192 | 26.2 | 144 | 19.6 | 123 | 16.8 | 20 | 2.7 |
| Indian | 703 | 23 | 3.3 | 352 | 50.1 | 226 | 32.1 | 76 | 10.8 | 18 | 2.6 | 2 | 0.3 | 6 | 0.9 |
| Other Asian | 1743 | 142 | 8.1 | 1168 | 67.0 | 332 | 19.0 | 70 | 4.0 | 19 | 1.1 | 5 | 0.3 | 7 | 0.4 |
| MELAA | 327 | 6 | 1.8 | 175 | 53.5 | 87 | 26.6 | 42 | 12.8 | 12 | 3.7 | 3 | 0.9 | 2 | 0.6 |
| European | 2905 | 77 | 2.7 | 1819 | 62.6 | 657 | 22.6 | 231 | 8.0 | 73 | 2.5 | 30 | 1.0 | 18 | 0.6 |
| **Age** | | | | | | | | | | | | | | | |
| ≤20 | 162 | 4 | 2.5 | 64 | 39.5 | 39 | 24.1 | 32 | 19.8 | 14 | 8.6 | 2 | 1.2 | 7 | 4.3 |
| 21-25 | 637 | 42 | 6.6 | 239 | 37.5 | 142 | 22.3 | 89 | 14.0 | 62 | 9.7 | 44 | 6.9 | 19 | 3.0 |
| 26-30 | 1692 | 74 | 4.4 | 896 | 53.0 | 378 | 22.3 | 177 | 10.5 | 84 | 5.0 | 61 | 3.6 | 22 | 1.3 |
| 31-35 | 2669 | 98 | 3.7 | 1587 | 59.5 | 597 | 22.4 | 215 | 8.1 | 98 | 3.7 | 58 | 2.2 | 16 | 0.6 |
| 36-40 | 1395 | 33 | 2.4 | 789 | 56.6 | 350 | 25.1 | 129 | 9.2 | 53 | 3.8 | 33 | 2.4 | 8 | 0.6 |
| >40 | 291 | 6 | 2.1 | 148 | 50.9 | 72 | 24.7 | 48 | 16.5 | 6 | 2.1 | 9 | 3.1 | 2 | 0.7 |
| **Parity** | | | | | | | | | | | | | | | |
| Nullipara | 3343 | 146 | 4.4 | 1991 | 59.6 | 727 | 21.7 | 279 | 8.3 | 119 | 3.6 | 48 | 1.4 | 33 | 1.0 |
| Multipara | 3503 | 111 | 3.2 | 1732 | 49.4 | 851 | 24.3 | 411 | 11.7 | 198 | 5.7 | 159 | 4.5 | 41 | 1.2 |
| **Smoking status at booking** | | | | | | | | | | | | | | | |
| Smoking | 303 | 9 | 3.0 | 85 | 28.1 | 77 | 25.4 | 50 | 16.5 | 31 | 10.2 | 31 | 10.2 | 20 | 6.6 |
| Not smoking | 6543 | 248 | 3.8 | 3638 | 55.6 | 1501 | 23 | 640 | 9.8 | 286 | 4.4 | 176 | 2.7 | 54 | 0.8 |

**Table 75: Pregnancy complications and BMI NWH 2017**

| | <18.5 | | 18.5-24.99 | | 25-29.99 | | 30-34.99 | | 35-39.99 | | ≥40 | | Missing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **N=257** | | **N=3723** | | **N=1578** | | **N=690** | | **N=317** | | **N=207** | | **N=74** | |
| | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| **Diabetes** | | | | | | | | | | | | | | |
| GDM | 22 | 8.6 | 274 | 7.4 | 174 | 11.0 | 87 | 12.6 | 47 | 14.8 | 32 | 15.5 | 1 | 1.4 |
| Type 1 | 0 | | 19 | 0.5 | 9 | 0.6 | 3 | 0.4 | 2 | 0.6 | 0 | | 0 | |
| Type 2 | 1 | 0.4 | 4 | 0.1 | 14 | 0.9 | 19 | 2.8 | 13 | 4.1 | 13 | 6.3 | 1 | 1.4 |
| No diabetes* | 234 | 91.1 | 3426 | 92.0 | 1381 | 87.5 | 581 | 84.2 | 255 | 80.4 | 162 | 78.3 | 72 | 97.3 |
| **Hypertension** | | | | | | | | | | | | | | |
| Chronic hypertension | 0 | | 40 | 1.1 | 33 | 2.1 | 20 | 2.9 | 11 | 3.5 | 16 | 7.7 | 0 | |
| Superimposed pre-eclampsia | 0 | | 5 | 0.1 | 1 | 0.1 | 6 | 0.9 | 1 | 0.3 | 3 | 1.4 | 0 | |
| Gestational hypertension | 4 | 1.6 | 80 | 2.1 | 48 | 3.0 | 27 | 3.9 | 23 | 7.3 | 13 | 6.3 | 0 | |
| Pre-eclampsia | 4 | 1.6 | 57 | 1.5 | 55 | 3.5 | 33 | 4.8 | 19 | 6.0 | 15 | 7.2 | 4 | 5.4 |
| No hypertension | 249 | 96.9 | 3541 | 95.1 | 1441 | 91.3 | 604 | 87.5 | 263 | 83.0 | 160 | 77.3 | 70 | 94.6 |

*includes women who have not had diabetes screening in pregnancy (n=378)

**Table 76: Postpartum haemorrhage rates among spontaneous vaginal births (N=3158) by BMI NWH 2017**

| | <18.5 | | 18.5-24.99 | | 25-29.99 | | 30-34.99 | | 35-39.99 | | ≥40 | | Missing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **N=143** | | **N=1708** | | **N=643** | | **N=337** | | **N=170** | | **N=104** | | **N=53** | |
| | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **N** | **%** |
| **PPH≥1000mls** | 6 | 4.2 | 115 | 6.7 | 54 | 8.4 | 47 | 13.9 | 20 | 11.8 | 23 | 22.1 | 6 | 11.3 |
| **PPH≥1500mls** | 2 | 1.4 | 50 | 2.9 | 28 | 4.4 | 24 | 7.1 | 12 | 7.1 | 14 | 13.5 | 4 | 7.5 |

**Table 77: Postpartum haemorrhage rates among Caesarean sections (N=2709) by BMI NWH 2017**

| Total | <18.5 N=72 | | 18.5-24.99 N=1394 | | 25-29.99 N=727 | | 30-34.99 N=286 | | 35-39.99 N=120 | | ≥40 N=97 | | Missing N=13 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **PPH≥1000mls** | 3 | 4.2 | 139 | 10.0 | 100 | 13.8 | 48 | 16.8 | 25 | 20.8 | 24 | 24.7 | 2 | 15.4 |
| **PPH≥1500mls** | 0 | | 41 | 2.9 | 29 | 4.0 | 17 | 5.9 | 10 | 8.3 | 11 | 11.3 | 0 | |

**Table 78: Maternal interventions and birth outcomes by BMI NWH 2017**

| | TOTAL N=6846 | | <18.5 n=257 | | 18.5-24.99 n=3723 | | 25-29.99 n=1578 | | 30-34.99 n=690 | | 35-39.99 n=317 | | ≥40 n=207 | | Missing n=74 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Onset of birth** | | | | | | | | | | | | | | | | |
| Spontaneous labour | 2924 | 42.7 | 116 | 45.1 | 1665 | 45 | 648 | 41.1 | 258 | 37.4 | 126 | 39.7 | 57 | 27.5 | 54 | 26.1 |
| Induced labour | 2312 | 33.8 | 90 | 35.0 | 1213 | 33 | 503 | 31.9 | 274 | 39.7 | 126 | 39.7 | 94 | 45.4 | 12 | 5.8 |
| Emergency CS before labour | 278 | 4.1 | 7 | 2.7 | 129 | 3.5 | 82 | 5.2 | 25 | 3.6 | 17 | 5.4 | 14 | 6.8 | 4 | 1.9 |
| Elective CS | 1332 | 19.5 | 44 | 17.1 | 716 | 19.2 | 345 | 21.9 | 133 | 19.3 | 48 | 15.1 | 42 | 20.3 | 4 | 1.9 |
| **Mode of birth** | | | | | | | | | | | | | | | | |
| Spontaneous vaginal birth | 3158 | 46.1 | 143 | 55.6 | 1708 | 46 | 643 | 40.7 | 337 | 48.8 | 170 | 53.6 | 104 | 50 | 53 | 25.6 |
| Operative vaginal | 979 | 14.3 | 42 | 16.3 | 621 | 16.7 | 208 | 13.2 | 67 | 9.7 | 27 | 8.5 | 6 | 3 | 8 | 3.9 |
| Elective CS | 1332 | 19.5 | 44 | 17.1 | 716 | 19.2 | 345 | 21.9 | 133 | 19.3 | 48 | 15.1 | 42 | 20 | 4 | 1.9 |
| Emergency CS | 1377 | 20.1 | 28 | 10.9 | 678 | 18.2 | 382 | 24.2 | 153 | 22.2 | 72 | 22.7 | 55 | 27 | 9 | 4.3 |

**Table 79: Neonatal outcomes by BMI NWH 2017**

| | TOTAL N=6974 | | <18.5 n=258 | | 18.5-24.99 n=3782 | | 25-29.99 n=1614 | | 30-34.99 n=706 | | 35-39.99 n=326 | | ≥40 n=211 | | Missing n=77 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Preterm** | 632 | 8.6 | 16 | 6.2 | 293 | 7.7 | 174 | 10.8 | 65 | 9.2 | 37 | 11.3 | 18 | 8.5 | 29 | 37.7 |
| Iatrogenic* | 347 | 4.8 | 9 | 3.5 | 150 | 4.0 | 102 | 6.3 | 38 | 5.4 | 23 | 7.1 | 16 | 7.6 | 9 | 11.7 |
| Spontaneous | 285 | 3.8 | 7 | 2.7 | 143 | 3.8 | 72 | 4.5 | 27 | 3.8 | 14 | 4.3 | 2 | 0.9 | 20 | 26.0 |
| **Term** | 6342 | 90.2 | 242 | 93.8 | 3489 | 92.3 | 1440 | 89.2 | 641 | 90.8 | 289 | 88.7 | 193 | 91.5 | 48 | 62.3 |
| Iatrogenic* | 3667 | 52.4 | 132 | 51.2 | 1948 | 51.5 | 857 | 53.1 | 406 | 57.5 | 174 | 53.4 | 138 | 65.4 | 12 | 15.6 |
| Spontaneous | 2675 | 37.8 | 110 | 42.6 | 1541 | 40.7 | 583 | 36.1 | 235 | 33.3 | 115 | 35.3 | 55 | 26.1 | 36 | 46.8 |
| **SGA** | 1016 | 14.3 | 33 | 12.8 | 493 | 13.0 | 253 | 15.7 | 120 | 17.0 | 56 | 17.2 | 43 | 20.4 | 18 | 23.4 |
| **≥ 2 days in NICU** | 566 | 7.8 | 18 | 7.0 | 232 | 6.1 | 166 | 10.3 | 67 | 9.5 | 33 | 10.1 | 27 | 12.8 | 23 | 29.9 |
| **Perinatal deaths (n/1000)** | 86 | 12.3 | 1 | 3.9 | 39 | 10.3 | 21 | 13.0 | 11 | 15.6 | 8 | 24.5 | 2 | 9.5 | 4 | 51.9 |

*Iatrogenic includes elective Caesarean, emergency Caesarean before onset of labour and induced labour

## 5.17 Fetal Medicine Unit

The data included in this section have been extracted from the MFM Viewpoint database for 2017.

### Findings

**Figure 74: Number of visits over time (2011 – 2017)**

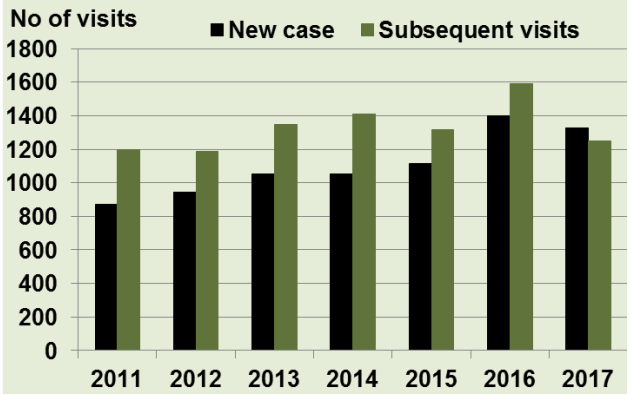
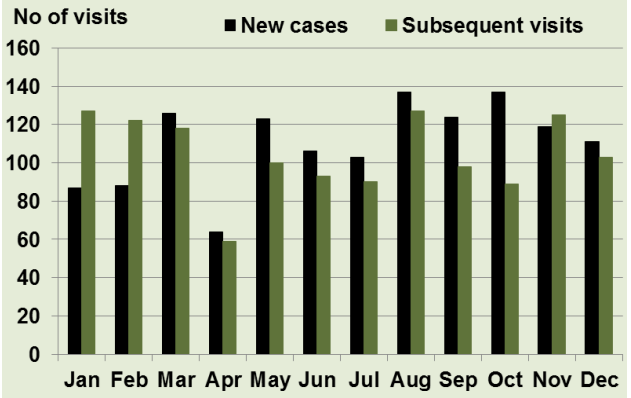



**Table 80: Number of visits over time (2011-2017)**

| | New cases | Subsequent visit |
|---|---|---|
| 2011 | 874 | 1199 |
| 2012 | 944 | 1189 |
| 2013 | 1054 | 1345 |
| 2014 | 1054 | 1412 |
| 2015 | 1113 | 1316 |
| 2016 | 1401 | 1589 |
| 2017 | 1325 | 1251 |

**Figure 75: Number of new cases and subsequent visits to Fetal Medicine Unit NWH 2017**




In 2017 there were on average 110 new cases per month and 104 subsequent visits.

**Table 81: Number of mothers/procedures performed in fetal medicine service NWH 2013-2017**

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| **Amniocentesis*** | 165 | 141 | 123 | 181 | 164 |
| **CVS*** | 87 | 76 | 99 | 118 | 94 |
| **Echocardiogram*** | 457 | 411 | 449 | 574 | 625 |
| **Intrauterine transfusion (mothers)** | 11 | 8 | 8 | 8 | 11 |
| **Intrauterine transfusion (procedures)** | 29 | 17 | 25 | 23 | 27 |
| **Other procedures (mothers)** | 50 | 49 | 46 | 69 | 49 |
| **Other procedures (procedures)** | 60 | 51 | 52 | 81 | 66 |

*Amniocentesis, CVS and Echocardiogram data apply to the total number of procedures performed, so the count may include multiple procedures for one baby and may include more than one procedure in multiple pregnancies

Intrauterine transfusion and other procedure data are given as total number of procedures and number of individual women who had a procedure.

Other procedures include fetal blood sampling, amnio-drainage, amnio-infusion, other sampling, shunt, embryo reduction/fetocide, and laser ablation.

### Comment

**Table 82: Diagnoses by pregnancy (multiple pregnancies (n=74 twin, 5 triplet, 1 quad) represented once only) among first presentations to Fetal Medicine service in 2017**

| Findings | 2017 (N=1323) | |
|---|---|---|
| | n | % |
| Heart | 190 | 14.4 |
| Genetic/multisystem disorders | 163 | 12.3 |
| Genitourinary tract | 119 | 9.0 |
| Haematological/Others/Fetal demise | 82 | 6.2 |
| Brain | 70 | 5.3 |
| Preterm birth | 69 | 5.2 |
| Liquor/growth | 61 | 4.6 |
| Multiple gestation | 55 | 4.2 |
| Abdominal wall and GI tract | 47 | 3.6 |
| Musculoskeletal | 39 | 3.0 |
| Face and neck | 28 | 2.1 |
| Chest | 17 | 1.3 |
| Infection | 15 | 1.1 |
| Spine | 9 | 0.7 |
| Placenta, membranes, umbilical cord | 8 | 0.6 |
| Fetal growth restriction | 1 | 0.1 |
| Isoimmunisation | 1 | 0.1 |
| Multiple pregnancy | 1 | 0.1 |
| No obvious fetal defect | 348 | 26.3 |

The steady increase in numbers seen by Auckland fetal medicine service over previous years does not appear to have continued. There are a number of possible explanations for this. It may be simply due to statistical variation, it may represent change in referral patterns, or could represent a change in how cases are managed after referral. During 2017 and

continuing into 2018, the fetal medicine unit in Auckland has faced critical staffing shortages. This has meant that many cases are now being managed "virtually" and in the community with advice from the fetal medicine team. Counties Manukau have also appointed two maternal fetal medicine specialists in this time period and as a result we now receive far fewer referrals from the CMDHB area.

The number of fetal echocardiograms undertaken continues to increase – this is a combination of a greater number of referrals from community – reflecting better detection rates, and also a move to our service undertaking early screening echocardiograms at 16 weeks for fetuses with increased nuchal translucency greater than or equal to 3.5mm on MSS1. Babies with cardiac anomalies continue to be the most common reason for review. Of note the commonest diagnosis is 'no obvious fetal defect'. This may be following resolution of an abnormality, such as when increased nuchal translucency resolves. Some suspected abnormalities on scan are not confirmed, and the fetus is found to have no structural anomalies.

The number of amniocenteses and CVS has reduced, which may reflect the lower number of patients seen overall, or the impact of the availability of noninvasive prenatal testing in the private sector, which has seen women opting not to have an invasive procedure. Other invasive procedure numbers including in utero transfusions remain stable. During 2017 we saw a greater number of transfusions required for fetal anemia secondary to parvovirus infection.



**National Women's**

Annual Clinical Report 2017

# CHAPTER 6

# LABOUR AND BIRTH

This chapter includes data on labour and birth interventions and outcomes, including induction of labour and mode of birth. Tables pertaining to this chapter can be found at the end of each section.

## 6.1 Gestation at birth

**Figure 76: Distribution of gestation at birth among babies born NWH 2006-2017**

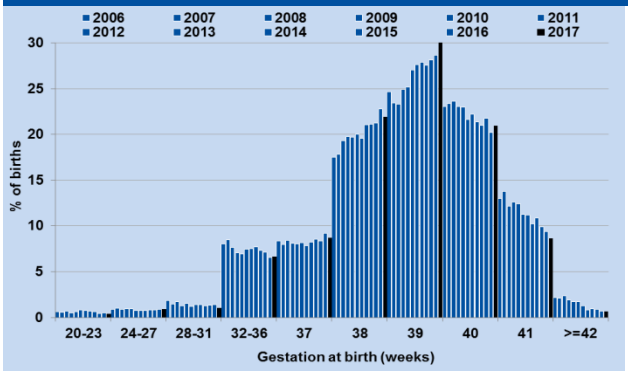
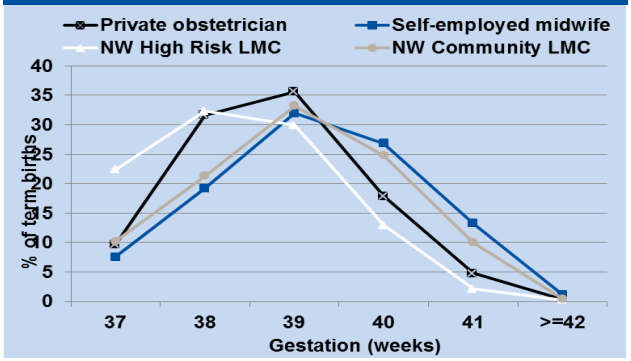



**Figure 77: Distribution of gestation at birth among term babies born by LMC 2017**




There continue to be significant changes in gestation at birth among births at NWH (**Figure 76**).

Since 2006, there has been a significant reduction in late preterm births (32-36 weeks), though this may be stabilising. Just under half of preterm births within our unit are due to spontaneous labour or preterm pre-labour rupture of membranes (PPROM). Current therapeutic strategies are unlikely to prevent preterm birth in women presenting with threatened preterm labour. However we do have opportunity to identify those at most risk of going on to preterm birth so interventions that reduce neonatal morbidity and mortality can be targeted appropriately. The Preterm Birth clinic continues to provide such support to women at high risk of preterm birth, and has also been a focus of research-based activity in this important area.

We have seen from 2013 to 2017 an ongoing significant reduction in smoking rates at booking. Rates of smoking at birth have also reduced in 2017. In some ethnic and age groups smoking rates remain unacceptably high. Smoking is a strong risk factor for preterm birth.

The distribution of gestation at birth at term also continues to show changes over time, with a continuation of the increase at 39 weeks seen since 2009, and stability in the pattern at all other gestations except 41 weeks which continues to show a decrease. As commented on in the last report, this pattern may be due to guideline driven practice in relation to timing of birth.

### Iatrogenic birth

#### Methods

The four pathways to birth are: (1) induction of labour, (2) elective Caesarean section, (3) emergency Caesarean prior to onset of labour, and (4) spontaneous onset of labour. If any woman had a failed induction followed by emergency Caesarean, she has been categorised as an induced labour for the purposes of this section.

Input of induction-related data to the Healthware database requires active opening of an induction screen. This is not consistently done, especially if 'inductions' are performed on the Labour and Birthing Suite (typically by ARM with or without an oxytocin infusion). To improve capture of these inductions, clinical notes were reviewed if the indication for ARM (artificial rupture of membranes) was induction or if an ARM was performed or syntocinon commenced before the onset of contractions. From 2008 clinical notes were also reviewed if syntocinon was commenced before 3cm dilatation. This rigorous approach to defining induction of labour ensures that all cases are captured.

Indication for induction is prioritised at data entry to primary and secondary indication. Primary indications are given here.

#### Findings

The decrease in induction rates seen in 2014 for nullipara and multipara at term was likely related to the adoption of an Auckland consensus guideline on indications for induction of labour. This decrease in rates has not been maintained (**Figure 78**).

**Figure 78: Induction of labour rates NWH 1992-2017**

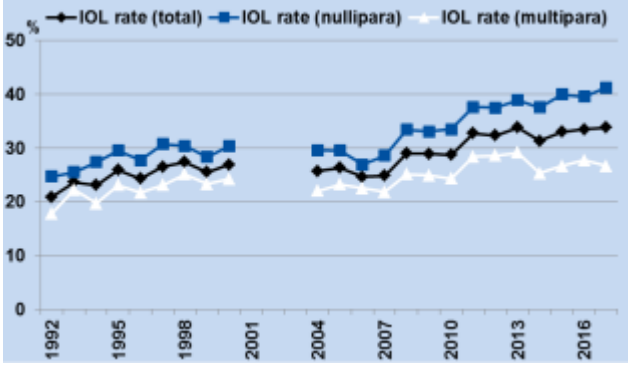


**Figure 79: Pathways to birth by gestation and parity NWH 2017**

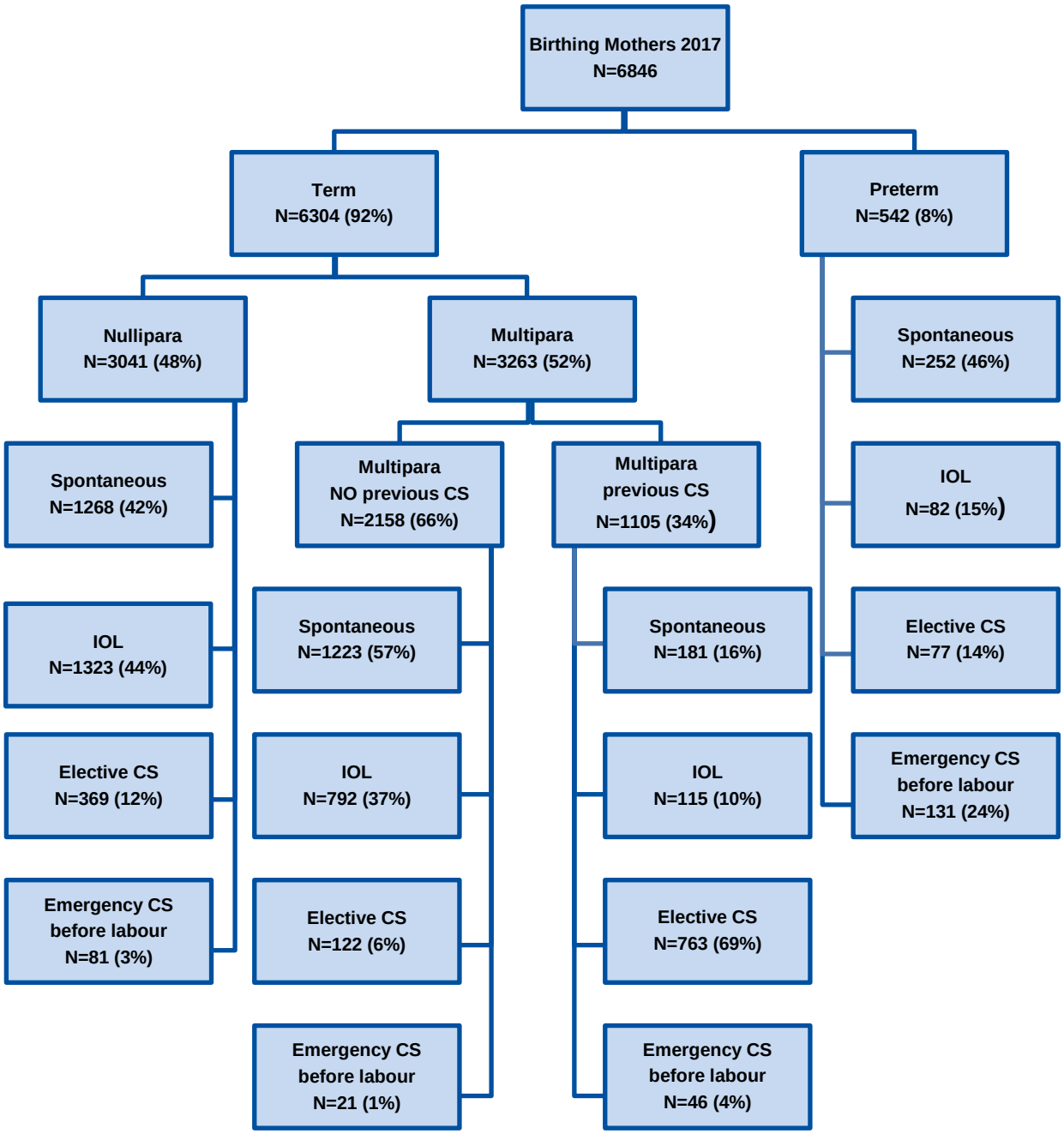
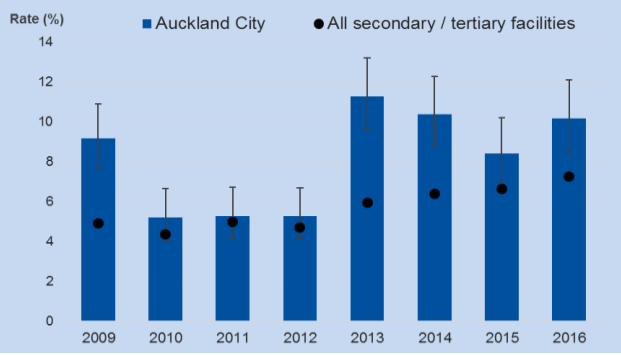


**Figure 80: NZ Maternity Indicators 2016: Standard primiparae who undergo induction of labour NWH and NZ secondary/tertiary facility rates 2009-2016**



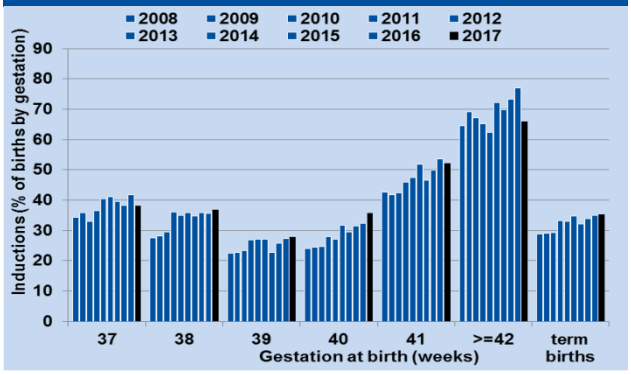

Error bars represent the 95% confidence interval for NWH rate.

The induction of labour rate in standard primiparae (as defined by the Ministry of Health in New Zealand Maternity Clinical Indicators 2014 https://www.health.govt.nz/system/files/documents/publications/nz-maternity-clinical-indicators-report-2016-feb18.pdf) is one of the clinical indicators reported annually by the Ministry of Health as part of the Maternity Quality and Safety Programme. This allows the opportunity to compare ADHB management of a low risk population with other secondary/tertiary facilities around NZ.

The rates of induction among standard primiparae during 2010-2012 are out of keeping with the rates in the surrounding years and out of keeping with data from the NWH clinical database suggesting that these are incorrect.

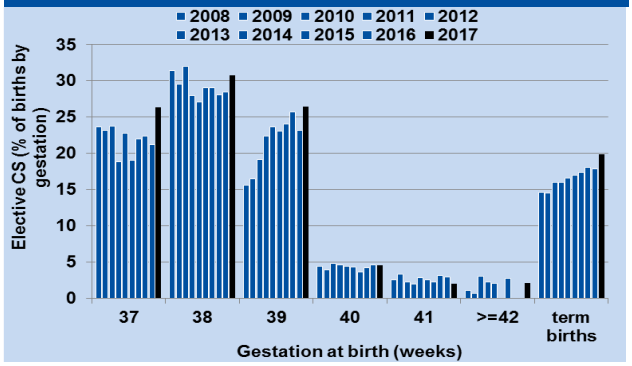
In 2016 the ADHB facility rate (10.2%) was significantly higher than the national average, although it is of note that the national average has also risen (7.3%). Note that the 2016 rate by DHB of residence for Auckland was 7.6% and within confidence intervals for the national median.

**Figure 81: Induction of labour rates by gestation at birth NWH 2008-2017**




Overall the pattern for gestation at birth at term is encouraging (**Figure 81**).There is a continuing shift to induction at 38 to 40 weeks with concomitant reduction or stabilization at other gestations. Any trends for ≥42 weeks should be interpreted with caution due to very small numbers.

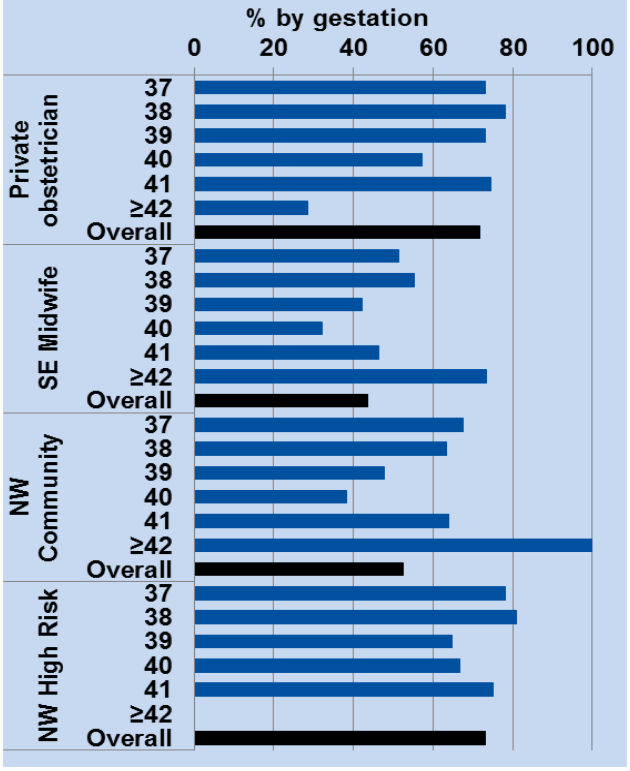
**Figure 82: Elective Caesarean rates by gestation at birth NWH 2008-2017**




Looking at term elective caesarean (**Figure 82**), there has been a surprising rise in the percentage of births at 37 weeks that were by elective caesarean. There has also been a rise at 38 and 39 weeks, no change at 40 weeks, and reduction at 41 weeks. Again this may reflect some guidelines driving practice around SGA and hypertensive disease; however the rise at 37 weeks is of concern and requires further investigation.

**Figure 83** suggests variation in practice by LMC at birth in regards to iatrogenic onset of birth. It is difficult to comment on this data without detailed data on clinical indications.

**Figure 83: Iatrogenic onset of birth rate (induction and elective Caesarean) at term by LMC at birth NWH 2017**



## Indication for induction

**Figure 84: Primary indication for induction by gestation (as a percentage of all births) NWH 2017**

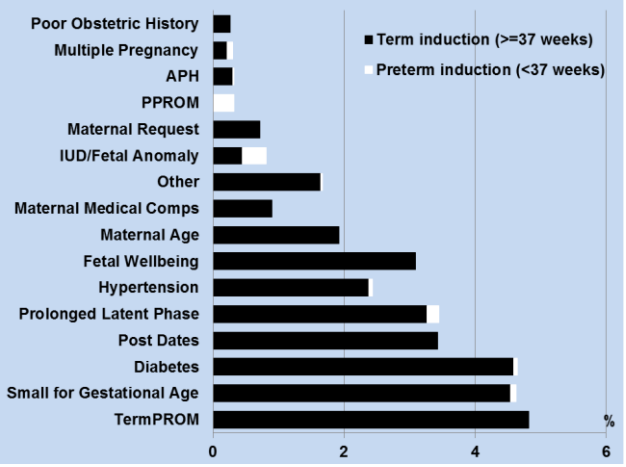



**Figure 85: Primary indication for induction at term as a percentage of term births by parity**

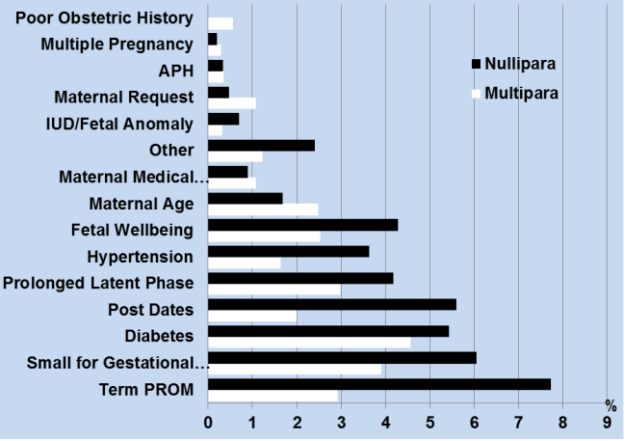
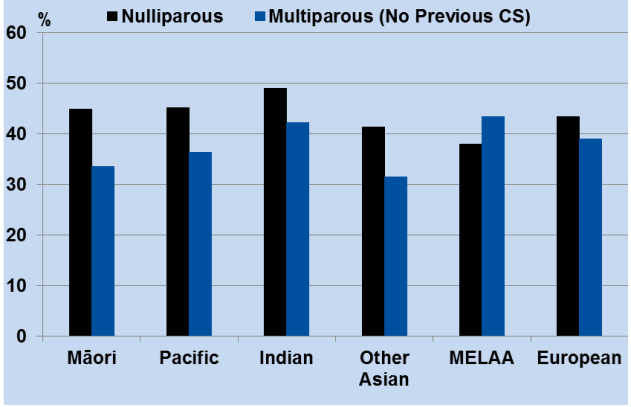



**Figure 84** denotes what proportion of inductions, by indication, are performed at 37 weeks onwards versus under 37 weeks. PPROM features prominently for induction under 37 weeks, despite guidance around aiming for 37 weeks. The top indication overall is Term PROM, followed by SGA and diabetes. Current NWH guidelines support maternal choice regarding planned induction of labour as soon as possible after term PROM, versus planned expectant management. The national SGA guideline has been embedded in NWH policy since March 2014, and provides guidance around risk stratification in planned timing of birth for SGA. The NWH Diabetes in pregnancy guideline is under review at present, which is an opportunity to update guidance on timing of birth. Prolonged latent phase as an indication for induction of labour is debatable but guided by maternal and clinician preference.

In December 2014 a formal booking system for elective and acute inductions was implemented. The goal was to clarify the primary indication for induction of labour. The booking system has been under review in 2018 with a view to improved service planning.

**Figure 86: Induction rate at term by ethnicity and parity NWH 2017**



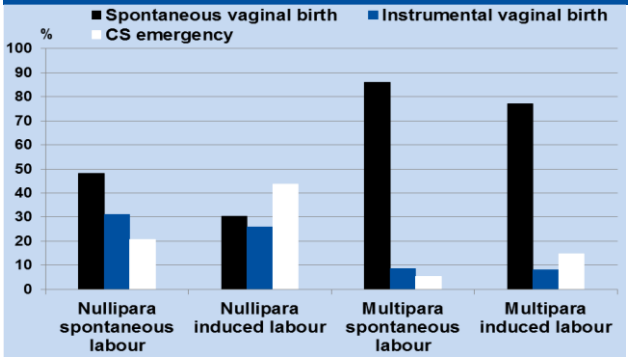

When post-dates was stated to be the primary indication for induction, 5.5% occurred prior to 41 weeks (up from 4% in 2016) (**Table 83**). The IOL guideline around maternal age changed in June 2014 so that earlier birth was recommended only for women ≥40 years. Almost universally for 2017, women over 40 are not being induced for postdates past 40 weeks so either they are labouring spontaneously or being induced earlier or for other indications. For those under 40, most IOL are at 41 weeks and above. It is concerning to see an ongoing substantial proportion of inductions at 42 weeks and above, and further audit is required on the reasons for this.

**Table 83: Gestation at birth among women whose primary indication for induction was 'post-dates' by maternal age NWH 2017**

| Gestation (weeks) | Total N=235 | | Age<35 n=181 | | Age≥35 n=54 | | Age<40 n=234 | | Age≥40 n=1 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| 40-40[6] | 13 | 5.5 | 10 | 5.5 | 3 | 5.6 | 13 | 6 | 0 | 0 |
| 41-41[6] | 198 | 84.3 | 152 | 84.0 | 46 | 85.2 | 197 | 84 | 1 | 100 |
| 42-42[6] | 23 | 9.8 | 18 | 9.9 | 5 | 9.3 | 23 | 10 | 0 | 0 |
| 43-43[6] | 1 | 0.4 | 1 | 0.6 | 0 | 0.0 | 1 | 0 | 0 | 0 |

## Mode of birth following induced and spontaneous onset of labour by parity

**Figure 87: Mode of birth among intended vaginal births at term by parity and onset of labour (excludes previous Caesarean) NWH 2017**




For women expecting their first baby, in spontaneous labour at term, their chance of emergency Caesarean is 21%. In women without previous Caesarean in our hospital (nullipara and multipara), the emergency Caesarean rate following induction is higher than following spontaneous onset of labour. However these observational data need to be interpreted with caution. Numerous randomised trials have shown that when labour is induced for an appropriate indication, the Caesarean rate in the induced group is actually lower than the Caesarean rate in the control "conservative management" group.

This association between IOL and caesarean in our facility holds for both prelabour emergency CS (failed IOL) and intrapartum CS. Failed IOL appears to be more common when the indication is hypertension, whereas intrapartum CS is more common with postdates and diabetes. The failed IOL rate in nulliparae is of concern (11.8%).

**Figure 88: Mode of birth at term among nullipara by indication for induction NWH 2017**

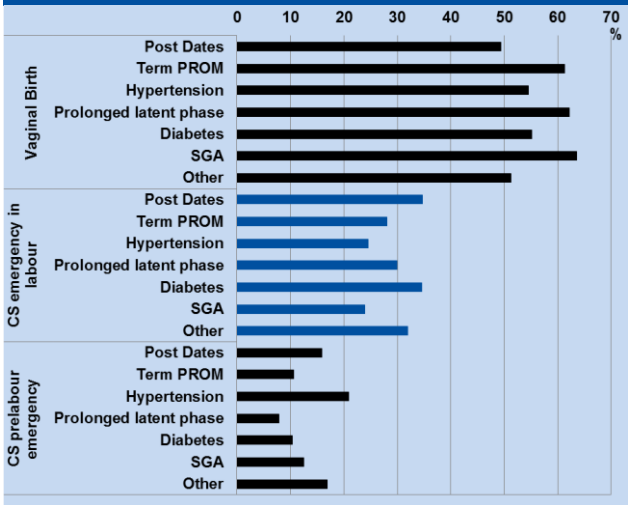
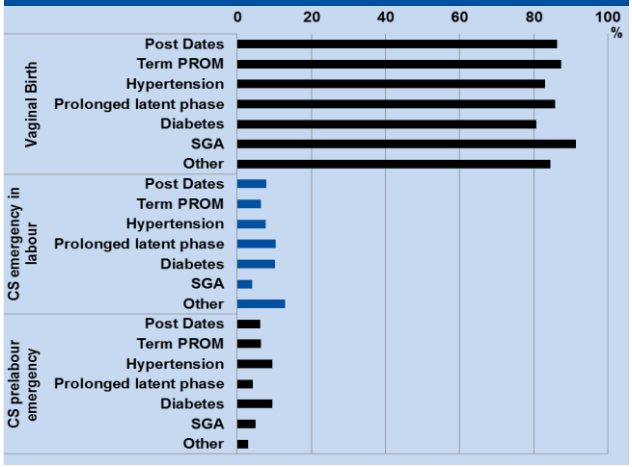



**Figure 89: Mode of birth at term among multipara by indication for induction NWH 2017**

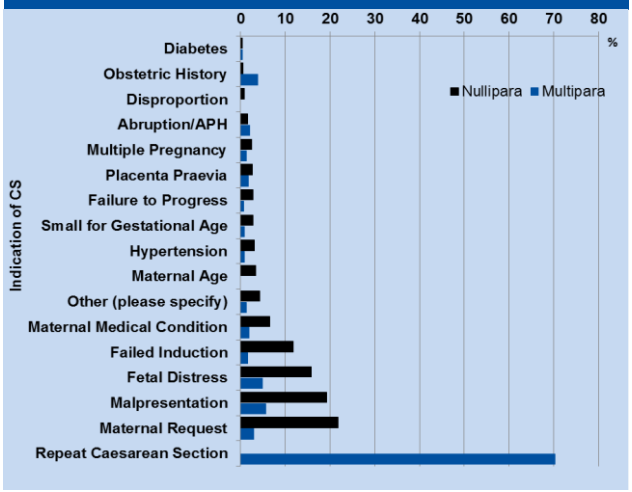



### 6.1.1 Indication for elective and pre-labour Caesarean section

The largest contributor to overall rate of elective and pre-labour emergency Caesareans, as expected, was 'repeat Caesarean section'. For multiparous women, 70% of elective and pre-labour emergency Caesarean sections were performed for this indication (or 42% of all elective/prelabour CS, **Table 90**). The next most common indications for elective or prelabour Caesarean overall for both nulliparae and multiparae were malpresentation (11%), maternal request (10.4%) and fetal distress (9.2%).

Elective or prelabour primary Caesarean in nulliparae who birth in our facility remains an area of concern (21.8% of nulliparous elective/prelabour CS is for maternal request). Among elective/prelabour Caesareans among nullipara, failed induction is listed as the primary indication for 11.8%. The true rate of failed induction among induced nulliparae at term was 13.7% (**Table 91**).

**Figure 90: Reported primary indication for elective or prelabour CS as proportion of all CS by parity NWH 2017**



### 6.1.2 Use of syntocinon

All data are checked for women who are given syntocinon prior to 3 cm dilatation, to differentiate augmentation from induction of labour.

**Table 84: Use of syntocinon by onset of labour and parity NWH 2017**

| | Total birth | Syntocinon | |
|---|---|---|---|
| | N | n | % |
| **Total** | 6846 | 2195 | 32.1 |
| **Induced labour** | | | |
| Nullipara | 1378 | 1020 | 74.0 |
| Multipara | 934 | 582 | 62.3 |
| **Spontaneous labour** | | | |
| Nullipara | 1417 | 499 | 35.2 |
| Multipara | 1507 | 85 | 5.6 |

Syntocinon was used to augment spontaneous labour for 35% of nulliparous and 6% of multiparous women. The use of syntocinon augmentation of labour in multiparous women is open to challenge given international evidence that syntocinon in established labour shortens length of labour but does not increase the vaginal birth rate.

**Figure 91: Use of syntocinon for induction and augmentation of labour by parity, onset of labour, and LMC NWH 2017**

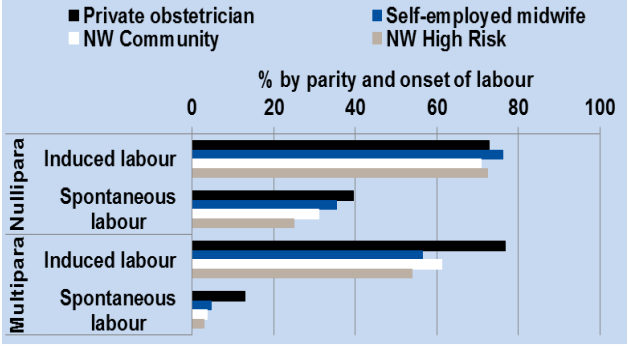
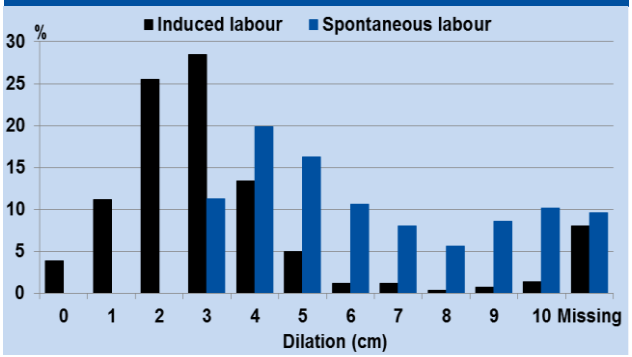



**Figure 92: Dilatation at commencement of syntocinon infusion among labouring women by induction status NWH 2017**




### Summary / Implications

Whilst gestation at birth after induction of labour continues to cluster between 38 and 40 weeks, there is an unprecedented rise in the rate of elective caesarean section at 37 weeks. This needs investigation. Postdates induction at 42 weeks and beyond continues to occur in small numbers. Further work is needed to understand the reasons for prelabour caesarean in nulliparae in our facility, including those who have a failed induction of labour. Repeat caesarean remains far and away the largest contributor to prelabour caesarean. Nulliparae who labour spontaneously in our facility have a nearly 80% chance of vaginal birth, and also have a 35% rate of requiring augmentation with syntocinon. The overall induction of labour rate has remained between 32% and 34% since 2011.

## 6.2 Data tables: Iatrogenic onset of birth: Induction of labour and pre-labour Caesarean section

**Table 85: Maternal demographic characteristics by onset of birth at term NWH 2017**

| | Total | Spontaneous labour | | Induced labour | | CS Elective | | CS Emergency before labour | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Total** | **6304** | **2672** | **42.4** | **2230** | **35.4** | **1254** | **19.9** | **148** | **2.3** |
| **Maternal Age** | | | | | | | | | |
| ≤20 | 137 | 83 | 60.6 | 47 | 34.3 | 1 | 0.7 | 6 | 4.4 |
| 21-25 | 578 | 296 | 51.2 | 228 | 39.4 | 44 | 7.6 | 10 | 1.7 |
| 26-30 | 1560 | 787 | 50.4 | 567 | 36.3 | 179 | 11.5 | 27 | 1.7 |
| 31-35 | 2464 | 1041 | 42.2 | 850 | 34.5 | 514 | 20.9 | 59 | 2.4 |
| 36-40 | 1298 | 427 | 32.9 | 446 | 34.4 | 391 | 30.1 | 34 | 2.6 |
| ≥41 | 267 | 38 | 14.2 | 92 | 34.5 | 125 | 46.8 | 12 | 4.5 |
| **Ethnicity** | | | | | | | | | |
| Māori | 372 | 177 | 47.6 | 131 | 35.2 | 52 | 14.0 | 12 | 3.2 |
| Pacific | 674 | 347 | 51.5 | 257 | 38.1 | 60 | 8.9 | 10 | 1.5 |
| Indian | 646 | 266 | 41.2 | 268 | 41.5 | 91 | 14.1 | 21 | 3.3 |
| Other Asian | 1641 | 754 | 45.9 | 540 | 32.9 | 300 | 18.3 | 47 | 2.9 |
| MELAA | 306 | 120 | 39.2 | 104 | 34.0 | 77 | 25.2 | 5 | 1.6 |
| European | 2665 | 1008 | 37.8 | 930 | 34.9 | 674 | 25.3 | 53 | 2.0 |
| **BMI** | | | | | | | | | |
| <18.5 | 242 | 110 | 45.5 | 85 | 35.1 | 44 | 18.2 | 3 | 1.2 |
| 18.5-24.99 | 3474 | 1539 | 44.3 | 1166 | 33.6 | 680 | 19.6 | 89 | 2.6 |
| 25-29.99 | 1430 | 583 | 40.8 | 486 | 34.0 | 327 | 22.9 | 34 | 2.4 |
| 30-34.99 | 635 | 235 | 37.0 | 268 | 42.2 | 124 | 19.5 | 8 | 1.3 |
| 35-39.99 | 286 | 114 | 39.9 | 124 | 43.4 | 39 | 13.6 | 9 | 3.1 |
| ≥40 | 189 | 55 | 29.1 | 91 | 48.1 | 38 | 20.1 | 5 | 2.6 |
| Missing | 48 | 36 | 75.0 | 10 | 20.8 | 2 | 4.2 | 0 | 0.0 |
| **LMC at Birth** | | | | | | | | | |
| Self-employed Midwife | 2911 | 1594 | 54.8 | 969 | 33.3 | 300 | 10.3 | 48 | 1.6 |
| Private Obstetrician | 1872 | 464 | 24.8 | 648 | 34.6 | 695 | 37.1 | 65 | 3.5 |
| GP | 11 | 6 | 54.5 | 2 | 18.2 | 2 | 18.2 | 1 | 9.1 |
| NW Community | 1144 | 523 | 45.7 | 416 | 36.4 | 184 | 16.1 | 21 | 1.8 |
| NW Medical | 227 | 50 | 22.0 | 120 | 52.9 | 47 | 20.7 | 10 | 4.4 |
| NW Diabetes | 107 | 8 | 7.5 | 71 | 66.4 | 25 | 23.4 | 3 | 2.8 |
| Other DHB | 2 | 0 | 0.0 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| Unbooked | 30 | 27 | 90.0 | 2 | 6.7 | 1 | 3.3 | 0 | 0.0 |

MELAA = Middle Eastern, Latin American or African

**Table 86: Induction of labour rates 2006-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Births** | **7695** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| **Women Induced** | 1906 | 2203 | 2238 | 2214 | 2463 | 2483 | 2438 | 2315 | 2289 | 2423 | 2312 |
| **Incidence (%)** | **24.8** | **29.0** | **28.9** | **28.7** | **32.7** | **32.3** | **33.8** | **31.3** | **33.0** | **33.5** | **33.8** |
| **Total Nullipara** | 3752 | 3623 | 3811 | 3650 | 3539 | 3778 | 3441 | 3604 | 3321 | 3517 | 3343 |
| **Nullipara Induced** | 1047 | 1207 | 1260 | 1226 | 1330 | 1382 | 1337 | 1354 | 1328 | 1391 | 1378 |
| **Incidence (%)** | **27.9** | **33.3** | **33.1** | **33.5** | **37.6** | **36.5** | **38.9** | **37.5** | **40.0** | **39.6** | **41.2** |
| **Total Multipara** | 3943 | 3966 | 3924 | 4059 | 3984 | 3917 | 3782 | 3796 | 3612 | 3724 | 3503 |
| **Multipara Induced** | 859 | 996 | 978 | 988 | 1133 | 1101 | 1101 | 961 | 961 | 1032 | 934 |
| **Incidence (%)** | **21.8** | **25.1** | **24.9** | **24.3** | **28.4** | **28.1** | **29.1** | **25.3** | **26.6** | **27.7** | **26.7** |

**Table 87: Indication for induction by gestation NWH 2017**

| | Preterm n=542 | | Term n=6304 | | Total N=6846 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Total** | **82** | **15.1** | **2230** | **35.4** | **2312** | **33.8** |
| Term PROM | 0 | 0.0 | 330 | 5.2 | 330 | 4.8 |
| Diabetes | 4 | 0.7 | 314 | 5.0 | 318 | 4.6 |
| Small for Gestational Age | 6 | 1.1 | 311 | 4.9 | 317 | 4.6 |
| Post Dates | 0 | 0.0 | 235 | 3.7 | 235 | 3.4 |
| Hypertension | 4 | 0.7 | 163 | 2.6 | 167 | 2.4 |
| Prolonged latent phase | 12 | 2.2 | 224 | 3.6 | 236 | 3.4 |
| Fetal wellbeing | 0 | 0.0 | 212 | 3.4 | 212 | 3.1 |
| Other | 2 | 0.4 | 113 | 1.8 | 115 | 1.7 |
| Maternal Age | 0 | 0.0 | 132 | 2.1 | 132 | 1.9 |
| Maternal Medical Complications | 0 | 0.0 | 62 | 1.0 | 62 | 0.9 |
| IUD/Fetal Anomaly | 25 | 4.6 | 31 | 0.5 | 56 | 0.8 |
| PPROM | 22 | 4.1 | 0 | 0.0 | 22 | 0.3 |
| Maternal Request | 0 | 0.0 | 49 | 0.8 | 49 | 0.7 |
| Poor Obstetric History | 0 | 0.0 | 18 | 0.3 | 18 | 0.3 |
| APH | 1 | 0.2 | 21 | 0.3 | 22 | 0.3 |
| Multiple Pregnancy | 6 | 1.1 | 15 | 0.2 | 21 | 0.3 |

**Table 88: Indication for induction by parity (term births) NWH 2017**

| | Nullipara n=3041 | | Multipara n=3263 | | Total N=6304 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Total** | **1323** | **43.5** | **907** | **27.8** | **2230** | **35.4** |
| Term PROM | 235 | 7.7 | 95 | 2.9 | 330 | 5.2 |
| Diabetes | 165 | 5.4 | 149 | 4.6 | 314 | 5.0 |
| Small for Gestational Age | 184 | 6.1 | 127 | 3.9 | 311 | 4.9 |
| Post Dates | 170 | 5.6 | 65 | 2.0 | 235 | 3.7 |
| Hypertension | 110 | 3.6 | 53 | 1.6 | 163 | 2.6 |
| Prolonged latent phase | 127 | 4.2 | 97 | 3.0 | 224 | 3.6 |
| Fetal wellbeing | 130 | 4.3 | 82 | 2.5 | 212 | 3.4 |
| Maternal Age | 51 | 1.7 | 81 | 2.5 | 132 | 2.1 |
| Other | 73 | 2.4 | 40 | 1.2 | 113 | 1.8 |
| Maternal Medical Complications | 27 | 0.9 | 35 | 1.1 | 62 | 1.0 |
| Maternal Request | 14 | 0.5 | 35 | 1.1 | 49 | 0.8 |
| Poor Obstetric History | 0 | 0.0 | 18 | 0.6 | 18 | 0.3 |
| APH | 10 | 0.3 | 11 | 0.3 | 21 | 0.3 |
| IUD/Fetal Anomaly | 21 | 0.7 | 10 | 0.3 | 31 | 0.5 |
| Multiple Pregnancy | 6 | 0.2 | 9 | 0.3 | 15 | 0.2 |

**Table 89: Rates of induction by age and ethnicity (prioritised) among term nullipara and multipara (excluding previous Caesarean) NWH 2017**

| | Term Nullipara | Induction of labour | | Term Multipara no prev CS | Induction of labour | |
|---|---|---|---|---|---|---|
| | N | n | % | N | n | % |
| **Total** | **3041** | **1323** | **43.5** | **2158** | **792** | **36.7** |
| **Age** | | | | | | |
| ≤25 | 465 | 196 | 42.2 | 197 | 66 | 33.5 |
| 26-30 | 936 | 396 | 42.3 | 452 | 147 | 32.5 |
| 31-35 | 1125 | 499 | 44.4 | 893 | 310 | 34.7 |
| ≥35 | 515 | 232 | 45.0 | 616 | 269 | 43.7 |
| **Ethnicity** | | | | | | |
| Māori | 147 | 66 | 44.9 | 164 | 55 | 33.5 |
| Pacific | 233 | 105 | 45.1 | 339 | 123 | 36.3 |
| Indian | 384 | 188 | 49.0 | 168 | 71 | 42.3 |
| Other Asian | 822 | 340 | 41.4 | 540 | 170 | 31.5 |
| MELAA | 137 | 52 | 38.0 | 97 | 42 | 43.3 |
| European | 1318 | 572 | 43.4 | 850 | 331 | 38.9 |

**Table 90: Primary indication for elective or pre labour emergency Caesarean section (all gestations) NWH 2017**

| | Total N=1852 | | Nullipara n=738 | | Multipara n=1114 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| Abruption/APH | 35 | 1.9 | 12 | 1.6 | 23 | 2.1 |
| Diabetes | 7 | 0.4 | 3 | 0.4 | 4 | 0.4 |
| Disproportion | 6 | 0.3 | 6 | 0.8 | 0 | 0.0 |
| Failed Induction | 104 | 5.6 | 87 | 11.8 | 17 | 1.5 |
| Fetal Distress | 171 | 9.2 | 117 | 15.9 | 54 | 4.8 |
| Hypertension | 33 | 1.8 | 23 | 3.1 | 10 | 0.9 |
| Malpresentation | 204 | 11.0 | 142 | 19.2 | 62 | 5.6 |
| Maternal Age | 25 | 1.3 | 25 | 3.4 | 0 | 0.0 |
| Maternal Medical Condition | 69 | 3.7 | 48 | 6.5 | 21 | 1.9 |
| Maternal Request | 193 | 10.4 | 161 | 21.8 | 32 | 2.9 |
| Multiple Pregnancy | 32 | 1.7 | 18 | 2.4 | 14 | 1.3 |
| Obstetric History | 46 | 2.5 | 4 | 0.5 | 42 | 3.8 |
| Placenta Praevia with or without bleeding | 39 | 2.1 | 19 | 2.6 | 20 | 1.8 |
| Repeat Caesarean Section | 783 | 42.3 | 0 | 0.0 | 783 | 70.3 |
| Small for Gestational Age | 31 | 1.7 | 21 | 2.8 | 10 | 0.9 |
| Other (please specify) | 74 | 4.0 | 52 | 7.0 | 22 | 2.0 |

**Table 91: Mode of birth at term by onset of birth and parity (excluding women with prior CS) among intended vaginal births NWH 2017**

| | Nullipara | | | | Multipara (no prev CS) | | | |
|---|---|---|---|---|---|---|---|---|
| | Spontaneous labour N=1268 | | Induced labour N=1323 | | Spontaneous labour N=1404 | | Induced labour N=907 | |
| | n | % | n | % | n | % | n | % |
| **Mode of birth** | | | | | | | | |
| SVB | 611 | 48.2 | 402 | 30.4 | 1208 | 86.0 | 700 | 77.2 |
| Operative vaginal | 395 | 31.2 | 343 | 25.9 | 120 | 8.5 | 73 | 8.0 |
| CS emergency in labour | 262 | 20.7 | 397 | 30.0 | 76 | 5.4 | 86 | 9.5 |
| CS emergency not in labour * | 0 | 0.0 | 181 | 13.7 | 0 | 0.0 | 48 | 5.3 |
| **Epidural** | 779 | 61.4 | 1093 | 82.6 | 375 | 26.7 | 521 | 57.4 |

*failed induction rate at term

**Table 92: Mode of birth at term among nullipara by indication for induction NWH 2017**

| | Post dates N=170 | | Term PROM N=235 | | Hypertension N=110 | | Prolonged latent phase N=127 | | Diabetes N=165 | | SGA N=184 | | Other N=332 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Mode of birth** | | | | | | | | | | | | | | |
| SVB | 47 | 27.6 | 79 | 33.6 | 27 | 24.5 | 45 | 35.4 | 52 | 31.5 | 68 | 37.0 | 84 | 25.3 |
| Operative vaginal | 37 | 21.8 | 65 | 27.7 | 33 | 30.0 | 34 | 26.8 | 39 | 23.6 | 49 | 26.6 | 86 | 25.9 |
| CS emergency in labour | 59 | 34.7 | 66 | 28.1 | 27 | 24.5 | 38 | 29.9 | 57 | 34.5 | 44 | 23.9 | 106 | 31.9 |
| CS emergency not in labour* | 27 | 15.9 | 25 | 10.6 | 23 | 20.9 | 10 | 7.9 | 17 | 10.3 | 23 | 12.5 | 56 | 16.9 |
| **Epidural** | 138 | 81.2 | 204 | 86.8 | 83 | 75.5 | 118 | 92.9 | 135 | 81.8 | 148 | 80.4 | 267 | 80.4 |

*failed induction rate at term

**Table 93: Mode of birth at term among multipara (excluding previous Caesarean) by indication for induction NWH 2017**

| | Post dates N=65 | | Term PROM N=95 | | Hypertension N=53 | | Prolonged latent phase N=97 | | Diabetes N=149 | | SGA N=127 | | Other N=321 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Mode of birth** | | | | | | | | | | | | | | |
| SVB | 49 | 75.4 | 76 | 80.0 | 41 | 77.4 | 70 | 72.2 | 103 | 69.1 | 111 | 87.4 | 250 | 77.9 |
| Operative vaginal | 7 | 10.8 | 7 | 7.4 | 3 | 5.7 | 13 | 13.4 | 17 | 11.4 | 5 | 3.9 | 21 | 6.5 |
| CS emergency in labour | 5 | 7.7 | 6 | 6.3 | 4 | 7.5 | 10 | 10.3 | 15 | 10.1 | 5 | 3.9 | 41 | 12.8 |
| CS emergency not in labour* | 4 | 6.2 | 6 | 6.3 | 5 | 9.4 | 4 | 4.1 | 14 | 9.4 | 6 | 4.7 | 9 | 2.8 |
| **Epidural** | 25 | 38.5 | 55 | 57.9 | 28 | 52.8 | 64 | 66.0 | 78 | 52.3 | 58 | 45.7 | 213 | 66.4 |

*failed induction rate at term

**Table 94: Dilatation at start of syntocinon infusion among labouring women by induction status NWH 2017**

| Dilatation | Induced labour N=1602 | | Spontaneous labour N=584 | |
|---|---|---|---|---|
| | n | % | n | % |
| 0 | 61 | 3.8 | 0 | |
| 1 | 179 | 11.2 | 0 | |
| 2 | 408 | 25.5 | 0 | |
| 3 | 456 | 28.5 | 66 | 11.3 |
| 4 | 215 | 13.4 | 116 | 19.9 |
| 5 | 80 | 5.0 | 95 | 16.3 |
| 6 | 18 | 1.1 | 62 | 10.6 |
| 7 | 18 | 1.1 | 47 | 8.0 |
| 8 | 6 | 0.4 | 33 | 5.7 |
| 9 | 11 | 0.7 | 50 | 8.6 |
| 10 | 21 | 1.3 | 59 | 10.1 |
| Missing | 129 | 8.1 | 56 | 9.6 |

## 6.3 Mode of birth

### Findings

**Figure 93: Mode of birth NWH 1991–2017**

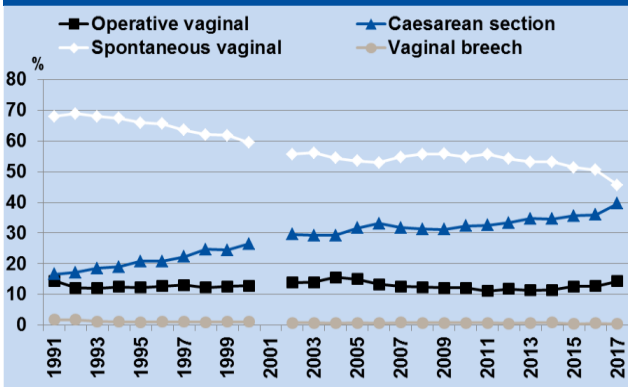



**Figure 94: Mode of birth among nullipara NWH 1993-2017**

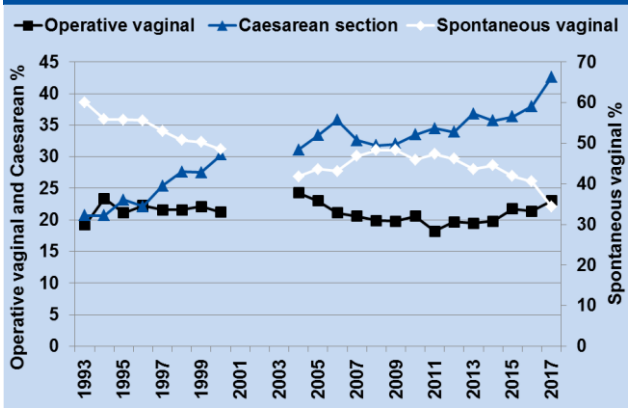
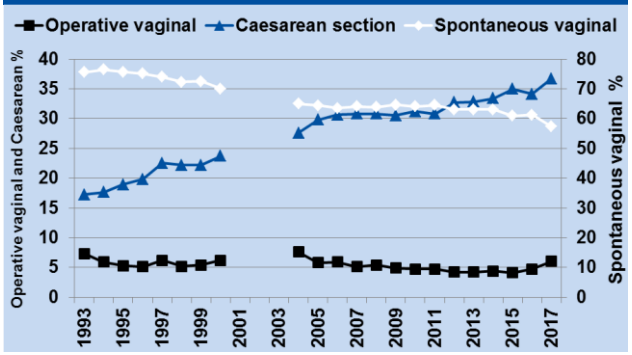
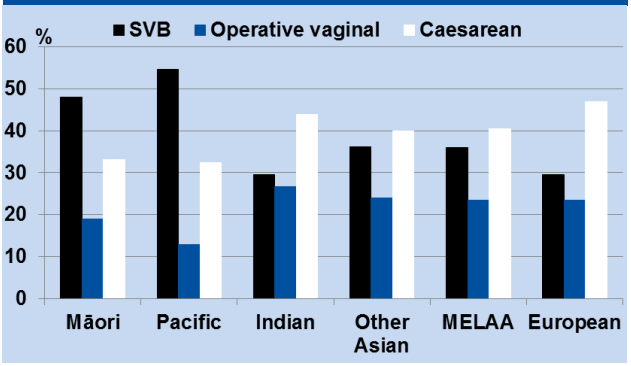



**Figure 95: Mode of birth among multipara NWH 1993-2017**




In the mid-90s, the overall Caesarean section rate at NWH was around 20%. A peak of 33% was reached in 2006 and since then has been increasing steadily, with a peak reached in 2017 of 40%.

**Figure 96: Mode of birth by ethnicity among nulliparous women NWH 2017**




For both nulliparae and multiparae this rise appears to be at the cost of spontaneous vaginal birth, although there is a small rise in operative vaginal birth also.

As has been the case for many years, Pacific and Māori women have higher rates of spontaneous vaginal birth (SVB) than all other ethnic groups (**Figure 96**). It is unknown whether this represents a barrier to access interventions, or whether other ethnic groups have an overly high intervention rate. Perinatal outcomes need to be considered as part of the picture.

**Figure 97: Mode of birth by maternal age among nullipara NWH 2017**

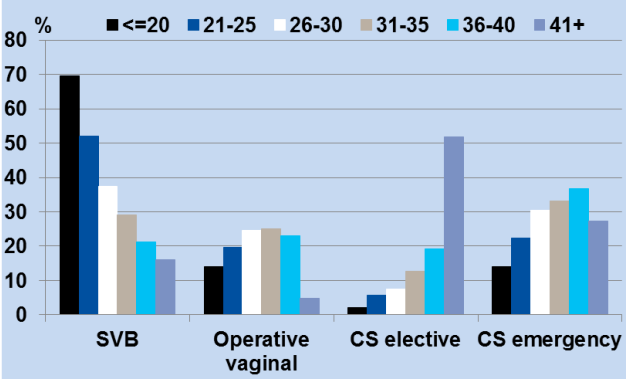
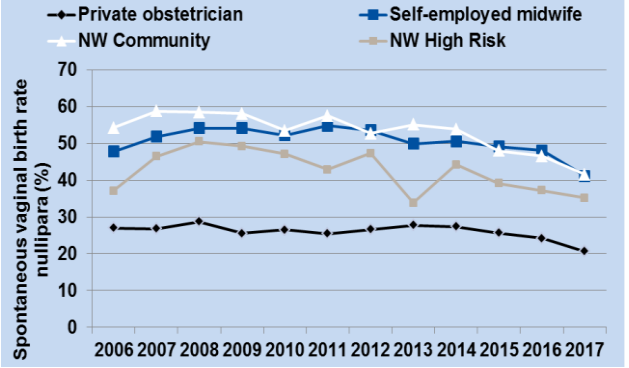



**Figure 98: Spontaneous vaginal birth rate among all nullipara by LMC 2017**

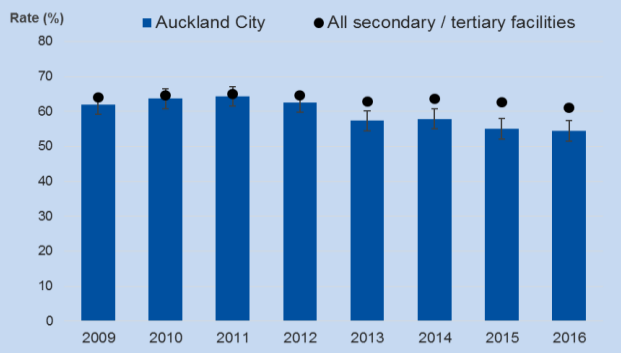


The spontaneous vaginal birth rate falls with increasing age (**Figure 97**). Operative vaginal birth increases with increasing age until 35 years, beyond which there is a marked increase in elective Caesarean section rate.

The group of main concern is nulliparous women with only 34.4% achieving a spontaneous vaginal birth in 2017 (**Figure 94**).

The spontaneous vaginal birth rate in standard primiparae (as defined by the Ministry of Health) is one of the clinical indicators reported annually by the Ministry of Health as part of the Maternity Quality and Safety Programme. This allows the opportunity to compare ADHB with other secondary/tertiary facilities around NZ. At 54.4%, the spontaneous vaginal birth rate among standard primipara birthing at Auckland City Hospital was well below the national average (61%) in the latest Maternity Clinical Indicators report (2016 data).

**Figure 99: NZ Maternity Indicators 2016: Standard primiparae who have a spontaneous vaginal birth NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

NWH data regarding LMC at birth has consistently shown a clear variation in mode of birth for standard primiparae by LMC.

Prevention of primary Caesarean in an evidence-based way must be the focus of ongoing work in quality improvement for the future. Areas such as education around labour management (especially for induced labours), management of malpresentation, and support for primary birthing in low risk nulliparae, have been identified as important. Practices that have been shown to preserve or improve perinatal outcomes, without increasing CS rate (or indeed that may reduce CS rate) should continue to be explored and implemented via robust guideline review and audit.

### Water birth

Thirty one babies were recorded in the database as having been born in water in 2017. Two of these were under the care of NWH LMC service, twenty eight were under the care of a self-employed midwife and one was under the care of a private obstetrician. Two babies were admitted to the NICU. All were live births.

## 6.4 Caesarean section

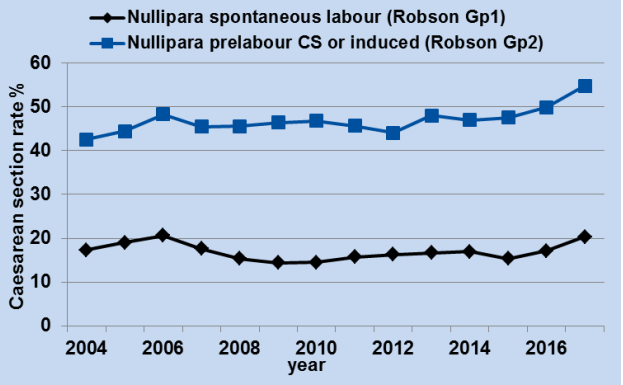
### Methods

Since 2004, we have collected data on elective and emergency Caesarean. An elective Caesarean is defined as a Caesarean which was planned in advance and performed either prior to, or after, the onset of labour. An emergency Caesarean is defined as an unplanned Caesarean section that is performed either prior to onset of labour or during labour. Caesarean following failed induction is classified as an emergency Caesarean prior to labour.

### Findings

The Caesarean section rate in 2016, at 40%, is again the highest it has ever been at NWH. The largest contribution to the Caesarean section rate comes from repeat Caesarean. This is followed closely by nullipara having Caesareans before labour or following induction of labour.

**Figure 100: Robson groups 1&2: Nulliparous Caesarean section rates among singleton cephalic term pregnancies by onset of labour NWH 2004-2017**




See Robson groups (**Table 96**) which show the contribution of various clinical groupings to the Caesarean section rate.

There are differences in the demography of the case loads by LMC eg by age, ethnicity, smoking behavior, and socioeconomic status as illustrated and documented in the demography section of this report. There are also differences in obstetric risk, and these differences probably explain the higher levels of intervention among women labeled NW High Risk in the figures. These women received their primary maternity care from the Diabetes Clinic or the Maternal Fetal Medicine service, were unregistered at the time of birth, or were transferred from other DHBs. The differences between women under private obstetrician and self-employed midwifery or NW Community service primary care

are unlikely to explain the differentials in intervention rates and these differences are probably due to variances in the choices made by women and their LMCs.

**Figure 101: Robson groups 3-5: Multiparous Caesarean section rates among singleton cephalic term pregnancies by onset of labour and previous Caesarean status NWH 2004-2017**

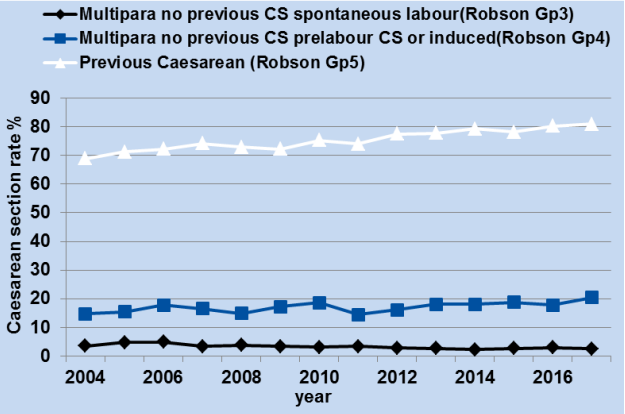



**Figure 102: Caesarean section rate among all nullipara by LMC 2017**

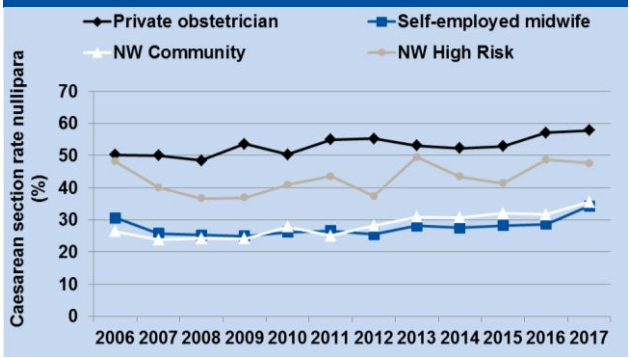
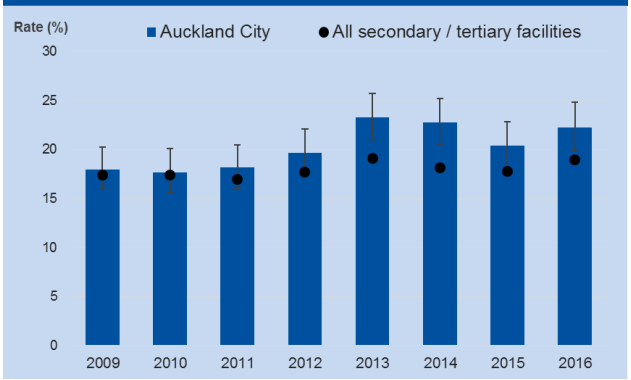



**Figure 103: NZ Maternity Indicators 2016: Standard primiparae who undergo Caesarean section NWH and NZ secondary/tertiary facility rates 2009-2013**




Error bars represent the 95% confidence interval for NWH rate.

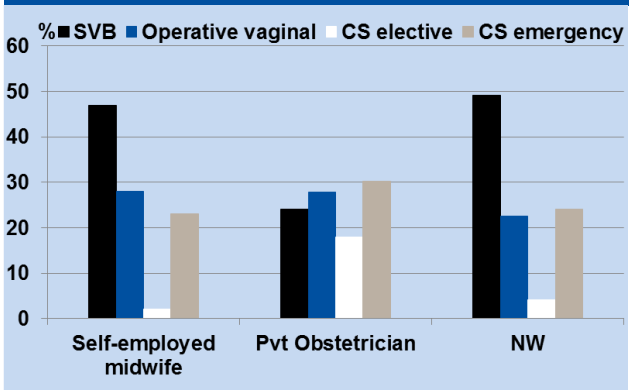
The Caesarean section rate in standard primiparae (as defined by the Ministry of Health) is one of the clinical indicators reported annually by the Ministry of Health as part of the Maternity Quality and Safety Programme (**Figure 103**). This allows for the opportunity to compare ADHB with other secondary/tertiary facilities around NZ. At 22.3%, NWH was above the national average (19.0%; 2016 data).

Care of the nulliparous woman in labour would seem to be ripe for review in terms of setting and implementing evidence based standards. These include attention to place of birth, thresholds for action regarding progress of labour, and techniques to manage the second stage. By reducing the primary Caesarean rate, the inevitable rise in repeat Caesarean sections may at least be slowed.

Research evidence is clear that multiple repeat Caesarean sections are strongly associated with adverse maternal outcomes, such as abnormal placentation, postpartum haemorrhage and peripartum hysterectomy.

National Women's supports vaginal birth after Caesarean. We also have a policy of consultant attendance for any possible Caesarean section at full dilatation to ensure robust decision making and safe care.

**Figure 104: Mode of birth at term by LMC at birth among standard primipara NWH 2017**




The standard primipara was defined in order to remove the confounding of maternal age and medical and obstetric complications associated with operative birth. **Figure 104** uses the NWH definition of the standard primipara (See **Appendix 3 – Definitions**). Comparing rates of operative birth by LMC in this group of low-risk women, we can truly understand the variation in practice by LMC. Of the three caregiver groups compared in the figure above, spontaneous vaginal birth rates are lowest, and elective Caesarean section rates highest, for standard primiparae under private specialist obstetrician care. These data support the argument above that the drivers for higher Caesarean section rates among women under private obstetrician LMC care are non-clinical.

