Queensland
Mothers and Babies
2020 – 2021

Report of the Queensland Maternal and Perinatal Quality Council 2023

Queensland Government

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Foreword

The Queensland Maternal and Perinatal Quality Council (QMPQC) serves as the peak body under Queensland Health's auspices, dedicated to monitoring and enhancing maternal and perinatal outcomes throughout the state. The work of the Council is supported by its three sub-committees—the Maternal Mortality Sub-Committee, the Perinatal Mortality Sub-Committee, and the Congenital Anomalies Sub-Committee.

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The QMPQC collates data and performs comprehensive reviews of patient records enquiring as to why maternal or perinatal deaths occurred, any contributing factors of different types, and make recommendations to prevent such deaths in future. The Council's core objectives are:

- to benchmark against comparable services
- make recommendations to improve systems and quality of care
- enhance the safety and quality of maternity care provided to women, babies and their families across Queensland.

This report primarily focuses on the 121,213 mothers who gave birth to 123,015 babies in Queensland during the biennium of 2020 and 2021, coinciding with the onset of the COVID-19 pandemic. While this period presented unprecedented challenges within the healthcare system and the delivery of maternity care, it is important to note that the comprehensive analysis presented in this report does not include in-depth analysis of these challenges. Future reports will address these issues and their resulting outcomes.

Notably, the fertility rate among Queensland mothers continues to decline, posing implications for policy development across various governmental sectors. The decentralised nature of healthcare delivery in Queensland presents unique challenges, especially for our most vulnerable populations residing in remote areas. Ensuring access to appropriate care, timely transfers in case of complications, and adequately resourced hospitals with well-trained staff are crucial for safeguarding maternal and neonatal health across Queensland's vast distances.

During the biennium of 2020 and 2021, the QMPQC identified several concerning issues, including the resurgence of syphilis as a cause of congenital anomalies, the implementation of pulse oximetry screening for neonates to detect congenital heart disease, and the persistence of suicide as a leading cause of late maternal deaths. Recommendations for practice improvements in these areas have been made, underscoring our commitment to enhancing care standards.

As maternal mortality declines, maternal morbidity may be rising. QMPQC has identified a need to systematically review instances of Severe Acute Maternal Morbidity (SAMM), with a member of QMPQC Council completing a PhD in this subject. It is hoped research findings from this project will lead to better recognition and prompt, action to prevent SAMM.

Perinatal mental health conditions have emerged as significant concerns in all areas, particularly in under-resourced rural and regional areas. Recognition and treatment of these conditions is lacking, and increased resources need to be deployed in the further training of maternity care

staff in the early recognition, triage and treatment of these conditions. The QMPQC emphasises the critical role of adverse childhood experiences in maternal mental health, the imperative to improve access to trauma-informed care, and the urgent need for timely access to appropriate perinatal mental health services, available to all women, wherever they live in Queensland.

An important initiative of the QMPQC has been the continued efforts of the perinatal contributing factors project, aiming to identify gaps in perinatal care and to identify areas for improvement.

While this report primarily focuses on areas for system improvement, it is crucial to acknowledge the exceptional healthcare system that Queensland boasts. We extend our deepest gratitude to all clinicians, administrators, and consumer representatives for their expertise, collaborative spirit, and unwavering dedication to providing the very best care to Queensland's mothers and babies.

We trust that this report will serve as a valuable resource in our ongoing pursuit of excellence in maternal and perinatal care, ensuring the very best start to life for all Queenslanders.

Contents

List of figures

08

List of tables

List of flowcharts

Acknowledgements

The authors of this report would like to express their sincere condolences to the mothers and families who have experienced a perinatal or maternal death.

The authors would also like to acknowledge the clinicians that provide care to mothers and families throughout these events. This report forms part of the ongoing efforts across Queensland Health to better understand the causes of perinatal and maternal death, in the hope that future deaths may be prevented.

The Queensland Maternal and Perinatal Quality Council (QMPQC) acknowledges and pays respect to the traditional owners and Aboriginal and Torres Strait Islander People, both past and present, upon whose land we operate to facilitate the delivery of safe and high-quality healthcare services to all Queenslanders.

Language inclusion disclaimer

We acknowledge that individuals may identify in various gendered senses, and our use of these terms is not intended to exclude or invalidate any gender identity. We strive to be inclusive and recognise the diversity of experiences within the realm of parenthood. If any language used here does not align with your preferred terminology, please accept our apologies, and feel free to substitute language that better reflects your identity and experience.

Throughout this document, the terms *mother, women, pregnant women* and similar language are used in the sexed sense to refer to individuals involved in the process of giving birth or having babies. These terms should be taken to also include people who do not identify as women but were pregnant or have given birth.

This report also uses *Aboriginal and Torres Strait Islander women* and *Aboriginal and Torres Strait Islander* mothers to refer to First Nations women in Queensland. The term *Indigenous* is used inclusively and refers to Australia's Aboriginal and Torres Strait Islander women and mothers.

We recognise the limitations of language and aim to be inclusive and respectful, acknowledging individuals who may not identify with the terms used.

Acknowledgment of support:

The QMPQC's work is sustained by exceptional secretariat support and coordination, as well as the expertise of a team of perinatal epidemiologists from the Queensland Department of Health, Patient Safety and Quality Branch, Clinical Excellence Queensland (CEQ), and the Statistical Services Branch. Their unwavering support is indispensable to the functioning of the QMPQC.

The preparation of this report has been made possible through the support and guidance of the Queensland Department of Health, Statistical Services Branch, with assistance from the Patient Safety and Quality Branch. Special thanks to Karen McGill, Miles Utz, Simin Arabshahi, Thao Tran, and Lauren Sewell for their invaluable contributions to epidemiological analysis and data interpretation.

The Maternal Mortality Sub-Committee (MMSC) and Perinatal Mortality Sub-Committee (PMSC) express gratitude to the staff in health information access, information release, and patient safety and quality units of both public and private health services. Their prompt response to requests for mortality and morbidity information has greatly facilitated in-depth case reviews, identification of potential avoidable factors, and accurate classification of maternal and perinatal deaths.

Acknowledgment to healthcare providers

All Queensland Hospital and Health Services (HHSs), as well as private healthcare providers, deserve commendation for supporting staff who volunteer as members of the QMPQC and its Sub-Committees, allowing them time during working hours to attend meetings and contribute to the quality assurance agenda. The recommendations and good practice points developed by these members aim to enhance healthcare provision for the women of Queensland.

Furthermore, our heartfelt appreciation goes to healthcare providers for accepting invitations and supporting their staff to attend education seminars, enabling the knowledge gained to benefit mothers and babies across Queensland.

The QMPQC also extends gratitude to clinicians participating in perinatal and maternal mortality review and classification through local case review committees. Their critical role at the local level significantly contributes to effecting change and improving outcomes.

Acknowledgment of consumer contributions

The contribution of consumers to the work of the QMPQC and its Sub-Committees is deeply appreciated. Their input enriches discussions and adds immense value, particularly in shaping the content of QMPQC biennial reports and during case reviews.

Additional acknowledgments

We extend our thanks to the following individuals and organisations for their support and collaboration:

- Dr Helen Brown, Deputy Director-General, Clinical Excellence Queensland, Queensland Health
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- Joanne Ellerington, Manager, Data Collections – Queensland Hospital Admitted Patient Data Collection and Queensland Perinatal Data Collection, Statistical Collection and Integration Unit, Statistical Services Branch, Queensland Health
- The Queensland State Coroners and the staff of the Office of the State Coroner.

Summary: The health of Queensland mothers and babies, 2020 and 2021

This report delves into the perinatal health landscape of Queensland, focusing on data spanning the years 2020 and 2021. A comprehensive analysis encompassing 121,213 mothers and 123,015 babies sheds light on various facets of maternal and neonatal care, including disparities, challenges, and areas for improvement.

Maternal health and pregnancy

There has been a shift in the demographic trends of mothers, with a slight increase in births among women aged 35 and above, while the proportion of teenage mothers has decreased significantly.

Notably, Aboriginal and Torres Strait Islander women exhibit higher rates of teenage pregnancies.

There continues to be disparities in access to antenatal care, with higher rates of appropriate antenatal care among women in private facilities compared to public facilities or home births. There is an encouraging increase in the proportion of Aboriginal and Torres Strait Islander women accessing recommended antenatal care.

Smoking during pregnancy remains a concern, with higher rates observed in Queensland compared to national averages, particularly during the first 20 weeks of gestation. This is a critical public health issue that needs attention.

The use of illicit drugs amongst pregnant women in Queensland is also a cause for concern. Drugs such as marijuana, methamphetamine and cocaine have all been associated with adverse maternal and perinatal outcomes.

Babies and birth

Rates of preterm births and low birthweight babies have remained relatively stable over the past decade, despite many efforts to improve these outcomes.

Babies born to Aboriginal and Torres Strait Islander mothers are more likely to be small for gestational age as seen over the past eight years.

Almost one third of babies require admission to special care or intensive care nurseries, often due to preterm birth or congenital anomalies.

Congenital anomalies

Congenital anomalies are the leading cause of perinatal deaths, with notable increases observed in specific conditions over the years.

Data shows an association of congenital anomalies with maternal factors such as pregestational diabetes and advanced maternal age.

Maternal mortality

Maternal mortality, although rare, remains concerning, particularly with maternal suicide being a leading cause of death.

Data underscores the importance of mental health follow-up and highlights gaps in mental health services for perinatal women.

Perinatal mortality

Perinatal mortality rates in Queensland are higher than the national average, with disparities evident in higher rates among Aboriginal and Torres Strait Islander communities.

Stillbirths are a major concern, primarily caused by congenital anomalies. Terminations of pregnancy significantly contribute to perinatal losses recorded under PSANZ codes, with 16 percent of stillbirths remaining as unexplained, increasing for full-term stillbirths. This figure may be overestimated due to low rates of perinatal investigations.

Implementing all five bundle elements into standard antenatal care has significantly improved performance indicators without increasing induction of labour or caesarean section rates. Stillbirth rates, due to their rarity and reporting timelines, will continue to be monitored by CEQ.

Autopsy rates for stillbirths and neonatal deaths remain low, hindering comprehensive understanding and prevention efforts.

Perinatal care review

The review of perinatal deaths is the key to improving perinatal outcomes by: (a) identifying potentially avoidable deaths and (b) using the examination of clinical circumstances surrounding these deaths, to improve the safety and quality in healthcare systems. Potentially modifiable factors identified may include issues of access to care, organisational management and factors relating to health care workers.

While Queensland has made important improvements in maternal and neonatal care, persistent challenges such as perinatal mortality, congenital anomalies, and maternal mental health underscore the need for continued vigilance and targeted interventions. Together, we need to ensure optimal outcomes for mothers and babies, regardless of demographic factors.

Recommendations

1. Expand the number of sites in Hospital and Health Services (HHSs) and Aboriginal and Torres Strait Islander Community Controlled Health Organisations implementing *Growing Deadly Families* (GDF) *Strategy 2019-2025* models of care.

2. Establish a Syphilis Expert Advisory Group for Queensland, to provide expert advice about antenatal care, support Hospitals and Health Services in the review of *Severity Assessment Code 1* (SAC1) congenital syphilis cases and monitor and evaluate adherence to testing and clinical management guidelines.

3. Raise awareness of education resources on suicide safety planning and access to acute mental health services that are available to healthcare professionals who support women and families in the peripartum.

4. Raise awareness of the training and resources available to staff to prevent, identify and support the care of women experiencing family, domestic and sexual violence in the peripartum.

5. Support the continued, dedicated resourcing of additional Mother-Baby units throughout Queensland.

6. Provide access to education and training resources to strengthen the capacity of health professionals to care for women with perinatal mental health and psychosocial health concerns, throughout the continuum of perinatal and postnatal care.

7. Raise awareness of pathways for patient access to perinatal mental health services throughout Queensland, including access to specialties perinatal health advice across the continuum of care.

8. Raise awareness of training and resources available to healthcare professionals for unplanned pregnancies, complex trauma and the principles of trauma informed care.

9. Incorporate guidance to ensure cervical cancer as a differential diagnosis for antepartum haemorrhage into existing Queensland Clinical Guidelines.

10. Ensure clinical training includes speculum examinations and diagnosis/exclusion of cervical cancer during pregnancy.

11. Review the Clinical Services Capability Framework - maternity module for maternity services to consider the requirement for Level 4 services to have access to obstetric medicine services.

12. In sites using electronic medical records, implement mechanisms to ensure timely data sharing between hospital providers, GPs, midwives, and women.

13. Consider amending the Queensland *Coroners Act 2003* to include investigation of all maternal deaths (including late deaths), except where there is a clear and unequivocally diagnosed cause of death, for example, a known metastatic malignancy.

14. Appropriately resourcing and follow-up with Queensland Health tertiary perinatal pathology centres to ensure that timely, high-quality perinatal and neonatal autopsy investigations, including placenta pathology, can be conducted by perinatal pathologists.

15. Standardise perinatal mortality reviews and integrate the Perinatal Mortality Clinical Audit Tool (APMCAT) into the review process. Assess contributing factors and classify mortality cases using the Perinatal Society of Australia and New Zealand (PSANZ) perinatal mortality classification system.

Actions to-date for Recommendations

Since the review of the maternal and perinatal data sets for the period under review for this report, and compilation of findings to identify systems improvements, a significant amount of work has been achieved to address the recommendations provided in this report.

The following summary is provided to demonstrate the concerted and dedicated efforts to reduce preventable incidents in mothers and babies in Queensland. The improvements to-date will continue to be evaluated for success, with ongoing actions monitored as implementation approaches are rolled out across identified areas of need.

1.

There are currently 12 *Growing Deadly Families Aboriginal and Torres Strait Islander Maternity Services Strategy 2019-2025* sites across Queensland (six HHSs and six Aboriginal and Torres Strait Islander community-controlled health organisations.