## Robson 10-group classification 2010-2017

The Robson-10 group classification attempts to "dissect" Caesarean section practice so that the maternity unit can understand trends within similar groups of mothers. The final column shows the contribution to the overall Caesarean section rate from each of these groups of mothers, and shows very clearly the impact of repeat Caesarean section on the Caesarean section rate at NWH.

**Table 95: Robson 10-Group Classification NWH 2010-2017**

| Robson Group | 2010 | | | 2011 | | | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | CS | Total Births | CS Rate | Contribution to CS rate |
| Totals | n | N | % | n | N | % | n | N | % | n | N | % | n | N | % | n | N | % | n | N | % | n | N | % | % |
| | **2491** | **7709** | **32.3** | **2448** | **7523** | **32.5** | **2570** | **7695** | **33.4** | **2506** | **7223** | **34.7** | **2559** | **7400** | **34.6** | **2468** | **6933** | **35.6** | 2608 | 7241 | 36.0 | 2709 | 6846 | 39.6 | |
| **1 Nullip, singleton, cephalic, term, spontaneous labour** | 251 | 1736 | 14.5 | 244 | 1555 | 15.7 | 275 | 1684 | 16.3 | 238 | 1426 | 16.7 | 266 | 1565 | 17.0 | 206 | 1342 | 15.4 | 246 | 1438 | 17.1 | 257 | 1262 | 20.4 | 9.5 |
| **2 Nullip, singleton, cephalic, term, induced or CS before labour** | 648 | 1384 | 46.8 | 669 | 1465 | 45.7 | 686 | 1555 | 44.1 | 735 | 1530 | 48.0 | 731 | 1554 | 47.0 | 726 | 1529 | 47.5 | 810 | 1624 | 49.9 | 900 | 1644 | 54.7 | 33.2 |
| **3 Multip, singleton, cephalic, no previous CS, term, spontaneous labour** | 53 | 1693 | 3.1 | 49 | 1503 | 3.3 | 41 | 1467 | 2.8 | 35 | 1359 | 2.6 | 34 | 1457 | 2.3 | 35 | 1292 | 2.7 | 39 | 1354 | 2.9 | 31 | 1217 | 2.5 | 1.1 |
| **4 Multip, singleton, cephalic, no previous CS, term, induced or CS before labour** | 159 | 856 | 18.6 | 141 | 977 | 14.4 | 154 | 957 | 16.1 | 176 | 980 | 18.0 | 156 | 868 | 18.0 | 165 | 883 | 18.7 | 166 | 930 | 17.8 | 180 | 883 | 20.4 | 6.6 |
| **5 Previous CS, singleton, cephalic, term** | 757 | 1005 | 75.3 | 752 | 1016 | 74.0 | 757 | 977 | 77.5 | 755 | 970 | 77.8 | 834 | 1051 | 79.4 | 815 | 1042 | 78.2 | 845 | 1052 | 80.3 | 858 | 1059 | 81.0 | 31.7 |
| **6 Nullip, singleton, breech** | 177 | 199 | 88.9 | 151 | 172 | 87.8 | 186 | 202 | 92.1 | 154 | 172 | 89.5 | 146 | 167 | 87.4 | 137 | 152 | 90.1 | 149 | 166 | 89.8 | 143 | 158 | 90.5 | 5.3 |
| **7 Multip, singleton, breech (incl prev CS)** | 115 | 141 | 81.6 | 117 | 142 | 82.4 | 132 | 154 | 85.7 | 127 | 147 | 86.4 | 101 | 127 | 79.5 | 101 | 113 | 89.4 | 90 | 116 | 77.6 | 84 | 93 | 90.3 | 3.1 |
| **8 All multiple (incl prev CS)** | 104 | 153 | 68.0 | 111 | 163 | 68.1 | 112 | 163 | 68.7 | 91 | 151 | 60.3 | 98 | 147 | 66.7 | 98 | 137 | 71.5 | 85 | 127 | 66.9 | 84 | 127 | 66.1 | 3.1 |
| **9 All abnormal lie (incl prev CS)** | 62 | 69 | 89.9 | 53 | 56 | 94.6 | 40 | 47 | 85.1 | 17 | 22 | 80.0 | 26 | 27 | 96.3 | 22 | 25 | 88.0 | 20 | 27 | 74.1 | 20 | 23 | 87.0 | 0.7 |
| **10 All preterm singleton cephalic (incl prev CS)** | 165 | 473 | 34.9 | 161 | 474 | 34.0 | 187 | 489 | 38.2 | 178 | 466 | 38.2 | 167 | 437 | 38.2 | 163 | 418 | 39.0 | 158 | 407 | 38.8 | 152 | 380 | 40.0 | 5.6 |

### 6.4.1 Indication for in labour emergency Caesarean section

**Figure 105: Indication for in labour emergency Caesarean section NWH 2017**

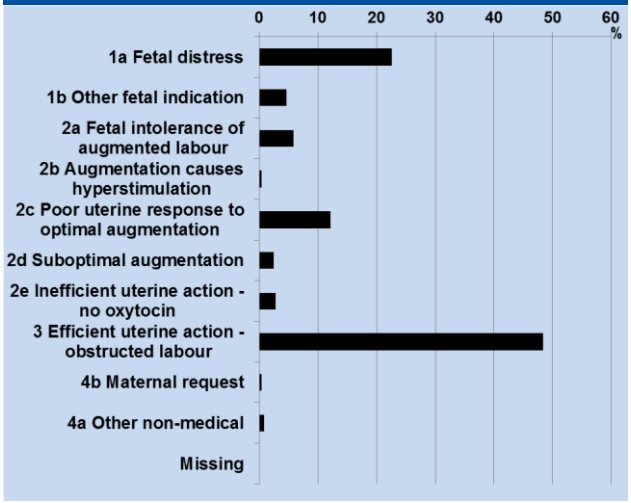



**Figure 105** above shows the reasons for emergency Caesarean section in labour, of which the most frequent is still "obstructed labour." "Other fetal indication" includes all fetal indications where the CTG is not necessarily abnormal e.g. cord prolapse, antepartum haemorrhage, suspected uterine rupture, and also malpresentation such as undiagnosed breech, deflexed OP, and deep transverse arrest.

Caesareans performed for "fetal intolerance" or "fetal distress" where fetal blood sampling (FBS) was not performed may be unnecessary. NWH guidelines regarding fetal intrapartum surveillance are based on RANZCOG guidelines. It is important for all maternity practitioners to be up to date with training in this regard.

### 6.4.2 Vaginal birth after Caesarean

The figure which follows looks at trends in trial of labour and VBAC rates at NWH over the years 2006 to 2017 among parity 1 woman with a previous CS presenting at term with cephalic singleton pregnancy. (Note that this subgroup excludes women with previous vaginal birth and previous VBAC, which is the clinical factor most strongly associated with VBAC).

The three stacked bars to the left of each figure represent women who present for a trial of labour and the bar to the right represents elective repeat Caesarean section. In 2017, of these 735 women, the elective repeat Caesarean rate was 70%, the highest for a decade. Of these 735 women, 25% had a trial of labour after Caesarean. In women who had a trial of labour, 61% had a vaginal birth (compared to 62% in 2016).

**Figure 106: Mode of birth among parity 1, singleton, cephalic, term prior Caesarean pregnancies NWH 2006-2017**

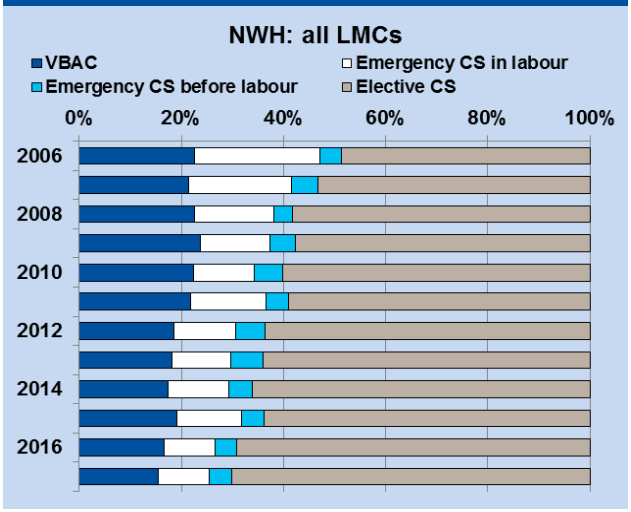
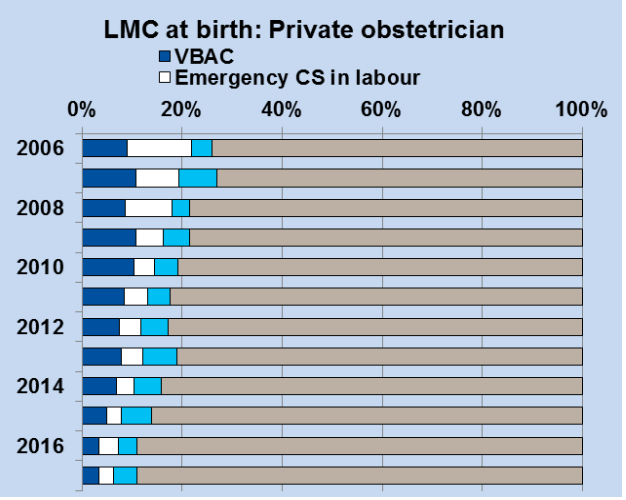



**Table 111** and **Table 112** and the remaining figures in this section show trends by LMC.

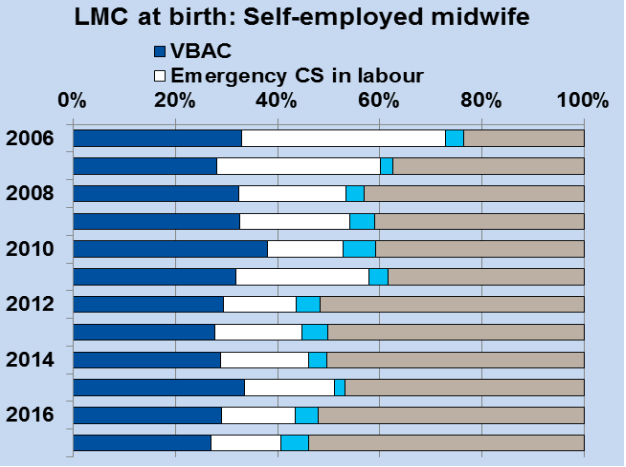
**Figure 107: VBAC rates among parity 1 term cephalic singleton previous Caesarean pregnancies – private obstetrician LMC 2006-2017**




Of the 735 women who had one previous Caesarean and only one previous birth, the rate of planned Caesarean prior to labour varied by LMC: 54% for women under the care of independent midwives (up from 52% in 2016), 57% for women under the care of NW (up from 56%), and 89% for women under the care of private obstetricians (the same as last year). The rate of successful trial of labour (among spontaneous and induced labours) also varied by LMC: 67% for women under the care of independent midwives, 61% for women under the care of NW, and 46% for women under the care of private obstetricians. Of these 735 women, the successful trial of labour rate also varied by mode of onset of labour, from 73% in spontaneous labour to 44% if labour was induced.

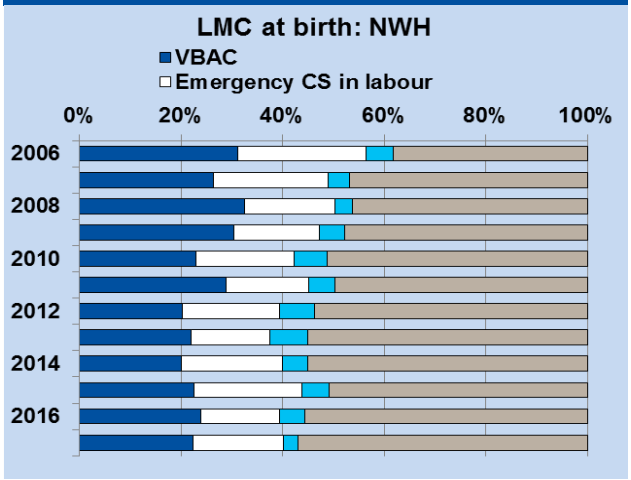
Of all women with a previous Caesarean section having a trial of labour, 61% had a vaginal birth in 2017 compared to 58% in 2006. The overall vaginal birth after Caesarean (VBAC) rate was only 15.8% in 2017, largely due to elective repeat CS.

**Figure 108: VBAC rates among parity 1 term cephalic singleton previous Caesarean pregnancies – Self-employed midwife LMC 2006-2017**




These data inform the patient information booklet available on the National Women's website, and should be used to provide consistent counselling to all women with previous Caesarean. Of note, the philosophy of the Positive Birth After Caesarean (PBAC) clinic, which started in February 2011, is to provide evidence-based information about options for mode of birth, make an individualised plan for the woman, and support her choice during pregnancy and in labour.

**Figure 109: VBAC rates among parity 1 term cephalic singleton previous Caesarean pregnancies – NW primary maternity care 2006-2017**




## 6.5 Data tables: Mode of birth

**Table 96: Mode of birth trends NWH 2005-2017 (n=mothers)**

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of births** | 7194 | 7212 | 7695 | 7589 | 7735 | 7709 | 7523 | 7695 | 7223 | 7400 | 6933 | 7241 | 6846 |
| | % | % | % | % | % | % | % | % | % | % | % | % | % |
| **Spontaneous vertex** | 53.5 | 52.9 | 54.7 | 55.6 | 55.8 | 54.7 | 55.6 | 54.2 | 53.0 | 53.1 | 51.3 | 50.5 | 45.6 |
| **Vaginal breech** | 0.8 | 0.7 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.6 | 0.8 | 0.9 | 0.5 | 0.7 | 0.5 |
| **Forceps/ ventouse** | 14.2 | 13.3 | 12.6 | 12.4 | 12.2 | 12.2 | 11.1 | 11.8 | 11.5 | 11.5 | 12.6 | 12.8 | 14.3 |
| **Caesarean** | 31.6 | 33.1 | 31.7 | 31.3 | 31.2 | 32.3 | 32.5 | 33.4 | 34.7 | 34.6 | 35.6 | 36.0 | 39.6 |
| Elective | 11.6 | 12.8 | 13.4 | 14.4 | 14.6 | 15.9 | 15.7 | 16.6 | 17.0 | 17.3 | 18.0 | 17.7 | 19.4 |
| Emergency | 20.0 | 20.3 | 18.3 | 16.9 | 16.6 | 16.4 | 16.8 | 16.8 | 17.7 | 17.3 | 17.6 | 18.3 | 20.1 |

In the case of twins only one mode of birth is given and mode of birth is prioritised as Caesarean, forceps/ventouse, vaginal breech, then spontaneous vaginal.

**Table 97: Spontaneous vaginal birth rates NWH 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total births (mothers)** | **7695** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| **Spontaneous vaginal birth** | 4282 | 4280 | 4374 | 4217 | 4243 | 4218 | 3884 | 3992 | 3594 | 3706 | 3158 |
| **Incidence %** | 55.6 | 56.4 | 56.4 | 55.5 | 56.4 | 54.8 | 53.8 | 53.9 | 51.8 | 51.2 | 46.1 |
| **Total nullipara** | 3752 | 3623 | 3811 | 3650 | 3539 | 3778 | 3441 | 3604 | 3321 | 3517 | 3343 |
| **Spontaneous vaginal birth** | 1755 | 1749 | 1839 | 1675 | 1674 | 1746 | 1501 | 1603 | 1392 | 1427 | 1150 |
| **Incidence %** | 46.8 | 48.3 | 48.3 | 45.9 | 47.3 | 46.2 | 43.6 | 44.5 | 41.9 | 40.6 | 34.4 |
| **Total multipara** | 3943 | 3966 | 3924 | 4059 | 3984 | 3917 | 3782 | 3796 | 3612 | 3724 | 3503 |
| **Spontaneous vaginal birth** | 2527 | 2531 | 2495 | 2601 | 2569 | 2472 | 2383 | 2389 | 2202 | 2279 | 2008 |
| **Incidence %** | 64.1 | 63.8 | 63.6 | 64.1 | 64.5 | 63.1 | 63.0 | 62.9 | 61.0 | 61.2 | 57.3 |

## Table 98: Caesarean section rates NWH 2007-2017

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total births (mothers)** | **7695** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| **Caesarean Sections** | 2438 | 2372 | 2414 | 2491 | 2448 | 2570 | 2506 | 2559 | 2468 | 2608 | 2709 |
| **Incidence %** | 31.7 | 31.3 | 31.2 | 32.3 | 32.5 | 33.4 | 34.7 | 34.6 | 35.6 | 36.0 | 39.6 |
| **Total nullipara** | **3752** | **3623** | **3811** | **3650** | **3539** | **3778** | **3441** | **3604** | **3321** | **3517** | **3343** |
| **Caesarean** | 1225 | 1152 | 1219 | 1223 | 1222 | 1288 | 1266 | 1289 | 1206 | 1338 | 1424 |
| **Incidence %** | 32.6 | 31.8 | 32.0 | 33.5 | 34.5 | 34.1 | 36.8 | 35.8 | 36.3 | 38.0 | 42.6 |
| **Total elective** | 310 | 313 | 340 | 383 | 353 | 408 | 396 | 379 | 369 | 390 | 402 |
| **Elective %** | 8.3 | 8.6 | 8.9 | 10.5 | 10.0 | 10.8 | 11.5 | 10.5 | 11.1 | 11.1 | 12.0 |
| **Total emergency** | 915 | 839 | 879 | 840 | 869 | 880 | 870 | 910 | 837 | 948 | 1022 |
| **Emergency %** | 24.4 | 23.2 | 23.1 | 23.0 | 24.6 | 23.3 | 25.3 | 25.2 | 25.2 | 27.0 | 30.6 |
| **Total multipara** | **3943** | **3966** | **3924** | **4059** | **3984** | **3917** | **3782** | **3796** | **3612** | **3724** | **3503** |
| **Caesarean** | 1213 | 1220 | 1195 | 1268 | 1226 | 1282 | 1240 | 1270 | 1262 | 1270 | 1285 |
| **Incidence %** | 30.8 | 30.8 | 30.5 | 31.2 | 30.8 | 32.7 | 32.8 | 33.5 | 34.9 | 34.1 | 36.7 |
| **Total elective** | 720 | 780 | 792 | 843 | 830 | 868 | 831 | 902 | 878 | 892 | 929 |
| **Elective %** | 18.3 | 19.7 | 20.2 | 20.8 | 20.8 | 22.2 | 22.0 | 23.8 | 24.3 | 24.0 | 26.5 |
| **Total emergency** | 493 | 440 | 403 | 425 | 396 | 414 | 409 | 368 | 384 | 378 | 356 |
| **Emergency %** | 12.5 | 11.1 | 10.2 | 10.5 | 9.9 | 10.6 | 10.8 | 9.7 | 10.6 | 10.2 | 10.2 |

## Table 99: Mode of birth by parity and previous Caesarean section status NWH 2017

| | Nullipara preterm N=302 | | Nullipara term N=3041 | | Multipara no prev CS preterm N=141 | | Multipara no prev CS term N=2158 | | Multipara prev CS preterm N=99 | | Multipara prev CS term N=1105 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Spontaneous vertex** | 119 | 39.4 | 1012 | 33.3 | 76 | 53.9 | 1769 | 82.0 | 12 | 12.1 | 135 | 12.2 |
| **Vaginal breech** | 18 | 6.0 | 1 | 0.0 | 11 | 7.8 | 3 | 0.1 | 1 | 1.0 | 1 | 0.1 |
| **Operative vaginal birth** | 31 | 10.3 | 738 | 24.3 | 6 | 4.3 | 127 | 5.9 | 11 | 11.1 | 66 | 6.0 |
| Ventouse | 16 | 5.3 | 493 | 16.2 | 4 | 2.8 | 90 | 4.2 | 6 | 6.1 | 43 | 3.9 |
| Forceps | 15 | 5.0 | 245 | 8.1 | 2 | 1.4 | 37 | 1.7 | 5 | 5.1 | 23 | 2.1 |
| **Caesarean section** | 134 | 44.4 | 1290 | 42.4 | 48 | 34.0 | 259 | 12.0 | 75 | 75.8 | 903 | 81.7 |
| Emergency | 101 | 33.4 | 921 | 30.3 | 34 | 24.1 | 137 | 6.3 | 45 | 45.5 | 140 | 12.7 |
| Elective | 33 | 10.9 | 369 | 12.1 | 14 | 9.9 | 122 | 5.7 | 30 | 30.3 | 763 | 69.0 |

## Table 100: LMC by parity and previous Caesarean section status NWH 2017

| | Self-employed Midwife N=3132 | | Pvt Obstetrician N=2004 | | GP N=11 | | NWH N=1646 | | Other DHB N=18 | | Unbooked N=35 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Primipara** | 1587 | 50.7 | 1060 | 52.9 | 1 | 9.1 | 677 | 41.1 | 9 | 50.0 | 9 | 25.7 |
| Standard primipara | 586 | 18.7 | 341 | 17.0 | 0 | 0.0 | 482 | 29.3 | 0 | 0.0 | 2 | 5.7 |
| **Multipara** | 1545 | 49.3 | 944 | 47.1 | 10 | 90.9 | 969 | 58.9 | 9 | 50.0 | 26 | 74.3 |
| Previous CS | 371 | 11.8 | 457 | 22.8 | 2 | 18.2 | 370 | 22.5 | 2 | 11.1 | 2 | 5.7 |
| No prev CS | 1174 | 37.5 | 487 | 24.3 | 8 | 72.7 | 599 | 36.4 | 7 | 38.9 | 24 | 68.6 |

## Table 101: Mode of birth at term by LMC at birth (nullipara) NWH 2017

| | Self-employed Midwife N=1457 | | Pvt Obstetrician N=986 | | GP N=1 | | NWH N=588 | | Other DHB N=1 | | Unbooked N=8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Spontaneous vertex** | 573 | 39.3 | 197 | 20.0 | 0 | | 235 | 40.0 | 0 | | 7 | 87.5 |
| **Vaginal breech** | 1 | 0.1 | 0 | 0.0 | 0 | | 0 | 0.0 | 0 | | 0 | |
| **Forceps** | 116 | 8.0 | 89 | 9.0 | 0 | | 40 | 6.8 | 0 | | 0 | |
| **Ventouse** | 260 | 17.8 | 128 | 13.0 | 1 | 100.0 | 103 | 17.5 | 1 | 100.0 | 0 | |
| **CS elective** | 80 | 5.5 | 255 | 25.9 | 0 | | 34 | 5.8 | 0 | | 0 | |
| **CS emergency** | 427 | 29.3 | 317 | 32.2 | 0 | | 176 | 29.9 | 0 | | 1 | 12.5 |

**Table 102: Mode of birth at term by LMC at birth (standard primipara) NWH 2017**

| | SE Midwife N=586 | | Pvt Obs N=341 | | GP N=0 | | NWH N=195 | | Other DHB N=0 | | Unbooked N=2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 275 | 46.9 | 82 | 24.0 | 0 | | 96 | 49.2 | 0 | | 1 | 50.0 |
| Vaginal breech | 0 | 0.0 | 0 | 0.0 | 0 | | 0 | 0.0 | 0 | | 0 | |
| Forceps | 47 | 8.0 | 42 | 12.3 | 0 | | 14 | 7.2 | 0 | | 0 | |
| Ventouse | 117 | 20.0 | 53 | 15.5 | 0 | | 30 | 15.4 | 0 | | 0 | |
| CS elective | 12 | 2.0 | 61 | 17.9 | 0 | | 8 | 4.1 | 0 | | 0 | |
| CS emergency | 135 | 23.0 | 103 | 30.2 | 0 | | 47 | 24.1 | 0 | | 1 | 50.0 |

**Table 103: Mode of birth at term by LMC at birth (multipara, no previous CS) NWH 2017**

| | SE Midwife N=1116 | | Pvt Obs N=457 | | GP N=8 | | NWH N=555 | | Other DHB N=1 | | Unbooked N=21 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 950 | 85.1 | 349 | 76.4 | 7 | 87.5 | 441 | 79.5 | 1 | 100.0 | 21 | 100.0 |
| Vaginal breech | 2 | 0.2 | 1 | 0.2 | 0 | | 0 | | 0 | | 0 | |
| Forceps | 19 | 1.7 | 7 | 1.5 | 0 | | 11 | 2.0 | 0 | | 0 | |
| Ventouse | 50 | 4.5 | 18 | 3.9 | 0 | | 22 | 4.0 | 0 | | 0 | |
| CS elective | 35 | 3.1 | 60 | 13.1 | 0 | | 27 | 4.9 | 0 | | 0 | |
| CS emergency | 60 | 5.4 | 22 | 4.8 | 1 | 12.5 | 54 | 9.7 | 0 | | 0 | |

**Table 104: Mode of birth at term by LMC at birth (multipara, previous CS) NWH 2017**

| | SE Midwife N=338 | | Pvt Obs N=429 | | GP N=2 | | NWH N=335 | | Other DHB N=0 | | Unbooked N=1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 67 | 19.8 | 13 | 3.0 | 0 | | 55 | 16.4 | 0 | | 0 | |
| Vaginal breech | 1 | 0.3 | 0 | | 0 | | 0 | 0.0 | 0 | | 0 | |
| Forceps | 7 | 2.1 | 5 | 1.2 | 0 | | 11 | 3.3 | 0 | | 0 | |
| Ventouse | 24 | 7.1 | 3 | 0.7 | 0 | | 16 | 4.8 | 0 | | 0 | |
| CS elective | 185 | 54.7 | 380 | 88.6 | 2 | 100.0 | 195 | 58.2 | 0 | | 1 | 100.0 |
| CS emergency | 54 | 16.0 | 28 | 6.5 | 0 | | 58 | 17.3 | 0 | | 0 | |

**Table 105: Mode of birth by ethnicity NWH 2017**

| | Māori N=435 | | Pacific N=733 | | Indian N=703 | | Other Asian N=1743 | | MELAA N=327 | | European N=2905 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 244 | 56.1 | 472 | 64.4 | 251 | 35.7 | 822 | 47.2 | 142 | 43.4 | 1192 | 41.0 |
| Vaginal breech | 9 | 2.1 | 8 | 1.1 | 5 | 0.7 | 3 | 0.2 | 2 | 0.6 | 8 | 0.3 |
| Forceps | 17 | 3.9 | 12 | 1.6 | 60 | 8.5 | 75 | 4.3 | 17 | 5.2 | 146 | 5.0 |
| Ventouse | 29 | 6.7 | 39 | 5.3 | 83 | 11.8 | 193 | 11.1 | 31 | 9.5 | 277 | 9.5 |
| CS elective | 58 | 13.3 | 70 | 9.5 | 96 | 13.7 | 313 | 18.0 | 77 | 23.5 | 717 | 24.7 |
| CS emergency | 78 | 17.9 | 132 | 18.0 | 208 | 29.6 | 337 | 19.3 | 58 | 17.7 | 565 | 19.4 |

**Table 106: Mode of birth by ethnicity (nullipara) NWH 2017**

| | Māori N=169 | | Pacific N=256 | | Indian N=421 | | Other Asian N=881 | | MELAA N=153 | | European N=1463 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 76 | 45.0 | 136 | 53.1 | 120 | 28.5 | 317 | 36.0 | 53 | 34.6 | 429 | 29.3 |
| Vaginal breech | 5 | 3.0 | 4 | 1.6 | 4 | 1.0 | 1 | 0.1 | 2 | 1.3 | 3 | 0.2 |
| Forceps | 9 | 5.3 | 8 | 3.1 | 47 | 11.2 | 59 | 6.7 | 11 | 7.2 | 126 | 8.6 |
| Ventouse | 23 | 13.6 | 25 | 9.8 | 65 | 15.4 | 153 | 17.4 | 25 | 16.3 | 218 | 14.9 |
| CS elective | 13 | 7.7 | 15 | 5.9 | 30 | 7.1 | 91 | 10.3 | 25 | 16.3 | 228 | 15.6 |
| CS emergency | 43 | 25.4 | 68 | 26.6 | 155 | 36.8 | 260 | 29.5 | 37 | 24.2 | 459 | 31.4 |

**Table 107: Mode of birth by ethnicity (multipara) NWH 2017**

| | Māori N=266 | | Pacific N=477 | | Indian N=282 | | Other Asian N=862 | | MELAA N=174 | | European N=1442 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 168 | 63.2 | 336 | 70.4 | 131 | 46.5 | 505 | 58.6 | 89 | 51.1 | 763 | 52.9 |
| Vaginal breech | 4 | 1.5 | 4 | 0.8 | 1 | 0.4 | 2 | 0.2 | 0 | | 5 | 0.3 |
| Forceps | 8 | 3.0 | 4 | 0.8 | 13 | 4.6 | 16 | 1.9 | 6 | 3.4 | 20 | 1.4 |
| Ventouse | 6 | 2.3 | 14 | 2.9 | 18 | 6.4 | 40 | 4.6 | 6 | 3.4 | 59 | 4.1 |
| CS elective | 45 | 16.9 | 55 | 11.5 | 66 | 23.4 | 222 | 25.8 | 52 | 29.9 | 489 | 33.9 |
| CS emergency | 35 | 13.2 | 64 | 13.4 | 53 | 18.8 | 77 | 8.9 | 21 | 12.1 | 106 | 7.4 |

**Table 108: Mode of birth by maternal age (nullipara) NWH 2017**

| | ≤20 N=135 | | 21-25 N=380 | | 26-30 N=1028 | | 31-35 N=1245 | | 36-40 N=449 | | >40 N=106 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 91 | 67.4 | 192 | 50.5 | 382 | 37.2 | 357 | 28.7 | 93 | 20.7 | 16 | 15.1 |
| Vaginal breech | 3 | 2.2 | 6 | 1.6 | 3 | 0.3 | 4 | 0.3 | 2 | 0.4 | 1 | 0.9 |
| Forceps | 2 | 1.5 | 26 | 6.8 | 71 | 6.9 | 118 | 9.5 | 43 | 9.6 | 0 | |
| Ventouse | 17 | 12.6 | 49 | 12.9 | 183 | 17.8 | 195 | 15.7 | 60 | 13.4 | 5 | 4.7 |
| CS elective | 3 | 2.2 | 22 | 5.8 | 77 | 7.5 | 159 | 12.8 | 86 | 19.2 | 55 | 51.9 |
| CS emergency | 19 | 14.1 | 85 | 22.4 | 312 | 30.4 | 412 | 33.1 | 165 | 36.7 | 29 | 27.4 |

**Table 109: Mode of birth by maternal age (multipara) NWH 2017**

| | ≤20 N=27 | | 21-25 N=257 | | 26-30 N=664 | | 31-35 N=1424 | | 36-40 N=946 | | >40 N=185 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| Spontaneous vertex | 20 | 74.1 | 190 | 73.9 | 442 | 66.6 | 804 | 56.5 | 463 | 48.9 | 73 | 39.5 |
| Vaginal breech | 1 | 3.7 | 1 | 0.4 | 3 | 0.5 | 9 | 0.6 | 2 | 0.2 | 0 | |
| Forceps | 1 | 3.7 | 6 | 2.3 | 14 | 2.1 | 26 | 1.8 | 17 | 1.8 | 3 | 1.6 |
| Ventouse | 0 | | 4 | 1.6 | 24 | 3.6 | 63 | 4.4 | 45 | 4.8 | 7 | 3.8 |
| CS elective | 0 | | 26 | 10.1 | 116 | 17.5 | 382 | 26.8 | 323 | 34.1 | 82 | 44.3 |
| CS emergency | 5 | 18.5 | 30 | 11.7 | 65 | 9.8 | 140 | 9.8 | 96 | 10.1 | 20 | 10.8 |

**Table 110: VBAC: Mode of birth among prior Caesarean pregnancies by mode of onset of birth (n=830) NWH 2017**

| | Previous Caesarean (1 or more), all gestations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Spontaneous labour n=131 | | Induced labour n=80 | | CS elective n=567 | | CS emergency before onset of labour n=52 | | Total N=830 | |
| | n | % | n | % | n | % | n | % | n | % |
| SVB | 50 | 38.2 | 19 | 23.8 | 0 | | 0 | | 69 | 8.3 |
| Operative vaginal birth | 46 | 35.1 | 16 | 20.0 | 0 | | 0 | | 62 | 7.5 |
| CS elective | 0 | | 0 | | 567 | 100 | 0 | | 567 | 68.3 |
| CS emergency | 35 | 26.7 | 45 | 56.3 | 0 | | 52 | 100 | 132 | 15.9 |

**Table 111: VBAC: Mode of birth among parity 1, singleton, cephalic, term prior Caesarean pregnancies by mode of onset of birth (n=735) NWH 2017**

| | Parity 1, previous Caesarean, singleton, cephalic, term | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Spontaneous labour n=110 | | Induced labour n=77 | | CS elective n=515 | | CS emergency before onset of labour n=33 | | Total N=735 | |
| | n | % | n | % | n | % | n | % | n | % |
| SVB | 42 | 38.2 | 18 | 23.4 | 0 | | 0 | | 60 | 8.2 |
| Operative vaginal birth | 38 | 34.5 | 16 | 20.8 | 0 | | 0 | | 54 | 7.3 |
| CS elective | 0 | | 0 | | 515 | 100 | 0 | | 515 | 70.1 |
| CS emergency | 30 | 27.3 | 43 | 55.8 | 0 | | 33 | 100 | 106 | 14.4 |

**Table 112: VBAC: Mode of birth among parity 1, singleton, cephalic, term prior Caesarean pregnancies by LMC at birth (n=755) NWH 2017**

| | Parity 1, previous Caesarean, singleton, cephalic, term | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Self-employed Midwife n=234 | | Pvt Obstetrician n=321 | | NW* n=179 | | Total N=735 | |
| | n | % | n | % | n | % | n | % |
| **SVB** | 34 | 14.5 | 6 | 1.9 | 20 | 11.2 | 60 | 8.2 |
| **Operative vaginal birth** | 29 | 12.4 | 5 | 1.6 | 20 | 11.2 | 54 | 7.3 |
| **CS elective** | 126 | 53.8 | 286 | 89.1 | 102 | 57.0 | 515 | 70.1 |
| **CS emergency** | 45 | 19.2 | 24 | 7.5 | 37 | 20.7 | 106 | 14.4 |

* National Women's patients include Community, Medical and Diabetic

**Table 113: Indication for in labour emergency Caesarean section all gestations (spontaneous or induced onset of labour) (n=857) NWH 2017**

| | N=857 | |
|---|---|---|
| | n | % |
| 1a Fetal distress | 193 | 22.5 |
| 1b Other fetal indication | 39 | 4.6 |
| 2a Fetal intolerance of augmented labour | 50 | 5.8 |
| 2b Augmentation causes hyperstimulation | 3 | 0.4 |
| 2c Poor uterine response to optimal augmentation | 104 | 12.1 |
| 2d Suboptimal augmentation | 21 | 2.5 |
| 2e Inefficient uterine action - no oxytocin | 23 | 2.7 |
| 3 Efficient uterine action - obstructed labour | 414 | 48.3 |
| 4b Maternal request | 3 | 0.4 |
| 4a Other non-medical | 7 | 0.8 |
| Missing | 0 | 0.0 |

## 6.6 Instrumental vaginal birth

The rate of instrumental birth has been fairly stable over recent years, however appears to be on the rise again. In 2017, 17.8% of women who planned a vaginal birth had an instrumental birth, up from 16.2% in 2016 (**Figure 110**). This is due to an increase in both forceps and ventouse births.

**Figure 110: Operative vaginal birth NWH 1992-2017**

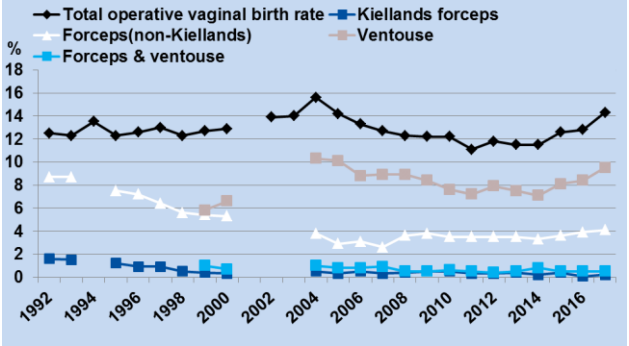
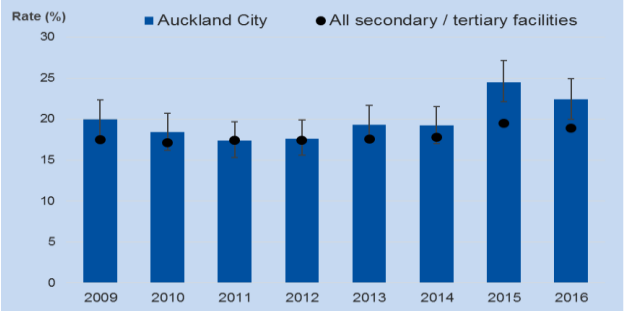
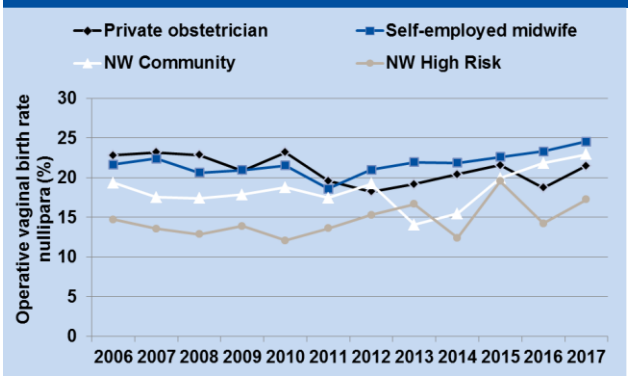



**Figure 111: NZ Maternity Indicators 2016: Standard primiparae who undergo an instrumental vaginal birth NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

**Figure 112: Operative vaginal birth rate among all nullipara by LMC 2017**



The instrumental birth rate in standard primiparae is one of the clinical indicators reported annually by the Ministry of Health as part of the Maternity Quality and Safety Programme. This allows the opportunity to compare NWH with other secondary/tertiary facilities around NZ. For 2015 data, the rate increased (24.5%), thereby placing NWH above benchmark for the first time. In 2016 the rate decreased to 22.4%, still above the national average (18.9%).

**Figure 113: Maternal outcomes following double or single instrumental vaginal birth, attempted instrumental vaginal birth prior to emergency Caesarean section and emergency Caesarean section in labour NWH 2017**

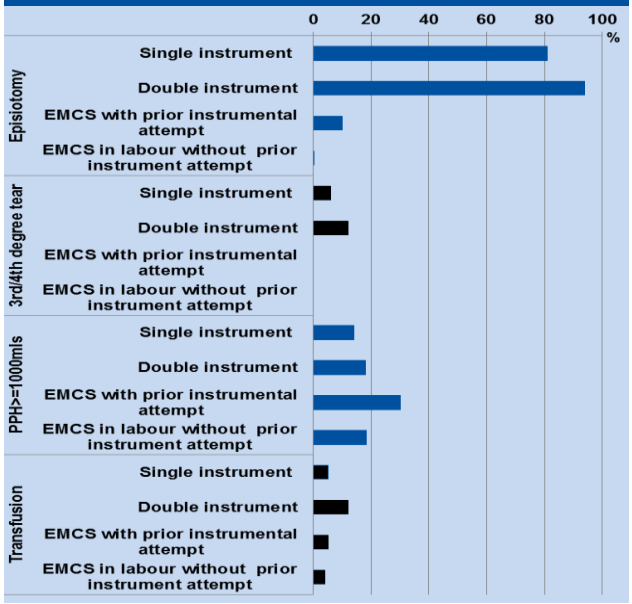
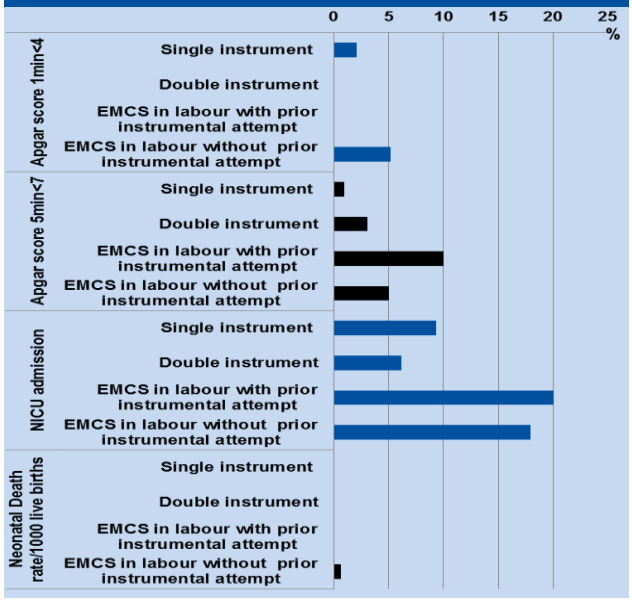



**Figure 114: Neonatal outcomes following double or single instrumental vaginal birth, attempted instrumental vaginal birth prior to emergency Caesarean section and emergency Caesarean section in labour NWH 2017**




### 6.6.1 Double instrumental and attempted instrumental prior to emergency Caesarean births

These data apply to the birth of a baby using more than one instrument (e.g. ventouse and forceps, or different types of forceps) and to birth of a baby by Caesarean section after an attempted vaginal instrumental birth.

Of 5,515 women attempting a vaginal birth in 2017, only 33 women had a double instrumental delivery, and only 20 women had an emergency Caesarean following a failed instrumental attempt. These low proportions are reassuring.

## 6.7 Breech presentation

### 6.7.1 Breech birth

In 2017, 99% of women with breech presentation at term were delivered by Caesarean. Considerable effort is made in counselling and advising women who wish to attempt vaginal breech birth. All of our obstetricians support women having the option for vaginal breech birth should they wish to make this choice, however, not all are confident and skilled at performing vaginal breech birth. This is a national issue due to the reducing exposure of obstetric staff and trainees, nevertheless, knowledge of how to conduct vaginal breech birth should be regarded as part of the emergency skillset.

### 6.7.2 External cephalic version

This section reports statistics relating to women who attended the Day Assessment Unit at NWH for external cephalic version (ECV) for breech presentation. Data regarding ECV are captured directly into Healthware at the time of the procedure.

International and local guidelines recommend that women with persistent breech presentation at term be referred for ECV.

#### Findings

**Table 114: Mode of birth following attempted ECV NWH 2017**

| | Failed ECV N=49 | | Successful ECV N=46 | |
|---|---|---|---|---|
| | n | % | n | % |
| **Type of Birth** | | | | |
| **Vaginal** | 2 | 4.1 | 32 | 69.6 |
| SVB | 2 | 4.1 | 22 | 47.8 |
| Operative vaginal | 0 | | 10 | 21.7 |
| **CS elective** | 43 | 87.8 | 0 | |
| **CS emergency** | 4 | 8.2 | 14 | 30.4 |

Note: 27 women booked ECV, but not performed because either not suitable (n=11) or presentation is cephalic (n=15) on the day. These are not included in the analysis.

In 2017, a total of 95 women (43% of breeches at term) were referred for ECV. The ECV success rate was 48%, higher than in previous years and lower than international rates (50-60%).

Descent of the breech into the pelvis is associated with unsuccessful ECV. If there was no descent, the success rate was 61% compared with 0% if there was any descent at all (consistent with previous findings). This is consistent with data published from a NWH study (2008) reporting an unengaged presenting part to be the strongest predictor for successful ECV. Nine women with missing data for descent were excluded.

Ninety-six percent of successful ECVs remained cephalic at the time of birth, and two women whose ECV was unsuccessful also had a cephalic presentation at birth. Of the 46 women who had a successful ECV, 32 had a vaginal birth (70%). This is consistent with the range of rates reported internationally (63-85%).

There was no statistically significant association between ECV among women with singleton breech at term (n=223) and maternal age, ethnicity, or BMI. There was a significant difference by LMC at birth, ranging from 62% of women under the care of a self-employed midwife to 22% of women under the care of a private obstetrician. Only 17% of women with prior Caesarean were referred for ECV compared to 47% of women with no prior Caesarean. There is no evidence from the international literature that a history of previous Caesarean section is a contraindication for ECV, as stated in our local guideline.

ECV continues to be a safe procedure at NWH, effective in reducing the number of breech presentations at birth and the number of Caesareans performed. The challenge still remains to increase the numbers of women undergoing attempted ECV. The Breech Guideline including an updated ECV pathway has been recently republished, with an exciting new aspect to the service. ECV under spinal anaesthesia is added to our toolkit to improve success rates and acceptability to women. We commend the work and effort put into the governance of, and the implementation of, the ECV clinical pathway.

### Labour and Birth Summary / Implications

The Caesarean section rate continues to increase and has again reached an all-time high in 2017. The leading specific contributors to the total rate are multipara having repeat Caesarean, nullipara having Caesareans before labour or following induction of labour, and malpresentation. Evidence-based ways to reduce these rates without compromising other indicators of maternal and neonatal outcome need to be implemented and audited.

Seventy percent of women with one previous Caesarean section and one previous baby, presenting at term with a singleton cephalic baby, opt for elective Caesarean for their next birth, and this is consistent over the years. This is despite the fact that most women who try for VBAC will have a vaginal birth regardless of the reason for their first Caesarean. More women with previous Caesarean eligible for trial of labour should be counselled and supported about this option, especially those under the care of private obstetricians who have the lowest rates of both trial of labour after Caesarean, and successful trial of labour.

There is a marked difference in intervention rates by LMC, with the highest rates of emergency Caesarean, and episiotomy, seen among women under the care of private obstetricians. Many of these women are from other DHBs and choose to birth at Auckland City Hospital.

Almost half of women with breech presentation at term had an attempt at ECV, and almost half were successful (even in nulliparous women). Improvement in these rates is expected with the newly introduced adjunct of spinal anaesthesia. More women with breech presentation, if suitable, should be referred for consultation about ECV.

## 6.8 Data tables: Operative vaginal birth, Vaginal breech birth

**Table 115: Operative vaginal birth rates 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total births (mothers)** | **7695** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| **Total operative vaginal births** | 975 | 937 | 947 | 942 | 832 | 907 | 833 | 849 | 871 | 927 | 979 |
| **Incidence %** | 12.7 | 12.3 | 12.2 | 12.2 | 11.1 | 11.8 | 11.5 | 11.5 | 12.6 | 12.8 | 14.3 |
| **Total nullipara** | **3752** | **3623** | **3811** | **3650** | **3539** | **3778** | **3441** | **3604** | **3321** | **3517** | **3343** |
| **Operative vaginal births** | 772 | 722 | 753 | 752 | 643 | 744 | 674 | 712 | 723 | 752 | 769 |
| **Nulliparous operative vaginal birth rate (%)** | 20.6 | 19.9 | 19.8 | 20.6 | 18.2 | 19.7 | 19.6 | 19.8 | 21.8 | 21.4 | 23.0 |
| **Total multipara** | **3943** | **3966** | **3924** | **4059** | **3984** | **3917** | **3782** | **3796** | **3612** | **3724** | **3503** |
| **Operative vaginal births** | 203 | 215 | 194 | 190 | 189 | 163 | 159 | 137 | 148 | 175 | 210 |
| **Multiparous operative vaginal birth rate (%)** | 5.1 | 5.4 | 4.9 | 4.7 | 4.7 | 4.2 | 4.2 | 3.6 | 4.1 | 4.7 | 6.0 |

**Table 116: Type of operative vaginal birth 2006-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total births** | **7695** | **7589** | **7735** | **7709** | **7523** | **7695** | **7223** | **7400** | **6933** | **7241** | **6846** |
| **Total operative vaginal** | 975 | 937 | 947 | 942 | 832 | 907 | 833 | 849 | 871 | 927 | 979 |
| **% of all births** | 12.7 | 12.3 | 12.2 | 12.2 | 11.1 | 11.8 | 11.5 | 11.5 | 12.6 | 12.8 | 14.3 |
| **Total forceps alone** | 222 | 301 | 339 | 308 | 288 | 267 | 256 | 259 | 275 | 284 | 295 |
| % of all births | 2.9 | 4.0 | 4.0 | 4.0 | 3.8 | 3.5 | 3.5 | 3.5 | 4.0 | 3.9 | 4.3 |
| **Kiellands forceps** | 22 | 29 | 42 | 38 | 25 | 22 | 31 | 13 | 26 | 4 | 14 |
| % of all births | 0.3 | 0.4 | 0.5 | 0.5 | 0.3 | 0.3 | 0.4 | 0.2 | 0.4 | 0.06 | 0.2 |
| **Other forceps** | 200 | 272 | 297 | 270 | 263 | 245 | 225 | 246 | 249 | 280 | 281 |
| % of all births | 2.6 | 3.6 | 3.8 | 3.5 | 3.5 | 3.2 | 3.1 | 3.3 | 3.6 | 3.9 | 4.1 |
| **Ventouse alone or forceps +ventouse** | 753 | 677 | 650 | 634 | 544 | 640 | 577 | 588 | 596 | 643 | 684 |
| % of all births | 9.8 | 8.9 | 8.4 | 8.3 | 7.2 | 8.3 | 8.0 | 7.9 | 8.6 | 8.9 | 10.0 |
| **Ventouse alone** | 686 | 636 | 608 | 584 | 509 | 606 | 540 | 527 | 564 | 607 | 651 |
| % of all births | 8.9 | 8.4 | 7.8 | 7.6 | 6.8 | 7.9 | 7.5 | 7.1 | 8.1 | 8.4 | 9.5 |
| **Forceps+ventouse** | 67 | 41 | 35 | 50 | 35 | 34 | 37 | 61 | 32 | 36 | 33 |
| % of all births | 0.9 | 0.5 | 0.5 | 0.6 | 0.5 | 0.4 | 0.5 | 0.8 | 0.5 | 0.5 | 0.5 |

**Table 117: Maternal outcomes following double and single instrumental vaginal birth, attempted instrumental vaginal birth prior to emergency Caesarean section and emergency Caesarean section in labour NWH 2017**

| | Single instrument (vaginal birth) N=946 | | Double instrument (vaginal birth) N=33 | | Emergency Caesarean with prior instrumental attempt N=20 | | Emergency Caesarean in labour without prior instrumental N=1358 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Episiotomy** | 765 | 80.9 | 31 | 93.9 | 2 | 10.0 | 3 | 0.2 |
| **Third or fourth degree tear** | 56 | 5.9 | 4 | 12.1 | 0 | | 0 | |
| **PPH≥1000mls** | 132 | 14.0 | 6 | 18.2 | 6 | 30.0 | 249 | 18.3 |
| **Transfusion** | 49 | 5.2 | 4 | 12.1 | 1 | 5.0 | 56 | 4.1 |

**Table 118: Neonatal outcomes following double and single instrumental vaginal birth, attempted instrumental vaginal birth prior to emergency Caesarean section and emergency Caesarean section in labour NWH 2017**

| | Single instrument (vaginal birth) N=953 | | Double instrument (vaginal birth) N=33 | | Emergency Caesarean with prior instrumental attempt N=20 | | Emergency Caesarean in labour without prior instrumental N=1395 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Apgar score 1min <4** | 19 | 2.0 | 0 | | 0 | | 71 | 5.1 |
| **Apgar score 5min <7** | 9 | 0.9 | 1 | 3.0 | 2 | 10.0 | 69 | 5.0 |
| **NICU admission** | 89 | 9.3 | 2 | 6.1 | 4 | 20.0 | 249 | 17.9 |
| **Neonatal Death rate (/1000 live births)** | 0 | | 0 | | 0 | | 8 | 0.6 |

**Table 119: Breech birth 2006-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total babies born** | **7875** | **7753** | **7897** | **7866** | **7690** | **7863** | **7377** | **7551** | **7074** | **7368** | **6974** |
| Total breech births | 449 | 439 | 335 | 434 | 406 | 463 | 401 | 367 | 345 | 351 | 317 |
| Percent of total births | 5.7 | 5.7 | 4.2 | 5.5 | 5.2 | 5.9 | 5.4 | 4.9 | 4.9 | 4.8 | 4.5 |
| **Total singleton babies** | **7518** | **7427** | **7576** | **7556** | **7360** | **7533** | **7072** | **7253** | **6796** | **7114** | **6719** |
| Total singleton breech | 351 | 346 | 335 | 340 | 310 | 356 | 319 | 294 | 265 | 282 | 251 |
| Percent of singletons | 4.7 | 4.7 | 4.4 | 4.3 | 4.2 | 4.7 | 4.5 | 4.1 | 3.9 | 4.0 | 3.7 |
| **Total multiple babies** | **357** | **324** | **321** | **310** | **330** | **330** | **305** | **298** | **278** | **254** | **255** |
| Total multiple breech | 98 | 93 | 89 | 94 | 96 | 107 | 82 | 73 | 80 | 69 | 66 |
| Percent of multiple births | 27.5 | 28.7 | 27.7 | 30.3 | 34.3 | 32.4 | 26.9 | 24.5 | 28.8 | 27.2 | 25.9 |

**Table 120: Mode of birth by breech presentation (singletons) NWH 2017**

| | N | Total breech | % Breech/total singleton birth | Breech & CS | % CS/total breech |
|---|---|---|---|---|---|
| **Total singleton births** | 6719 | 251 | 4 | 227 | 90 |
| **20-24 weeks** | 32 | 14 | 44 | 0 | |
| **25-31 weeks** | 90 | 20 | 22 | 13 | 65 |
| **32-36 weeks** | 331 | 33 | 10 | 32 | 97 |
| **≥37 weeks** | 6266 | 184 | 3 | 182 | 99 |

**Table 121: Mode of birth by type of breech (singletons only) NWH 2017**

| | Extended leg n=104 | | Flexed leg n=106 | | Unspecified n=36 | | Total breech n=246 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Vaginal breech** | 8 | 7.7 | 7 | 6.6 | 4 | 11.1 | 19 | 7.7 |
| **Caesarean** | 96 | 92.3 | 99 | 93.4 | 32 | 88.9 | 227 | 92.3 |
| CS emergency | 24 | 23.1 | 28 | 26.4 | 15 | 41.7 | 67 | 27.2 |
| CS elective | 72 | 69.2 | 71 | 67.0 | 17 | 47.2 | 160 | 65.0 |

**Table 122: Mode of birth by type of breech (multiples only) NWH 2017**

| | Extended leg n=17 | | Flexed leg n=25 | | Unspecified n=21 | | Total breech n=63 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Vaginal breech** | 5 | 29.4 | 7 | 28.0 | 3 | 14.3 | 15 | 23.8 |
| **Caesarean** | 12 | 70.6 | 18 | 72.0 | 18 | 85.7 | 48 | 76.2 |
| CS emergency | 2 | 11.8 | 9 | 36.0 | 9 | 42.9 | 20 | 31.7 |
| CS elective | 10 | 58.8 | 9 | 36.0 | 9 | 42.9 | 28 | 44.4 |

**Table 123: Referral for ECV (women at term with singleton breech presentation or attempted ECV) by demographic and clinical characteristics NWH 2017**

| | Singleton breech at term or attempted ECV N=223 | ECV n=95 | | No ECV n=128 | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| **Age (years)** | | | | | |
| ≤ 20 | 7 | 3 | 43 | 4 | 57 |
| 21-30 | 71 | 34 | 48 | 37 | 52 |
| 31-40 | 141 | 55 | 39 | 86 | 61 |
| ≥ 41 | 4 | 3 | 75 | 1 | 25 |
| **Ethnicity (prioritised)** | | | | | |
| Māori/ Pacific Island | 30 | 17 | 57 | 13 | 43 |
| Other Asian | 46 | 15 | 33 | 31 | 67 |
| Indian | 16 | 8 | 50 | 8 | 50 |
| NZ/Other European | 123 | 53 | 43 | 70 | 57 |
| Other | 8 | 2 | 25 | 6 | 75 |
| **BMI** | | | | | |
| <18.5 | 15 | 7 | 47 | 8 | 53 |
| 18.5-24.99 | 133 | 51 | 38 | 82 | 62 |
| 25-29.99 | 44 | 22 | 50 | 22 | 50 |
| 30-34.99 | 19 | 10 | 53 | 9 | 47 |
| 35-39.99 | 8 | 4 | 50 | 4 | 50 |
| ≥40 | 4 | 1 | 25 | 3 | 75 |
| missing | 0 | 0 | N/A | 0 | N/A |
| **LMC at birth** | | | | | |
| Self-employed Midwife | 94 | 58 | 62 | 36 | 38 |
| NWH Community | 32 | 15 | 47 | 17 | 53 |
| NWH Diabetes/Medical | 19 | 5 | 26 | 14 | 74 |
| Private Obstetrician | 77 | 17 | 22 | 60 | 78 |
| GP | 1 | 0 | | 1 | 100 |
| **Previous CS** | | | | | |
| Yes | 35 | 6 | 17 | 29 | 83 |
| No | 188 | 89 | 47 | 99 | 53 |

## 6.9 Obstetric analgesia

Data on use of analgesia and anaesthesia for birth are collected by staff in Labour and Birthing Suite. These data include method of analgesia; and time, dilatation and indication for epidural. Some tables do not include elective Caesarean section patients as these patients did not access the Labour and Birthing Suite during their admission.

When we have used the term epidural/spinal in this chapter, this means any of epidural, combined spinal epidural (CSE), or spinal anaesthesia. When the term used is epidural, this includes epidural and CSE.

### Findings

Epidurals continue to be the most utilised mode of analgesia/anaesthesia for the management of birth (67.5% of all women).

Of women who labored (excluding elective Caesarean or emergency Caesarean before labour), 72% of women who were induced were assisted by an epidural (or CSE) compared with 43% of women who had spontaneous onset of labour. Labouring patients of private obstetrician LMCs have the highest rate of epidural (or CSE) use (80%) of all LMCs. Use of parenteral pethidine continues to decline year on year (3.2% in 2017, 4.2% in 2016, 5.3% in 2015, 5.6% in 2014, 7.0% in 2013, 8.9% in 2012, 13.1% in 2011, and 15.5% in 2010).

**Figure 115: Epidural use among women with spontaneous and induced labour 2006-2017**

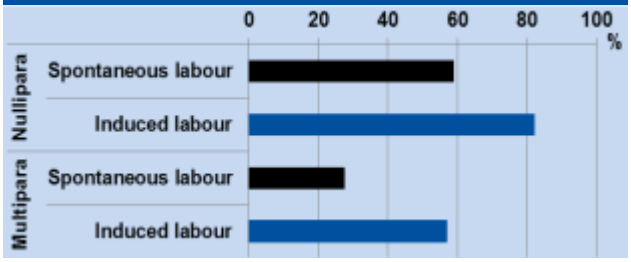
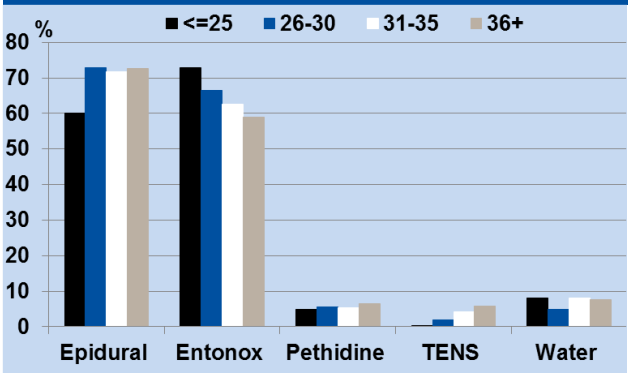



**Figure 116: Analgesic use and maternal age among labouring nulliparous women NWH 2017**




Use of general anaesthesia (GA) for Caesarean section remains reasonable based on internationally recommended levels. In 2017 3.5% of women were administered a GA. This number includes all women given a GA, not just those for Caesarean sections. The GA rate for true emergency Caesarean sections was 7.9%.

**Figure 117: Analgesic use and LMC at birth among labouring nulliparous women NWH 2017**

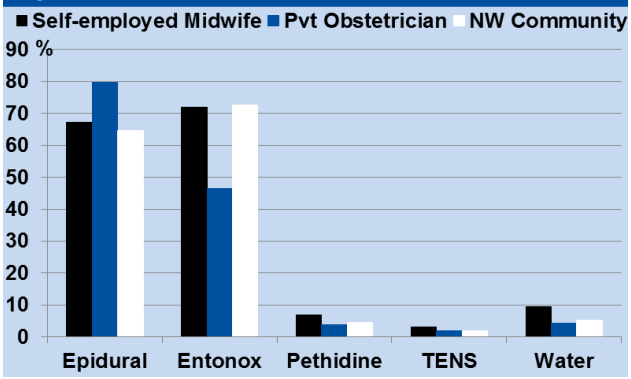



**Figure 118: Analgesic use and ethnicity among labouring nulliparous women NWH 2017**

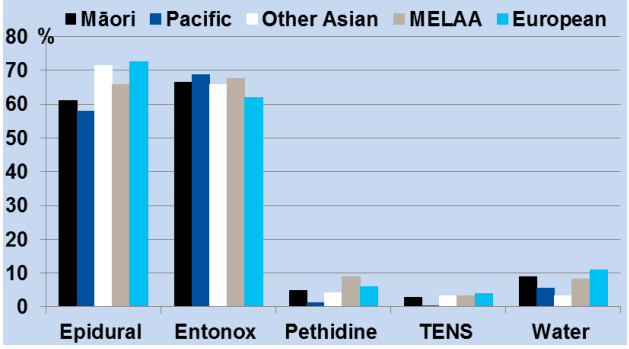
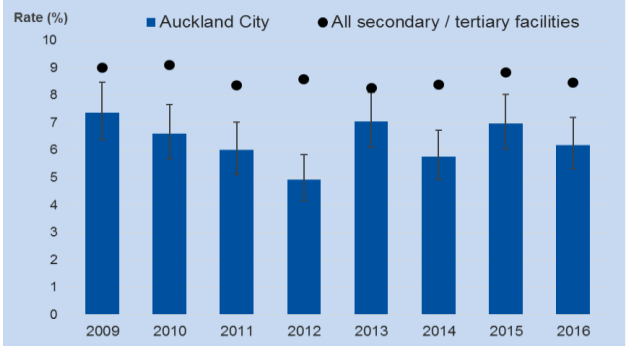



**Figure 119: NZ Maternity Indicators 2016: Women having a general anaesthetic for Caesarean section NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

**Figure 119** from the NZ Maternity Clinical Indicators shows the proportion of women having a general anaesthetic for Caesarean section at NWH in 2014 compared to the proportion in all secondary and tertiary facilities in NZ. NWH compares favourably in this national dataset, being significantly below the national proportion for this indicator. This may be a reflection of the specialist anaesthetic services provided by ADHB.

## 6.10 Data tables: Obstetric Analgesia

**Table 124: Analgesic use by parity and mode of onset of birth NWH 2017**

| | Total | Epidural/Spinal | | Entonox | | Pethidine | | TENS | | Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | N | % | N | % | n | % | n | % | n | % |
| **All Women** | **6846** | **4620** | **67.5** | **3137** | **45.8** | **222** | **3.2** | **115** | **1.7** | **296** | **4.3** |
| **Mode of onset of birth** | | | | | | | | | | | |
| CS elective | 1332 | 1303 | 97.8 | 30 | 2.3 | 3 | 0.2 | 0 | | 0 | |
| CS emergency before onset of labour | 278 | 249 | 89.6 | 28 | 10.1 | 2 | 0.7 | 1 | 0.4 | 3 | 1.1 |
| **Labouring women*** | | | | | | | | | | | |
| Nullipara | 2795 | 2077 | 74.3 | 1819 | 65.1 | 154 | 5.5 | 86 | 3.1 | 196 | 7.0 |
| Multipara | 2441 | 991 | 40.6 | 1260 | 51.6 | 63 | 2.6 | 28 | 1.1 | 97 | 4.0 |
| **Induced labour** | | | | | | | | | | | |
| Nullipara | 1378 | 1208 | 87.7 | 829 | 60.2 | 72 | 5.2 | 48 | 3.5 | 41 | 3.0 |
| Multipara | 934 | 555 | 59.4 | 445 | 47.6 | 26 | 2.8 | 12 | 1.3 | 20 | 2.1 |
| **Spontaneous labour** | | | | | | | | | | | |
| Nullipara | 1417 | 869 | 61.3 | 990 | 69.9 | 82 | 5.8 | 38 | 2.7 | 155 | 10.9 |
| Multipara | 1507 | 436 | 28.9 | 815 | 54.1 | 37 | 2.5 | 16 | 1.1 | 77 | 5.1 |

* Excludes elective Caesarean and emergency Caesarean before onset of labour.

**Table 125: GA use and mode of birth NWH 2017**

| | Total | GA* only | | GA* + epidural | | Total GA* | |
|---|---|---|---|---|---|---|---|
| | N | N | % | n | % | n | % |
| **Total** | 6846 | 169 | 2.5 | 71 | 1.0 | 240 | 3.5 |
| **SVB** | 3158 | 46 | 1.5 | 16 | 0.5 | 62 | 2.0 |
| **Operative vaginal** | 979 | 9 | 0.9 | 6 | 0.6 | 15 | 1.5 |
| **CS elective** | 1331 | 36 | 2.7 | 9 | 0.7 | 45 | 3.4 |
| **CS emergency** | 1378 | 78 | 5.7 | 40 | 2.9 | 118 | 8.6 |

*General anaesthesia administered to women who had vaginal births were given postpartum for management of retained placenta, postpartum haemorrhage or for women whose epidural pain relief was inadequate for an operative vaginal birth.

**Table 126: Epidural use (epidural or CSE) among women with spontaneous and induced labour 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of births** | 7695 | 7589 | 7753 | 7709 | 7523 | 7695 | 7223 | 7400 | 6933 | 7241 | 6846 |
| **Number women with spontaneous labour** | 4490 | 4070 | 4125 | 4007 | 3628 | 3666 | 3270 | 3523 | 3139 | 3292 | 2924 |
| **Spontaneous labour and epidural** | 2057 | 1743 | 1717 | 1686 | 1483 | 1571 | 1297 | 1423 | 1237 | 1301 | 1249 |
| **%** | 45.8 | 42.8 | 41.6 | 42.1 | 40.9 | 42.9 | 39.7 | 40.4 | 39.4 | 39.5 | 42.7 |
| **Number of women with induced labour** | 1906 | 2203 | 2238 | 2214 | 2463 | 2485 | 2438 | 2315 | 2289 | 2423 | 2312 |
| **Induced labour and epidural** | 1326 | 1550 | 1599 | 1557 | 1707 | 1780 | 1709 | 1583 | 1624 | 1702 | 1660 |
| **%** | 69.6 | 70.4 | 71.4 | 70.3 | 69.3 | 71.6 | 70.1 | 68.3 | 70.9 | 70.2 | 71.8 |

**Table 127: Analgesic use and LMC at birth among labouring nulliparous women NWH 2017**

| | Total | Epidural/CSE | | Entonox | | Pethidine | | TENS | | Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % |
| **Self-employed Midwife** | 1458 | 981 | 67.3 | 1048 | 71.9 | 99 | 6.8 | 46 | 3.2 | 138 | 9.5 |
| **Pvt Obstetrician** | 734 | 585 | 79.7 | 342 | 46.6 | 28 | 3.8 | 29 | 2.0 | 32 | 4.4 |
| **GP** | 1 | 1 | 100.0 | 1 | 100.0 | 0 | | 0 | | 0 | |
| **NWH Community** | 468 | 302 | 64.5 | 340 | 72.6 | 21 | 4.5 | 9 | 1.9 | 24 | 5.1 |
| **NWH Diabetes** | 37 | 29 | 78.4 | 28 | 75.7 | 2 | 5.4 | 2 | 5.4 | 1 | 2.7 |
| **NWH Medical** | 84 | 61 | 72.6 | 53 | 63.1 | 4 | 4.8 | 0 | | 1 | 1.2 |
| **Other DHB** | 4 | 3 | 75.0 | 1 | 25.0 | 0 | | 0 | | 0 | |
| **Unbooked** | 9 | 2 | 22.2 | 6 | 66.7 | 0 | | 0 | | 0 | |

**Table 128: Analgesic use and ethnicity (prioritised) among labouring nulliparous women NWH 2017**

| | Total | Epidural/CSE | | Entonox | | Pethidine | | TENS | | Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % |
| **Māori** | 146 | 89 | 61.0 | 97 | 66.4 | 7 | 4.8 | 4 | 2.7 | 13 | 8.9 |
| **Pacific** | 233 | 135 | 57.9 | 160 | 68.7 | 3 | 1.3 | 1 | 0.4 | 13 | 5.6 |
| **Indian** | 374 | 275 | 73.5 | 261 | 69.8 | 30 | 8.0 | 6 | 1.6 | 9 | 2.4 |
| **Other Asian** | 753 | 538 | 71.4 | 496 | 65.9 | 32 | 4.2 | 24 | 3.2 | 24 | 3.2 |
| **MELAA** | 123 | 81 | 65.9 | 83 | 67.5 | 11 | 8.9 | 4 | 3.3 | 10 | 8.1 |
| **European** | 1166 | 846 | 72.6 | 722 | 61.9 | 71 | 6.1 | 47 | 4.0 | 127 | 10.9 |

MELAA = Middle Eastern, Latin America, African

**Table 129: Analgesic use and maternal age among labouring nulliparous women NWH 2017**

| Maternal age (years) | Total | Epidural/CSE | | Entonox | | Pethidine | | TENS | | Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % |
| **≤20** | 124 | 68 | 54.8 | 95 | 76.6 | 7 | 5.6 | 0 | | 13 | 10.5 |
| **21-25** | 346 | 214 | 61.8 | 248 | 71.7 | 16 | 4.6 | 2 | 0.6 | 25 | 7.2 |
| **26-30** | 916 | 667 | 72.8 | 609 | 66.5 | 51 | 5.6 | 18 | 2.0 | 45 | 4.9 |
| **31-35** | 1027 | 737 | 71.8 | 642 | 62.5 | 55 | 5.4 | 44 | 4.3 | 84 | 8.2 |
| **36-40** | 342 | 252 | 73.7 | 201 | 58.8 | 20 | 5.8 | 18 | 5.3 | 25 | 7.3 |
| **>40** | 40 | 26 | 65.0 | 24 | 60.0 | 5 | 12.5 | 4 | 10.0 | 4 | 10.0 |

## 6.11 Labour and birth at Birthcare Auckland

The data for mothers birthing at Birthcare has been provided by Birthcare. The data for mothers transferred to Auckland City Hospital in labour and birthed at NWH was extracted from the NWH clinical database Healthware.

Birthcare Auckland is a primary maternity hospital located across Auckland Domain from Auckland City Hospital. Birthcare has a Birthing Suite of three large rooms. These have been recently refurbished (completed in June 2018) as part of the Primary Birthing Project to address the decrease in births at Birthcare. Each birthing room has a new birthing pool, a fridge, bean bag, swiss ball, bead roll and two of the rooms have birthing couches.

Birthcare's vision is to provide an environment where women and their whānau are able to relax, and encourages active physiological labour and birth. To support this vision each room has mood lighting that allows women to choose their colour, aromatherapy diffusers and sound systems for women to choose their oils and their music. Free Natural Childbirth Classes are also run at Birthcare.

A LMC back-up midwife fee is available for each labour and birth. This was introduced in 2017 to encourage and support midwives to offer Birthcare as the preferred place of birth to women with low risk pregnancies. Having a known back-up midwife provides physical and emotional support to the LMC midwife. Birthcare employed midwives continue to provide second midwife support during labour and birth as well.

There are four clinic rooms for LMC midwives to use for their antenatal clinics.

### Findings

Three hundred and eighty women commenced labour at Birthcare in 2017. There were 306 births at Birthcare in 2017. This is a downward trend over the years, from a peak of 451 in 2011. Seventy four (74) women (19%) transferred during labour in 2017. More than half of these women transferred in their own transport.

Seventy-two percent of nulliparous women and 90% of multiparous women achieved a natural birth at Birthcare. The transfer in labour rates were 29% for nulliparous and 10% for multiparous women.

### Postnatal Stay at Birthcare Auckland

Birthcare has 45 postnatal beds and provides postnatal care for women who birth at Auckland City Hospital, North Shore, Waitakere and Counties Manukau Hospitals. The following are additional services provided at Birthcare:

- Lactation services
- Paediatric review services
- Physiotherapy review and classes
- Preparation for home classes
- Neonatal hearing screening.

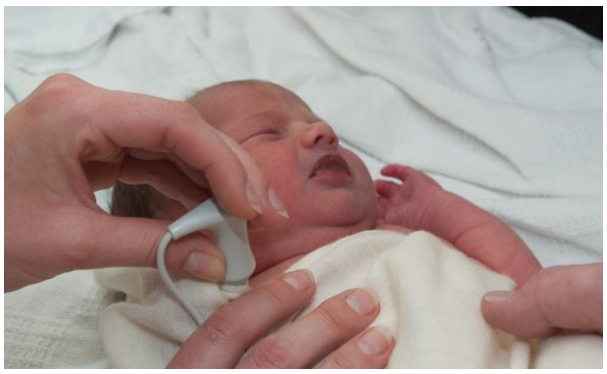
## 6.12 Data tables: Labour and birth at Birthcare Auckland

**Table 130: Demographic characteristics of women labouring at Birthcare by place of birth 2017**

| | Birth at Birthcare n=306 | | Intrapartum transfer to NW n=74 | | Total N=380 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Parity** | | | | | | |
| Nullipara | 138 | 45.1 | 55 | 74.3 | 193 | 50.8 |
| Multipara | 168 | 54.9 | 19 | 25.7 | 187 | 49.2 |
| **Age** | | | | | | |
| <21 | 4 | 1.3 | 3 | 4.1 | 7 | 1.8 |
| 21-25 | 26 | 8.5 | 11 | 14.9 | 37 | 9.7 |
| 26-30 | 99 | 32.4 | 30 | 40.5 | 129 | 33.9 |
| 31-35 | 110 | 35.9 | 24 | 32.4 | 134 | 35.3 |
| 36-40 | 59 | 19.3 | 6 | 8.1 | 65 | 17.1 |
| >40 | 8 | 2.6 | 0 | | 8 | 2.1 |
| **Ethnicity** | | | | | | |
| Māori | 23 | 7.5 | 7 | 9.5 | 30 | 7.9 |
| Pacific | 38 | 12.4 | 6 | 8.1 | 44 | 11.6 |
| Indian | 10 | 3.3 | 2 | 2.7 | 12 | 3.2 |
| Other Asian | 41 | 13.4 | 10 | 13.5 | 51 | 13.4 |
| MELAA | 12 | 3.9 | 7 | 9.5 | 19 | 5.0 |
| European | 182 | 59.5 | 42 | 56.8 | 224 | 58.9 |
| **DHB of Domicile** | | | | | | |
| Auckland DHB | 208 | 68.0 | 51 | 68.9 | 259 | 68.2 |
| Counties Manukau DHB | 35 | 11.4 | 4 | 5.4 | 39 | 10.3 |
| Waitemata DHB | 63 | 20.6 | 19 | 25.7 | 82 | 21.6 |
| Other | 0 | | 0 | | 0 | |

**Table 131: Interventions and outcomes among women who commenced labour at Birthcare 2017**

| | Birth at Birthcare n=306 | | Intrapartum transfer to NW n=74 | | Total N=380 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Mode of birth** | | | | | | |
| Normal vaginal | 306 | 100.0 | 37 | 50.0 | 343 | 90.3 |
| Operative vaginal | | | 20 | 27.0 | 20 | 5.3 |
| Emergency Caesarean | | | 17 | 23.0 | 17 | 4.5 |
| **Perineal trauma** | | | | | | |
| Episiotomy | 14 | 4.6 | 26 | 35.1 | 40 | 10.5 |
| Third/fourth degree tear | 6 | 2.0 | 2 | 2.7 | 8 | 2.1 |
| 2nd degree tear | 105 | 34.3 | 17 | 23.0 | 122 | 32.1 |
| 1st degree tear | 62 | 20.3 | 10 | 13.5 | 72 | 18.9 |
| Graze | 17 | 5.6 | 4 | 5.4 | 21 | 5.5 |
| Vaginal wall tear | 4 | 1.3 | 3 | 4.1 | 7 | 1.8 |
| Labial tear | 11 | 3.6 | | 0.0 | 11 | 2.9 |
| Intact | 96 | 31.4 | 13 | 17.6 | 109 | 28.7 |
| **Blood loss** | | | | | | |
| ≥500 mls | 11 | 3.6 | 29 | 39.2 | 40 | 10.5 |
| **Perinatal outcomes** | | | | | | |
| Stillbirth (/1000) | 0 | | 0 | | 0 | |
| Admitted to NICU | 0 | | 0 | | 0 | |
| Neonatal death (/1000) | 0 | | 0 | | 0 | |
| **Exclusive breastfeeding rate at discharge from the facility** | 273 | 89.2 | 65 | 87.8 | 338 | 88.9 |





# CHAPTER 7

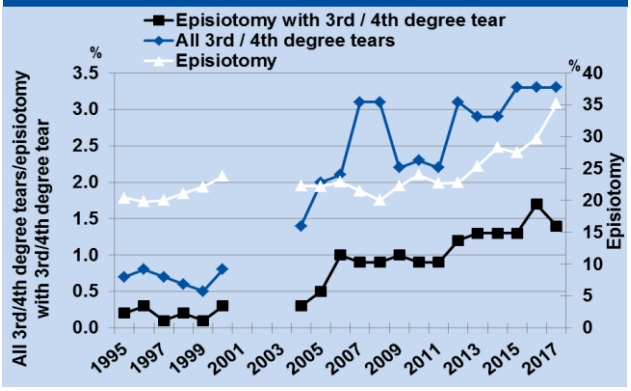
# LABOUR AND BIRTH OUTCOMES

This chapter summarises maternal and neonatal outcomes following labour and birth, including perineal trauma, postpartum haemorrhage (PPH), Apgar scores at 1 and 5 minutes, admission to neonatal intensive care, and neonatal death. Some tables pertaining to this chapter can be found in the text and the remainder at the end of the chapter.

## 7.1 Perineal trauma

### Findings

**Figure 120: Perineal trauma among all vaginal births NWH 1995-2017**




There has been an increase in use of episiotomy over the past 20 years. At 35% of vaginal births (1 woman in 3), this is the highest rate reported among women birthing at NWH since 1995. Episiotomy rate has increased for spontaneous and operative vaginal birth and for vaginal birth for Asian, Māori/Pacific and European ethnic groupings. Next year we plan to include data collected on the reasons for episiotomy.

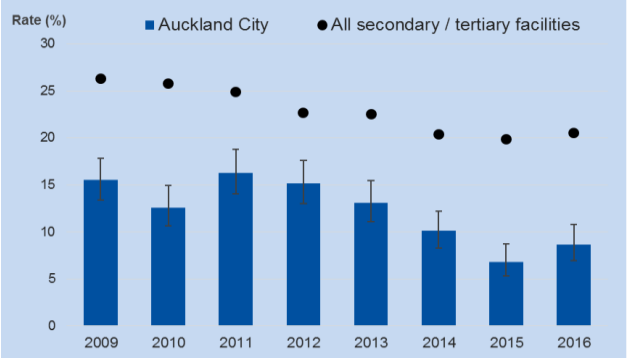
There has also been an increase in 3rd/4th degree tears from about 2005. At 3.3% of vaginal births (1 woman in 30), this is the highest rate reported among women birthing at NWH since 1995. It is suspected that some of this apparent increase in trauma is due to improved recognition. However we are concerned about perineal care and are undertaking an audit of current practice. An education session is planned later this year to introduce an evidence-based bundle of care for prevention of perineal trauma, followed by further audit.

The wider context in our practice improvement endeavours has been a focus on appropriate support for a birthing woman through providing a second midwife at birth as well as encouraging a hands-on (rather than hands-off) approach to crowning of the fetal head. Although again the literature is not robust, there is some evidence that protecting the perineum whilst the fetal head is crowning is protective against 3rd and 4th degree tears. There is also evidence that the use of warm compresses in second stage is an effective preventative strategy. Senior midwives are available on the unit and are competent to identify 3rd and 4th degree tears and support appropriate referral as required.

Management of significant perineal trauma is expected to be improved with uptake of "OASIS" surgical workshops by SMOs and registrars. These workshops aim to standardize the surgical repair of 3rd and 4th degree tears in line with best available evidence.

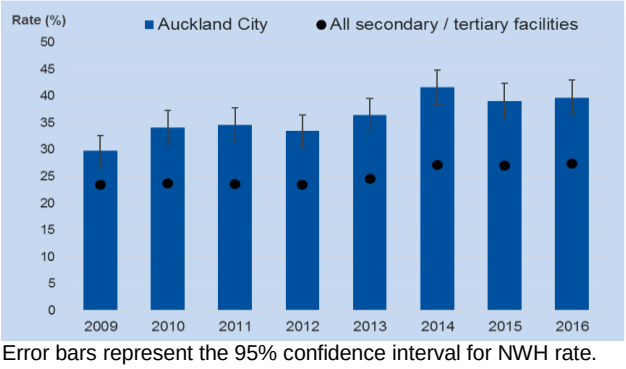
The changes seen at NWH are reflected in the national data as seen in the New Zealand Maternity Clinical Indicators 2016 report, showing, among standard primipara birthed in secondary or tertiary facilities from 2009-2016, a statistically significant reduction in intact perineum from 26.3% to 20.5, increase in episiotomy without 3rd/4th degree tear from 23.5% to 27.4%, increase in 3rd/4th degree tear without episiotomy from 3.7% to 4.1%, and increase in 3rd/4th degree tear with episiotomy from 1.6% to 2.3%.

**Figure 121: NZ Maternity Indicators 2016: Intact perineum among standard primipara NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

**Figure 122: NZ Maternity Indicators 2016: Episiotomy without 3rd/4th degree tear among standard primipara NWH and NZ secondary/tertiary facility rates 2009-2016**

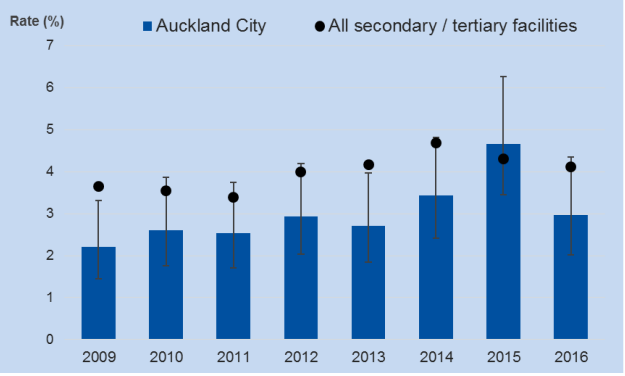



Error bars represent the 95% confidence interval for NWH rate.

**Figure 121** to **Figure 124** illustrate results for NWH compared to secondary and tertiary facilities in New Zealand. The 95% confidence intervals around the NWH rates indicate whether the rates differ significantly from national rates. The total rate of 3rd/4th degree tear among standard primipara (as defined in the Clinical Indicators document) at NWH

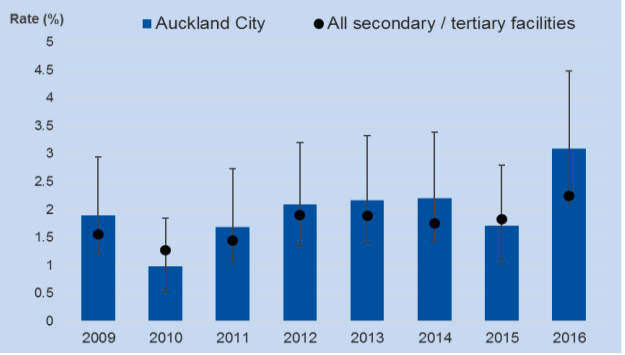
in 2016 was 6.1% compared to 6.4% in all secondary or tertiary facilities nationally.

**Figure 123: NZ Maternity Indicators 2016: Third or fourth degree tear without episiotomy among standard primipara NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

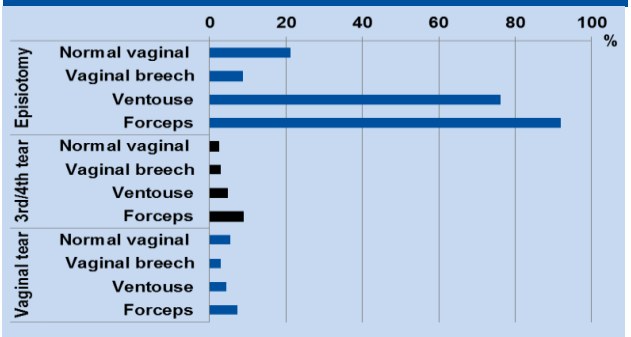
**Figure 124: NZ Maternity Indicators 2016: Episiotomy and 3rd/4th degree tear among standard primipara NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

In the context of an increase in various risk factors for perineal trauma, including ethnic group (i.e. Indian, Other Asian women), BMI within Asian women, continued focus on prevention of perineal trauma remains a priority.

**Figure 125: Perineal trauma among vaginal births by mode of vaginal birth NWH 2017**




It is not clear whether a low third and fourth degree tear rate is causally consequent upon and/or justifies a higher episiotomy rate. The service accepts that routine episiotomy does not prevent major tears but it remains open to question as to whether selective episiotomy may do so.

**Figure 126: Perineal trauma among vaginal births by ethnicity NWH 2017**

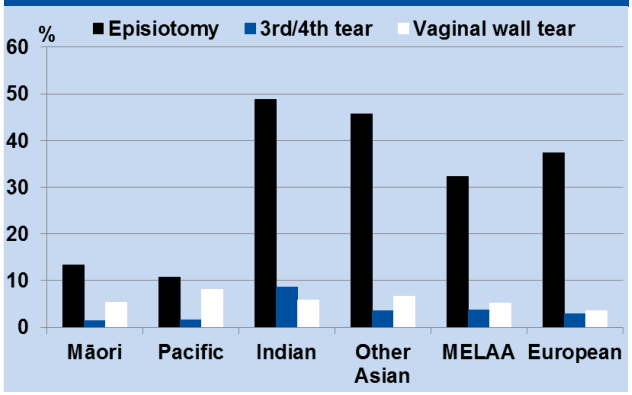
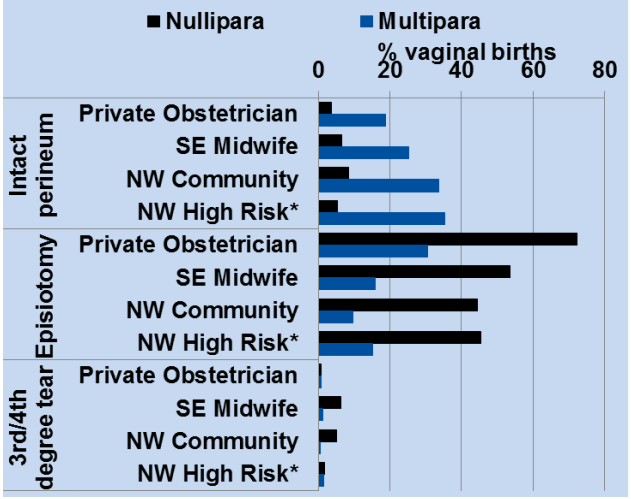



**Figure 127: Perineal trauma among vaginal births by LMC and parity NWH 2017**




*NW High Risk includes Diabetes, MFM, Unbooked and Other DHB.

There are marked differences in perineal trauma rates by LMC, with private obstetricians having the highest episiotomy and lowest 3rd and 4th degree tear rates.

There is no longer a dedicated postpartum perineal tear clinic at NWH. These women are now seen at general gynaecology clinic or urogynaecology clinic depending on the severity of perineal trauma.

## 7.2 Third stage management

In 2008, the collection of third stage data was refined to better determine initial management of third stage compared to subsequent treatment in response to postpartum bleeding. Active management of third stage includes routine uterotonic given with birth of the anterior shoulder followed by gentle traction until the placenta is delivered. Physiologic third stage entails expectant management without uterotonic and with delivery of the placenta by maternal effort.

### Findings

The NWH guideline recommends that "all women are offered active management of the 3rd stage". Among vaginal births, 4.8% of women had their third stage managed physiologically and 91.0% were managed actively. In 4.2% of cases, method of third stage management was unknown.

Routine primary ecbolic recommended for a woman without risk factors is syntocinon. Seventy percent of women who had active management received syntocinon as the primary ecbolic.

For a woman with risk factors, syntometrine should be considered as the primary ecbolic if not contraindicated (ergot is contraindicated in maternal hypertension). In women with a BMI of 30 or more, 24.1% were given syntometrine, women with previous CS, 21.7%, and for women with twins, 34.9%.

Of women with hypertension, 15 (6.5%) received syntometrine and this is an area to improve safety in prescribing. No woman with preeclampsia was given ergotamine. The guideline should be updated to say ergot is contraindicated for hypertension in pregnancy.

**Table 137** shows postpartum haemorrhage by third stage management. This table shows that women who have active management in third stage have higher rates of PPH and of transfusion. This phenomenon is frequently seen in observational data, and is contrary to the findings of all randomized trials of active management. It suggests that appropriate risk assessment is occurring and that women at increased risk of bleeding are provided active management while those who are managed physiologically are truly low risk.

## 7.3 Postpartum haemorrhage

The source of blood loss data varies for some of the years shown. In the years 2005 to 2007, blood loss in labour and birth was not combined with blood loss recorded postnatally as in numerous cases the total blood loss was recorded in both places. The amended data on PPH rate in 2005 and 2006 given here may underestimate the PPH rate in those years. From 2008, the data have been cleaned extensively. This cleaning has included a comparison of blood loss recorded in Healthware to blood loss in the PIMS theatre database. These data were not available in previous years. The effect of this is likely to have been an increase in the reporting of PPH, especially in those cases giving birth in Labour and Birthing Suite and then transferring to theatre for the management of retained placenta or bleeding.

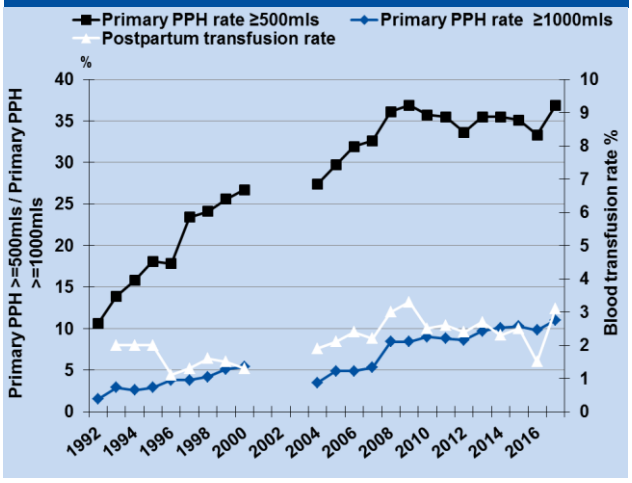
Further to these data management improvements, the estimation of blood loss including the weighing of all blood is now part of labour ward culture. While this is undoubtedly a more accurate way to measure blood loss, there are still incidences where losses are not measured and these may lead to inaccurate comparisons at this institution and with other units. Postpartum transfusion is recommended as a better comparative measure.

### Findings

The primary PPH rates at both ≥500mls and ≥1000mls appear to have increased in 2017. The rate of PPH ≥1000mls was 11.0% in 2017.

The postpartum transfusion rate in 2017 was 3.1%. The reduction in transfusion rate noted in 2016, attributed to the acceptance of postpartum iron infusion as an alternative strategy in 2015, has not been sustained. We need to determine whether this increase in transfusion rate is entirely due to the observed increase in PPH, or whether there is a change in transfusion practice. We plan to audit transfusions in 2017 against our guidelines to determine whether they met the stated criteria.

**Figure 128: Postpartum haemorrhage and transfusion rates NWH 1992-2017**

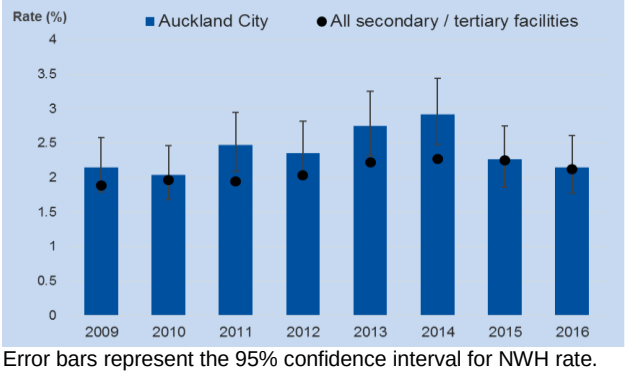



The 2016 Maternity Clinical Indicators show that the transfusion rate for women having a Caesarean birth at NWH in 2016 (2.3%) was lower than the national rate (2.9%) but this may not be sustained in the next report given our local data for 2017; as it was for women having a vaginal birth (2.2%) compared to 2.1%.

The transfusion rate for women having a vaginal birth in 2016 was the same for women birthing at NWH as the national rate (**Figure 128**).

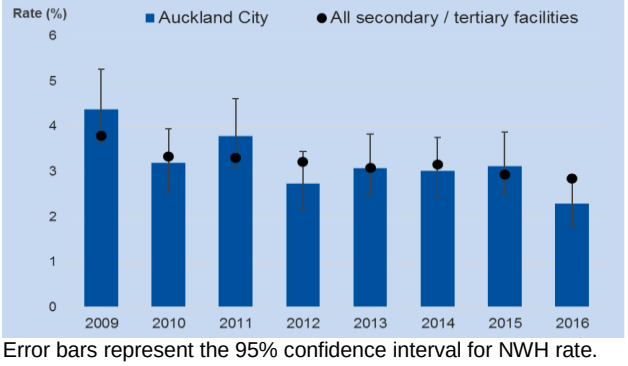
As shown in **Figure 131**, postpartum transfusion is associated with operative vaginal birth and emergency Caesarean section.

**Figure 129: NZ Maternity Indicators 2016: Blood transfusion with vaginal birth NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

**Figure 130: NZ Maternity Indicators 2016: Blood transfusion with Caesarean section NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for NWH rate.

**Figure 131: Postpartum transfusion by mode of onset of birth and by mode of birth NWH 2017**

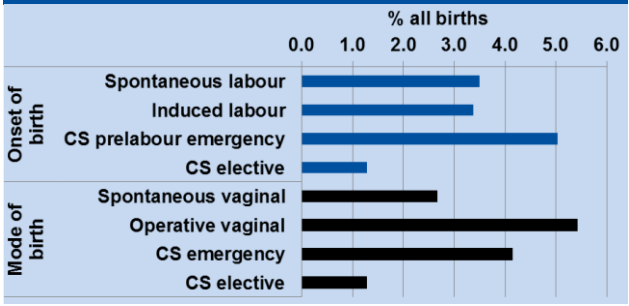



**Figure 132: Postpartum transfusion by LMC (% of all births) NWH 2017**

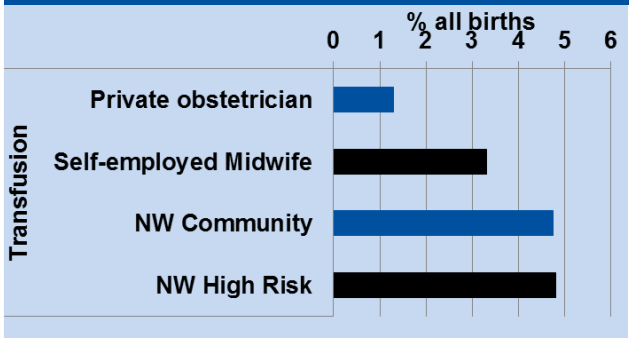



**Figure 132** shows that postpartum transfusion is also associated with LMC at birth. Women under the care of LMC obstetricians have the lowest rate of transfusion. This may be related to women under their care having fewer risk factors or higher pre-birth haemoglobin, more active management of third stage, higher operative skill, or provider preference. PPH rate is also lower among women under the care of LMC obstetricians.

**Table 132: Postpartum transfusion rates by recorded blood loss at birth NWH 2017**

| | Total | Postpartum transfusion | |
|---|---|---|---|
| | | n | % |
| **Total** | **6846** | **211** | **3.1** |
| **Blood loss <500** | 4318 | 6 | 0.1 |
| **PPH 500-999** | 1775 | 25 | 1.4 |
| **PPH 1000-1499** | 446 | 41 | 9.2 |
| **PPH 1500-2499** | 240 | 83 | 34.6 |
| **PPH ≥2500** | 64 | 55 | 85.9 |
| **Blood loss unknown** | 3 | 1 | 33.3 |

## 7.4 Data tables: Perineal trauma

**Table 133: Episiotomy rates among vaginal births NWH 2006-2017**

| | 2006 n= 4822 | 2007 n= 5257 | 2008 n= 5217 | 2009 n= 5321 | 2010 n= 5218 | 2011 n= 5075 | 2012 n= 5125 | 2013 n= 4717 | 2014 n= 4841 | 2015 n= 4465 | 2016 n= 4633 | 2017 n= 4137 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of episiotomies** | 1103 | 1130 | 1069 | 1184 | 1252 | 1153 | 1170 | 1200 | 1371 | 1228 | 1375 | 1458 |
| **Incidence %** | 22.9 | 21.5 | 20.5 | 22.3 | 24.0 | 22.7 | 22.8 | 25.4 | 28.3 | 27.5 | 29.7 | 35.2 |
| **Episiotomy with 3rd/4th degree tear** | 47 | 49 | 46 | 56 | 49 | 46 | 60 | 61 | 61 | 58 | 80 | 59 |
| **Incidence %** | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 | 0.9 | 1.2 | 1.3 | 1.3 | 1.3 | 1.7 | 1.4 |
| **All 3rd/4th degree tears** | 103 | 161 | 160 | 116 | 120 | 114 | 158 | 138 | 139 | 149 | 153 | 137 |
| **Incidence %** | 2.1 | 3.1 | 3.1 | 2.2 | 2.3 | 2.2 | 3.1 | 2.9 | 2.9 | 3.3 | 3.3 | 3.3 |

**Table 134: Episiotomy rates in vaginal births, all gestations by LMC at birth and parity NWH 2017**

| | Nullipara | | | Multipara | | |
|---|---|---|---|---|---|---|
| | Total | n | % | Total | n | % |
| **Total** | 1919 | 1075 | 56.0 | 2218 | 383 | 17.3 |
| **Self-employed midwife** | 1043 | 560 | 53.7 | 1173 | 186 | 15.9 |
| **Private Obstetrician** | 447 | 323 | 72.3 | 422 | 129 | 30.6 |
| **General Practitioner** | 1 | 1 | 100.0 | 7 | 0 | 0.0 |
| **National Women's** | 428 | 191 | 44.6 | 616 | 68 | 11.0 |

**Table 135: Perineal trauma by mode of birth, parity and LMC at birth among all vaginal births NWH 2017**

| | Total | Episiotomy | | 3rd/4th tear | | Vaginal wall tear | |
|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % |
| **Total vaginal births** | **4137** | **1458** | **35.2** | **137** | **3.3** | **221** | **5.3** |
| **Mode of birth** | | | | | | | |
| Normal vaginal | 3123 | 659 | 21.1 | 76 | 2.4 | 167 | 5.3 |
| Vaginal breech | 35 | 3 | 8.6 | 1 | 2.9 | 1 | 2.9 |
| Ventouse | 652 | 496 | 76.1 | 31 | 4.8 | 29 | 4.4 |
| Forceps | 327 | 300 | 91.7 | 29 | 8.9 | 24 | 7.3 |
| **Parity** | | | | | | | |
| Nulliparous | 1919 | 1075 | 56.0 | 109 | 5.7 | 154 | 8.0 |
| Multiparous | 2218 | 383 | 17.3 | 28 | 1.3 | 67 | 3.0 |
| **LMC at birth** | | | | | | | |
| Self-employed midwife | 2216 | 746 | 33.7 | 96 | 4.3 | 119 | 5.4 |
| Private Obstetrician | 869 | 452 | 52.0 | 14 | 1.6 | 27 | 3.1 |
| General Practitioner | 8 | 1 | 12.5 | 0 | 0.0 | 1 | 12.5 |
| NW Community | 806 | 196 | 24.3 | 23 | 2.9 | 60 | 7.4 |
| NW Diabetes | 57 | 14 | 24.6 | 0 | | 4 | 7.0 |
| NW MFM | 142 | 45 | 31.7 | 4 | 2.8 | 10 | 7.0 |
| Other DHB | 6 | 1 | 16.7 | 0 | | 0 | |
| Unbooked | 33 | 3 | 9.1 | 0 | | 0 | |
| **Ethnicity** | | | | | | | |
| Māori | 299 | 40 | 13.4 | 4 | 1.3 | 16 | 5.4 |
| Pacific | 531 | 57 | 10.7 | 8 | 1.5 | 43 | 8.1 |
| Indian | 399 | 195 | 48.9 | 34 | 8.5 | 23 | 5.8 |
| Other Asian | 1093 | 499 | 45.7 | 38 | 3.5 | 73 | 6.7 |
| MELAA | 192 | 62 | 32.3 | 7 | 3.6 | 10 | 5.2 |
| European | 1623 | 605 | 37.3 | 46 | 2.8 | 56 | 3.5 |

MELAA = Middle Eastern, Latin American, African

**Table 136: Perineal outcomes in spontaneous (non-operative) vertex birth, all gestations, by LMC at birth and parity NWH 2017**

| | Nullipara | | | Multipara | | |
|---|---|---|---|---|---|---|
| | Total | n | % | Total | n | % |
| **Intact perineum total** | **1131** | **72** | **6.4** | **1992** | **527** | **26.5** |
| Self-employed midwife | 644 | 43 | 6.7 | 1059 | 267 | 25.2 |
| Private Obstetrician | 218 | 8 | 3.7 | 378 | 71 | 18.8 |
| General Practitioner | 0 | 0 | | 7 | 2 | 28.6 |
| National Women's | 269 | 21 | 7.8 | 548 | 187 | 34.1 |
| **Episiotomy total** | **1131** | **414** | **36.6** | **1992** | **245** | **12.3** |
| Self-employed midwife | 644 | 220 | 34.2 | 1059 | 118 | 11.1 |
| Private Obstetrician | 218 | 130 | 59.6 | 378 | 102 | 27.0 |
| General Practitioner | 0 | 0 | | 7 | 0 | |
| National Women's | 269 | 64 | 23.8 | 548 | 25 | 4.6 |
| **Third or fourth degree tear total** | **1131** | **55** | **4.9** | **1992** | **21** | **1.1** |
| Self-employed midwife | 644 | 41 | 6.4 | 1059 | 13 | 1.2 |
| Private Obstetrician | 218 | 2 | 0.9 | 378 | 3 | 0.8 |
| General Practitioner | 0 | 0 | | 7 | 0 | |
| National Women's | 269 | 12 | 4.5 | 548 | 5 | 0.9 |

**Table 137: Third stage management among vaginal births NWH 2017**

| | Physiological N=197 | | Active syntocinon N=2905 | | Active syntometrine N=861 | | Unknown* N=174 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Primary PPH (≥500mls)** | 23 | 11.7 | 704 | 24.2 | 230 | 26.7 | 52 | 29.9 |
| **Primary PPH (≥1000mls)** | 10 | 5.1 | 287 | 9.9 | 92 | 10.7 | 20 | 11.5 |
| **Postpartum blood transfusion** | 3 | 1.5 | 97 | 3.3 | 26 | 3.0 | 11 | 6.3 |

* includes Others (3) and N/A (1)

**Table 138: Third stage management by PPH risk among vaginal births NWH 2017**

| | Total | Physiological | | Active syntocinon | | Active syntometrine | | Unknown* | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **TOTAL** | **4137** | **197** | **4.8** | **2905** | **70.2** | **861** | **20.8** | **174** | **4.2** |
| **Spontaneous vaginal birth** | 3158 | 191 | 6.0 | 2148 | 68.0 | 685 | 21.7 | 134 | 4.2 |
| **Operative vaginal birth** | 979 | 6 | 0.6 | 757 | 77.3 | 176 | 18.0 | 40 | 4.1 |
| **BMI** | | | | | | | | | |
| <18.5 | 185 | 8 | 4.3 | 133 | 71.9 | 35 | 18.9 | 9 | 4.9 |
| 18.5-24.99 | 2329 | 140 | 6.0 | 1620 | 69.6 | 482 | 20.7 | 87 | 3.7 |
| 25-29.99 | 851 | 26 | 3.1 | 623 | 73.2 | 165 | 19.4 | 37 | 4.3 |
| 30-34.99 | 404 | 11 | 2.7 | 278 | 68.8 | 94 | 23.3 | 21 | 5.2 |
| 35-39.99 | 197 | 6 | 3.0 | 136 | 69.0 | 47 | 23.9 | 8 | 4.1 |
| ≥40 | 110 | 0 | 0.0 | 72 | 65.5 | 30 | 27.3 | 8 | 7.3 |
| Missing | 61 | 6 | 9.8 | 43 | 70.5 | 8 | 13.1 | 4 | 6.6 |
| **Previous CS** | 226 | 7 | 3.1 | 166 | 73.5 | 49 | 21.7 | 4 | 1.8 |
| **Hypertension** | | | | | | | | | |
| No hypertension | 3906 | 192 | 4.9 | 2701 | 69.2 | 846 | 21.7 | 167 | 4.3 |
| Gestational Hypertension | 92 | 0 | | 86 | 93.5 | 4 | 4.3 | 2 | 2.2 |
| Chronic hypertension | 67 | 3 | 4.5 | 51 | 76.1 | 11 | 16.4 | 2 | 3.0 |
| Superimposed | 5 | 0 | | 5 | 100.0 | 0 | | 0 | |
| Preeclampsia | 67 | 2 | 3.0 | 62 | 92.5 | 0 | | 3 | 4.5 |
| **Singleton** | 4094 | 195 | 4.8 | 2880 | 70.3 | 846 | 20.7 | 173 | 4.2 |
| **Multiple** | 43 | 2 | 4.7 | 25 | 58.1 | 15 | 34.9 | 1 | 2.3 |

* includes Others (3) and N/A (1)

## 7.5 Data tables: Postpartum haemorrhage

**Table 139: Postpartum haemorrhage rate NWH 2005-2017**

| | 2005* | 2006* | 2007* | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Births** | 7194 | 7212 | 7695 | 7589 | 7735 | 7709 | 7523 | 7695 | 7223 | 7400 | 6933 | 7241 | 6846 |
| **Primary PPH (≥500mls)** | 2139 | 2302 | 2507 | 2736 | 2850 | 2753 | 2674 | 2587 | 2563 | 2628 | 2433 | 2414 | 2525 |
| **Incidence %** | 29.7 | 31.9 | 32.6 | 36.1 | 36.9 | 35.7 | 35.5 | 33.6 | 35.5 | 35.5 | 35.1 | 33.3 | 36.9 |
| **Primary PPH (≥1000mls)** | 350 | 351 | 410 | 634 | 651 | 695 | 659 | 662 | 701 | 746 | 713 | 706 | 750 |
| **Incidence %** | 4.9 | 4.9 | 5.3 | 8.4 | 8.4 | 9.0 | 8.8 | 8.6 | 9.7 | 10.1 | 10.3 | 9.8 | 11.0 |

*Data corrected in 2005-2007. See methodology above.

**Table 140: Postpartum blood loss by mode of birth NWH 2017**

| | Spontaneous vaginal birth n=3158 | | Operative vaginal birth n=979 | | CS emergency n=1378 | | CS elective n=1331 | | Total n=6846 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **PPH≥500mls** | 662 | 21.0 | 347 | 35.4 | 919 | 66.7 | 597 | 44.9 | 2525 | 36.9 |
| **PPH≥1000mls** | 271 | 8.6 | 138 | 14.1 | 255 | 18.5 | 86 | 6.5 | 750 | 11.0 |
| **PPH≥1500mls** | 134 | 4.2 | 62 | 6.3 | 82 | 6.0 | 26 | 2.0 | 304 | 4.4 |
| **Postpartum transfusion** | 84 | 2.7 | 53 | 5.4 | 57 | 4.1 | 17 | 1.3 | 211 | 3.1 |

**Table 141: Postpartum blood loss by onset of birth NWH 2017**

| | Spontaneous labour n=2924 | | Induced labour n=2312 | | CS emergency before onset of labour n=278 | | CS elective n=1332 | | Total N=6846 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **PPH≥500mls** | 858 | 29.3 | 917 | 39.7 | 153 | 55.0 | 597 | 44.8 | 2525 | 36.9 |
| **PPH≥1000mls** | 323 | 11.0 | 299 | 12.9 | 42 | 15.1 | 86 | 6.5 | 750 | 11.0 |
| **PPH≥1500mls** | 135 | 4.6 | 129 | 5.6 | 14 | 5.0 | 26 | 2.0 | 304 | 4.4 |
| **Postpartum transfusion** | 102 | 3.5 | 78 | 3.4 | 14 | 5.0 | 17 | 1.3 | 211 | 3.1 |

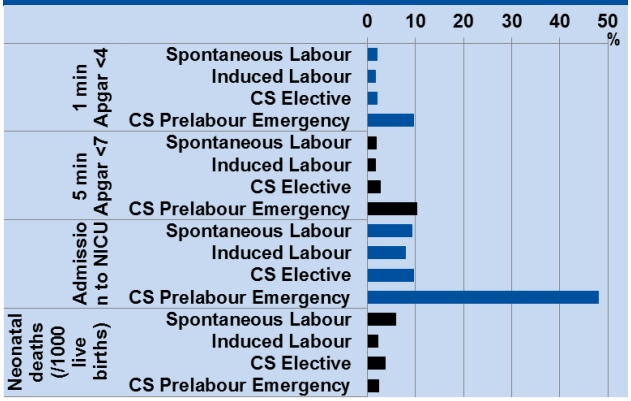
**Table 142: Blood transfusion NWH 2000-2017**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Antenatal** | 10 | 12 | 11 | 6 | 6 | 18 | 13 | 5 | 4 | 7 | 4 | 6 | 3 |
| **Antenatal & intrapartum** | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| **Antenatal & postpartum** | 0 | 3 | 0 | 0 | 2 | 2 | 0 | 1 | 2 | 1 | 0 | 1 | 0 |
| **Intrapartum** | 2 | 2 | 6 | 1 | 4 | 3 | 3 | 1 | 6 | 2 | 7 | 3 | 0 |
| **Intrapartum & postpartum** | 4 | 3 | 3 | 4 | 1 | 2 | 1 | 1 | 2 | 1 | 3 | 1 | 0 |
| **Postpartum** | 128 | 133 | 150 | 165 | 212 | 228 | 193 | 180 | 192 | 170 | 168 | 105 | 211 |
| **Total transfusions** | 145 | 153 | 170 | 177 | 225 | 253 | 210 | 189 | 207 | 181 | 182 | 116 | 214 |
| **Total transfusion rate** | 1.9 | 2.1 | 2.4 | 2.3 | 3.0 | 3.3 | 2.8 | 2.5 | 2.9 | 2.5 | 2.6 | 1.6 | 3.1 |

## 7.6 Neonatal Outcomes

### Findings

**Figure 133: Neonatal morbidity among live births by mode of onset of birth (all gestations) NWH 2017**

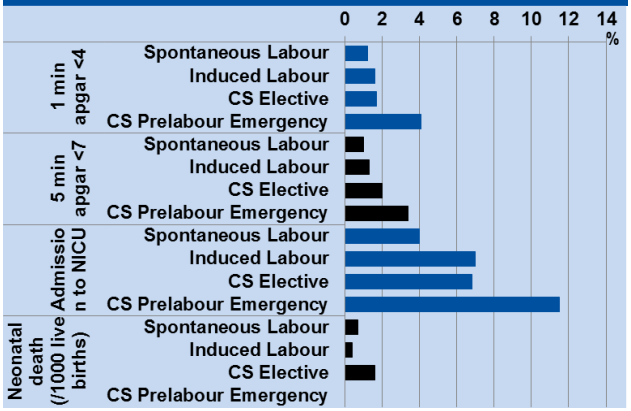



Birth by prelabour emergency Caesarean section is associated with increased risk of adverse neonatal outcome overall and at term (**Figure 133** and **Figure 134**). The increase in risk is related to the indication for prelabour emergency Caesarean section.

Note that days of admission to NICU are based on data collected in the NICU database and record stays crossing midnight. For example, one day admission to NICU means a baby staying past midnight on one night.

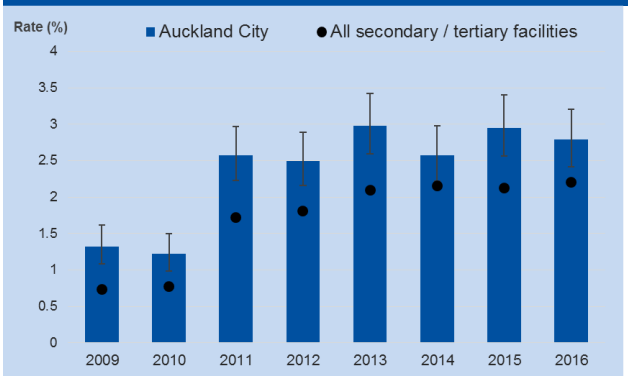
### 7.6.1 Neonatal outcomes among term babies

**Figure 134: Neonatal morbidity among live births at term (≥37 weeks) by mode of onset of birth NWH 2017**




Admissions of term infants to NICU increased from 2006 to 2011, but have been stable since 2011. This same pattern is evident in **Figure 140** which compares term admission to NICU with more than 4 hours respiratory support for our unit compared to all secondary and tertiary facilities in NZ. Rates have been fairly consistent for the years 2011 to 2016.

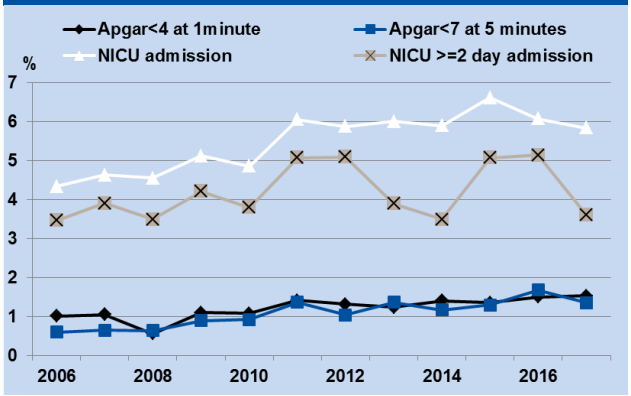
**Figure 135: NZ Maternity Indicators 2016: Babies born at term requiring >4 hours respiratory support NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for the facility rate.

Admission to NICU at term occurs at similar rates where the LMC is a self-employed midwife, an LMC obstetrician or the NWH Community Clinic, and not surprisingly higher where the LMC is a high risk service (including unbooked women, transfers from other DHBs for tertiary care, Maternal and Fetal Medicine and Diabetes clinics). The increase in NICU admission has been observed across all LMC groups **Figure 137**.

**Figure 136: NICU admission and low Apgar scores among live births at term NWH 2006-2017**




Babies born early term (37-38 weeks' gestational age) by elective caesarean section are at increased risk of respiratory distress, NICU admission and prolonged hospitalisation (>5 days) than babies born at term (39-41 weeks' gestational age). Early term babies are more likely to require respiratory support, including mechanical ventilation, and more likely to develop hypoglycaemia than babies born at term. Early term birth is also associated with a higher risk of cerebral palsy, having special educational needs and infant mortality. Elective caesarean sections should be scheduled for ≥ 39 weeks' gestational age unless there is a medical indication to deliver earlier.

In 2018 the service has increased efforts to prevent elective CS at less than 39 weeks when not indicated for mother or baby clinical reason.

Over the time period 2006-2017 there has been a statistically significant increase in the proportion of babies with low Apgar scores at one and 5 minutes (chi square test for trend, $p<0.001$) however the clinical significance of these findings is uncertain **Figure 138**.

The highest proportion of babies with low Apgar scores is among high risk pregnancies under NWH team care, as might be expected. Babies under LMC obstetrician care have relatively lower rates of low Apgar scores compared to the other providers of care to lower risk women. This is at odds with the similar rates of NICU admission between these groups. This may be explained by the considerably higher rate of Caesarean section among private obstetrician patients as Caesarean section is associated with higher rates of NICU admission.

**Figure 137: Admission to NICU among live births at term by LMC NWH 2006-2017**

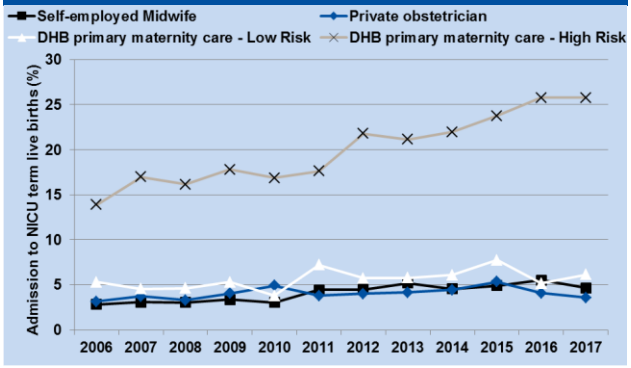



**Figure 138: Apgar <7 at 5 minutes among live births at term by LMC NWH 2006-2017**

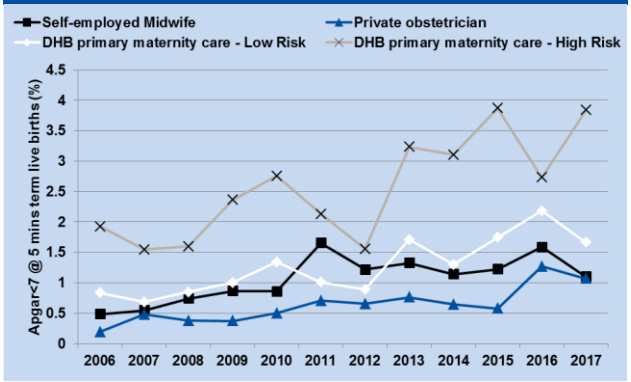
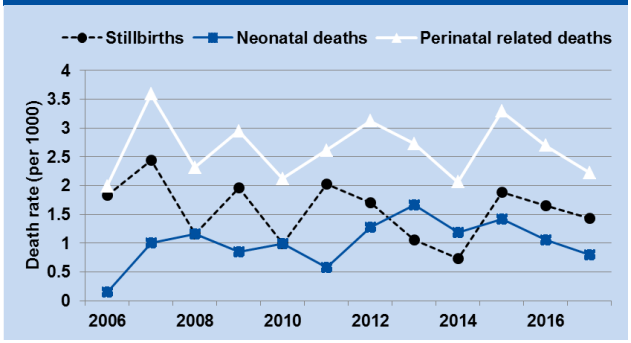


**Figure 139: Stillbirth and neonatal death rates at term NWH 2006-2017**



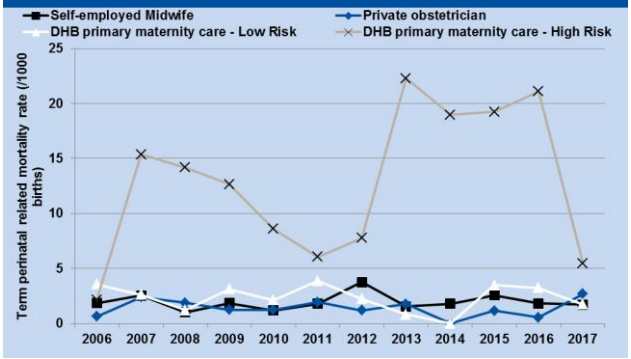

Stillbirths and perinatal related deaths are calculated per 1000 births, neonatal deaths per 1000 live births.

There has been no significant change in perinatal related mortality rate at term between 2006 and 2017.

Proportionately more perinatal related deaths at term are contributed by high risk pregnancies under the care of NWH (rate 13.4/1000 births from 2006-2017) but numbers vary greatly by year.

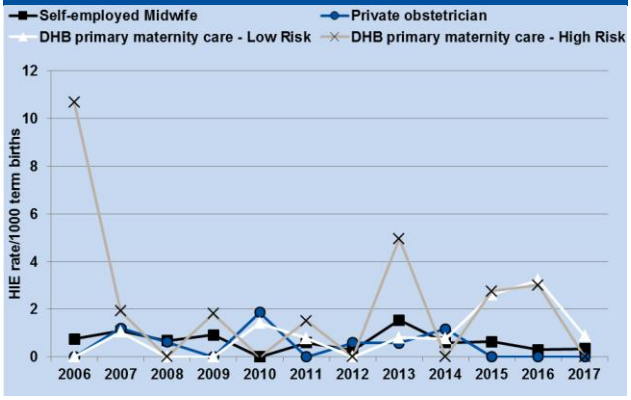
If all years 2006-2017 are considered together, the perinatal related mortality rate at term among pregnancies cared for by private obstetricians (1.39/1000 births) was significantly lower than pregnancies cared for by the NW Community service (2.36/1000 births) (p=0.03) but not from pregnancies cared for by self-employed midwifery LMCs (1.96/1000 births) (p=0.12) (**Figure 140**). There was no difference between NW low risk maternity services and self-employed midwifery LMCs (p=0.35). These are unadjusted data and so do not account for the obvious differences in sociodemographic and clinical risk between caregivers (**Chapter 3**).

**Figure 140: Perinatal related mortality rate at term (per 1000 term births) by LMC NWH 2006-2017**




The hypoxic ischaemic encephalopathy rate per 1000 term births at NWH for 2006-2017 was 0.76 (95%CI 0.58-0.98). This rate is significantly lower than the national rate (1.21/1000 term births 2010-2016 (PMMRC 2018)).

**Figure 141: HIE rate (per 1000 term births) by LMC NWH 2006-2017**




The HIE rate for the years 2006-2017 was 0.50/1000 term births for pregnancies under obstetrician LMC care, 0.64/1000 under self-employed midwifery care, 0.88/1000 under NW Community care, and 1.42/1000 (excluding the outlying rate in 2006) among high risk pregnancies under the care of NWH (includes MFM, diabetes clinic LMC care, Other DHB transfers and unbooked mothers) (**Figure 141**). The rate for high risk care at NWH is significantly higher than that for women under obstetrician LMC care (p=0.03) and self-employed midwifery care (p=0.05) but not for NW Community care (p=0.29).

## 7.7 Data tables: Neonatal outcomes

**Table 143: Neonatal morbidity and mortality among live births by mode of birth (all gestations) NWH 2017**

| | Spontaneous vertex n=3125 | | Vaginal breech n=28 | | Forceps birth n=329 | | Ventouse birth n=654 | | CS elective n=1376 | | CS emergency n=1410 | | Total N=6922 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 1 min Apgar <4 | 27 | 0.9 | 11 | 39.3 | 6 | 1.8 | 13 | 2.0 | 27 | 2.0 | 71 | 5.0 | 155 | 2.2 |
| 1 min Apgar <7 | 156 | 5.0 | 19 | 67.9 | 35 | 10.6 | 76 | 11.6 | 113 | 8.2 | 229 | 16.2 | 628 | 9.1 |
| 5 min Apgar <7 | 30 | 1.0 | 13 | 46.4 | 5 | 1.5 | 5 | 0.8 | 37 | 2.7 | 71 | 5.0 | 161 | 2.3 |
| Admitted to NICU | 236 | 7.6 | 15 | 53.6 | 41 | 12.5 | 50 | 7.6 | 131 | 9.5 | 252 | 17.9 | 725 | 10.5 |
| ≥2 days in NICU | 195 | 6.2 | 14 | 50.0 | 33 | 10.0 | 30 | 4.6 | 83 | 6.0 | 211 | 15.0 | 566 | 8.2 |
| Neonatal deaths (/1000 live births) | 10 | 3.2 | 10 | 35.7 | 0 | | 0 | | 5 | 3.6 | 9 | 6.4 | 34 | 4.9 |

**Table 144: Neonatal morbidity among live births by mode of onset of birth (all gestations) NWH 2017**

| | Spontaneous labour n=2940 | | Induced labour n=2314 | | CS elective n=1375 | | CS emergency before onset of labour n=293 | | Total N=6922 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| 1 min Apgar <4 | 60 | 2.0 | 40 | 1.7 | 27 | 2.0 | 28 | 9.6 | 155 | 2.2 |
| 1 min Apgar <7 | 222 | 7.6 | 201 | 8.7 | 113 | 8.2 | 92 | 31.4 | 628 | 9.1 |
| 5 min Apgar <7 | 57 | 1.9 | 37 | 1.6 | 37 | 2.7 | 30 | 10.2 | 161 | 2.3 |
| Admitted to NICU | 272 | 9.3 | 182 | 7.9 | 130 | 9.5 | 141 | 48.1 | 725 | 10.5 |
| ≥2 days in NICU | 224 | 7.6 | 126 | 5.4 | 82 | 6.0 | 134 | 45.7 | 566 | 8.2 |
| Neonatal deaths (/1000 live births) | 17 | 5.8 | 5 | 2.2 | 5 | 3.6 | 7 | 2.4 | 34 | 4.9 |

**Table 145: Neonatal morbidity by mode of birth in live born term or post term (≥37 weeks) babies NWH 2017**

| | Spontaneous vertex n=2922 | | Vaginal breech n=5 | | Forceps birth n=304 | | Ventouse birth n=625 | | CS elective n=1271 | | CS emergency n=1206 | | Total N=6333 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 1 min Apgar <4 | 16 | 0.5 | 0 | | 5 | 1.6 | 12 | 1.9 | 21 | 1.7 | 42 | 3.5 | 96 | 1.5 |
| 1 min Apgar <7 | 109 | 3.7 | 1 | 20.0 | 30 | 9.9 | 70 | 11.2 | 77 | 6.1 | 140 | 11.6 | 427 | 6.7 |
| 5 min Apgar <7 | 14 | 0.5 | 0 | | 5 | 1.6 | 3 | 0.5 | 25 | 2.0 | 38 | 3.2 | 85 | 1.3 |
| Admitted to NICU | 127 | 4.3 | 0 | | 22 | 7.2 | 44 | 7.0 | 87 | 6.8 | 87 | 7.2 | 367 | 5.8 |
| ≥2 days in NICU | 90 | 3.1 | 0 | | 14 | 4.6 | 24 | 3.8 | 47 | 3.7 | 52 | 4.3 | 227 | 3.6 |
| Neonatal deaths (/1000 live births) | 2 | 0.7 | 0 | | 0 | | 0 | | 2 | 1.6 | 1 | 0.8 | 5 | 0.8 |

**Table 146: Neonatal morbidity by onset of birth in term or post term live born (≥37 weeks) babies NWH 2017**

| | Spontaneous labour n=2671 | | Induced labour n=2243 | | CS elective n=1271 | | CS emergency before onset of labour n=148 | | Total N=6333 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| 1 min Apgar <4 | 33 | 1.2 | 36 | 1.6 | 21 | 1.7 | 6 | 4.1 | 96 | 1.5 |
| 1 min Apgar <7 | 147 | 5.5 | 181 | 8.1 | 77 | 6.1 | 22 | 14.9 | 427 | 6.7 |
| 5 min Apgar <7 | 26 | 1.0 | 29 | 1.3 | 25 | 2.0 | 5 | 3.4 | 85 | 1.3 |
| Admitted to NICU | 107 | 4.0 | 156 | 7.0 | 87 | 6.8 | 17 | 11.5 | 367 | 5.8 |
| ≥2 days in NICU | 65 | 2.4 | 102 | 4.5 | 47 | 3.7 | 13 | 8.8 | 227 | 3.6 |
| Neonatal deaths (/1000 live births) | 2 | 0.7 | 1 | 0.4 | 2 | 1.6 | 0 | | 5 | 0.8 |

**Table 147: Neonatal morbidity in term or post term live born (≥ 37 weeks) babies NWH 2009-2017**

| | 2009 N=7113 | | 2010 N=7065 | | 2011 N=6889 | | 2012 N=7030 | | 2013 N=6596 | | 2014 N=6786 | | 2015 N=6371 | | 2016 N=6677 | | 2017 N=6333 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **1 min Apgar <4** | 78 | 1.1 | 76 | 1.1 | 97 | 1.4 | 92 | 1.3 | 81 | 1.2 | 95 | 1.4 | 86 | 1.3 | 100 | 1.5 | 96 | 1.5 |
| **5 min Apgar <7** | 63 | 0.9 | 65 | 0.9 | 94 | 1.4 | 73 | 1.0 | 90 | 1.4 | 79 | 1.2 | 82 | 1.3 | 112 | 1.7 | 85 | 1.3 |
| **Admitted to NICU** | 364 | 5.1 | 343 | 4.9 | 417 | 6.1 | 413 | 5.9 | 396 | 6.0 | 400 | 5.9 | 421 | 6.6 | 405 | 6.1 | 367 | 5.8 |
| **≥2 days in NICU** | 299 | 4.2 | 268 | 3.8 | 349 | 5.1 | 358 | 5.1 | 257 | 3.9 | 237 | 3.5 | 323 | 5.1 | 343 | 5.1 | 227 | 3.6 |
| **Neonatal deaths (/1000 live births)** | 6 | 1 | 7 | 1 | 4 | 1 | 9 | 1 | 11 | 2 | 8 | 1 | 9 | 1.4 | 7 | 1.0 | 5 | 0.8 |

**Table 148: Neonatal outcomes among term births by LMC 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | n | n | n | n | n | n | n | n | n | n |
| **Private Obstetrician** | | | | | | | | | | | |
| Term births (total) | 1667 | 1604 | 1609 | 1606 | 1562 | 1677 | 1707 | 1708 | 1742 | 1812 | 1872 |
| Stillbirth | 4 | 3 | 2 | 0 | 2 | 1 | 2 | 0 | 2 | 1 | 3 |
| Neonatal Death | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 2 |
| Apgar<7 at 5 minutes | 8 | 6 | 6 | 8 | 11 | 11 | 13 | 11 | 10 | 23 | 20 |
| NICU admission | 62 | 53 | 65 | 79 | 59 | 67 | 71 | 76 | 93 | 74 | 66 |
| ≥2 days in NICU | 53 | 36 | 51 | 52 | 48 | 56 | 39 | 38 | 82 | 60 | 32 |
| Hypoxic ischaemic encephalopathy | 2 | 1 | 0 | 3 | 0 | 1 | 1 | 2 | 0 | 0 | 0 |
| **SEMW** | | | | | | | | | | | |
| Term births (total) | 2743 | 2968 | 3255 | 3376 | 3335 | 3460 | 3246 | 3332 | 3115 | 3286 | 2911 |
| Stillbirth | 6 | 3 | 5 | 4 | 6 | 9 | 3 | 3 | 7 | 5 | 4 |
| Termination of Pregnancy | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Neonatal Death | 1 | 0 | 1 | 0 | 0 | 4 | 2 | 3 | 1 | 1 | 1 |
| Apgar<7 at 5 minutes | 15 | 22 | 28 | 28 | 55 | 42 | 43 | 38 | 38 | 52 | 32 |
| NICU admission | 84 | 90 | 110 | 103 | 148 | 155 | 168 | 151 | 153 | 181 | 134 |
| ≥2 days in NICU | 69 | 63 | 90 | 84 | 124 | 139 | 113 | 90 | 133 | 153 | 77 |
| Hypoxic ischaemic encephalopathy | 3 | 2 | 3 | 0 | 2 | 1 | 5 | 2 | 2 | 1 | 1 |
| **NW Community** | | | | | | | | | | | |
| Term births (total) | 1909 | 1652 | 1602 | 1420 | 1295 | 1347 | 1230 | 1310 | 1148 | 1240 | 1144 |
| Stillbirth | 4 | 2 | 5 | 3 | 4 | 1 | 0 | 0 | 1 | 3 | 1 |
| Neonatal Death | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 3 | 1 | 1 |
| Apgar<7 at 5 minutes | 13 | 14 | 16 | 19 | 13 | 12 | 21 | 17 | 20 | 27 | 19 |
| NICU admission | 87 | 76 | 85 | 54 | 93 | 77 | 71 | 80 | 89 | 64 | 70 |
| ≥2 days in NICU | 73 | 61 | 68 | 45 | 77 | 67 | 44 | 46 | 78 | 51 | 46 |
| Hypoxic ischaemic encephalopathy | 2 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 3 | 4 | 1 |
| **DHB primary maternity care - High Risk** | | | | | | | | | | | |
| Term births (total) | 521 | 564 | 553 | 581 | 660 | 515 | 404 | 422 | 364 | 332 | 366 |
| Stillbirth | 3 | 0 | 1 | 0 | 2 | 1 | 2 | 3 | 2 | 2 | 1 |
| Termination of Pregnancy | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Neonatal Death | 5 | 8 | 5 | 5 | 2 | 3 | 7 | 5 | 5 | 5 | 1 |
| Apgar<7 at 5 minutes | 8 | 9 | 13 | 16 | 14 | 8 | 13 | 13 | 14 | 9 | 14 |
| NICU admission | 88 | 91 | 98 | 98 | 116 | 112 | 85 | 92 | 86 | 85 | 91 |
| ≥2 days in NICU | 75 | 79 | 86 | 85 | 99 | 94 | 60 | 62 | 77 | 78 | 69 |
| Hypoxic ischaemic encephalopathy | 1 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 0 |




# CHAPTER 8

# POSTNATAL CARE

This chapter provides information on infant feeding and postnatal admissions. Some tables pertaining to this chapter can be found in the text and the remainder at the end of the chapter.

## 8.1. Infant feeding

The feeding status of infants born at NWH is collected at the time of discharge from the hospital. For some, this is in the immediate postpartum period, leaving from Labour and Birthing Suite, and for others it follows a postnatal stay. Babies admitted to the Neonatal Intensive Care Unit are excluded from the data presented here. Infant feeding data for NICU babies can be found in **Chapter 9**.

Data are also collected at the time of postnatal discharge (approximately 4-6 weeks post birth) for those women and babies who have midwifery homecare provided by the NWH Community Team or MFM Diabetes Midwifery Teams.

### Definitions

**Exclusive breastfeeding**: The infant has never, to the mother's knowledge, had any water, formula or other liquid or solid food. Only breast milk, from the breast or expressed, and prescribed (as per Medicines Act 1981) medicines have been given from birth.

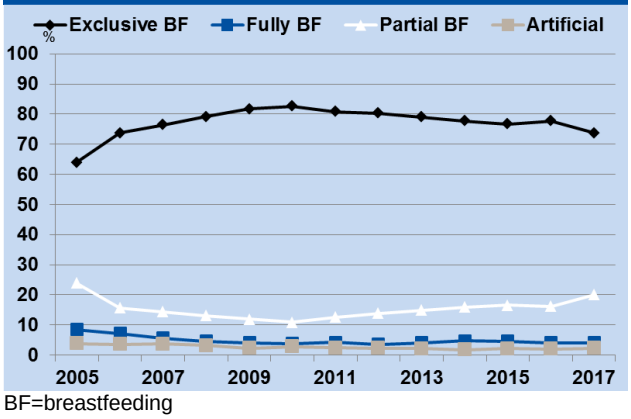
**Fully breastfeeding**: The infant has taken breast milk only, no other liquids or solids except a minimal amount of water or prescribed medicines, in the past 48 hours.

**Partial breastfeeding**: The infant has taken some breast milk and some infant formula or other solid food in the past 48 hours.

**Artificial feeding**: The infant has had no breast milk but has had alternative liquid such as infant formula with or without solid food in the past 48 hours.

### Findings

**Figure 142: Method of infant feeding at discharge from NWH 2005-2017**




BF=breastfeeding

In 2017, the exclusive breastfeeding rate on discharge from hospital following birth was 73.8%, below the NZ Breastfeeding Authority (NZBFA) target of 75%. With consistent effort from all staff the exclusive rate rose to over 75 % for the second half of 2017. It is of note that this rate includes babies of diabetic mothers, preterm and/or low birth weight babies (<2500g) who do not go to NICU and babies of mothers with medical complications. It is important to interpret the exclusive breastfeeding rate with regard to the complexity of the cohort of women birthing at NWH.

**Figure 143: Exclusive breastfeeding at discharge from NWH by mode of birth 2005-2017**

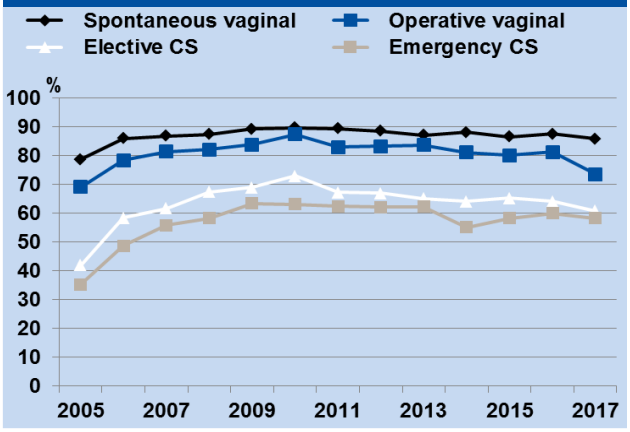
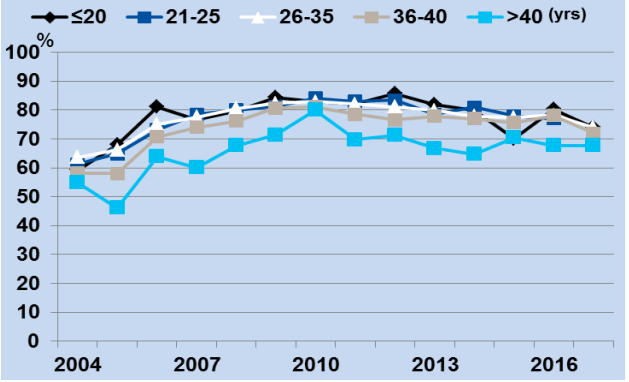
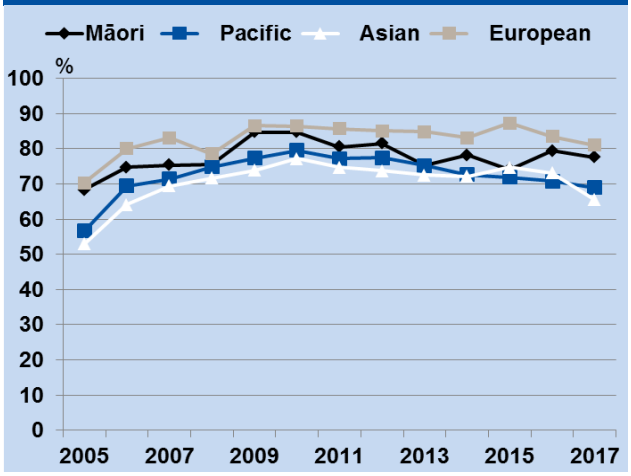



**Figure 144: Exclusive breastfeeding rates at discharge from NWH by maternal age 2004-2017**



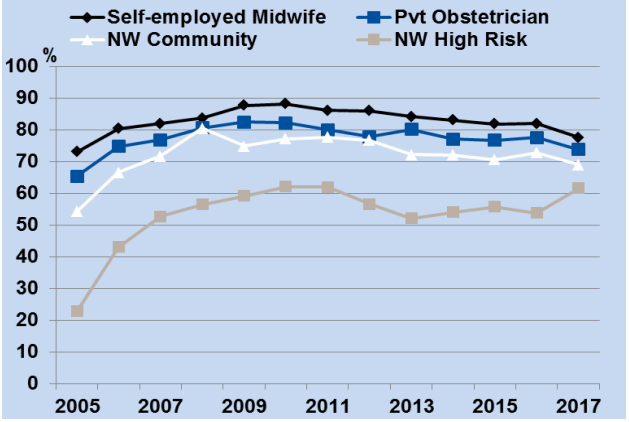

The service remains committed to maintaining its Baby Friendly Hospital Accreditation (BFHI) status and is currently working towards our fourth assessment in 2018. BFHI is implemented by ensuring we adhere to the WHO CODE and the 10 steps to successful breastfeeding are implemented. Education for all staff on how to protect and support breastfeeding and ongoing BFHI education annually for all staff is required to maintain our BFHI accreditation. The maternity service has an annual lactation plan, led by the lactation consultants, who also provide expert lactation support for women experiencing complex breastfeeding problems both in hospital and in the community.

**Figure 145: Exclusive breastfeeding rates at discharge from NWH by ethnicity 2005-2017**




Exclusive breastfeeding rates vary by ethnic grouping, at 78% for Māori mothers, 69% for Pacific mothers, 66% for Asian mothers and 81% for European mothers in 2017.

**Figure 146: Exclusive breastfeeding rate at discharge from NWH by LMC at birth 2005-2017**




The rates for exclusive breastfeeding vary by LMC groups. High risk women often have their babies early and have medical complications which can impact on the initiation and duration of exclusive breastfeeding. However, the greatest improvement in breast feeding rates over time has been in this group.

**Figure 147** demonstrates the extent to which the combined fully and exclusive breastfeeding rate for women who are cared for by NW community, diabetes and fetal medicine midwives changes by the time of Homecare discharge at 4-6 weeks. A reduction in breastfeeding by 6 weeks postnatally is a trend that is occurring nationwide and the MOH has made this a reportable target for DHBs. The figure includes only women under the care of NWH LMC midwives and only women with data at both time points. These are the only breastfeeding data available to us after discharge from hospital. The overall rate of exclusive/fully breastfeeding at discharge from NWH Homecare was 60%.

**Figure 147: Breastfeeding rates (exclusive and fully breastfeeding) at hospital discharge and at discharge from NWH Homecare (4-6 weeks) (n=845) 2017**

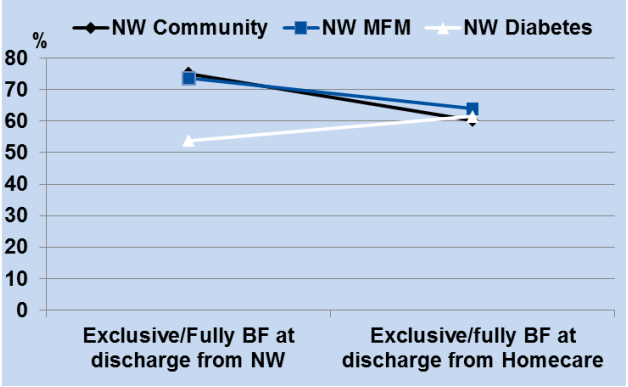



**Figure 147** shows an increase in the exclusive and fully breastfeeding rate among women who are cared for by the diabetic team.

The numbers are small (n=26) and the increase is a result of babies of diabetic mums who were partially fed when they left hospital becoming fully breastfed at 6 weeks.

There has been a reduction in the number of women for whom NW provides postnatal homecare from 1038 in 2016 to 845 in 2017. This was due to vacancies in the community team and therefore self-employed midwives were asked to provide the postnatal care.

## Summary

Maintaining a higher exclusive breastfeeding rate in line with WHO recommendations is multifactorial and needs sufficient resources and support both within the hospital and in the community. It is important that women have the support of their midwife, their family/whānau and if they are having breastfeeding difficulties they are able to get the expert help of a Lactation Consultant (International Board Certified Lactation Consultant (IBCLC)) i.e. the right breastfeeding support at the right time to assist them to overcome any breastfeeding challenges.

The lactation team and the community midwives are educating women antenatally about the importance of exclusive breastfeeding and the benefits for themselves and their infants with new technology such as social media, breastfeeding apps and YouTube videos. We need to continue to strive to find the best ways to educate and engage with women and family/whānau as we have a diverse multicultural community.

## 8.2. Data tables: Infant feeding

**Table 149: Infant feeding on discharge from NWH by mode of birth, LMC and maternal age NWH 2017**

| | Total | Exclusive BF | | Fully BF | | Partial BF | | Artificial | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Total** | **6179** | **4559** | **73.8** | **248** | **4.0** | **1234** | **20.0** | **138** | **2.2** |
| **Maternal age (years)** | | | | | | | | | |
| ≤ 20 | 127 | 94 | 74.0 | 3 | 2.4 | 22 | 17.3 | 8 | 5.8 |
| 21-25 | 552 | 436 | 79.0 | 22 | 4.0 | 78 | 14.1 | 16 | 2.2 |
| 26-30 | 1502 | 1082 | 72.0 | 72 | 4.8 | 312 | 20.8 | 36 | 1.8 |
| 31-35 | 2453 | 1846 | 75.3 | 88 | 3.6 | 481 | 19.6 | 38 | 1.7 |
| 36-40 | 1282 | 923 | 72.0 | 53 | 4.1 | 279 | 21.8 | 27 | 3.1 |
| >40 | 263 | 178 | 67.7 | 10 | 3.8 | 62 | 23.6 | 13 | 4.9 |
| **Ethnicity** | | | | | | | | | |
| Māori | 352 | 273 | 77.6 | 15 | 4.3 | 50 | 14.2 | 14 | 4.0 |
| Pacific | 652 | 450 | 69.0 | 30 | 4.6 | 136 | 20.9 | 36 | 5.5 |
| Other Asian | 1629 | 1064 | 65.3 | 61 | 3.7 | 472 | 29.0 | 32 | 2.0 |
| Indian | 630 | 416 | 66.0 | 28 | 4.4 | 176 | 27.9 | 10 | 1.6 |
| NZ European | 1885 | 1537 | 81.5 | 70 | 3.7 | 248 | 13.2 | 30 | 1.6 |
| Other European | 731 | 581 | 79.5 | 34 | 4.7 | 107 | 14.6 | 9 | 1.2 |
| MELAA | 300 | 238 | 79.3 | 10 | 3.3 | 45 | 15.0 | 7 | 2.3 |
| **Deprivation Quintile (NZ Dep 2013)** | | | | | | | | | |
| 1 | 1027 | 783 | 76.2 | 31 | 3.0 | 198 | 19.3 | 15 | 1.5 |
| 2 | 1187 | 868 | 73.1 | 48 | 4.0 | 243 | 20.5 | 28 | 2.4 |
| 3 | 1242 | 949 | 76.4 | 40 | 3.2 | 239 | 19.2 | 14 | 1.1 |
| 4 | 1169 | 859 | 73.5 | 59 | 5.0 | 229 | 19.6 | 22 | 1.9 |
| 5 | 1182 | 837 | 70.8 | 49 | 4.1 | 243 | 20.6 | 53 | 4.5 |
| Missing | 372 | 263 | 70.7 | 21 | 5.6 | 82 | 22.0 | 6 | 1.6 |
| **Primipara** | | | | | | | | | |
| Standard | 1054 | 828 | 78.6 | 27 | 2.6 | 186 | 17.6 | 13 | 1.2 |
| Non standard | 1918 | 1257 | 65.5 | 119 | 6.2 | 505 | 26.3 | 37 | 1.9 |
| **Multipara** | 3207 | 2474 | 77.1 | 102 | 3.2 | 543 | 16.9 | 88 | 2.7 |
| **Mode of birth** | | | | | | | | | |
| Spontaneous vaginal | 2889 | 2475 | 85.7 | 79 | 2.7 | 272 | 9.4 | 63 | 2.2 |
| Operative vaginal | 892 | 656 | 73.5 | 39 | 4.4 | 181 | 20.3 | 16 | 1.8 |
| Elective CS | 1244 | 756 | 60.8 | 59 | 4.7 | 391 | 31.4 | 38 | 3.1 |
| Emergency CS | 1154 | 672 | 58.2 | 71 | 6.2 | 390 | 33.8 | 21 | 1.8 |
| **Gestation** | | | | | | | | | |
| < 37 weeks | 215 | 61 | 28.4 | 49 | 22.8 | 95 | 44.2 | 10 | 4.7 |
| ≥37 weeks | 5964 | 4498 | 75.4 | 199 | 3.3 | 1139 | 19.1 | 128 | 2.1 |
| **Birth weight** | | | | | | | | | |
| < 2.5 kgs | 209 | 64 | 30.6 | 48 | 23.0 | 92 | 44.0 | 5 | 2.4 |
| 2.5 - 2.9 kgs | 1078 | 737 | 68.4 | 54 | 5.0 | 266 | 24.7 | 21 | 1.9 |
| 3.0 - 4.4 kgs | 4812 | 3705 | 77.0 | 143 | 3.0 | 855 | 17.8 | 109 | 2.3 |
| ≥4.5 kgs | 80 | 53 | 66.3 | 3 | 3.8 | 21 | 26.3 | 3 | 3.8 |
| **LMC at birth** | | | | | | | | | |
| Self-employed Midwife | 2853 | 2211 | 77.5 | 107 | 3.8 | 505 | 17.7 | 30 | 1.1 |
| Private Obstetrician | 1904 | 1403 | 73.7 | 66 | 3.5 | 393 | 20.6 | 42 | 2.2 |
| GP | 10 | 6 | 60.0 | 0 | | 3 | 30.0 | 1 | 10.0 |
| NWH Community | 1121 | 774 | 69.0 | 52 | 4.6 | 255 | 22.7 | 40 | 3.6 |
| NWH MFM | 151 | 93 | 61.6 | 12 | 7.9 | 37 | 24.5 | 9 | 6.0 |
| NWH Diabetes | 108 | 50 | 46.3 | 11 | 10.2 | 37 | 34.3 | 10 | 9.3 |
| Unbooked | 29 | 19 | 65.5 | 0 | | 4 | 13.8 | 6 | 20.7 |
| Other DHB | 3 | 3 | 100.0 | 0 | | 0 | | 0 | |

BF=breastfeeding

**Table 150: Method of Infant feeding at discharge from NWH 2012-2017**

| | 2012 N= 6862 | | 2013 N=6452 | | 2014 N=6656 | | 2015 N=6171 | | 2016* N=6488 | | 2017 N=6179 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Exclusive breastfeeding** | 5508 | 80.3 | 5094 | 79.0 | 5175 | 77.7 | 4737 | 76.7 | 5046 | 77.8 | 4559 | 73.8 |
| **Fully breastfeeding** | 243 | 3.5 | 256 | 4.0 | 312 | 4.7 | 278 | 4.5 | 269 | 4.1 | 248 | 4.0 |
| **Partial breastfeeding** | 957 | 13.9 | 963 | 14.9 | 1056 | 15.9 | 1026 | 16.6 | 1042 | 16.1 | 1234 | 20.0 |
| **Artificial feeding** | 154 | 2.2 | 138 | 2.1 | 113 | 1.7 | 130 | 2.1 | 129 | 2.0 | 138 | 2.2 |

*2 Infants were missing breastfeeding method at discharge in 2016

**Table 151: Infant feeding on discharge from NWH Homecare 2017**

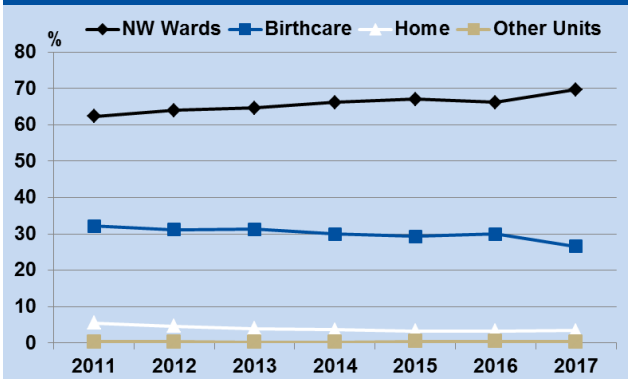
| | Total | Exclusive BF | | Fully BF | | Partial BF | | Artificial | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Community** | **747** | 377 | 50.5 | 72 | 9.6 | 220 | 29.5 | 78 | 10.4 |
| **Medical** | **72** | 39 | 54.2 | 7 | 9.7 | 19 | 26.4 | 7 | 9.7 |
| **Diabetes** | **26** | 12 | 46.2 | 4 | 15.4 | 10 | 38.5 | 0 | |

## 8.3. Postnatal admissions

Primary postnatal care is provided at Birthcare Auckland. Where clinically indicated, women receive postnatal care at National Women's in either a secondary or tertiary postnatal unit.

### Findings

**Figure 148: Maternal destination immediately after birth NWH 2012-2017**




Over the past years there has been a reduction in the number of women who have gone directly to Birthcare from Labour and Birthing suite (**Figure 148**). The corresponding increase in CS rate may have been a contributing factor to this reduction (**Figure 149**).

As expected, mothers are admitted initially to the NWH wards after Caesarean Section. Almost half of the women having a vaginal birth are admitted directly to Birthcare Auckland for postnatal care.

Māori, Pacific and Indian women remain underrepresented among women transferring to Birthcare immediately postpartum. Further work is required to understand the reasons for this.

**Figure 149: Maternal destination immediately after birth by mode of birth NWH 2017**

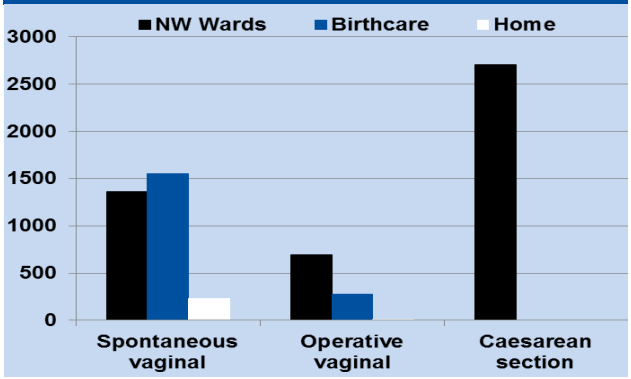
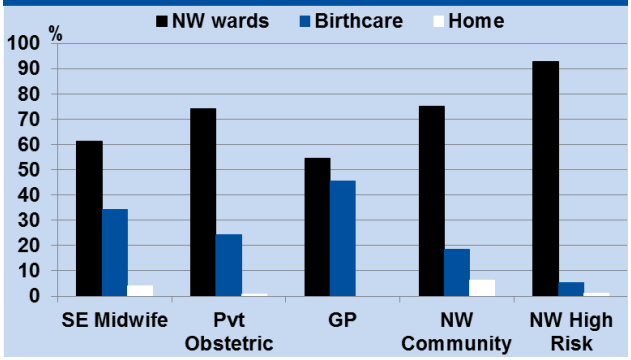



**Figure 150: Postnatal destination immediately after birth by LMC at birth NWH 2017**




### 8.3.1. Admission to NWH postnatal ward among women having a spontaneous vaginal birth

The arrangement with Birthcare Auckland is for the provision of postnatal primary care to well women and their babies. Women who have had spontaneous vaginal births but whose babies require neonatal care or paediatric review are

admitted to National Women's postnatal wards to remain close to their baby.

**Figure 151: Postnatal destination immediately after birth by ethnicity NWH 2017**

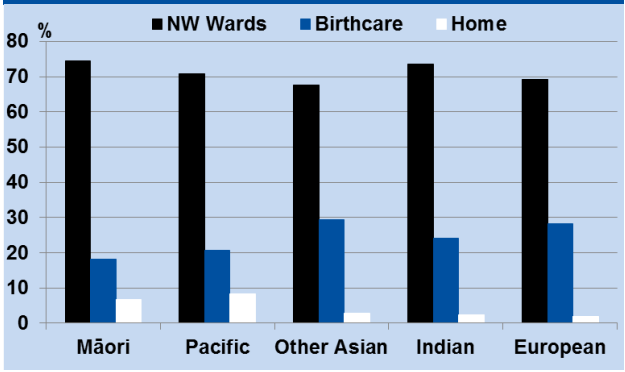



**Table 152: Reason for admission to NWH postnatal wards among women having a spontaneous vaginal birth 2017**

| | N=1357 | |
|---|---|---|
| | n | % |
| Neonatal reason* | 578 | 42.6 |
| Postpartum haemorrhage | 322 | 23.7 |
| Diabetes | 76 | 5.6 |
| Hypertensive disorder | 46 | 3.4 |
| Perineal trauma | 109 | 8.0 |
| Retained placenta/products | 42 | 3.1 |
| Fainting/dizziness | 12 | 0.9 |
| Other listed reasons† | 172 | 12.7 |

*includes admission to NICU, low birth weight (<2500g), requiring paediatrician care, stillbirth, neonatal death.
†includes epidural complications, infection, maternal medical conditions, social issues, cardiac conditions, wound problems, psychiatric disorders, and anaemia.

**Table 153: Discharge destination by mode of birth among initial admissions to NW wards**

| | N=4765 | |
|---|---|---|
| | n | % |
| Caesaren section birth - discharged to home | 1401 | 29.4 |
| Caesaren section birth - transferred to Birthcare | 1116 | 23.4 |
| Caesaren section birth - transferred to other destinations | 191 | 4.0 |
| Operative vaginal birth - discharged to home | 321 | 6.7 |
| Operative vaginal birth - transferred to Birthcare | 336 | 7.1 |
| Operative vaginal birth - transferred to other destinations | 39 | 0.8 |
| Spontaneous vaginal birth - discharged to home | 860 | 18.0 |
| Spontaneous vaginal birth - transferred to Birthcare | 377 | 7.9 |
| Spontaneous vaginal birth - transferred to other destinations | 124 | 2.6 |

## 8.4. Postnatal readmissions

We were unable to provide these data for 2017 due to discrepancies in the various data sources. Further analysis of the data is required and will be a priority in the next few months.