Data from selected sites demonstrates positive outcomes including increased number of antenatal visits for First Nations pregnant women and a reduction in low-birth weight babies.

The GDF program has funded an additional three HHSs in 2024.

2.

An expert group is being established within the QMPQC to review SAC 1 congenital syphilis cases. A terms of reference is currently being developed.

The Queensland Syphilis Action Plan (QSAP) 2023-2028 was developed with thorough consideration of the QMPQC recommendations, ensuring that aligned priorities from the QMPQC report will be met over the life of the QSAP. The following positions have been established to support implementation of the QSAP, with particular focus on pregnant Queenslanders, and the recommendations of the QMPQC:

Nurse Navigator – Sexual Health (Queensland Syphilis Surveillance Service (QSSS)), Clinical Midwife Consultant (statewide remit, located Metro North), a Clinical Midwife Consultant (located at Tropical Public Health Unit, Cairns) and a Nursing/Midwifery NG7 role is proposed to be located in Central Queensland.

The Patient Safety Health Service Directive (HSD) has been updated to include a protocol for reporting congenital syphilis cases that was finalised in September 2024.

3.

Enhanced and expanded perinatal mental health peer-led models and education including a total of $1 million to Peach Tree Perinatal Wellness and $1.8 million to PANDA – Perinatal Anxiety and Depression Australia to provide intensive specialised care.

4.

The Domestic and Family Violence (DFV) Specialist Health Workforce Program builds the capability of the frontline health workforce to respond to DFV through the delivery of training by specialist DFV clinicians. The DFV Toolkit includes antenatal screening for domestic and family violence guideline for Queensland Health professionals involved in providing care to women during the antenatal period.

5. Catherine's House is Queensland's first integrated perinatal mental health centre. $39 million was announced as additional new investment to boost perinatal mental healthcare and deliver 30 additional public inpatient mental health mother-baby beds in six locations – Townsville, Cairns and Hinterland, Logan, Sunshine Coast, Ipswich and South Brisbane, to be implemented from mid-2024 to late 2026.

6. The first Queensland Perinatal Mental Health Clinical Guideline has been developed and was published on the Queensland Health Clinical Guidelines website on 4 April 2024. Information has been circulated to stakeholders. This new guideline will raise awareness of perinatal mental health issues and provide evidence-based guidance regarding screening (including culturally appropriate screening), assessment, referral pathways, recommended follow-up and other necessary psychosocial consultation in relation to the mental health care for women, fathers and partners during pregnancy, birth and the postpartum period and provides a consistent framework to guide clinicians in delivering perinatal mental health services.

7. The implementation of perinatal mental health screening using the iCOPE screening tool has commenced. Implementation of the screening tool, iCOPE, is in 42 services across 90 locations in Queensland.

8. The Queensland Centre for Perinatal and Infant Mental Health has increased statewide capacity including for ePIMH telepsychiatry with a focus on regional, rural and remote areas through new funding of $2 million over five years under Better Care Together.

9. Better Births with Consent (Department of Health funded) face to face workshops are accessible to clinicians from every HHS annually for 4 years to support the principles of trauma informed care, with Multidisciplinary Birth Education funded through the Queensland Birth Strategy. The "Train the Trainer" program is being rolled out across Queensland to support healthcare professionals in providing complex and trauma informed care.

10. Planning for action is currently underway.

11. The Queensland Maternity and Neonatal Clinical Network (QMNCN) have endorsed the recommendation. The Office of the Chief Health Office is looking forward to re-establishing the Clinical Services Capability Framework Governance Committee and is taking the necessary steps to do so.

12. The Pregnancy Health Record (PHR), the paper version has been finalised, as such a new section iView band was developed in the Maternity module within the integrated electronic Medical Record (ieMR).

13. Under consideration by the Attorney-General.

14. Pathology Queensland has established three expert perinatal pathology centres at The Royal Brisbane and Women's Hospital (RBWH), the Gold Coast University Hospital (GCUH) and the Sunshine Coast University Hospital (SCUH) to perform perinatal autopsies and deliver more timely and patient centric services. An additional specialist perinatal pathologist has been appointed. Two (1.6 FTE) perinatal loss coordinators have been appointed (0.8 SCUH and 0.8 RBWH).

15.

QMPQC in conjunction with CEQ have scheduled education sessions to promote and guide clinicians and Patient Safety Officers in standardising perinatal mortality process and to identify contributing factors in 2025.

Consumer guidance

The QMPQC is fortunate to have six consumer representatives as part of its membership. Their contribution to discussions provides insight from the perspective of mothers and families, which is highly valued. Areas for attention as expressed by consumers have been included throughout the report to be placed in context and to echo the recommendation of the Council.

Many issues identified in this report that affect the safety and quality of maternity care and the wellbeing of women and their babies would be improved by universal access to continuity of midwifery care. The benefits, safety and cost effectiveness of continuity of midwifery care are well established and should be among the first strategies considered to improve the quality and safety of maternity care for all women, regardless of risk.

Mothers and pregnancy

This report delves into the perinatal health landscape of Queensland, focusing on data spanning the years 2020 and 2021. A comprehensive analysis encompassing 121,213 mothers and 123,015 babies sheds light on various facets of maternal and neonatal care, including disparities, challenges, and areas for improvement.

Births in Queensland

In 2020 and 2021, 121,213 mothers gave birth to 123,015 babies. The number of mothers giving birth and the number of babies born each year for the last 10 years are shown in Table 1.

While the number of births has remained relatively stable, the fertility rate has decreased from 2.0 to 1.8 percent over the same time period[1].

Table 1: Number of mothers and babies, Queensland, 2012 to 2021

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mothers	62,667	62,182	62,811	60,942	61,876	59,399	59,644	59,559	58,731	62,482
Babies	63,727	63,172	63,824	61,903	62,779	60,326	60,503	60,443	59,603	63,412

Maternal age

The proportion of mothers aged 35 and over increased slightly from 19.2 percent in 2012 to 22.7 percent in 2021, while the proportion of mothers aged under 20 years decreased from 5.1 percent to 2.4 percent. Aboriginal and Torres Strait Islander mothers were approximately six times more likely to be aged under 20 years than all other mothers from non- Aboriginal and Torres Strait Islander origins (11.1 percent compared to 1.9 percent) and were approximately half as likely to be 35 years and older (10.9 percent compared to 23.5 percent).

Older maternal age was associated with a higher risk of complications and adverse outcomes. For example, mothers 35 years and older had increased rates of gestational diabetes and hypertension. They also had higher rates of adverse outcomes compared with women aged 20-34 years, including high rates of antepartum haemorrhage, babies diagnosed with a chromosomal congenital anomaly, preterm birth, and stillbirth, even after adjustment for parity (where applicable). Further analysis has been undertaken exploring rates of complications and adverse outcomes in older mothers compared with those observed for women aged 20-34 years[2] .

The data published in 2018 from a review of morbidity and mortality associated with older maternal age at birth in 2014 and 2015 showed younger mothers (those under 20 years of age) are at increased risk of being underweight, to smoke during pregnancy, and to experience preterm births, compared to women aged 20-34 years. They are also less likely to receive the recommended minimum number of antenatal visits. Models of antenatal care that promote continuity of care by the same provider could have a very important role in reducing these risks for a range of socially disadvantaged women[3].

[1] Births, Australia, 2021 | Australian Bureau of Statistics (abs.gov.au)
[2] Statbite#75 Morbidity and mortality associated with older maternal age at birth, Queensland, 2014 and 2015.
[3] Australian Government Department of Health, Pregnancy Care Guidelines

Multiple pregnancies

In 2020 and 2021, multiple pregnancies represented 1.5 percent of all pregnancies. Almost all multiple pregnancies (98.2 percent) were twins. Assisted conception techniques were used in 19.1 percent of all multiple pregnancies.

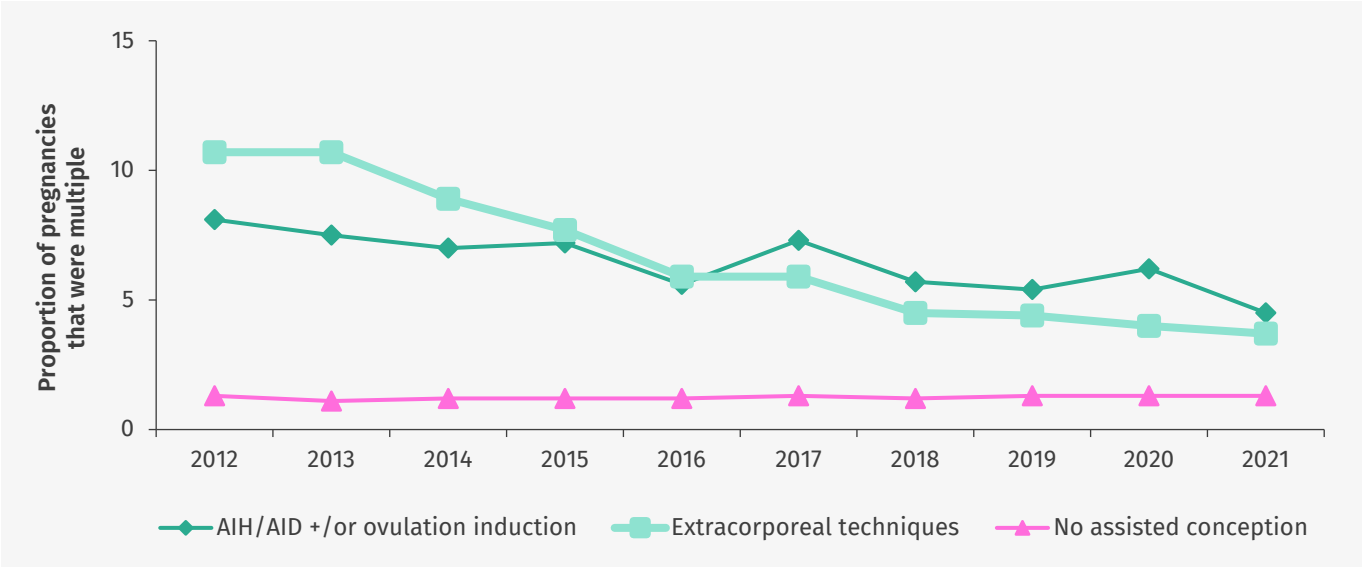
Women aged 35 years or older were 1.7 times as likely to have a multiple pregnancy compared to women aged less than 20 years, and 1.4 times as likely as women aged 20-34. However, as 13.6 percent of pregnancies among mothers aged 35 and older were a result of assisted conception techniques (compared with 4.4 percent for mothers aged under 35 years), it is important to distinguish between these effects. Among women who did not use assisted reproductive technology (ART) to conceive, multiple pregnancies were 1.4 times as likely in women aged 35 years and older than in women aged less than 20 years, and 1.2 times higher than in women aged 20-34, suggesting an independent effect of age.

Babies of multiple pregnancies have a higher risk of being born preterm (less than 37 weeks gestation). Of multiple pregnancies, 67.1 percent resulted in preterm births compared with 7.1 percent of singleton pregnancies. Of preterm multiple pregnancies, 53.1 percent had no labour; 10.8 percent had their labour induced and only 36.1 percent went into spontaneous labour. This indicates that most preterm births in multiple pregnancies are associated with obstetric intervention.

Assisted conception

Due to improvements in assisted reproductive technology (ART) and clinical practice, there has been a steady decline in the proportion of multiple pregnancies conceived with various types of ART (Figure 1). There has been no change in the proportion of pregnancies conceived with ovulation induction and/or artificial insemination that are multiple, however the proportion of single embryo transfers continues to increase since 2017 and may be attributing to the decrease in multiple pregnancies associated with ART[4].

Figure 1: Percentage of multiple pregnancies conceived with or without assisted conception. Queensland, 2012 to 2021



Pregnancies that utilised multiple assisted conception techniques are counted under each technique. As a result, categories are not mutually exclusive and cannot be summed.
AIH/AID/ovulation induction/donor egg/embryo transfer: artificial insemination and/or ovulation induction processes and/or donor egg and/or embryo transfer.
Extracorporeal techniques: in-vitro fertilisation, gamete intra-fallopian transfer, intracytoplasmic sperm injection, embryo transfer or related techniques.
Other/unknown/not stated assisted conception techniques are not graphed.

[4] Australia and New Zealand Assisted Reproduction Database

Good practice point

Due to the increase in adverse perinatal and maternal outcomes in women who conceive and carry a multiple pregnancy, it is important that practitioners providing assisted conception by whatever means, adhere to contemporary evidence-based clinical practice guidelines, to an auditable standard.

Antenatal care

Attending less than the recommended minimum number of antenatal visits is associated with increased risk of adverse pregnancy outcomes including preterm birth, stillbirth, neonatal deaths and maternal deaths. In Queensland, it is recommended that all pregnant women attend at least five antenatal visits during pregnancy[5]. This level of antenatal care was achieved by 96.5 percent (based on women who gave birth at 32 weeks or more gestation). This is an increase from 95.2 percent in 2012. The proportion of Aboriginal and Torres Strait Islander women attending the recommended number of antenatal visits has also increased significantly from 85.5 percent in 2012 to 90.7 percent in 2021 but remains lower than for all other women.

Younger mothers (under 20 years of age) were less likely to attend the recommended number of antenatal visits than older mothers (92.6 percent vs 96.6 percent respectively; p-value <0.0001 Table 2). This difference between younger and older mothers was evident for all other mothers (94.1 percent vs 97.1 percent; p-value<0.0001) but not for Aboriginal and Torres Strait Islander mothers with attendance being similar (89.6 percent vs 90.9 percent; p-value =0.2).