### 8.4.1. Admissions to postnatal wards of women who birthed elsewhere

There were 115 admissions in 2017 of mothers who had birthed elsewhere. Most often these births were at Birthcare Auckland, Waitakere, North Shore, Middlemore Hospitals or home. The majority of admissions were because the baby required admission to the neonatal unit and wherever possible we try to keep mothers and babies together.

## 8.5. Data tables: Postnatal admissions

**Table 154: Maternal destination immediately after birth NWH 2012-2017**

| | 2012 N=7695 | | 2013 N=7223 | | 2014 N=7400 | | 2015 N=6933 | | 2016 N= 7241 | | 2017 N=6846 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| NW Wards | 4617 | 63.9 | 4777 | 64.6 | 4585 | 66.1 | 4855 | 67.0 | 4855 | 66.1 | 4769 | 69.7 |
| Birthcare | 2251 | 31.2 | 2313 | 31.3 | 2083 | 30.0 | 2123 | 29.3 | 2123 | 30.0 | 1824 | 26.6 |
| Home | 336 | 4.6 | 293 | 4.0 | 251 | 3.6 | 236 | 3.3 | 236 | 3.26 | 231 | 3.4 |
| Other Units | 19 | 0.3 | 17 | 0.2 | 14 | 0.2 | 27 | 0.4 | 27 | 0.4 | 22 | 0.3 |

**Table 155: Maternal destination following birth by mode of birth NWH 2017**

| | Total | NWH Wards | | Birthcare Auckland | | Home | | Other Units | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Total** | **6846** | **4769** | **69.7** | **1824** | **26.6** | **231** | **3.37** | **22** | **0.3** |
| **Spontaneous vaginal** | 3158 | 1365 | 43.2 | 1549 | 49.1 | 229 | 7.3 | 15 | 0.5 |
| **Operative vaginal** | 979 | 697 | 71.2 | 275 | 28.1 | 2 | 0.2 | 5 | 0.5 |
| **CS Elective** | 1331 | 1330 | 99.9 | 0 | | 0 | | 1 | 0.1 |
| **CS Emergency** | 1378 | 1377 | 99.9 | 0 | | 0 | | 1 | 0.1 |

**Table 156: Maternal destination following birth by prioritised maternal ethnicity NWH 2017**

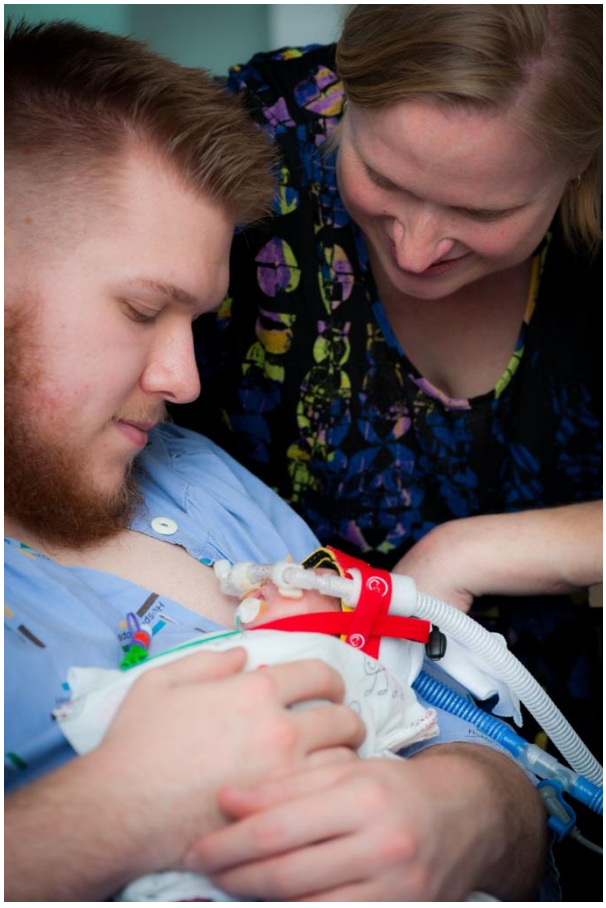
| | Total | NWH Wards | | Birthcare Auckland | | Home | | Other Units | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Māori** | 435 | 324 | 74.5 | 79 | 18.2 | 29 | 6.7 | 3 | 0.7 |
| **Pacific** | 733 | 519 | 70.8 | 152 | 20.7 | 61 | 8.3 | 1 | 0.1 |
| **Asian** | 1743 | 1178 | 67.6 | 513 | 29.4 | 51 | 2.9 | 1 | 0.1 |
| **Indian** | 703 | 517 | 73.5 | 169 | 24.0 | 17 | 2.4 | 0 | |
| **MELAA** | 327 | 221 | 67.6 | 90 | 27.5 | 15 | 4.6 | 1 | 0.3 |
| **European** | 2905 | 2010 | 69.2 | 821 | 28.3 | 58 | 2.0 | 16 | 0.6 |

**Table 157: Maternal destination following birth by prioritised maternal ethnicity NWH 2017**

| | Total | NWH Wards | | Birthcare Auckland | | Home | | Other Units | |
|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % |
| **Total** | **6846** | **4769** | **69.7** | **1824** | **26.6** | **231** | **3.4** | **22** | **0.3** |
| **Self-employed midwife** | 3132 | 1920 | 61.3 | 1075 | 34.3 | 126 | 4.0 | 11 | 0.4 |
| **Private Obstetrician** | 2004 | 1490 | 74.4 | 490 | 24.5 | 18 | 0.9 | 6 | 0.3 |
| **General Practitioner** | 11 | 6 | 54.5 | 5 | 45.5 | 0 | | 0 | |
| **NW Community** | 1242 | 934 | 75.2 | 229 | 18.4 | 77 | 6.2 | 2 | 0.2 |
| **NW High risk** | 404 | 375 | 92.8 | 22 | 5.4 | 4 | 1.0 | 3 | 0.7 |
| **Other DHB** | 18 | 17 | 94.4 | 0 | | 1 | 5.6 | 0 | |
| **Unbooked** | 35 | 27 | 77.1 | 3 | 8.6 | 5 | 14.3 | 0 | |

**Table 158: Reason for postnatal admission by place of birth for women who birthed elsewhere NWH 2017**

| | Total | | Birthcare | | Home | | Middlemore | | North Shore | | Waitakere | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=115 | | n=38 | | n=10 | | n=14 | | n=18 | | n=24 | | n=11 | |
| | N | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Neonatal admission** | 66 | 57.4 | 8 | 21.1 | 6 | 60 | 10 | 71.4 | 15 | 83.3 | 18 | 75.0 | 9 | 81.8 |
| **Infection** | 1 | 0.9 | 0 | | 0 | | 0 | 0.0 | 0 | 0.0 | 1 | 4.2 | 0 | |
| **Breast Infection** | 8 | 7.0 | 3 | 26.3 | 0 | | 1 | 7.1 | 2 | 11.1 | 1 | 4.2 | 1 | 9.1 |
| **Postpartum haemorrhage** | 14 | 12.2 | 10 | 18.4 | 2 | 20 | 1 | 7.1 | 0 | | 1 | 4.2 | 0 | |
| **Obstetric trauma** | 7 | 6.1 | 7 | 10.5 | 0 | | 0 | | 0 | | 0 | | 0 | |
| **Retained placenta / products** | 4 | 3.5 | 4 | 10.5 | 0 | | 0 | | 0 | | 0 | | 0 | |
| **Other** | 15 | 13.0 | 6 | 15.8 | 2 | 20 | 2 | 14.3 | 1 | 5.6 | 3 | 12.5 | 1 | 9.1 |





# CHAPTER 9

# NEWBORN SERVICES

**This chapter provides data on the outcomes of babies cared for in the Neonatal Intensive Care Unit (NICU). Additional data can be found at the end of this chapter. Data in the Newborn section pertain to all babies admitted to and cared for at the NWH Neonatal Intensive Care Unit if born during the 2017 calendar year. This includes babies transferred from other units or home.**

**Admissions and all other data in this chapter except occupancy relate to babies born in the 2017 calendar year. Occupancy data relate to the unit occupancy for each day in 2017.**

**In the presentation of the data in this chapter there are a number of comparisons with matched data from other sources. Consequently the denominator used variably relates to (1) all babies born in 2017 and admitted to the Auckland City Hospital (ACH) NICU, (2) inborn (ACH) babies and (3) babies born in 2017 assigned to ACH by the Australia New Zealand Neonatal Network (ANZNN).**

**Australia New Zealand Neonatal Network (ANZNN)**

ANZNN collects standardised data from all level 3 NICUs in Australia and New Zealand. A dataset is collected for each baby admitted to a NICU who:

- is <1500g birth weight
- is <32 weeks gestation
- requires assisted ventilation (IPPV, CPAP, high flow or HFOV) for four or more hours or died while receiving mechanical ventilation prior to four hours of age
- has major surgery (defined as opening of a body cavity)
- babies who are cooled as a treatment for neonatal encephalopathy

Each infant is assigned to the level 3 NICU at which they were originally treated for at least 4 hours, even if that baby was subsequently transferred. Data are collected up to discharge home, even if care is in several hospitals.

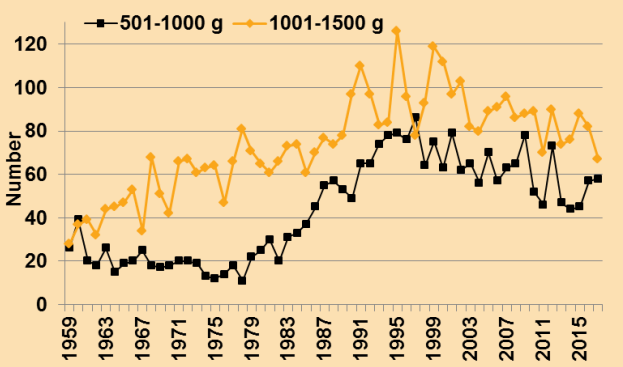
ANZNN was established in 1994 and ACH has supplied data since 1995. De-identified data are sent electronically to the Sydney secretariat. Approval to send data was obtained from the North Health Ethics Committee prior to ACH joining ANZNN. An annual report of the combined data from all units is published each year and feedback data are sent to each unit that contributes, comparing outcomes of that unit to those of the Network overall.

Data presented here are from the ANZNN annual reports and the ACH NICU database, which was updated partway through 2017. The ANZNN data include data from ACH.

## 9.1 Inborn live birth at National Women's 1959-2017

This includes all babies born alive (including those who died at or soon after birth and those with lethal anomalies). The weight ranges 501-1000 and 1001-1500 are used as these data have been collected prospectively since 1959, initially by Professor Ross Howie.

**Figure 152: Number of inborn live births ≤1500g NWH 1959-2017 (excludes BBAs)**




## 9.2 NICU occupancy

The 2017 occupancy of 12,430 bed days is approximately equivalent to a mean of 34 babies per day. This number represents an average occupancy of around 85%. Trends for the occupancy by gestational age groups and birth weight are given in the figures below. Babies born at higher gestational age generally have shorter duration of stay as they require less time to achieve maturity. There was a small increase in occupancy for babies born at less than 28 weeks' gestation in 2017 compared to 2016, although the total number of admissions of babies of babies born at this gestation remained stable. Note that for the last decades the two Waitemata units have cared for their own uncomplicated level 2 babies so the overall acuity of the ACH unit has risen for a given occupancy.

**Figure 153: Occupancy (baby days per year) of NICU by gestational age 1999-2017**

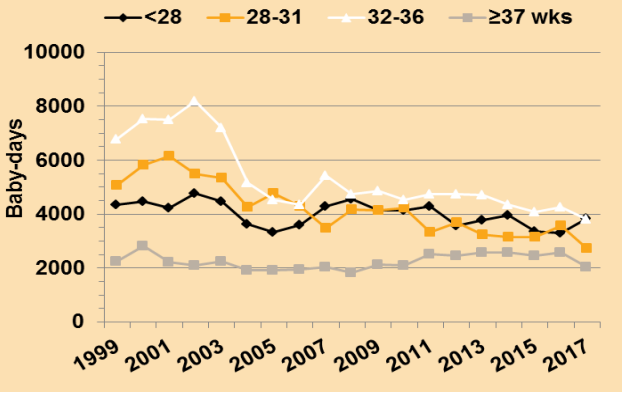
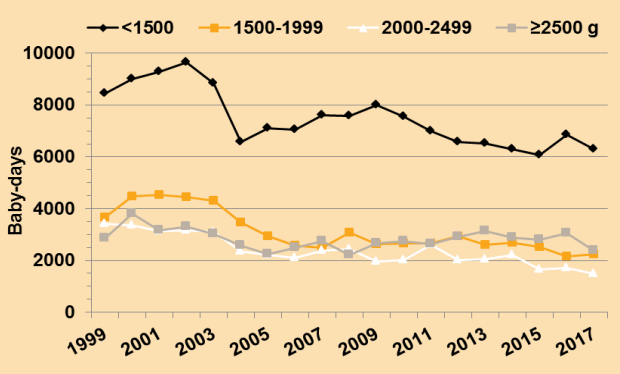


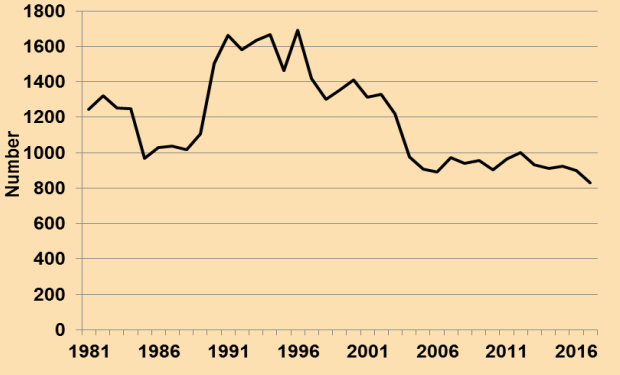
**Figure 154: Occupancy (baby days per year) of NICU by birth weight 1999-2017**




## 9.3 Admissions to NICU

Total admissions were 832 for the 2017 calendar year. This is slightly lower than the average of 900-1000 admissions per year over the last decade. Auckland City Hospital is the level 3 referral unit for the two Waitemata hospitals and for Northland Base Hospital, and also provides regional intensive care services for infants undergoing surgical procedures in the newborn period, and care for babies with antenatally diagnosed congenital cardiac disease from around the country. The neonatal units at North Shore and Waitakere Hospitals admit babies >1500g and >32 weeks gestation and provide Level 2 care including CPAP.

**Figure 155: Admissions to NICU 1981-2017**




### 9.3.1 Admissions to NICU by gestation and birth weight

For 2017, the number of babies admitted between 32-36 weeks and >36 weeks gestation appears to have decreased slightly while there is a small increase in the number of admissions of babies born below 32 weeks gestation. In 2017 there were 3 admissions to NICU of babies born at 23 weeks gestation. The rise in term infant numbers seen from 2008 until 2011 has plateaued over the last 5 years. These babies are likely to have a mixture of problems but the two most common reasons for admission remain Table 177 respiratory distress and congenital abnormality, which includes congenital cardiac anomalies.

**Figure 156: Admissions to NICU (total) by gestational age 1999-2017**

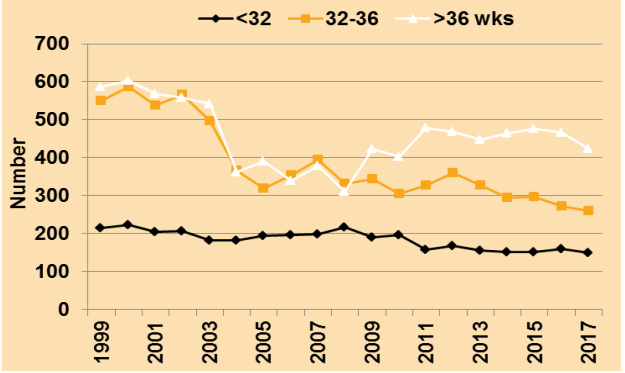



**Figure 157: Admissions to NICU (total) by birth weight 2000-2017**

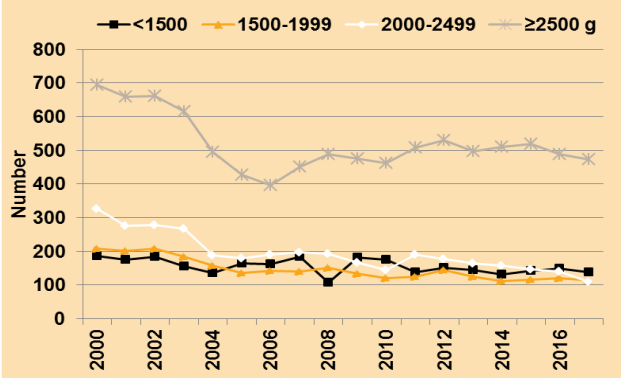
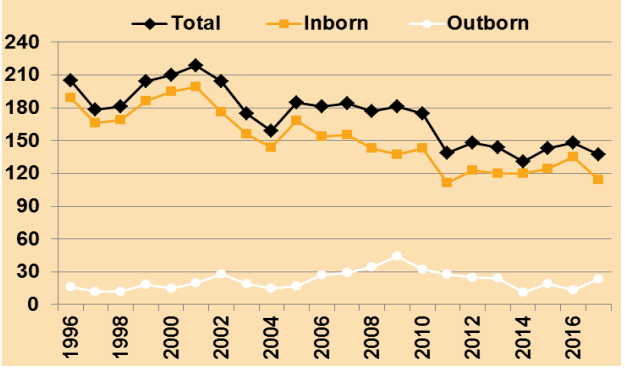



**Figure 158: Admissions to NICU of <1500g babies (VLBW) by place of birth 1996-2017 (outborn includes BBAs)**



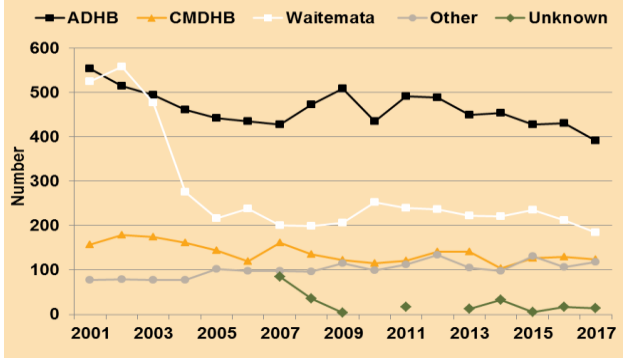

There was a small increase in the number of VLBW babies who were outborn in 2017; overall, however, this number remains low and includes transfers from level 2 units for level 3 care and infants who are transferred from Middlemore Hospital NICU for surgical care so are a significant group with regard to complexity of care. As a general principle, antenatal transfer is preferable as this avoids transportation of small or fragile infants. Hence the number of outborn infants is very much lower than

the number of infants born to mothers domiciled outside of ADHB.

### 9.3.2 Admissions to NICU by domicile of mother

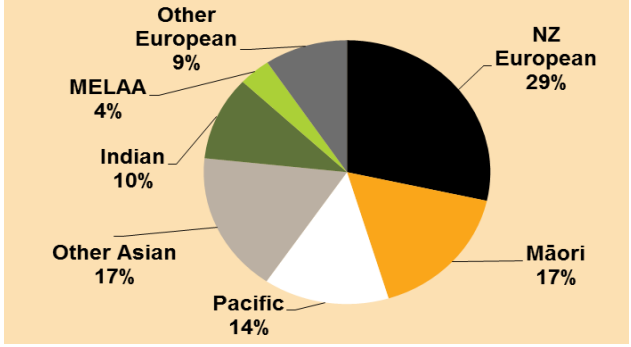
As previously noted there was a big decline in admissions of babies whose mothers are domiciled in the Waitemata DHB with the opening of their two level 2 units in the early 2000s. In the last few years there has been a slight rise in admission numbers from CMDHB. The reasons for that are not fully elucidated but could be a mixture of CMDHB neonatal unit being full and mothers from CMDHB electing to give birth at ACH. There is also antenatal transfer to Auckland associated with the maternal fetal medicine network providing antenatal care for a small number of infants with major congenital anomalies. The "unknown" group includes the small number of mothers referred to fetal medicine team from overseas (Cook Islands and Tahiti).

**Figure 159: Admissions to NICU by maternal domicile 2001-2017**




### 9.3.3 Admissions to NICU by ethnicity of baby

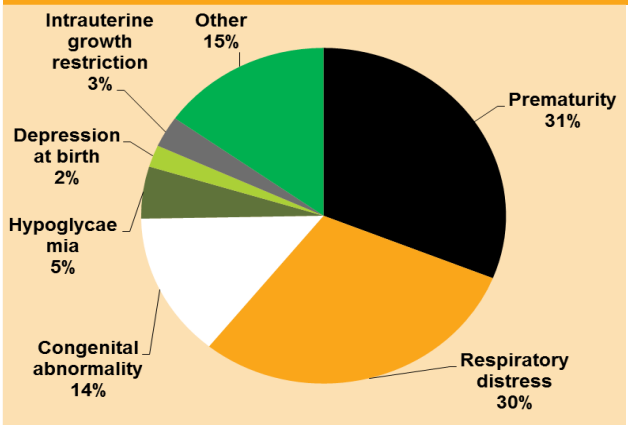
**Figure 160: Admissions to NICU by ethnicity of baby 2017**




The most frequent ethnicity of NICU admissions was NZ European with 28.5% overall, including 27% of preterm and 31% of term infants, respectively. The second largest ethnic groups overall were Other Asian and Māori at 17% each, followed by Pacific at 14%. Within the ethnic groups, there are differences in rates between term and preterm admissions, notably Māori and Pacific have slightly higher rates for preterm admissions compared to term admissions while Indian and Other Asian have slightly higher rates of term admissions compared to preterm admissions **Table 176**. Due to the change to infant ethnicity reporting made in 2007 we have not reported long term changes in infant ethnicity over time. However, the high rate of non-NZ European ethnicity and the growth in the number of Asian admissions over the last 5 years is noted.

### 9.3.4 Reasons for admission to NICU

**Figure 161: Reasons for admissions to NICU 2017**




Prematurity, respiratory distress and congenital anomalies remain the three commonest reasons for admission to NICU. The number of babies admitted to NICU with hypoglycaemia as the main reason for admission has continued to fall over the years, with only 3.3% of term admissions being secondary to hypoglycaemia in 2017 compared to 11% in 2015 and 7.5% in 2016. Treatment and prevention of hypoglycaemia using glucose gel has been the subject of a major ongoing research trial over the last few years. The full list of reasons for admission is presented in **Table 177**. "Other" reason for admission includes four babies who were admitted to NICU for assessment following failed pulse oximetry screening and five babies with antenatally diagnosed renal anomalies.

### 9.3.5 Antenatal corticosteroids (benchmarked with ANZNN)

Antenatal corticosteroid use has been consistently high in the Network (ANZNN) and NWH over the last five years. In 2017, 92% of NWH babies admitted to NICU at <32 weeks gestation received some antenatal corticosteroids before birth and 61% received a course starting between 24 hours and seven days before birth. Although data are not available from ANZNN for all years, it appears that NWH and ANZNN rates are very similar across age groups 24-31 weeks gestation.

**Figure 162: Any antenatal corticosteroids at 24-27 weeks 1995-2017**

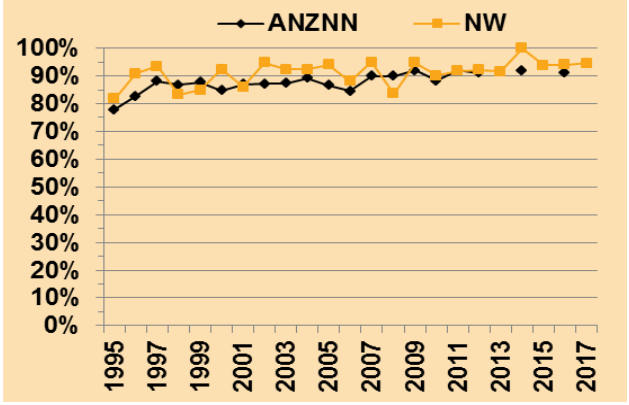
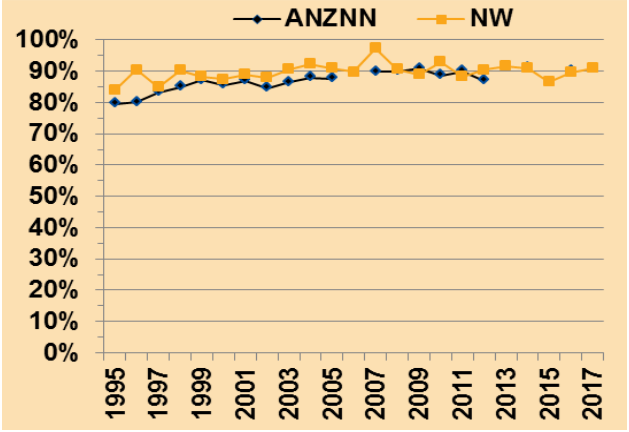



**Figure 163: Any antenatal corticosteroids at 28-31 weeks 1995-2017**




## 9.4 Care and complications

### 9.4.1 Infection (inborn admissions)

In 2017, there were 5 early-onset culture proven septicaemias (all inborn babies), which is similar to the previous five years (5-10 cases per year). The organisms included E coli (2), Group B Streptococcus (2), and Haemophilus influenza (1). There were two cases of early onset Group B Streptococcus (GBS) infection, one in a preterm infant and the other in a term infant. There were two cases of early onset E. coli infection, one of which was in a 24 week gestation infant who was born following prolonged rupture of membranes and fetal distress. This baby died on day 6 of overwhelming infection. A 34 week gestation infant, one of twins, also had an early onset E. coli bacteraemia. The one case of Haemophilus influenzae septicaemia was in a 31 week gestation infant who was born following premature prolonged rupture of membranes and fetal distress.

Overall the number of infants with early onset infections has remained stable over the years, with premature infants being over-represented (4 out of the 5 cases).

There were 23 episodes of late-onset septicaemia, sometimes with more than one organism. The number of episodes of late onset sepsis has remained stable (19-23) over the last three years and is significantly down from 38 episodes in 2014. There were, however, 14 episodes of late onset infections associated with the presence of a central line. For late onset sepsis in infants with a central line, the most common organism was Staphylococcus epidermidis / Coagulase Negative Staphylococcus (8) and there were three cases of Staphyloccocus aureus, two cases of E. coli and one of enterococcus faecalis. There are ongoing efforts to reduce central line associated infections. However, hospital acquired infections remain a significant concern in this vulnerable group.

Other important organisms involved in late sepsis include Staphylococcus aureus, enterococcus faecalis and Streptococcus.

### 9.4.2 Hypoxic ischaemic encephalopathy (all admissions)

Two inborn babies developed significant stage 3 hypoxic ischaemic encephalopathy (HIE) in 2017, giving an incidence of 0.32/1000 term births (2/6342). Both of these babies commenced cooling, however, one was stopped early as baby had significant multi-organ system involvement and care was re-directed following a brain MRI showing evidence of severe and extensive injury. The incidences were between 0.3 and 1.4/1000 term births for the years between 2006 and 2016 or 0.77/1000 for the period 2006-2017 (Table 180). A total of 6 babies received therapeutic hypothermia, 4 of whom were outborn. The age at which cooling was commenced ranged from 1 to 7 hours, although all outborn babies were passively cooled before admission to NICU. There were three outborn babies with Sarnat stage 2 or 3 HIE who were not cooled due to late presentation.

### 9.4.3 Intraventricular haemorrhage in very low birth weight infants admitted to NICU 1985-2015

**Figure 164: Intraventricular haemorrhage in <1250g infants admitted to NICU 1985-2017**

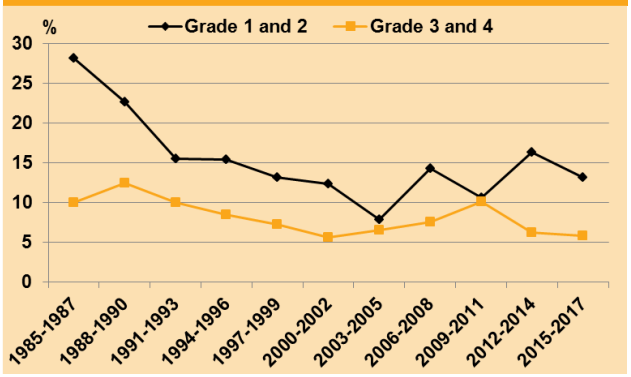
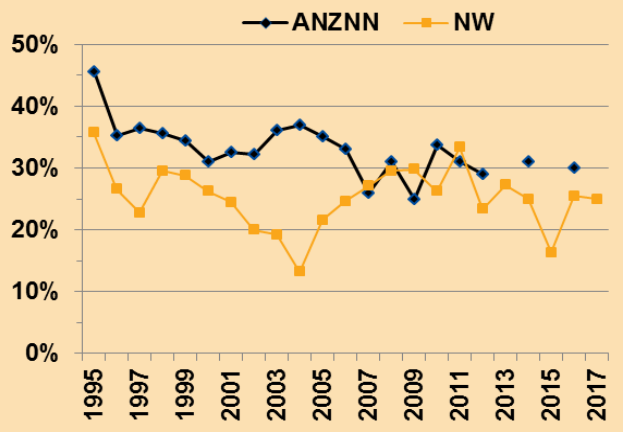


Figure 164 demonstrates the historical trend in IVH rates over the last 30 years. However, there have been some changes in investigation and reporting during this period. In 2005, NWH criteria for routine cerebral ultrasound scanning was changed to <30 weeks or <1250g whereas the ANZNN criteria has remained unchanged. It had previously been <32 weeks or <1500g but there was a very low incidence of significant abnormalities in the larger more mature infants. From 2010 onward, to avoid major changes in the denominator, we have interpreted those infants in whom an ultrasound was not performed, due to the policy change, as negative (no IVH).

### 9.4.4 Intraventricular haemorrhage (Benchmarked with ANZNN)

**Figure 165: Any IVH at 24-27 weeks 1995-2017**




On the whole, ACH data for rates of IVH are comparable with ANZNN data Figure 165 to Figure 168 but with more year-to-year variation due to the smaller number of infants in each group. The rates of severe IVH (Grade 3 & 4) remain low but these are associated with significant neurodevelopmental consequences so remain an important benchmark. Included in this group are a consistent but small number of outborn babies who have not had tertiary level antenatal care.

**Figure 166: Severe (G3-4) IVH at 24-27 weeks 1995-2017**

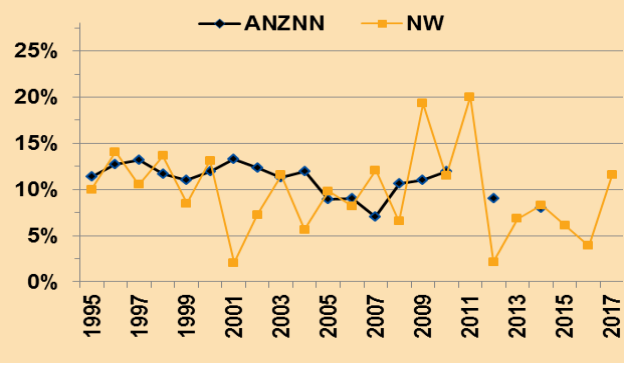



**Figure 167: Any IVH at 28-31 weeks 1995-2017**

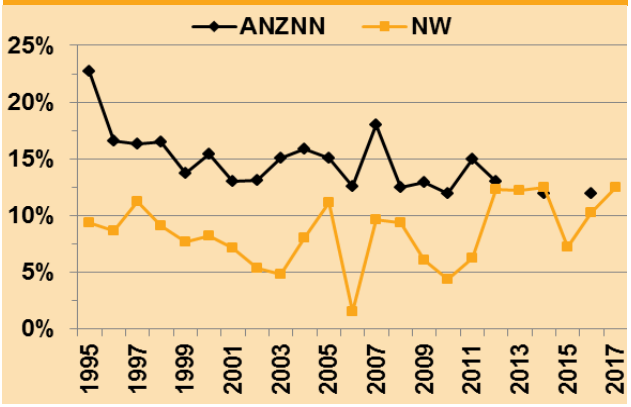
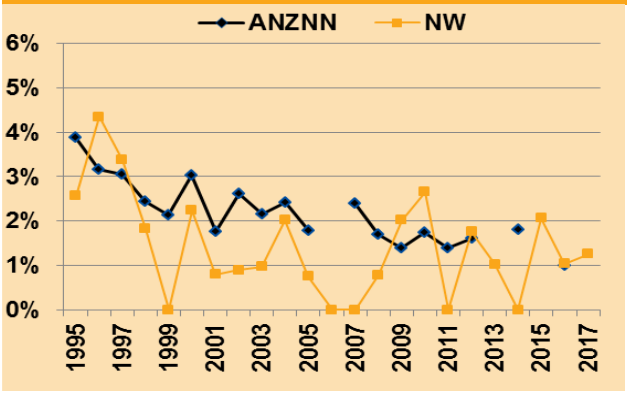


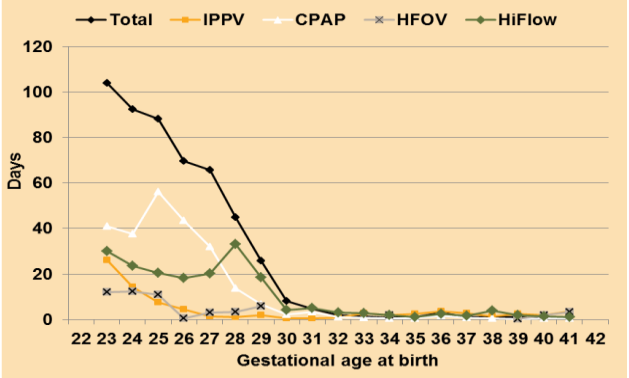

**Figure 168: Severe (G3-4) IVH at 28-31 weeks 1995-2017**




Six out of 54 (11%) babies born at less than 28 weeks gestation had grade 3-4 IVH in 2017. Although the rate fluctuates from year to year, it remains comparable with ANZNN rates. Rates of severe grades of IVH in babies born > 28 weeks gestation remains low, between 0 - 2 % per year.

### 9.4.5 Assisted ventilation (all admissions)

**Figure 169: Median ventilation days by gestational age among (ventilated) inborn survivors NWH 2017**




Data in this section are presented for all inborn babies at ACH, thus excluding babies transferred to NICU in the postnatal period. This allows more

meaningful comparisons of postnatal care at ACH over time. Note that we have redrawn the table to include numbers of babies who received support using High Frequency Oscillatory Ventilation (HFOV), which is typically used as a rescue therapy. Importantly we have also added numbers receiving Humidified High Flow air/oxygen (HiFlow). This practice was introduced in 2010/11 but over the years, its use has increased and it now represents a significant proportion of our respiratory support use.

The neonatal unit has used CPAP as the primary mode of respiratory support in uncomplicated inborn premature infants since the late 1990s. Although the majority of infants born below 26 weeks gestation receive a period of positive pressure ventilation, there is a steady reduction in the proportion receiving such support from 26 to 32 weeks gestation.

Since 2010, the number of babies receiving ventilation (IPPV and HFOV combined) has remained fairly stable but there has been an increase in the number of babies receiving CPAP and HiFlow, which has resulted in an overall rise in the number of babies receiving any respiratory support compared with a decade ago. The most common reasons for this requirement for support were: respiratory distress, meconium aspiration, congenital anomalies, support for encephalopathy, surgery and "other", which includes metabolic disease. It is routine for babies with encephalopathy who receive whole body cooling to be ventilated due to the sedation they receive, regardless of respiratory status. Note small peaks in HFOV use at 25-27 weeks and around term.

The use of humidified high flow air/oxygen (HiFlow) as a method of weaning off CPAP or sometimes as an alternative to CPAP has been well received by parents and staff, and is now becoming the primary method of respiratory support for some babies. This system offers advantages in the ease of care and handling and softer interface for the baby. As with any changes in practice, there is a need to review this on an ongoing basis, especially in view of duration of respiratory support and long term respiratory outcomes, including chronic lung disease.

### 9.4.6 Trends in use of assisted ventilation among <32 week inborn survivors

**(Note that medians apply only to babies ventilated; babies not ventilated are NOT included in the calculations)**

**HiFlow** High flow air oxygen
**HFOV** High frequency oscillatory ventilation
**IPPV** Intermittent positive pressure ventilation
**CPAP** Continuous positive airway pressure

**Figure 170: Median days on IPPV NWH 1995-2017**

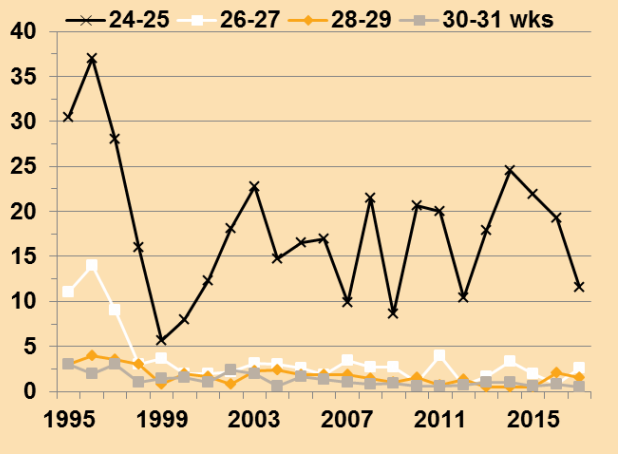



**Figure 171: Median days on CPAP NWH 1995-2017**

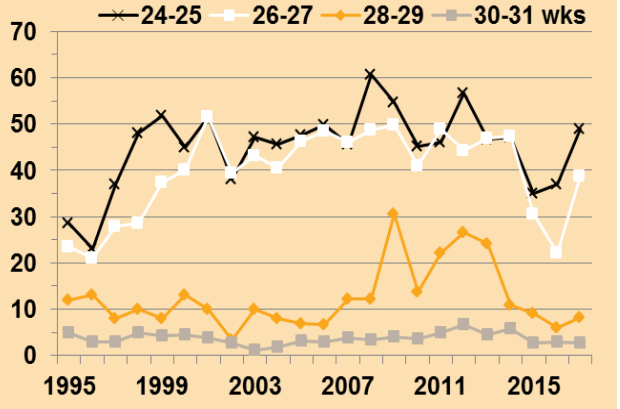
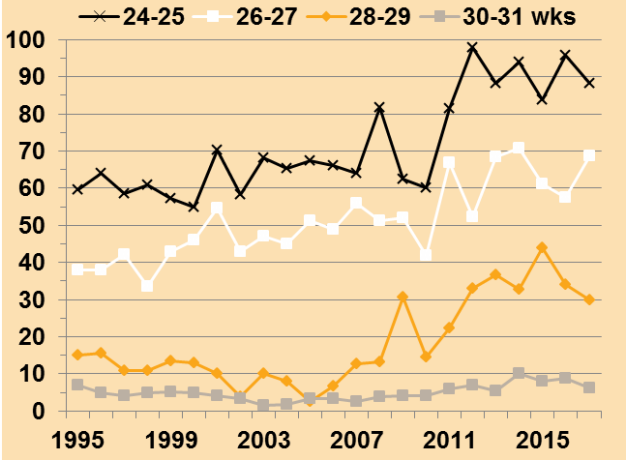



**Figure 172: Median days on any ventilation NWH 1995-2017**




These figures illustrate median days on respiratory support for inborn survivors. This group may be considered a more homogeneous population than the outborn.

The introduction of CPAP resulted in a decline in the median number of days on IPPV for preterm infants. The number of days on CPAP support remains low for babies born between 30-31 weeks. There is a slight decrease in the number of days on IPPV with a corresponding increase in median days on CPAP for babies born <26 weeks gestation.

### 9.4.7 Trends in the use of assisted ventilation among all infants born in NW (≥24 weeks gestation).

**Figure 173: Number on IPPV NWH 1995-2017**

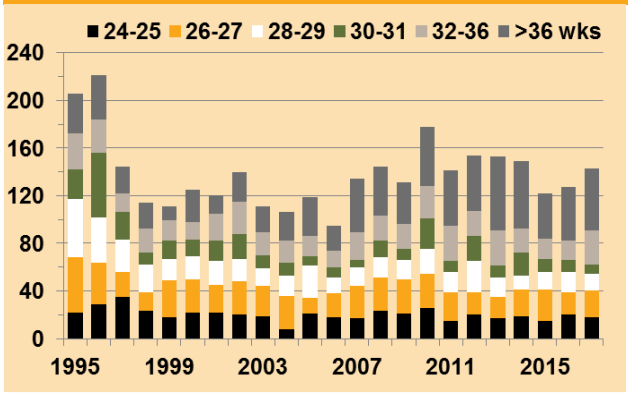



**Figure 174: Number on CPAP NWH 1995-2017**

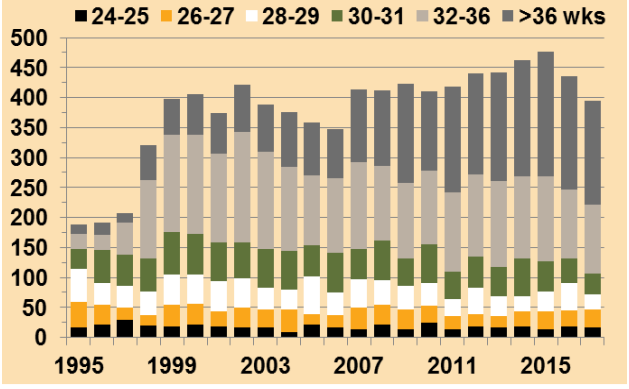



**Figure 175: Number on HFOV NWH 2013-2017**

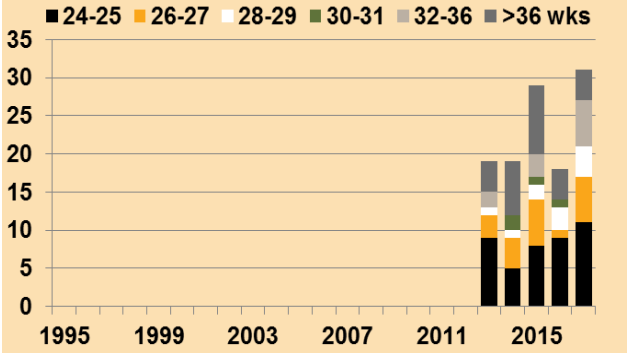



**Figure 176: Number on HiFlow NWH 2013-2017**

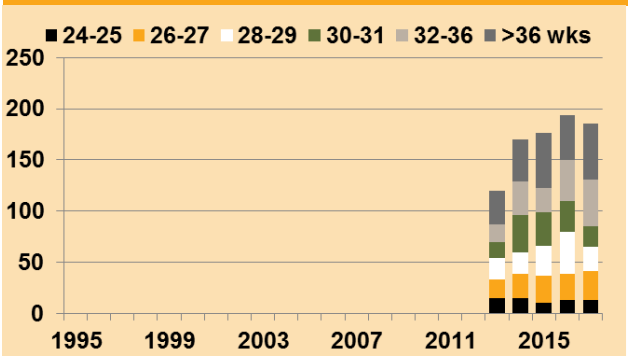
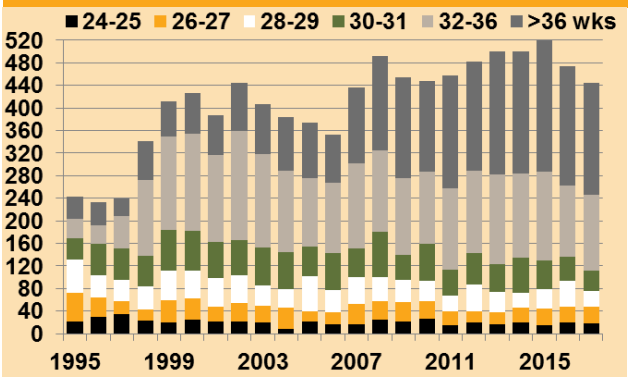



**Figure 177: Number on any ventilation NWH 1995-2016**




These figures show the number of babies requiring respiratory support at ACH over the last 20 years. The effect of introducing double short-pronged Hudson® CPAP in 1997 is clear with a reduction in number receiving intubation and assisted ventilation.

From 2011 onward we have collected information on the use of High Flow Humidified Air / Oxygen. Figures representing these data and HFOV were added in 2013. Use of HFOV is fairly stable but HiFlow use continues to increase. In 2014 NICU introduced the use of non-invasive ventilation (NIPPV) but numbers are very small and included in CPAP group.

### 9.4.8 Positive pressure ventilation and CPAP use in NWH and across Australia and New Zealand at 24-27 weeks gestation (ANZNN benchmarking)

These data compare the use of IPPV and CPAP in NICU and across the Australia and New Zealand Neonatal Network. The Network collects standardised data from all NICUs in Australia and New Zealand.

The median data presented here are for all babies ventilated (i.e. babies not ventilated are excluded).

**Figure 178: Percentage on IPPV (24-27 wks ANZNN assigned) NWH 1995-2017**

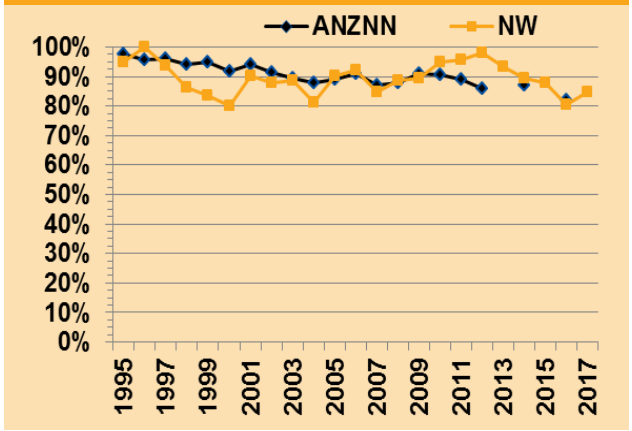



**Figure 179: Percentage on CPAP (24-27 wks ANZNN assigned) NWH 1995-2017**

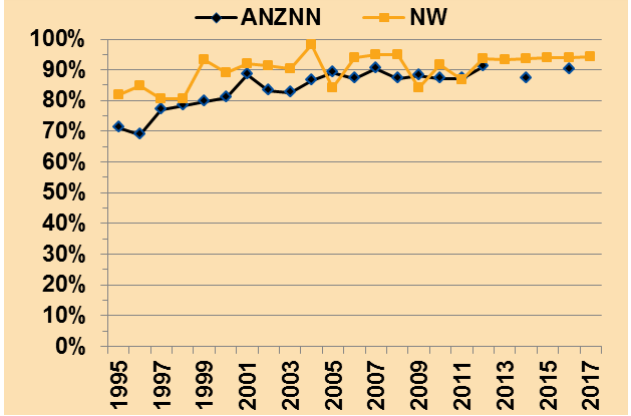



**Figure 180: Median days on IPPV (24-27 wks ANZNN assigned) NWH 1995-2017**

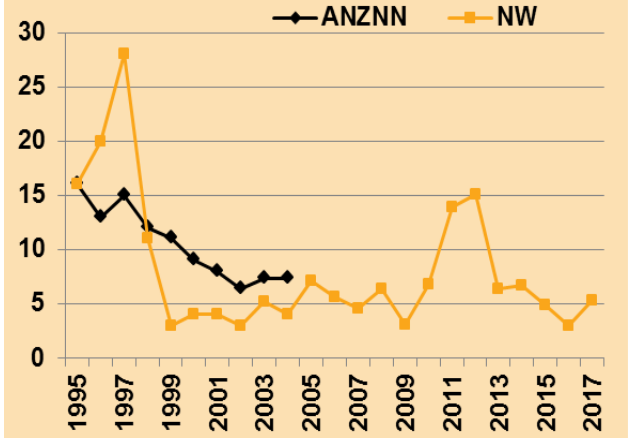
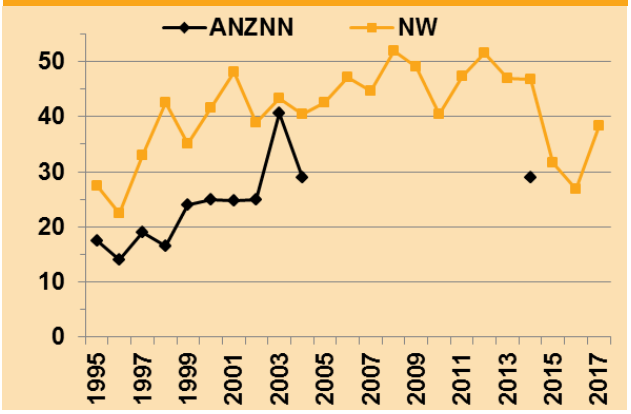



**Figure 181: Median days on CPAP (24-27 wks ANZNN assigned) NWH 1995-2017**




## 9.4.9 Positive pressure ventilation and CPAP use in NW and across Australia and New Zealand at 28-31 weeks gestation (ANZNN benchmarking)

**Figure 182: Percentage on IPPV (28-31 wks ANZNN assigned) NWH 1995-2017**

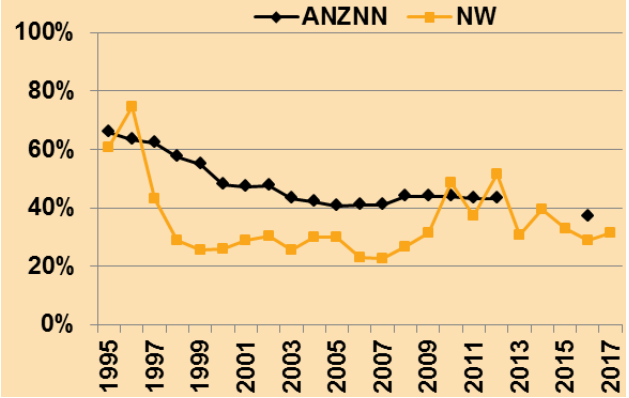



**Figure 183: Percentage on CPAP (28-31 wks ANZNN assigned) NWH 1995-2017**

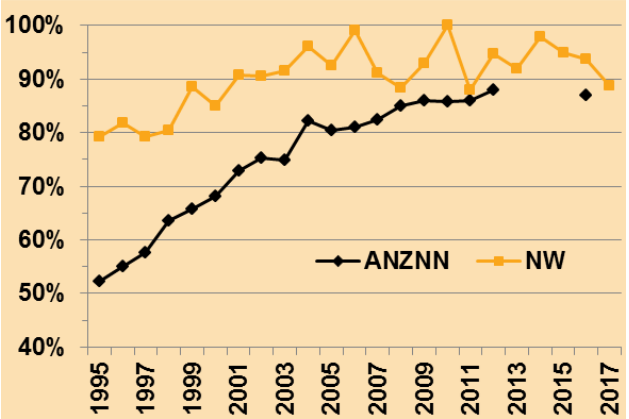


**Figure 184: Median days on IPPV (28-31 wks ANZNN assigned) NWH 1995-2017**

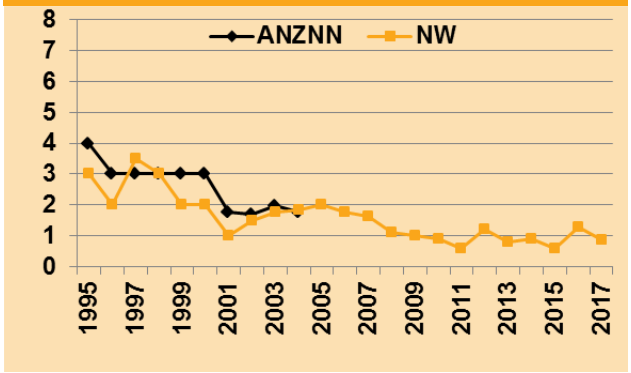
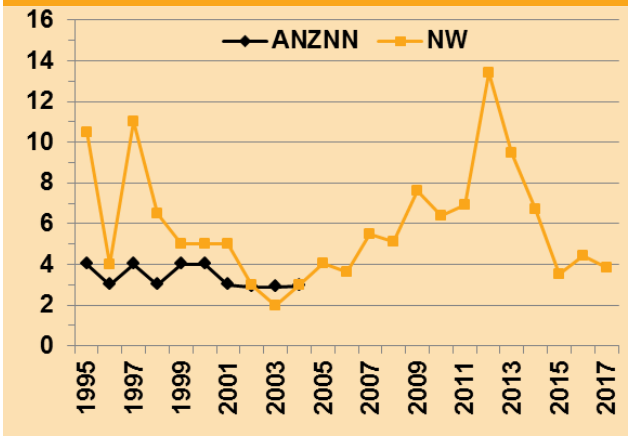



**Figure 185: Median days on CPAP (28-31 wks ANZNN assigned) NWH 1995-2017**




A high proportion of babies born below 28 weeks gestation spend prolonged periods of time on respiratory support.

### 9.4.10 High frequency oscillatory ventilation and inhaled nitric oxide

These data are on all babies admitted to NICU in each year, including those born in other hospitals or at home.

High frequency oscillatory ventilation (HFOV) has typically been used for 'rescue' treatment at ACH. Hence, babies treated with HFOV are the sickest babies in NICU who would be expected to have a very poor outlook whatever the treatment. There is, however, a trend towards greater use of HFOV in the more immature babies with the ability to deliver this form of support using the Dräger Babylog® VN500 ventilators. At all gestations there is a significant mortality in those infants who receive these advanced respiratory supports.

Figure 186 and Figure 187 compare the use of HFOV and iNO at ACH with use across the ANZNN. Generally, the use of these interventions in preterm infants has increased since 2003 but is probably comparable with ANZNN data.

**Figure 186: HFOV at 24-27 weeks (ANZNN assigned babies) NWH 1995-2017**

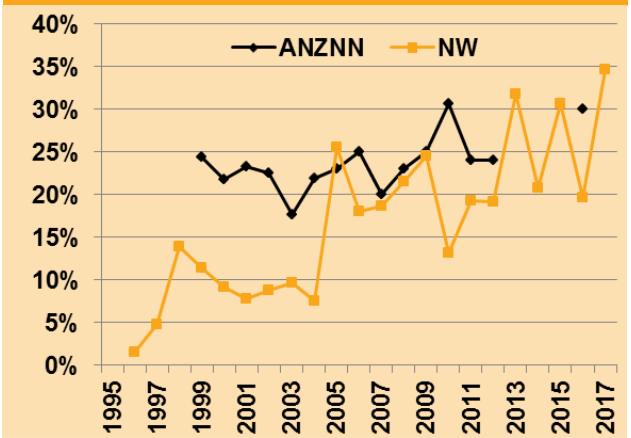
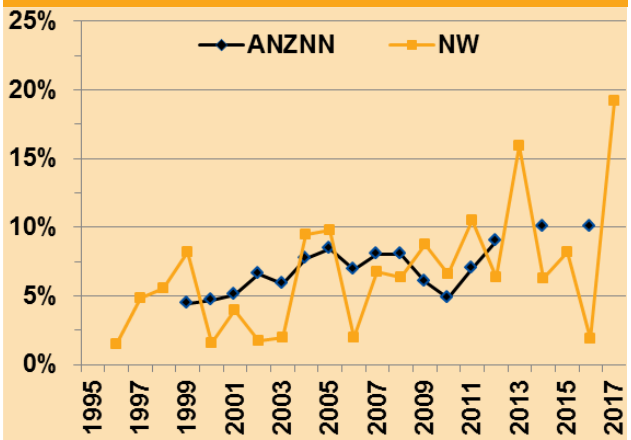



**Figure 187: Inhaled nitric oxide at 24-27 weeks (ANZNN assigned babies) NWH 1995-2017**

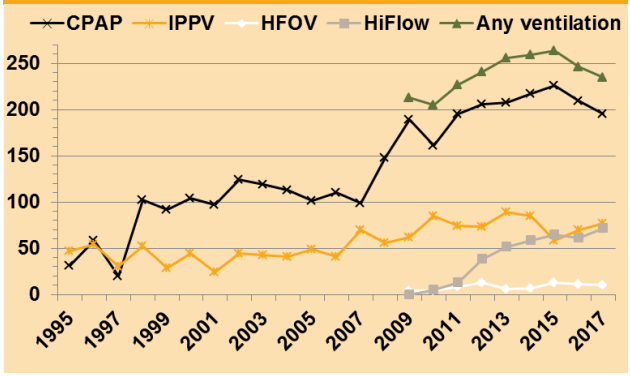



### 9.4.11 Term/post-term infants on assisted ventilation from 1995 to 2016

Figure 188 shows trends in the number of term infants treated with the available forms of respiratory support. As with preterm infants, in the late 1990s there was a significant increase in CPAP use due to the removal of headbox oxygen as a therapy. Since 2007 there has been an increase in numbers receiving CPAP. In 2013 we revised the figure to include data for HFOV and HiFlow and included an indication of total respiratory support (i.e. all modes combined). In 2017 there was a small decrease in CPAP with a small increase in the use of HiFlow, but use of the other more invasive forms of support remains stable.

TTN/RDS, meconium aspiration syndrome/PPHN, infection, congenital anomalies, support for surgery, neonatal encephalopathy and "other", which could include a neuromuscular problem, were the reasons for ventilation in term infants.

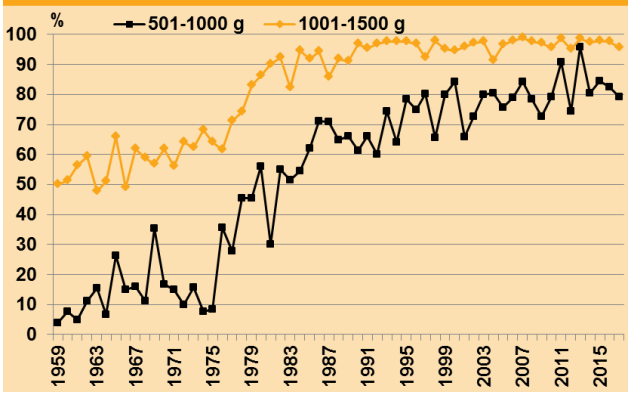
**Figure 188: Number of term and post term babies needing respiratory support (IPPV, HFOV, CPAP and HiFlow) NWH 1995-2017**




## 9.5 Outcomes

### 9.5.1 Survival of NWH inborn babies by birth weight

**Figure 189: Neonatal survival (0-28 days) of ≤1500g inborn live births NWH 1959-2017**




Over the years the definitions used have been the same, counting all babies, including those who died soon after birth, if they showed signs of life.

The numbers of babies with anomalies and the number who were not actively treated because of their low gestation varies from year to year, and has a big influence on the overall survival rate, particularly in the extremely low birth weight group (500-1000g, ELBW).

Significant advances in neonatal care have been reviewed in previous reports. However, it is worth noting the current quality of survival, in terms of neurodevelopment, as reported in the Child Development Unit (CDU) section of the report (section 9.9).

### 9.5.2 Survival of inborn babies (23 to 31 weeks) by gestational age

There is a gradient in the survival rates between 23 and 27 weeks gestational age. Although the number of infants in each group per year is small, the pattern of survival in very preterm infants has been steady over the last decade.

**Figure 190: Numbers of live inborn babies 23 to 31 weeks gestation NWH 2008-2017 (n=1481)**

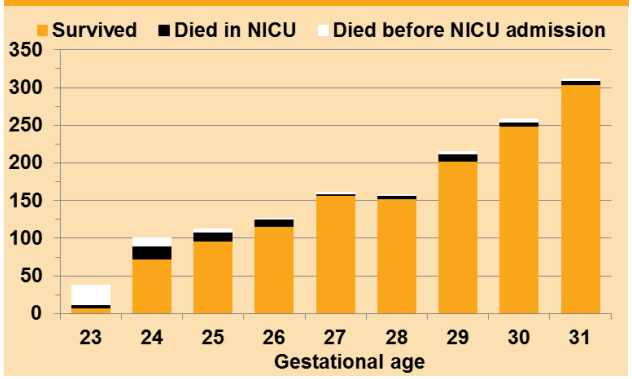



**Figure 191: Survival of live inborn babies 23-31 weeks NWH 2008-2017 (n=1481)**

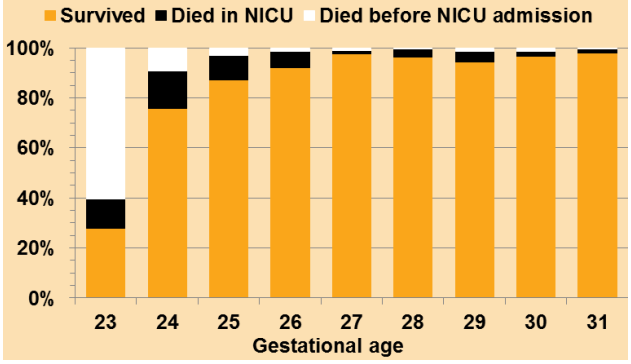
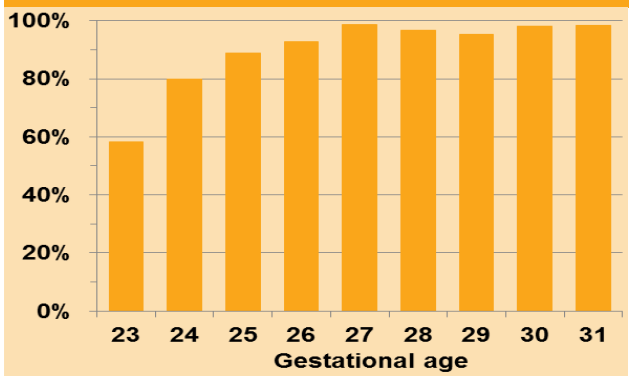



**Figure 192: Survival of live inborn babies admitted to NICU 2008-2017 (n=1426)**




In comparison with ANZNN and some other international data sets survival at 23 weeks has previously been low. After this was highlighted by the review 2 years ago work has been done nationally to review practice and produce consensus guidelines on the care of babies born at these extreme preterm gestations. We offer intensive care at 23 weeks gestation in some cases, especially if parents choose to do so after detailed discussions with the medical teams. There were 3 inborn babies

at 23 weeks gestation who were admitted in 2017, who all survived to discharge, compared to only 1 out of 4 babies in 2016. At gestations greater than 24 weeks ACH survival rates are comparable to outcomes published by ANZNN, which approximate population data.

### 9.5.3 Survival of 24-27 week babies admitted to NICU (benchmarked with ANZNN)

**Figure 193: Survival at 24-25 weeks gestation compared with ANZNN data NWH 1995-2017**

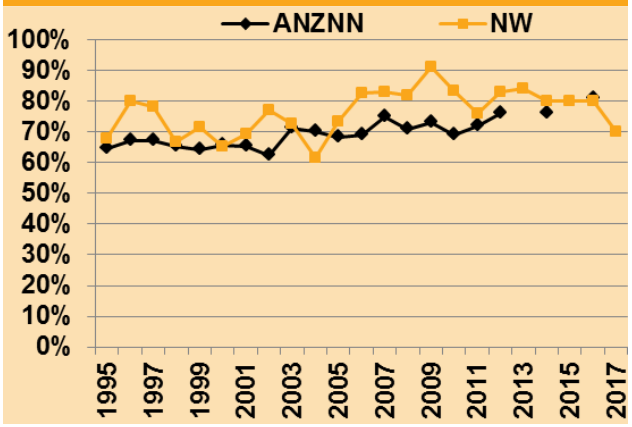
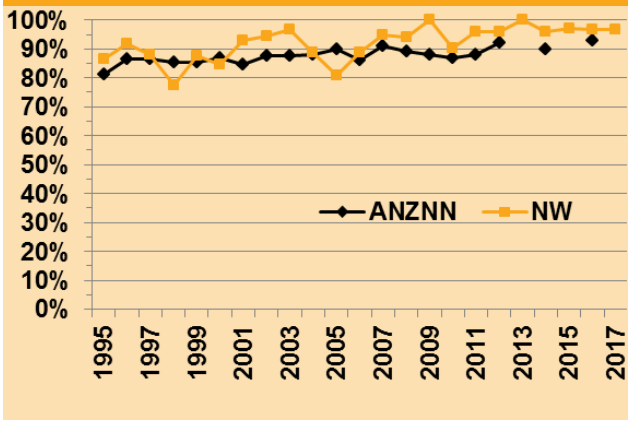



**Figure 194: Survival at 26-27 weeks compared with ANZNN data NWH 1995-2017**




Survival rates for 24-27 weeks gestation are consistently around 80% although there is some variation due to relatively small numbers at 24-25 weeks gestation. These data are for all inborn babies admitted, including those with lethal malformations but excluding deaths in Labour and Birthing Suite.

### 9.5.4 Cystic periventricular leukomalacia (PVL)

In 2017 there were no inborn babies with cystic PVL.

### 9.5.5 Retinopathy of prematurity benchmarked with ANZNN

Rates of stage 3-4 ROP compare reasonably with ANZNN data but fluctuate each year due to small numbers. As previously reported, changes in the screening technique and the appointment of a new ophthalmologist in 2006 were associated with an increased incidence of ROP. However, a large proportion of the increase was due to increased detection of milder grades (Stage 1 and 2) that do not have any short or long-term consequences.

The rates of significant (Stage 3 or 4) ROP have remained stable over the years and are comparable to the ANZNN data. There were only 3 cases of stage 3 ROP and no cases of stage 4 ROP in 2017. Two babies were treated with Bevacizumab (anti vascular endothelial growth factor); 1 for stage 2 ROP with pre-plus disease and the other for stage 3 ROP. No babies were treated with laser photocoagulation.

**Figure 195: Stage 3-4 ROP at 24-27 weeks NWH 1995-2017**

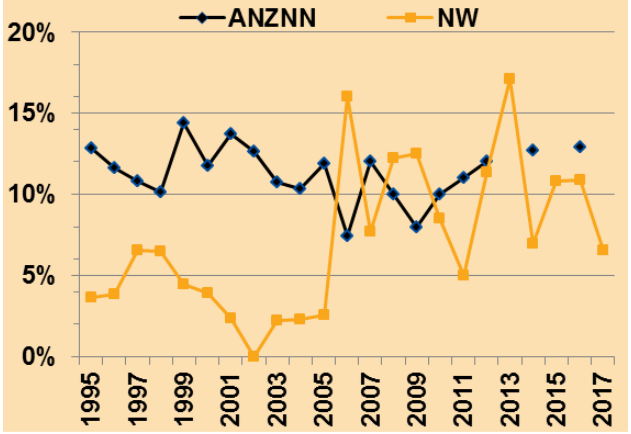
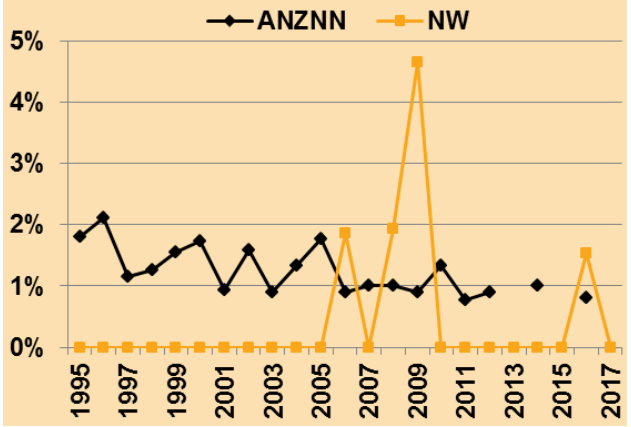



**Figure 196: Stage 3-4 ROP at 28-31 weeks NWH 1995-2017**



### Chronic lung disease (CLD) benchmarked with ANZNN

Chronic lung disease is an important clinical outcome, particularly in the very preterm population. Although a variety of definitions exist in the literature the graphs below have consistently used a rate defined by *"the use of support or oxygen at 36 weeks corrected gestation"*. ANZNN has also used this definition until 2016.

The graphs below give a 20 year outline of CLD in the ACH NICU compared with ANZNN. It has been previously noted that changes in the target oxygen saturation levels were associated with altered rates of CLD. In the late 1990s target levels were increased only then to fall in 2002 with the presentation of the BOOST trial of oxygen saturation in CLD. Between 2005 and 2011 there were no discernible major trends in the incidence of chronic lung disease. However, in 2010 the SUPPORT trial reported a higher risk of death if oxygen saturation was targeted in the range 85-89% compared with 91-95% so there has once again been a shift upwards in rates of lung disease defined by ongoing use of respiratory support or supplementary oxygen. This trend has been shown in the other ANZNN units. The rates of chronic lung disease in all babies born less than 32 weeks' gestation has shown a sustained increase since 2010.

From 2016, ANZNN data for babies born at <28 weeks gestation will be based on chronic lung disease measured quantitatively to determine physiological chronic lung disease status and to provide a comparable indicator of lung disease severity regardless of NICU practice (modified from Quine et al. 2006 Arch Dis Child Fetal Neonatal Ed 91:F409 and Walsh et al. 2004 Pediatrics 114:1305). We have started collecting these data this year and they will be included in next year's report. 2017 cases of CLD are as per ANZNN pre-2016 definition.

**Figure 197: Chronic lung disease at 24-27weeks NWH 1995-2017**

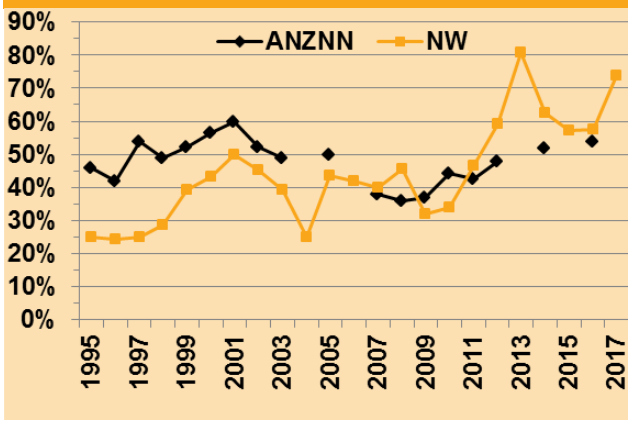
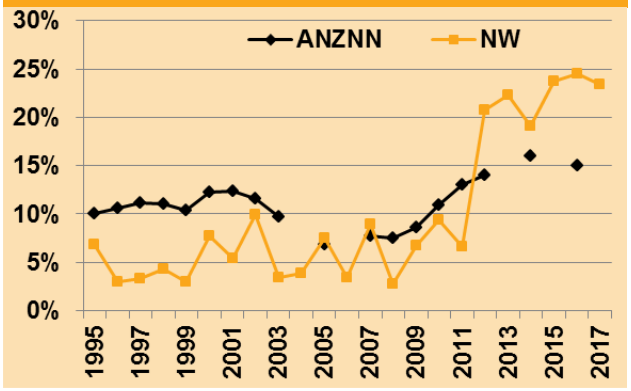



**Figure 198: Chronic lung disease at 28-31weeks NWH 1995-2017**

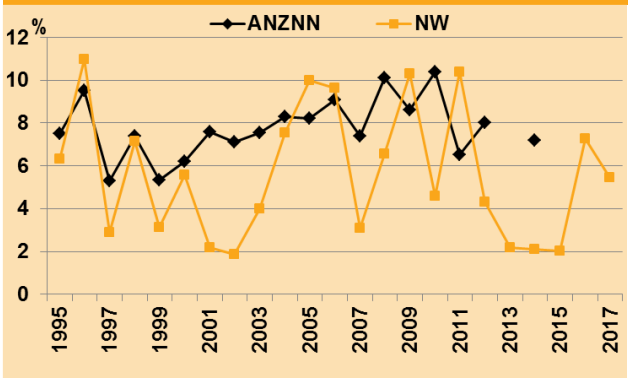



### 9.5.6 Necrotising enterocolitis benchmarked with ANZNN

The benchmarking figure below compares rates for babies below 28 weeks gestation from ACH and the ANZNN. Moderate variability in rate due to small numbers has been typical. However, probiotic use was introduced in 2011 initially as a clinical trial and more recently as a standard procedure for infants below 1500g or 32 weeks gestation so it is important to continue to observe NEC rates closely. Data for individual NEC cases by gestation and birth weight are given in **Table 195** and **Table 196** and it is notable that the rate of NEC have remained low following the introduction of probiotics.

There were six cases of NEC recorded in 2017, three among inborn and three among outborn babies, one of whom was admitted from another hospital for neurosurgical input many weeks after NEC. Five babies required surgery for NEC. There were two deaths – one was in a baby who had an acute hypoxic episode many weeks after NEC and the other was in a baby in whom NEC was complicated by meningitis and encephalomalacia.

**Figure 199: Necrotising enterocolitis (NEC) in ANZNN assigned babies under 28 weeks gestation compared with the incidence in ANZNN 1995-2017**



### 9.5.7 Patent Ductus Arteriosus (PDA) (all babies)

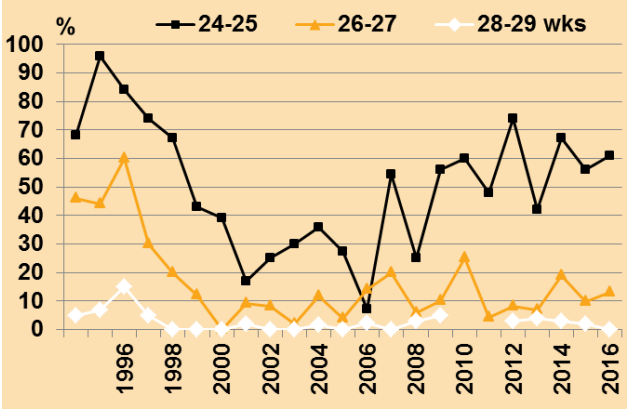
In 2017, 14 inborn infants below 30 weeks gestation were treated medically for a symptomatic PDA and one baby was treated surgically for a symptomatic PDA. Three of these infants were <23 weeks gestation and all three required two courses of medications (2X Indomethacin, 1X Indomethacin and 1X Ibuprofen, and 1X Indomethacin and 1X Paracetamol). None of these babies required surgical duct ligation. Nine babies were treated with Indomethacin, 1 with Ibuprofen and 1 baby was treated with Paractemol only. In one case, a second course (Paracetamol) was given following Indomethacin. The majority of infants who received treatment for a symptomatic PDA associated with prematurity (i.e. did not have a congenital cardiac anomaly) were less than 1000g. Infants who had a PDA ligation in association with congenital cardiac anomalies are not included here.

### 9.5.8 Pneumothorax needing drainage (all babies)

In total 15 babies developed a pneumothorax that needed drainage in 2017 (12 inborn, 3 outborn). Gestation at birth ranged 24 - 41 weeks. Six of the babies were born at <32 weeks gestation. Two infants with pneumothoraces had meconium aspiration syndrome and PPHN.

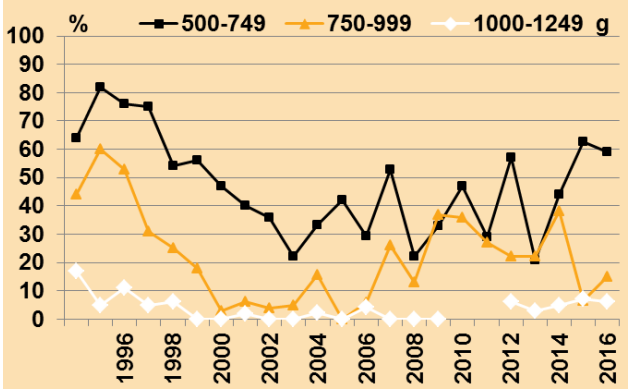
### 9.5.9 Postnatal corticosteroids (ANZNN babies)

**Figure 200: Percentage receiving postnatal dexamethasone by gestational age (ANZNN alive at one week <30wks) NWH 1995-2017**




These data are on the use of postnatal corticosteroids to treat CLD. Data on steroid use to facilitate extubation, associated with upper airway oedema are excluded. The denominator used in the figures is the number of babies alive at 1 week of age. In 2017, 16 (33%) inborn infants below 28 weeks gestation received postnatal steroids for chronic lung disease. All three infants born at 23 weeks gestation received postnatal steroids and at 24-25 weeks gestation 63% received steroids. This decreased to 10% at 26-27 weeks gestation and none of those born at >28 weeks gestation were treated with postnatal steroids. There is an intention to use steroids rationally and at the lowest required dose.

**Figure 201: Percentage receiving postnatal dexamethasone by birth weight (ANZNN alive at one week <1250g) NWH 1995-2017**




## 9.6 Immunisation

### 9.6.1 Hepatitis B

In 2017, 4 inborn infants and 1 outborn infant were exposed to HepB positive mothers and all given immunoglobulin and vaccine.

### 9.6.2 BCG

In 2017 there were no babies given BCG vaccination whilst in the neonatal unit. There is currently an interruption of BCG vaccine supply due to a global shortage.

### 9.6.3 Infrarix Hexa and Prevanar at 6 weeks

There were 82 babies who were first admitted before 40 days and discharged at or after 40 days, and who did not die so were potentially eligible for their 6 week immunisation. Only one baby whose parents declined was not immunised.

### 9.6.4 Infrarix Hexa and Prevanar at 3 months

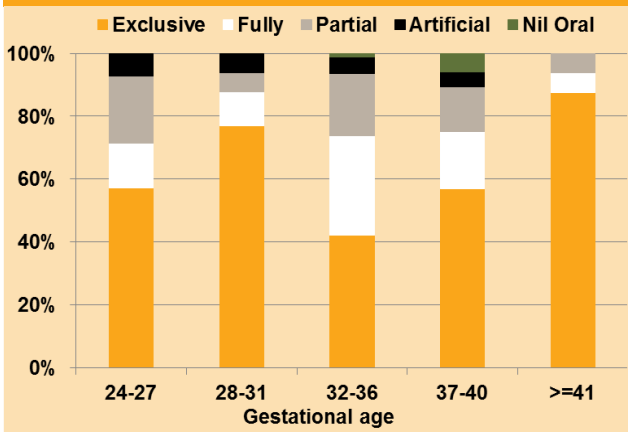
There were 18 eligible babies in 2017 who were first admitted before 90 days and finally discharged at or after 90 days, and who did not die who were potentially eligible for immunization. All received immunisation.