Table 2: Mothers birthing in Queensland, at least 32 weeks gestation, who attended five or more antenatal visits, by Aboriginal and Torres Strait Islander status, 2020 and 2021

Aboriginal and Torres Strait Islander status of mother	Age	5+ visits	Number of mothers	% 5+ visits	p-value
Aboriginal and Torres Strait Islander mothers	<20	870	971	89.6	0.2
	20+	7,110	7,826	90.9	
Non-Aboriginal and Torres Strait Islander mothers	<20	1,914	2,035	94.1	<0.0001
	20+	105,117	108,303	97.1	
Total	<20	2,784	3,006	92.6	<0.0001
	20+	112,227	116,129	96.6	

Women who attended an unknown or unspecified number of antenatal visits or gave birth at less than 32 weeks gestation are excluded. Women with an Aboriginal and Torres Strait Islander status of 'not-stated' are included in non-Aboriginal and Torres Strait Islander status counts. P-values from Chi-square tests.

It is recommended that the first antenatal visit occur in the first trimester (prior to 14 weeks gestation) to enable the early detection and management of pregnancy-related conditions, as well as other pre-existing factors which might impact on pregnancy outcome. Higher rates of antenatal care during the first trimester were found among women who gave birth in private facilities (94.0 percent) compared to women who gave birth at home (62.1 percent) or women who birthed in public facilities (81.0 percent).

Aboriginal and Torres Strait Islander women were less likely to receive antenatal care in the first trimester (71.7 percent) compared to non-Aboriginal and Torres Strait Islander women (84.7 percent).

[5] Australian Government Department of Health, Pregnancy Care Guidelines

Good practice point

The Growing Deadly Families *Growing Deadly Families Aboriginal and Torres Strait Islander Maternity Services Strategy 2019-2025* (the 'GDF Strategy') supports comprehensive and culturally capable maternity care. Referral offered to all Aboriginal and Torres Strait Islander women and women who are having an Aboriginal and/or Torres Strait Islander baby, to access maternity care through a First Nations specific Midwifery Group Practice (MGP) or an MGP model of care if available. Currently there are 12 GDF funded sites across Queensland. This includes six funded Hospital and Health Services and six Aboriginal and Torres Strait Islander Community Controlled Organisations, noting not all the funded sites offer MGP.

Smoking during pregnancy

Smoking during pregnancy is associated with poor perinatal outcomes, including greater risk of low birth weight, being small for gestational age (SGA), preterm birth and perinatal death[6]. In 2020 and 2021, 11.5 percent of women in Queensland smoked at some time during pregnancy. This was higher than the national proportion for the same period (8.9 percent). Proportions were higher before 20 weeks gestation, where 11.4 percent of mothers smoked compared with 8.9 percent of mothers who smoked at or after 20 weeks gestation. Nationally, for the same period, 8.6 percent of mothers smoked in the first 20 weeks of pregnancy[7]. Smoking cessation during pregnancy is associated with improved pregnancy outcomes compared to women who continue to smoke [8].
In 2020 and 2021, 21.7 percent of women who smoked in the first 20 weeks ceased smoking after 20 weeks gestation. Aboriginal and Torres Strait Islander women were less likely to stop smoking after 20 weeks gestation (14.5 percent) compared to all other women (24.6 percent).

An analysis of the impact of smoking during pregnancy on adverse outcomes in Queensland found that the most influential risk factor was smoking at or after 20 weeks gestation. Smoking after 20 weeks gestation was associated with a 1.4 times higher risk of preterm births, after adjusting for other risk factors. Smoking is also an important risk factor for stillbirth[9]. Since 2012, there has been a steady decline in the proportion of women who reported smoking after 20 weeks gestation.

Higher rates of smoking after 20 weeks gestation persist among some groups:

- 37.8 percent of Aboriginal and Torres Strait Islander women smoked after 20 weeks gestation (down from 43.3 percent in 2012)
- 26.7 percent of younger women (under 20 years of age) smoked after 20 weeks gestation compared to 9.1 percent of women aged 20-34 and 6.4 percent of women aged 35 years and older
- 25.1 percent of women who lived in remote or very remote areas smoked after 20 weeks gestation compared to 6.4 percent of women in major cities
- 19.4 percent of women living in areas with the lowest socioeconomic status (SES) quintile smoked after 20 weeks gestation compared to 2.2 percent in the highest SES quintile
- There is variation, determined by HHS of usual residence, in the proportion of women who smoke after 20 weeks gestation[10].

[6] Australian Institute of Health and Welfare (AIHW) 2021, Australia's mothers and babies, viewed 10 May 2022,
[7] Births, Australia, 2021 | Australian Bureau of Statistics (abs.gov.au)
[8] Stillbirth CRE:Smoking – one of the most important things to prevent in pregnancy and beyond
[9] Flenady V et al. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. The Lancet 2011; 377:1331-40
[10] Rate of perinatal mortality and selected perinatal risk factors, 2010-12p., and post-natal death 2008-10p., by Hospital and health Service of usual residence, compared with Queensland

Good practice point

Prioritise specialised, evidence-based programs to individually assist Aboriginal and Torres Strait Islander women and other high-risk groups to stop smoking before and during pregnancy, particularly those developed for groups of women with higher incidence of smoking during pregnancy.

Given that the smoking rates are highest amongst vulnerable women, target smoking cessation programs to women with high rates of trauma, low rates of education and literacy, and difficult life circumstances.

Smoking cessation resources for pregnant women:

- Yarn to Quit
- iSISTAQUIT
- Quitline (initiatives.Queensland.gov.au)
- Smoke-free Healthcare, a program to assist staff and patients of Queensland Health
- Free quit smoking support program for pregnant women and partners
- Putting Queensland Kids First - Supporting healthier pregnancies

Illicit drug use

The rise of illicit drug use among pregnant women in Queensland is a growing concern and has been identified through QMPQC maternal mortality case reviews where illicit drug use was related to suicides. According to the National Drug Strategy Household Survey[11] 2022-2023, there has been a notable increase in the use of drugs such as cannabis, methamphetamine, and cocaine among the general population. The Australian Institute of Health and Welfare (AIHW) highlights that cannabis remains the most commonly used illicit drug, followed by cocaine and methamphetamines[12].

The use of these substances during pregnancy is associated with adverse maternal and perinatal outcomes, including lower birth weights, premature birth, and developmental issues for the child. The AIHW reports that substance use during pregnancy can significantly impact both the mother and the unborn child, leading to complications such as miscarriage and fetal alcohol spectrum disorders (FASD)[13].

In regional areas of Queensland, the issue may be exacerbated due to fewer services available for targeted care and support for these women. This disparity highlights the need for improved healthcare services and support systems in these regions to address the unique challenges they face[15].

There is a concerning association between illicit drug use and maternal mortality. The Queensland Chief Health Officer's report emphasizes the significant health risks linked to illicit drug use, including poisoning, drug use disorders, and other serious health conditions that can lead to maternal death[13].

Efforts to mitigate these issues must focus on enhanced education, better access to healthcare, support in midwifery continuity of care models and targeted interventions, especially in underserved regional areas.

Maternal weight

Among women who gave birth in Queensland in 2020 and 2021 (Figure 2):

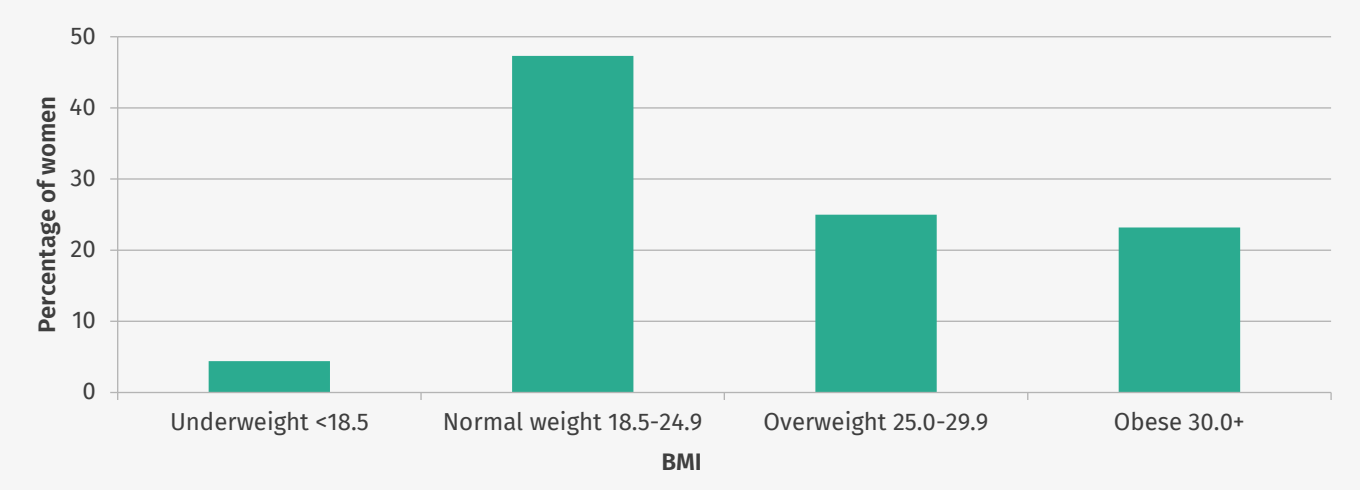
- 23.2 percent were classified as obese (body mass index (BMI) of 30.0 or more)
- 25.0 percent were overweight (BMI of 25.0 to 29.9)
- 47.3 percent were in the normal weight range (BMI of 18.5-24.9)
- 4.4 percent were underweight (BMI of <18.5).

[11] National Drug Strategy Household Survey 2022–2023, About - Australian Institute of Health and Welfare (aihw.gov.au).

[12] Illicit drug use - Australian Institute of Health and Welfare (aihw.gov.au).

[13] Illicit drugs | Report of the Chief Health Officer Queensland

Figure 2: Distribution of BMI for women who gave birth in Queensland, 2020 and 2021



BMI based on self-reported weight and self-reported or measured height at conception.
Excludes mothers of unknown BMI.

Maternal BMI is a risk factor for pregnancy and birth complications. For example, higher pre-pregnancy BMI has been linked to a greater risk of gestational diabetes and hypertension; pre-eclampsia; caesarean section; thromboembolism; postpartum haemorrhage and wound infections. Babies of obese mothers have a higher risk of macrosomia, some congenital anomalies, stillbirth and neonatal death[9, 14, 15, 16]. The higher rates of mothers who were overweight or obese were observed in older mothers, multiparous mothers and mothers who smoked during pregnancy[17]. This reported higher rate of complications persisted among births to overweight and obese women even after adjusting for these factors.

Place of birth

Most women in Queensland (96.6 percent) gave birth in a hospital, with only 2.4 percent giving birth in a birthing centre, 0.4 percent (n= 535) at home and 0.6 percent (n= 721) in other locations, including those where the birth occurred before arrival at hospital. For 76.7 percent of women the birth occurred in a public hospital and for 22.2 percent in a private hospital. This is comparable to national rates where 74.2 percent of women who gave birth in hospital, gave birth in a public hospital[18]. The proportion of women giving birth in private hospitals has not changed greatly over the last decade.

Women giving birth in public hospitals tend to have higher risk pregnancies. In 2020 and 2021:

- 25.2 percent who gave birth in public facilities were obese compared with 16.9 percent who birthed in private hospitals
- 11.4 percent who gave birth in public facilities smoked after 20 weeks compared with 0.5 percent who birthed in private hospitals
- 96.0 percent of women who gave birth in public facilities attended the recommended minimum number of antenatal visits compared with 98.8 percent who birthed in private hospitals
- only 2.5 percent of Aboriginal and Torres Strait Islander women gave birth in a private hospital compared with 23.8 percent of all other women.
- Women giving birth in private hospitals tended to be older than women who birth in public hospitals (34.8 percent were aged 35 years and older compared to 19.0 percent, respectively) and were more likely to have had an assisted conception. Public hospitals had a higher proportion of younger women (aged less than 20 years) (3.3 percent) than private hospitals (0.1 percent).

[14] CMACE and RCOG (Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists) 2010. Management of women with obesity in pregnancy. CMACE/RCOG Joint Guideline.
[15] Utz M, Johnston T, Zarate D, Humphrey M. A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Health Statistics Branch, Queensland Health. 2014.
[16] Watson M, MacLeod SL, Cornes S, Howell S. Maternal obesity and selected pregnancy risks and outcomes in nulliparous mothers in Queensland, 2008. Statbite#27. Health Statistics Centre, Queensland Health. 2010.
[17] Fraser M, Utz M, Johnston T. Maternal overweight and obesity in Queensland, 2008 to 2017. Statbite#79. Statistical Services Branch, Queensland Health. 2019.
[18] Australia's mothers and babies, Data - Australian Institute of Health and Welfare (aihw.gov.au)

Onset of labour

The onset of labour may be either spontaneous or induced. When a birth is categorised as 'no labour' this means it occurred by caesarean section prior to any labour commencing.

Under half (43.1 percent) of women had a spontaneous onset of labour, almost one third (32.7 percent) of women had their labour induced and 24.2 percent had no labour. The proportion of women whose labour began spontaneously has declined steadily over the last decade, from 55.7 percent in 2012 to 43.5 percent in 2021.

Over this period there was a substantial increase in the proportion of women whose labour was induced from 23.3 percent in 2012 to 32.2 percent in 2021 and a small increase in the proportion with no labour, that is, caesarean section before labour onset (from 20.9 percent in 2012 to 24.3 percent in 2021).

Table 3 shows the 10 most frequent primary reasons for induction of labour (ICD-10-AM) in the last 10 years and the change in these from 2012 to 2021. While the number of pregnancies that were induced due to prolonged pregnancy has decreased, the number of pregnancies induced due to maternal care for other specified fetal problems (which includes decreased fetal movements), and diabetes related reasons have increased.

Table 3: Most frequent primary reasons for induction of labour, Queensland, 2012 and 2021

ICD 10 AM Code		Frequency		% of Induction	
		2012	2021	2012	2021
O48	Prolonged pregnancy	3,530	2,038	24.1	10.1
Z34.8	Supervision of other normal pregnancy	1,942	1,564	13.3	7.8
O36.5	Maternal care for poor fetal growth	702	1,374	4.8	6.8
O36.8	Maternal care for other specified fetal problems	218	1,896	1.5	9.4
O36.6	Maternal care for excessive fetal growth	369	1,780	2.5	8.9
Z34.0	Supervision of normal first pregnancy	866	1,122	5.9	5.6
O24.42	Diabetes mellitus arising during pregnancy, insulin treated	494	1,524	3.4	7.6
O42.0	Premature rupture of membranes, onset of labour within 24 hours	900	698	6.2	3.5
O42.11	Premature rupture of membranes, onset of labour between 1-7 days later	906	786	6.2	3.9
O13	Gestational [pregnancy-induced] hypertension	753	639	5.2	3.2
	Total inductions	**14,620**	**20,094**	**100.0**	**100.0**

For multiple births, mother was categorised by the reason of induction recorded for the first baby.

Aboriginal and Torres Strait Islander women in comparison to other women had higher rates of spontaneous onset of labour (49.3 percent compared to 42.6 percent), the same rates of induction (32.7 percent) and lower rates of no labour (18.0 percent compared to 24.7 percent).

The mode of onset of labour varies by facility sector over time (Figure 3). In 2020 and 2021 women in public hospitals were much more likely to have a spontaneous onset of labour (47.5 percent) than women in private hospitals (25.1 percent) and much less likely to have no labour (18.8 percent compared to 43.9 percent).

The rate of women undergoing induction of labour has increased in the public sector over the last decade (22.7 percent in 2012-2013 to 33.7 percent in 2020 and 2021) and is now comparable with the rate in the private sector (31.0 percent).

Frequency of induction of labour data (Figure 3) also importantly indicates comparative increases are evident from 2012- 2021 where maternal care was medically indicated, specifically in relation to poor fetal growth, specified fetal problems, excessive fetal growth and in insulin-dependent diabetes mellitus cases.

Rates of induction of labour in selected women (first time mothers) and in all women in Queensland by hospital are shown in Queensland Health National Core Maternity Indicators[19].

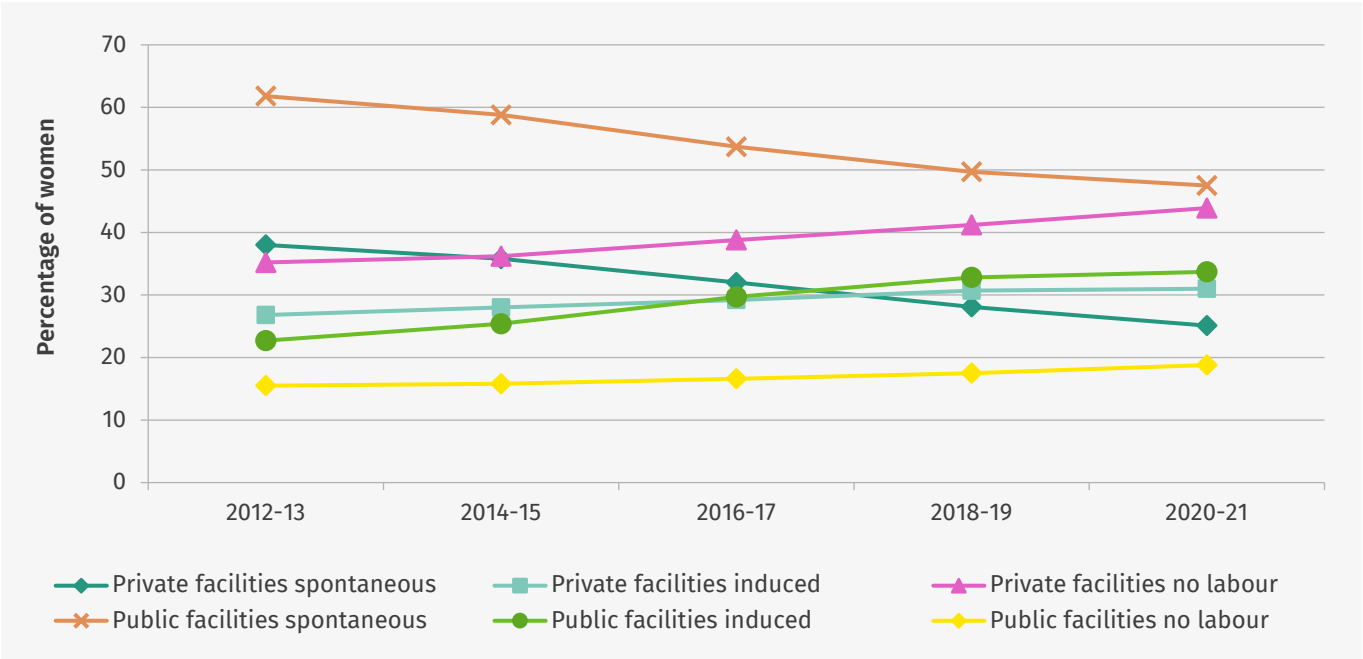
Consumer guidance

This report has highlighted the increasing rate of induction of labour. Shared decision-making about timing of birth is challenging for both women and maternity care providers to navigate. The need to consider stillbirth risk factors, the long-term health implications of early term birth, and risks to the woman of induction of labour all point to this being a particularly complex decision. As induction of labour becomes increasingly routine, women feel less involved in decision-making. Strategies are needed to ameliorate this, including tools to support clear, timely and evidence-based discussions that increase the woman's capacity to be involved in her care and make an informed decision.

Good practice point

Customising care for each woman is crucial. When contemplating labour induction, it is essential to evaluate the potential risks associated with early term birth for both the mother and the baby. Every induction or elective caesarean section should be evidence-based and have a specific reason, aiming to minimise late prematurity whenever possible. This aligns with initiatives like *Every Week Counts*, implemented in Queensland, in January 2023, which emphasises the importance of avoiding unnecessary interventions.

Figure 3: Onset of labour by facility sector, for women birthing in Queensland, 2012-13 to 2020-21



[19] Queensland Health National Core Maternity Indicators – Caesarean section for selected females giving birth of the first time

For multiple births, mother was categorised by the labour onset of the first baby.
Women who gave birth before arrival, home birthing, free birthing or birthing at an unknown facility not tabulated.

The rate of induction of labour varied with gestational age. A high proportion of births over 41 weeks were the result of induction (51.4 percent). For term births (37-41 weeks), the induction rate was slightly higher in public hospitals (34.9 percent) compared with private hospitals (32.3 percent).

There was a correspondingly higher spontaneous labour rate in public hospitals. For babies born prior to term (32-36 weeks) more than half (56.1 percent) of births in private hospitals were by caesarean section (no labour) compared with just less than a third (32.0 percent) in public hospitals.

Figure 4: Labour onset distribution by maternal age, public and private facilities, 2020 and 2021

For multiple births, mother was categorised by the facility/labour onset of the first baby.
Women who gave birth before arrival, home birthing, free birthing or birthing at an unknown facility not tabulated.

Figure 4 shows that women aged 35 years and older had a higher rate of caesarean section births without labour in private hospitals, while women in the same age range had a higher rate of spontaneous births in public hospitals. Within each age group, the proportion of no labour (caesarean sections) was almost twice as high in private hospitals compared to public facilities. Further information relating to these findings is available in the Queensland Perinatal Data Collection (PDC) . The analysis provided for this report did not elaborate in these findings.

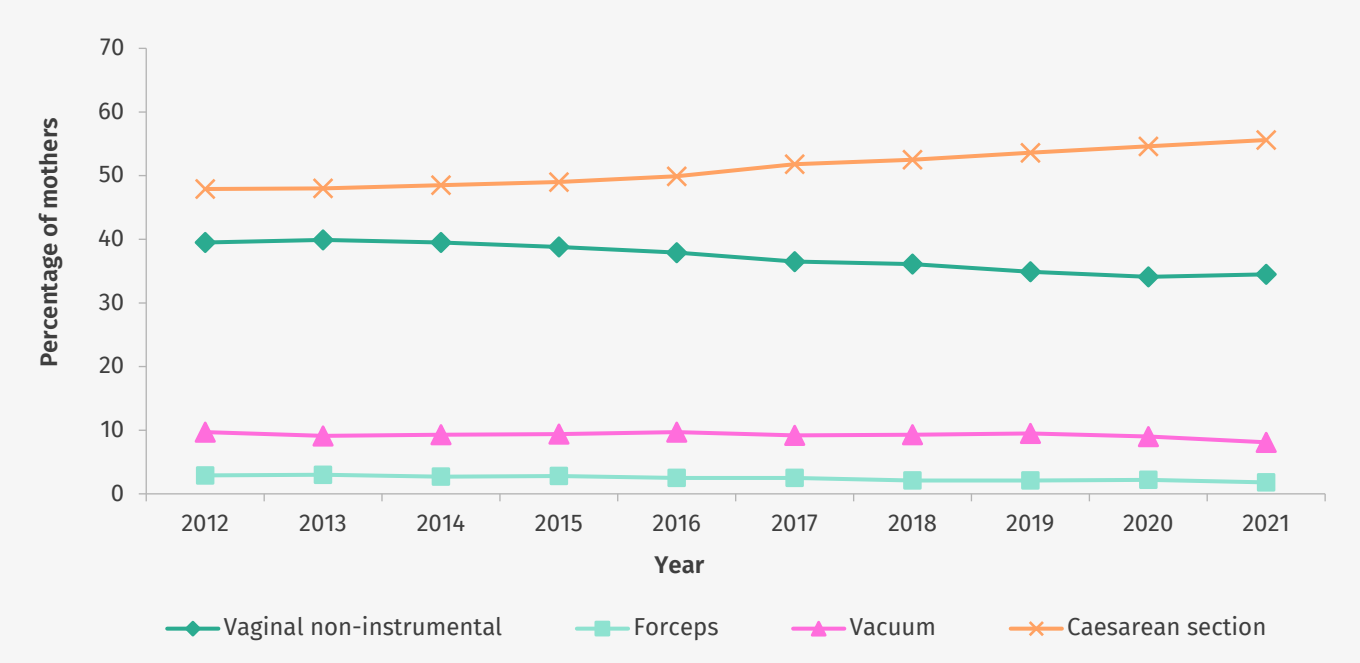
Method of birth

In 2020 and 2021, 52.9 percent of births were vaginal non-instrumental births; 37.3 percent were by caesarean section and 9.7 percent were instrumental vaginal births (7.2 percent vacuum extraction and 2.5 percent forceps). In the last decade there has been a decrease in vaginal non-instrumental and vacuum extraction births and a slight increase in caesarean sections, in both public and private facilities (see Figure 5 and Figure 6).

In 2020 and 2021, women birthing in a private hospital were more likely to have a caesarean section than women in public hospitals (55.1 percent compared with 32.7 percent). This has also been observed elsewhere in Australia and in other

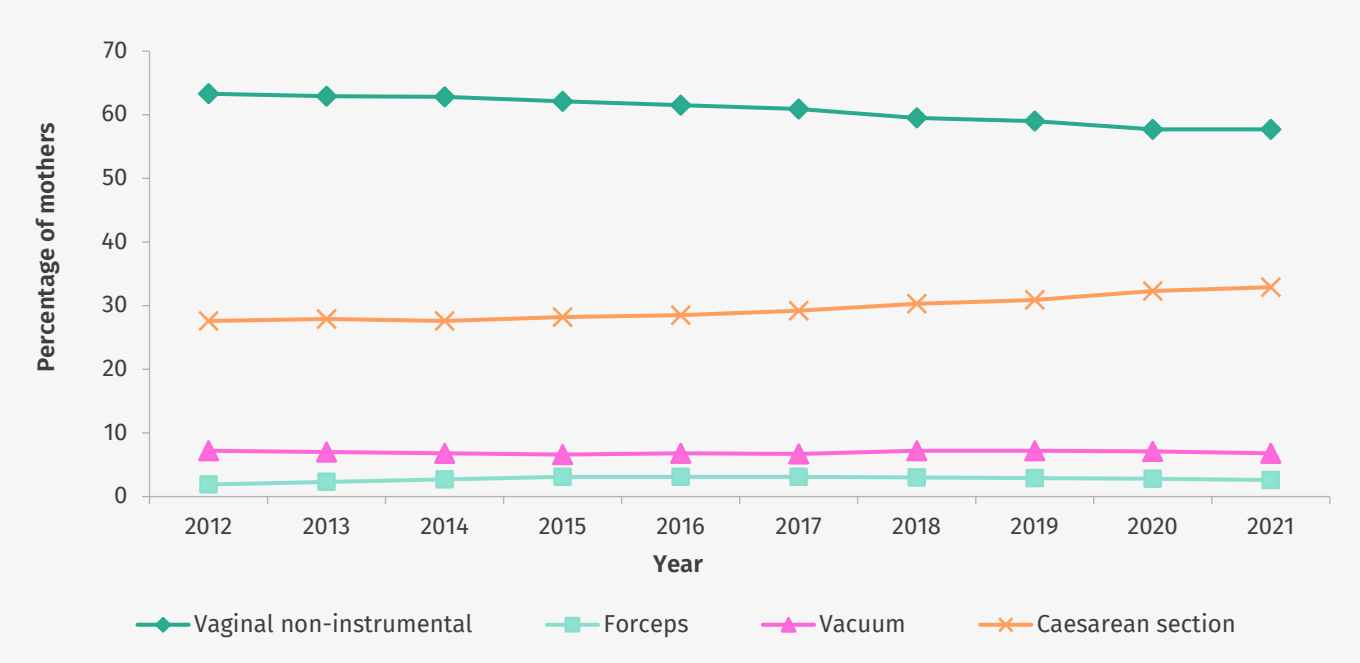
countries as per the Organisation for Economic Co-operation and Development (OECD)[20].