## 9.7 Infant Feeding (Inborn)

Data are presented on babies admitted to the NICU who were either discharged to the postnatal ward or to home. Note it is a standard of care for VLBW infants to receive human milk fortifier, which is classified as a breast milk substitute. For the purposes of this report VLBW infants who only

receive breast milk and fortifier are classified as exclusive breast feeding.

**Figure 202: Method of feeding at discharge from NICU by gestational age 2017**




The data for 2017 show that 57% of infants at 24-27 weeks' gestation received exclusive breast feeding. Over 93% of NICU infants below 28 weeks received breast milk to some degree. Rates of fully or exclusively breastfeeding are also high for the other gestational age groups. Overall these data are consistent with the high rates of breast milk feeding reported previously.

The newborn service strives to achieve a high rate of breast feeding across the range of gestational age groups. However, there are on-going and different challenges for the different groups of babies. Preterm infants born below 28 weeks gestation may be in hospital for 3 or more months and neonatal growth is a major issue. In addition, the mothers may have to express milk for many weeks before the baby is ready to breast feed, often at times of considerable stress especially if baby is unwell. Some mothers are unable to maintain their supply up to the time of infant discharge despite input and support from the staff but nevertheless have provided valuable breast milk earlier in the neonatal course. Other situations where exclusive breast feeding may not be possible are when the mother is unwell and not able to express sufficient milk to maintain supply for a relatively large well infant or in cases of twins where a mother may not have enough supply initially for both babies to receive exclusive breast milk feeds.

## 9.8 Neonatal deaths prior to NICU discharge among babies admitted to NICU

In 2017, there were 15 deaths of inborn babies (Table 203) and 3 deaths of outborn babies (Table 202). Causes of death in NICU included hypoxic ischaemic encephalopathy, congenital anomalies and infection. Infant (<12 month) deaths that occurred following transfer from NICU to Starship Hospital (or to other hospitals) are not reported here as these are largely cardiac or multiple anomalies and are reported by the Starship services involved.

## 9.9 Child Development Unit

### 9.9.1 Follow up at 2 years (corrected) of children under 1500 grams born in 2015

One hundred and thirty-three infants born in 2015 who weighed less than 1500 grams (very low birth weight) were cared for in the Newborn Service and survived to hospital discharge. Of these children:

- 37 infants (28%) weighed less than 1000 grams
- 65 infants (49%) had a gestational age of between 23 and 28 weeks
- 14 infants (11%) were SGA

One child died after discharge.

Follow up data was obtained for 99 children (74%). Information was not obtained, or not provided in this report, for 34 children for the following reasons:

- 31 children were lost to follow up either because of living overseas (3 children) or in other New Zealand centres (14 children), or the families could not be traced (9 children) or declined follow up (5 children);
- Results for two (2) children were excluded because of other confounding medical conditions;
- Results were not obtained for one (1) child who was scheduled to be assessed but had not been seen at the time of this report.

Ninety-four children received individual assessment at the Child Development Unit ("CDU"). The Bayley Scales of Infant and Toddler Development-III were administered by a registered psychologist as close as possible to the child reaching two years (corrected age). Neurological examinations were carried out by paediatricians. Results for a further five children were obtained from paediatricians, psychologists and neurodevelopmental therapists outside of the CDU. Children (n=99) were placed in outcome categories as set out in Table 160 below.

| Table 159: Outcome categories for infants under 30 months of age | | |
|---|---|---|
| **Category I** | **(Severe disability): one or more of the following** | |
| | (i) | Sensorineural deafness (requiring hearing aids) |
| | (ii) | Bilateral blindness |
| | (iii) | Severe cerebral palsy |
| | (iv) | Developmental delay (Bayley* Cognitive Score 2 or more standard deviations below mean) |
| **Category II** | **One or more of the following** | |
| | (i) | Bayley* Cognitive Score between 1 & 2 standard deviations below mean |
| | (ii) | Mild-moderate cerebral palsy without developmental (cognitive) delay |
| | (iii) | Impaired vision requiring spectacles |
| | (iv) | Conductive hearing loss requiring aids |
| **Category III**** | **Presence of tone disorder or motor delay** | |
| | | Bayley* Motor Score more than 1 standard deviation below mean (but Cognitive score within average range) |
| **Category IV** | **Normal development** | |
| | (i) | No apparent tone disorder, and |
| | (ii) | No apparent developmental delay (Bayley* Cognitive and Motor Scores within average range or above) |

*Note: Outcome categories modified from Kitchen et al, 1984, 1987.*
**Bayley Scales of Infant & Toddler Development III – all scores adjusted for gestational age.*
***Category III is included to signal that a number of preterm infants tested at an early age have minor tone disorders or motor delay. These may improve as the children mature with age and experience.*

Table 160 presents the results, using these outcome categories, for the 99 children tested at 2 years of age (corrected).

| Table 160: Outcome categories at 2 years (corrected) for children under 1500g born in 2015 (n=99) NWH | | |
|---|---|---|
| | **Number** | **Description** |
| **Category I** | 4 (4%) | 1 child with a Cognitive score of more than 2 standard deviations below the mean and with a normal range Motor score.<br>2 children with both Cognitive and Motor scores 2 or more standard deviations below the mean.<br>1 child with cerebral palsy GMFCS level 4, plus diagnosed Global Developmental Delay |
| **Category II** | 6 (6%) | 2 children with mild-moderate cerebral palsy without developmental delay.<br>1 child with Cognitive and Motor scores between 1 and 2 standard deviations below the mean.<br>3 children with Cognitive scores between 1 and 2 standard deviations below the mean and with normal range Motor scores. |
| **Category III** | 0 (0%) | |
| **Category IV** | 89 (90%) | Children with no apparent tone disorders and no apparent developmental delay. |

The distribution of the children within each Category is presented by gestational age Table 161 and by birthweight Table 162.

**Table 161: Outcome of children <1500g born in 2015 at 2 years (corrected) by gestational age groups (n=99) NWH**

| Outcome Category | Gestational age (weeks) 23 - 28 weeks n= 48 | | 29 - 35 weeks n=51 | | Total n=99 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| I | 1 | 2 | 3 | 6 | 4 | 4 |
| II | 3 | 6 | 3 | 6 | 6 | 6 |
| III | 0 | 0 | 0 | 0 | 0 | 0 |
| IV | 44 | 92 | 45 | 88 | 89 | 90 |

**Table 162: Outcome of children <1500g born in 2015 at 2 years (corrected) by birthweight groups (n=99) NWH**

| Outcome Category | Birthweight (grams) <1000g n=29 | | 1000 – 1499g n=70 | | Total n=99 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| I | 2 | 7 | 2 | 3 | 4 | 4 |
| II | 2 | 7 | 4 | 6 | 6 | 6 |
| III | 0 | 0 | 0 | 0 | 0 | 0 |
| IV | 25 | 86 | 64 | 91 | 89 | 90 |

The distribution by Category for this 2015 (2 year old) cohort is compared with NWH outcomes since 2001 in Figure 203.

**Figure 203: Outcome at 24 months (corrected age) of children <1500g birthweight born 2001-2015 NWH**

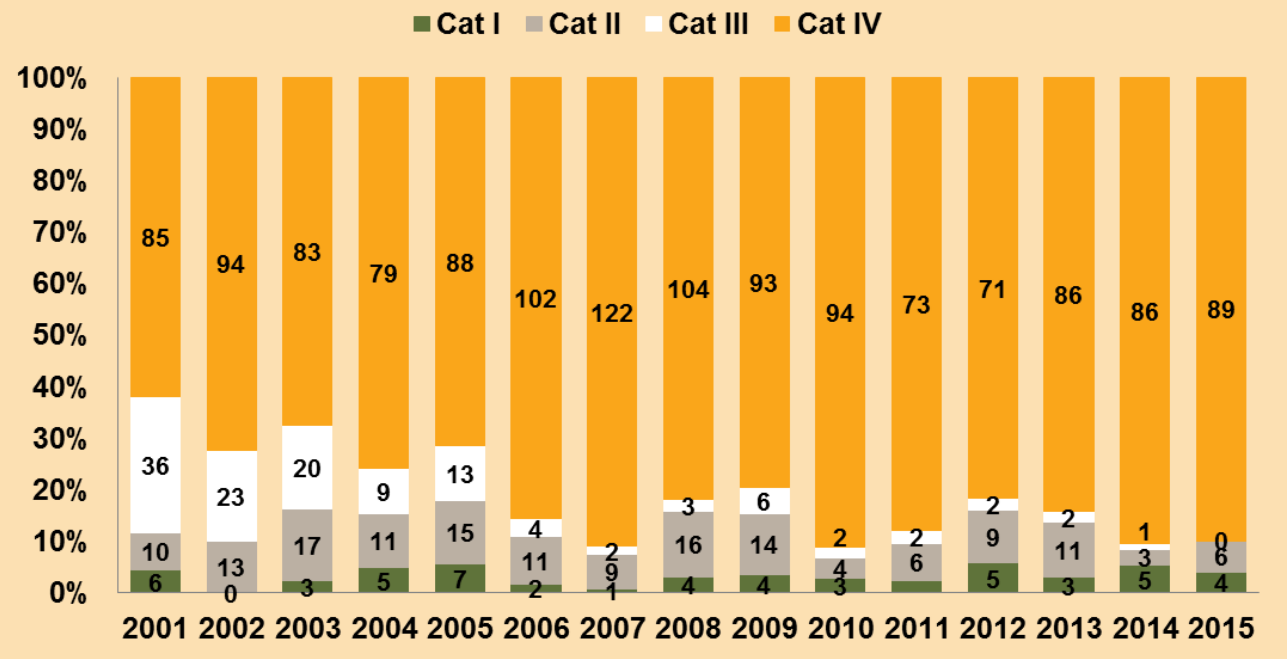
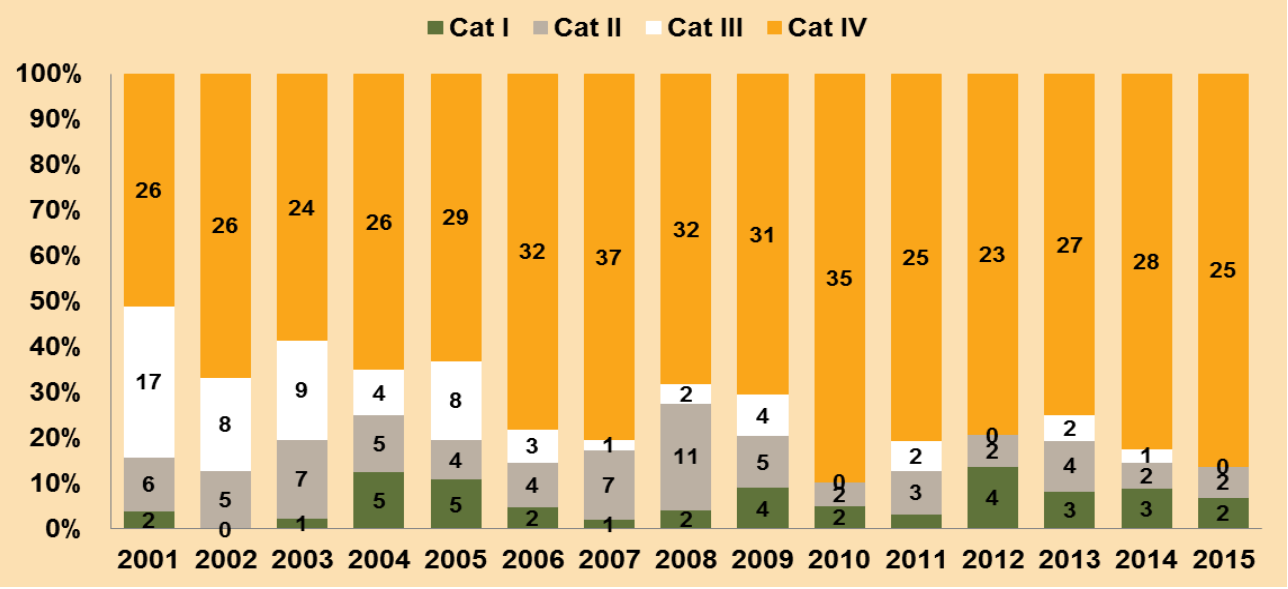



Figure 204 presents a comparison of the distribution by Category for babies weighing under 1000 grams at birth, from 2001 to 2015.

**Figure 204: Outcome at 24 months (corrected age) of children <1000g birthweight born 2001-2015 NWH**




### 9.9.2 Development at 4 years of children under 1500g born in 2013

One hundred and thirty-three children born in 2013 who weighed less than 1500 grams were cared for in the Newborn Service and survived to hospital discharge. Of these children:

- 50 infants (38%) weighed less than 1000 grams
- 67 infants (50%) had a gestational age of between 24 and 28 weeks.
- 16 infants (12%) were SGA.

At four years of age data was obtained for 92 children (69%). Information was not able to be obtained for 41 children for the following reasons:

- One child was born overseas and was not admitted to NICU until day 51. Results are excluded from this report;
- Six children were diagnosed with Autistic Spectrum Disorder and results are excluded;
- One child was scheduled to be seen but had not been assessed at the time of going to print;
- 33 children were not tested either because they were living overseas (13 children), living in other New Zealand centres (7 children), unable to be traced (9 children), or parents declined follow up (4 children);

Of the 92 children for whom outcome data was obtained, 90 attended at the CDU and were individually assessed by a registered psychologist who interviewed parents, administered standardised tests and carried out clinical assessments. Two children could not be assessed directly because of distance from home to National Women's and for these two children, reports were obtained from paediatricians, psychologists and other professionals monitoring the children's progress. The results for 92 children were then placed in Outcome Categories as set out in Table 163.

**Table 163: Outcome categories at 4 years**

| | | |
|---|---|---|
| **Category I** | **(Severe disability): one or more of the following** | |
| | (i) | Sensorineural deafness (requiring hearing aids) |
| | (ii) | Bilateral blindness |
| | (iii) | Severe cerebral palsy |
| | (iv) | Stanford-Binet* Composite Score (Full Scale IQ) 2 or more standard deviations below mean |
| **Category II** | **One or more of the following:** | |
| | (i) | Mild-moderate cerebral palsy |
| | (ii) | Stanford-Binet* Composite Score (Full Scale IQ) between 1 & 2 standard deviations below mean. |
| **Category III** | | Motor Skills† Standard Score more than one standard deviation below mean |
| **Category IV** | Normal development i.e. none of the above | |

* *The Stanford-Binet Intelligence Scales 5th edition*

† *Vineland Adaptive Behavior Scales, 2005*: Motor Skills Domain.

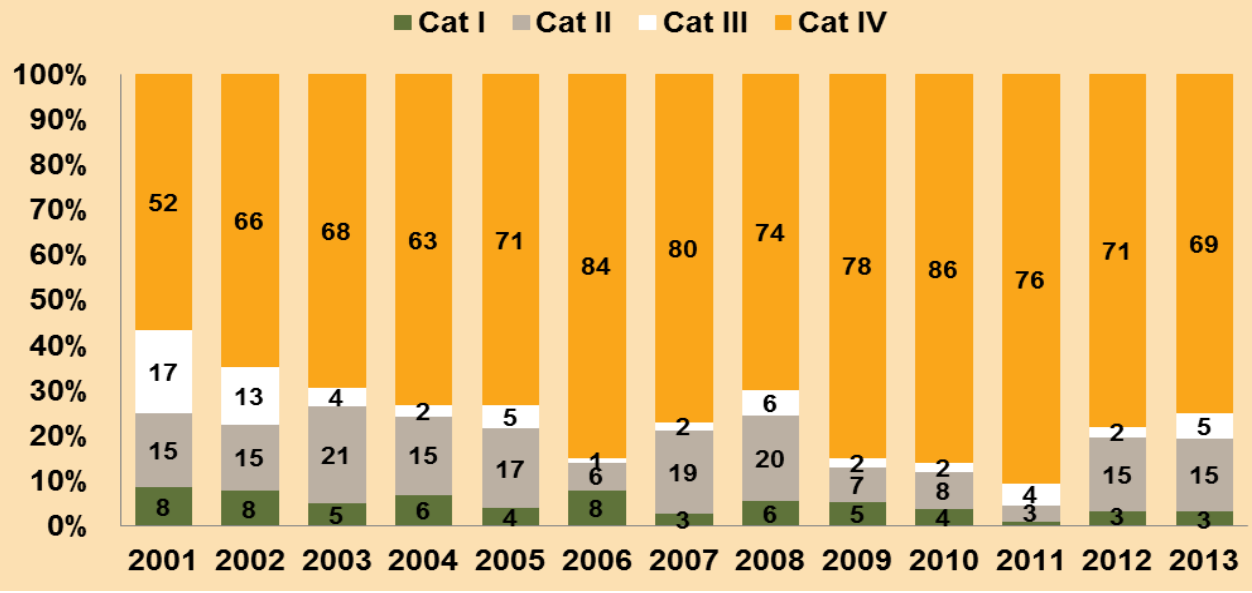
Using these Categories the results for the 92 children are presented in Table 164 below.

**Table 164: Outcome categories at 4 years for children under 1500g born 2013 (n=92)**

| | Number | Description |
|---|---|---|
| **Category I** | 3 (3.3%) | 3 children each with a Full Scale IQ score greater than 2 standard deviations below the mean and Motor Scores 2 or more standard deviations below the mean. |
| **Category II** | 15 (16.3%) | 7 children with mild-moderate cerebral palsy (1 of whom wears prescription glasses and uses hearing aids)<br>1 child with bilateral optic nerve hypoplasia<br>1 child who wears prescription glasses, with a Full-Scale IQ score within the average range<br>5 children with Full-Scale IQ scores between 1 and 2 standard deviations below the mean and average Motor scores<br>1 child with Full-Scale IQ score between 1 and 2 standard deviations below the mean and a Motor Score between 1 and 2 standard deviations below the mean. |
| **Category III** | 5 (5.4%) | 5 children with Motor Scores more than 1 standard deviation below the mean and Cognitive scores within the average range |
| **Category IV** | 69 (75%) | |

Figure 205 provides a comparison of the distribution by Category of the (above) 2013 cohort with outcomes for the period 2001 to 2013:

**Figure 205: Outcome at 4 years of children <1500g birthweight born 2001-2013 NWH**




## SGA

Of the total cohort of 133 born in 2013, sixteen (12%) children were identified as being SGA at birth. At four years outcome data were obtained for eleven of these sixteen SGA children. Seven of the eleven children (64%) were placed in Category IV indicating normal cognitive and motor development at that stage. A further two children (18%) were placed in Category Three. One child (9%) was placed in Category II and one child (9%) in Category One.

## Autistic Spectrum Disorders

By the age of four years six of the 133 cohort children (4.5%) were diagnosed with Autistic Spectrum Disorder ("ASD"). At the time of publication, two further four-year old children have been referred for paediatric assessment for possible ASD. Because no diagnosis has been made, these two children are not included in the ASD results. The NW cohort numbers are small but at 4.5% the incidence for this population appears to be slightly higher than the 1:100 incidence thought to occur in the wider New Zealand population:

https://www.health.govt.nz/your-health/conditions-and-treatments/disabilities/autism-spectrum-disorder (Website updated 21 April 2017)

## Summary

Babies weighing less than 1500 grams at birth are identified in the literature as being at risk for

developmental problems. In 2017 the Child Development Unit assessed or received information on the developmental outcomes for 99 two-year old children born in 2015 with a very low birthweight and for 92 four-year old very low birthweight children born in 2013.

Outcome data for the children at two years indicated that 90% of this population had no apparent tone abnormalities or developmental delays. Four percent of the cohort presented with severe disabilities. A further 6% demonstrated mild or moderate disabilities.

For the four year old children results indicated that 75% were within the average range for cognitive and motor abilities. This increases to 80% if Category Three children with average cognitive skills and low average motor skills are included. Three children (3%) had a severe disability. A further 16% presented with moderate disabilities, generally involving mild/moderate cerebral palsy and/or below average cognitive scores.

## 9.10 Data table: Newborn services

**Table 165: Characteristics of <32 week or <1500g babies cared for at NWH NICU by ANZNN status 2016**

| | | | 32 weeks or <1500g | | | |
|---|---|---|---|---|---|---|
| | Total N=168 | | ANZNN n=153 | | Non ANZNN n=15 | |
| | N | % | n | % | n | % |
| **Gestation (weeks)** | | | | | | |
| <24 | 3 | 2 | 3 | 2 | 0 | 0 |
| 24-25 | 24 | 14 | 20 | 13 | 4 | 27 |
| 26-27 | 36 | 21 | 32 | 21 | 4 | 27 |
| 28-29 | 35 | 21 | 31 | 20 | 4 | 27 |
| 30-31 | 52 | 31 | 49 | 32 | 3 | 20 |
| 32-36 | 17 | 10 | 17 | 11 | 0 | 0 |
| >36 | 1 | 1 | 1 | 1 | 0 | 0 |
| **Weight (g)** | | | | | | |
| 500-749 | 20 | 12 | 18 | 12 | 2 | 13 |
| 750-999 | 40 | 24 | 36 | 24 | 4 | 27 |
| 1000-1249 | 37 | 22 | 31 | 20 | 6 | 40 |
| 1250-1499 | 40 | 24 | 38 | 25 | 2 | 13 |
| 1500-1999 | 27 | 16 | 26 | 17 | 1 | 7 |
| 2000-2499 | 4 | 2 | 4 | 3 | 0 | 0 |
| **Birthplace** | | | | | | |
| National Women's | 138 | 82 | 138 | 90 | 0 | 0 |
| Northland | 2 | 1 | 2 | 1 | 0 | 0 |
| Waitemata DHB | 11 | 7 | 11 | 7 | 0 | 0 |
| Counties Manukau DHB | 10 | 6 | 0 | 0 | 10 | 67 |
| Born before arrival/homebirth | 3 | 2 | 2 | 1 | 1 | 7 |
| Other | 4 | 2 | 0 | 0 | 4 | 27 |

## 9.11 Data tables: NICU Occupancy

**Table 166: Occupancy (baby days) on NICU 2004–2017**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Baby days** | 14958 | 14541 | 14212 | 15228 | 15296 | 15236 | 14982 | 14877 | 14461 | 14296 | 14070 | 13060 | 13779 | 12430 |

**Table 167: Occupancy (baby-days) for NICU by gestational age 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 15228 | 15296 | 15236 | 14982 | 14877 | 14661 | 14296 | 14070 | 13050 | 13743 | 12430 |
| **<28** | 4282 | 4546 | 4129 | 4133 | 4302 | 3563 | 3774 | 3956 | 3370 | 3305 | 3851 |
| **28-31** | 3490 | 4170 | 4137 | 4230 | 3336 | 3684 | 3228 | 3153 | 3157 | 3582 | 2735 |
| **32-36** | 5423 | 4750 | 4844 | 4519 | 4736 | 4752 | 4713 | 4362 | 4066 | 4271 | 3812 |
| **≥37** | 2033 | 1830 | 2126 | 2100 | 2503 | 2462 | 2581 | 2599 | 2457 | 2585 | 2031 |

**Table 168: Occupancy (baby-days) for NICU by birth weight 2007-2017**

| Weight(g) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 15228 | 15296 | 15236 | 14982 | 14877 | 14461 | 14296 | 14070 | 13060 | 13779 | 12430 |
| **<1500** | 7618 | 7584 | 7996 | 7563 | 6988 | 6583 | 6517 | 6302 | 6059 | 6866 | 6305 |
| **1500-1999** | 2489 | 3071 | 2620 | 2662 | 2658 | 2951 | 2606 | 2687 | 2530 | 2169 | 2254 |
| **2000-2499** | 2384 | 2432 | 1953 | 2005 | 2592 | 2009 | 2031 | 2209 | 1661 | 1697 | 1498 |
| **≥2500** | 2737 | 2209 | 2667 | 2752 | 2639 | 2918 | 3142 | 2872 | 2810 | 3047 | 2373 |

## 9.12 Data tables: Admissions to NICU

**Table 169: NICU admissions by year 2004-2017**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number** | 975 | 906 | 890 | 972 | 939 | 957 | 902 | 963 | 1000 | 930 | 910 | 925 | 898 | 832 |

**Table 170: Admissions of inborn babies to NICU by birth weight 2007-2017**

| Birth Weight (g) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total (n)** | **870** | **822** | **820** | **791** | **839** | **872** | **831** | **809** | **825** | **797** | **720** |
| **<500** | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| **500-749** | 19 | 19 | 15 | 23 | 20 | 14 | 13 | 19 | 16 | 21 | 18 |
| **750-999** | 37 | 37 | 42 | 29 | 24 | 25 | 32 | 23 | 21 | 31 | 32 |
| **1000-1249** | 47 | 35 | 31 | 39 | 25 | 35 | 29 | 37 | 39 | 42 | 29 |
| **1250-1499** | 51 | 52 | 49 | 50 | 42 | 48 | 46 | 40 | 48 | 41 | 35 |
| **1500-1999** | 130 | 135 | 126 | 110 | 110 | 132 | 112 | 102 | 109 | 110 | 98 |
| **2000-2499** | 188 | 180 | 155 | 135 | 176 | 169 | 152 | 145 | 131 | 124 | 96 |
| **2500-2999** | 139 | 118 | 117 | 126 | 129 | 118 | 115 | 121 | 124 | 114 | 114 |
| **3000-3999** | 198 | 212 | 246 | 226 | 259 | 277 | 270 | 270 | 288 | 269 | 263 |
| **≥4000** | 60 | 34 | 39 | 51 | 54 | 53 | 62 | 51 | 49 | 45 | 35 |

**Table 171: Admissions of inborn babies to NICU by gestational age 2007-2017**

| Gestation (weeks) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **870** | **822** | **820** | **791** | **839** | **872** | **831** | **809** | **825** | **797** | **720** |
| **23** | 5 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 4 | 3 |
| **24** | 4 | 8 | 9 | 13 | 8 | 7 | 7 | 12 | 6 | 11 | 8 |
| **25** | 13 | 16 | 12 | 15 | 8 | 13 | 10 | 7 | 9 | 9 | 10 |
| **26** | 18 | 17 | 15 | 10 | 14 | 7 | 13 | 14 | 14 | 10 | 11 |
| **27** | 18 | 17 | 20 | 20 | 11 | 13 | 8 | 13 | 17 | 18 | 19 |
| **28** | 21 | 13 | 19 | 16 | 16 | 16 | 21 | 11 | 17 | 23 | 10 |
| **29** | 26 | 29 | 20 | 21 | 15 | 31 | 15 | 15 | 17 | 25 | 18 |
| **30** | 27 | 37 | 22 | 36 | 22 | 25 | 21 | 37 | 23 | 18 | 10 |
| **31** | 33 | 43 | 30 | 33 | 28 | 30 | 31 | 26 | 31 | 25 | 31 |
| **32** | 46 | 40 | 42 | 29 | 42 | 34 | 43 | 25 | 43 | 26 | 41 |
| **33** | 63 | 48 | 65 | 59 | 44 | 53 | 66 | 46 | 40 | 49 | 37 |
| **34** | 114 | 90 | 82 | 90 | 96 | 96 | 77 | 65 | 83 | 66 | 66 |
| **35** | 82 | 83 | 69 | 55 | 68 | 81 | 62 | 68 | 46 | 45 | 47 |
| **36** | 72 | 70 | 57 | 51 | 55 | 70 | 60 | 70 | 60 | 67 | 44 |
| **37** | 59 | 54 | 64 | 58 | 72 | 61 | 65 | 67 | 70 | 68 | 55 |
| **38** | 81 | 86 | 89 | 93 | 84 | 111 | 92 | 105 | 99 | 104 | 86 |
| **39** | 68 | 68 | 77 | 67 | 107 | 99 | 92 | 98 | 110 | 101 | 112 |
| **40** | 74 | 70 | 83 | 78 | 78 | 76 | 98 | 80 | 93 | 90 | 85 |
| **41** | 39 | 23 | 38 | 41 | 59 | 41 | 46 | 46 | 43 | 34 | 27 |
| **42** | 6 | 10 | 6 | 6 | 10 | 8 | 3 | 4 | 4 | 4 | 0 |
| **43** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Table 172: Admissions of outborn babies to NICU by birth weight 2007-2017

| Birth Weight (g) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **102** | **117** | **137** | **111** | **124** | **128** | **99** | **101** | **100** | **101** | **112** |
| **<500** | | 1 | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **500-749** | 8 | 7 | 4 | 5 | 3 | 4 | 2 | 3 | 1 | 0 | 2 |
| **750-999** | 11 | 7 | 17 | 11 | 10 | 5 | 9 | 2 | 3 | 2 | 8 |
| **1000-1249** | 6 | 13 | 15 | 8 | 10 | 7 | 4 | 1 | 5 | 5 | 8 |
| **1250-1499** | 4 | 7 | 8 | 7 | 5 | 8 | 9 | 6 | 10 | 6 | 5 |
| **1500-1999** | 10 | 16 | 8 | 10 | 15 | 13 | 12 | 10 | 7 | 11 | 15 |
| **2000-2499** | 8 | 12 | 12 | 10 | 14 | 9 | 12 | 11 | 16 | 16 | 14 |
| **2500-2999** | 13 | 13 | 12 | 10 | 14 | 22 | 16 | 14 | 13 | 9 | 14 |
| **3000-3999** | 33 | 31 | 50 | 37 | 41 | 50 | 27 | 44 | 38 | 39 | 37 |
| **≥4000** | 9 | 10 | 11 | 12 | 12 | 9 | 8 | 10 | 7 | 13 | 9 |

## Table 173: Admissions of outborn babies to NICU by gestational age 2007-2017

| Gestation (weeks) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **102** | **117** | **137** | **111** | **124** | **128** | **99** | **101** | **100** | **101** | **112** |
| **22** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **23** | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| **24** | 5 | 3 | 4 | 4 | 6 | 1 | 1 | 3 | 0 | 1 | 2 |
| **25** | 6 | 7 | 3 | 4 | 1 | 4 | 4 | 1 | 2 | 1 | 4 |
| **26** | 5 | 5 | 11 | 3 | 5 | 3 | 5 | 2 | 1 | 0 | 5 |
| **27** | 6 | 5 | 4 | 7 | 4 | 4 | 2 | 0 | 3 | 5 | 1 |
| **28** | 3 | 2 | 10 | 7 | 3 | 5 | 2 | 1 | 4 | 1 | 5 |
| **29** | 5 | 4 | 6 | 5 | 6 | 4 | 3 | 1 | 3 | 3 | 2 |
| **30** | 1 | 8 | 2 | 2 | 4 | 4 | 4 | 4 | 3 | 1 | 8 |
| **31** | 3 | 2 | 3 | 0 | 3 | 2 | 6 | 4 | 2 | 5 | 3 |
| **32** | 2 | 8 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 4 |
| **33** | 4 | 1 | 7 | 4 | 6 | 6 | 1 | 4 | 5 | 5 | 4 |
| **34** | 4 | 6 | 3 | 3 | 4 | 7 | 4 | 5 | 6 | 5 | 8 |
| **35** | 4 | 8 | 5 | 4 | 5 | 4 | 6 | 4 | 5 | 5 | 5 |
| **36** | 4 | 4 | 10 | 5 | 4 | 7 | 5 | 5 | 7 | 2 | 3 |
| **37** | 9 | 8 | 11 | 9 | 8 | 13 | 12 | 6 | 12 | 7 | 9 |
| **38** | 10 | 5 | 8 | 12 | 9 | 17 | 5 | 12 | 13 | 14 | 13 |
| **39** | 9 | 8 | 5 | 9 | 15 | 13 | 13 | 15 | 10 | 14 | 8 |
| **40** | 9 | 22 | 30 | 17 | 19 | 18 | 19 | 18 | 12 | 22 | 17 |
| **41** | 9 | 7 | 11 | 11 | 17 | 12 | 2 | 13 | 9 | 7 | 9 |
| **42** | 4 | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |

## Table 174: Domicile of mother of all babies admitted to NICU 2011-2017

| | 2011 n=963 | | 2012 n=1000 | | 2013 n=930 | | 2014 n=910 | | 2015 n=925 | | 2016 n=898 | | 2017 n=832 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| **Northern Region** | 892 | 92.6 | 915 | 91.5 | 856 | 92.0 | 892 | 92.6 | 915 | 91.5 | 856 | 92.0 | 732 | 88.0 |
| Auckland | 491 | 51.0 | 489 | 48.9 | 449 | 48.3 | 491 | 51.0 | 489 | 48.9 | 449 | 48.3 | 392 | 47.1 |
| Counties Manukau | 121 | 12.6 | 141 | 14.1 | 141 | 15.2 | 121 | 12.6 | 141 | 14.1 | 141 | 15.2 | 124 | 14.9 |
| Waitemata | 239 | 24.8 | 236 | 23.6 | 222 | 23.9 | 239 | 24.8 | 236 | 23.6 | 222 | 23.9 | 184 | 22.1 |
| Northland | 41 | 4.3 | 49 | 4.9 | 44 | 4.7 | 41 | 4.3 | 49 | 4.9 | 44 | 4.7 | 32 | 3.8 |
| **Midland** | 24 | 2.5 | 33 | 3.3 | 24 | 2.6 | 24 | 2.5 | 33 | 3.3 | 24 | 2.6 | 39 | 4.7 |
| **Central** | 12 | 1.2 | 23 | 2.3 | 26 | 2.8 | 12 | 1.3 | 10 | 1.2 | 14 | 1.1 | 28 | 3.4 |
| **Southern** | 15 | 1.6 | 20 | 2.0 | 11 | 1.2 | 13 | 1.4 | 20 | 2.2 | 20 | 2 | 19 | 2.3 |
| **Overseas** | 0 | | 0 | | 0 | | 0 | | 2 | 0.4 | 0 | 0.4 | 0 | |
| **Missing** | 20 | 2.0 | 9 | 0.9 | 13 | 1.4 | 33 | 3.6 | 9 | 1.0 | 9 | 1.8 | 14 | 1.7 |

**Table 175: DHB of mothers of all babies admitted to NICU 2017**

| DHB | 2017 n=832 | | DHB | 2017 n=832 | |
|---|---|---|---|---|---|
| | n | % | | n | % |
| Auckland | 392 | 47.1 | Hawkes Bay | 6 | 0.7 |
| Counties Manukau | 124 | 14.9 | Mid-Central | 5 | 0.6 |
| Waitemata | 184 | 22.1 | Hutt | 5 | 0.6 |
| Northland | 32 | 3.9 | Capital & Coast | 9 | 1.1 |
| Waikato | 17 | 2.0 | Nelson Marlborough | 1 | 0.1 |
| Bay of Plenty | 7 | 0.8 | Canterbury | 12 | 1.4 |
| Wairarapa | 0 | | South Canterbury | 1 | 0.1 |
| Tairawhiti | 3 | 0.4 | Southern | 5 | 0.6 |
| Taranaki | 8 | 1.0 | West Coast | 1 | 0.1 |
| Lakes | 4 | 0.5 | Overseas | 0 | |

*14 missing DHB

**Table 176: Prioritised ethnicity of babies admitted to NICU 2017**

| | Preterm (<37 weeks) N=466 | | Term (>=37 weeks) N=366 | | Total N=832 | |
|---|---|---|---|---|---|---|
| | N | % | n | % | n | % |
| NZ European | 125 | 26.8 | 112 | 30.6 | 237 | 28.5 |
| Māori | 84 | 18.0 | 56 | 15.3 | 140 | 16.8 |
| Pacific | 74 | 15.9 | 44 | 12.0 | 118 | 14.2 |
| Other Asian | 77 | 16.5 | 66 | 18.0 | 143 | 17.2 |
| Indian | 44 | 9.4 | 42 | 11.5 | 86 | 10.3 |
| MELAA | 44 | 9.4 | 34 | 9.3 | 78 | 9.4 |
| Other European | 18 | 3.9 | 12 | 3.3 | 30 | 3.6 |

**Table 177: Main reason for admission to NICU 2017**

| | Preterm N=466 | | Term N=366 | | Total N=832 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| Prematurity | 267 | 57.3 | 0 | 0.0 | 267 | 32.4 |
| Respiratory distress | 83 | 17.8 | 151 | 41.3 | 234 | 28.4 |
| Congenital abnormality | 44 | 9.4 | 111 | 30.3 | 155 | 18.8 |
| Hypoglycaemia | 6 | 1.3 | 12 | 3.3 | 18 | 2.2 |
| Depression at birth | 5 | 1.1 | 11 | 3.0 | 16 | 1.9 |
| SGA | 14 | 3.0 | 5 | 1.4 | 19 | 2.3 |
| Cyanotic episode | 3 | 0.6 | 10 | 2.7 | 13 | 1.6 |
| Suspected infection | 3 | 0.6 | 8 | 2.2 | 11 | 1.3 |
| Neurological problem | 11 | 2.4 | 5 | 1.4 | 16 | 1.9 |
| Haemolytic disease | 2 | 0.4 | 3 | 0.8 | 5 | 0.6 |
| Feeding difficulty | 1 | 0.2 | 2 | 0.5 | 3 | 0.4 |
| Bile stained vomiting | 6 | 1.3 | 0 | 0.0 | 6 | 0.7 |
| Jaundice | 1 | 0.2 | 3 | 0.8 | 4 | 0.5 |
| Other | 20 | 4.3 | 45 | 12.3 | 58 | 7.0 |

## 9.13 Data tables: Antenatal corticosteroids

**Table 178: Percentage receiving antenatal corticosteroids by birth weight among ANZNN assigned babies 2014-2017**

| Birth weight (g) | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | 1-7d | Any | N | 1-7d | Any | N | 1-7d | Any | N | 1-7d | Any |
| | n | % | % | n | % | % | n | % | % | n | n(%) | n(%) |
| Total | 126 | 63 | 95 | 136 | 62 | 88 | 140 | 69 | 94 | 123 | 80(65) | 113(92) |
| <500 | 1 | 100 | 100 | 0 | 0 | 0 | 0 | | | | | |
| 500-749 | 20 | 70 | 100 | 16 | 88 | 100 | 21 | 81 | 100 | 18 | 13(72) | 18(100) |
| 750-999 | 24 | 46 | 96 | 23 | 52 | 91 | 31 | 68 | 97 | 36 | 21(58) | 34(94) |
| 1000-1249 | 37 | 76 | 97 | 42 | 57 | 88 | 44 | 70 | 89 | 31 | 20(65) | 27(87) |
| 1250-1499 | 44 | 59 | 91 | 55 | 62 | 84 | 44 | 64 | 95 | 38 | 26(68) | 34(89) |

**Table 179: Percentage receiving antenatal corticosteroids by gestational age among ANZNN assigned babies (2014-2017)**

| Gestation (weeks) | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | 1-7d | N | 1-7d | N | 1-7d | N | 1-7d | Any | N | 1-7d | Any |
| | n | % | n | % | n | % | n | % | % | n | % | % |
| **Total** | 144 | 60 | 94 | 146 | 56 | 89 | 152 | 65 | 91 | 135 | 82(61) | 124(92) |
| **<24** | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 25 | 100 | 3 | 2(67) | 3(100) |
| **24-25** | 20 | 60 | 100 | 15 | 73 | 100 | 20 | 75 | 100 | 20 | 13(65) | 19(95) |
| **26-27** | 28 | 71 | 100 | 34 | 53 | 91 | 31 | 71 | 90 | 32 | 17(53) | 30(94) |
| **28-29** | 28 | 64 | 96 | 39 | 51 | 74 | 50 | 70 | 94 | 31 | 22(71) | 30(97) |
| **30-31** | 68 | 53 | 88 | 58 | 57 | 95 | 47 | 55 | 85 | 49 | 28(57) | 42(86) |

## 9.14 Data tables: Care and complications

### 9.14.1 Hypoxic ischaemic encephalopathy (inborn babies)

**Table 180: Details of inborn hypoxic ischaemic encephalopathy (HIE) Stages 2 or 3 2017**

| Place of Birth | Gestation | Birth Weight | HIE stage | Apgar 1/5 | Comment |
|---|---|---|---|---|---|
| L8 Theatre | 40 | 4075 | 3 | 1/2 | Em LSCS for prolonged fetal bradycardia. Received therapeutic hypothermia. |
| L9 Theatre | 36 | 2620 | 3 | 0/6 | Em LSCS following reduced fetal movements. Stage 3 HIE. Neonatal death following re-direction of care. |

### 9.14.2 Intraventricular haemorrhage

**Table 181: Intraventricular haemorrhage by birth weight 2017 (benchmarked with ANZNN)**

| Birth Weight (g) | N | Unknown | None | Grade 1 | Grade 2 | Grade 3 | Grade 4 |
|---|---|---|---|---|---|---|---|
| **Total** | **153** | **33** | **96** | **14** | **3** | **1** | **6** |
| **500-749** | 18 | 0 | 14 | 2 | 0 | 0 | 2 |
| **750-999** | 36 | 0 | 26 | 4 | 2 | 1 | 3 |
| **1000-1249** | 31 | 1 | 26 | 4 | 0 | 0 | 0 |
| **1250-1499** | 38 | 16 | 19 | 2 | 0 | 0 | 1 |
| **1500-1999** | 26 | 14 | 9 | 2 | 1 | 0 | 0 |
| **2000-2499** | 4 | 2 | 2 | 0 | 0 | 0 | 0 |

**Table 182: Intraventricular haemorrhage by gestation 2017 (benchmarked with ANZNN)**

| Gestation (weeks) | N | Unknown | None | Grade 1 | Grade 2 | Grade 3 | Grade 4 |
|---|---|---|---|---|---|---|---|
| Total | **153** | **33** | **96** | **14** | **3** | **1** | **6** |
| **<24** | 3 | 0 | 2 | 1 | 0 | 0 | 0 |
| **24-25** | 20 | 0 | 12 | 2 | 2 | 1 | 3 |
| **26-27** | 32 | 0 | 27 | 3 | 0 | 0 | 2 |
| **28-29** | 31 | 0 | 26 | 4 | 0 | 0 | 1 |
| **30-31** | 49 | 23 | 21 | 4 | 1 | 0 | 0 |
| **32-36** | 17 | 9 | 8 | 0 | 0 | 0 | 0 |
| **>36** | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

**Table 183: Intraventricular haemorrhage in all <1250g babies admitted to NICU 1990-2017**

| Year | Total | Unknown | None | Grade 1 | Grade 2 | Grade 3 | Grade 4 |
|---|---|---|---|---|---|---|---|
| **1990** | 98 | 16 | 59 | 8 | 5 | 4 | 6 |
| **1991** | 125 | 14 | 81 | 16 | 4 | 2 | 8 |
| **1992** | 103 | 11 | 68 | 8 | 4 | 7 | 5 |
| **1993** | 114 | 7 | 82 | 6 | 10 | 3 | 6 |
| **1994** | 117 | 13 | 75 | 13 | 8 | 4 | 4 |
| **1995** | 121 | 11 | 82 | 12 | 8 | 1 | 7 |
| **1996** | 127 | 10 | 95 | 7 | 3 | 3 | 9 |
| **1997** | 117 | 12 | 82 | 9 | 4 | 3 | 7 |
| **1998** | 90 | 7 | 66 | 7 | 4 | 0 | 6 |
| **1999** | 121 | 6 | 93 | 13 | 3 | 0 | 6 |
| **2000** | 116 | 5 | 88 | 7 | 5 | 2 | 9 |
| **2001** | 122 | 5 | 95 | 16 | 4 | 0 | 2 |
| **2002** | 116 | 3 | 97 | 7 | 3 | 1 | 5 |
| **2003** | 97 | 0 | 85 | 2 | 3 | 0 | 7 |
| **2004** | 96 | 1 | 83 | 4 | 1 | 3 | 4 |
| **2005** | 117 | 3 | 94 | 4 | 10 | 3 | 3 |
| **2006** | 99 | 8 | 75 | 8 | 3 | 0 | 5 |
| **2007** | 129 | 5 | 95 | 7 | 10 | 4 | 8 |
| **2008** | 101 | 0 | 77 | 14 | 3 | 3 | 4 |
| **2009** | 124 | 17 | 85 | 3 | 7 | 3 | 9 |
| **2010** | 118 | 18 | 80 | 5 | 7 | 5 | 3 |
| **2011** | 92 | 12 | 56 | 8 | 2 | 7 | 7 |
| **2012** | 92 | 13 | 63 | 9 | 4 | 0 | 3 |
| **2013** | 89 | 8 | 58 | 12 | 3 | 3 | 5 |
| **2014** | 86 | 8 | 59 | 13 | 1 | 1 | 4 |
| **2015** | 85 | 9 | 66 | 5 | 1 | 1 | 3 |
| **2016** | 102 | 0 | 79 | 11 | 5 | 3 | 3 |
| **2017** | 97 | 0 | 76 | 11 | 3 | 1 | 5 |

### 9.14.3 Assisted ventilation

**Table 184: Number of babies on assisted ventilation (inborn) NWH 2004-2017**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Any ventilation** | 402 | 395 | 384 | 444 | 446 | 455 | 453 | 469 | 482 | 501 | 501 | 522 | 478 | 449 |
| **IPPV** | 123 | 140 | 96 | 141 | 145 | 134 | 184 | 154 | 154 | 154 | 149 | 122 | 131 | 146 |
| **CPAP** | 388 | 367 | 374 | 419 | 415 | 423 | 418 | 427 | 441 | 443 | 462 | 476 | 437 | 397 |
| **HFOV** | | | 11 | 18 | 21 | 22 | 11 | 17 | 20 | 19 | 19 | 29 | 20 | 33 |
| **HiFlow** | | | | | | | | 63 | 125 | 121 | 170 | 176 | 195 | 189 |

**Table 185: HFOV and inhaled nitric oxide (iNO) use and survival NWH 2017**

| | HFOV | | iNO | | HFOV + iNO | |
|---|---|---|---|---|---|---|
| | Treated n | Survivors n(%) | Treated n | Survivors n(%) | Treated n | Survivors n(%) |
| **Total** | **42** | **34(81)** | **36** | **30(83)** | **21** | **17(81)** |
| **<28 weeks** | 20 | 15(75) | 12 | 9(75) | 12 | 9(75) |
| **28-31 weeks** | 5 | 5(100) | 4 | 3(75) | 2 | 2(100) |
| **32-36 weeks** | 7 | 4(57) | 5 | 4(80) | 2 | 1(50) |
| **≥37 weeks** | 10 | 10(100) | 15 | 14(93) | 5 | 5(100) |

**Table 186: High Frequency Oscillatory Ventilation 2007-2017**

| Gestation (wks) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 19/23 | 15/27 | 15/29 | 21/28 | 18/20 | 21/29 | 19/25 | 12/20 | 31/35 | 23/30 | 34/42 | 228/308 | 74 |
| **<28** | 11/14 | 9/17 | 8/18 | 12/18 | 11/12 | 6/10 | 11/14 | 5/10 | 14/16 | 8/14 | 15/20 | 110/163 | 67 |
| **28-31** | 3/4 | 0/1 | 2/3 | 3/3 | 1/1 | 3/5 | 1/2 | 1/3 | 3/3 | 5/5 | 5/5 | 27/35 | 77 |
| **32-36** | 1/1 | 3/4 | 3/5 | 2/3 | 1/1 | 1/1 | 2/3 | 0 | 2/3 | 0 | 4/7 | 19/28 | 68 |
| **≥37** | 4/4 | 3/5 | 2/3 | 4/4 | 5/6 | 11/13 | 5/6 | 6/7 | 12/13 | 10/11 | 10/10 | 72/82 | 88 |

The numbers in each cell are survivors/totals. The last column is the percentage survival over the last 11 years.

**Table 187: Inhaled Nitric Oxide (iNO) 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 26/29 | 15/18 | 10/20 | 32/36 | 20/26 | 26/33 | 25/29 | 12/17 | 18/20 | 20/22 | 30/36 | 234/286 | 82 |
| **<28** | 4/5 | 3/5 | 2/7 | 7/9 | 4/6 | 2/4 | 6/7 | 1/3 | 3/ 4 | 0/1 | 9/12 | 41/63 | 65 |
| **28-31** | 2/3 | 2/2 | 0/2 | 3/4 | 1/2 | 3/4 | 0/1 | 1/2 | 2/2 | 2/2 | 3/4 | 19/28 | 68 |
| **32-36** | 5/6 | 2/2 | 2/3 | 4/5 | 6/6 | 0/0 | 3/5 | 1/1 | 2/2 | 1/1 | 4/5 | 30/36 | 83 |
| **≥37** | 15/15 | 8/9 | 6/8 | 18/18 | 9/12 | 21/25 | 16/16 | 9/11 | 11/12 | 17/18 | 14/15 | 144/159 | 91 |

The numbers in each cell are survivors/totals. The last column is the percentage survival over the last 11 years.

**Table 188: iNO plus HFOV 2007-2017**

| Gestation (wks) | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 10/12 | 6/9 | 5/12 | 12/15 | 9/11 | 15/19 | 11/14 | 7/10 | 15/16 | 12/14 | 17/21 | 119/153 | 78 |
| **<28** | 3/4 | 2/4 | 2/6 | 5/7 | 4/5 | 2/4 | 5/6 | 1/3 | 3/3 | 0/1 | 9/12 | 36/55 | 65 |
| **28-31** | 2/3 | - | 0/1 | 2/2 | 1/1 | 3/3 | 0/1 | 1/1 | 2/2 | 2/2 | 2/2 | 15/18 | 83 |
| **32-36** | 1/1 | 2/2 | 2/3 | 1/2 | 1/1 | 0/0 | 1/2 | 0 | 2/2 | 0/0 | 1/2 | 11/15 | 73 |
| **≥37** | 4/4 | 2/3 | 1/2 | 4/4 | 3/4 | 10/12 | 5/5 | 5/6 | 8/9 | 10/11 | 5/5 | 57/65 | 88 |

The numbers in each cell are survivors/totals. The last column is the percentage survival over the last 10 years.

**Table 189: Reason for IPPV and CPAP in term and post-term infants 2006-2017**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| **TTN/RDS** | 3/84 | 8/100 | 7/88 | 8/96 | 9/111 | 10/108 | 6/112 | 11/144 | 10/125 | 2/15 |
| **Infection** | -/10 | 1/16 | 2/9 | 2/18 | 3/14 | 0/11 | 4/18 | 3/23 | 2/18 | 0/1 |
| **Meconium** | 4/13 | 4/15 | 10/14 | 13/30 | 15/32 | 12/21 | 11/22 | 5/16 | 7/22 | 10/18 |
| **Anomaly** | 10/8 | 6/5 | 9/8 | 7/9 | 5/4 | 4/6 | 6/6 | 10/7 | 7/6 | 14/17 |
| **PPHN** | 5/6 | 5/6 | 9/10 | 4/4 | 7/4 | 7/7 | 5/4 | 4/3 | 6/6 | 9/7 |
| **Encephalopathy** | 6/2 | 7/8 | 11/1 | 8/5 | 1/2 | 13/2 | 11/4 | 6/3 | 8/6 | 3/3 |
| **Support for surgery** | 14/8 | 10/3 | 13/6 | 9/3 | 15/4 | 23/9 | 13/5 | 8/1 | 18/4 | 21/15 |
| **Other** | 6/13 | 17/36 | 21/24 | 14/30 | 17/35 | 20/43 | 28/46 | 11/29 | 12/22 | 6/4 |
| **Non-specific** | | | | | | | | | | 3/84 |
| **Missing reason** | | 1/0 | | | | 0/1 | 1/0 | | 1/1 | 9/31 |

Numbers in each cell are IPPV/CPAP.

## 9.15 Data tables: Outcomes

### 9.15.1 Survival

**Table 190: Numbers of survivors by gestational age of babies <32 weeks gestation 2017**

| Gestation (weeks) | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Born alive in NWH** | 2 | 1 | 1 | 7 | 9 | 12 | 13 | 20 | 10 | 18 | 10 | 30 |
| **Died at birth in NWH** | 2 | 1 | 1 | 4 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 |
| **Born alive at NWH and admitted to NICU** | 0 | 0 | 0 | 3 | 8 | 10 | 11 | 19 | 10 | 18 | 10 | 30 |
| **Born alive at NWH and survived** | 0 | 0 | 0 | 3 | 6 | 8 | 11 | 19 | 9 | 17 | 10 | 29 |
| **Outborn admitted** | 0 | 0 | 0 | 0 | 2 | 4 | 5 | 1 | 5 | 2 | 8 | 3 |

### 9.15.2 Retinopathy of prematurity

**Table 191: Retinopathy of prematurity by birth weight in babies surviving to 36 weeks gestation (ANZNN assigned babies) 2017**

| Birth Weight(g) | N | Unknown | None | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|---|---|---|
| **Total** | **144** | **50** | **48** | **27** | **16** | **3** | **0** |
| **<500** | | | | | | | |
| **500-749** | 14 | 0 | 2 | 5 | 6 | 1 | 0 |
| **750-999** | 34 | 0 | 12 | 14 | 7 | 1 | 0 |
| **1000-1249** | 31 | 2 | 22 | 5 | 1 | 1 | 0 |
| **1250-1499** | 37 | 22 | 10 | 3 | 2 | 0 | 0 |
| **1500-1999** | 24 | 22 | 2 | 0 | 0 | 0 | 0 |
| **2000-2499** | 4 | 4 | 0 | 0 | 0 | 0 | 0 |

**Table 192: Retinopathy of prematurity by gestational age in babies surviving to 36 weeks gestation (ANZNN assigned babies) 2017**

| Gestation (wks) | N | Unknown | None | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|---|---|---|
| **Total** | **144** | **50** | **48** | **27** | **16** | **3** | **0** |
| **<24** | 3 | 0 | 1 | 0 | 2 | 0 | 0 |
| **24-25** | 15 | 0 | 0 | 4 | 9 | 2 | 0 |
| **26-27** | 31 | 0 | 17 | 10 | 3 | 1 | 0 |
| **28-29** | 29 | 0 | 18 | 9 | 2 | 0 | 0 |
| **30-31** | 48 | 39 | 6 | 1 | 0 | 0 | 0 |
| **>31** | 18 | 11 | 6 | 1 | 0 | 0 | 0 |

### 9.15.3 Chronic lung disease

**Table 193: Chronic lung disease by birth weight (inborn babies <1500gms) 2017**

| Birth Weight (g) | Inborn <1500g n | Dead by 36 wks/28days | Alive at 36 wks | In $O_2$ | $O_2$ + CPAP/ IPPV | CPAP/ IPPV | CLD | CLD/ livebirth admissions % | CLD/ survivors to 36 wks % |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | **114** | **6** | **108** | **2** | **7** | **39** | **48** | **42** | **44** |
| **500-749** | 18 | 4 | 14 | 0 | 2 | 11 | 13 | 72 | 7 |
| **750-999** | 32 | 1 | 31 | 2 | 2 | 17 | 21 | 66 | 68 |
| **1000-1249** | 29 | 0 | 29 | 0 | 2 | 7 | 9 | 31 | 31 |
| **1250-1499** | 35 | 1 | 34 | 0 | 1 | 4 | 5 | 14 | 15 |

**Table 194: Chronic lung disease by gestational age (inborn babies <32weeks) 2017**

| Gestation (weeks) | Inborn <32wks N | Dead by 36 wks/28 days | Alive at 36 wks | In $O_2$ | $O_2$+CPAP/ IPPV | CPAP/ IPPV | CLD | CLD/ livebirth admissions % | CLD/ survivors to 36 wks % |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | **120** | **8** | **112** | **2** | **7** | **43** | **52** | **43** | **38** |
| **<24** | 3 | **0** | **3** | **0** | **1** | **2** | **3** | **100** | **100** |
| **24-25** | 18 | 5 | 13 | 0 | 1 | 10 | 11 | 61 | 85 |
| **26-27** | 30 | 0 | 30 | 2 | 2 | 17 | 21 | 70 | 70 |
| **28-29** | 28 | 2 | 26 | 0 | 3 | 9 | 12 | 43 | 46 |
| **30-31** | 41 | 1 | 40 | 0 | 0 | 5 | 5 | 12 | 13 |

### 9.15.4 Necrotising enterocolitis ANNZN

The data in the two tables below are for babies with "confirmed" NEC and therefore do not include babies with "probable" NEC.

**Table 195: Necrotising enterocolitis (NEC) by birth weight ANNZN <1500g 2012-2017**

| Weight (g) | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | N | % | N | n | % | N | n | % | N | n | % | N | n | % |
| **Total** | **139** | **3** | **2** | **134** | **1** | **1** | **126** | **2** | **2** | **136** | **1** | **1** | **140** | **6** | **4** | **123** | **3** | **2** |
| **<500** | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | | | | 0 | | | 0 | | |
| **500-749** | 14 | 1 | 7 | 14 | 0 | 0 | 20 | 1 | 5 | 16 | 1 | 6 | 21 | 2 | 10 | 18 | 1 | 6 |
| **750-999** | 29 | 1 | 3 | 36 | 1 | 3 | 24 | 0 | 0 | 23 | 0 | 0 | 31 | 3 | 10 | 36 | 1 | 3 |
| **1000-1249** | 40 | 1 | 3 | 31 | 0 | 0 | 37 | 1 | 3 | 42 | 0 | 0 | 44 | 1 | 2 | 31 | 1 | 3 |
| **1250-1499** | 55 | 0 | 0 | 53 | 0 | 0 | 44 | 0 | 0 | 55 | 0 | 0 | 44 | 0 | 0 | 38 | 0 | 0 |

**Table 196: Necrotising enterocolitis by gestational age ANNZN <32wks 2012-2017**

| Gestation (weeks) | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % |
| **Total** | **161** | **3** | **2** | **144** | **1** | **1** | **144** | **3** | **2** | **146** | **1** | **1** | **152** | **7** | **5** | **135** | **3** | **2** |
| **<24** | 0 | 0 | 0 | 2 | 1 | 50 | 0 | 0 | 0 | 0 | | | 4 | 0 | | 3 | 0 | 0 |
| **24-25** | 23 | 2 | 9 | 19 | 0 | 0 | 20 | 1 | 5 | 15 | 1 | 7 | 20 | 3 | 15 | 20 | 2 | 10 |
| **26-27** | 24 | 0 | 0 | 25 | 0 | 0 | 28 | 0 | 0 | 34 | 0 | 0 | 31 | 1 | 3 | 32 | 1 | 3 |
| **28-29** | 54 | 1 | 2 | 40 | 0 | 0 | 28 | 0 | 0 | 39 | 0 | 0 | 50 | 1 | 2 | 31 | 0 | 0 |
| **30-31** | 60 | 0 | 0 | 58 | 0 | 0 | 68 | 2 | 3 | 58 | 0 | 0 | 47 | 2 | 4 | 49 | 0 | 0 |

### 9.15.5 Pneumothorax (All babies <1500g or <32 weeks)

**Table 197: Pneumothorax requiring drainage by birth weight (<1500g) 2012-2017**

| Birth weight (g) | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % |
| **Total <1500g** | **148** | **0** | **0** | **144** | **2** | **1** | **131** | **2** | **2** | **143** | **1** | **1** | **148** | **0** | **0** | **137** | **3** | **2** |
| **<500** | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | | | | | | | | |
| **500-749** | 23 | 0 | 0 | 18 | 0 | 0 | 22 | 2 | 9 | 17 | 1 | 6 | 21 | | | 20 | 0 | 0 |
| **750-999** | 30 | 0 | 0 | 41 | 1 | 2 | 25 | 0 | 0 | 24 | 0 | 0 | 33 | | | 40 | 2 | 5 |
| **1000-1249** | 42 | 0 | 0 | 33 | 0 | 0 | 38 | 0 | 0 | 44 | 0 | 0 | 47 | | | 37 | 1 | 3 |
| **1250-1499** | 56 | 0 | 0 | 55 | 1 | 2 | 45 | 0 | 0 | 58 | 0 | 0 | 47 | | | 40 | 0 | 0 |

**Table 198: Pneumothorax requiring drainage by gestation (all babies <32wks) 2012-2017**

| Gestation (weeks) | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % | N | n | % |
| **Total <32wks** | **169** | **0** | **0** | **155** | **2** | **1** | **151** | **3** | **2** | **152** | **1** | **1** | **160** | **0** | **0** | **150** | **6** | **4** |
| **<24** | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | | 0 | | | 4 | | | 3 | 0 | 0 |
| **24-25** | 25 | 0 | 0 | 22 | 0 | 0 | 23 | 1 | 4 | 17 | 1 | 6 | 22 | | | 24 | 1 | 4 |
| **26-27** | 27 | 0 | 0 | 28 | 1 | 4 | 29 | 1 | 3 | 35 | 0 | 0 | 33 | | | 36 | 0 | 0 |
| **28-29** | 56 | 0 | 0 | 41 | 0 | 0 | 28 | 0 | 0 | 41 | 0 | 0 | 52 | | | 35 | 4 | 11 |
| **30-31** | 61 | 0 | 0 | 62 | 1 | 2 | 71 | 1 | 1 | 59 | 0 | 0 | 49 | | | 52 | 1 | 2 |

**Table 199: Inborn babies receiving postnatal corticosteroids by birth weight 2017** (babies alive at 1 week and less than 1500g)

| Birth weight (g) | N | n | % |
|---|---|---|---|
| **Total** | **112** | **16** | **14** |
| **500-749** | 17 | 10 | 59 |
| **750-999** | 31 | 4 | 13 |
| **1000-1249** | 29 | 1 | 3 |
| **1250-1499** | 35 | 1 | 3 |

**Table 200: Inborn babies receiving postnatal corticosteroids by gestational age 2017 (babies alive at 1 week and < 32 weeks)**

| Gestation (weeks) | N | n | % |
|---|---|---|---|
| **Total** | **116** | **16** | **14** |
| **<24** | 3 | 3 | 100 |
| **24-25** | 16 | 10 | 63 |
| **26-27** | 30 | 3 | 10 |
| **28-29** | 27 | 0 | 0 |
| **30-31** | 40 | 0 | 0 |

**Table 201: Method of feeding at discharge from NICU by gestational age and birth weight 2017 (inborn)**

| | Total | Exclusive | | Fully | | Partial | | Artificial | | Nil Oral | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % |
| **Total** | 704 | 391 | 55.5 | 148 | 21.0 | 108 | 15.3 | 34 | 4.8 | 23 | 3.3 |
| **Gestation (weeks)** | | | | | | | | | | | |
| 20-23 | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 24-27 | 42 | 24 | 57.1 | 6 | 14.3 | 9 | 21.4 | 3 | 7.1 | 0 | 0.0 |
| 28-31 | 65 | 50 | 76.9 | 7 | 10.8 | 4 | 6.2 | 4 | 6.2 | 0 | 0.0 |
| 32-36 | 230 | 97 | 42.2 | 73 | 31.7 | 45 | 19.6 | 12 | 5.2 | 3 | 1.3 |
| 37-40 | 332 | 189 | 56.9 | 60 | 18.1 | 48 | 14.5 | 15 | 4.5 | 20 | 6.0 |
| ≥41 | 32 | 28 | 87.5 | 2 | 6.3 | 2 | 6.3 | 0 | 0.0 | 0 | 0.0 |
| **Birth weight (g)** | | | | | | | | | | | |
| <500 | 0 | | | | | | | | | | |
| 500-749 | 14 | 11 | 78.6 | 1 | 7.1 | 2 | 14.3 | 0 | 0.0 | **0** | 0.0 |
| 750-999 | 30 | 22 | 73.3 | 2 | 6.7 | 3 | 10.0 | 3 | 10.0 | 0 | 0.0 |
| 1000-1249 | 29 | 17 | 58.6 | 5 | 17.2 | 4 | 13.8 | 3 | 10.3 | 0 | 0.0 |
| 1250-1499 | 34 | 23 | 67.6 | 3 | 8.8 | 7 | 20.6 | 1 | 2.9 | 0 | 0.0 |
| 1500-1999 | 95 | 40 | 42.1 | 29 | 30.5 | 21 | 22.1 | 5 | 5.3 | 0 | 0.0 |
| 2000-2499 | 95 | 42 | 44.2 | 29 | 30.5 | 17 | 17.9 | 5 | 5.3 | 2 | 2.1 |
| 2500-2999 | 110 | 49 | 44.5 | 31 | 28.2 | 22 | 20.0 | 6 | 5.5 | 2 | 1.8 |
| 3000-3999 | 262 | 166 | 63.4 | 40 | 15.3 | 29 | 11.1 | 11 | 4.2 | 16 | 6.1 |
| >3999 | 35 | 21 | 60.0 | 8 | 22.9 | 3 | 8.6 | 0 | 0.0 | 3 | 8.6 |

## 9.16 Data tables: Details of deaths prior to discharge among inborn and outborn babies admitted to NICU

**Table 202: Outborn neonatal and post-neonatal deaths prior to discharge 2017**

| Born at | Gestational age | Birth Weight | Apgar @ 1 min | Apgar @ 5 min | Age at death (d) | Cause of death |
|---|---|---|---|---|---|---|
| Waitakere Hospital | 26 | 992 | . | . | 4 | Extreme preterm, severe RDS, hypotension, bilateral grade III IVH and renal dysfunction. Re-direction of care on day 3-4 |
| Whangarei Hospital | 37 | 2225 | . | . | 33 | Severe HIE antenatal. cardiorespiratory arrest in NICU, did not respond to resuscitation |
| Tahiti | 26 | 920 | . | . | 56 | Referred from Tahiti for neurosurgical review on day 56, arrived in very poor condition with NEC. Died on the same day |

**Table 203: Inborn neonatal and post-neonatal deaths prior to discharge from NICU 2017**

| Birthplace | Gestational age | Birth weight | Apgar @1 min | Apgar @ 5 min | Age at death (d) | Main Cause of death |
|---|---|---|---|---|---|---|
| L&B Suite | 31 | 1815 | 9 | 8 | 3 | Congenital abnormality & antenatal hypoxic insult |
| Theatre | 34+6 | 1660 | 4 | 7 | 1 | Congenital abnormality – pulmonary hypoplasia and severe RDS |
| Theatre | 29 | 1817 | 4 | 6 | 0 | Congenital abnormality (Kaposiform Haemangio-Endothelioma), fetal hydrops |
| L&B Suite | 33 | 2150 | 1 | 2 | 0 | Congenital abnormality (bilateral pleural effusions)) |
| Theatre | 25 | 960 | 4 | 9 | 5 | Extreme prematurity and neurological (grade IV IVH) |
| L&B Suite | 25 | 810 | 2 | 6 | 101 | Neurological (post natal hypoxia) |
| Theatre | 28 | 1270 | 7 | 6 | 14 | Congenital abnormality – cardiac |
| Theatre | 36 | 2620 | 0 | 6 | 3 | Neurological – severe HIE |
| L&B Suite | 25 | 745 | 5 | 6 | 64 | Infection (meningitis and encephalomalacia) |
| L&B Suite | 24 | 545 | 6 | 7 | 6 | Extreme prematurity; early onset E. coli septicaemia |
| L&B Suite | 24 | 660 | 6 | 7 | 38 | Late onset infection |
| L&B Suite | 25 | 715 | 6 | 5 | 15 | Late onset infection |
| Theatre | 37 | 2830 | 4 | 2 | 8 | Congenital abnormality (Spinal muscular atrophy) |
| Theatre | 32 | 2500 | 5 | 6 | 3 | Congenital abnormality (non immune hydrops) |
| L&B Suite | 38 | 2980 | 3 | 5 | 5 | Congenital abnormality – cardiac |

**National Women's**
Annual Clinical Report 2017

# CHAPTER 10

# PERINATAL AND MATERNAL MORTALITY

This chapter provides information on perinatal related and maternal deaths and severe maternal morbidity.

NWH has pregnancy loss counseling services to provide support for women with stillbirth and neonatal death and also those who undergo termination for fetal abnormality or other cause. In 2016 a Perinatal Specialist Midwife was appointed to coordinate and improve the perinatal loss service at National Women's Health.

## Methods

Perinatal related mortality data are obtained from the Healthware clinical database and also from a stand-alone Access database. These data include classifications of cause of death assigned following multi-disciplinary discussion.

The classification of perinatal related death uses the Perinatal Society of Australia and New Zealand (PSANZ) system and an updated version of this will begin to be used in 2018. It includes a classification system by antecedent cause (PSANZ-PDC). In addition neonatal deaths are classified by relevant conditions preceding neonatal death using the PSANZ-NDC. PSANZ Perinatal Death Classification (PSANZ-PDC) is used to identify the single most important factor which led to the chain of events that resulted in the death. PSANZ Neonatal Death Classification (PSANZ-NDC) is applied, in addition to the PSANZ-PDC, to identify the single most important factor in the neonatal period which caused the neonatal death. Two associated factors can also be recorded in each of these systems, but associated factors are not included in the analysis in this report.

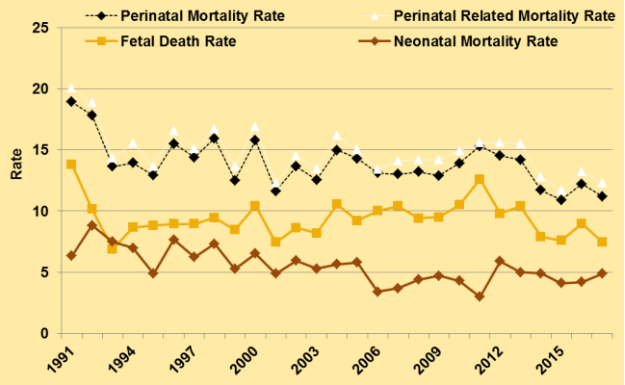
Perinatal mortality rate is defined in New Zealand as fetal death (stillbirth of a baby of at least 20 weeks gestation at issue or at least 400 grams birthweight if gestation is unknown) plus early neonatal death (death of a live born baby, of at least 20 weeks of gestation at issue or at least 400 grams birthweight if gestation is unknown, before completion of the first 7 days of life), and expressed as a rate per 1000 total babies born. Perinatal related mortality rate includes, in addition, late neonatal deaths (death of a live born baby of at least 20 weeks of gestation at issue or at least 400 grams birth weight if gestation is unknown following 7 days of life but before completion of 28 days of life). Perinatal related death risk is presented by gestation and in this case is the risk of fetal death or neonatal death per 1000 babies remaining in utero to represent the risk at a specific gestation in pregnancy. Fetal death rate is calculated per 1000 babies born, meaning babies remaining in utero if data are presented by gestation, or meaning total babies born if presented as an overall rate. Neonatal death rate is per 1000 live born babies, except in the perinatal mortality time trends figure where neonatal death rates are per 1000 total babies born. This variation is to demonstrate the contribution of fetal deaths and neonatal deaths to overall perinatal related mortality rates.

Perinatal related mortality rates are also presented excluding deaths of babies with or from congenital abnormality. This is calculated by excluding fetal deaths where the primary PDC classification was congenital abnormality and neonatal deaths where the primary PDC and/or NDC classification was congenital abnormality.

All perinatal related deaths are reviewed monthly by a multidisciplinary team comprising an obstetrician (MFM subspecialist and perinatal mortality meeting convener), perinatal specialist midwife, neonatologist, and perinatal pathologist. This group classifies the cause of death and summarises recommendations for management if there is a future pregnancy. They also complete the documentation for the NZ Perinatal and Maternal Mortality Review Committee (PMMRC) including assigning contributing factors and determining whether the death was potentially avoidable.

## 10.1. Perinatal and perinatal related mortality rates

**Figure 206: Perinatal mortality rate, perinatal related mortality rate, fetal death rate and neonatal mortality rate NWH 1991-2017 (all rates expressed as deaths/1000 births)**

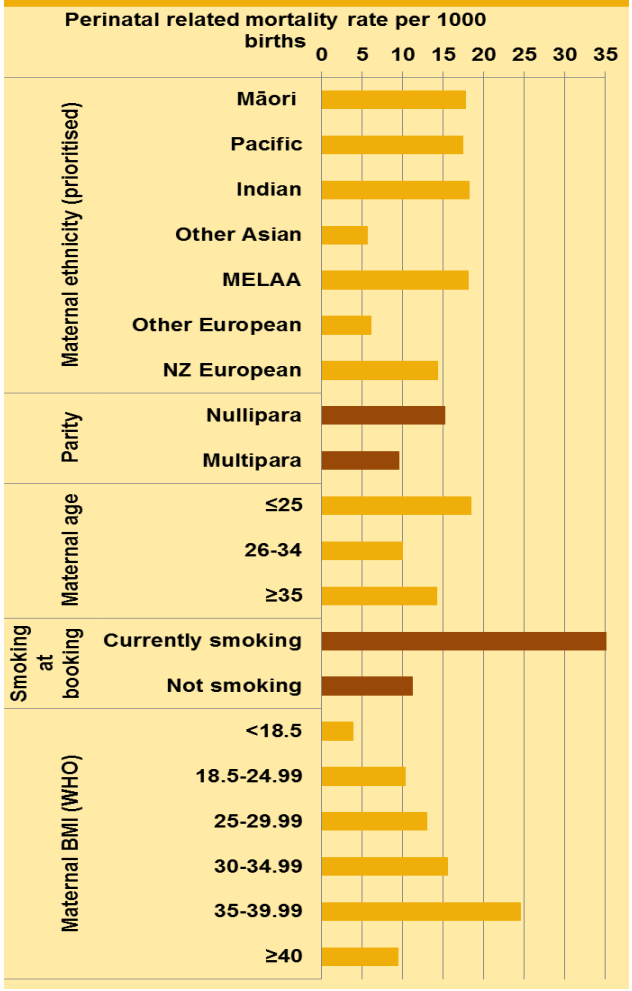



Perinatal mortality at NWH has remained relatively stable over recent years.

Consistent with national data, perinatal related mortality is higher in women: with elevated BMI, who smoke in pregnancy, are under 25, nulliparous and from Māori, Pacific and Indian ethnic groups compared to European, Middle Eastern, Latin American and African women also had higher rates than NZ European whereas women of other Asian ethnicity (predominantly Chinese) had a lower perinatal mortality rate. Thirty-five percent of all perinatal related deaths that occurred in ADHB were to women who did not reside in the ADHB area. The

majority of these deaths were from pregnancies/babies who required transfer to our tertiary centre for their care. The perinatal related mortality rate for women resident in the ADHB area and birthing at NWH in 2017 was 48/4571 (10.5/1000).

**Figure 207: Perinatal related mortality rate (/1000 births) by maternal demographic characteristics 2017**




## 10.2. Gestational age and perinatal related mortality

In 2017 there was only one stillbirth at 41+0 or greater gestation.

## 10.3. Multiple births and perinatal related mortality

In multiple pregnancies the perinatal related mortality rate remains substantially higher than the rate for singleton pregnancies, confirming the high risk nature of these pregnancies especially in mono-chorionic di-amniotic twin pregnancies. Details regarding the cause of death in multiple pregnancies are found in Section 5.7. The perinatal related mortality rate in multiple pregnancies in 2017 was (16/255 = 62.7/1000 births).

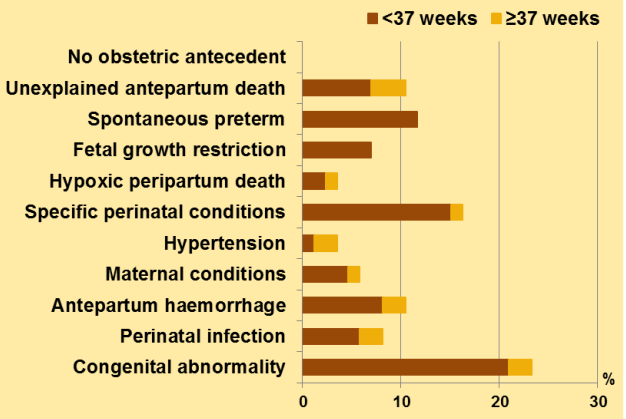
## 10.4. Lead maternity carer (LMC) and perinatal related mortality

There were two groups with higher perinatal mortality in 2017: unbooked women, and those attending the MFM services (Table 209).

Perinatal related deaths among mothers attending the MFM services include deaths in the fetal medicine service. Two of the 8 deaths were terminations of pregnancy. The commonest cause of perinatal related death among women attending the MFM services was congenital abnormality (3 (38%)). The remainder died with spontaneous preterm birth (2), perinatal infection (1), hypoxic peripartum death (1), and fetal growth restriction (1).

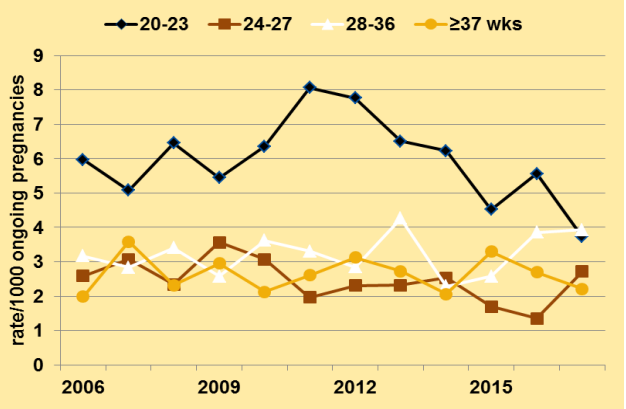
## 10.5. Classification (PSANZ-PDC) of perinatal related deaths

**Figure 208: Contribution to perinatal related death by obstetric antecedent cause (PSANZ-PDC) and gestation at birth NWH 2017**




The commonest cause of perinatal related deaths was congenital anomalies, which is in keeping with data from previous years. The overall distribution of classifications is similar to previous years.

**Figure 209: Perinatal related mortality risks (/1000 ongoing pregnancies) by gestation 2006-2017**



## 10.6. Gestation of neonatal deaths

**Table 204: Neonatal deaths by neonatal classification (PSANZ-NDC) and gestational age at birth NWH 2017**

| | Total neonatal deaths N=34 | | < 37 weeks n=29 | | ≥ 37 weeks n=5 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **Extreme prematurity** | 9 | 26 | 9 | 31 | 0 | 0 |
| **Congenital abnormality** | 13 | 38 | 10 | 35 | 3 | 60 |
| **Infection** | 4 | 12 | 3 | 10 | 1 | 20 |
| **Neurological** | 5 | 15 | 4 | 14 | 1 | 20 |
| **Cardio-respiratory disorders** | 2 | 6 | 2 | 7 | 0 | 0 |
| **Other** | 1 | 3 | 1 | 3 | 0 | 0 |

Deaths due to congenital abnormality (38%) and extreme prematurity (26%) were the most common causes of neonatal death in 2017.