Figure 5: Method of birth of babies in private facilities, Queensland, 2012 to 2021



For multiple births, mother was categorised by the facility/birth method of the first baby.

Figure 6: Method of birth of babies in public facilities, Queensland, 2012 to 2021



For multiple births, mother was categorised by the facility/birth method of the first baby.

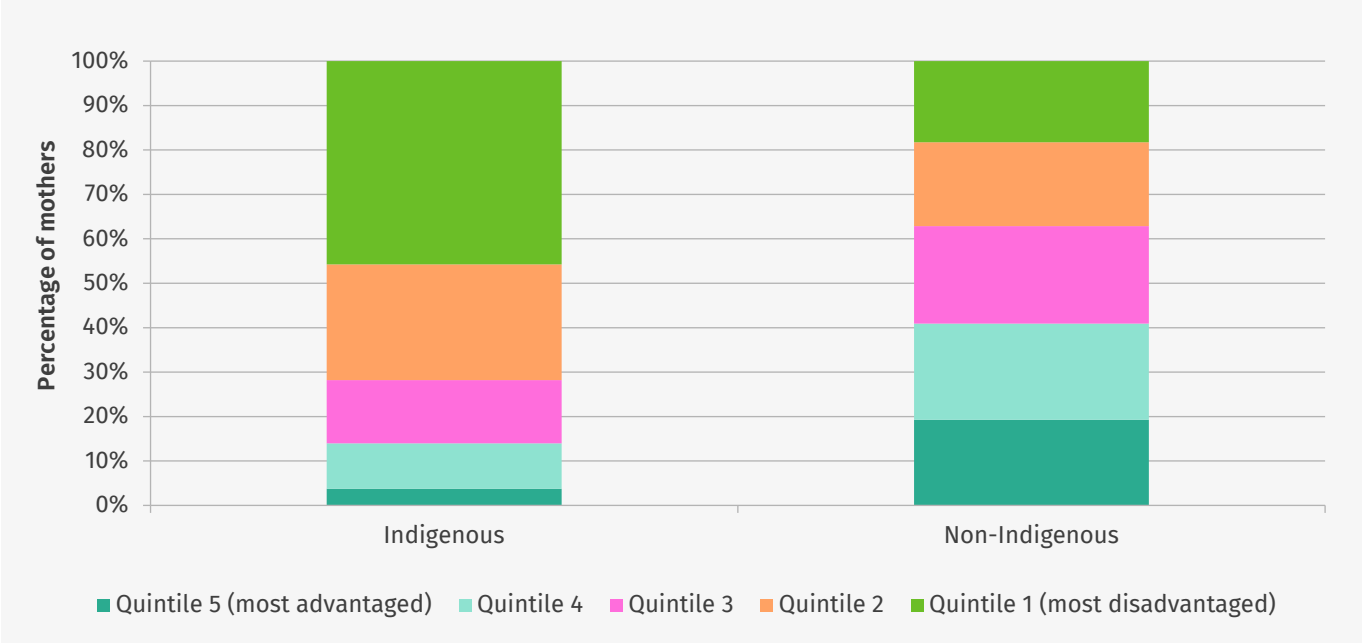
[20] Organisation for Economic Co-operation and Development (OECD) 2017. Health at a glance 2017: OECD indicators. Paris: OECD Publishing. Viewed 26 July 2019.

Aboriginal and Torres Strait Islander mothers

Providing culturally safe and appropriate, evidenced-based care that is location based and relevant to the local community positively impacts on the numbers of Aboriginal and Torres Strait Islander women having early and ongoing engagement with antenatal care. Early and ongoing engagement with culturally safe care results in improved pregnancy outcomes for Aboriginal and Torres Strait Islander peoples[21]. Cultural safety is essential for partnering with Aboriginal and Torres Strait Islander women in maternity care[22]. In 2020 and 2021, 9,072 women giving birth in Queensland identified as Aboriginal and/or Torres Strait Islander, representing 7.5 percent of women giving birth, compared to 4.9 percent nationally[23].

Aboriginal and Torres Strait Islander women gave birth to 9,211 babies of which 96.9 percent were identified as being of Aboriginal and/or Torres Strait Islander origin. Most health indicators use the Aboriginal and Torres Strait Islander status of the mother to define Aboriginal and Torres Strait Islander status for the birth event, because these indicators are primarily designed to monitor pregnancy outcomes for these women[24].

Figure 7: Mothers who gave birth in Queensland hospitals, by Aboriginal and Torres Strait Islander status and Socio-economic Indexes for Areas (SEIFA), Queensland, 2020 and 2021



Excludes non-Queensland residents and those with unknown SEIFA status.

While many Aboriginal and Torres Strait Islander women experience a healthy pregnancy, there is a clear disparity in birth outcomes between Aboriginal peoples and Torres Strait Islander peoples and other Australians. This may be attributed to Aboriginal and Torres Strait Islander people in Australia having been affected by complex intergenerational-trauma, following an inheritance of historical trauma, which includes state-sanctioned systematic removal of children from their families and ongoing racism and discrimination. Institutionalised racism led to health care services and systems that historically did not meet the needs of Aboriginal and Torres Strait Islander women and families. As a result of the above complexities, Aboriginal and Torres Strait Islander women giving birth in Queensland have higher rates of disadvantage (Figure 7), leading to higher rates of identified risk factors and adverse outcomes than other birthing women in Queensland. Issues highlighted in earlier sections of this report that relate to Aboriginal

[21] RACGP - Antenatal care for Aboriginal and Torres Strait Islander women
[22] Growing Deadly Families Strategy
[23] Australia's mothers and babies, Data - Australian Institute of Health and Welfare (aihw.gov.au)
[24] van Roo S, Johnston T, Petersen L, Cornes S. Identification of Indigenous status for measurement of perinatal risk factors and outcomes: Insights gained through use of both mother and baby status. Statbite#67. Health Statistics Branch, Queensland Health. 2015.

and Torres Strait Islander women and their babies include:

- Aboriginal and Torres Strait Islander women were approximately six times more likely to have babies when aged under 20 years, which carries a higher risk of complications and adverse outcomes (see page 8)
- Over the last 10 years, there has been an increase in Aboriginal and Torres Strait Islander women engaging in the minimum recommended number of antenatal visits, however, this continues to be less than the number of other Australian women receiving the recommended number of visits in 2020 and 2021 (see page 9)
- Aboriginal and Torres Strait Islander women had much higher rates of smoking during pregnancy than other women (see page 10)
- Aboriginal and Torres Strait Islander women were very unlikely to give birth in a private hospital (see page 12)
- Aboriginal and Torres Strait Islander women had lower rates of intervention such as induction of labour (see page 13).

There are several contributing factors not investigated in this report that have potentially led to increased poorer outcomes for Aboriginal and Torres Strait Islander women and their babies. These may have contributed to the increased risks identified for these women. These include the lack of culturally safe and appropriate place-based maternity care services available for Aboriginal and Torres Strait Islander peoples. The ongoing consequences of trauma both current and intergenerational contributes to Aboriginal and Torres Strait Islander people engaging in unhealthy and maladaptive coping mechanisms such as smoking, and alcohol consumption[25]. Other contributing factors not considered in the statistics for this population are the socio-economic disadvantage and the impact or remote location.

Recommendation 1:

Expand the number of sites in Hospital and Health Services and Aboriginal and Torres Strait Islander Community Controlled Health Organisations implementing *Growing Deadly Families (GDF) Strategy 2019-2025* models of care.

Good practice point

To improve the cultural safety of maternity care services, provision of continuity of care maternity group practice (MGP) models, and standardising further cultural competency training for staff that includes, trauma-informed care, motivational interviewing and clinical yarning.

Providing First Nations women and women having First Nations babies access to timely, culturally safe, secure maternity and birthing services achieve a closing the gap in maternal and birth outcomes for First Nations people. The GDF Strategy is ensuring First Nations women and women having First Nations babies have access to continuity of carer and embed cultural into maternity care, this will improve the cultural safety in maternity care services.

[25] RACGP - Antenatal care for Aboriginal and Torres Strait Islander women : Smoking and alcohol

Queensland's current initiatives for Aboriginal and Torres Strait Islander mothers and babies

The First 1,000 Days Australia

The *First 1,000 Days* Australia initiative is working with Aboriginal and Torres Strait Islander Elders, researchers, community members, front-line workers and policy makers to provide a coordinated, comprehensive, culturally informed intervention through a multigenerational and dynamic expression of family to improve the health and wellbeing of Aboriginal and Torres Strait Islander children and families.

Making Tracks Together: Queensland's Aboriginal and Torres Strait Islander Health Equity Framework

Access to high quality antenatal care and maternal health services are a key component to improving health outcomes for both the mother and the baby. To improve mortality rates among Aboriginal and Torres Strait Islanders, *Making Tracks toward closing the gap in health outcomes for Indigenous Queenslanders by 2033* child and maternal investment has focused on culturally competent collaborative maternal continuity of care models in both HHSs and Non-Government Organisations. This initiative aims to prioritise a healthy start to life for Aboriginal and Torres Strait Islander Queenslanders, focusing efforts on improving the health literacy and reproductive health of young women through culturally effective women's health services, antenatal and infant care, parenting support and child health services.

Growing Deadly Families

The *Growing Deadly Families Aboriginal and Torres Strait Islander Maternity Services Strategy 2019-2025* (GDF Strategy) is the Queensland Government's commitment to improving Aboriginal and Torres Strait Islander maternity outcomes for women and their babies. The GDF Strategy focuses on First Nations co-designed and co-delivered maternity services; access to culturally and clinically appropriate maternity services and building a culturally capable workforce with more Aboriginal and Torres Strait Islander people working across all disciplines of maternity care.

The Office of the Chief Midwife Officer is leading the implementation of the GDF Strategy, which aims to ensure that every woman in Queensland giving birth to an Aboriginal and/or Torres Strait Islander baby has access to high quality, clinically and culturally capable maternity services. There are currently 12 GDF sites across Queensland, including six HHSs and six Aboriginal and Torres Strait Islander Community Controlled Health Organisations. Building on the success to date, there will be an expansion of GDF sites in 2024 and 2025.

Babies and birth

Gestational age

Gestational age of the baby in completed weeks as determined by clinical assessment after birth is an important determinant of pregnancy outcome. For example, preterm births (prior to 37 weeks gestation) accounted for 87.0 percent of perinatal deaths occurring during this period.

In 2020 and 2021, 8.9 percent of babies were born preterm, and 0.4 percent were born post-term (42 weeks and over). There have been some changes in these proportions over the past decade. Preterm births decreased from 9.3 percent in 2012 to 8.8 percent in 2021, though this decline was not statistically significant (annual percentage change: -0.17; 95 percent CI: -0.45, 0.12). In contrast, the decrease in the post-term group, from 0.5 percent of births in 2012 to 0.4 percent of births in 2021, was statistically significant (annual percentage change: -3.59; 95 percent CI: -4.91, -2.26).

Factors that increase the risk for preterm birth include multiple pregnancy, maternal BMI <18 .5 underweight; smoking during pregnancy; pre-existing or gestational diabetes; pre-existing or gestational hypertension and older maternal age (35 years of age and older). Other factors, such as the presence of a fetal congenital anomaly, a previous stillbirth, a previous caesarean section and having pre-eclampsia, can also result in preterm birth. Iatrogenic prematurity, resulting from medical interventions, is also a significant factor, especially in multiple pregnancies.

A higher proportion of babies whose mothers are of Aboriginal and/or Torres Strait Islander origin, live in remote locations or who are more socioeconomically disadvantaged are born preterm. A multivariate analysis of risk factors for preterm birth found that a mother's Aboriginal and Torres Strait Islander status, remoteness and socioeconomic status are not strongly associated with preterm birth once other risk factors are considered[26]. This suggests higher preterm birth rates in these groups are due to higher rates of other risk factors such as smoking, lower attendance than recommended at antenatal visits and other complications such as gestational diabetes (see Table 4).

Table 4: Rate of selected perinatal risk factors, by Aboriginal and Torres Strait Islander status, Socioeconomic Indices for Areas (SEIFA) quintile and remoteness, 2020 and 2021

	Preterm [(a)]	< 5 antenatal visits [(b)]	Smoking after 20 weeks [(c)]	Obesity [(d)]
Aboriginal and Torres Strait Islander identity	14.1	9.3	37.8	33.2
Non-Aboriginal and Torres Strait Islander identity	8.5	3.0	6.6	22.5
Quintile 1 (most disadvantaged)	10.4	4.8	19.4	32.7
Quintile 2	9.5	3.3	11.2	27.1
Quintile 3	8.4	3.7	7.0	23.0
Quintile 4	8.2	3.1	4.6	19.8
Quintile 5 (most advantaged)	7.7	2.2	2.2	13.1
Unknown/interstate	18.3	3.6	4.4	17.6
Major city	8.4	3.5	6.4	20.9

[26] A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Utz M, Johnston T, Zarate D and Humphrey M. Health Statistics Branch, Queensland Health. 2014.

	Preterm [a]	< 5 antenatal visits [b]	Smoking after 20 weeks [c]	Obesity [d]
Inner regional	9.1	3.2	12.1	28.5
Regional	9.8	3.1	13.8	26.4
Remote/very remote	11.7	5.5	25.1	30.0
Interstate	18.3	3.7	4.5	17.7

(a) Rate per 100 babies. Excludes babies of unknown gestational age.
(b) Rate per 100 mothers. Excludes mothers with unknown number of antenatal visits and births at less than 32 weeks gestation.
(c) Rate per 100 mothers. Excludes mothers of unknown smoking status after 20 weeks.
(d) Rate per 100 mothers. Excludes mothers of unknown BMI.

The rate of preterm birth was similar in public facilities (9.0 percent) and private facilities (8.9 percent). There is a much higher rate of caesarean section prior to labour in private facilities at earlier gestations than in public facilities (Figure 8). In early term deliveries (37-38+6 weeks), 82.9 percent of babies in private facilities were born by modes of birth other than spontaneous vaginal birth, compared to 64.6 percent of babies born in public facilities. Perinatal Society of Australia and New Zealand and Centre of Research Excellence Stillbirth guidelines[27] recommend that planned births (by induction of labour or caesarean section) should ideally be performed as close to 40 weeks as possible. Shared decision-making about timing of birth is needed to enable women to make an informed decision, based on a clear understanding of their individualised risks and benefits reflecting their preferences and values.

Queensland Health, in collaboration with the Australian Preterm Birth Prevention Alliance, Women's Healthcare Australasia, and the Institute of Healthcare Improvement, has set a goal to safely reduce preterm and early term births by 20 percent by 2024. To achieve this, seven evidence-based strategies have been integrated into standard maternity care across the state's HHSs from 2022 to 2024. Queensland Health supported seven participating sites in the 'Every Week Counts' National Preterm Birth Prevention Collaborative by offering expertise in improvement science and change management. Additionally, the Queensland Preterm Birth Prevention Program (QPTBPP) extended its reach to non-collaborative sites through on-site education, delivering essential messaging to 270 maternity health professionals across 10 HHSs and 20 hospitals. Bespoke education was also provided to GP obstetricians, community GPs, and private obstetricians, addressing their specific learning needs and highlighting their crucial roles in maternity care throughout Queensland.[28]

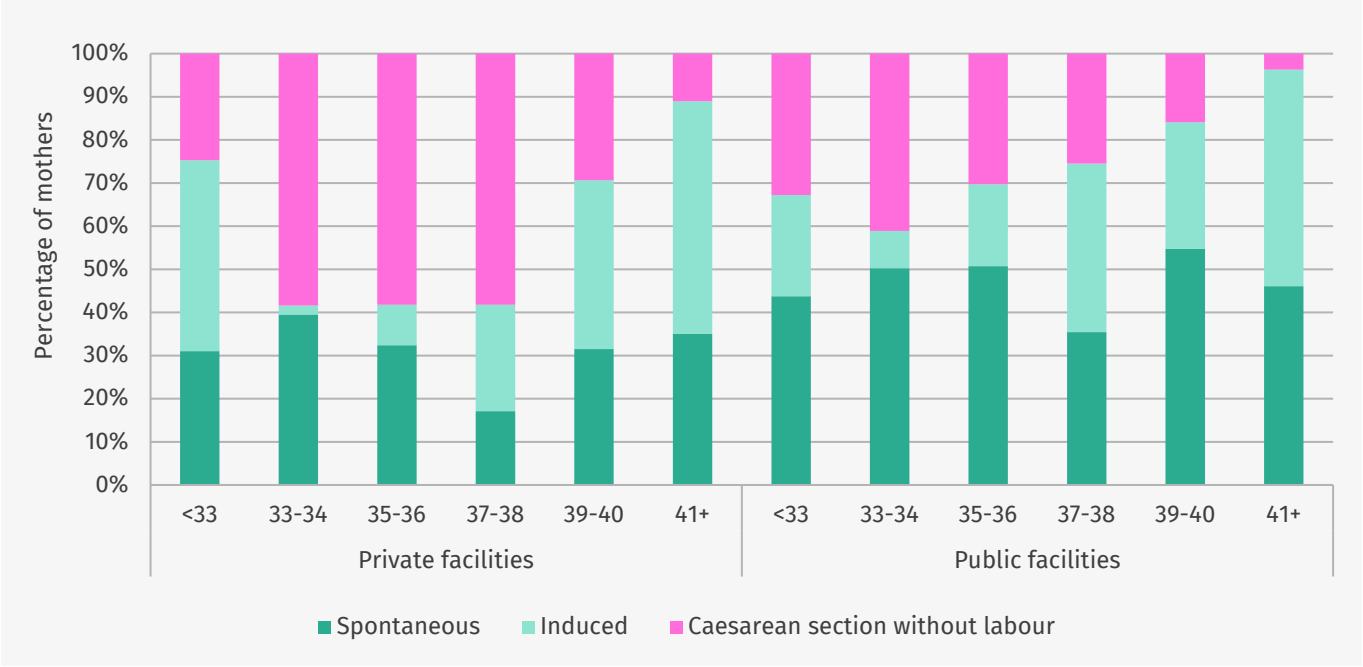
Good practice point

Ensure all maternity care providers support informed decision-making and promote optimal birth outcomes by performing elective caesarean sections based on medical necessity.

[27] Perinatal Society of Australia and New Zealand and Centre of Research Excellence Stillbirth. Position statement: Improving decision-making about the timing of birth for women with risk factors for stillbirth. Centre of Research Excellence in Stillbirth, Brisbane, Australia, September 2019.

[28] Home | The Australian Preterm Birth Prevention Alliance (pretermalliance.com.au)

Figure 8: Labour onset distribution by gestational age and facility sector, Queensland, 2020 and 2021



For multiple births, mother was categorised by the facility/labour onset of the first baby.

Birthweight

In 2020 and 2021, 6.6 percent of live-born babies were low birthweight (less than 2500g), and this rate has not changed over the past 10 years (6.5 percent in 2012 and 2013).

While babies born earlier are generally smaller, a subgroup of babies have weight-related complications or adverse outcomes that are independent of gestation. These babies are referred to as being SGA and are commonly defined as the lowest 10 percent of weights within a group defined by gestational age and sex, according to national birthweight percentiles. Of particular clinical interest are babies who are SGA at or near term, as this can be the result of fetal growth restriction caused by placental dysfunction and can lead to adverse outcomes such as perinatal asphyxia and stillbirth[29]. Improved detection of fetal growth restriction and earlier birth may help to reduce both perinatal mortality and morbidity[30].

Some characteristics of mothers are linked to an increased risk of giving birth to a singleton SGA baby:

- 12.4 percent of babies of Aboriginal and Torres Strait Islander mothers were SGA compared with 8.0 percent of babies born of other mothers
- 13.3 percent of babies of mothers aged less than 20 years of age were SGA compared with 8.2 percent of babies of mothers aged 20-34 years of age
- 17.7 percent of babies of mothers who were underweight with a BMI <18.5, were SGA compared with 9.2 percent of babies whose mothers were in the normal BMI weight range
- 16.1 percent of babies whose mothers smoked during pregnancy were SGA compared with 7.3 percent of babies whose mothers did not smoke.

[29] Fetal growth restriction and stillbirth: Biomarkers for identifying at risk fetuses

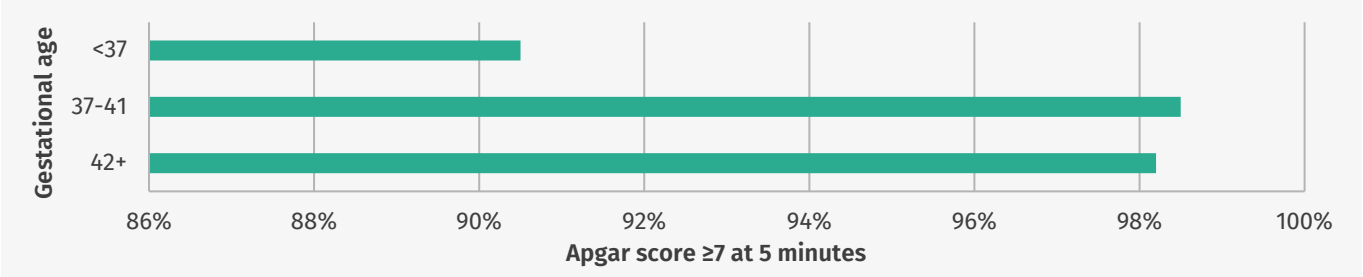
[30] Ekanem E, etal. Implementation of Uterine Artery Doppler Scanning: Improving the Care of Women and Babies High Risk for Fetal Growth Restriction. J Pregnancy. 2023 Jan 23;2023:1506447. doi: 10.1155/2023/1506447. PMID: 36726451; PMCID: PMC9886456

Neonatal morbidity

Neonatal morbidity is a term used to describe illness or injury in babies during the first 28 days of life. Monitoring neonatal morbidity is important to enable a better understanding of perinatal service requirements and to assist with monitoring of quality of care.

The Apgar score is a clinical scale used to describe a baby's condition at one minute and five minutes after birth based on the baby's appearance (colour), pulse rate, grimace response to foot stimulation, activity and respiration rate (Apgar). It is used as a clinical assessment of the baby during the initial phase of transition to extrauterine life. This score serves as a valuable tool for assessing the baby's health, assisting in determining the necessity for and effectiveness of any required resuscitation measures. A five-minute Apgar score of seven or higher signifies that the baby is effectively transitioning to extrauterine life. Conversely, a five-minute Apgar score lower than seven suggests suboptimal transition to extrauterine life. At five minutes of age, generally 97.8 percent of liveborn babies have an Apgar score of seven or more, whilst 2.2 percent had a score that was less than seven. The incidence of Apgar scores less than seven occurred more commonly for babies born at lower gestations (Figure 9).

Figure 9: Proportion of liveborn babies with an Apgar score greater than or equal to seven at five minutes, by gestational age, Queensland, 2020 and 2021

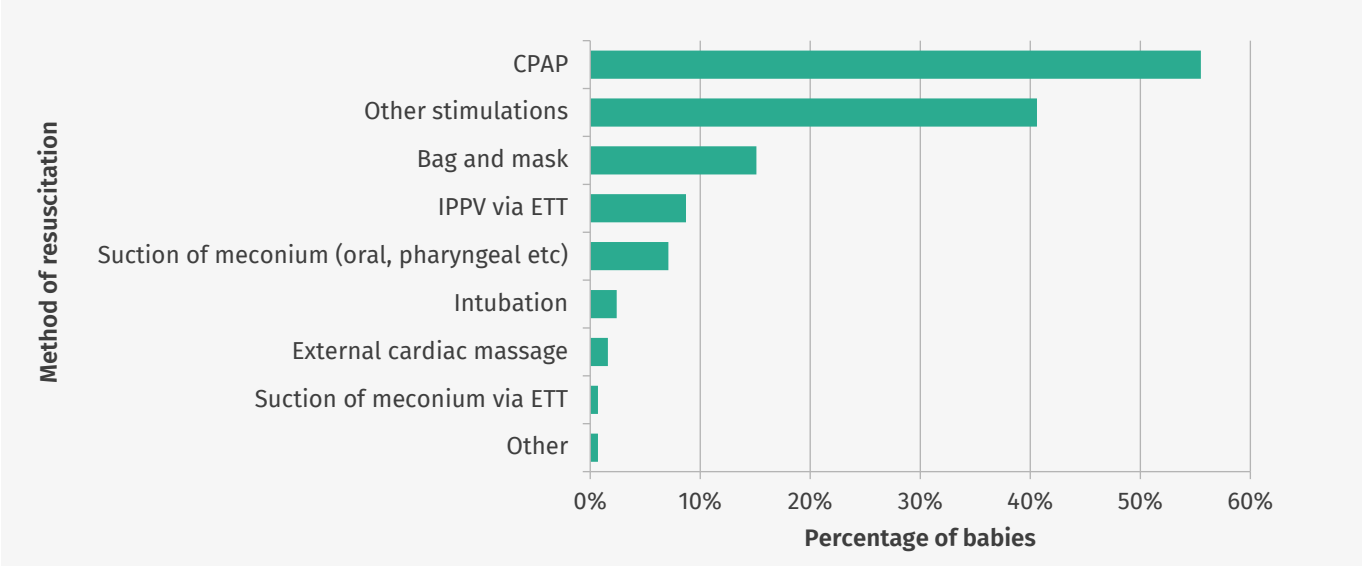


Excludes babies of unknown Apgar score at 5 minutes and/or unknown gestational age

Resuscitation

Of the liveborn babies, 19.5 percent required some form of active resuscitation immediately after birth (excluding suction and facial oxygen).

Figure 10: Distribution of active resuscitation* methods administered to live born babies, Queensland, 2020-21



A single baby could receive multiple resuscitation measures. Categories are not mutually exclusive.
*Excluding suction and facial oxygen.

Neonatal length of stay in hospital

In 2020 and 2021, the median length of stay (LOS) for babies born in hospital was two days. This number includes babies transferred to other facilities but excludes babies who died. Factors that impact LOS include gestational age, birthweight, method of birth and hospital sector, along with complications of pregnancy or birth, and co-morbidities affecting either the mother or baby. There has been a reduction in LOS globally in recent decades. However, these changes need to be interpreted with caution, as many maternal and neonatal factors can have an impact.

Length of stay varied between public and private hospitals. In the public sector, median LOS for babies born vaginally was one day and following caesarean section was three days. In comparison, in private hospitals, the median LOS for vaginal births was four days and for caesarean births was five days.

Length of stay is often used as a surrogate marker of morbidity. For babies born preterm in any Queensland facility, the median LOS was 11 days, compared with a median of two days for babies born at term. For babies born at term who were SGA, the median LOS was also two days.

Examination of hospital LOS as a marker of morbidity needs to consider multiple factors including, but not limited to: consideration of unintended impacts on breastfeeding rates, neonatal re-admission or emergency department presentation, peripartum mental health and parenting skills, and facility capabilities including staffing and bed capacity.

Admission to special care and intensive care nursery

When complications or medical conditions arise affecting the baby, admission to the special care or intensive care nursery often occurs. In 2020 and 2021, 30.2 percent of liveborn babies (36,900 babies) were admitted to a nursery. Of these, 8,686 were preterm and 7,468 had a congenital anomaly (note that these categories can overlap). There were 23,019 babies born at term who were admitted to a special care or intensive care nursery and did not have an identified congenital anomaly.