## 10.7. Fetal Growth Restriction and Perinatal Related Death

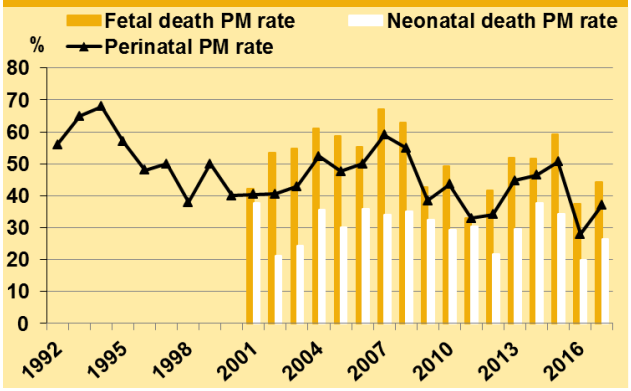
Fetal growth restriction (FGR) was the primary perinatal death classification assigned for six of the 86 deaths in 2017. This classification is used when there is antenatal diagnosis of FGR or where pre-specified pathological or Doppler criteria are identified.

However, of singleton perinatal deaths (excluding congenital abnormalities), 9/35 (26%) of fetal deaths and 4/15 (27%) of neonatal deaths were small for gestational age (birthweight <10$^{th}$ customised centile). 6/19 (32%) singleton non-anomalous fetal deaths and 1/6 (17%) neonatal deaths at >=26 weeks' were SGA. For fetal deaths, the customised centile is calculated for the gestation at which the baby is thought to have died. Centiles are not calculated for stillbirths (five of 35 singleton non-anomalous stillbirths in 2017) when gestation at death is unknown or is thought to have been more than one week prior to birth or when death occurred prior to 20 weeks.

## 10.8. Postmortem

Post-mortem is the gold standard investigation for perinatal related death. NWH is fortunate to have access to a world-class perinatal pathology service provided in 2017 by Drs Kate Strachan, Kate Bartlett, Gretchen Pomare and supported by Jane Zuccollo. The post-mortem rate was 32/86 (37%) in 2017.

**Figure 210: Post-mortem rates NWH 1992-2017**




## 10.9. Education Points from Perinatal Meetings in 2017

### Postmortem

- Post mortem is the gold standard investigation after perinatal death. When consent for post mortem is not provided parents should be offered non-invasive examinations such as x-ray, ultrasound and clinical photography which may provide additional information for parents and the medical team. In selected circumstances MRI may also be helpful e.g. suspected neurological abnormalities.
- To enable staff to provide accurate information to women and their families, a presentation was given by one of our perinatal pathologists on the technical aspects of post mortem examination.
- Description of the baby, cord and placenta at birth, is part of the routine documentation, and can provide useful information that contributes to determining the cause of death. For example: confirmation of congenital abnormalities, findings of a pale baby or cord entanglement are important findings to note. Clinical photographs can be especially helpful in these circumstances, as they can be reviewed by the perinatal pathologist.
- A full and detailed external examination of the baby should be done, in every case, preferably by the most senior neonatal staff member available. The perinatal pathologists are also happy to carry out external examinations during working hours. This is particularly important if a post-mortem is not done.
- A new consent form for post mortem has been introduced and is to be standardised across NZ. This form gives a clearer outline of the process and investigations involved in post mortem providing a clearer understanding for the parents; it is vital relevant clinical information is provided for the pathologist.

### Decreased Fetal Movements

The 2018 update of resources on Decreased Fetal Movements is available at:

https://www.stillbirthcre.org.au/resources/bundle-of-care/decreased-fetal-movements/

https://adhb.hanz.health.nz/Policy/Decreased%20(reduced)%20fetal%20movements.pdf

Reminder of the latest evidence

- Encouraging mother to learn baby's normal pattern of movements and being aware of changes in patterns rather than counting fetal movements.
- A reduction in strength of movements is important.
- If a mother is concerned about her baby's movements, she should be invited into hospital for assessment within 2hrs
- Drinking cold water and eating to see if the baby will move should not be suggested. This is not evidence based and will delay presentation.
- It is not normal for bigger mothers to perceive fewer movements.

### Spontaneous Preterm Labour and Birth

- Having a previous preterm birth or late second trimester loss is an important risk factor for recurrent preterm birth. Women with a prior spontaneous preterm birth or second trimester loss can be offered referral to the Preterm Birth (PTB) Clinic at NWH.
- Criteria for Referral to the PTB Clinic include:

| |
|---|
| Previous spontaneous PTB/PPROM <36 weeks |
| Previous spontaneous second trimester loss 16-24 weeks |
| History of cervical surgery (LLETZ) with histological evidence of >10mm depth specimen |
| Knife cone biopsy or trachelectomy or LLETZ >1 procedure |
| Congenital uterine and/or cervical anomaly |
| Short cervix in current pregnancy <25mm at <24 weeks |
| Other risk factors e.g. multiple surgical termination of pregnancy and/or evacuation of retained products of conception procedures (≥2), complicated caesarean section at full dilatation, history of diethylstilboestrol exposure (woman or her mother), known collagen or connective tissue disorders. |

- Other factors which may predispose to spontaneous preterm birth include: smoking or recreational drug use (especially marijuana); chlamydia or untreated urinary tract infection in pregnancy; antepartum haemorrhage.
- The risk for spontaneous preterm birth increases with the number of risk factors.

### Marijuana use is not uncommon in pregnancy

- There are reports of marijuana being used for nausea and vomiting in pregnancy. Marijuana use is associated with increased risk of spontaneous pre-term birth, particularly at very preterm gestations. Women should be asked about marijuana use at booking and be advised and supported to stop.

### Non-Recognition of Small for Gestational Age (SGA) Pregnancies

The NZ MFM SGA Guideline for Management of Suspected SGA Pregnancies and infants after 34 weeks is available via the NZMFM Network at

http://www.healthpoint.co.nz/public/new-zealand-maternal-fetal-medicine-network/?solo=otherList&index=5

NWH has a clinical pathway for management of pregnancies with suspected SGA.

Reminder of some key points:

- Serial measurement of fundal height (not more frequently than 2 weekly) from 26/28weeks until delivery, which is then plotted on a GROW chart
- Suspected abnormal growth when a fundal height is <10$^{th}$ centile or crossing centile lines (>30%) – growth scan recommended
- Serial growth scans are recommended for women with major risk factors for SGA
- Remember if you measure fundal height and enter it into Healthware you need to save the assessment visit and then go back and check where the fundal height plots on the GROW chart
- Women with known SGA pregnancies should present in early labour for fetal monitoring and be advised to present if contractions occur after vaginal examination (stretch and sweep).

### Syphilis in pregnancy

- Syphilis is increasing in Western settings including in NZ.
- Congenital syphilis is preventable by treating the mother
- All women should have VDRL at booking
- Women with a positive test for syphilis should be screened for HIV and other STIs and contact tracing undertaken
- Unbooked women should have VDRL performed at presentation
- In women with major risk factors (multiple partners, incarcerated, drug/ alcohol abuse) VDRL should be repeated in the third trimester +/- at delivery

www.cdc.gov/std/tg2015/syphilis-pregnancy.htm

## 10.10. Data Tables: Perinatal related mortality

### Table 205: Inborn and BBA deaths NWH 2007-2017

| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fetal deaths** | 20-22 wks | 24 | 29 | 24 | 33 | 41 | 33 | 24 | 25 | 17 | 16 | 15 |
| | 23-24 wks | 15 | 11 | 14 | 9 | 16 | 11 | 18 | 8 | 9 | 9 | 5 |
| | 25-26 wks | 7 | 4 | 4 | 8 | 5 | 9 | 6 | 11 | 1 | 6 | 6 |
| | 27-28 wks | 5 | 8 | 6 | 5 | 2 | 4 | 4 | 2 | 5 | 5 | 1 |
| | 29-38 wks | 19 | 21 | 19 | 24 | 26 | 13 | 20 | 13 | 12 | 25 | 19 |
| | >38 wks | 12 | 3 | 8 | 4 | 7 | 7 | 5 | 1 | 10 | 5 | 6 |
| **Total fetal deaths** | | **82** | **76** | **75** | **83** | **97** | **77** | **77** | **60** | **54** | **66** | **52** |
| **Neonatal deaths** | Early neonatal deaths (≤7 days) | 20 | 26 | 27 | 26 | 21 | 37 | 28 | 28 | 23 | 24 | 26 |
| | Late neonatal deaths (8-28 days) | 9 | 8 | 10 | 8 | 2 | 9 | 9 | 9 | 6 | 7 | 8 |
| **Total neonatal deaths** | | **29** | **34** | **37** | **34** | **23** | **46** | **37** | **37** | **29** | **31** | **34** |
| **Total deaths** | | 111 | 110 | 112 | 117 | 120 | 123 | 114 | 97 | 83 | 97 | 86 |
| **Perinatal mortality rate/1000** | | 13 | 13.2 | 12.9 | 13.9 | 15.3 | 14.5 | 14.2 | 11.7 | 10.9 | 12.2 | 11.2 |
| **Perinatal related mortality rate/1000** | | 14.1 | 14.2 | 14.2 | 14.9 | 15.6 | 15.6 | 15.5 | 12.8 | 11.7 | 13.2 | 12.3 |
| **Perinatal related mortality rate (excluding lethal & terminated fetal abnormalities)** | | 8 | 9.8 | 10.3 | 10.5 | 10.1 | 9.2 | 9.8 | 7.5 | 9.3 | 9.1 | 9.1 |

### Table 206: Perinatal related loss and DHB of residence NWH 2017*

| DHB of residence | TOP n=16 | | Stillbirth n=39 | | Neonatal death n=31 | | Perinatal related death n=86 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Auckland** | 14 | 88 | 22 | 56 | 12 | 39 | 48 | 56 |
| **Counties Manukau** | 1 | 6 | 4 | 10 | 5 | 16 | 10 | 12 |
| **Waitemata** | 1 | 6 | 12 | 31 | 9 | 29 | 22 | 26 |
| **Other** | 0 | 0 | 1 | 3 | 5 | 16 | 6 | 7 |

*due to rounding not all % columns add to 100
Of 16 TOPs 13 were stillbirths and 3 were neonatal deaths

### Table 207: Gestational age and perinatal related mortality NWH 2017

| | Births N=6974 | | Fetal deaths n=52 | | | Neonatal deaths n=34 | | | Total perinatal related deaths n=86 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | risk* | n | % | risk ** | n | % | risk*** |
| **<24 weeks** | 29 | 0.4 | 18 | 34.6 | 2.6 | 8 | 23.5 | 1.2 | 26 | 26.8 | 3.7 |
| **24-27 weeks** | 64 | 0.9 | 9 | 17.3 | 1.3 | 10 | 29.4 | 1.4 | 19 | 19.6 | 2.7 |
| **28-31 weeks** | 74 | 1.1 | 5 | 9.6 | 0.7 | 3 | 8.8 | 0.4 | 8 | 8.2 | 1.2 |
| **32-36 weeks** | 465 | 6.7 | 11 | 21.2 | 1.6 | 8 | 23.5 | 1.2 | 19 | 19.6 | 2.8 |
| **37-40 weeks** | 5,694 | 81.6 | 8 | 15.4 | 1.3 | 5 | 14.7 | 0.8 | 13 | 13.4 | 2.0 |
| **≥41 weeks** | 648 | 9.3 | 1 | 1.9 | ∞ | 0 | 0.0 | | 1 | 1.0 | ∞ |

*Fetal death risk = number of fetal deaths per 1000 babies remaining in utero
**NND risk = number of deaths per 1000 babies remaining in utero
***Perinatal related death risk = number of perinatal related deaths per 1000 babies remaining in utero
∞Not calculated due to small numbers

## Table 208: Multiple births and perinatal related mortality NWH 2017

| | Births N=6974 | | Fetal deaths N=52 | | | Neonatal deaths n=34 | | | Total perinatal related deaths n=86 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | rate* | n | % | rate‡ | n | % | rate† |
| **Singleton** | 6719 | 96.3 | 44 | 84.6 | 6.5 | 26 | 76.5 | 3.9 | 70 | 81.4 | 10.4 |
| **Multiple** | 255 | 3.7 | 8 | 15.4 | 31.4 | 8 | 23.5 | 32.4 | 16 | 18.6 | 62.7 |

* Fetal death rate = number of fetal deaths per 1000 births
‡ Neonatal Death rate = number of deaths per 1000 live births
† Perinatal-related mortality rate = number of perinatal related deaths per 1000 births

## Table 209: LMC at birth and perinatal related mortality NWH 2017

| | Births N=6974 | | Fetal deaths n=52 | | | Neonatal deaths n=34 | | | Total perinatal related deaths n=86 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | n | % | rate* | n | % | rate‡ | n | % | rate† |
| **Self-employed midwife** | 3,159 | 45.3 | 29 | 55.8 | 9.3 | 12 | 35.3 | 3.9 | 41 | 47.7 | 13.1 |
| **Private Obstetrician** | 2,054 | 29.5 | 9 | 17.3 | 4.4 | 6 | 17.6 | 3.0 | 15 | 17.4 | 7.4 |
| **General Practitioner** | 11 | 0.2 | 0 | | | 0 | | | 0 | | |
| **NW Community** | 1,276 | 18.3 | 8 | 15.4 | 6.4 | 9 | 26.5 | 7.2 | 17 | 19.8 | 13.5 |
| **NW Diabetes** | 127 | 1.8 | 0 | | | 2 | 5.9 | ∞ | 2 | 2.3 | ∞ |
| **NW MFM** | 292 | 4.2 | 3 | 5.8 | 10.6 | 5 | 14.7 | 17.8 | 8 | 9.3 | 28.2 |
| **Other DHB** | 20 | 0.3 | 0 | | | 0 | | | 0 | | |
| **Unbooked** | 35 | 0.5 | 3 | 5.8 | 93.8 | 0 | | | 3 | 3.5 | 93.8 |

Unbooked = not registered with an LMC prior to labour
* Fetal death rate = number of fetal deaths per 1000 births
‡ Neonatal Death rate = number of deaths per 1000 live births
† Perinatal related mortality rate = number of perinatal related deaths per 1000 births
∞ Not calculated due to small numbers

## Table 210: Perinatal death by Perinatal Death Classification (PSANZ-PDC) NWH 2017

| | Fetal deaths n=52 | | | Neonatal deaths n=34 | | | Perinatal related deaths n=86 | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | Rate* | n | % | Rate** | n | % | Rate* |
| **Congenital abnormality** | 9 | 17.3 | 1.3 | 11 | 32.4 | 1.6 | 20 | 23.3 | 2.9 |
| **Perinatal infection** | 5 | 9.6 | 0.7 | 2 | 5.9 | ∞ | 7 | 8.1 | 1.0 |
| **Antepartum haemorrhage** | 5 | 9.6 | 0.7 | 4 | 11.8 | 0.6 | 9 | 10.5 | 1.3 |
| **Maternal conditions** | 3 | 5.8 | 0.4 | 2 | 5.9 | ∞ | 5 | 5.8 | 0.7 |
| **Hypertension** | 3 | 5.8 | 0.4 | 0 | 0.0 | | 3 | 3.5 | 0.4 |
| **Specific perinatal conditions** | 8 | 15.4 | 1.1 | 6 | 17.6 | 0.9 | 14 | 16.3 | 2.0 |
| **Hypoxic peripartum death** | 0 | | | 3 | 8.8 | 0.4 | 3 | 3.5 | 0.4 |
| **Fetal growth restriction** | 6 | 11.5 | 0.9 | 0 | | | 6 | 7.0 | 0.9 |
| **Spontaneous preterm** | 4 | 7.7 | 0.6 | 6 | 17.6 | 0.9 | 10 | 11.6 | 1.4 |
| **Unexplained antepartum death** | 9 | 17.3 | 1.3 | 0 | | | 9 | 10.5 | 1.3 |
| **No obstetric antecedent** | 0 | | | 0 | | | 0 | | |

* Rate: per 1000 births ** Rate: per 1000 live births
∞ Not calculated due to small numbers

## Table 211: Maternal characteristics and perinatal related mortality NWH 2017

| | Births | | Stillbirths | | | Neonatal deaths | | | Perinatal related deaths | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n=6974 | | n=52 | | | n=34 | | | n=86 | | |
| | N | % | n | % | rate* | n | % | rate‡ | n | % | rate† |
| **Maternal ethnicity (prioritised)** | | | | | | | | | | | |
| Māori | 449 | 6.4 | 5 | 9.6 | 11.1 | 3 | 8.8 | 6.8 | 8 | 9.3 | 17.8 |
| Pacific | 746 | 10.7 | 7 | 13.5 | 9.4 | 6 | 17.6 | 8.1 | 13 | 15.1 | 17.4 |
| Indian | 711 | 10.2 | 9 | 17.3 | 12.7 | 4 | 11.8 | 5.7 | 13 | 15.1 | 18.3 |
| Other Asian | 1,759 | 25.2 | 5 | 9.6 | 2.8 | 5 | 14.7 | 2.9 | 10 | 11.6 | 5.7 |
| MELAA | 332 | 4.8 | 5 | 9.6 | 15.1 | 1 | 2.9 | ∞ | 6 | 7.0 | 18.1 |
| Other European | 819 | 11.7 | 3 | 5.8 | 3.7 | 2 | 5.9 | ∞ | 5 | 5.8 | 6.1 |
| NZ European | 2,158 | 30.9 | 18 | 34.6 | 8.3 | 13 | 38.2 | 6.1 | 31 | 36.0 | 14.4 |
| **Parity** | | | | | | | | | | | |
| Nullipara | 3413 | 48.9 | 31 | 59.6 | 9.1 | 21 | 61.8 | 6.2 | 52 | 60.5 | 15.2 |
| Multipara | 3561 | 51.1 | 21 | 40.4 | 5.9 | 13 | 38.2 | 3.7 | 34 | 39.5 | 9.5 |
| **Maternal age** | | | | | | | | | | | |
| ≤25 | 813 | 11.7 | 8 | 15.4 | 9.8 | 7 | 20.6 | 8.7 | 15 | 17.4 | 18.5 |
| 26-34 | 3985 | 57.1 | 22 | 42.3 | 5.5 | 18 | 52.9 | 4.5 | 40 | 46.5 | 10.0 |
| ≥35 | 2176 | 31.2 | 22 | 42.3 | 10.1 | 9 | 26.5 | 4.2 | 31 | 36.0 | 14.2 |
| **Maternal smoking at booking** | | | | | | | | | | | |
| Currently smoking | 313 | 4.5 | 7 | 13.5 | 22.4 | 4 | 11.8 | 13.1 | 11 | 12.8 | 35.1 |
| Not smoking | 6661 | 95.5 | 45 | 86.5 | 6.8 | 30 | 88.2 | 4.5 | 75 | 87.2 | 11.3 |
| **Maternal BMI (WHO)** | | | | | | | | | | | |
| <18.5 | 258 | 3.7 | 1 | 1.9 | ∞ | 0 | | | 1 | 1.2 | ∞ |
| 18.5-24.99 | 3782 | 54.2 | 25 | 48.1 | 6.6 | 14 | 41.2 | 3.7 | 39 | 45.3 | 10.3 |
| 25-29.99 | 1614 | 23.1 | 14 | 26.9 | 8.7 | 7 | 20.6 | 4.4 | 21 | 24.4 | 13.0 |
| 30-34.99 | 706 | 10.1 | 4 | 7.7 | 5.7 | 7 | 20.6 | 10.0 | 11 | 12.8 | 15.6 |
| 35-39.99 | 326 | 4.7 | 5 | 9.6 | 15.3 | 3 | 8.8 | 9.3 | 8 | 9.3 | 24.5 |
| >=40 | 211 | 3.0 | 1 | 1.9 | ∞ | 1 | 2.9 | ∞ | 2 | 2.3 | ∞ |
| missing | 77 | 1.1 | 2 | 3.8 | | 2 | 5.9 | | 4 | 4.7 | |
| **NZDep 2006 (quintile)** | | | | | | | | | | | |
| 1 | 1139 | 16.3 | 6 | 11.5 | 5.3 | 3 | 8.8 | 2.6 | 9 | 10.5 | 7.9 |
| 2 | 1342 | 19.2 | 8 | 15.4 | 6.0 | 6 | 17.6 | 4.5 | 14 | 16.3 | 10.4 |
| 3 | 1373 | 19.7 | 10 | 19.2 | 7.3 | 5 | 14.7 | 3.7 | 15 | 17.4 | 10.9 |
| 4 | 1334 | 19.1 | 12 | 23.1 | 9.0 | 8 | 23.5 | 6.1 | 20 | 23.3 | 15.0 |
| 5 | 1351 | 19.4 | 13 | 25.0 | 9.6 | 7 | 20.6 | 5.2 | 20 | 23.3 | 14.8 |
| Missing data | 435 | 6.2 | 3 | 5.8 | | 5 | 14.7 | | 8 | 9.3 | |

* Stillbirth rate = number of stillbirths per 1000 births,
‡ Neonatal Death rate = number of neonatal deaths per 1000 live births
† Perinatal related mortality rate = number of stillbirths & neonatal deaths to 27 days per 1000 births
∞ Not calculated due to small numbers (<3)

## Table 212: Postnatal transfer deaths (babies born elsewhere who transferred to NWH for postnatal care) 2006-2017

| | | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Early neonatal deaths** | <7 days | 3 | 5 | 3 | 4 | 5 | 3 | 4 | 2 | 3 | 2 | 1 | 1 |
| **Late neonatal deaths** | 7–27 days | 3 | 2 | 3 | 5 | 1 | 0 | 0 | 2 | 1 | 2 | 1 | 1 |
| **Total deaths** | | 6 | 7 | 6 | 9 | 6 | 3 | 4 | 4 | 4 | 4 | 2 | 2 |

## Table 213: Perinatal full postmortem rates (%) 2006-2017

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Perinatal postmortem (%)** | 50 | 59 | 55 | 38 | 44 | 33 | 34 | 45 | 46 | 51 | 28 | 37 |

**Table 214: Classification of perinatal-related death (PSANZ-PDC) 2009-2017**

| Classification (PSANZ-PDC) | 2009 N=112 | | 2010 N=117 | | 2011 N=120 | | 2012 N=123 | | 2013 N=114 | | 2014 N=97 | | 2015 N=83 | | 2016 N=97 | | 2017 N=86 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Congenital abnormality | 31 | 28 | 48 | 41 | 43 | 36 | 48 | 39 | 38 | 33 | 37 | 38 | 28 | 34 | 33 | 34 | 20 | 23 |
| Perinatal infection | 4 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 6 | 5 | 2 | 2 | 4 | 5 | 3 | 3 | 7 | 8 |
| Hypertension | 6 | 5 | 4 | 3 | 4 | 3 | 5 | 4 | 3 | 3 | 5 | 5 | 1 | 1 | 0 | | 3 | 3 |
| APH | 15 | 13 | 11 | 9 | 9 | 8 | 15 | 12 | 15 | 13 | 10 | 10 | 9 | 11 | 14 | 14 | 9 | 10 |
| Maternal conditions | 6 | 5 | 9 | 8 | 8 | 7 | 10 | 8 | 4 | 4 | 7 | 7 | 2 | 2 | 7 | 7 | 5 | 6 |
| Specific perinatal conditions | 16 | 14 | 9 | 8 | 23 | 19 | 14 | 11 | 21 | 18 | 13 | 13 | 11 | 13 | 15 | 15 | 14 | 16 |
| Hypoxic peripartum death | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | | 3 | 4 |
| Fetal growth restriction | 5 | 4 | 2 | 2 | 8 | 7 | 3 | 2 | 8 | 7 | 5 | 5 | 7 | 8 | 6 | 6 | 6 | 7 |
| Spontaneous preterm | 19 | 17 | 18 | 15 | 10 | 8 | 15 | 12 | 9 | 8 | 9 | 9 | 10 | 12 | 10 | 10 | 10 | 12 |
| Unexplained antepartum death | 9 | 8 | 10 | 9 | 9 | 8 | 10 | 8 | 8 | 7 | 6 | 6 | 9 | 11 | 9 | 9 | 9 | 10 |
| No obstetric antecedent | 0 | | 0 | | 1 | 1 | 0 | | 0 | | 1 | 1 | 1 | 1 | 0 | | 0 | |

**Table 215: Classification of death (PSANZ-PDC) among terminations of pregnancy 2017**

| Classification (PSANZ-PDC) | Termination of pregnancy N=16 | |
|---|---|---|
| | n | % |
| Congenital abnormality | 9 | 56 |
| Spontaneous preterm | 2 | 13 |
| Specific perinatal conditions | 2 | 13 |
| Maternal condition | 2 | 13 |
| Fetal growth restriction | 1 | 6 |

**Table 216: Perinatal related deaths by classification (PSANZ-PDC) and gestational age 2017**

| | Total deaths N=86 | | Preterm (<37 weeks) n=72 | | Term (≥ 37 weeks) n=14 | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| Congenital abnormality | 20 | 23 | 18 | 25 | 2 | 14 |
| Perinatal infection | 7 | 8 | 5 | 7 | 2 | 14 |
| Antepartum haemorrhage | 9 | 10 | 7 | 10 | 2 | 14 |
| Maternal conditions | 5 | 6 | 4 | 6 | 1 | 7 |
| Hypertension | 3 | 3 | 1 | 1 | 2 | 14 |
| Specific perinatal conditions | 14 | 16 | 13 | 18 | 1 | 7 |
| Hypoxic peripartum death | 3 | 3 | 2 | 3 | 1 | 7 |
| Fetal growth restriction | 6 | 7 | 6 | 8 | 0 | |
| Spontaneous preterm | 10 | 12 | 10 | 14 | 0 | |
| Unexplained antepartum death | 9 | 10 | 6 | 8 | 3 | 21 |
| No obstetric antecedent | 0 | | 0 | | 0 | |

## 10.11. Maternal Mortality

In 2017 there were no maternal deaths for women who birthed at ACH.

Maternal Morbidity

## 10.12. Maternal Morbidity

### Emergency peripartum hysterectomy

Emergency peripartum hysterectomy is defined as hysterectomy performed for complications related to pregnancy within 6 weeks of birth, when that pregnancy resulted in birth at NWH at or beyond 20 weeks gestation. Planned hysterectomy for morbidly adherent placenta is included but planned hysterectomy for malignancy is excluded.

There were 7 peripartum hysterectomies in 2016 (1.02/1000 births). This included one emergency hysterectomy for uterine atony, one for obstetric injury, and five for abnormal placentation (praevia, accrete, percreta). Two hysterectomies for abnormal placentation were planned antenatally.

**Figure 211: Emergency peripartum hysterectomy rates/1000 births NWH 1992-2017**

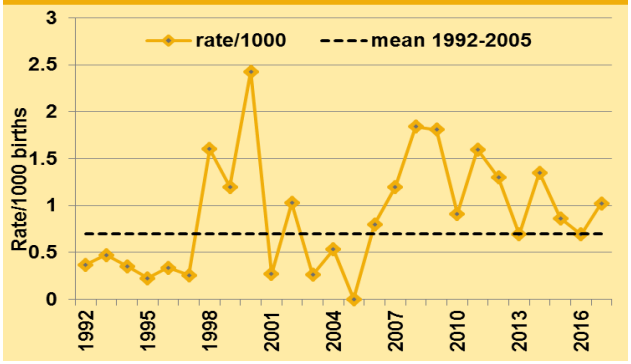
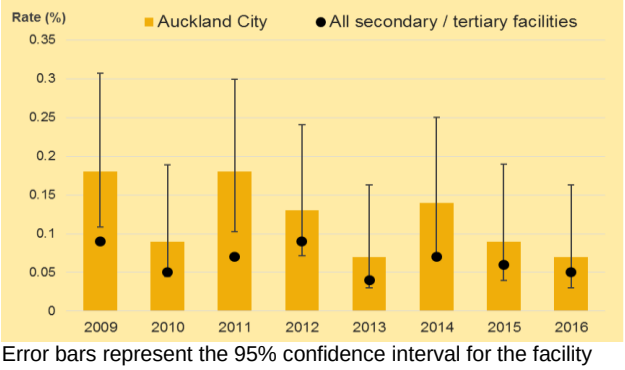



**Figure 212: NZ Maternity Indicators 2016: Emergency peripartum hysterectomy rates NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for the facility rate.

There are small absolute numbers per year and so the rate is highly variable. However, the run chart in Figure 211 indicates that there has been a significant increase in rate from the mean in 1992-2005 with eleven data points at or above the mean line. This is consistent with worldwide trends and is related to increasing numbers of women with a history of previous Caesarean section.

## 10.13. Other Severe Maternal Morbidity

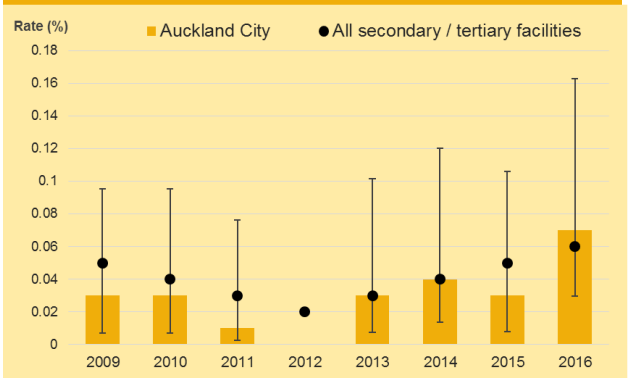
These data are collected as part of the AMOSS study or by queries from Healthware and the hospital discharge database.

**Table 217: Severe maternal morbidities (per 1000 births) NWH 2014-2017**

| Diagnosis | 2014 N=7400 | | 2015 N=6933 | | 2016 N=7241 | | 2017 N=6846 | |
|---|---|---|---|---|---|---|---|---|
| | n | (/1000) | n | (/1000) | n | (/1000) | n | (/1000) |
| Amniotic fluid embolism | 1 | 0.1 | 0 | | 0 | | 0 | |
| Eclampsia | 2 | 0.3 | 1 | 0.1 | 1 | 0.1 | 0 | |
| Emergency peripartum hysterectomy | 10 | 1.4 | 6 | 0.9 | 5 | 0.7 | 7 | 1.0 |
| Admission to DCCM/CVICU | 22 | 3.0 | 22 | 3.2 | 26 | 3.6 | 71* | 10.4 |

*two admissions to DCCM did not birth at ACH

**Figure 213: NZ Maternity Indicators 2016: Eclampsia at birth admission NWH and NZ secondary/tertiary facility rates 2009-2016**

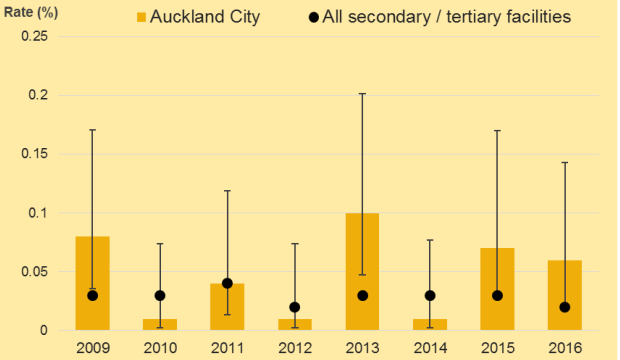



Error bars represent the 95% confidence interval for the facility rate.

In 2017, there were more admissions to DCCM/CVICU as the Ward 91 High Dependency Unit (located on Labour and Birthing Suite) was not always able to be staffed to allow these women to be cared for within the maternity service. There were four antenatal admissions, 2 antenatal admissions extending into the postnatal period, and 67 postpartum admissions. Sixty six admissions were to DCCM and 7 to CVICU. Of the 69 postpartum admissions, 67 birthed at ACH and two elsewhere.

Reasons for admission were postpartum haemorrhage (32), preeclampsia (19), cardiac (including cardiomyopathy) (10), sepsis (7), and other (5).

**Figure 214: NZ Maternity Indicators 2016: Admission to ICU requiring ventilation during the pregnancy or postnatal period NWH and NZ secondary/tertiary facility rates 2009-2016**




Error bars represent the 95% confidence interval for the facility rate




# CHAPTER 11

# GYNAECOLOGY

## 11.1 Colposcopy

The data presented in this section come from data entered into the Solutions Plus record by clinicians and support staff. The data have been checked against appointments recorded in the PHS outpatient services management system. Post-treatment data are based on treatments in 2016.

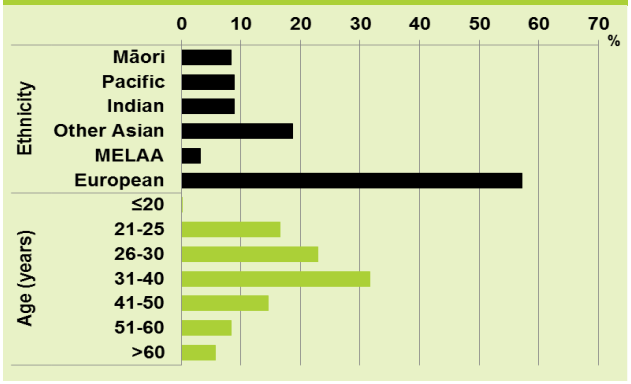
The standards used in this section are taken from the C-Quip (RANZCOG Colposcopy Quality Improvement Program).

Unfortunately several of the C-Quip 'standards' do not actually set a numerical target for which individuals and institutions should aim; merely that data for the standard should be known.

### Findings:

There were 1620 cervical colposcopies performed in the department in 2017, of which 1088 were initial cervical colposcopies.

**Figure 215: Demographic details of women having an initial colposcopic examination in NWH 2017**




The proportion of women aged 21-25 is showing a gradual downward trend. Interestingly there appears to be a trend toward proportionately more women in the over 60 cohort (rising from 3% to almost 6% in a 6 year period). Nationally, HPV vaccination rates remain suboptimal.

Pleasingly, it is now rare for women under 20 to be referred to the clinic (only one referral in 2017).

"Smoking Status" continues to be a non-mandatory field, however recorded smoking rates remain stable at 12%, and 75% of women are reportedly smokefree.

There has been a small reduction in the number of women being referred from outside ADHB (now 5%). This reflects an increase in women being treated in their domiciled DHB for high grade vaginal dysplasia, as agreed between the DHBs. Most of these women need simple excisions only. The Gynaecology Oncologist colposcopists will continue to see women from other DHBs who need complex vaginal dysplasia excisions.

**Table 218: Referral smear cytology among women presenting for initial colposcopy NWH 2017**

| | Initial visit N=1088 | |
|---|---|---|
| | n | % |
| Invasive | 5 | 0.5 |
| High grade | 241 | 22.2 |
| Low grade | 702 | 64.5 |
| Atypical glandular | 13 | 1.2 |
| Unsatisfactory | 9 | 0.8 |
| Other | 3 | 0.3 |
| Normal | 78 | 7.2 |
| No smear taken | 37 | 3.4 |

**Table 219: Histology of biopsy among women presenting for initial colposcopy NWH 2017**

| | Initial visit N=1088 | |
|---|---|---|
| | n | % |
| Invasive | 3 | 0.3 |
| High grade | 159 | 14.6 |
| Low grade | 208 | 19.1 |
| Dysplasia NOS | 18 | 1.7 |
| HPV | 44 | 4.0 |
| Inflammation | 68 | 6.3 |
| Insufficient sample | 12 | 1.1 |
| Normal | 155 | 14.2 |
| No biopsy taken | 421 | 38.7 |

In 2017 we had 16 colposcopists. This has been sufficient for each to average 68 new cases per year, and 101 colposcopies per year in total. These numbers, along with individual colposcopists' numbers, are well within the C-QuIP and NCSP standards (with the latter standard being a minimum of 150 per three years, twice the number required for C-QuIP). With rates of high grade dysplasia continuing to fall, we will need to be mindful of colposcopist numbers and maintenance of skills.

The proportion of non-pregnant women referred with high grade smears having a biopsy has been commented on for several years in this report as being an area where we were below standard (C-QuIP Therapeutic Standard 2 – Target 95%). It is therefore very rewarding to see a continued increase in biopsy rates in this situation. We have reached 93.6%, up from 88.6% last year, which is an excellent achievement and reflects increased awareness in this area.

All patients referred with a smear suggestive of invasion had biopsies taken.

Almost all biopsies were satisfactory for evaluation.

An audit was undertaken of compliance with referral to colposcopy MDM for discordancy (Sixth year medical students Garg and Kane, February 2018).

All women who have high grade referral smears but do not have a biopsy showing high grade dysplasia should be referred for MDM review (NCSP Guidelines for Screening in NZ 2009). Compliance with this guideline was noted to be below standard at 70%.

Colposcopists have been reminded of this part of the guideline and a re-audit is planned. The records of all cases that were not referred were reviewed. None were discharged with high grade cytology. By far the most common situation is non-referral due to normalisation of smear from ASC-H to low grade or less when the smear was repeated in colposcopy clinic. This prompted a clinician decision to review at 3-6 months, which was consistent with the advice of the MDM panel for equivalent cases that were reviewed and discussed.

The "high grade smear no-biopsy" data in includes pregnant women (in whom a biopsy would not usually be done without suspicion of invasive disease) – hence the C-QuIP standard above is more useful.

C-QuIP Diagnostic Standard 4a, correlation of high grade colposcopic finding with histology, has fallen slightly. With the improvement in biopsy rates, however, this becomes less clinically relevant. The absolute numbers of women having a high grade biopsy have fallen, from 221 in 2014, to 159 in 2017. It is therefore to be expected that as each individual clinician sees fewer high grade cases, their ability to accurately discriminate between high grade and low grade disease will lessen.

Correlation between cytology and histology – C-QuIP Diagnostic Standard 4b (no target given), remains stable at little more than 50% at 6 months. It should be noted that our MDM recommendation in this situation is frequently to "review in 6 months", so high grade histology at the next visit is not captured here.

All of our treatments are by excision (ie not ablation) – which is reflected in C-QuIP Therapeutic Standard 1a. Almost 90% of treatment specimens show high grade dysplasia. This is a pleasing result, at well above Therapeutic Standard 1b of 80%, however it does remind us that in 10% of cases, the histology will NOT show high grade dysplasia, and it would be prudent to discuss this with women during the consent process. The low rates of high grade dysplasia post-treatment confirm that this is a reflection of self-resolving high grade dysplasia, rather than ineffective treatment, which is very reassuring.

Our 'treatment failure' rates – Therapeutic Standard 4 – remain exceptionally low at 0.5%, well below the target of up to 5%.

Therapeutic Standard 5, follow-up within 9 months after treatment, has fallen slightly, now 76.1%.

**Table 220: Cervical treatments NWH 2017**

| | 2017 N=234 | |
|---|---|---|
| | N | % |
| **LLETZ** | 215 | 91.9 |
| **Cold knife cone** | 17 | 7.3 |
| **Total hysterectomy** | 1 | 0.4 |
| **Other** | 1 | 0.4 |

There were 46 LLETZ treatments under general anaesthesia, which means 79% of patients underwent LLETZ with local anaesthesia. This is almost at the 80% NCSP standard, and is the closest that we have been to this standard in at least the last 6 years. The absolute number of LLETZ treatments under general anaesthesia has fallen substantially from 71 the previous year, and the total number of LLETZ treatments has also fallen, from 266 in 2016 and 296 in 2013. This will be partly due to non-treatment of young women with CIN2 in the PRINCess trial, however the number of women in that trial is small compared to the total reduction.

### 11.1.1 Post treatment follow up

Seventy nine percent of women had follow-up within 9 months of treatment. At 12 months, (the NCSP guideline) this rose to 82%.

Fifty five women did not have follow-up at NWH documented.

**Table 221: Timing of follow up colposcopy (ACH) after treatments NWH 2016**

| | 2016 N=310 | |
|---|---|---|
| | N | % |
| **≤ 9 months** | 244 | 78.7 |
| **> 9 months** | 11 | 3.5 |
| **No follow up** | 55 | 17.7 |

An audit of reasons for lack of ADHB follow-up after treatment of high grade dysplasia (Final Year Medical Students Nurdjaja and Hardcastle, data from year 2016 treatments) found that 50% of the patients who had no follow-up at 12 months at ADHB had documented referrals to other DHBs, having moved area. Another 10% were known to have left NZ. In only 25%, the patient was unable to be contacted, and truly 'lost to follow-up'. The remaining patients were either seen in other services (eg GO or declined colposcopy, preferring to see their GP for a smear. All patients were offered appointments within 9 months of treatment. Interestingly all women who did not have follow-up by 12 months at ADHB were under the age of 30, reflecting the mobile nature of this population group.

**Table 222: C-QuIP Standards for Colposcopy 2016 and 2017**

| | Standard | Numerator | Denominator | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | n | N | % | n | N | % |
| | **Quality standards for Diagnostic Colposcopists** | | | | | | | | |
| 1 | Maintaining skill levels: Each practitioner is required to undertake 75 colposcopies in each 3 year period (SMOs only). | | | | | 100 | | | 100 |
| 2 | ≥95% of women with HG cytology have punch or excisional biopsy. | Number of women referred with HG cytology who have a punch or excisional biopsy within 6 months (exclude pregnant women) | Number of women seen in 2016 with HG cytology | 287 | 324 | 88.6 | 308 | 329 | 93.6 |
| 3 | ≥90% of biopsies are suitable for histological interpretation | Number of satisfactory histology biopsies | Number of biopsies | 849 | 864 | 98.3 | 658 | 670 | 98.2 |
| 4a | Correlation of high grade colposcopic diagnosis with histological findings - no standard given | Number of women with high grade histology (CIN2/3 or cancer) within 6 months of HG colposcopy diagnosis | Number of women with high grade colposcopic finding in 2016 | 146 | 223 | 65.5 | 147 | 244 | 60.2 |
| 4b | Correlation of high grade cytology diagnosis with histological findings - no standard given | Number of women referred with HG cytology who have high grade histology (CIN2/3 or cancer) within 6 months (exclude pregnant women) | Number of women seen in 2016 with HG cytology | 168 | 324 | 51.9 | 172 | 329 | 52.3 |
| | **Quality standards for Therapeutic Colposcopists** | | | | | | | | |
| 1a | 100% of treatments should have a histology sample | Number of women treated in 2017 who have histology performed prior to or at treatment | Number of women who are treated | 310 | 310 | 100 | 234 | 234 | 100 |
| 1b | ≥80% of histology among women treated in 2017 shows high grade changes | Number of women treated in 2017 who have high grade changes at punch biopsy or on treatment specimen | Number of women who are treated | 268 | 310 | 86.5 | 209 | 234 | 89.3 |
| 3 | Histology among women treated in 2017 shows high grade changes - no standard | Number of women treated in 2017 who have high grade changes at punch biopsy within 6 months of treatment or on treatment specimen | Number of women who are treated | 248 | 310 | 80 | 196 | 234 | 83.8 |
| 4 | ≤5% of women treated for HG histology (in 2016) will have a HG histology (treatment failure) within 12 months | Number of women with HG histology within 12 months of treatment | Number of women treated (in 2015) with a HG lesion on histology | 1 | 213 | 0.5 | 1 | 201 | 0.5 |
| 5 | Follow up within 9 months of treatment (in 2016) for HG histology should be maximised - no standard | Number of women who have a cytology, biopsy, or colposcopy within 9 months of treatment for HG histology | All women treated (in 2015) for HG histology | 177 | 213 | 83.1 | 153 | 201 | 76.1 |

## Table 223: Histological diagnosis (biopsy at initial colposcopy) by referral smear cytology NWH 2017

| Referral smear cytology | Total Colposcopies | Histological diagnosis | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No biopsy | | Invasive | | High Grade | | Low Grade | | Dysplasia NOS | | Condyloma/ inflammation | | HPV | | Insufficient Sample | | Normal | |
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **1088** | **421** | **38.7** | **3** | **0.3** | **159** | **14.6** | **208** | **19.1** | **18** | **1.7** | **68** | **6.3** | **44** | **4.0** | **12** | **1.1** | **155** | **14.2** |
| **Invasive** | 5 | 0 | | 1 | 20.0 | 4 | 80.0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| **High grade** | 241 | 44 | 18.3 | 1 | 0.4 | 103 | 42.7 | 41 | 17.0 | 3 | 1.2 | 11 | 4.6 | 6 | 2.5 | 3 | 1.2 | 29 | 12.0 |
| **Low grade** | 702 | 280 | 39.9 | 0 | | 45 | 6.4 | 160 | 22.8 | 12 | 1.7 | 51 | 7.3 | 36 | 5.1 | 9 | 1.3 | 109 | 15.5 |
| **Atypical glandular** | 13 | 5 | 38.5 | 0 | | 3 | 23.1 | 0 | | 1 | 7.7 | 2 | 15.4 | 0 | | 0 | | 2 | 15.4 |
| **nsatisfactory** | 9 | 5 | 55.6 | 0 | | 0 | | 0 | | 1 | 11.1 | 2 | 22.2 | 0 | | 0 | | 1 | 11.1 |
| **Other** | 3 | 3 | 100 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| **Normal** | 78 | 59 | 75.6 | 0 | | 1 | 1.3 | 3 | 3.8 | 0 | | 2 | 2.6 | 2 | 2.6 | 0 | | 11 | 14.1 |
| **No Smear** | 37 | 25 | 67.6 | 1 | 2.7 | 3 | 8.1 | 4 | 10.8 | 1 | 2.7 | 0 | | 0 | | 0 | | 3 | 8.1 |

## Table 224: Cervical histology findings by colposcopic diagnosis (at initial colposcopy if satisfactory) NWH 2017

| Colposcopic diagnosis | Total Colposcopies | Histological diagnosis | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No biopsy | | Invasive | | High Grade | | Low Grade | | Dysplasia NOS | | Condyloma/ inflammation | | HPV | | Insufficient Sample | | Normal | |
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **1016** | **371** | **36.5** | **2** | **0.2** | **157** | **15.5** | **202** | **19.9** | **17** | **1.7** | **65** | **6.4** | **43** | **4.2** | **12** | **1.2** | **147** | **14.5** |
| **Invasive** | 2 | 0 | | 0 | | 2 | 100.0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| **High grade** | 158 | 8 | 5.1 | 1 | 0.6 | 84 | 53.2 | 35 | 22.2 | 3 | 1.9 | 6 | 3.8 | 3 | 1.9 | 2 | 1.3 | 16 | 10.1 |
| **Low grade** | 506 | 63 | 12.5 | 0 | | 63 | 12.5 | 154 | 30.4 | 11 | 2.2 | 51 | 10.1 | 36 | 7.1 | 10 | 2.0 | 118 | 23.3 |
| **Condyloma/ inflammation** | 12 | 9 | 75.0 | 0 | | 1 | 8.3 | 0 | | 0 | | 2 | 16.7 | 0 | | 0 | | 0 | |
| **Other** | 21 | 10 | 47.6 | 0 | | 1 | 4.8 | 2 | 9.5 | 1 | 4.8 | 2 | 9.5 | 1 | 4.8 | 0 | | 4 | 19.0 |
| **Normal** | 306 | 279 | 91.2 | 1 | 0.3 | 2 | 0.7 | 9 | 2.9 | 2 | 0.7 | 3 | 1.0 | 3 | 1.0 | 0 | | 7 | 2.3 |
| **No opinion given** | 11 | 2 | 18.2 | 0 | | 4 | 36.4 | 2 | 18.2 | 0 | | 1 | 9.1 | 0 | | 0 | | 2 | 18.2 |

| Table 225: Histology findings post cervical treatment NWH 2016 | | |
|---|---|---|
| | 2016 treatments N=310 | |
| | n | % |
| **Histology findings at post treatment follow up** | | |
| No biopsy taken | 229 | 73.9 |
| High grade | 1 | 0.3 |
| Low grade | 7 | 2.3 |
| Dysplasia NOS | 5 | 1.6 |
| HPV | 1 | 0.3 |
| Inflammation | 8 | 2.6 |
| Normal | 3 | 1.0 |
| Insufficient sample | 1 | 0.3 |
| Non attendance | 55 | 17.7 |

It is very pleasing to see that there was only one histologically proven treatment failure (0.5%). This is well below the C-Quip standard of up to 5%.

### 11.1.2 Research and training

The PRINCess (Prediction of Regression in CIN2) trial completed recruiting in 2017 and we expect the remaining patients to complete their follow-up in 2018.

NWH became a centre for the EXCISE trial (EXcisional treatment Comparison for the In Situ Endocervical adenocarcinoma). This multicentre Australasian trial is a prospective randomised non-inferiority trial comparing LLETZ to cone biopsy for AIS.

We continue to train registrars in colposcopy and have in-house RANZCOG assessors for their In Hospital Clinical Assessment colposcopy module.

Final year medical students from the University of Auckland each attend a colposcopy clinic as part of their O&G attachment.

### Summary

Comparison against C-QuIP standards has shown excellent results for our unit.

In particular, we have made substantial improvements in biopsy rates in women with high grade referral smears.

Fewer women are having their LLETZ treatments under general anaesthesia.

Our 12 month treatment failure rates are exceptionally low.

Colposcopists are reminded of the requirement to refer to MDM all discordant cases where women have high grade referral smears but no high grade histological diagnosis is made at colposcopy.

Movement of patients between DHBs during the course of treatment and follow-up is a challenge.

HPV vaccination guidelines in NZ changed in January 2017 to include both males and females, and the age for funded vaccination increased to 26 years. The nonovalent vaccine also replaced the original quadrivalent vaccine.

We are starting to see a significant effect of HPV vaccination. The number of LLETZ treatments has fallen by 19% in four years. As the number of women with high grade dysplasia falls, we must ensure that our currently high standards of diagnostic and therapeutic colposcopy are maintained. Colposcopists must continue to perform sufficient numbers of procedures, both diagnostic and therapeutic, to maintain their skills.

## 11.2 Data tables: Colposcopy

**Table 226: Demographic details of women having an initial colposcopic examination in NWH 2012-2017**

| | Initial colposcopy July-Dec 2012 | | Initial colposcopy in 2013 | | Initial colposcopy in 2014 | | Initial colposcopy in 2015 | | Initial colposcopy in 2016 | | Initial colposcopy in 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=759 | | N=1406 | | N=1357 | | N=1182 | | N=1348 | | N=1088 | |
| | n | % | N | % | n | % | n | % | n | % | n | % |
| **Ethnicity** | | | | | | | | | | | | |
| Māori | 51 | 6.7 | 105 | 7.5 | 88 | 6.5 | 79 | 6.7 | 78 | 5.8 | 91 | 8.4 |
| Pacific | 83 | 10.9 | 131 | 9.3 | 133 | 9.8 | 129 | 10.9 | 114 | 8.5 | 97 | 8.9 |
| Indian | 45 | 5.9 | 56 | 4.0 | 232 | 17.1 | 40 | 3.4 | 58 | 4.3 | 39 | 3.6 |
| Other Asian | 112 | 14.8 | 198 | 14.1 | 40 | 2.9 | 191 | 16.2 | 223 | 16.5 | 204 | 18.8 |
| MELAA | | | | | | | | | | | 35 | 3.2 |
| European | 444 | 58.5 | 855 | 60.8 | 801 | 59.0 | 704 | 59.6 | 809 | 60.0 | 461 | 42.4 |
| Other European | | | | | | | | | | | 161 | 14.8 |
| Other | 24 | 3.2 | 61 | 4.3 | 63 | 4.6 | 39 | 3.3 | 66 | 4.9 | | |
| **Age (yrs)** | | | | | | | | | | | | |
| ≤20 | 10 | 1.3 | 7 | 0.5 | 6 | 0.4 | 3 | 0.3 | 2 | 0.1 | 1 | 0.1 |
| 21-25 | 312 | 41.1 | 281 | 20.0 | 247 | 18.2 | 212 | 17.9 | 224 | 16.6 | 181 | 16.6 |
| 26 -30 | | | 271 | 19.3 | 278 | 20.5 | 256 | 21.7 | 324 | 24.0 | 249 | 22.9 |
| 31-40 | 199 | 26.2 | 447 | 31.8 | 407 | 30.0 | 357 | 30.2 | 401 | 29.7 | 344 | 31.6 |
| 41-50 | 128 | 16.9 | 216 | 15.4 | 239 | 17.6 | 186 | 15.7 | 192 | 14.2 | 159 | 14.6 |
| 51-60 | 87 | 11.5 | 136 | 9.7 | 117 | 8.6 | 123 | 10.4 | 130 | 9.6 | 91 | 8.4 |
| >60 | 23 | 3.0 | 48 | 3.4 | 63 | 4.6 | 45 | 3.8 | 75 | 5.6 | 63 | 5.8 |
| **Smoking status** | | | | | | | | | | | | |
| Currently smoking | 64 | 8.4 | 131 | 9.3 | 97 | 7.1 | 62 | 5.2 | 216 | 16.0 | 130 | 11.9 |
| Not currently | 174 | 22.9 | 467 | 33.2 | 465 | 34.3 | 304 | 25.7 | 983 | 72.9 | 819 | 75.3 |
| Unknown | 521 | 68.6 | 808 | 57.5 | 795 | 58.6 | 816 | 69.0 | 149 | 11.1 | 139 | 12.8 |
| **DHB of residence** | | | | | | | | | | | | |
| Auckland | 709 | 93.4 | 1317 | 93.7 | 1272 | 93.7 | 1112 | 94.1 | 1253 | 93.0 | 1031 | 94.8 |
| Counties Manukau | 14 | 1.8 | 27 | 1.9 | 19 | 1.4 | 17 | 1.4 | 31 | 2.3 | 19 | 1.7 |
| Waitemata | 25 | 3.3 | 38 | 2.7 | 45 | 3.3 | 29 | 2.5 | 43 | 3.2 | 26 | 2.4 |
| Other | 11 | 1.4 | 24 | 1.7 | 21 | 1.5 | 24 | 2.0 | 21 | 1.6 | 12 | 1.1 |

NA=not available

**Table 227: Cervical treatments NWH 2011 – 2017**

| | 2011 N=236 | | July-Dec 2012 N=133 | | 2013 N=339 | | 2014 N=286 | | 2015 N=300 | | 2016 N=310 | | 2017 N=234 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **LLETZ** | 220 | 93.2 | 118 | 88.7 | 298 | 87.9 | 262 | 91.6 | 284 | 94.7 | 267 | 86.1 | 215 | 91.9 |
| **Cold knife cone** | 16 | 6.8 | 11 | 8.3 | 29 | 8.6 | 21 | 7.3 | 14 | 4.7 | 38 | 12.3 | 17 | 7.3 |
| **Hysterectomy** | 0 | | 1 | 0.8 | 11 | 3.2 | 3 | 1.0 | 0 | | 0 | | 1 | 0.4 |
| **Other** | | | 3 | 2.3 | 1 | 0.3 | | | 2 | 0.7 | 5 | 1.6 | 1 | 0.4 |

## 11.3 Gynaecologic oncology (GO) surgical services

### Findings

The data in this chapter are extracted from a stand-alone Gynaecologic Oncology (GO) referrals database, a stand-alone GO clinical database (including details of all cases referred to multidisciplinary review or for surgery, and details of all surgeries undertaken by the GO team), the hospital CMS database, and the theatre database (PIMS).

The data in most of the clinical tables pertain to those patients with data in the GO clinical database.

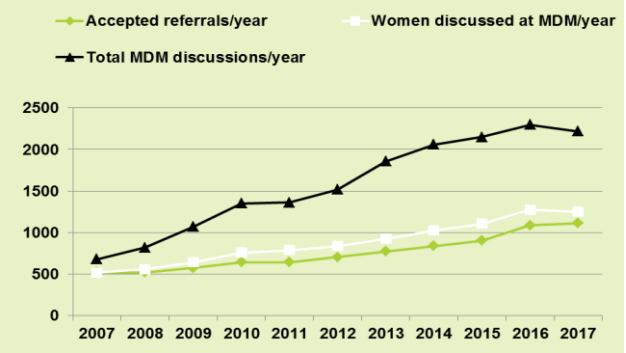
ADHB is the largest of the three New Zealand GO centres, providing care for over half the population, approximately 2.3 million. We continue to provide

surgical services for, and lead the coordination of the MDM for the eight DHBs of the Northern and Midland Cancer networks.

There were 1071 new referrals to the MDM in 2017, of which 1064 met the criteria for MDM discussion.

A total of 2,214 MDM discussions about 1,249 patients were held in 2017, which is a similar volume to last year and averages 44 cases per week.

**Figure 216: Referrals and Multidisciplinary meetings (MDMs) 2007-2017**




There has been an increase in staffing within the wider GO MDT over the past year. Currently the Auckland based MDT consists of 1.6 MDM coordinators, four gynaecological oncologists, three medical oncologists, three radiation oncologists, three pathologists, three radiologists and three Clinical Nurse Specialists (two surgical and one medical), one GO Fellow plus junior staff. Live video links to the referring DHB teams continue to work well with improved communication in real time across the DHBs.

Unfortunately a satisfactory solution to real-time documentation of the MDM has not been found and the process is still manual and very time consuming. Electronic direct entry referrals and MDM management still remain an aspiration and have been flagged as a priority by the Northern and Midland GO Tumour Stream (NMGOTS). As a compromise and to reduce the workload of the transcription department, the recommendations are now recorded on the MDM document at the time of discussion, and no longer transcribed. However this means the MDM coordinator workload has increased, as they are now responsible for conversion of this to a Concerto document.

All DHBs' referral numbers and proportions are remaining constant, implying appropriate use of referral pathways and adherence to National Standards. There is good engagement across both Northern and Midland Cancer Networks and the MDM is well attended by local gynaecologists, radiation and medical oncologists, as well as pathologists from Counties Manukau and Waitamata DHBs.

The clinical cooperation between DHBs is largely coordinated by the clinical nurse specialist (CNS) in conjunction with her counterparts in the referring DHBs and demand is now well beyond the capacity of a single CNS. A second GO CNS (1 FTE) was recruited part way through 2017, as well as an additional part time (0.6FTE) assistant MDM coordinator.

**Figure 217: Demography of women discussed at MDM 2017 (n=1249)**

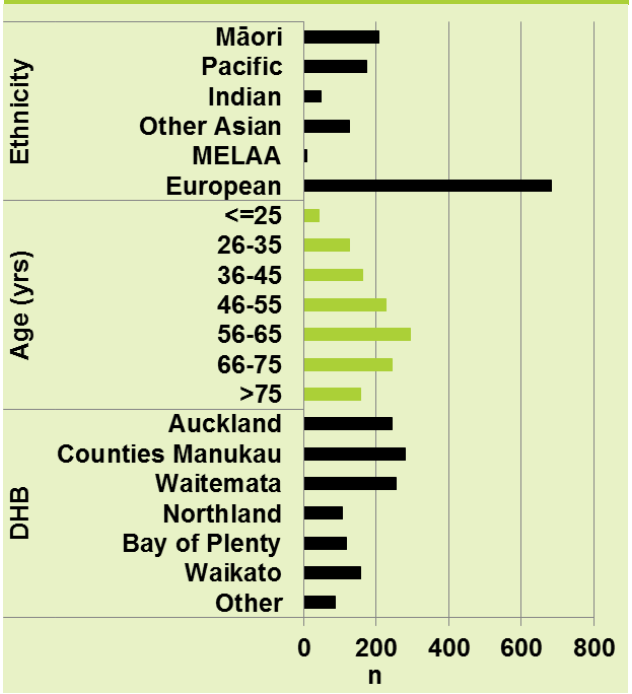
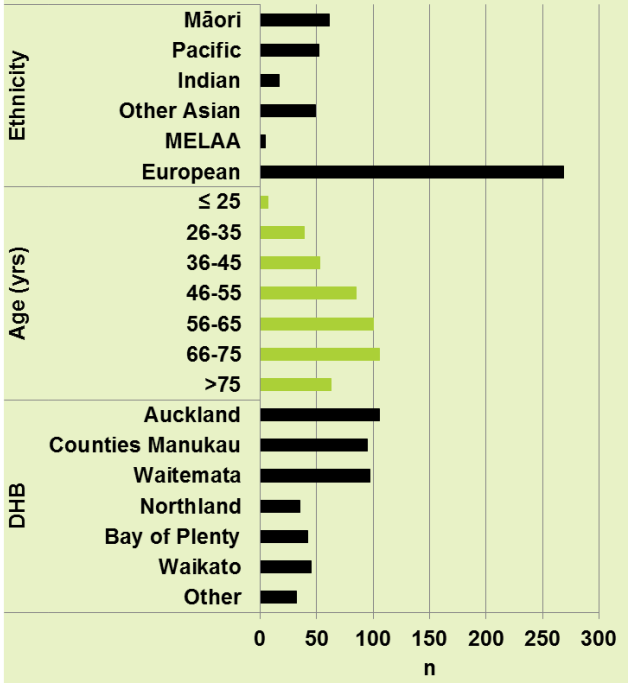



**Figure 218: Demography of women undergoing surgery by the Gynaecologic Oncology team 2017 (n=453)**



### 11.3.1 Reporting to Faster Cancer Treatment standards

The National Standards were published by the Ministry of Health. The Faster Cancer Treatment (FCT) 62 day target (from referral to definitive treatment) came into force in July 2014. Mandatory targets were increased from 85% to 90% compliance in June 2017.

Data relating to clinic and surgical appointments are pulled from two different databases, which complicates data management. It is recommended that a combined database be developed. Overlap between clinic visit in one calendar year and surgery in another mean the numbers are more difficult to interpret and appear to be less than expected.

**Table 228: Performance against FCT 62 day target among ADHB domiciled women (2017)**

| Reporting Month | Total Patients | Percentage | Adjusted Percentage |
|---|---|---|---|
| Jan-17 | 3 | 67% | 100% |
| Feb-17 | 5 | 60% | 60% |
| Mar-17 | 4 | 50% | 75% |
| Apr-17 | 5 | 60% | 80% |
| May-17 | 5 | 40% | 60% |
| Jun-17 | 1 | 100% | 100% |
| Jul-17 | 4 | 100% | 100% |
| Aug-17 | 3 | 67% | 100% |
| Sep-17 | 4 | 75% | 100% |
| Oct-17 | - | - | |
| Nov-17 | 6 | 83% | 83% |
| Dec-17 | 1 | 100% | 100% |
| **Grand Total** | **41** | **68%** | **83%** |

Table 228 shows GO tumour stream performance for ADHB domiciled referrals into general gynaecology. A proportion of these referrals will transfer to GO for tertiary level treatment. The GO department's level of service also impacts on the performance of other DHB targets, as we provide the end part of their pathway.

Performance has improved over the past year from 73% to 83% compliance, but still falls short of both the initial 85%, and the revised target of 90%. Regional work has shown that diagnostic delays are often responsible for breaches, and the establishment of the rapid access clinic has helped improve this pathway.

The FCT audit project (2015) highlighted diagnostic procedures as the bottleneck in the cancer pathway. Work on tumour stream pathways by NMGOTS has shown that achieving the 62 day pathway for patients with endometrial cancer is extremely difficult to achieve if a general anaesthetic hysteroscopy is required.

One of the recommendations from NMGOTS was that a rapid access clinic with access to outpatient hysteroscopy was developed and this was established within the general gynaecology department in 2017, and this is likely to have led to the performance improvement.

**Table 229: Time from referral (referrals received in 2017) to first MDM (n=940 women)**

| | 2017 N=940 | |
|---|---|---|
| | n | % |
| **<7 days** | 392 | 41.7 |
| **7-14 days** | 452 | 48.1 |
| **>14 days** | 96 | 10.2 |

Excludes referrals for molar pregnancy and consideration of prophylactic surgery.

The department's default position is for referrals to be discussed at the next MDM the following week. The proportion of MDM discussions occurring more than two weeks from referral has increased this year to 10.2%, with 89.8% being discussed within 14 days of referral.

The Gynae tumour stream is the only MDM that functions 52 weeks per year and all referrals are triaged between 0 - 4 working days from referral, with the aim of patients being discussed at the next MDM, if all relevant information/investigations are available. Due to volumes of referrals, in line with the MDM terms of reference, cases are not discussed unless all relevant information is available for decision making, ie both radiology and pathology are available for review if needed. This can lead to cases being deferred and access to imaging is often the limiting factor.

The increase is pathology FTE has led to fewer deferred cases due to pathology review for initial presentations.

**Table 230: Time from first MDM (first MDM in 2017) to first Clinic appointment**

| | 2017 N=343 | |
|---|---|---|
| | N | % |
| **<7 days** | 170 | 49.6 |
| **7-14 days** | 72 | 21.0 |
| **>14 days** | 86 | 25.1 |
| **Clinic before MDM** | 4 | 1.2 |
| **No MDM** | 11 | 3.2 |

Approximately a third of the MDM referrals need a First Specialist Appointment with GO and subsequent surgery at the Cancer Centre and this proportion has stayed fairly constant.

In 2016 there was a recommendation from the Regional Tumour Stream that patients be seen in clinic the day after the MDM if possible, to try and streamline the FCT pathways and this was implemented towards the end of 2016.

There has been a dramatic improvement over the past two years following implementation of this policy from 3.2% of patients being seen the day

after MDM in 2015, to 27.1% in 2016 and now 49.6% being seen the next day in 2017. The number being seen within 14 days of MDM has increased from 21.4% in 2015 to 70.6% in 2017, which reflects increased capacity due to the increase in SMO and Fellow FTE. Not all patients are able to attend the next day, due to transport arrangements from around the country, or time needed to be informed of their diagnosis by the local referring team.

Some appointments, such as for the patients requiring interval debulking surgery, are scheduled to coincide with chemotherapy cycles, and provisional surgery dates are arranged at the start of chemotherapy, 3 months prior. Delay in chemotherapy administration leads to changes in surgical and clinic dates and requires good communication with the local medical oncology teams. Work is underway to try and streamline this process.

**Table 231: Time from first Clinic visit (visit in 2017) to surgery (n=297 women)**

| | 2017 N=297 | |
|---|---|---|
| | n | % |
| **<14 days** | 114 | 38.4 |
| **14 - 31 days** | 83 | 27.9 |
| **>31 days** | 60 | 20.2 |
| **Surgery before clinic** | 23 | 7.7 |

The New Zealand Gynaelogical Cancer Group recommendation is that patients are offered surgery within two weeks of their FSA. The proportion achieving this target has risen from 29.4% to 38.4%, reflecting the increase in SMO FTE and the ability to cover leave. However this is unlikely to improve further due to theatre capacity. The numbers of cases per list will fall with the push towards more minimal access surgery for endometrial cancers and more radical surgery for ovarian cancers and this has a direct effect on waiting time for surgery.

Currently we are only achieving the NZGCG standard in just over a third of patients and the MoH 31 day target (decision to treat to treatment) has improved from 70% in 2016 for 79.8% in 2017, but is still below the 90% standard target.

**Table 232: Time from referral (referrals in 2017) to surgery by site (n=297 women)**

| | Total | <62 days | | ≥62 days | |
|---|---|---|---|---|---|
| | N | n | % | n | % |
| **Any site** | 297 | 259 | 87.2 | 38 | 12.8 |
| **Ovary/Tube/ Peritoneum** | 95 | 90 | 94.7 | 5 | 5.3 |
| **Cervix** | 52 | 34 | 65.4 | 18 | 34.6 |
| **Vulval/Vagina** | 25 | 22 | 88.0 | 3 | 12.0 |
| **Endometrium** | 110 | 98 | 89.1 | 12 | 10.9 |
| **Uterus** | 9 | 9 | 100.0 | 0 | 0.0 |
| **Non-gynae cancer** | 4 | 4 | 100.0 | 0 | |

The figures in Table 232 do not refer to the MOH 62 day target as they relate to time from referral to GO, not from initial primary referral. These results should be interpreted with caution, as they are overly optimistic as they do not reflect the true FCT results, as the initial part of the pathway has been excluded.

Interval debulking surgery for women with ovarian cancer having neoadjuvant chemotherapy will always be outside of the 62 day target, as surgery is timed after three cycles of chemotherapy

### 11.3.2 Gynaecologic Oncology surgeries

This section describes the surgery and short term outcomes of women undergoing inpatient surgery in 2017 under the care of the GO team. Unfortunately, despite multiple attempts to find a solution, we still do not have the facility for collection of long term outcome data or survival reporting. This has also been flagged as a priority area in service improvement by NMGOTS, and is a fundamental requirement for a Cancer Centre.

During 2017 one publication on outcomes of Stage 4 ovarian cancer has been achieved in combination with the two other NZ cancer centres, however reporting of survival statistics should be business as usual, rather than an academic project.

Surgical activity has continued to increase. The department performed 572 operations in 2017 and 544 operations in 2016, compared to 454 in 2015 and 431 in 2014. This reflects the increase in FTE and the ability to cover vacant lists due to leave. The proportion of malignant to benign cases has remained stable, with 80% of the theatre workload confirmed malignant on histology. Operative theatre capacity is still affected by the lack of a dedicated brachytherapy suite in radiation oncology and the need to accommodate brachytherapy on major operating lists, leading to the loss of up to one half day list per week for the department.

The proportion of endometrial cancers treated with minimal access surgery has increased from 25% to 30%, with a single conversion to an open procedure. Development of a formal strategy to increase minimal access surgery is part of the department's plan going forward. BMI is often a limiting factor and mean BMI for TLH was 30.8 (22-43), whereas mean BMI for TAH was 35.4 (18-60). Dr Tan spent a 3 month sabbatical in 2017 developing minimal access surgical skills, with a view to developing a laparoscopic sentinel node service for endometrial cancer within the department.

**Table 233: Surgical debulking rates at primary and interval surgery for ovarian, tube and peritoneum cancer surgeries 2017**

| | Total | | Primary surgery | | Interval surgery | |
|---|---|---|---|---|---|---|
| | N=128 | | n=69 | | n=47 | |
| | n | % | N | % | n | % |
| **Residual disease** | | | | | | |
| None | 91 | 71.1 | 58 | 84.1 | 24 | 51.1 |
| <1cm | 17 | 13.3 | 5 | 7.2 | 11 | 23.4 |
| ≥1cm | 20 | 15.6 | 6 | 8.7 | 12 | 25.5 |
| **Bowel surgery** | | | | | | |
| Yes | 25 | 19.5 | 10 | 14.5 | 11 | 23.4 |
| No | 103 | 80.5 | 59 | 85.5 | 36 | 76.6 |

The number of ovarian cancer surgeries has increased by 11% in 2017, partly due to a more aggressive departmental debulking policy and an increase in surgery for recurrent ovarian cancer. This reflects a change in international practice, where benefit from surgery, if a complete resection can be achieved, has been shown in patients previously only treated with chemotherapy as second line treatment.

**Table 234: Residual disease by stage for ovarian, tube and peritoneum cancer surgeries 2017**

| Residual disease | Stage 1/2 | Stage 3/4 | Recurrence |
|---|---|---|---|
| None | 44 | 45 | 3 |
| <1cm | 0 | 17 | 0 |
| ≥1cm | 0 | 19 | 0 |
| **Total** | **44** | **81** | **3** |

The proportion of all stage ovarian cancers undergoing primary debulking has fallen from 70% to 60%, but this is associated with a significant increase in the complete (R0) resection rates from 70% in 2016 to 84%. This probably reflects patient selection and a push towards more radical surgery. The interval debulking (IDS) R0 resection rates have fallen from 63% to 51%, despite the bowel resection rate increasing in the IDS group. The overall bowel resection rate has stayed stable. When we analyse the advanced ovarian cancers by stage, we achieve an optimal cytoreduction rate of 77.5% with R0 rate of 56%.

This is the first year we have data on advanced ovarian/tubal/peritoneal cancer patients who did not get surgical treatment. Twenty four patients with Stage 3 or 4 disease did not get to surgery, from a total of 104 patients with advanced ovarian malignancy. Seven received palliation only and three died before surgery. One declined all treatment including chemotherapy and two declined surgery. Six either had no response or progressive disease on chemotherapy, one was non-resident and ineligible for treatment, and two were unfit for surgery. Only two patients were not operated on as their disease was felt to be unrespectable, reflecting the department's move to more aggressive cytoreduction.

**Table 235: Clinical outcomes among inpatient surgeries performed by the Gynaecologic Oncology team by cancer status 2017**

| | Total* | | Malignant | | Premalignant/ Benign | |
|---|---|---|---|---|---|---|
| | N=570 | | n=465 | | n=105 | |
| | n | % | n | % | n | % |
| **Intraoperative complications** | | | | | | |
| >1000ml blood loss | 16 | 2.8 | 13 | 2.8 | 3 | 2.9 |
| Bowel injury | 5 | 0.9 | 4 | 0.9 | 1 | 1.0 |
| Bladder injury | 6 | 1.1 | 5 | 1.1 | 1 | 1.0 |
| Ureteric injury | 2 | 0.4 | 2 | 0.4 | 0 | |
| Other | 4 | 0.7 | 4 | 0.9 | 0 | |
| **Postoperative complications** | | | | | | |
| Transfusion | 49 | 8.6 | 43 | 9.2 | 6 | 5.7 |
| Febrile morbidity | 23 | 4.0 | 21 | 4.5 | 2 | 1.9 |
| Wound infection | 13 | 2.3 | 13 | 2.8 | 0 | |
| Thromboembolism | 3 | 0.5 | 3 | 0.6 | 0 | |
| Cardiovascular | 3 | 0.5 | 1 | 0.2 | 2 | 1.9 |
| Gastro-intestinal | 25 | 4.4 | 23 | 4.9 | 2 | 1.9 |
| Urinary retention | 22 | 3.9 | 21 | 4.5 | 1 | 1.0 |
| Return to theatre within 6 wks | 18 | 3.2 | 14 | 3.0 | 4 | 3.8 |
| Readmission with complication within 6 wks | 49 | 8.6 | 39 | 8.4 | 9 | 8.6 |
| Death | 1 | 0.2 | 1 | 0.2 | 0 | |

Missing data not included.
*Two molar pregnancies are not included in the above table; one of them developed thromboembolism and was readmitted to hospital within 6 weeks.

Complication and readmission rates have remained stable, with the majority of morbidity due to infectious causes. Wound infection remains the leading cause of readmission, with 37% of all readmissions related to wound issues, and it is hoped that a push towards more minimally invasive procedures, particularly for women with increased BMI will help reduce this risk.

The return to theatre this year has increased significantly from 2.2% to 3.2%, although absolute numbers are still low. The three main causes are bleeding, normally in the form of wound or vault haematoma formation, wound dehiscence or wound debridement secondary to infection. We have had a case of a port site hernia and one vault dehiscence from laparoscopic procedures. The single death was due to progressive disease at six months, whilst still an inpatient after multiple infective complications and cutaneous fistula formation.

Intraoperative morbidity remains stable and acceptable with a visceral or vascular injury rate of around 1%. Despite pursuing more radical debulking surgery, intraoperative blood loss and transfusion rates have decreased compared to previous years.

## Summary/Implications

The highlights of the year were the appointments of a 5th Gynaecological Oncologist, Dr Cecile Bergzoll, a second Clinical Nurse Specialist, Angie Li, and a Fellow. Initially this was a non-certified Gynaecological Oncologist (CGO) training Fellow, but a CGO trainee is due to start in early 2018. By the end of the year we were back to 4 SMOs, but have successfully recruited into the 5th position due to start in early 2018.

The formal collaboration with the colorectal department, providing support for complex colorectal cases, also started in 2017 and is working well with valued collegial relationships strengthening across the DHB.

The workload of the department appears to have levelled out in terms of numbers of patients seen; however this data does not reflect the change in complexity of cases. We are pushing to achieve a much higher minimal access workload, particularly in women with high BMIs and the radicality of ovarian cancer surgery continues to increase. Both of these approaches take more theatre time and currently staffing of operating demand does not align with these aims, and efficient use of theatre resource remains an ongoing challenge. We currently have on average 4.5 full day lists per week, but the lack of dedicated brachytherapy facilities continues to impact on surgical capacity.

The current surgical model of care does not fit well with the changes in practice and will need to be addressed. Length of list time in relation to individual operation timing, dedicated teams and changes in both surgical and anaesthetic practice are all ideas currently under consideration to maximise the use of the current limited resources.

The morbidity from infection for our patients remains the leading cause of return to theatre and readmission, and consumes considerable resource. The move to minimal access surgery is likely to reduce this and embracing new technologies, such as sentinel node biopsy, as opposed to full lymphadenectomy, in endometrial cancer, would help to reduce this further. We need to be mindful of total costs when service planning and this includes the cost of morbidity and subsequent expense in other areas of the health service as well as cost to the community services, the patient and her whānau.

These changes in practice have an impact on waiting times and we are failing to meet the NZGCG recommendation of the 2 week wait for surgery in the majority of cases. We have streamlined entry into the service, as demonstrated by the significant reduction in waiting times for FSA after MDM, but access to theatre remains a bottleneck in the pathway. This will impact the Ministry of Health 31 day target for all DHBs across both regions. There is a risk that delay to treatment will lead to upstaging of cancers, with a deleterious effect on prognosis.

The 62 day Ministry of Health target results have improved and although the rapid access clinic has helped to increase performance to 83%, with half of the year being fully compliant, further work is needed in this area to identify remaining barriers.

We are fortunate to have high levels of collegiality and collaboration with referring DHBs across the regions. This is demonstrated with the work of NMGOTS, who have achieved many of the workstream aims in 2017. Testsafe has been rolled out so that Midland DHBs now have visibility of ADHB documents for their patients, without the need to individually email discharge summaries and operation notes. However the continuing manual nature of referral and data collection via the MDM remains a clinical risk and uses an enormous amount of clinical resource, with the risk that relevant stakeholders are not fully informed of critical information. Collaboration with our regional partners is encouraged and we have had several general gynaecologists come and spend part of their sabbatical within the department this year.

The regional radiology pathways for Gynae cancers have been developed and rolled out and agreement reached about regional use of PET scanning and indications revised. Primary care pathways for ovarian masses have been developed and published regionally. The Clinical Nurse Specialists from several DHBs have collaborated to produce a regional information leaflet for patients coming to Auckland for surgery. Current projects are underway to develop genetic pathways.

Unfortunately no further progress has been made in establishing an electronic MDM system or in collection of long term morbidity and mortality data, but this remains a long term goal, currently hindered by technology and funding. Lack of appropriate systems mean that the current manual referral process is time consuming, and registrars spend many days producing MDM documentation every week. In an attempt to improve the efficiency of communication to referrers the MDM document is no longer transcribed, and real time recommendations are typed into the document at the MDM. However this still needs to be converted to a Concerto document and then individually emailed by the MDM coordinator. An electronic system would save months of manpower annually. A direct entry MDM management system unfortunately still only remains aspirational, but has been identified regionally as a top priority.