Transfer between hospitals

Some women and babies require transfer of care from one facility to another to access a clinical service of higher capability. Whenever feasible, potential complications or medical conditions impacting the mother or infant should be identified before delivery. Subsequently, pregnant women are scheduled to receive antenatal care at a hospital with appropriate clinical service capabilities. This scenario highlights the importance of having a minimum of five antenatal appointments and initiating antenatal care early in pregnancy. In other instances, women may need to be transferred either shortly before or during labour, or babies may require transfer after delivery. Such transfers can be necessary due to unforeseen issues or complications that were not identified during antenatal care, or when adequate antenatal care was not received.

Among the women who gave birth, 3.3 percent were transferred before the onset of labour, while 0.8 percent were transferred during labour. Furthermore, 2.5 percent of newborns required transfer to another hospital after delivery.

The 10 most recorded reasons for antenatal transfer are shown in Table 5.

Table 5: First 10 reasons for antenatal transfer and proportion of transferred mothers birthing in Queensland, 2020 and 2021

Transfer Reason Description (ICD-10-AM)	Code (ICD-10-AM)	Frequency	% of transferred mothers
Unavailability and inaccessibility of healthcare facilities	Z75.3	924	18.6
Persons encountering health services in other specified circumstances	Z76.8	736	14.8
Other problems related to medical facilities and other health care	Z75.8	316	6.3
Maternal care for poor fetal growth	O36.5	297	6
Premature rupture of membranes, onset of labour between 1-7 days later	O42.11	231	4.6
Maternal care for other (suspected) fetal abnormality and damage	O35.8	219	4.4
False labour before 37 completed weeks of gestation	O47.0	182	3.7
Obesity, not elsewhere classified, body mass index [BMI] >= 40 kg/m2	E66.93	181	3.6
Diabetes mellitus arising during pregnancy, insulin treated	O24.42	159	3.2
Premature rupture of membranes, onset of labour within 24 hours	O42.0	134	2.7

There can be multiple reasons for transfer for an individual woman. Categories are not mutually exclusive.

For those babies transferred after birth, 92.3 percent were admitted to a special care or intensive care nursery. The median length of stay for babies transferred after birth (excluding babies who died) was 17 days.

There was a higher perinatal mortality rate for all types of transfers than for the overall population, which reflects the higher rates of complications and medical conditions for babies where a transfer was required.

Queensland is the most decentralised state in terms of maternity service provision. Most neonatal intensive care for very preterm babies is concentrated in the southeast corner of the state, apart from the Neonatal Intensive Care Unit in Townsville. The process of transferring babies to these specialised nurseries, including retrieval, is well-established. However, transferring mothers to tertiary centres to be with their babies with or following a neonatal transfer for intensive care can be challenging. This separation is extraordinarily stressful for parents, and efforts should be made to minimise the distance between a mother and her baby whenever possible.

Queensland Health initiatives to improve maternal and perinatal outcomes

Queensland Birth Strategy: Public Funded Homebirth

Having a baby at home through the public hospital system is now an option in most states and territories in Australia. There is strong evidence that homebirth safe for low risk, selected mothers and babies, when well-integrated into the health service.

In high-income countries and for selected women at low risk of perinatal complications, planned home birth at onset of labour is associated with:

- similar or better outcomes for mothers and babies
- higher levels of childbirth satisfaction
- reduced healthcare costs
- less iatrogenic events related to overuse of medical interventions.

In August 2023, the Honorable Minister for Health, Mental Health and Ambulance Services and Minister for Women, Shannon Fentiman MP announced that Sunshine Coast University Hospital will be the exemplar site in Queensland to commence publicly funded homebirth .

The Publicly Funded Home Birth Advisory Committee has been reconvened to oversee the Publicly Funded Home Birth Implementation Plan. A Publicly Funded Home Birth Clinical Guideline has been developed by the Queensland Clinical Guideline team.

The new service commenced 5 July 2024 within the Sunshine Coast HHS.

Queensland Maternity Education: Clinical Skills Development Service

Queensland Health has developed online provisioning education courses and training programs specifically targeted Maternity Education Programs (MEP).

MEP has been developed in collaboration with stakeholders across Queensland, to develop a new approach to maternity care training that is holistic, sustainable, accessible, and modern.

Using an approach of staged learning and case-based education, QME will guide practitioners from novice to advanced in a progressive and supported environment.

These tools will help ensure Queensland is a safe place for pregnant and birthing women by providing accessible, evidence-based, and timely training and education to Queensland Health staff.

Courses:

Water Immersion for Labour and Birth (WILB):

This education package equips maternity care providers with contemporary, evidence-based information and skills to provide high-quality care for women considering water immersion for labour and/or birth.

Newborn Bloodspot Screening (NBS):

This online course provides learners with an overview of the newborn bloodspot screening (heel prick test) collection process in Queensland. Topics covered include:

- what is newborn bloodspot screening and why it is important
- what conditions are detected from the NBS test

- indications and contraindications of bloodspot screening
- roles and responsibility
- how to perform a heel prick test and collect a quality sample
- how to submit samples for testing.

MEPcast:

MEPcast is a podcast for Queensland Health's Maternity Education Program. Each episode will explore ideas and issues on how we can enhance and improve the delivery of maternity care education in Queensland.

MEP Foundation:

Maternity Emergency Program (MEP) Foundation is a one-day simulation workshop designed for medical and midwifery staff who are new to working in a maternity clinical environment.

The session introduces the clinical management of pregnant women throughout labour, birth and the postnatal period, and deals with complications along the way.

MEP Advanced:

Maternity Emergency Program (MEP) Advanced is a one-day simulation workshop designed for medical and midwifery staff who are currently working in a maternity clinical environment.

The session explores pregnancy related issues, intrapartum complexities and postnatal complications through simulation and case studies.

Queensland Health facility Resource Kits:

A resource kit is a collection of tools and resources to effectively run a simulation course. These resource kits are designed for use in any Queensland Health facility. Each resource can be modified by the facilitator and scaled to the needs of the learner as well as the environment in which the education is being delivered, from tertiary to rural and remote facilities.

Additional resources:

- Shoulder dystocia
- Postpartum haemorrhage
- Sepsis antenatal
- Sepsis postnatal
- Undiagnosed breech
- Pre-eclampsia/eclampsia
- Uterine rupture
- Uterine inversion
- Maternal anaphylaxis
- Anaesthetic toxicity
- Panda Warmer Neonatal Resuscitation System
- Undiagnosed Breech

Neonatal Regional Education in Stabilisation (NeoREST):

In response to requests from regional and rural birthing centres, an outreach education program focused on neonatal stabilisation has been developed by the Statewide NeoRESQ service. This program takes the content available in the Queensland Maternity and Neonatal Clinical Guidelines (QCG), and teaches the skills required to put the knowledge into practice. NeoREST has since been delivered to regional and rural facilities as a 1-day workshop. These workshops are multidisciplinary and interactive, focusing on skill development and high-fidelity simulation training. Funding has been provided through the Queensland Women and Girls' Health Strategy 2032 to expand the number of these workshops, with more than 30 NeoREST workshops planned throughout the State in 2024. (Some workshops are conducted over two days and allow for other staff from other facilities to attend the workshops in the host HHS).

Grantley Stable Neonatal Unit (GSNU) iLearn Resource Package:

The Grantley Stable Neonatal Unit (GSNU) iLearn Resource Package is an online resource, with links to educational resources, handbooks and guidelines by the GSNU, Royal Brisbane and Women's Hospital. The resource package is designed for doctors, nurses and students involved in the care of neonates. It is free, and can be accessed 24 hours a day, 7 days a week, from a person's home computer, tablet or smartphone. The package will continue to be made freely available and promoted for use.

Expansion of IMPROVE workshops:

Improving perinatal mortality review and outcomes via education (IMPROVE) is a training package of six courses that is designed to support healthcare professionals in responding to women who have experienced stillbirth.

In February and March 2022, the NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) was funded by Queensland Health to plan and deliver two virtual IMPROVE Train the Trainer workshops aimed to increase the cohort of IMPROVE educators located throughout Queensland. Approximately 44 clinicians of various backgrounds including obstetrics, gynaecology, neonatology, midwifery, and social work attended the training held on 25 February and 14 March. They were credentialed later in 2022.

Work will commence to maximise the delivery of IMPROVE workshops across Queensland.

Congenital anomalies

Congenital anomaly definition

Congenital anomalies, also known as birth defects, encompass a broad spectrum of atypical bodily structures or functions that are present at or before birth, although their detection may occur later in life. Some anomalies may be addressed through surgical or non-surgical interventions, while others pose life-threatening risks and may result in lifelong impacts[31]. These anomalies can lead to significant medical, social, or cosmetic consequences for individuals. They may constitute major factors contributing to fetal, infant, and child mortality, chronic illness, and disability, and typically necessitate medical intervention[32]. Congenital anomalies affect around one in 20 births in Australia. Surveillance for congenital anomalies can help jurisdictions understand the burden of these conditions, refer identified infants to services in a timely manner, and evaluate existing prevention programs.

Congenital anomalies can be diagnosed antenatally during a pregnancy or diagnosed at birth. Diagnosing congenital anomalies involves a combination of medical history, physical examinations, and various diagnostic tests. The specific diagnostic approach can vary depending on the nature of the anomaly. Additionally, early detection and diagnosis of congenital anomalies are crucial for timely intervention and management.

Congenital anomalies outlined in this report were notified from Queensland births during 2020 and 2021. Population-wide reporting through the Queensland PDC as well as the notification of later detections and terminations by the Queensland Hospital Admitted Patient Data Collection (QHAPDC), have continued to improve our ability to ascertain serial rates for most congenital anomalies. Congenital anomaly rates for Queensland are reported based on a linked data resource, the Congenital Anomaly Linked File (CALF)[33]. Additional information on the CALF, as well as more detailed numbers and rates of congenital anomalies over time and for selected subgroups is available at CALF.

Classification of congenital anomalies

Congenital anomalies can be classified in various ways based on different criteria, including the affected body system, the timing of occurrence, and the underlying causes. Here are some common classifications:

- structural versus functional anomalies
- organ system affected
- timing of occurrence
- genetic versus non-genetic causes
- single anomalies versus syndromes
- severity.

These classifications are not mutually exclusive, and some congenital anomalies may fall into multiple categories. Additionally, advancements in genetic research have led to a better understanding of the molecular and genetic basis of many congenital anomalies, allowing for more precise classifications based on underlying genetic factors.

The Congenital Anomalies Sub-committee of the QMPQC has legislative responsibility to monitor the prevalence of congenital anomalies and their outcomes in all pregnancies, births and in children up to seven years of age across Queensland. This surveillance and reporting have fostered research and further investigations on specific congenital anomalies, with recommendations for improvements having been made. These have included improved detection of critical congenital heart disease (cCHD) by second trimester ultrasound and the adoption of routine Pulse Oximetry Screening (POS) for all newborns in Queensland to reduce mortality and morbidity in this vulnerable group of infants.

[31] WHO (2020) Congenital disorders (who.int)
[32] CDC 2020: Birth Defects Surveillance Toolkit; Surveillance of Congenital Anomalies
[33] Queensland Health CALF

Congenital anomaly rates for Queensland are reported based on a linked data resource, the Congenital Anomaly Linked File (CALF).

Congenital Anomalies Surveillance

Table 6 ranks the prevalence of Queensland's congenital anomalies of for 2020 and 2021, with talipes, undescended testis and patent ductus arteriosus being the most commonly recorded congenital anomalies during this time frame.

Table 6: Order of prevalence of key congenital anomalies, Queensland 2020 and 2021

Congenital anomaly	Count	Rate per 1,000	One in number of pregnancies
Talipes	2,979	24.1	41
Undescended testis (treated)	1,004	8.1	123
Patent ductus arteriosus	937	7.6	132
Atrial septal defects	853	6.9	145
Ventricular septal defect	747	6.1	165
Hypospadias	560	4.5	220
Obstructive defects renal pelvis	507	4.1	243
Craniosynostosis	264	2.1	468
Trisomy 21 Down Syndrome	243	2	508
Renal agenesis or dysgenesis	219	1.8	564
Developmental dysplasia of hip	216	1.7	572
Cleft palate/cleft lip	212	1.7	582
Neural tube defects	140	1.1	882
Pyloric stenosis	135	1.1	914
Polydactyly	134	1.1	921
Microcephaly	108	0.9	1,143
Reduction deformities (upper and/or lower limbs)	102	0.8	1,210
Coarctation of aorta	99	0.8	1,247
Syndactyly	94	0.8	1,313
Transposition of great vessels	87	0.7	1,419
Trisomy 18 Edward Syndrome	84	0.7	1,470
Tetralogy of Fallot	73	0.6	1,691
Spina Bifida	68	0.6	1,815
Hypoplastic Left Heart Syndrome	67	0.5	1,842
Branchial Remnants	67	0.5	1,842
Congenital hypothyroidism	61	0.5	2,024

Congenital anomaly	Count	Rate per 1,000	One in number of pregnancies
Tracheo-oesophageal fistula, oesophageal atresia/stenosis	54	0.4	2,286
Gastroschisis	53	0.4	2,329
Congenital hydrocephalus (excl. those with NTD)	53	0.4	2,329
Anencephalus	50	0.4	2,469
Cystic Kidney disease	49	0.4	2,519
Diaphragmatic hernia	49	0.4	2,519
Vesico-ureteric reflux	47	0.4	2,627
Stenosis/atresia anus	47	0.4	2,627
Disorders of amino acid transport and metabolism	47	0.4	2,627
Anotia, microtia	44	0.4	2,806
Choanal Atresia	42	0.3	2,939
Stenosis/atresia small intestine	41	0.3	3,011
Cystic fibrosis	38	0.3	3,249
Hirschprungs disease	37	0.3	3,336
Trisomy 13 Patau	30	0.2	4,115
Congenital cataract and lens anomalies	29	0.2	4,257
Turner Syndrome (45,X)	28	0.2	4,409
Exomphalos	26	0.2	4,748
Disorders of carbohydrate transport and metabolism	24	0.2	5,144
Adrenogenital syndrome	20	0.2	6,172
Muscular dystrophies/myopathies	14	0.1	8,818
Encephalocoele	14	0.1	8,818
Microphthalmia	11	0.1	11,222
Haemophilia	10	0.1	12,345
G6PD deficiency	9	0.1	13,716
Thalassaemias	5	0	24,689
Fetal Alcohol Syndrome/FASD	4	0	30,862
Anophthalmia	2	0	61,724
Phenylketonuria	2	0	61,724

Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland.
Includes cases where the birth was recorded in Queensland, or the termination of pregnancy was conducted at a facility in Queensland.
Data are preliminary and subject to change. Subsequent reports are likely to show additional cases of congenital anomalies, as further morbidity details are determined in the 5 years following an individual's birth. * Neural Tube Defect (NTD)

Specific congenital anomalies

Neural tube defects

The neural tube is responsible for shaping the development of the early brain and spine. Neural tube defects (NTDs) arise when the baby's neural tube fails to close appropriately during early pregnancy frequently occurring before a woman becomes aware of her pregnancy. The primary NTDs encountered include spina bifida, characterized by a defect in the spinal cord, encephalocele where a sac containing brain/meninges/cerebrospinal fluid forms outside the skull due to a bone defect, and anencephaly, a condition involving a defect in the brain.