In terms of academic activity, 2017 has seen publication of the first outcome data of ovarian cancer patients in NZ, in collaboration with Christchurch and Wellington, and we have achieved

publications in Gynecologic Oncology and BMJ Open. The department produced several posters and oral presentations at the RANZCOG ASM and members were invited speakers at the RCOG World Congress, RANZCOG ASM and the ASCCP meetings.

We continue to be the largest contributor to the ANZGOG study of sentinel nodes in vulval cancer and recruitment is continuing, and currently are the largest recruiter to the EXCISE pilot study, a RCT of LLETZ versus cone biopsy in the management of AIS across Australia and New Zealand. The FeMMe study of conservative management in early endometrial cancer and atypical hyperplasia, in collaboration with Queensland Cancer Research Centre, started recruiting patients in 2017 and is ongoing. The PRINCESS study of conservative management of CIN2 concluded recruitment in December 2016, and final results should be due in 2018, with interim papers in submission. We have been very successful in securing grant money to explore genomics in vulval cancer and this project is underway. The large review of vulval cancer patients over 30 years is ongoing, with data collection extended and should be complete next year. A study investigating the use of oxygen perfusion at the time of open surgery and it's tissue effect completed recruitment in 2016 and has been submitted for publication and further joint projects with the department of surgery are planned.

Members of the department have continued to be active internationally with representation on the IGCS training development committee, PSRH, ISSVD postgraduate faculty, Cancer Society Board and ASCCP committee. Nationally we have contributed to the NZGCG executive committee and there is a push towards increased research and data collaboration with the 2 other Cancer Centres in Christchurch and Wellington.

In summary, this is an exciting time for the department with new team members, and the expansion of skills to benefit our patients. We need to embrace new technologies that minimise morbidity and improve surgical outcomes and continue to find a solution for the burden of manual administration. Continuation of our excellent collegial relationships with other departments will lead to increased collaboration to promote research and development within the Gynaecological Oncology department.

## 11.4 Data tables: Gynaecologic oncology

**Table 236: ADHB Gynaecologic Oncology MDM workload: Referrals and MDM discussions 2007 – 2017**

| | 2007 n | 2008 n | 2009 n | 2010 n | 2011 n | 2012 n | 2013 n | 2014 n | 2015 n | 2016 n | 2017 n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **All referrals (by year of referral)** | | | | | | | | | | | |
| Not accepted | 29 | 50 | 9 | 9 | 4 | 6 | 6 | 20 | 23 | 25 | 0 |
| Accepted | 520 | 519 | 576 | 645 | 643 | 703 | 775 | 839 | 905 | 1089 | 1112 |
| **Referral reason (accepted only)** | | | | | | | | | | | |
| Molar pregnancy | | 14 | 48 | 52 | 64 | 72 | 49 | 76 | 59 | 55 | 60 |
| Consideration of prophylactic surgery | | 15 | 23 | 10 | 13 | 7 | 15 | 15 | 15 | 6 | 5 |
| Other | 520 | 490 | 505 | 583 | 566 | 624 | 711 | 748 | 831 | 1028 | 1047 |
| **Referral status (accepted only)** | | | | | | | | | | | |
| New | 449 | 515 | 566 | 638 | 637 | 703 | 773 | 838 | 904 | 1089 | 1112 |
| Follow up | 23 | 4 | 9 | 4 | 4 | | 2 | 1 | | | |
| Repeat | 42 | | | | | | | | | | |
| Recurrence | 1 | | 1 | 3 | 2 | | | | 1 | | |
| Unknown | 5 | | | | | | | | | | |
| **Referrals proceeding to MDM (accepted referrals only)** | | | | | | | | | | | |
| Had MDM | 470 | 474 | 534 | 624 | 616 | 692 | 753 | 818 | 878 | 1065 | 1105 |
| No MDM | 50 | 45 | 42 | 21 | 27 | 11 | 22 | 21 | 27 | 24 | 7 |
| **Total women discussed at MDM by year (irrespective of referral date)** | 516 | 562 | 644 | 759 | 788 | 839 | 924 | 1026 | 1105 | 1277 | 1250 |
| **Total MDM reviews per year** | 681 | 822 | 1071 | 1351 | 1363 | 1517 | 1856 | 2060 | 2138 | 2299 | 2219 |

## Table 237: Demographic characteristics of women discussed at MDM in 2017 by primary site

| | Total | | Ovary | | Peritoneum | | Fallopian tube | | Endometrium | | Uterus | | Cervix | | Vulva | | Vagina | | Placenta | | Non-gynae cancer | | Unknown | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=1250 | | n=342 | | n=26 | | n=71 | | n=427 | | n=50 | | n=136 | | n=39 | | n=19 | | n=69 | | n=46 | | n=25 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Ethnicity** | | | | | | | | | | | | | | | | | | | | | | | | |
| Māori | 208 | 16.6 | 54 | 15.8 | 4 | 15.4 | 6 | 8.5 | 83 | 19.4 | 8 | 16.0 | 27 | 19.9 | 4 | 10.3 | 5 | 26.3 | 4 | 5.8 | 8 | 17.4 | 5 | 20.0 |
| Pacific | 174 | 13.9 | 29 | 8.5 | 3 | 11.5 | 4 | 5.6 | 98 | 23.0 | 6 | 12.0 | 12 | 8.8 | 1 | 2.6 | 1 | 5.3 | 9 | 13.0 | 6 | 13.0 | 5 | 20.0 |
| Indian | 48 | 3.8 | 16 | 4.7 | 0 | 0.0 | 2 | 2.8 | 12 | 2.8 | 2 | 4.0 | 7 | 5.1 | 2 | 5.1 | 0 | | 5 | 7.2 | 1 | 2.2 | 1 | 4.0 |
| Other Asian | 127 | 10.2 | 34 | 9.9 | 2 | 7.7 | 8 | 11.3 | 29 | 6.8 | 3 | 6.0 | 26 | 19.1 | 1 | 2.6 | 0 | | 18 | 26.1 | 3 | 6.5 | 3 | 12.0 |
| MELAA | 9 | 0.7 | 5 | 1.5 | 0 | | 0 | | 2 | 0.5 | 2 | 4.0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| European | 683 | 54.6 | 204 | 59.6 | 17 | 65.4 | 51 | 71.8 | 203 | 47.5 | 29 | 58.0 | 63 | 46.3 | 31 | 79.5 | 13 | 68.4 | 33 | 47.8 | 28 | 60.9 | 11 | 44.0 |
| **Age (years)** | | | | | | | | | | | | | | | | | | | | | | | | |
| ≤25 | 42 | 3.4 | 21 | 6.1 | 1 | 3.8 | 1 | 1.4 | 2 | 0.5 | 2 | 4 | 2 | 1.5 | 0 | | 1 | 5.3 | 11 | 15.9 | 1 | 2.2 | 0 | |
| 26-35 | 125 | 10.0 | 32 | 9.4 | 1 | 3.8 | 0 | | 10 | 2.3 | 4 | 8 | 35 | 25.7 | 1 | 2.6 | 0 | | 37 | 53.6 | 1 | 2.2 | 4 | 16.0 |
| 36-45 | 162 | 13.0 | 42 | 12.3 | 2 | 7.7 | 7 | 9.9 | 39 | 9.1 | 11 | 22 | 30 | 22.1 | 3 | 7.7 | 1 | 5.3 | 16 | 23.2 | 7 | 15.2 | 4 | 16.0 |
| 46-55 | 226 | 18.1 | 67 | 19.6 | 3 | 11.5 | 14 | 19.7 | 81 | 19.0 | 20 | 40 | 20 | 14.7 | 3 | 7.7 | 4 | 21.1 | 5 | 7.2 | 7 | 15.2 | 2 | 8.0 |
| 56-65 | 293 | 23.4 | 81 | 23.7 | 4 | 15.4 | 16 | 22.5 | 135 | 31.6 | 6 | 12 | 23 | 16.9 | 7 | 17.9 | 4 | 21.1 | 0 | | 10 | 21.7 | 7 | 28.0 |
| 66-75 | 244 | 19.5 | 60 | 17.5 | 7 | 26.9 | 24 | 33.8 | 106 | 24.8 | 5 | 10 | 19 | 14.0 | 8 | 20.5 | 3 | 15.8 | 0 | | 8 | 17.4 | 4 | 16.0 |
| >75 | 158 | 12.6 | 39 | 11.4 | 8 | 30.8 | 9 | 12.7 | 54 | 12.6 | 2 | 4 | 7 | 5.1 | 17 | 43.6 | 6 | 31.6 | 0 | | 12 | 26.1 | 4 | 16.0 |
| **DHB of Residence** | | | | | | | | | | | | | | | | | | | | | | | | |
| Auckland | 245 | 19.6 | 74 | 21.6 | 5 | 19.2 | 14 | 19.7 | 81 | 19.0 | 11 | 22.0 | 16 | 11.8 | 4 | 10.3 | 3 | 15.8 | 17 | 24.6 | 15 | 32.6 | 5 | 20.0 |
| Counties Manukau | 281 | 22.5 | 68 | 19.9 | 8 | 30.8 | 17 | 23.9 | 92 | 21.5 | 12 | 24.0 | 32 | 23.5 | 8 | 20.5 | 4 | 21.1 | 27 | 39.1 | 9 | 19.6 | 4 | 16.0 |
| Waitemata | 254 | 20.3 | 67 | 19.6 | 5 | 19.2 | 12 | 16.9 | 94 | 22.0 | 7 | 14.0 | 25 | 18.4 | 11 | 28.2 | 3 | 15.8 | 17 | 24.6 | 4 | 8.7 | 9 | 36.0 |
| Northland | 106 | 8.5 | 30 | 8.8 | 1 | 3.8 | 5 | 7.0 | 39 | 9.1 | 6 | 12.0 | 14 | 10.3 | 1 | 2.6 | 4 | 21.1 | 1 | 1.4 | 4 | 8.7 | 1 | 4.0 |
| Bay Of Plenty | 118 | 9.4 | 36 | 10.5 | 3 | 11.5 | 9 | 12.7 | 39 | 9.1 | 4 | 8.0 | 14 | 10.3 | 4 | 10.3 | 0 | | 2 | 2.9 | 4 | 8.7 | 3 | 12.0 |
| Waikato | 158 | 12.6 | 43 | 12.6 | 2 | 7.7 | 8 | 11.3 | 57 | 13.3 | 8 | 16.0 | 24 | 17.6 | 8 | 20.5 | 1 | 5.3 | 2 | 2.9 | 4 | 8.7 | 1 | 4.0 |
| Lakes | 53 | 4.2 | 16 | 4.7 | 1 | 3.8 | 5 | 7.0 | 12 | 2.8 | 1 | 2.0 | 6 | 4.4 | 1 | 2.6 | 3 | 15.8 | 3 | 4.3 | 4 | 8.7 | 1 | 4.0 |
| Tairawhiti | 25 | 2.0 | 6 | 1.8 | 1 | 3.8 | 1 | 1.4 | 10 | 2.3 | 0 | | 3 | 2.2 | 1 | 2.6 | 1 | 5.3 | 0 | | 1 | 2.2 | 1 | 4.0 |
| Other | 9 | 0.7 | 1 | 0.3 | 0 | | 0 | | 3 | 0.7 | 1 | 2.0 | 2 | 1.5 | 1 | 2.6 | 0 | | 0 | | 1 | 2.2 | 0 | |

## Table 238: Demographic characteristics of women undergoing surgery under the GO team in 2017 by primary site

| | Total | | Ovary | | Peritoneum | | Fallopian tube | | Endometrium | | Uterus | | Cervix | | Vulva | | Vagina | | Placenta | | Non-gynae cancer | | Unknown | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=453 | | n=115 | | n=7 | | n=43 | | n=120 | | n=10 | | n=73 | | n=57 | | n=13 | | n=3 | | n=7 | | n=5 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Ethnicity** | | | | | | | | | | | | | | | | | | | | | | | | |
| Māori | 61 | 13.5 | 17 | 14.8 | 1 | 14.3 | 4 | 9.3 | 18 | 15.0 | 1 | 10 | 11 | 15.1 | 6 | 10.5 | 2 | 15.4 | 1 | 33.3 | 0 | | 0 | |
| Pacific | 52 | 11.5 | 11 | 9.6 | 0 | | 3 | 7.0 | 25 | 20.8 | 1 | 10 | 8 | 11.0 | 1 | 1.8 | 1 | 7.7 | 1 | 33.3 | 1 | 14.3 | 0 | |
| Indian | 17 | 3.8 | 4 | 3.5 | 0 | | 2 | 4.7 | 4 | 3.3 | 0 | | 6 | 8.2 | 1 | 1.8 | 0 | | 0 | | 0 | | 0 | |
| Other Asian | 49 | 10.8 | 16 | 13.9 | 1 | 14.3 | 4 | 9.3 | 10 | 8.3 | 0 | | 14 | 19.2 | 0 | | 2 | 15.4 | 0 | | 1 | 14.3 | 1 | 20 |
| MELAA | 5 | 1.1 | 0 | | 0 | | 0 | | 1 | 0.8 | 1 | 10 | 0 | | 2 | 3.5 | 0 | | 0 | | 0 | | 1 | 20 |
| European | 269 | 59.4 | 67 | 58.3 | 5 | 71.4 | 30 | 69.8 | 62 | 51.7 | 7 | 70 | 34 | 46.6 | 47 | 82.5 | 8 | 61.5 | 1 | 33.3 | 5 | 71.4 | 3 | 60 |
| **Age (yrs)** | | | | | | | | | | | | | | | | | | | | | | | | |
| ≤25 | 7 | 1.5 | 2 | 1.7 | 0 | | 0 | | 0 | | 0 | | 0 | | 4 | 7.0 | 1 | 7.7 | 0 | | 0 | | 0 | |
| 26-35 | 39 | 8.6 | 7 | 6.1 | 1 | 14.3 | 0 | | 0 | | 0 | | 25 | 34.2 | 4 | 7.0 | 0 | | 0 | | 0 | | 2 | 4 |
| 36-45 | 53 | 11.7 | 17 | 14.8 | 0 | | 4 | 9.3 | 7 | 5.8 | 2 | 20 | 15 | 20.5 | 5 | 8.8 | 0 | | 2 | 66.7 | 1 | 14.3 | 0 | |
| 46-55 | 85 | 18.8 | 25 | 21.7 | 1 | 14.3 | 8 | 18.6 | 16 | 13.3 | 5 | 50 | 18 | 24.7 | 7 | 12.3 | 4 | 30.8 | 1 | 33.3 | 0 | | 0 | |
| 56-65 | 100 | 22.1 | 27 | 23.5 | 3 | 42.9 | 11 | 25.6 | 38 | 31.7 | 1 | 10 | 7 | 9.6 | 9 | 15.8 | 3 | 23.1 | 0 | | 0 | | 1 | 20 |
| 66-75 | 106 | 23.4 | 25 | 21.7 | 2 | 28.6 | 17 | 39.5 | 37 | 30.8 | 1 | 10 | 7 | 9.6 | 11 | 19.3 | 3 | 23.1 | 0 | | 2 | 28.6 | 1 | 20 |
| >75 | 63 | 13.9 | 12 | 10.4 | 0 | | 3 | 7.0 | 22 | 18.3 | 1 | 10 | 1 | 1.4 | 17 | 29.8 | 2 | 15.4 | 0 | | 4 | 57.1 | 1 | 20 |
| **DHB of residence** | | | | | | | | | | | | | | | | | | | | | | | | |
| Auckland | 106 | 23.4 | 26 | 22.6 | 0 | | 8 | 18.6 | 31 | 25.8 | 4 | 40 | 16 | 21.9 | 11 | 19.3 | 5 | 38.5 | 0 | 0.0 | 4 | 57.1 | 1 | 20 |
| Counties Manukau | 95 | 21 | 21 | 18.3 | 1 | 14.3 | 11 | 25.6 | 19 | 15.8 | 2 | 20 | 23 | 31.5 | 12 | 21.1 | 3 | 23.1 | 2 | 66.7 | 0 | | 1 | |
| Waitemata | 97 | 21.4 | 24 | 20.9 | 2 | 28.6 | 7 | 16.3 | 24 | 20 | 2 | 20 | 19 | 26 | 16 | 28.1 | 1 | 7.7 | 1 | 33.3 | | | 1 | 20 |
| Northland | 35 | 7.7 | 13 | 11.3 | 0 | | 3 | 7.0 | 10 | 8.3 | 1 | 10 | 4 | 5.5 | 2 | 3.5 | 2 | 15.4 | 0 | | | | 0 | |
| Bay Of Plenty | 42 | 9.3 | 13 | 11.3 | 2 | 28.6 | 6 | 14 | 12 | 10 | 0 | | 3 | 4.1 | 4 | 7 | 0 | | 0 | | 0 | | 2 | 40 |
| Waikato | 45 | 9.9 | 12 | 10.4 | 0 | 0 | 3 | 7.0 | 17 | 14.2 | 1 | 10 | 4 | 5.5 | 8 | 14 | 0 | | 0 | | 0 | | 0 | |
| Lakes | 21 | 4.6 | 3 | 2.6 | 1 | 14.3 | 5 | 11.6 | 4 | 3.3 | 0 | | 2 | 2.7 | 2 | 3.5 | 2 | 15.4 | 0 | | 2 | 28.6 | 0.0 | |
| Tairawhiti | 8 | 1.8 | 2 | 1.7 | 1 | 14.3 | 0 | | 3 | 2.5 | 0 | | 1 | 1.4 | 1 | 1.8 | 0 | | 0 | | 0 | | 0 | |
| Taranaki | 2 | 0.4 | 1 | 0.9 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | 14.3 | 0.0 | |
| Hawkes Bay | 1 | 0.2 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | 1.8 | 0 | | 0 | | 0 | | 0 | |
| Overseas | 1 | 0.2 | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | 1.4 | 0 | | 0 | | 0 | | 0 | | 0 | |

**Table 239: Malignant status prior to and after surgery by primary site among all surgical procedures performed by the GO team in 2017 (some women will have multiple surgeries included)**

| | Total | | Ovarian | | Peritoneum | | Fallopian tube | | Endometrium | | Uterus | | Cervix | | Vulva | | Vaginal | | Non-gynae cancer | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=572 | | n=120 | | n=7 | | n=47 | | n=127 | | n=12 | | n=159 | | n=68 | | n=16 | | n=8 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **MDM in 2017** | | | | | | | | | | | | | | | | | | | | |
| Yes | 521 | 91.1 | 110 | 91.7 | 7 | 100.0 | 47 | 100.0 | 125 | 98.4 | 12 | 100.0 | 148 | 93.1 | 47 | 69.1 | 12 | 75.0 | 8 | 100.0 |
| No | 51 | 8.9 | 10 | 8.3 | 0 | | 0 | | 2 | 1.6 | 0 | | 11 | 6.9 | 21 | 30.9 | 4 | 25.0 | 0 | |
| **Diagnosis (prior to surgery)** | | | | | | | | | | | | | | | | | | | | |
| Benign | 25 | 4.4 | 9 | 7.5 | 0 | | 0 | | 1 | 0.8 | 0 | | 3 | 1.9 | 7 | 10.3 | 1 | 6.3 | 0 | |
| Premalignant | 32 | 5.6 | 0 | | 0 | | 0 | | 1 | 0.8 | 0 | | 13 | 8.2 | 16 | 23.5 | 1 | 6.3 | 0 | |
| Malignant | 420 | 73.4 | 65 | 54.2 | 6 | 85.7 | 38 | 80.9 | 114 | 89.8 | 8 | 66.7 | 133 | 83.6 | 39 | 57.4 | 10 | 62.5 | 4 | 50.0 |
| Prophylactic | 8 | 1.4 | 8 | 6.7 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Unknown | 87 | 15.2 | 38 | 31.7 | 1 | 14.3 | 9 | 19.1 | 11 | 8.7 | 4 | 33.3 | 10 | 6.3 | 6 | 8.8 | 4 | 25.0 | 4 | 50.0 |
| **Diagnosis (after surgery)** | | | | | | | | | | | | | | | | | | | | |
| Benign | 79 | 13.8 | 45 | 37.5 | 0 | | 1 | 2.1 | 6 | 4.7 | 4 | 33.3 | 4 | 2.5 | 12 | 17.6 | 2 | 12.5 | 0 | |
| Pre-malignant | 26 | 4.5 | 0 | | 0 | | 0 | | 2 | 1.6 | 0 | 0 | 9 | 5.7 | 13 | 19.1 | 2 | 12.5 | 0 | |
| Malignant | 465 | 81.3 | 75 | 62.5 | 7 | 100.0 | 46 | 97.9 | 119 | 93.7 | 8 | 66.7 | 146 | 91.8 | 43 | 63.2 | 12 | 75.0 | 8 | 100.0 |
| Molar | 2 | 0.3 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |

## 11.5 Termination of pregnancy

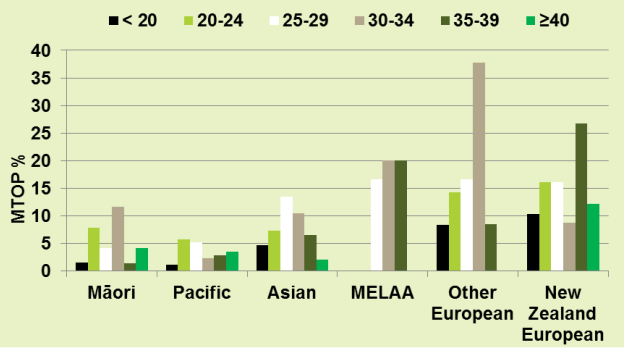
Abortion is the most commonly performed procedure in gynaecology. A third of all women will undergo a termination of pregnancy (TOP) in their lifetime. The number of abortions in New Zealand has declined steadily in the past decade from over 18,000 per annum in 2007 to just under 13,000 in 2016. The general abortion rate (the number of abortions per 1,000 of the mean estimated population of women aged 15-44 years) has declined from 21.1 to 13.5 in the last decade.

National Women's Health provides a regional first trimester abortion service for the greater Auckland area at Epsom Day Unit (EDU), Greenlane Clinical Centre. Second trimester surgical abortions are provided as a contracted specialist service. Women undergoing second and third trimester medical abortions are cared for as inpatients on the Gynaecology Ward (less than 20 weeks) or on Women's Assessment Unit for later gestations.

### 11.5.1 First trimester regional service

In the first trimester 3,648 abortions were performed at EDU in 2017, slightly more than the previous year, indicating the abortion numbers have begun to plateau after a decade of falling rates. The increasing population in Auckland area may be the explanation but comparison with national data will give further insight into expected trends in future. The fall in abortion rates in NZ is not occurring to nearly the same extent in other developed countries. ASC suggests that the increasing use of long acting reversible contraceptives (LARCs) is the main reason, but availability of emergency contraception at pharmacies without prescription may have also contributed. The reasons remain unclear and research into factors contributing to the reduced abortion rates in New Zealand is indicated.

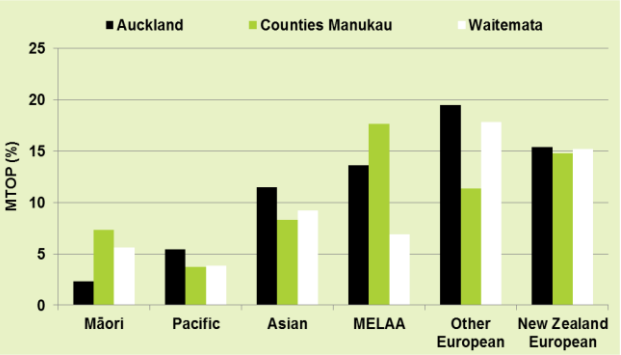
**Figure 219: First trimester Medical TOP rate among by age and ethnicity NWH 2017**




MELAA = Middle Eastern, Latin American, African

The majority of first trimester abortions at EDU were surgical procedures performed under conscious sedation. Almost 10% of first trimester terminations were medical (MTOP) in 2017, which is an increase from 8% reported in 2016. Similar proportions of medical to surgical terminations were undertaken by DHB of residence (ADHB 11%, Counties Manukau 8%, and Waitemata 11%).

**Figure 220: First trimester medical TOP rate by DHB of residence and ethnicity NWH 2017**




However, there is considerable inequity by age and ethnicity in the rate of medical terminations, as shown in Figure 219 and Figure 220. Young women (8.5% under 25 years compared to 10% for women ≥25 years) and Māori and Pacific (6% and 4% compared to 16% among European) women were less likely to access medical termination, which is of concern also because these women are already at increased risk of preterm birth for which surgical termination is a risk factor. The proportion of MTOPs at EDU (10%) still remains lower than the national average (12%). The NZ MTOP rate compares poorly to rates as high as 65% in community clinics in the UK[1].

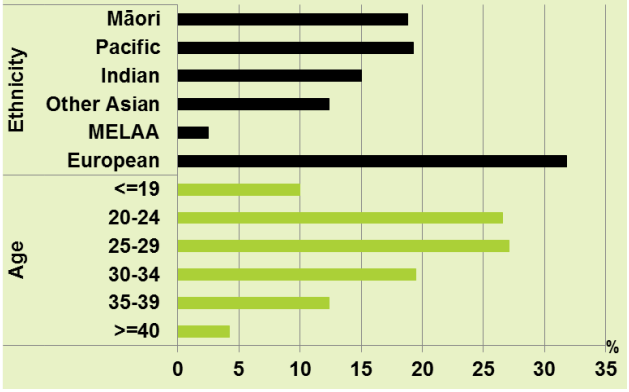
There are a number of factors discouraging women from choosing MTOP rather than surgery (STOP). The current abortion law requirements are the major constraint. Many women choose MTOP because they prefer to abort in the privacy of their own home, have earlier access (up to 9 weeks gestation) and the perception MTOP is more like a natural miscarriage, with avoidance of surgical risks. The legal requirement to take the medication on site at Greenlane on two days 24-48hours apart and limitation to weekdays (due to on call staffing) is inconvenient. Women should be able to choose the time, day and place to take their medication, particularly younger women who may not have the support of family members or whānau. Another reason STOP is preferred is a 5% chance MTOP is incomplete and will require further clinic and treatment visits.

These factors may explain the very poor uptake of MTOP at EDU amongst Māori and Pacific women <25 years at half the rate or less compared to the European group. Improving the MTOP rate in this group would likely occur if the medication could be taken at home rather than at Greenlane. For those

[1] Department of Health & Social Care. 2017. Abortion Statistics, England and Wales: 2017. London: Department of Health & Social Care. (available from https://www.gov.uk/government/statistics/abortion-statistics-for-england-and-wales-2017)

who are unwilling to be at home or who start to abort soon after taking misoprostol, care as an outpatient at EDU is recommended, but there is no suitable facility at EDU for this purpose (single room with ensuite).

**Figure 221: Demography of women having a first trimester termination of pregnancy NWH 2017**




Māori and Pacific women are over represented among women having a first trimester termination compared to European women although the proportion of terminations for Indian and Asian women continues to increase steadily every year. The number of adolescent women (19 years or younger) having a termination has reduced from 22% to 10% over the last decade, with a smaller reduction in the 20-25 year old group. The assumption is made this drop is due to the availability and uptake of government funded long acting reversible contraceptives (LARCs) in both these groups.

### 11.5.2 Second trimester surgical service

A regional service is provided on a weekly basis at Greenlane Surgical Unit by specialists on contract to ADHB. Three hundred and twenty six abortions between 14 and 19 weeks were performed in 2017. The first trimester regional service has extended gestations to up to 13 weeks to reduce reliance on the second trimester service. There are no ADHB employed abortion care providers for the second trimester STOP service. Assessment of future demand and upskilling local specialists is under review.

### 11.5.3 Second trimester medical service

Thirty-two women had a medical termination of pregnancy/induction of labour between 14 and 20 weeks in 2017.

Since 2015 we have seen a gradual reduction of 2nd trimester medical termination, consistent with a reduction in early surgical termination of pregnancy.

In 2017 the most common indications for second trimester medical termination of pregnancy or induction were intrauterine death (13) and maternal mental health (8).

International studies have shown that smaller doses of Mifigynae (200-400mg instead of 600mg) are equally effective. In 2017, 22 of 29 (76%) women received 200 or 400 mg Mifegynae rather than 600mg. The results are encouraging but we have only small numbers of cases on which to base a conclusion.

Also following international studies, we continue to administer Misoprostol buccally for selected cases instead of vaginally (16% of women in 2017). This route has the same effect but is less invasive and more comfortable for women. We are keen to carry on with this approach and continue monitoring outcomes.

In 2017, six women (19%) required manual removal of the placenta. One woman undergoing second trimester medical termination required a blood transfusion in 2017.

Ninety-one percent of women were managed either as a day stay or required one night in hospital in 2017.

### 11.5.4 Future access to abortion care in the greater Auckland area

Taken from the Abortion Supervisory Committee (ASC) 2017 report[2] the committee has ongoing concerns about access to abortion services in the greater Auckland region.

"Auckland is a large geographical and populated area with only one main public service located at the Epsom Day Unit in Auckland Hospital. It is widely known that Auckland has escalating transportation issues and developments being built long distances from available services at Auckland Hospital. The ASC believes it would be beneficial to Auckland residents, in particular those living in Counties Manukau, to have a service closer to home. Barriers to accessible pre-decision counselling and abortion services can have detrimental outcomes in terms of a patient's well-being and optimum clinical care."

[2]ASC has stated that the current situation is unacceptable and untenable with a climbing and sprawling population in Auckland. The committee is calling on healthcare providers in Auckland to consider setting up a local first trimester service in South Auckland.

The Labour coalition government elected six months ago requested the NZ Law Commission to look at options for moving abortion care from a legal jurisdiction to reproductive health care framework. There is an opportunity if current abortion laws are repealed that access for women to abortion services will be greatly improved. Community based care

[2] Ministry of Justice. 2017. Report of the Abortion Supervisory Committee 2017. Wellington: Ministry of Justice. (available from https://www.justice.govt.nz/tribunals/abortion-supervisory-committee/annual-reports/)

offering medical abortion will improve access for women in the region in contrast to the current centralised regional mostly surgically focused facility at EDU.

## 11.6 Data tables: Termination of pregnancy

**Table 240 : Number of first trimester terminations EDU 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total number of terminations** | 5558 | 5550 | 5391 | 5049 | 4949 | 4535 | 4213 | 3842 | 3603 | 3501 | 3648 |

**Table 241: Number of counseling sessions EDU 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | n | N | n | n | n | n | n | n | n | n |
| **Post op counselling** | 23 | 25 | 22 | 33 | 32 | 18 | 41 | 33 | 28 | 36 | 47 |
| **Pregnancy option counselling** | 86 | 99 | 102 | 84 | 76 | 64 | 84 | 66 | 63 | 47 | 40 |
| **Declines %** | 2.2 | 2.5 | 2.7 | 2.8 | 3.0 | 2.9 | 2.9 | 3.4 | 2.4 | 2.5 | 1.9 |

**Table 242: Demography and characteristics of women attending EDU NWH 2007-2017**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % | % | % |
| **Ethnicity** | | | | | | | | | | | |
| Māori | 21.2 | 20.5 | 19.9 | 20.4 | 19.5 | 19.3 | 19.3 | 18.8 | 19.3 | 18.3 | 18.8 |
| Pacific | 24.5 | 23.1 | 24.3 | 24.1 | 22.6 | 24.6 | 23.5 | 21.9 | 21.1 | 21.5 | 19.3 |
| Indian | 8.3 | 9.4 | 10.2 | 11.7 | 11.7 | 10.6 | 12.1 | 12.5 | 13.2 | 13.3 | 15.0 |
| Other Asian | 10.5 | 10.8 | 10.6 | 10.3 | 10.9 | 11.0 | 10.3 | 11.9 | 10.9 | 12.2 | 12.4 |
| MELAA | 3.3 | 2.6 | 3.3 | 2.6 | 2.4 | 2.1 | 2.8 | 2.9 | 2.4 | 2.3 | 2.5 |
| New Zealand European | 27.6 | 27.7 | 26.1 | 25.7 | 27.2 | 27.0 | 26.4 | 25.8 | 26.8 | 26.0 | 25.3 |
| Other European | 4.5 | 4.8 | 5.1 | 5.2 | 5.7 | 5.5 | 5.6 | 6.3 | 6.3 | 6.4 | 6.5 |
| **Age** | | | | | | | | | | | |
| ≤ 19 | 22.3 | 21.7 | 22.2 | 20.7 | 17.8 | 16.6 | 14.6 | 13.6 | 12.3 | 11.9 | 10.0 |
| 20 – 24 | 29.6 | 29.0 | 29.8 | 30.6 | 30.6 | 31.3 | 31.8 | 29.6 | 29.3 | 26.3 | 26.6 |
| 25 – 29 | 20.1 | 21.6 | 20.8 | 19.9 | 21.6 | 21.7 | 22.3 | 22.9 | 23.4 | 25.8 | 27.1 |
| 30 – 34 | 14.3 | 13.3 | 13.9 | 14.1 | 15.4 | 16.0 | 16.8 | 17.7 | 18.5 | 19.1 | 19.5 |
| 35 –39 | 9.7 | 10.1 | 9.3 | 10.0 | 10.2 | 10.0 | 10.4 | 11.4 | 12.1 | 11.8 | 12.4 |
| ≥40 | 4.0 | 4.3 | 4.0 | 4.7 | 4.4 | 4.5 | 4.1 | 4.9 | 4.4 | 5.1 | 4.2 |
| **Gestation (weeks) at Termination** | | | | | | | | | | | |
| 6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 1.9 | 1.7 | 1.1 | 1.7 |
| 7 | 0.2 | 0.1 | 0.6 | 2.7 | 1.4 | 1.1 | 4.4 | 6.1 | 8.2 | 8.7 | 10.1 |
| 8 | 8.8 | 13.0 | 18.4 | 33.7 | 30.3 | 25.3 | 17.2 | 20.4 | 20.5 | 22.2 | 23.5 |
| 9 | 20.8 | 23.9 | 24.5 | 23.7 | 26.9 | 27.4 | 23.9 | 21.6 | 19.8 | 23.2 | 21.1 |
| 10 | 25.1 | 25.1 | 24.3 | 16.8 | 18.4 | 18.8 | 22.8 | 19.4 | 19.0 | 17.4 | 18.1 |
| 11 | 24.1 | 21.3 | 18.8 | 13.0 | 12.6 | 14.4 | 16.9 | 15.9 | 15.6 | 15.4 | 14.1 |
| 12 | 20.9 | 16.7 | 13.2 | 10.1 | 9.9 | 11.7 | 13.6 | 13.5 | 15.1 | 11.9 | 11.0 |
| 13 | 0.0 | 0.2 | 0.1 | 0.0 | 0.4 | 1.2 | 1.0 | 1.1 | 0.1 | 0.1 | 0.5 |

MELAA = Middle Eastern, Latin American, African

**Table 243: Medical and surgical first trimester termination of pregnancy by ethnicity and DHB of residence 2017 (includes TOP in EDU GSU and ACH)**

| | Auckland | | | Counties Manukau | | | Waitemata | | | Other DHB | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | M | M% | S | M | M% | S | M | M% | S | M | S | M | M% |
| **Māori** | 168 | 4 | 2.3 | 303 | 24 | 7.3 | 219 | 13 | 5.6 | 11 | 0 | 701 | 41 | 5.5 |
| **Pacific** | 175 | 10 | 5.4 | 386 | 15 | 3.7 | 151 | 6 | 3.8 | 0 | 0 | 712 | 31 | 4.2 |
| **Asian** | 286 | 37 | 11.5 | 397 | 36 | 8.3 | 246 | 25 | 9.2 | 2 | 1 | 931 | 99 | 9.6 |
| **MELAA** | 19 | 3 | 13.6 | 14 | 3 | 17.6 | 27 | 2 | 6.9 | 1 | 0 | 61 | 8 | 11.6 |
| **Other European** | 62 | 15 | 19.5 | 39 | 5 | 11.4 | 106 | 23 | 17.8 | 1 | 1 | 208 | 44 | 17.5 |
| **NZ European** | 258 | 47 | 15.4 | 185 | 32 | 14.7 | 401 | 72 | 15.2 | 11 | 0 | 855 | 151 | 15.0 |
| **Other Ethnicity** | 2 | 1 | * | 2 | 0 | * | 2 | 1 | * | 1 | 0 | 7 | 2 | 22.2 |
| **Total** | 970 | 117 | 10.8 | 1326 | 115 | 8.0 | 1152 | 142 | 11.0 | 27 | 2 | 3475 | 376 | 9.8 |

S = STOP M = MTOP M% = MTOP%
* not calculated due to small numbers

## Table 244: Medical and surgical first trimester termination of pregnancy by age and ethnicity 2017

| | Māori | | | Pacific | | | Asian | | | MELAA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | M | M% | S | M | M% | S | M | M% | S | M | M% |
| **<20** | 123 | 2 | 1.6 | 82 | 1 | 1.2 | 40 | 2 | 4.8 | 3 | 0 | |
| **20-24** | 210 | 18 | 7.9 | 229 | 14 | 5.8 | 139 | 11 | 7.3 | 21 | 0 | |
| **25-29** | 203 | 9 | 4.2 | 183 | 10 | 5.2 | 269 | 42 | 13.5 | 15 | 3 | 16.7 |
| **30-34** | 76 | 10 | 11.6 | 122 | 3 | 2.4 | 263 | 31 | 10.5 | 12 | 3 | 20.0 |
| **35-39** | 66 | 1 | 1.5 | 69 | 2 | 2.8 | 172 | 12 | 6.5 | 8 | 2 | 20.0 |
| **≥40** | 23 | 1 | 4.2 | 27 | 1 | 3.6 | 48 | 1 | 2.0 | 2 | 0 | |
| **Total** | 701 | 41 | 5.5 | 712 | 31 | 4.2 | 931 | 99 | 9.6 | 61 | 8 | 11.6 |

| | Other European | | | New Zealand European | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | S | M | M% | S | M | M% | S | M | M% |
| **<20** | 22 | 2 | 8.3 | 104 | 12 | 10.3 | 374 | 19 | 4.8 |
| **20-24** | 48 | 8 | 14.3 | 255 | 49 | 16.1 | 902 | 100 | 10.0 |
| **25-29** | 50 | 10 | 16.7 | 214 | 41 | 16.1 | 934 | 115 | 11.0 |
| **30-34** | 33 | 20 | 37.7 | 165 | 16 | 8.8 | 671 | 83 | 11.0 |
| **35-39** | 43 | 4 | 8.5 | 74 | 27 | 26.7 | 432 | 48 | 10.0 |
| **≥40** | 12 | 0 | | 43 | 6 | 12.2 | 155 | 9 | 5.5 |
| **Total** | 208 | 44 | 17.5 | 855 | 151 | 15.0 | 3468 | 374 | 9.7 |

S = STOP M = MTOP M% = MTOP%
*Excludes 9 women with other or unknown ethnicity

## Table 245: Characteristics of women undergoing second trimester medical termination of pregnancy NWH 2011-2016

| | 2011 N=69 | | 2012 N=52 | | 2013 N=40 | | 2014 N=51 | | 2015 N=40 | | 2016 N=35 | | 2017 N=32 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **DHB of residence** | | | | | | | | | | | | | | |
| Auckland | 56 | 81 | 44 | 85 | 32 | 80 | 43 | 84 | 33 | 83 | 29 | 83 | 29 | 91 |
| Counties Manukau | 9 | 13 | | | 6 | 15 | 2 | 4 | 4 | 10 | 3 | 9 | 1 | 3 |
| Waikato | | | 3 | 6 | | | 1 | 2 | 0 | 0 | | | | |
| Waitemata | 3 | 4 | 3 | 6 | 2 | 5 | 5 | 10 | 2 | 5 | 3 | 9 | 1 | 3 |
| Other | 1 | 1 | 2 | 4 | | | | | 1 | 3 | | | 1 | 3 |
| **Indication for termination of pregnancy/induction** | | | | | | | | | | | | | | |
| Fetal anomaly | 24 | 35 | 27 | 52 | 14 | 35 | 24 | 47 | 15 | 38 | 10 | 29 | 7 | 22 |
| Intrauterine death | 19 | 28 | 8 | 15 | 8 | 20 | 13 | 25 | 10 | 25 | 15 | 43 | 13 | 41 |
| Maternal mental health | 20 | 29 | 10 | 19 | 13 | 33 | 8 | 16 | 10 | 25 | 4 | 11 | 8 | 25 |
| Spontaneous rupture of membranes | 6 | 9 | 7 | 13 | 5 | 13 | 6 | 12 | 5 | 13 | 6 | 17 | 4 | 13 |
| **Gestation (wks)** | | | | | | | | | | | | | | |
| 12 | 1 | 1 | 1 | 2 | | | | | | | | | | |
| 13 | 4 | 6 | | | | | 7 | 14 | | | | | 2 | 6 |
| 14 | 13 | 19 | 3 | 6 | 4 | 10 | 6 | 12 | 7 | 18 | 2 | 6 | 3 | 9 |
| 15 | 6 | 9 | 6 | 12 | 4 | 10 | 5 | 10 | 9 | 23 | 6 | 17 | 3 | 9 |
| 16 | 12 | 17 | 10 | 19 | 10 | 25 | 9 | 18 | 6 | 15 | 9 | 26 | 4 | 13 |
| 17 | 11 | 16 | 11 | 21 | 1 | 3 | 15 | 29 | 4 | 10 | 1 | 3 | 5 | 16 |
| 18 | 8 | 12 | 8 | 15 | 10 | 25 | 5 | 10 | 4 | 10 | 9 | 26 | 6 | 19 |
| 19 | 12 | 17 | 13 | 25 | 11 | 28 | 4 | 8 | 9 | 23 | 8 | 23 | 9 | 28 |
| 20 | 1 | 1 | | | | | | | 1 | 3 | | | | |
| 21 | 1 | 1 | | | | | | | | | | | | |

**Table 246: Clinical details and outcomes of second trimester medical termination NWH 2010-2017**

| | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N=69 | | N=52 | | N=40 | | N=51 | | N=40 | | N=35 | | N=32 | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Mifegynae** | 64 | 93 | 46 | 88 | 36 | 90 | 48 | 94 | 39 | 98 | 29 | 83 | 29 | 91 |
| **Vaginal misoprostol** | 68 | 99 | 50 | 96 | 38 | 95 | 45 | 88 | 27 | 68 | 26 | 74 | 24 | 75 |
| **Buccal misoprostol** | | | | | | | 4 | 8 | 8 | 20 | 5 | 14 | 8 | 25 |
| **Oral misoprostol** | | | | | | | | | | | | | | |
| Not given | 23 | 33 | 8 | 15 | 6 | 15 | 17 | 50 | 13 | 33 | 9 | 26 | 7 | 22 |
| 1 dose | 26 | 38 | 19 | 37 | 22 | 55 | 17 | 50 | 12 | 30 | 11 | 31 | 12 | 38 |
| 2 dose | 9 | 13 | 10 | 19 | 4 | 10 | 11 | 32 | 3 | 8 | 8 | 23 | 4 | 13 |
| 3 doses | 5 | 7 | 9 | 20 | 3 | 8 | 2 | 6 | 2 | 5 | 3 | 9 | 3 | 9 |
| ≥ 4 doses | 6 | 9 | 6 | 12 | 5 | 13 | 4 | 12 | 10 | 25 | 4 | 11 | 3 | 9 |
| **Syntocinon infusion** | 6 | 9 | 5 | 10 | 4 | 10 | 4 | 8 | 6 | 15 | 5 | 14 | 2 | 6 |
| **Manual removal of placenta** | 3 | 4 | 3 | 6 | 3 | 8 | 2 | 4 | 5 | 13 | 3 | 9 | 6 | 19 |
| **Retained products of conception** | 4 | 6 | 6 | 12 | 4 | 10 | 2 | 4 | 3 | 8 | 3 | 9 | 2 | 6 |
| **Transfusion** | 0 | | 0 | | 2 | 5 | 3 | 6 | 1 | 3 | 3 | 9 | 1 | 3 |
| **Nights in hospital** | | | | | | | | | | | | | | |
| 0 | 39 | 57 | 24 | 46 | 23 | 58 | 30 | 59 | 20 | 50 | 15 | 43 | 16 | 50 |
| 1 | 26 | 38 | 24 | 46 | 13 | 33 | 17 | 33 | 18 | 45 | 16 | 46 | 13 | 41 |
| 2-3 | 4 | 6 | 3 | 6 | 3 | 8 | 4 | 8 | 1 | 3 | 3 | 9 | 2 | 6 |
| >3 | | | 1 | 2 | 1 | 3 | | | 1 | 3 | 1 | 3 | 1 | 3 |

## 11.7 General Gynaecology inpatient surgery

The data presented in this section pertain largely to inpatient gynaecologic surgeries from Ward 97 that were performed by the general gynaecology team. Surgeries performed by the Gynaecologic Oncology team are collected in a separate database and are presented in **Section 11.3**. In 2017, 126 surgeries were undertaken at the Greenlane Surgical Unit (GSU) and are not included in this chapter. In 2014 and 2015, 62 and 161 cases undertaken at GSU, respectively, were included with the data in this chapter.

The numbers relate to episodes of surgery rather than individuals. Some individuals had more than one surgical episode in the year.

As more than one procedure may occur at a single operation, it may appear that numbers are not consistent within this section. If a specific procedure is discussed, then all accounts of the procedure are included, however for summary tables, the first procedure entered into the database has been used to represent the primary surgical episode.

### Definitions

Where surgical complications are given, these relate to the following definitions:

**Intra operative injury to internal organs:** Injury to bladder, bowel, ureter, major blood vessel, but only if surgical repair was required.

**Significant postop infection:** Any infection (defined by evidence of wound dehiscence or wound collection, pelvic abscess, or fever >39$^0$C) occurring as a result of surgery.

**Readmission:** Re-admission to hospital (hospital stay of 3 hours or more) for a reason related to the surgical procedure within 6 weeks of surgery. In 2015, total readmissions include planned and unplanned readmissions but the number of planned readmissions is also identified separately.

**Other significant complications:** Includes gastrointestinal complications (ileus, bowel obstruction), fistulae.

### Findings

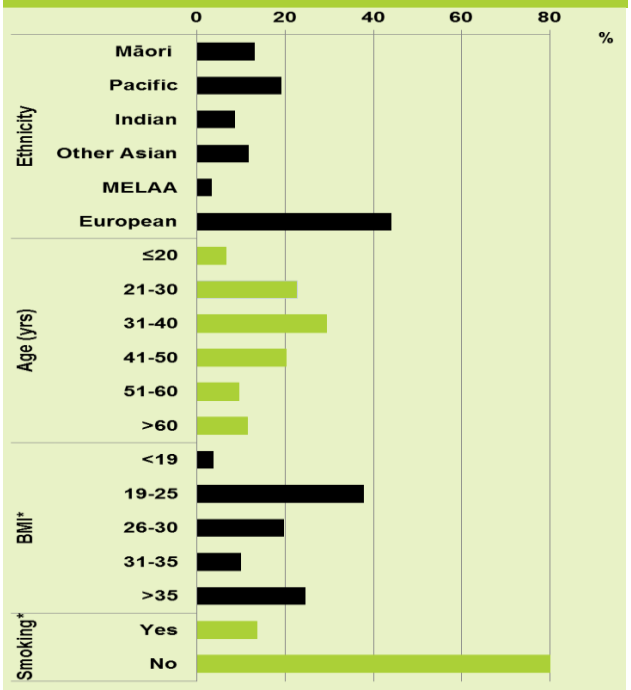
In 2017, there were 1320 general gynaecology surgeries completed; 1271 (96%) primary procedures, 29 (2%) repeat surgeries as a result of complications of surgery at ACH and 20 (2%) repeat surgeries as a result of complications of surgery at a private hospital. Only primary procedures are included in the data presented. Volumes of primary procedures are stable over several years.

Abnormal bleeding in the non-pregnant patient remains the most common indication for gynaecologic surgery in 2017.

**Table 247: Primary indication for primary inpatient gynaecologic surgery NWH 2017**

| | 2017 N=1271 | |
|---|---|---|
| | n | % |
| **Primary indication for surgery** | | |
| Abnormal bleeding, non-pregnant | 298 | 23.4 |
| Miscarriage | 109 | 8.6 |
| Termination | 153 | 12.0 |
| Urogynaecology / Prolapse | 127 | 10.0 |
| Ovarian cyst | 111 | 8.7 |
| Abscess | 59 | 4.6 |
| Pain, cause unknown | 72 | 5.7 |
| Cancer / Pelvic mass | 34 | 2.7 |
| Endometriosis | 82 | 6.5 |
| Ectopic pregnancy | 55 | 4.3 |
| Infertility | 22 | 1.7 |
| Anatomical anomalies of the genital tract | 17 | 1.3 |
| CIN/VIN/VaIN | 26 | 2.0 |
| Polyp(s)/Endometrial Sampling | 39 | 3.1 |
| Other | 67 | 5.3 |

**Figure 222: Demographic details of women having inpatient primary surgery performed by the general gynaecology team NWH 2017**




*BMI missing for 52 women and smoking status for 36 women.

In 2017, 14% of patients admitted to being current smokers – this figure is relatively unchanged over the last 5 years. Absence of documentation of smoking status in this unit is 2.8%.

Approximately one in five patients having general gynaecology surgery at ACH are domiciled outside the ADHB area (19.9%), mostly within Counties Manukau (7%) and Waitemata (8%) DHB areas.

**Table 248: Primary surgical procedure and timing of surgery among inpatient primary surgeries performed by the general gynaecology team NWH 2017**

| | | Timing of surgery | | | |
|---|---|---|---|---|---|
| | Total | Acute | | Elective | |
| | N | n | % | n | % |
| **Total** | 1271 | 332 | 26.1 | 939 | 73.9 |
| Ovarian and /or tubal surgery | 140 | 51 | 36.4 | 89 | 63.6 |
| Hysteroscopy | 188 | 22 | 11.7 | 166 | 88.3 |
| Evacuation retained products conception | 88 | 84 | 95.5 | 4 | 4.5 |
| Surgical termination of pregnancy | 150 | 2 | 1.3 | 148 | 98.7 |
| Urogynaecology procedure | 105 | 0 | | 105 | 100.0 |
| Hysterectomy | 150 | 3 | 2.0 | 147 | 98.0 |
| Diagnostic laparoscopy | 118 | 42 | 35.6 | 76 | 64.4 |
| Endometriosis surgery | 58 | 2 | 3.4 | 56 | 96.6 |
| Other vulval procedure | 53 | 44 | 83.0 | 9 | 17.0 |
| Other uterine/cervical | 179 | 63 | 35.2 | 116 | 64.8 |
| Fibroid embolisation | 3 | 0 | | 3 | 100.0 |
| Other | 39 | 19 | 48.7 | 20 | 51.3 |

**Table 249: Intra-operative injury at primary surgery among inpatient primary surgeries performed by the general gynaecology team NWH 2014-2017**

| | 2014 N=1607 | | 2015 N=1542 | | 2016 N=1430 | | 2017 N=1271 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| Bladder | 5 | 0.3 | 6 | 0.4 | 5 | 0.3 | 3 | 0.2 |
| Bowel | 3 | 0.2 | 1* | 0.1 | 1 | 0.1 | 5 | 0.4 |
| Ureter | | | 2 | 0.1 | | | 1 | 0.1 |
| Major blood vessel | | | | | 1 | 0.1 | 1 | 0.1 |
| Other | 1 | 0.1 | 3 | 0.2 | 1 | 0.1 | 1 | 0.1 |
| **TOTAL** | **9** | **0.6** | **12** | **0.8** | **8** | **0.6** | **11** | **0.9** |

*Single case of pseudomembranous colitis due to antibiotic prophylaxis for embolisation, required surgical management, diagnosis confirmed on histology.

**Table 250: ACHS Gynaecology Indicators: Injury to major viscus with repair**

| ACHS Gynaecology Indicator: Injury to MAJOR VISCUS | | |
|---|---|---|
| **Numerator** | Injury to major viscus, with repair, during or up to 2 weeks post operation | |
| **Denominator** | Gynaecological surgeries | |
| | **ACHS** | **NWH** |
| **Year** | **%** | **%** |
| **2009** | 0.32 | 0.98 |
| **2010** | 0.32 | 0.25 |
| **2011** | 0.40 | 0.67 |
| **2012** | 0.38 | 0.85 |
| **2013** | 0.42 | 1.12 |
| **2014** | 0.40 | 0.56 |
| **2015** | 0.49 | 0.78 |
| **2016** | 0.63 | 0.63 |
| **2017** | | 10/1285=0.78 |

**Figure 223: Complications of surgery among inpatient primary surgeries performed by the general gynaecology team by timing of surgery NWH 2017**

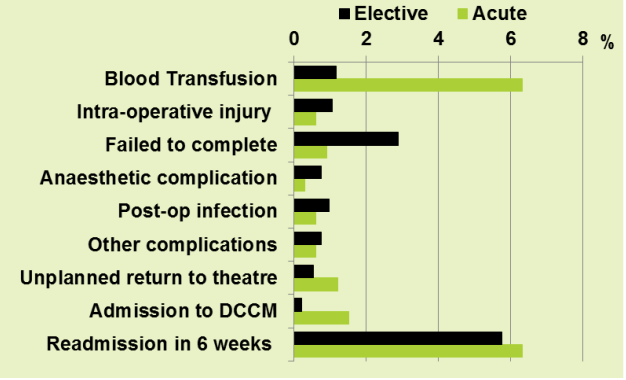
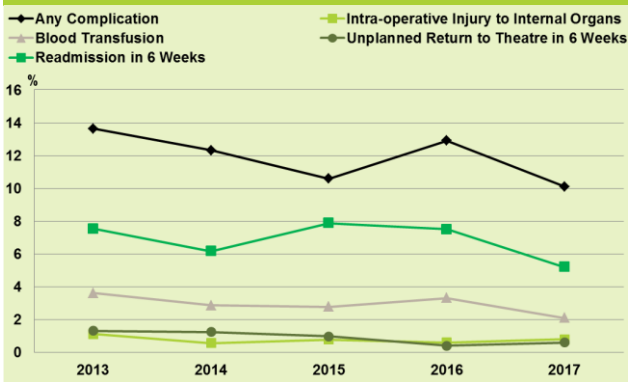



**Figure 224: Complications of surgery among inpatient primary surgeries performed by the general gynaecology team NWH 2013-2017**




*definitions of surgical complications can be found in Section 11.7.

**Table 251: Complications of surgery among inpatient primary surgeries performed by the general gynaecology team by timing of surgery NWH 2017**

| | Acute admission N=332 | | Elective admission N=939 | |
|---|---|---|---|---|
| | **n** | **%** | **n** | **%** |
| **Any complication** | **48** | **14.5** | **97** | **10.3** |
| Failure to complete planned procedure | 3 | 0.9 | 27 | 2.9 |
| Intra operative injury to internal organs | 2 | 0.6 | 10 | 1.1 |
| Significant post op infection | 2 | 0.6 | 9 | 1.0 |
| Anaesthetic complication | 1 | 0.3 | 7 | 0.7 |
| Other significant complication | 2 | 0.6 | 7 | 0.7 |
| Thromboembolic complication | 0 | | 0 | |
| Unplanned return to theatre in 6 weeks | 4 | 1.2 | 5 | 0.5 |
| Admission to DCCM | 5 | 1.5 | 2 | 0.2 |
| Readmission in 6 weeks | 21 | 6.3 | 54 | 5.8 |
| Postop complication | 7 | 2.1 | 25 | 2.7 |
| Planned re-admission | 0 | 0.0 | 5 | 0.5 |
| Transfusion | 0 | 0.0 | 0 | 0.0 |
| Other, please specify | 14 | 4.2 | 24 | 2.6 |
| Transfusion | 21 | 6.3 | 11 | 1.2 |

The intraoperative injury rate in 2017 was 0.9%. This is consistent with rates in previous years. Overall complication and readmission rates remain stable. However despite some improvement, the blood transfusion rate still remains well above ACHS standards.

Readmission data has been the subject of an improvement project for 2015 and 2016 lead by Ines Blaj, Charge Nurse of Ward 97. The two leading causes of readmissions were wound infections and vault/pelvic haematomas. As part of the ERAS project all patients are called on Day 1 and Day 7 post discharge. The patient information sheets that patients are given on discharge now have an emphasis on wound care and vaginal bleeding following hysterectomy.

## Table 252: Postoperative complications among primary inpatient surgeries by PRIMARY surgical procedure NWH 2017

| | Total | Any complication | | Failure to complete planned procedure | | Intra operative injury to internal organs | | Blood Transfusion | | Significant post-op Infection | | Unplanned return to theatre in 6 weeks | | Readmission in 6 weeks | | Anaesthetic complication | | Thrombo-embolic complication | | Other significant complication | | Admission to DCCM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Total** | **1271** | **145** | **11.4** | **30** | **2.4** | **12** | **0.9** | **32** | **2.5** | **11** | **0.9** | **9** | **0.7** | **75** | **5.9** | **8** | **0.6** | **0** | | **9** | **0.7** | **7** | **0.6** |
| Ovarian and /or tubal surgery | 140 | 18 | 12.9 | 3 | 2.1 | 3 | 2.1 | 6 | 4.3 | 1 | 0.7 | 2 | 1.4 | 3 | 2.1 | 1 | 0.7 | 0 | | 2 | 1.4 | 4 | 2.9 |
| Hysteroscopy | 188 | 13 | 6.9 | 5 | 2.7 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 0 | 0.0 | 7 | 3.7 | 0 | | 0 | | 0 | | 0 | |
| Urogynaecology procedure | 105 | 8 | 7.6 | 0 | | 0 | | 2 | 1.9 | 0 | | 1 | 1.0 | 6 | 5.7 | 0 | | 0 | | 2 | 1.9 | 0 | |
| Hysterectomy | 150 | 35 | 23.3 | 6 | 4.0 | 6 | 4.0 | 5 | 3.3 | 6 | 4.0 | 2 | 1.3 | 23 | 15.3 | 2 | 1.3 | 0 | | 3 | 2.0 | 0 | |
| Endometriosis surgery | 58 | 8 | 13.8 | 0 | | 0 | | 0 | | 1 | 1.7 | 0 | | 8 | 13.8 | 0 | | 0 | | 0 | | 0 | |
| Fibroid embolisation | 3 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Surgical termination of pregnancy | 150 | 4 | 2.7 | 0 | | 0 | | 0 | | 0 | | 0 | | 4 | 2.7 | 0 | | 0 | | 0 | | 0 | |
| Evacuation retained products of conception | 88 | 12 | 13.6 | 1 | 1.1 | 0 | | 6 | 6.8 | 0 | | 0 | | 6 | 6.8 | 0 | | 0 | | 0 | | 0 | |
| Diagnostic laparoscopy | 118 | 14 | 11.9 | 4 | 3.4 | 0 | | 3 | 2.5 | 1 | 0.8 | 1 | 0.8 | 7 | 5.9 | 0 | | 0 | | 1 | 0.8 | 0 | |
| Other vulval procedure | 53 | 4 | 7.5 | 1 | 1.9 | 0 | | 0 | 0.0 | 0 | | 1 | 1.9 | 3 | 5.7 | 0 | | 0 | | 0 | | 0 | |
| Other uterine/cervical | 179 | 20 | 11.2 | 6 | 3.4 | 2 | 1.1 | 7 | 3.9 | 1 | 0.6 | 1 | 0.6 | 5 | 2.8 | 4 | 2.2 | 0 | | 1 | 0.6 | 3 | 1.7 |
| Other | 39 | 9 | 23.1 | 4 | 10.3 | 0 | | 2 | 5.1 | 0 | | 1 | 2.6 | 3 | 7.7 | 1 | 2.6 | 0 | | 0 | 0.0 | 0 | |

**Definitions of complications:**
Intra operative injury to internal organs: Injury to bladder, bowel, ureter, major blood vessel, or other.
Significant postop infection: Any infection (defined by evidence of wound dehiscence or wound collection, pelvic abscess, or fever>39$^{o}$C) occurring as a result of surgery.
Readmission: Re-admission to hospital (hospital stay of 3 hours or more) for a reason related to the surgical procedure occurs within 6 weeks of surgery.
Other significant complications: Includes gastrointestinal complications (ileus, bowel obstruction), fistulae.

## 11.8 Data tables: General Gynaecology inpatient surgery

**Table 253: Primary indication for primary inpatient gynaecologic surgery NWH 2012-2017**

| | 2012 N=1528 | | 2013 N=1606 | | 2014 N=1607 | | 2015 N=1542 | | 2016 N=1430 | | 2017 N=1271 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Primary indication for surgery** | | | | | | | | | | | | |
| Abnormal bleeding, non-pregnant | 379 | 23.3 | 359 | 22.4 | 338 | 21.0 | 324 | 21.0 | 320 | 22.4 | 298 | 23.4 |
| Miscarriage | 343 | 21.1 | 333 | 20.7 | 180 | 11.2 | 139 | 9.0 | 147 | 10.3 | 109 | 8.6 |
| Termination | | | | | 174 | 10.8 | 180 | 11.7 | 158 | 11.0 | 153 | 12.0 |
| Urogynaecology / prolapse | 203 | 12.5 | 218 | 13.6 | 207 | 12.9 | 195 | 12.6 | 138 | 9.7 | 127 | 10 |
| Ovarian cyst | 165 | 10.1 | 126 | 7.9 | 126 | 7.8 | 96 | 6.2 | 136 | 9.5 | 111 | 8.7 |
| Abscess | 72 | 4.4 | 45 | 2.8 | 53 | 3.3 | 67 | 4.3 | 46 | 3.2 | 59 | 4.6 |
| Pain, cause unknown | 95 | 5.8 | 88 | 5.5 | 86 | 5.4 | 86 | 5.6 | 80 | 5.6 | 72 | 5.7 |
| Cancer / Pelvic mass | 72 | 4.4 | 63 | 3.9 | 91 | 5.7 | 53 | 3.4 | 49 | 3.4 | 34 | 2.7 |
| Endometriosis | 98 | 6.0 | 77 | 4.8 | 74 | 4.6 | 74 | 4.8 | 82 | 5.7 | 82 | 6.5 |
| Ectopic pregnancy | 101 | 6.2 | 84 | 5.2 | 83 | 5.2 | 71 | 4.6 | 77 | 5.4 | 55 | 4.3 |
| Infertility | 21 | 1.3 | 42 | 2.6 | 26 | 1.6 | 42 | 2.7 | 17 | 1.2 | 22 | 1.7 |
| Anatomical anomalies of the genital tract | | | | | 11 | 0.7 | 21 | 1.4 | 10 | 0.7 | 17 | 1.3 |
| CIN/VIN/VAIN | | | | | 47 | 2.9 | 32 | 2.1 | 25 | 1.7 | 26 | 2.0 |
| Polyps/endometrial sampling | | | | | 55 | 3.4 | 50 | 3.2 | 43 | 3.0 | 39 | 3.1 |
| Other, please specify | 79 | 4.9 | 171 | 10.7 | 56 | 3.5 | 112 | 7.3 | 102 | 7.1 | 67 | 5.3 |

**Table 254: Demographic details of women having inpatient gynaecologic primary surgery NWH 2012-2017**

| | 2012 N=1528 | | 2013 N=1606 | | 2014 N=1607 | | 2015 N=1542 | | 2016 N=1430 | | 2017 N=1271 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % |
| **Ethnicity** | | | | | | | | | | | | |
| Māori | 154 | 10.1 | 168 | 10.5 | 189 | 11.8 | 175 | 11.3 | 152 | 10.6 | 167 | 13.1 |
| Pacific | 260 | 17.0 | 246 | 15.3 | 261 | 16.2 | 229 | 14.9 | 263 | 18.4 | 243 | 19.1 |
| Indian | 137 | 9.0 | 132 | 8.2 | 124 | 7.7 | 142 | 9.2 | 118 | 8.3 | 109 | 8.6 |
| Other Asian | 174 | 11.4 | 194 | 12.1 | 184 | 11.4 | 193 | 12.5 | 191 | 13.4 | 150 | 11.8 |
| MELAA | | | | | | | | | | | 42 | 3.3 |
| Other | 57 | 3.7 | 51 | 3.2 | 52 | 3.2 | 60 | 3.9 | 46 | 3.2 | | |
| European | 737 | 48.2 | 808 | 50.3 | 790 | 49.2 | 743 | 48.2 | 659 | 46.2 | 560 | 44.1 |
| Not stated | 9 | 0.6 | 7 | 0.4 | 7 | 0.4 | 0 | | 1 | 0.1 | 0 | |
| **Age (years)** | | | | | | | | | | | | |
| <20 | 84 | 5.5 | 85 | 5.3 | 103 | 6.4 | 82 | 5.3 | 68 | 4.8 | 84 | 6.6 |
| 21-30 | 312 | 20.4 | 340 | 21.2 | 345 | 21.5 | 357 | 23.1 | 368 | 25.7 | 289 | 22.7 |
| 31-40 | 432 | 28.3 | 446 | 27.8 | 452 | 28.1 | 416 | 27.0 | 361 | 25.2 | 373 | 29.3 |
| 41-50 | 357 | 23.4 | 375 | 23.4 | 331 | 20.6 | 324 | 21.0 | 284 | 19.9 | 257 | 20.2 |
| 51-60 | 170 | 11.1 | 179 | 11.2 | 180 | 11.2 | 170 | 11.0 | 172 | 12.0 | 121 | 9.5 |
| >60 | 170 | 11.1 | 179 | 11.2 | 196 | 12.2 | 193 | 12.5 | 177 | 12.4 | 147 | 11.6 |
| Missing | 3 | 0.2 | 2 | 0.1 | | | | | | | | |
| **BMI** | | | | | | | | | | | | |
| <19 | 44 | 2.9 | 66 | 4.1 | 65 | 4.0 | 61 | 4.0 | 69 | 4.8 | 47 | 3.7 |
| 19-25 | 636 | 41.6 | 681 | 42.4 | 626 | 38.9 | 643 | 41.7 | 531 | 37.1 | 481 | 37.8 |
| 26-30 | 350 | 22.9 | 360 | 22.4 | 346 | 21.5 | 349 | 22.6 | 310 | 21.7 | 250 | 19.7 |
| 31-35 | 203 | 13.3 | 197 | 12.3 | 165 | 10.3 | 151 | 9.8 | 152 | 10.6 | 127 | 10.0 |
| >35 | 251 | 16.4 | 258 | 16.1 | 306 | 19.0 | 314 | 20.3 | 334 | 23.4 | 314 | 24.7 |
| Missing | 44 | 2.9 | 44 | 2.7 | 99 | 6.2 | 24 | 1.6 | 34 | 2.3 | 52 | 4.1 |
| **Smoking status** | | | | | | | | | | | | |
| Currently smoking | 267 | 17.5 | 237 | 14.8 | 252 | 15.7 | 197 | 12.8 | 185 | 12.9 | 174 | 13.7 |
| Past smoker | 185 | 12.1 | 173 | 10.8 | 154 | 9.6 | 115 | 75.2 | 97 | 6.8 | 66 | 5.2 |
| Never | 1074 | 70.3 | 119 | 74.2 | 119 | 74.1 | 148 | 9.6 | 1087 | 76.0 | 988 | 77.7 |
| Not currently smoking | | | | | | | | | | | 7 | 0.6 |
| Unknown | 2 | 0.1 | 4 | 0.2 | 9 | 0.6 | 37 | 2.4 | 61 | 4.3 | 36 | 2.8 |
| **DHB of residence** | | | | | | | | | | | | |
| Auckland | 1236 | 80.9 | 130 | 81.4 | 127 | 79.2 | 123 | 80.3 | 1122 | 78.6 | 1018 | 80.1 |
| Counties Manukau | 118 | 7.7 | 120 | 7.5 | | 8.2 | 144 | 9.3 | 132 | 9.2 | 87 | 6.8 |
| Waitemata | 123 | 8.1 | 132 | 8.2 | 151 | 9.4 | 112 | 7.3 | 114 | 7.8 | 106 | 8.3 |
| Other | 51 | 3.3 | 38 | 2.4 | 46 | 2.9 | 39 | 2.5 | 55 | 3.8 | 52 | 4.1 |
| Unknown | | | 8 | 0.5 | 5 | 0.3 | 9 | 0.6 | 7 | 0.5 | 8 | 0.6 |

MELAA = Middle Eastern, Latin American, and African (added in 2017)

**Table 255: Complications of surgery NWH 2013-2017**

| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N=1606 | | N=1607 | | N=1542 | | N=1430 | | N=1271 | |
| | n | % | n | % | n | % | n | % | n | % |
| **Total complications** | 219 | 13.6 | 198 | 12.3 | 164 | 10.6 | 139 | 9.7 | 145 | 10.1 |
| Blood transfusion | 58 | 3.6 | 46 | 2.9 | 43 | 2.8 | 47 | 3.3 | 30 | 2.1 |
| Intra-operative injury to internal organs | 18 | 1.1 | 9 | 0.6 | 12 | 0.8 | 8 | 0.6 | 12 | 0.8 |
| Failure to complete planned surgery | 20 | 1.2 | 30 | 1.9 | 22 | 1.4 | 22 | 1.5 | 11 | 0.8 |
| Anaesthetic complications | 11 | 0.7 | 9 | 0.6 | 12 | 0.8 | 14 | 1.0 | 8 | 0.6 |
| Significant postoperative infection | 20 | 1.2 | 16 | 1.0 | 16 | 1.0 | 7 | 0.5 | 9 | 0.6 |
| Other significant complications | 22 | 1.4 | 13 | 0.8 | 18 | 1.2 | 8 | 0.6 | 0 | 0.0 |
| Unplanned return to theatre | 21 | 1.3 | 20 | 1.2 | 15 | 1.0 | 6 | 0.4 | 9 | 0.6 |
| Admission to DCCM | 10 | 0.6 | 8 | 0.5 | 14 | 0.9 | 10 | 0.7 | 7 | 0.5 |
| Readmission to hospital (post op complication) | 121 | 7.5 | 99 | 6.2 | 105 | 6.8 | 107 | 7.5 | 75 | 5.2 |
| Planned re-admission | | | | | 17 | 1.1 | 13 | 0.9 | 32 | 2.2 |

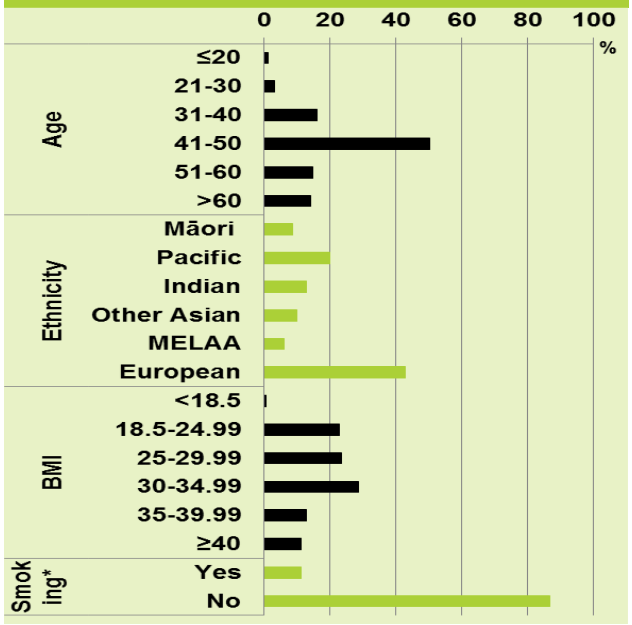
## 11.9 Hysterectomy

This section includes only hysterectomies performed by the general gynaecology surgical team from Ward 97. It does not include hysterectomies performed by the Gynaecologic Oncology team, or hysterectomy cases done from another hospital ward or under the care of other services (e.g. urology).

### Findings

There were 161 hysterectomies performed under the general gynaecology team in 2017.

**Figure 225: Characteristics of women undergoing hysterectomy performed by the general gynaecology team NWH 2017**




*missing smoking status of 1 woman
MELAA = Middle Eastern, Latin American, and African

Smoking rates, ethnicity and BMI are similar to previous years.

The proportion of women undergoing hysterectomy by abdominal approach in 2017 continued to trend downward from previous years. For the first time, the rate of minimally invasive hysterectomy (vaginal plus laparoscopic) is greater than the rate of abdominal (52.7% to 47%).

There continues to be an increasing trend to performing proportionally more laparoscopic (total and LAVH) hysterectomies and fewer by vaginal approach over the past three years, in part due to departmental education regarding concurrent salpingectomy at time of hysterectomy and desire to offer laparoscopic approach by surgeon. The indication for hysterectomy in 2017 was similar to previous years with abnormal uterine bleeding still the most common. The length of hospital stay remains unchanged by all methods since the drop by one day in median length of stay in 2012 which was associated with the introduction of the enhanced recovery program in gynaecology. Laparoscopic approach has the shortest stay of 2 days on average. Vaginal approach is more likely to be linked to other prolapse surgery which can affect discharge timing.

**Figure 226: Route of hysterectomy among hysterectomies performed by general gynaecologists NWH 2001-2017**

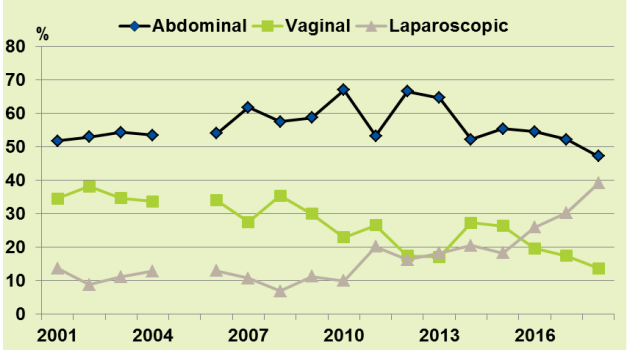
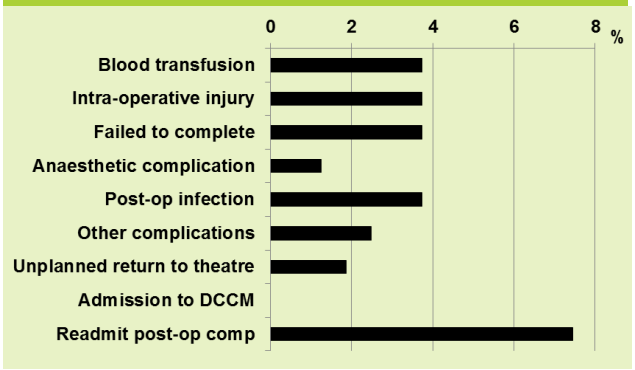


**Figure 227: Complications of surgery among women undergoing hysterectomy performed by the general gynaecology team NWH 2017**

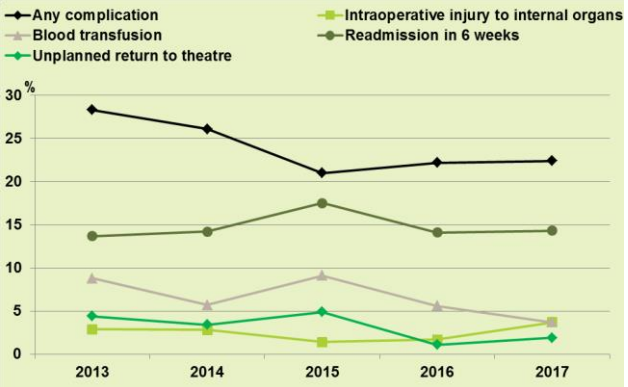



*definitions of surgical complications can be found in Section 11.7.

The overall complication rate for hysterectomy under the General Gynaecology Service in 2017 was 22.4% (Table 257). There was an increase in the number of intraoperative injuries in 2017 compared to 2016, although similar over last five years. The majority were recognised and managed at the time of the original surgery appropriately.

Transfusion, infection and readmission rates are unchanged essentially. Ongoing quality improvement projects to address readmission and infection rates are being implemented this year and include Surgical Bundling for Gynaecologic Procedures.

**Figure 228: Complications of surgery among women undergoing hysterectomy performed by the general gynaecology team NWH 2013-2017**




*definitions of surgical complications can be found in Section 11.7.

## Summary / Implications

The number of hysterectomies is low compared to other DHBs for our patient population. A review may be necessary to determine if more women should be offered a hysterectomy rather than non-invasive therapy in those situations where there is a higher likelihood of failure. Over the last five years, more women are being offered a trial of minimally invasive approach to hysterectomy. The total complication rate has also decreased compared to previous years but there are ongoing quality improvement projects for infection, transfusion and readmission rates.

## 11.10 Data tables: Hysterectomy

**Table 256: Characteristics of women undergoing hysterectomy by the general gynaecology team (excluding gynaecologic oncology) NWH 2013-2017**

| | 2013 N=205 | | 2014 N=176 | | 2015 N=143 | | 2016 N=177 | | 2017 N=161 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Age (years)** | | | | | | | | | | |
| ≤20 | 1 | 2.5 | 1 | 0.6 | 1 | 0.7 | 0 | | 2 | 1.2 |
| 21-30 | 1 | 2.5 | 1 | 0.6 | 2 | 1.4 | 2 | 1.1 | 5 | 3.1 |
| 31-40 | 26 | 12.7 | 20 | 11.4 | 18 | 12.6 | 20 | 11.2 | 26 | 16.1 |
| 41-50 | 100 | 48.8 | 90 | 51.1 | 63 | 44.1 | 85 | 47.8 | 81 | 50.3 |
| 51-60 | 45 | 22.0 | 40 | 22.7 | 40 | 28.0 | 37 | 20.8 | 24 | 14.9 |
| >60 | 31 | 15.1 | 24 | 13.6 | 19 | 13.3 | 33 | 18.6 | 23 | 14.3 |
| Unknown | 1 | 0.5 | | | | | | | | |
| **Ethnicity** | | | | | | | | | | |
| Māori | 23 | 11.2 | 23 | 13.1 | 16 | 11.2 | 15 | 8.4 | 14 | 8.7 |
| Pacific | 36 | 17.6 | 31 | 17.6 | 20 | 14.0 | 33 | 18.5 | 32 | 19.9 |
| Indian | 25 | 12.2 | 17 | 9.7 | 21 | 14.7 | 11 | 6.2 | 21 | 13.0 |
| Other Asian | 26 | 12.7 | 23 | 13.1 | 18 | 12.6 | 32 | 18.0 | 16 | 9.9 |
| MELAA | | | | | | | | | 9 | 5.6 |
| European | 91 | 44.4 | 79 | 44.9 | 63 | 44.1 | 79 | 44.8 | 69 | 42.9 |
| Other | 2 | 1.0 | 3 | 1.7 | 5 | 3.5 | 7 | 3.9 | 0 | |
| Not Stated | 2 | 1.0 | 0 | | 0 | | 0 | | 0 | |
| **District Health Board of residence** | | | | | | | | | | |
| Auckland | 194 | 94.6 | 153 | 86.9 | 126 | 88.1 | 162 | 91.0 | 144 | 89.4 |
| Waitemata | 6 | 2.9 | 8 | 4.5 | 5 | 3.5 | 7 | 3.9 | 5 | 3.1 |
| Counties Manukau | 2 | 1 | 7 | 4 | 4 | 2.8 | 3 | 1.7 | 5 | 3.1 |
| Other | 2 | 1.0 | 7 | 4.0 | 7 | 4.9 | 5 | 2.8 | 5 | 3.1 |
| Unknown | 1 | 0.5 | 1 | 0.6 | 1 | 0.7 | 0 | | 2 | 1.2 |
| **BMI** | | | | | | | | | | |
| <18.5 | 7 | 3.4 | 1 | 0.6 | 2 | 1.4 | 3 | 1.7 | 1 | 0.6 |
| 18.5-24.99 | 50 | 24.4 | 51 | 29.0 | 39 | 27.3 | 51 | 28.8 | 37 | 23.0 |
| 25-29.99 | 62 | 30.2 | 45 | 25.6 | 48 | 33.6 | 50 | 28.1 | 38 | 23.6 |
| 30-34.99 | 42 | 20.5 | 39 | 22.2 | 29 | 20.3 | 32 | 18.0 | 46 | 28.6 |
| 35-39.99 | 30 | 14.6 | 12 | 6.8 | 15 | 10.5 | 22 | 12.4 | 21 | 13.0 |
| ≥40 | 14 | 6.8 | 26 | 14.8 | 10 | 7.0 | 19 | 10.7 | 18 | 11.2 |
| Missing | 0 | | 2 | 1.1 | 0 | | 0 | | 0 | 0 |
| **Smoking** | | | | | | | | | | |
| Currently smoking | 32 | 15.6 | 30 | 17.0 | 14 | 9.8 | 15 | 8.4 | 18 | 11.2 |
| Past smoker | 18 | 8.8 | 18 | 10.2 | 13 | 9.1 | 12 | 6.7 | 6 | 3.7 |
| Never smoked | 155 | 75.6 | 128 | 72.7 | 114 | 79.7 | 145 | 81.9 | 134 | 83.2 |
| Not currently smoking | | | | | | | | | 2 | 1.2 |
| Unknown | 0 | | | | 2 | 1.4 | 5 | 2.8 | 1 | 0.6 |

MELAA = Middle Eastern, Latin American, and African; first included in 2017

**Table 257: Complications of surgery among women undergoing hysterectomy performed by the general gynaecology team NWH 2013-2017**

| | 2013 N=205 | | 2014 N=176 | | 2015 N=143 | | 2016 N=177 | | 2017 N=161 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Any complication** | **58** | **28.3** | **46** | **26.1** | **30** | **21.0** | **39** | **22.2** | **36** | **22.4** |
| Blood transfusion | 18 | 8.8 | 10 | 5.7 | 13 | 9.1 | 10 | 5.6 | 6 | 3.7 |
| Intraoperative injury | 6 | 2.9 | 5 | 2.8 | 2 | 1.4 | 3 | 1.7 | 6 | 3.7 |
| Anaesthetic complications | 1 | 0.5 | 0 | | 1 | 0.7 | 1 | 0.6 | 2 | 1.2 |
| Significant postoperative infection | 12 | 5.9 | 6 | 3.4 | 13 | 9.1 | 4 | 2.3 | 6 | 3.7 |
| Other significant complications | 11 | 5.4 | 5 | 2.8 | 10 | 7.0 | 5 | 2.8 | 4 | 2.5 |
| Unplanned return to theatre | 9 | 4.4 | 6 | 3.4 | 7 | 4.9 | 2 | 1.1 | 3 | 1.9 |
| Admission to DCCM | 2 | 1.0 | 3 | 1.7 | 6 | 4.2 | 2 | 1.1 | 0 | |
| **Readmission to hospital** | 28 | 13.7 | 25 | 14.2 | 25 | 17.5 | 25 | 14.1 | 23 | 14.3 |
| Planned readmissions | | | | | 1 | 0.7 | 2 | 1.1 | 2 | 1.2 |
| Postop complications | | | | | 18 | 12.6 | 17 | 9.6 | 12 | 7.5 |
| Other | | | | | 6 | 4.2 | 6 | 3.4 | 9 | 5.6 |
| Failed to complete planned surgery | 1 | 0.5 | 4 | 2.3 | 0 | | 2 | 1.1 | 6 | 3.7 |

**Table 258: Surgical details of hysterectomies performed by the general gynaecology team NWH 2013-2017**

| | 2013 N=205 | | 2014 N=176 | | 2015 N=143 | | 2016 N=177 | | 2017 N=161 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Approach** | | | | | | | | | | |
| Laparotomy | 105 | 51.2 | 96 | 54.5 | 75 | 52.4 | 84 | 47.5 | 74 | 46.0 |
| Total laparoscopic hysterectomy | 34 | 16.6 | 19 | 10.9 | 30 | 21.0 | 44 | 24.9 | 55 | 34.2 |
| Laparoscopic assisted vaginal | 8 | 3.9 | 13 | 7.4 | 7 | 4.9 | 10 | 5.6 | 8 | 5.0 |
| Laparoscopic converted to laparotomy | 2 | 1.0 | 2 | 1.1 | 3 | 2.1 | 8 | 4.5 | 2 | 1.2 |
| Vaginal | 56 | 27.3 | 46 | 26.3 | 28 | 19.6 | 31 | 17.5 | 22 | 13.7 |
| **Timing of surgery** | | | | | | | | | | |
| Elective | 198 | 96.6 | 173 | 98.2 | 136 | 95.1 | 175 | 98.9 | 157 | 97.5 |
| Acute | 7 | 3.4 | 3 | 1.8 | 7 | 4.9 | 2 | 1.1 | 4 | 2.5 |
| **Primary indication for surgery** | | | | | | | | | | |
| Abnormal bleeding, non-pregnant | 98 | 47.8 | 87 | 49.4 | 64 | 44.8 | 82 | 46.3 | 81 | 50.3 |
| Cancer /pelvic mass | 40 | 19.5 | 34 | 19.3 | 26 | 18.2 | 25 | 14.1 | 20 | 12.4 |
| Urogynaecology / prolapse | 36 | 17.6 | 33 | 18.8 | 25 | 17.5 | 35 | 19.8 | 25 | 15.5 |
| Pain, cause unknown | 6 | 2.9 | 4 | 2.3 | 3 | 2.1 | 7 | 4.0 | 6 | 3.7 |
| Endometriosis | 5 | 2.4 | 5 | 2.8 | 4 | 2.8 | 9 | 5.1 | 8 | 5.0 |
| Ovarian cyst | 6 | 2.9 | 5 | 2.8 | 5 | 3.5 | 6 | 3.4 | 5 | 3.1 |
| Other | 14 | 6.8 | 8 | 4.6 | 16 | 11.2 | 13 | 7.3 | 16 | 9.9 |
| **ASA rating** | | | | | | | | | | |
| 1 | 66 | 32.2 | 38 | 21.6 | 50 | 35.0 | 57 | 32.2 | 52 | 32.3 |
| 2 | 98 | 47.8 | 72 | 40.9 | 58 | 40.6 | 92 | 52.0 | 75 | 46.6 |
| 3 | 35 | 17.1 | 19 | 10.8 | 11 | 7.7 | 12 | 6.8 | 26 | 16.1 |
| 5 | 0 | | 1 | 0.6 | 1 | 0.7 | 1 | 0.6 | 0 | |
| Missing | 6 | 2.9 | 46 | 26.1 | 23 | 16.1 | 0 | | 8 | 5.0 |
| **LENGTH OF STAY (days)** | **Median(IQR)** | | **Median(IQR)** | | **Median(IQR)** | | **Median(IQR)** | | **Median(IQR)** | |
| **All hysterectomies** | 3 | (3-4) | 3 | (2-4) | 3 | (2-4) | 3 | (2-4) | 2 | (2-3) |
| **By approach:** | | | | | | | | | | |
| Abdominal | 3 | (3-4) | 3 | (3-4) | 3 | (2-4) | 3 | (3-4) | 3 | (3-4) |
| Laparoscopic | 3 | (2-3.5) | 2 | (2-2) | 2 | (2-3) | 2 | (2-2) | 2 | (1-2) |
| Vaginal | 3 | (2-4) | 3 | (2-3) | 3 | (2-3) | 3 | (2-3) | 2 | (2-3) |

**Table 259: Route of hysterectomy among hysterectomies performed by the general gynaecology team NWH 2009-2017**

| | 2009 N=162 | | 2010 N=173 | | 2011 N=166 | | 2012 N=175 | | 2013 N=205 | | 2014 N=176 | | 2015 N=143 | | 2016 N=177 | | 2017 N=161 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| **Abdominal** | 109 | 67 | 92 | 53.2 | 110 | 66.3 | 113 | 64.6 | 107 | 52.2 | 98 | 55.7 | 78 | 54.5 | 92 | 52.0 | 76 | 47.2 |
| **Vaginal** | 37 | 23 | 46 | 26.6 | 29 | 17.5 | 30 | 17.1 | 56 | 27.3 | 46 | 26.1 | 28 | 19.6 | 54 | 30.5 | 22 | 13.7 |
| **Laparoscopic** | 16 | 10 | 35 | 20.2 | 27 | 16.3 | 32 | 18.3 | 42 | 20.5 | 32 | 18.2 | 37 | 25.9 | 31 | 17.5 | 63 | 39.1 |

## 11.11 Gynaecology laparoscopic procedures

This section includes laparoscopic procedures performed by the general gynaecology surgical team. As in all sections 11.1 - 11.10, procedures performed by the gynaecologic oncology team are excluded.

### Findings

In 2017, there were 350 laparoscopic procedures, 268 elective and 82 acute procedures. One hundred and twenty one laparoscopic procedures (34%) were a combination of endometriosis surgery/hysterectomy/urogynaecology procedures and the vast majority were elective in timing. One hundred and ten laparoscopic procedures (31%) were coded as 'diagnostic', of which 32% were acute procedures. Next most common group were ovarian/tubal pathology such as ectopic pregnancy or cyst accidents with 94 procedures, 43% were acute in timing.

**Table 260: Complications of primary inpatient gynaecologic laparoscopic surgery NWH 2017**

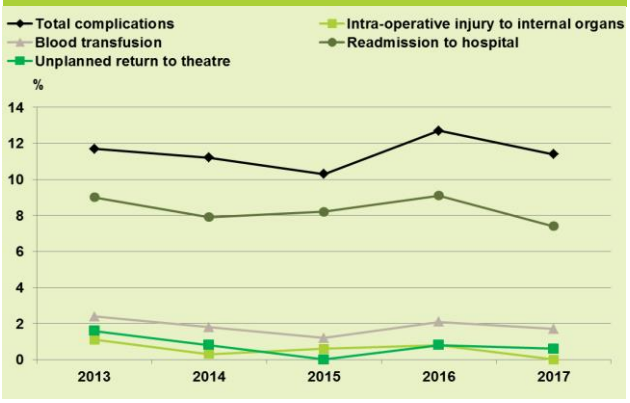
| | Total N=350 | |
|---|---|---|
| | n | % |
| **ANY COMPLICATION** | 40 | 11.4 |
| Blood transfusion | 6 | 1.7 |
| Intra operative injury | 0 | |
| Failure to complete procedure | 7 | 2.0 |
| Anaesthetic complications | 1 | 0.3 |
| Significant post-operative infection | 5 | 1.4 |
| Unplanned return to theatre | 2 | 0.6 |
| Admission to DCCM | 1 | 0.3 |
| Other significant complications | 1 | 0.3 |
| **Readmission to hospital** | 26 | 7.4 |
| Post op complications | 8 | 2.3 |
| Planned re-admission | 0 | |
| Other | 18 | 5.1 |

In 2017 there were the following complications.

#### 1. Re-admission to hospital:

Twenty six (7.4%) were re-admitted within six weeks of surgery. Eighteen patients were readmitted with pain and/or constipation. The rest were infection-related or ectopic-related complications.

**Figure 229: Complications of primary inpatient gynaecologic laparoscopic surgery NWH 2017**




*definitions of surgical complications can be found in Section 11.7.

#### 2. Injury to Internal organs:

No intraoperative injury to a major viscus organ was noted in 2017.

#### 3. Admission to DCCM:

One patient was admitted to DCCM after laparoscopic surgery for management of ruptured ectopic pregnancy.

#### 4. Failure to complete procedure:

Seven cases were reported to have failure to complete procedure. Five cases reported failure to complete due to unexpected complexity at the time of surgery or complication that developed. One case was due to anaesthetic complication from respiratory illness and another for change of surgical approach (vaginal suturing rather than laparoscopic).

#### 5. Blood transfusion:

Six patients required blood transfusion during or after laparoscopic surgery. Four cases were ruptured ectopic pregnancy related, and 2 cases were from other elective procedures.

#### 6. Significant post-operative infection:

Five patients had significant post-operative infection. Two cases were related to vault haematoma after laparoscopic hysterectomy, further 2 cases related to post-operative UTI, and 1 case of laparoscopic port site infection.

#### 7. Unplanned return to theatre:

Two cases of unplanned return to theatre were reported. One case related to vaginal vault bleeding

requiring re-suturing. Another case was for laparotomy repair of port site opening with associated bowel herniation.

### 8. Anaesthetic complications:

One case of anaesthetic complication was reported with acute respiratory illness at time of surgery. She was subsequently difficult to ventilate and her procedure was abandoned.

## 11.12 Data tables: Gynaecology laparoscopic procedures

**Table 261: Primary surgery performed, and timing of surgery among women having inpatient primary laparoscopic procedures NWH 2017**

| Primary procedure | Surgery in 2017 | Acute admission | | Elective admission | |
|---|---|---|---|---|---|
| | N | n | % | n | % |
| **Total** | 350 | 82 | 23.4 | 268 | 76.6 |
| Ovarian/tubal | 92 | 40 | 43.5 | 52 | 56.5 |
| Diagnostic laparoscopy | 110 | 36 | 32.7 | 74 | 67.3 |
| Endometriosis surgery | 57 | 2 | 3.5 | 55 | 96.5 |
| Hysterectomy | 57 | 1 | 1.8 | 56 | 98.2 |
| Other uterine/cervical | 15 | 3 | 20.0 | 12 | 80.0 |
| Hysteroscopy* | 10 | 0 | | 10 | 100.0 |
| Urogynaecology | 7 | 0 | | 7 | 100.0 |
| Fibroid embolization | 1 | 0 | | 1 | 100.0 |
| Other | 1 | 0 | | 1 | 100.0 |

* all associated with diagnostic laparoscopy and/or minor laparoscopic procedures

**Table 262: Primary indication for surgery by timing of surgery among women having primary inpatient laparoscopic procedures NWH 2017**

| Primary indication | Surgery in 2017 | Acute admission | | Elective admission | |
|---|---|---|---|---|---|
| | N | n | % | n | % |
| **Total** | **350** | **82** | **23.4** | **268** | **76.6** |
| Endometriosis | 77 | 2 | 2.6 | 75 | 97.4 |
| Ovarian cyst | 70 | 18 | 25.7 | 52 | 74.3 |
| Ectopic pregnancy | 44 | 44 | 100.0 | 0 | |
| Pain, cause unknown | 59 | 12 | 20.3 | 47 | 79.7 |
| Abnormal bleeding | 43 | 2 | 4.7 | 41 | 95.3 |
| Infertility | 15 | 0 | | 15 | 100.0 |
| Cancer/Pelvic mass | 11 | 0 | | 11 | 100.0 |
| Urogynaecology/Prolapse | 12 | 0 | | 12 | 100.0 |
| Other | 19 | 4 | 21.1 | 15 | 78.9 |

**Table 263: Complications of laparoscopic surgery NWH 2013-2017**

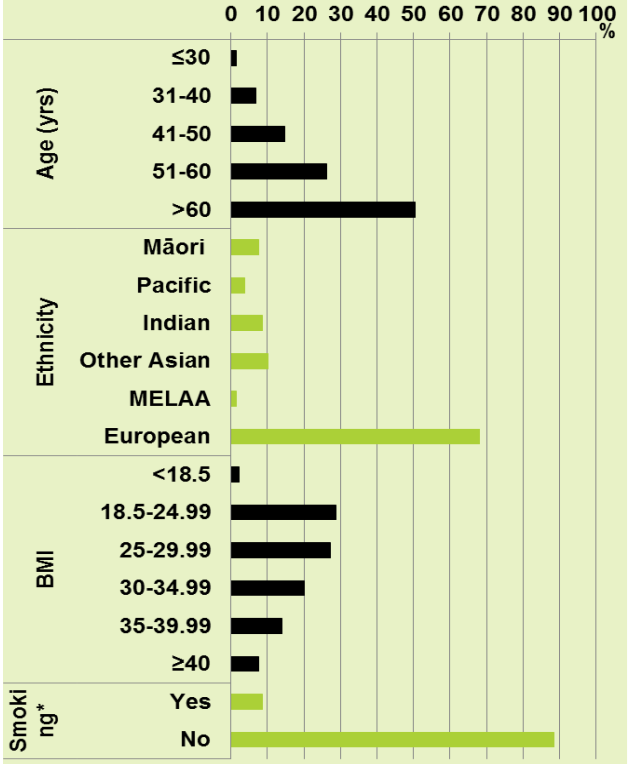
| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N=377 | | N=391 | | N=341 | | N=385 | | N=350 | |
| | n | % | n | % | n | % | n | % | n | % |
| **Any complications** | **44** | **11.7** | **44** | **11.2** | **35** | **10.3** | **49** | **12.7** | **40** | **11.4** |
| Blood transfusion | 9 | 2.4 | 7 | 1.8 | 4 | 1.2 | 8 | 2.1 | 6 | 1.7 |
| Intra-operative injury to internal organs | 4 | 1.1 | 1 | 0.3 | 2 | 0.6 | 3 | 0.8 | 0 | |
| Failure to complete planned surgery | 3 | 0.8 | 11 | 2.8 | 10 | 2.9 | 2 | 0.5 | 7 | 2.0 |
| Anaesthetic complications | 4 | 1.1 | 1 | 0.3 | 2 | 0.6 | 5 | 1.3 | 1 | 0.3 |
| Significant postoperative infection | 4 | 1.1 | 1 | 0.3 | 4 | 1.2 | 4 | 1.0 | 5 | 1.4 |
| Unplanned return to theatre | 6 | 1.6 | 3 | 0.8 | 0 | | 3 | 0.8 | 2 | 0.6 |
| Admission to DCCM | 1 | 0.3 | 2 | 0.5 | 3 | 0.9 | 1 | 0.3 | 1 | 0.3 |
| Other significant complications | 3 | 0.8 | 2 | 0.5 | 3 | 0.9 | 0 | | 1 | 0.3 |
| **Readmission to hospital** | 34 | 9.0 | 31 | 7.9 | 28 | 8.2 | 35 | 9.1 | 26 | 7.4 |
| Post op complications | 22 | 5.8 | 16 | 4.1 | 13 | 3.8 | 14 | 3.6 | 8 | 2.3 |
| Planned re-admission | 2 | 0.5 | 2 | 0.5 | 3 | 0.9 | 0 | | 0 | |
| Other | 10 | 2.7 | 13 | 3.3 | 12 | 3.5 | 21 | 5.5 | 18 | 5.1 |

## 11.13 Urogynaecology

The section on urogynaecology will concentrate on operative procedures rather than clinic throughput or urodynamic investigations as only surgical data are systematically collected. This chapter includes surgery performed as an inpatient at Auckland City Hospital (ACH), and specifically excludes day stay surgery at Greenlane surgical centre.

From 2012, urogynaecology procedures were categorized as: TVT, mesh repair, and prolapse repair. All other procedures are grouped together and include operations such as cystoscopy, Botulin toxin injection into the bladder muscle, vaginal mesh removal, midurethral sling release or removal, bladder instillation and cystoscopy.

**Figure 230:: Demography of women undergoing primary inpatient urogynaecology surgery NWH 2017**




*missing smoking status for 6 women

### Findings

In 2017, 129 urogynaecology procedures were undertaken during a primary admission (ie excluding procedures undertaken during an admission for a postsurgical complication).

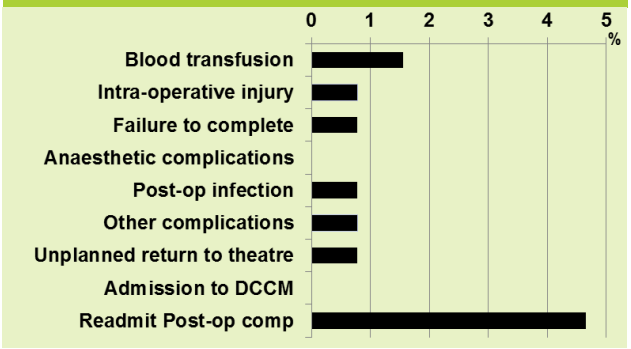
Of the 129 procedures, there were 31 tension free vaginal tape repairs (TVT), seven mesh repairs, 94 prolapse repairs, and 36 other urogynaecology procedures. There were a further 11 operations to manage vaginal mesh complications for women whose primary surgery was not performed at NW. Some women will have had two or more urogynaecology procedures at time of a primary admission.

Twenty three women also had a hysterectomy at the time of their primary admission for urogynaecology surgery.

The number of urogynaecology cases is similar to the 2016 year but down from 219 in 2015. The reason for this is that the more straight forward operations such as TVT, cystoscopy and single compartment prolapse repair in the otherwise healthy patient, are being performed at the Greenlane surgical unit because Greenlane now has the ability to offer overnight stay. The procedures performed at the Greenlane surgical unit are not included in the inpatient database and therefore are not included in this report.

The urogynaecology case mix has been similar to previous years (Table 264). Patients that are overweight or obese are 68% of all cases. The age range is very similar as is the ethnicity to the previous years. We do take tertiary referrals from other Gynaecology units, and these make up 20% of all cases. Waitemata and Counties Manukau have their own urogynaecology units, so patients from these DHBs are usually those who have moved during work up or those who have been long term patients.

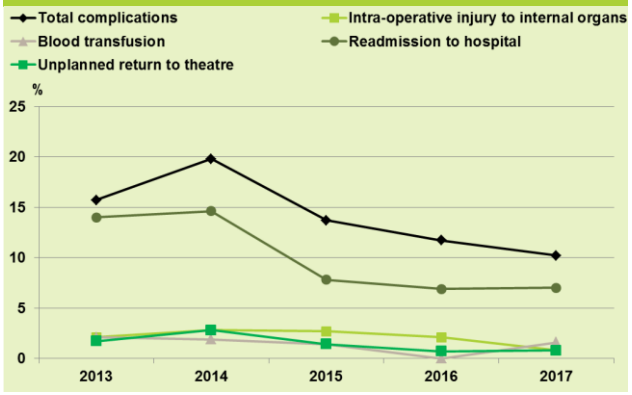
**Figure 231: Complications of primary urogynaecology surgery procedures NWH 2017**




*definitions of surgical complications can be found in section 11.7

Complications were seen in a total of 13 women (10.2%), who underwent urogynaecological surgery. As the data indicates, some patients had more than one complication recorded. This is the same as last year maintaining the improvement noted since 2015.

**Figure 232: Complications of primary urogynaecologic surgery procedures NWH 2013-2017**




*definitions of surgical complications can be found in Section 11.7.

We are still providing the option of prolapse repair with mesh for those patients where other methods of prolapse repair have failed. Eight women had mesh augmented repair in the 2017 year. Seven were placed abdominally laparoscopically and one at open sacrocolpopexy. We know from the international literature that this method of mesh placement is associated with the least long term issues with pain or mesh exposure. There have been no vaginally placed meshes used since 2014.

Vaginally placed mesh for prolapse is no longer supported outside of research and no longer available in New Zealand, due to the high complication rates (12-20%) that come with this method of repair. However tension-free vaginal tape (TVT) or midurethral slings which also come under the category of vaginally placed mesh are still available and are considered the gold standard treatment for urinary stress incontinence with the best risk profile and outcomes compared with other surgical treatments. Both Medsafe and the Australian equivalent Therapeutic Goods Administration (TAG) have approved these devices in the hands of appropriately trained surgeons. As with all operations there are risks specific to these products but these are considered low with mesh exposure and pain at between 2-3%.

The ACH urogynaecology team also frequently deals with the complications associated with vaginally placed mesh. We have dealt with tertiary referrals from as far south as Nelson and as far north as Whangarei. In the 2017 year we did 11 operations for mesh complications ranging from complete excision of vaginal mesh to release of mid-urethral slings. Eight of the 11 were from outside our DHB.

Operative complications have been analysed and the rate of major viscus injury has improved with no bowel or urethral injuries. There was only one bladder injury at vaginal hysterectomy. Two prolapse repairs required blood transfusion. One who also had a vaginal hysterectomy also required to return to theatre due to intra-abdominal bleeding. There were no admissions to Department of Critical Care Medicine (DCCM).

There was one failure to complete surgery when intra-abdominal adhesions were too widespread to safely complete the planned laparoscopic sacrocolpopexy.

We had 9 readmissions which is an improvement on previous years. Two were planned admissions for post-operative review. Six were admitted for post-operative infection, one with a pelvic haematoma that was treated conservatively and one with post-operative pain.

Over all, the complication rates within urogynaecology have continued to remain low. Vaginally placed mesh has been very topical in the media in 2017 with the results of various international reviews and the Australian Senate enquiry. As a tertiary referral unit we continue to be available for assessment and management of women who have complications as a result of mesh placement. Members of our team are also involved at a national level with formulating patient information resources.

## 11.14 Data tables: Urogynaecology

**Table 264: Demography of women undergoing primary inpatient urogynaecology surgery NWH 2013-2017**

| | 2013 N=235 | | 2014 N=212 | | 2015 N=219 | | 2016 N=145 | | 2017 N=129 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Age (years)** | | | | | | | | | | |
| ≤ 30 | 5 | 2.1 | 2 | 0.9 | 5 | 2.3 | 3 | 2.1 | 2 | 1.6 |
| 31-40 | 15 | 6.4 | 20 | 9.4 | 13 | 5.9 | 4 | 2.8 | 9 | 7.0 |
| 41-50 | 58 | 24.7 | 46 | 21.7 | 42 | 19.1 | 20 | 13.8 | 19 | 14.7 |
| 51-60 | 60 | 25.5 | 54 | 25.5 | 60 | 27.3 | 31 | 21.4 | 34 | 26.4 |
| >60 | 97 | 41.3 | 90 | 42.5 | 99 | 45.2 | 87 | 60.0 | 64 | 50.4 |
| **Ethnicity** | | | | | | | | | | |
| Māori | 20 | 8.5 | 20 | 9.4 | 16 | 7.3 | 12 | 8.2 | 10 | 7.8 |
| Pacific | 20 | 8.5 | 19 | 9.0 | 15 | 6.8 | 15 | 10.3 | 5 | 3.9 |
| Indian | 20 | 8.5 | 20 | 9.4 | 19 | 8.6 | 5 | 3.4 | 11 | 8.5 |
| Other Asian | 12 | 5.1 | 17 | 8.0 | 12 | 5.5 | 10 | 6.9 | 13 | 10.1 |
| MELAA | | | | | | | | | 2 | 1.6 |
| European | 159 | 67.7 | 131 | 61.8 | 148 | 67.6 | 103 | 71.5 | 88 | 68.2 |
| Other | 4 | 1.7 | 5 | 2.4 | 9 | 4.1 | 0 | | 0 | |
| **District Health Board of residence** | | | | | | | | | | |
| Auckland | 201 | 85.5 | 181 | 85.4 | 189 | 86.3 | 112 | 77.2 | 95 | 73.6 |
| Waitemata | 10 | 4.3 | 14 | 6.6 | 13 | 5.9 | 3 | 2.1 | 5 | 3.9 |
| Counties Manukau | 6 | 2.6 | 3 | 1.4 | 2 | 0.9 | 4 | 2.8 | 3 | 2.3 |
| Other | 18 | 7.7 | 13 | 6.1 | 14 | 6.4 | 26 | 17.9 | 26 | 20.2 |
| Missing | | | 1 | 0.5 | 1 | 0.5 | 0 | | 0 | |
| **BMI** | | | | | | | | | | |
| <18.5 | 2 | 0.9 | 3 | 1.4 | 4 | 1.8 | 3 | 2.1 | 3 | 2.3 |
| 18.5-24.99 | 64 | 27.2 | 50 | 23.6 | 64 | 29.2 | 32 | 22.1 | 37 | 28.7 |
| 25-29.99 | 81 | 34.5 | 80 | 37.7 | 77 | 35.0 | 54 | 37.0 | 35 | 27.3 |
| 30-34.99 | 52 | 22.1 | 38 | 17.9 | 41 | 18.6 | 32 | 22.1 | 26 | 20.2 |
| 35-39.99 | 23 | 9.8 | 23 | 10.8 | 18 | 8.2 | 16 | 11.0 | 18 | 14.0 |
| ≥40 | 13 | 5.5 | 16 | 7.5 | 13 | 5.9 | 8 | 5.5 | 10 | 7.8 |
| Missing | | | 2 | 0.9 | 2 | 0.9 | 0 | | 0 | |
| **Smoking** | | | | | | | | | | |
| Currently smoking | 23 | 9.8 | 21 | 9.9 | 15 | 6.8 | 5 | 3.4 | 11 | 8.5 |
| Past smoker | 31 | 13.2 | 24 | 11.3 | 18 | 8.2 | 17 | 11.6 | 13 | 10.1 |
| Never smoked | 181 | 77.0 | 167 | 78.8 | 181 | 82.6 | 110 | 75.9 | 101 | 78.3 |
| Missing | | | | | 5 | 2.3 | 13 | 9.0 | 4 | 3.1 |
| **Length of stay (days) (median (IQR))** | 2(1-3) | | 2(1-3) | | 2(1-3) | | 2(1-3) | | 2 (1-3) | |

**Table 265: Complications of primary urogynaecologic surgery procedures NWH 2013-2017**

| | 2013 N=235 | | 2014 N=212 | | 2015 N=219 | | 2016 N=145 | | 2017 N=129 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Total complications** | **37** | **15.7** | **42** | **19.8** | **30** | **13.7** | **17** | **11.7** | **13** | **10.1** |
| Blood transfusion | 5 | 2.1 | 4 | 1.9 | 3 | 1.4 | 0 | | 2 | 1.6 |
| Intra-operative injury to internal organs | 5 | 2.1 | 6 | 2.8 | 6 | 2.7 | 3 | 2.1 | 1 | 0.8 |
| Failure to complete planned surgery | 1 | 0.4 | 5 | 2.4 | 4 | 1.8 | 1 | 0.7 | 1 | 0.8 |
| Anaesthetic complications | 1 | 0.4 | 4 | 1.9 | 2 | 0.9 | 3 | 2.1 | 0 | |
| Significant postoperative infection | 5 | 2.1 | 8 | 3.8 | 3 | 1.4 | 2 | 1.4 | 1 | 0.8 |
| Unplanned return to theatre | 4 | 1.7 | 6 | 2.8 | 3 | 1.4 | 1 | 0.7 | 1 | 0.8 |
| Admission to DCCM | 0 | | 1 | 0.5 | 2 | 0.9 | 0 | | 0 | |
| Other significant complications | 4 | 1.7 | 4 | 1.9 | 3 | 1.4 | 1 | 0.7 | 2 | 1.6 |
| Readmission to hospital | 33 | 14.0 | 31 | 14.6 | 17 | 7.8 | 10 | 6.9 | 9 | 7.0 |
| Postoperative complication | 19 | 8.1 | 20 | 9.4 | 9 | 4.1 | 4 | 2.8 | 6 | 4.7 |
| Planned re-admission | 9 | 3.8 | 9 | 4.2 | 7 | 3.2 | 0 | | 2 | 1.6 |
| Other | 5 | 2.1 | 2 | 0.9 | 1 | 0.5 | 6 | 4.1 | 1 | 0.8 |

## 11.15 Faster Cancer Treatment

The Faster Cancer Treatment (FCT) target is a Ministry of Health benchmark requiring at least 90% of women diagnosed with gynaecological malignancy to receive their treatment within 62 days from receipt of referral. Referrals should be triaged as High Suspicion of Cancer (HiSCan) and be seen within two weeks. Reasons for breach of this target are categorised into "Patient Choice", Clinical Consideration" and "Lack of Capacity".

One of our main goals is to address the capacity issues. Consequently, two key initiatives were set up by the end of 2016. One is the High Suspicion of Cancer patient pathway, where the timeline for First Specialist Appointment (FSA) should be within two weeks of referral, and investigation and diagnosis completed by day 31 of the patient pathway. The other is the Rapid Access Clinic (RAC), the primary aim of which is to manage these women through an expedited pathway, with the ability to perform outpatient diagnostic and operative hysteroscopic procedures, to address the clinic and theatre capacity issues.

In the first six months from January to June 2017, a total of 227 women were triaged as HiSCan. Of these, 24 were diagnosed with gynaecological malignancy. The conversion rate was 10.6%. There were 10 breaches, of which four were due to patient choice, and six were due to lack of capacity. In this period there were no adjustments applied for clinical consideration or patient choice related breaches; Ministry of Health implemented the adjustment criteria from 1st July 2017. FCT performance against the MOH target for treatment within 62 days of receipt of referral (for HiSCan referrals that are malignant) was 58.3%.

The reason for the lack of capacity over this period was the major holiday season (December 2016-February 2017), where there was a two-week theatre and clinic shutdown, lack of leave cover for triaging of referrals, as well as limited Gynae-oncology follow-up appointment post MDM, and theatre sessions. Similar staffing and clinic issues were also identified over the Easter weekend in March 2017.

In the subsequent six months from July to December 2017, 200 women were triaged as HiSCan. Of these, 18 were diagnosed with gynaecological malignancy. The conversion rate was 9%. Three patients breached the target. Of these, two were due to patient choice, and one was due to clinical consideration. There was no capacity issue in this period. The adjusted FCT performance was 100%.

By the latter part of 2017, we were able to double our RAC throughput with additional FTE for two gynaecologists to service the clinic. By this time, the medical and nursing staff were also adequately upskilled to perform diagnostic and operative hysteroscopic procedures efficiently, so that histological diagnosis was achieved promptly, without the need to go through the same procedure under general anaesthesia. The added advantage of this outpatient pathway is the release of daystay capacity at Greenlane Surgical Unit for alternative procedures.

### 11.15.1 Rapid Access Clinic (RAC)

RAC was set up in September 2016, with the aim of helping to achieve the Faster Cancer Treatment target for gynaecology. Previously, some of the identified reasons for breach of this target were delay in FSA for women triaged as HiSCan (High Suspicion of Cancer), and limited capacity in pre-admission clinics and theatre for women who needed diagnostic procedures such as hysteroscopy and dilatation and curettage to achieve diagnosis. Consequently, a HiSCan pathway with an expedited timeline for managing these women was published internally in September 2016.

RAC was set up within this model of care. It aims to see HiSCan women within 7-14 days of referral being received, and offers women the option of outpatient hysteroscopy, endometrial sampling and simple operative hysteroscopic procedures, such as polypectomy/myomectomy using the Myosure equipment in a 'one-stop', outpatient setting, so that women can be assessed, investigated and treated without delays. Wherever possible, these women will have a virtual follow-up for their histology, to maximise the throughput of the clinic. Should there be capacity available women triaged for Abnormal Uterine Bleeding (AUB) Clinic can also be seen in RAC.

RAC operates in EDU, where there are already two pre-existing consulting rooms, a theatre, and is staffed by experienced EDU nurses. The clinic runs once a week. In the first year, it was serviced by one SMO. From October 2017, there was additional FTE for a second SMO, as well as a third consulting room, which is equipped with a gynaecology examination bed, for procedures such as endometrial sampling and IUCD replacement.

From September 2016 to December 2017, 237 women were seen in RAC. The ethnic background was 84 (35%) Europeans, 29 (12%) Māori, 53 (22%) Polynesians, 29 (12%) Indians, and 18 (7.6%) Chinese. The age range was 22-95 years old. BMI ranged from 17-74. Of these women, 206 (87%) were triaged as HiSCan and 23 (9.7%) as AUB. Ninety-five (40%) women were seen for postmenopausal bleeding, 30 (12.6%) for pelvic mass, 21 (8.8%) for incidental finding of endometrial pathology on imaging, and 68 (28.7%) for abnormal

uterine bleeding. One hundred and ten (46%) women had outpatient hysteroscopy. Of these, 29 (26%) proceeded to have diagnostic and/or operative hysteroscopy under general anaesthesia. The main reason for this was the finding of endometrial lesion(s) in clinic deemed inappropriate to be resected in the outpatient setting, patient intolerance, and/or request. In 13 (5.4%) women, an outpatient hysteroscopy was attempted. Three (1.3%) women declined. Twenty-two (9.3%) women had gynaecological malignancy, of which 14 were uterine, 4 were ovarian, and 2 were cervical.

We do not yet have a robust method to capture complication rates related to outpatient hysteroscopy in RAC. We deduce that women with any significant procedural-related complication(s) would either present to ED or WAU, or be re-referred back to the gynaecology service. Based on this deduction, there were two (1.8%) women who had endometritis post-procedure, requiring antibiotics.

## 11.16 Fertility PLUS

**Table 266: Fertility Plus IVF cycle outcomes 2017 (compared to ANZARD benchmark data)**

| | IVF cycles 2014 | | IVF/ICSI cycles 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| **Number of cycles started** | 605 | | 536 | | 492 | | 503 | |
| **Number of cycles stopped** | 50 | 8 | 50 | 9 | 44 | 9 | 38 | 8 |
| **ANZARD Benchmark for % cycles stopped** | | **9** | | **9** | | | | |
| **Reasons for stopped cycles** | | | | | | | | |
| 1) Over response | 5 | 1 | 6 | 1 | 2 | <1 | 4 | 1 |
| 2) Poor response | 38 | 6 | 34 | 6 | 31 | 6 | 27 | 5 |
| 3) Other (including patient choice) | 7 | 1 | 10 | 2 | 11 | 2 | 5 | 1 |
| **Number of cycles reaching oocyte pick up (OPU)** | 555 | 92 | 486 | 91 | 448 | 91 | 465 | 92 |
| **Number of cycles reaching embryo transfer** | 437 | 72 | 362 | 68 | 337 | 68 | 322 | 64 |
| **ANZARD Benchmark for cycles reaching transfer** | | **65** | | **59** | | | | |
| **Reasons for no transfer** | | | | | | | | |
| 1) Freeze all cycle | 95 | 17 | 97 | 20 | 92 | 21 | 125 | 25 |
| - Egg vitrification | 7 | | 4 | | 6 | | 4 | |
| - Elevated progesterone | 30 | | 31 | | 18 | | 31 | |
| - OHSS risk | 25 | | 20 | | 32 | | 29 | |
| - Endometrial (needing surgery) | 11 | | 3 | | 13 | | 8 | |
| - Agonist trigger | 22 | | 39 | | 18 | | 43 | |
| - Fertility preservation- embryos | | | | | 5 | | 4 | |
| - Other | | | | | | | 6 | |
| 2) No eggs | 5 | 1 | 5 | 1 | 3 | 1 | 9 | 2 |
| 3) No fertilisation | 14 | 2 | 12 | 2 | 13 | 3 | 7 | 1 |
| 4) Other | 4 | 1 | 10 | 2 | 3 | 1 | 2 | 0.4 |
| Clinical pregnancy/cycle started | 138 | 23 | 108 | 20 | 112 | 23 | 128 | 25 |
| **ANZARD Benchmark: pregnancy rate/cycle started** | | **20** | | **18** | | | | |
| Clinical pregnancy rate/OPU | 138/555 | 25 | 108/486 | 22 | 112/448 | 25 | 128/465 | 28 |
| **ANZARD Benchmark for pregnancy rate/OPU** | | **22** | | **20** | | | | |
| Clinical pregnancy rate/embryo transfer | 138/437 | 32 | 108/362 | 30 | 112/337 | 33 | 128/322 | 40 |
| **ANZARD Benchmark: pregnancy rate/embryo transfer** | | **30** | | **30** | | | | |
| IVF/ICSI cycles Single Embryo Transfer (SET) – all ages | 358/437 | 82 | 347/362 | 96 | 330/337 | 98 | 331/332 | 99.7 |
| **ANZARD Benchmark: SET: all ages** | | **78** | | **82** | | | | |
| Clinical pregnancy rate for Day 5 SET | | 43 | | 44 | | 42 | | 55 |
| **Twinning** | 11/138 | 8 | 1/108 | 1 | 1/112 | | 2/128 | |
| From DET | 9/138 | 7 | 0 | 0 | 0 | | 0 | |
| From SET (monozygotic) | 2/138 | 2 | 1 | 1 | 1 | | 2 | |
| **RTAC Guidelines** | | **<10** | | **<10** | | **<10** | | **<10** |
| THAW CYCLES - Clinical pregnancy rate per thawed embryo replacement | 48/177 | 27 | 139/455 | 31 | 144/455 | 32 | 147/489 | 30 |
| **ANZARD Benchmark: pregnancy rate/thawed embryo replacement** | | **33** | | **36.3** | | | | |
| Clinical pregnancy rate per thawed blastocyst replacement | 39/124 | 31 | 114/338 | 34 | 128/374 | 34 | 140/464 | 32 |
| **ANZARD Benchmark: pregnancy rate/thawed blastocyst replacement** | | **37** | | **36** | | | | |
| % which were SET thaw cycles | 163/177 | 92 | 447/455 | 98 | 449/455 | 99 | | 100 |
| **ANZARD Benchmark: % SET/thaw cycles** | | **88** | | **90** | | | | |
| Twinning rate from embryo thaw cycles | 0/48 | 0 | 1/139 | 1 | 3/144 | 2 | 1/147 | 0.7 |
| Admission for OHSS | 6/605 | 1 | 2/535 | 0.4 | 2/448 | 0.4 | | 0 |

These are the 2017 results of IVF/ICSI autologous cycles i.e. women having their own eggs used for insemination and resultant embryos transferred. Our results are benchmarked against the ANZARD (Australian and New Zealand Assisted Reproduction) Database which records all treatment cycles for Australia and New Zealand.

These data represent women of all ages. Donor/recipient, surrogacy and PGD cycles are not included.

The data collection for all accredited fertility clinics allows individual units to make their own comparisons against the figures for all patients in Australia undergoing treatment in any given year. As a comparison group for our 2017 data, we have been able to use the data from the ANZARD Report for 2015 (the most recently published ANZARD data).

It must be noted that our complete live birth data are not yet available for 2017 but we can report for cycles commenced in 2017 until the end of May 2018 the live birth plus on going foetal heart pregnancy rate following fresh transfers per initiated cycle was 20% and the cumulative rate until the end of May 2018 following the transfer of fresh and frozen-thaw embryos was 34% per initiated cycle.

### Donor egg cycles

In 2017, there were eight patients who started donor egg cycles, three (43%) of the recipients have had on going pregnancies from a thaw cycle. Four patients still have frozen embryos in storage and are having on going treatment.

### Surrogacy cycles

There were five women who had eleven thaw cycles where a surrogate received an embryo, resulting in one clinical pregnancy.

### Embryo Donation

There were three thaw cycles where a recipient received a donor embryo, resulting in one clinical pregnancy.

### Stopped cycles

The definition of a 'stopped cycle' is one in which the cycle starts (with treatment designed to stimulate the ovaries) but it is stopped before an egg collection takes place. Our 8% stopped cycle rate is the same as the ANZARD benchmark of 9%. Five of 503 started cycles were stopped due to over-response as these women were considered to have too high a risk of severe ovarian hyperstimulation syndrome (OHSS) to have an egg collection. We had no hospitalisations for OHSS in 2017 which compares favourably with the 2015 ANZARD benchmark of 0.6% per egg collection.

The majority of stopped cycles were for poor ovarian response (27 from 38 stopped cycles). In most women poor response is based on poor ovarian reserve which is not amenable to treatment. Women with poor ovarian reserve who do not respond to maximal gonadotrophins can be offered ovum donation.

### No embryo transfer

Sixty four percent of cycles had an embryo transfer and this is higher than the 58.8% ANZARD benchmark for 2015.

Reasons for 'freeze-all' cycles include progesterone levels ≥6 nmol/L (n=31) (allows for transfer in a later cycle when the endometrial synchrony is better), women at risk for severe OHSS (n=29) (transfer in a later cycle reduces OHSS risk) and use of agonist trigger (n=43) (associated with lower pregnancy rate in fresh cycles). Endometrial anomalies such as polyps on ultrasound are also a reason for freeze-all (eight women).

Seven women of the 465 undergoing egg collection did not develop embryos. Nine women had no eggs collected (this is always a potential hazard in women with a low response and only a couple of follicles or fewer). Of the seven women who had no fertilization of their eggs, the majority were women who had very few or very poor quality eggs. Unexpected failed fertilization of good numbers of apparently good quality eggs is a rare event.

### Pregnancies

As single embryo transfer and freeze all cycles become more common, the outcome of the fresh embryo transfer cycle, the traditionally expressed standard outcome measure, is assuming less relevance as a key performance indicator. Of more relevance is the cumulative live birth rate per woman undergoing IVF stimulation, of healthy singleton babies at term, when all embryos from both fresh and thaw are transferred from one initiated cycle.

### Single embryo transfer

Although single embryo transfer was introduced at Fertility Plus in 2006 for public cycles, it was only in the second half of 2014 that a single embryo transfer policy was introduced regardless of funding. In 2014 Fertility Plus had a multiple birth rate of 6.5% but in 2017 the multiple pregnancy rate was 1.0% which is similar to the rate for natural pregnancies. There were two multiple pregnancies from 128 pregnancies from fresh transfer and 1 of 147 pregnancies from thaw cycle transfer.

## Maternity data

### Description of women and babies included in the Annual Clinical Report.

The maternity section of this Annual Clinical Report includes data pertaining to women giving birth to babies at and beyond 20 weeks gestation at NWH during the 2017 calendar year or, if prior to arrival, due to unplanned birth at home or en route (BBA = born before arrival), and the babies of these women.

### Data sources

Maternity data for this report have been extracted from the NWH maternity clinical database (Healthware CSC). Data from the ATLAS database (ICD-10 coded data on hospital discharges), supported by the Business Intelligence Unit, and from the PIMS-theatre database were used to check the accuracy of some maternity data.

Maternity data for years prior to 2001 were collected into the AMSIS (Auckland Maternity Services Information System) database. For this report, most data for the years prior to 2001, included in tables and figures to demonstrate time trends, have been obtained from previous Annual Clinical Reports.

The majority of registration data for mothers with self-employed lead maternity caregivers (LMCs) were shared by LMCs and entered into Healthware by one Healthware administrator. Registration data for mothers under the care of NWH primary maternity services, and all antenatal, birth, and postnatal data were entered by clerks and NWH midwives.

The data included in the Maternal Fetal Medicine Service (MFM) section have been extracted from the MFM Viewpoint database for 2015.

### Data quality

Data cleaning is undertaken daily prior to extraction of the birth list for Births, Deaths and Marriages (BDM). On a monthly basis, cleaning of place and mode of birth and reconciliation with Birthcare numbers is undertaken.

For the 2004 - 2016 years, the data have been cleaned for ad hoc analysis for service provision, audit and research, policy, and for this clinical report. Cleaning has included completing missing data and checking out of range and inconsistent data. These cleaning strategies have been focused around priority areas for reporting and areas where cleaning could be efficiently completed within the resource available. Further details of variables cleaned are provided below.

NWH acknowledges that these cleaning efforts, whilst extremely time consuming, are not exhaustive. On occasion, it became apparent during analysis that further cleaning was required and this was performed on an ad hoc basis and may not be included in the list provided.

Services or individuals wishing to use the NWH data for further analysis should be aware that areas not mentioned may not have been cleaned. For further advice please contact the Women's Health Intelligence (WHI) Department.

A data dictionary covering some of the data collection variables can be obtained from the WHI department.

The introduction of comprehensive computerised clinical records (CRIS, 3M, Concerto, Éclair and Impax (Radiology PACS System)) by ADHB has enhanced data collection, checks on data integrity and clinical audit tremendously. Authorised clinical staff can access the complete clinical record electronically so that no clinical record is lost and the delays inherent in the old paper-based system are avoided.

## Newborn Data

Data in the Newborn section pertain to all babies admitted to and cared for at the NWH Neonatal Intensive Care Unit if born during the 2017 calendar year. This includes babies transferred from other units or home.

Data for this report have been extracted from stand-alone databases for neonatology.

Neonatal Intensive Care Unit (NICU) data are collected prospectively by the Resident Medical Officers and Nurse Specialists - Advanced Neonatal Practice working on the NICU. The neonatal database is used to produce problem lists, flow sheets and letters which also ensures checks of data integrity throughout a baby's stay. Further data are collected and accuracy checked for the Australia and New Zealand Neonatal Network (ANZNN).

An updated version of the neonatal database was introduced in June 2017.

### Newborn Data Quality

Additional checks of the accuracy of the data (including checking clinical records and some original radiology) are made in preparing the annual report and prior to sending the data to ANZNN.

Images were checked on all serious adverse outcomes (IVH, PVL, ROP, NEC, death). Laboratory and clinical records were checked on all possible or definite septicaemias or meningitides. Records were checked when the data entered in different fields in the database appeared inconsistent. Maternal and neonatal records of all babies with encephalopathy or neonatal seizures were reviewed.

## Gynaecology data

### Data sources

Gynaecology data were largely obtained from stand-alone Access databases. Fertility Plus data were extracted and reported by the service and Epsom Day Unit data were extracted from the PHS system.

General gynaecologic surgery data are entered on all inpatient gynaecologic surgeries from Ward 97. Gynaecologic Oncology team cases are entered in a separate database. It is the intention of the service that intra-operative data are entered by the surgeon at point of care, and post-operative complications are entered later by the ward clerical staff.

The data presented in the Colposcopy section arise from data collected from 2009-2011 into Healthware and data collected into the (Solutions Plus) Colposcopy database from July 2012. Data are not included for the transition period from January-July 2012.

The data in the Gynaecologic Oncology section have been obtained from an Access database recording gynaecologic oncology referrals and an Access database of all MDM reviews and inpatient surgeries among women cared for by the gynaecologic oncology service.

### Data Quality

The data in the gynaecologic oncology and general gynaecologic surgery databases were compared to surgeries entered in the PIMS theatre database and to hospital discharge coded surgeries which are stored in the ATLAS data warehouse to identify missing, inconsistent and out of range data. Inconsistencies were clarified by review of clinical case records. Clinical review of individual cases where complications occurred was also undertaken by clinicians responsible for individual surgical areas.

The definitions used in these databases can be viewed on the shared computer drive at N:\Groups\O and G Projects\Gynaecology Surgical Cases Database\Update and N:\Groups\Gynae Oncology\Database.

## Analytical and statistical methods

All data have been extracted and analyzed using SQL, Access, Excel, Python and STATA9. Tables are formatted with either column or row percentages as indicated.

## Data cleaning queries (Maternity data)

The following is a list of the data cleaning and validation queries which were carried out for the production of this report. This list is not exhaustive and some further ad hoc cleaning was carried out during analysis.

### Lead Maternity Carer

Check all LMC have correct LMC type and group
Check all unbooked women that LMC screen is correct
Check that all women have a LMC screen at birth
If women have booked after 13 weeks with NW LMC check that there is a reason for late booking

### Antenatal

Ethnicity is Not Stated or Other
Check parity if parity is less than parity at previous live birth (although previously parity was defined as 2 for twins). Check that obstetric history has been completed for women with a gravidity >1.
Previous Caesarean; If indication for Caesarean section=repeat Caesarean, previous Caesar=yes and parity is > 0.
BMI (Body Mass Index) Calculated from earliest weight recorded, as weight (kg)/height(m)$^2$. If BMI <17 or >40, check height and weight or any mismatch of data

### Antenatal Complications

If Antenatal Admission for Hypertension, APH or Diabetes, check Labour and birth mother screen, medical conditions is not = missing &/or check data is consistent.
If Induction Indication is Hypertension, APH or Diabetes, check Labour and birth mother screen medical conditions is not = missing &/or check data is consistent.
If Reason for Operative Birth is Hypertension, APH or Diabetes, check Labour and birth mother screen medical conditions is not = missing &/or check data is consistent.
If HDU Admission for Hypertension, APH or Diabetes, check AN or PN screen medical conditions & blood loss/ transfusion is not = missing &/or data is consistent.
Eclampsia = Yes in check Labour and birth mother screen
Antenatal Diabetes screen without a PN Diabetes Screen & vice versa.
Newborn Diabetes; Newborn Discharge Summary, check for missing diabetic data.
Height and weight, check all fields are complete
Smoking, check all women have smoking status at booking and at birth. Check all women who smoke have been offered smoking cessation

### Induction of Labour

If SROM at term and syntocinon is given before established labour then reason for induction is rupture of membranes at term
If time at ARM is earlier than established labour time, assume this is an induction.
If time at start of Syntocinon is earlier than established labour time, then check this is an induction.
If Syntocinion is started before 3 cms dilated check for Induction
If indication for ARM is induction and time of ARM is established labour, then induction data are entered.
If indication for ARM is induction and time of ARM is after established labour time, then indication for ARM is labour augmentation.
If an induction occurred, there is an Induction Indication entered.
If indication for Induction Is Other Please Specify then comment fields are checked for use of a drop down menu rather than free text.
Induction indication rupture of membranes at term but gestation is preterm
Induction indication PPROM but baby is term
Induction indication multiple pregnancy but baby is singleton
Induction indication maternal age but baby is preterm
Induction indication is poor Ob Hx but baby is preterm

### Pregnancy/Birth

Homebirths & BBA's (babies born before arrival at hospital when intended birth in hospital) All checked as appropriately classified.
Check all transfers in labour from Birthcare
Check 'Delivered by' is not missing.
Check that admission to Labour & Birth Suite/Operating Theatre/WAU is before birth time (unless is recorded as BBA).
If birth location is BBA, then birth time is before admission.
Onset of contraction time is before full dilatation which is in turn before Birth time (sometimes there is no onset of contraction time because of pre-labour Caesarean)
Onset of contraction time should **not** be missing if method of Birth is Caesarean (elective or emergency) in labour.
Full Dilatation Time should not be null if Birth Method is a vaginal birth.
If indication for induction is SRM then rupture of membrane time should be before induction start time which in turn is before onset of contraction time.
Syntocinon time is before birth time.
Membranes ruptured time is not null.
Membranes ruptured time is before birth time.
Time of epidural insertion is before birth time.
Full dilatation time is before birth time.
Birth time is always before birth of placenta time.
Placenta birth time is not null.
Check all Classical Caesareans to ensure they are authentic.
Check all in established labour CS
A Caesarean Section (CS) must have an option from the expanded tree to describe what type of CS. Cannot be just Lower Segment Caesarean Section or Classical Caesarean Section.
All emergency in labour CS must have Robson Group, urgency status. All emergency CS are checked for accuracy of definition.
If Birth Method is anything other than SVD or Spontaneous Breech Birth, check there is a reason for Operative Birth.
If Birth Method is a SVD or Spontaneous Breech Birth, check there is NO reason for operative birth.
If indication for operative birth is fetal distress, then fetal distress variable (in Labour & Birth Baby) is yes or meconium was present.
Check that elective CS does not have a reason for CS as failed induction
Indication for Operative Birth Is Other Please Specify + Comment fields - for checking.
If Birth Presentation is Breech, should not be a Spontaneous Vertex Birth.
If Birth method is breech, then presentation is breech.
If Birth method is 'Elective CS' then Dilatation at Syntocinon should be null.
Membrane method is SRM but has indication for ARM, check.
If ARM check there is an indication for ARM.
If vaginal birth, membranes method should not be At time of C/S.
Birth Presentation is null, check presentation
If Dilatation at Epidural is not Null then Anaesthesia should show Epidural Lumbar or Epidural Spinal.
If Time of Epidural is not Null then Anaesthesia should show Epidural Lumbar or Epidural Spinal.
If Caesarean is mode of birth, anaesthesia is not missing.
Analgesia with elective CS
If had an epidural, then dilatation at last VE is not missing and time of epidural is not missing.
If there is postpartum transfusion and blood loss is < 1000 mls, check blood loss.
Blood Loss is not out of range ie: <50, >1500 or is null.
Blood Loss >=1500 & Blood Transfusion = No.
Blood Loss <1500 & Blood Transfusion =Yes.
Vaginal Birth & Lacerations is Null.
Sutured by Is Not Null, Lacerations Is Null.
If Instrumental Birth (Forceps) then check for Episiotomy.
If woman has placenta praevia but not a elective CS

### Postnatal

Mothers Destination to Ward is somewhere within Auckland City Hospital but PN screen does not reflect this.
Mothers and baby's destination are not null
Mothers destination not NWH's & PN Admission screen entered
PN Adm - Missing 'Admitted to ward time', 'CMS Discharge date' or 'Admission Type'
PN Adm - 1° Reason for PN Admission is Other & Comment
PN Adm - 1° Reason for PN Admission is Null or SVD
Mothers Destination to Ward & Admitted to (PN Admission Screen) do not match or is null
If reason for admission is CS or instrumental birth but none of these occurred
PN Admission - missing Admission Type
Baby Destination (L&B Baby) is a NWH location, check Discharge Time & Discharge to & Discharge Care (Newborn Discharge Summary) is not null
Newborn Discharge Summary Missing Data (If DHB is ADHB & LMC is NWH LMC)
Discharge Care - Postnatal Admission is NWH Homecare (includes Diabetic etc) but missing Postnatal Homecare Summary or Newborn Discharge Summary
Discharge Care - Postnatal Admission NOT NWH, but Postnatal Homecare Summary Screen
Postnatal Homecare Missing Data
Breast Feeding Baby Unknown or missing fields from Immediate Newborn Assessment & Newborn Discharge Summary Screen.

### Baby

Birth weight – check if <400g or >5kg.
If gestation <35 weeks, check birth weight if >2500g.
If gestation >35 weeks, check birth weight if <2500g.
Gestation: check if < 20wks or > 44 wks.
If indication for induction is post term, check gestation if gestation is < 40 weeks.
Gestation to Neonatal Gestation (Immediate Newborn Assessment screen) > 1 week difference if <28 weeks and >2 weeks difference if $\geq$ 28 weeks.
Perinatal mortality database for perinatal deaths gestation to derived gestation > 1 week difference
Neonatal database gestation to derived gestation > 1 week difference.
(Because of the incomplete reconciliation of data sets, there may be a minimal number of cases where gestation varies in reporting of the neonatal and maternity data.)
Gestational Age (Immediate Newborn Assessment) Is Null.
Days in NICU/PIN/Paed care on Ward are not null or check if >30.
Missing Apgars.
Live birth with Apgars 1min or Apgars 5 min of 0.

### Data Checks with Other Sources

CMS/ Coding data to ensure correct birth numbers.

Neonatology database; fields checked include Birthweight, Gestation, Apgars & Days in NICU.

Perinatal related deaths database fields cross-referenced with Healthware include; ethnicity, gestation – LMP/EDD, LMC, Gravida/Parity, Height/Weight/BMI, Outcome, Apgars, Sex, Gestation, Birth Weight, PSANZ-PDC & PSANZ-NDC classifications, customised centile.

PIMs theatre data checked against Healthware for epidural and GA, blood loss, operative vaginal birth and CS.

ATLAS coding data cross checked with Healthware for hypertension, APH, diabetes, perineal trauma, mode of birth.

## Data cleaning queries (Gynaecology data)

### Gynaecology Oncology

Check if NHI is valid
Have had surgery, but morphology of cancer is missing
Have had surgery, but no register in surgical database
Primary site of cancer missing
Surgeon field is null or other
Type of surgery is null
Diagnosis is null
Height or weight is null
Length of hospital stay is null
Have record of MDM but no register in gynaeoncology database
Date of surgery is null
Date of referral missing
Referral accepted but no record of clinic visit or MDM
Incorrect NHI on referral
Woman had surgery but referral not accepted
Data cross checked against PIMS coding data for missing surgery and blood transfusion
Data cross checked against ATLAS coding data for blood transfusions, readmissions, post-operative complications and admissions to Department of Critical Care Medicine

### Gynaecology inpatients

Check for Indication for Admission is post-operative complications, Admission Type should not be primary admission
Admission Type is indicated as a post discharge event but primary surgery not ACH, check to see if this is true
Check blood transfusion status if blood loss is low
Diagnosis on Discharge is other, check the diagnosis and categorise under headings accordingly Date/Time of Admission or Date/Time

of Discharge is missing or if length of stay is >10 days, check admission and discharge dates
Missing Diagnosis on Discharge and/or Date/Time on Discharge, check diagnosis and/or date/time
Height and/or Weight is null, check height and/or weight and check data for validity
Smoking field is null, check smoking status
Date/Time of Surgery is null, check date/time of surgery
Timing of Surgery is null, check timing of surgery
Procedure is listed as other, check procedure performed and categorise under heading accordingly
ATLAS coding data is cross checked with Gynaecology Inpatient Database for missing surgeries, blood transfusions, hysterectomies, DCCM admissions, readmissions and surgical complications
PIMS theatre data checked with Gynaecology Inpatient Database for missing surgeries and blood transfusions
Check for duplicate entries
Surgery time should NOT be earlier than admission time
If surgery time is 7 days after admission, check if true
If surgery is in both Gynaecologic Oncology database and Gynaecology Inpatient database, check if correct

# APPENDIX 2 - GLOSSARY OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| ABA | American Board of Anaesthesiologists | IVF | In vitro fertilisation |
| ACH | Auckland City Hospital | IVH | Intraventricular haemorrhage |
| ACL | Anticardiolipin antibody | KPI | Key performance indicator |
| ACHS | Australian Council Healthcare Standards | LARCs | Long Acting Reversible Contraceptives |
| AMOSS | Australasian maternity outcomes surveillance system | LB | Live birth |
| AMSIS | Auckland Maternity Services Information System | Ligate | Surgical ligation of PDA |
| ANA | Antinuclear antibody | LLETZ | Large loop excision of the transformation zone |
| ANZNN | Australia and New Zealand Neonatal Network | LMC | Lead Maternity Carer |
| APH | Antepartum haemorrhage | LMP | Last menstrual period |
| ARM | Artificial rupture of membranes | LNND | Late neonatal death |
| ASA | American Society of Anaesthesiologists | LSCS | Lower segment Caesarean section |
| AUT | Auckland University of Technology | LSIL | Low-grade squamous intraepithelial lesion |
| BBA | (Baby) Born Before Arrival (not a planned home birth) | LV | Left ventricle |
| BFHI | Baby Friendly Hospital Initiative | MAS | Meconium aspiration syndrome |
| BI | Business Intelligence | MCDA | Monochorionic diamniotic twin |
| BMI | Body mass index | MCMA | Monochorionic monoamniotic twin |
| BP | Blood Pressure | MDM | Multidisciplinary meeting |
| BPD | Bronchopulmonary dysplasia | MELAA | Middle Eastern, Latin American and African |
| CDU | Child Development Unit | MFM | Maternal Fetal Medicine |
| CGO | Certificate of gynaecologic oncologists | MSU | Mid-stream urine |
| CHD | Congenital Heart Disease | MTOP | Medical termination of pregnancy |
| CI | Confidence Interval | N/R | Not resuscitated |
| CLD | Chronic lung disease | NAS | Neonatal abstinence syndrome |
| CPAP | Continuous positive airways pressure | NEC | Necrotising enterocolitis |
| CRIS | Clinical Records Information System | NFD | Not further defined |
| CS | Caesarean section | NICU | Neonatal Intensive Care Unit |
| CVA | Cerebro Vascular Accident | NIDDM | Non-insulin dependent diabetes mellitus |
| CVS | Chorionic villus sampling | NWH | National Women's |
| DAU | Day Assessment unit | NPSU | National perinatal statistics unit (Australia) |
| DBP | Diastolic blood pressure | NSU | National screening unit |
| DCCM | Department of Critical Care Medicine | NZBFA | NZ Breast Feeding Authority |
| DCDA | Dichorionic diamniotic twin | OP | Occiput posterior |
| DHB | District Health Board | OPU | Oocyte pick up |
| DIC | Disseminated intravascular coagulopathy | PCR | Protein Creatinine ratio |
| DNA | Did not attend | PDA | Patent ductus arteriosis |
| DORV | Double outlet right ventricle | PE/PET | Pre-eclampsia |
| DRG | Diagnosis related groups | PG | Prostaglandin |
| ECMO | Extra Corporeal Membrane Oxygenation | PIN | Parent Infant Nursery |
| EDU | Epsom Day Unit | PM | Postmortem |
| ENND | Early neonatal death | PMMRC | Perinatal & Maternal Mortality Review Committee |
| ERPOC | Evacuation of retained products of conception | PMR | Perinatal mortality rate |
| FCT | Faster cancer treatment | PPHN | Persistent pulmonary hypertension of the newborn |
| fFN | Fetal Fibronectin | PRLR | Perinatal related loss rate |
| FH | Fetal heart | (P)PROM | (Preterm) prolonged rupture of membranes |
| FSA | First specialist appointment | PROM | Prolonged rupture of membranes |
| FTE | Fulltime equivalent | PVL | Periventricular leukomalacia |
| GA | General anaesthetic | RAC | Rapid access clinic |
| GDM | Gestational diabetes mellitus | RDS | Respiratory distress syndrome |
| GH | Gestational hypertension | ROP | Retinopathy of prematurity |
| GLH | Green Lane Hospital | PMMRC | Perinatal & Maternal Mortality Review Committee |
| GO | Gynaecologic oncology | PMR | Perinatal mortality rate |
| GP | General Practitioner | PPHN | Persistent pulmonary hypertension of the newborn |
| GPH | Gestational proteinuric hypertension | PRLR | Perinatal related loss rate |
| GROW | Gestation Related Optimal Weight software | R0 | No residual macroscopic disease |
| GSU | Greenlane Surgical Unit | R1 | 1cm residual disease |
| GTT/OGTT | Oral Glucose Tolerant Test | R2 | 2cm residual disease |
| Hb | Haemoglobin | RMO | Resident Medical Officer |
| HbA1c | Glycosylated heamoglobin | RR | Relative risk |
| HDU | High Dependency Unit | SBP | Systolic blood pressure |
| HELLP | Hemolysis, Elevated Liver Enzymes, Low Platelets | SCBU | Special Care baby Unit |

# APPENDIX 2 - GLOSSARY OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| HiFlow | High flow air oxygen | SGA | Small for gestational age |
| HFOV | High frequency oscillatory ventilation | SRM | Spontaneous rupture of membranes |
| HIE | Hypoxic ischaemic encephalopathy | SLE | Systemic Lupus Erythematosus |
| HIV | Human Immunodeficiency Virus | SMO | Senior Medical Offcier |
| HiSCan | High suspicion of cancer | STOP | Surgical termination of pregnancy |
| HMD | Hyaline Membrane Disease | SVB | Spontaneous vaginal birth |
| HPV | Human papilloma virus | TCM | Transcutaneous oxygen monitor |
| ICH | Intracerebral haemorrhage | TGA | Transposition of the great arteries |
| IDDM | Insulin dependent diabetes mellitus | TIA | Transient Ischaemic Attack |
| Indo | Treated with indomethacin | TOP | Termination of pregnancy |
| iNO | Inhaled nitrous oxide | TVT | Tension-free vaginal tape |
| IPPV | Intermittent positive pressure ventilation | UAC | Umbilical artery catheter |
| IOL | Induction of labour | US/USS | Ultrasound/ultrasound scan |
| IUD | Intrauterine death | VBAC | Vaginal birth after Caesarean |
| ICSI | Intracytoplasmic sperm injection | VLBW | Very low birth weight |
| IVF | In vitro fertilisation | VSD | Ventricular septal defect |
| IVH | Intraventricular haemorrhage | WAU | Women's Assessment Unit |
| IUD | Intrauterine death | wks | Weeks |
| ICSI | Intracytoplasmic sperm injection | WHO | World Health Organisation |
| IDS | Interval debulking surgery | yrs | years |

### Antepartum haemorrhage (APH)

Antepartum haemorrhage includes vaginal bleeding from any cause at or beyond 20 weeks during pregnancy and labour, and includes placenta praevia without bleeding. While bleeding before 20 weeks is also important we do not reliably collect these data.

### Augmentation

Describes use of oxytocin or artificial rupture of membranes to accelerate established labour.

### Breastfeeding

**Exclusive breastfeeding**: The infant has never, to the mother's knowledge, had any water, formula or other liquid or solid food. Only breast milk, from the breast or expressed, and prescribed (as per Medicines Act 1981) medicines have been given from birth.

**Fully breastfeeding**: The infant has taken breast milk only, no other liquids or solids except a minimal amount of water or prescribed medicines, in the past 48 hours.

**Partial breastfeeding**: The infant has taken some breast milk and some infant formula or other solid food in the past 48 hours.

**Artificial feeding**: The infant has had no breast milk but has had alternative liquid such as infant formula with or without solid food in the past 48 hours.

### Chronic hypertension (CH)

Diastolic BP > 90mmHg at booking or a medical history of essential hypertension.

### Early Neonatal Death (ENND)

Death of a live born baby in the first week of life before completion of 7 days of life.

### Elective Caesarean section

An elective Caesarean is defined as a Caesarean which was scheduled in advance and scheduled prior to the onset of labour. Therefore, Caesarean sections performed after the onset of labour but booked prior to labour are included with elective Caesarean.

### Ethnicity

Ethnicity is collected at each hospital registration with the standard census 2001 question. The ethnicity used in this report represents the most recent response by an individual to the ethnicity question, and so may not be the ethnicity given at the time of birth admission. Up to three options are input into the CMS (Case Management System) database. In preparing the data for this report, each mother has been allocated to a single ethnic group. When more than one ethnic group is recorded, the prioritised ethnicity system has been used[3] below.

**Table 267: Level 2 prioritisation of ethnicity[3]**

| Priority order | Ethnic Group Code Description |
|---|---|
| 1 | Māori |
| 2 | Tokelauan |
| 3 | Fijian |
| 4 | Niuean |
| 5 | Tongan |
| 6 | Cook Island Māori |
| 7 | Samoan |
| 8 | Other Pacific Island |
| 9 | Pacific Island NFD (Not Further Defined) |
| 10 | South East Asian |
| 11 | Indian |
| 12 | Chinese |
| 13 | Other Asian |
| 14 | Asian NFD |
| 15 | Latin American / Hispanic |
| 16 | African |
| 17 | Middle Eastern |
| 18 | Other |
| 19 | Other European |
| 20 | European NFD |
| 21 | NZ European |

The most summarised (Level 1) prioritisation is as follows: Māori, Pacific peoples, Asian, MELAA (Middle Eastern, Latin American and African), other groups except NZ European, NZ European. To this, we have added 'Other European' and split 'Indian' from Asian, the former because it is a large group in our population and the latter because the obstetric risk profile of Indian mothers is significantly different from the remaining women in the 'Other Asian' category. In the majority of figures in this document, NZ European and Other European are recombined. Level 2 prioritisation is given in **Table 267**.

### Fetal Death

Baby of at least 20 weeks gestation, or at least 400 grams birth weight if gestation is unknown, born without any signs of life.

### Gestation

The gestation used in the maternity section of this report is derived from best estimate of

[3] Ministry of Health. 2017. HISO 10001:2017 Ethnicity Data Protocols. Wellington: Ministry of Health. (available online at https://www.health.govt.nz/system/files/documents/publications/hiso-10001-2017-ethnicity-data-protocols.pdf)

date of birth (EDD Best) calculated by Healthware at booking based on last menstrual period (LMP), scan data (overriding LMP data based on scan accuracy data sourced from the Australasian Society for Ultrasound Medicine), or clinical override of these dates as deemed appropriate. Healthware does not include gestation calculated from these data into its dataset, so this gestation, in weeks, is derived by taking the integer value of 40 + ((date of birth - EDD Best)/ 7).

### Gestational Diabetes (GDM)

This diagnosis is based on either a fasting glucose > 5.5mmol/L or a 2 hour glucose > 9.0mmol/L after a 75 gram oral glucose tolerance test, or glucose >11.0 after a polycose test.

### Gestational hypertension (GH)

Gestational hypertension (GH) is a blood pressure systolic ≥140 and or diastolic ≥90 mmHg on two or more consecutive occasions at least 4 hours apart or one measurement systolic ≥170 and or diastolic ≥110 mmHg.

### Infant Death

Death of a baby born alive before the age of 1 year.

### Large for Gestational Age (>90th customised centile)

Birth weight greater than 90th percentile for gestation, gender, ethnicity, maternal height, weight, age and parity, calculated using the GROW customised birth centile calculator.

### Late Neonatal Death (LNND)

Death of a baby after the 7th day and before completion of 28 days of life.

### Lead Maternity Carer (LMC)

The Lead Maternity Carer is the practitioner or caregiver service selected by the woman to have the legal professional and practical responsibility for ensuring the woman and her baby are given clinically appropriate care.

### National Women's LMC services

- **Community Midwives** are the LMC for women who either self-refer or are referred to NWH for maternity care. This includes women cared for by the community diabetes team. The midwives provide continuity of antenatal and postnatal care to women who live in NWH geographical boundary. Labour and birth care is provided by NWH core Labour and Birthing Suite midwives.
- **Diabetic Midwives** are the LMC for women who are referred to the Diabetic Service for secondary/tertiary and LMC care. The midwives provide continuity of antenatal and postnatal care to women who live in NWH geographical boundary. The Diabetic Midwives are not the LMC for all women referred to this service as some women will have an Independent LMC.
- **Medical Midwives** are the LMC for women who are referred to the Medical Service for secondary/tertiary and LMC care. These women have complex medical needs. The midwives provide continuity of antenatal and postnatal care to women who live in NWH geographical boundary. The Medical Midwives are not the LMC for all women referred to this service as some women will have an Independent LMC.
- **Self-employed LMC services / Independent midwife**
- **General Practitioner** (arranges private or hospital midwifery care)
- **Private Obstetrician** (arranges private or hospital midwifery care)

### Other LMC services

- **Unbooked** are women who present at NWH, usually in labour or pre-labour, and who do not have an LMC.
- **Other DHB:** These women are usually transferred to NWH in late pregnancy, and remain with their original LMC. This LMC might be another District Health Board LMC or a non- NWH access holder (e.g. a private obstetrician or independent midwife without access rights at NWH or a homebirth midwife without access rights at NWH).

### Live birth

Birth of a baby showing signs of life. In this report, live births are only included if >20 weeks gestation or >400g if gestation unknown.

### Maternal age

Defined as mother's age at her baby's birth.

### Mode of birth for multiple pregnancies

For analyses where the denominator is mothers, mode of birth is represented as the mode of birth of the baby requiring most intervention. Mode of birth has been prioritised as emergency Caesarean, elective Caesarean, forceps, ventouse, vaginal breech, then spontaneous vertex birth.

### Onset of birth

Onset of birth has been defined by the 4 pathways to birth: (1) elective Caesarean

section, (2) emergency Caesarean before the onset of labour, (3) induction of labour, and (4) spontaneous onset of labour.

### Neonatal hypoglycaemia

Blood glucose < 2.3mmol/L.

### Neonatal Death

Death of a live born baby before completion of 28 days of life

### Neonatal Death Rate

Early and late neonatal deaths per 1000 live births

### New Zealand Deprivation index (NZDep2013)

An area-based measure of socioeconomic deprivation derived from variables from the Census of Population and Dwellings 2013. The score is assigned according to most recently recorded maternal place of residence and may not be place of residence at time of birth and is presented as a decile or quintile. Increasing deciles of deprivation, from least deprived (decile 1) to most deprived (decile 10), are associated with higher mortality and rates of many diseases (Salmond and Crampton 2002a, 2002b). Census area unit level data are used throughout this report.

### NICU admissions days

Are based on data collected in the NICU database and record stays crossing over midnight. eg. One day admission to NICU means the baby staying past midnight on one night.

### Parity

The number of times a woman has given birth to a live born baby of any birth weight or gestation or to a stillborn infant at or after 20 weeks gestation or where the infant weighed 400g or more if gestation is unknown. Multiple birth adds only one to parity total.

### Perinatal Mortality Rate (PMR)

Fetal and early neonatal deaths per 1000 total births.

### Perinatal Related Mortality Rate (PRLR)

Fetal and early and late neonatal deaths per 1000 total births.

### Postnatally (or newly) Diagnosed Type 2 Diabetes

Type 2 diabetes diagnosed by postnatal oral glucose tolerance test (oGTT) in a woman diagnosed as a gestational diabetic (GDM) during pregnancy.

### Postpartum haemorrhage (PPH)

Primary PPH is >500mls blood loss from the genital tract within the first 24 hours of birth. Secondary PPH is >500mls blood loss from the genital tract after 24 hours up to 6 weeks postpartum.

### Preeclampsia (PE or PET)

Gestational hypertension accompanied by proteinuria measured as ≥2+ protein on one dipstick sample or PCR ≥30 on a spot urine sample, or a 24 hour collection ≥0.3g in 24 hours.

### PSANZ-PDC (PSANZ Perinatal Death Classification)

Identifies the single most important factor which led to the chain of events which resulted in the perinatal death.

### PSANZ-NDC (PSANZ Neonatal Death Classification)

Used in addition to the PSANZ-PDC to identify the single most important factor in the neonatal period which caused a neonatal death.

Small for gestational age (SGA) (customised)

Birthweight less than 10th percentile for gestation, gender, ethnicity, maternal height, weight, age and parity, calculated using the GROW customised birth centile calculator

### Standard primipara

A woman with

- no prior birth > 20 weeks,
- aged 20-34 years at index birth,
- with a singleton pregnancy,
- cephalic presentation,
- gestation 37-41 completed weeks
- baby not small for gestational age (customised centile >10th),
- no medical disease, defined as no history of cardiac disease, renal disease, mental health disorder, SLE, HIV infection, CVA/TIA, diabetes or hypertension,
- no gestational diabetes in index pregnancy,
- no pregnancy associated hypertensive disease in index pregnancy,
- no antepartum haemorrhage during index pregnancy.

### Vaginal birth after Caesarean section (VBAC)

Vaginal birth in a pregnancy where any previous birth was by Caesarean section

### Very Low Birth Weight

Birth weight less than 1500g