Over the last 14 years, there has been a marginal reduction in the incidence of diagnosed NTDs in Queensland (annual percentage change: -0.80; 95 percent CI: -2.24, 0.66) as shown in Figure 11. This change is statistically non-significant (p-value = 0.281). However, examination of data from the last five years from 2017 to 2021, shown in Table 7 revealed a noteworthy 2.13-fold increased risk of NTDs in infants born to mothers with pre-gestational diabetes (type 1 or type 2 diabetes before pregnancy; p-value = 0.025). Additionally, there was a notable 1.4-fold increased risk associated with mothers having a BMI of 30+ (p-value = 0.023).

Figure 11: Neural tube defects per 1,000 births, Queensland 2008 to 2021

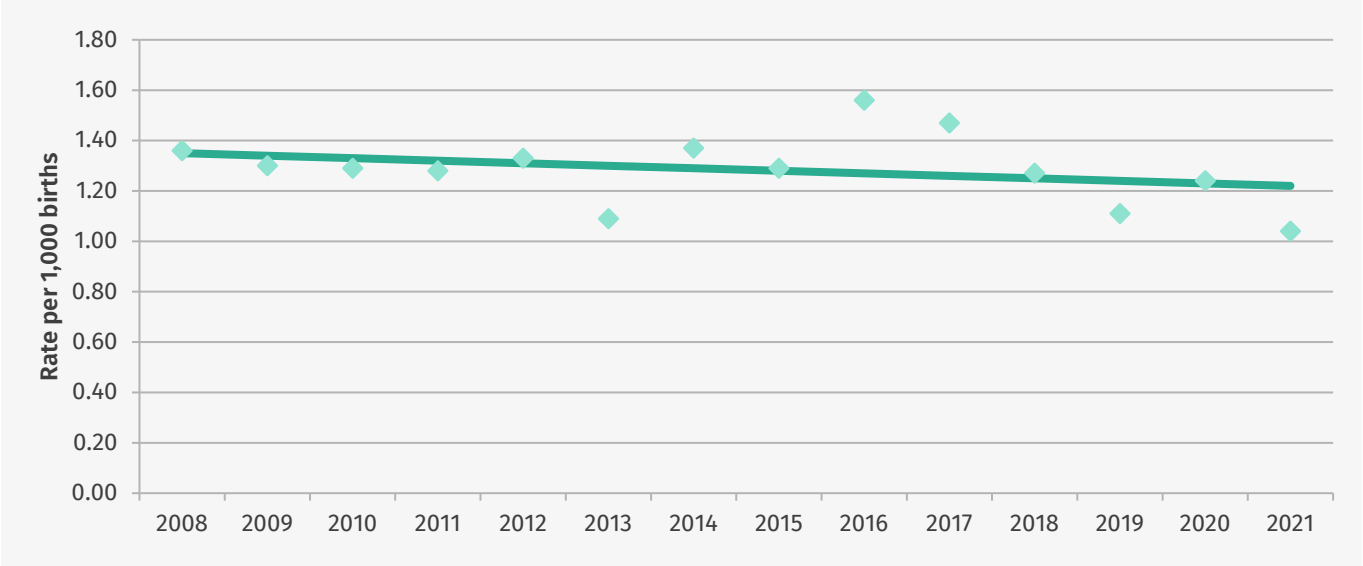


Table 7: Neural tube defects by selected maternal and child characteristics, 2017 to 2021

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	11	1.3	1.06 (0.58, 1.95), 0.838
	20-34 years	273	1.2	Reference
	35+ years	89	1.3	1.12 (0.88, 1.42), 0.369
Plurality [(b)]	Single	251	0.8	Reference
	Multiple	13	1.5	1.72 (0.99, 3.01), 0.056
Sex [(a)(b)]	Male	137	0.9	Reference
	Female	123	0.8	0.95 (0.75, 1.22), 0.707
Pre-gestational diabetes	No pre-gestational diabetes	364	1.2	Reference
	Pre-gestational diabetes	9	2.6	2.13 (1.10, 4.14), 0.025
	No pre-gestational hypertension	366	1.2	Reference

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Pre-gestational hypertension	Pre-gestational hypertension	7	1.8	1.49 (0.70, 3.14), 0.298
BMI [a][b]	Underweight <18.5	9	0.6	0.76 (0.38, 1.49), 0.419
	Normal 18.5-<25	119	0.8	Reference
	Overweight 25-29.9	49	0.7	0.82 (0.59, 1.15), 0.257
	Obese 30+	76	1.1	1.40 (1.05, 1.86), 0.023
Smoking during pregnancy [a][b]	Smoked during pregnancy	25	0.7	0.80 (0.53, 1.21), 0.295
	Did not smoke during pregnancy	239	0.9	Reference
SEIFA [a]	Quintile 1 (most disadvantaged/ least advantaged)	82	1.3	1.01 (0.73, 1.38), 0.971
	Quintiles 2-4	213	1.2	0.90 (0.69, 1.17), 0.432
	Quintile 5 (most advantaged/least disadvantaged)	71	1.3	Reference
Indigenous status of mother	Aboriginal and/or Torres Strait Islander	22	1	0.80 (0.52, 1.23), 0.309
	Not Aboriginal or Torres Strait Islander [d]	351	1.2	Reference

(a) excludes cases where characteristic was indeterminate, missing or unknown.
(b) excludes terminations of pregnancy before 20 weeks gestation (approximately 29% of total Neural tube defects cases and 0.3% of total births), as characteristic is not collected for these data
(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017
(d) Includes women whose Indigenous status was not stated
Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland

Microcephaly

Microcephaly in newborn babies is a congenital anomaly characterised by an abnormally small head size in comparison to typical developmental standards for the infant's age and sex. This condition is the result of the cerebrum being underdeveloped, with the fontanels closing prematurely. This condition is indicative of an underdeveloped brain, and it can result in intellectual disabilities, delayed motor function and other neurological challenges.

Over the past 14 years from 2008 to 2021, there has been a consistent increase in the annual percentage change of 4.67 percent (95 percent CI: 2.51, 6.88; p-value <0.001) as shown in Figure 12. Data analysed over the five years from 2017 to 2021 identified a 2.42 -fold elevated risk associated to mothers aged <20 years (p-value = 0.001). Additionally, higher risks are associated with mothers having pre-gestational diabetes (type 1 or Type 2 diabetes before pregnancy) with a 2.72-fold elevated risk (p-value = 0.009), and a 2.22-fold elevated risk associated to mothers who smoked during pregnancy (p-value <0.001), along with a 2.32-fold increased risk for mothers from the most disadvantaged SEIFA quintile (p-value <0.001), shown in Table 8.

Figure 12: Microcephaly per 1,000 births, Queensland 2008 to 2021

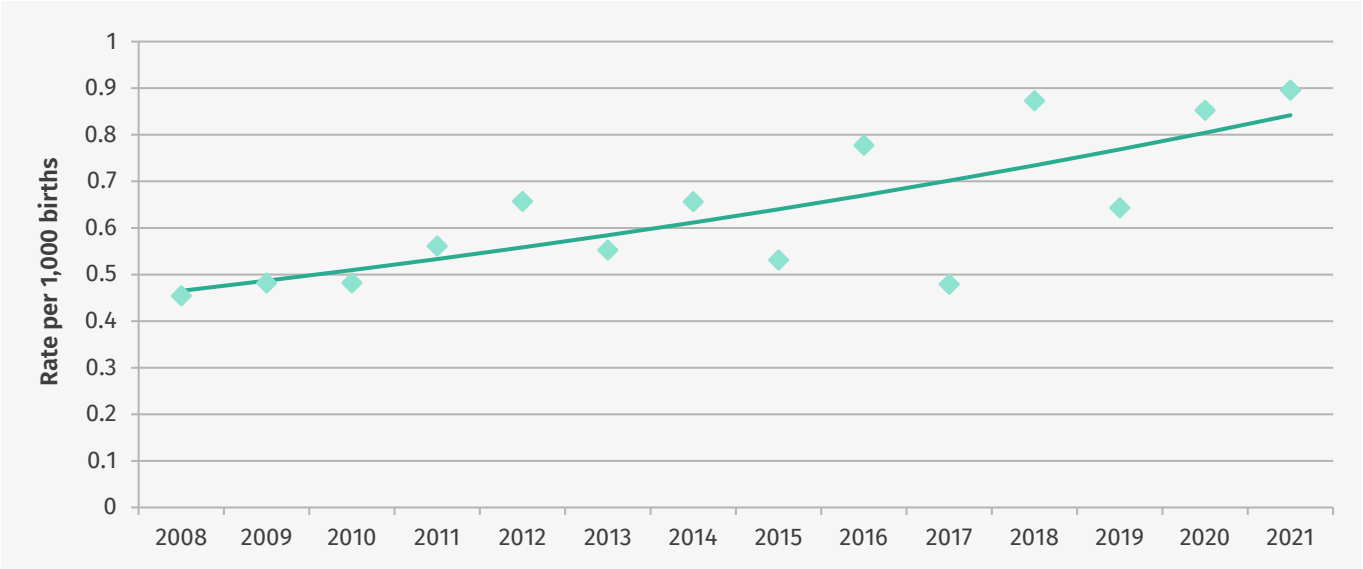


Table 8: Microcephaly by selected maternal and child characteristics, 2017 to 2021

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	15	1.7	2.42 (1.42, 4.10), 0.001
	20-34 years	164	0.7	Reference
	35+ years	50	0.7	1.04 (0.76, 1.43), 0.792
Plurality [b]	Single	226	0.8	Reference
	Multiple	2	0.2	0.29 (0.07, 1.18), 0.085
Sex [a][b]	Male	106	0.7	Reference
	Female	122	0.8	1.22 (0.94, 1.59), 0.129
Pre-gestational diabetes	No pre-gestational diabetes	222	0.7	Reference
	Pre-gestational diabetes	7	2.0	2.72 (1.28, 5.78), 0.009
Pre-gestational hypertension	No pre-gestational hypertension	224	0.7	Reference
	Pre-gestational hypertension	5	1.3	1.74 (0.72, 4.21), 0.223

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
BMI [a][b]	Underweight <18.5	17	1.2	1.62 (0.97, 2.70), 0.065
	Normal 18.5-<25	105	0.7	Reference
	Overweight 25-29.9	52	0.7	0.99 (0.71, 1.38), 0.963
	Obese 30+	41	0.6	0.85 (0.59, 1.22), 0.388
Smoking during pregnancy [a][b]	Smoked during pregnancy	51	1.5	2.22 (1.63, 3.04), <.001
	Did not smoke during pregnancy	176	0.7	Reference
SEIFA [a]	Quintile 1 (most disadvantaged/ least advantaged)	72	1.1	2.32 (1.49, 3.61), <.001
	Quintiles 2-4	128	0.7	1.42 (0.94, 2.15), 0.099
	Quintile 5 (most advantaged/ least disadvantaged)	27	0.5	Reference
Indigenous status of mother	Aboriginal and/or Torres Strait Islander	37	1.7	2.46 (1.73, 3.50), <.001
	Not Aboriginal or Torres Strait Islander [d]	192	0.7	Reference

(a) excludes cases where characteristic was indeterminate, missing, or unknown
(b) excludes terminations of pregnancy before 20 weeks gestation
(0.4% of total Microcephaly cases, and 0.3% of total births), as characteristic is not collected for these data.
(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017
(d) Includes women whose Indigenous status was not stated
Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland

Tetralogy of Fallot

Tetralogy of Fallot is a congenital heart defect made up of four different heart problems: ventricular septal defect, overriding aorta, pulmonary stenosis, and right ventricular hypertrophy. These problems result in a baby's skin turning blue because of a lack of oxygen.

Over the past 14 years, there has been a substantial upward trend observed during 2008 to 2021 in babies diagnosed with Tetralogy of Fallot, shown in Figure 13. The annual percentage change indicated a significant increase of 3.01 percent (95 percent CI: 0.45, 5.64; p-value = 0.021).

Analysing data covering five years, from 2017 to 2021 shown in Table 9, showed a 2.75-fold increased risk associated with mothers having multiple pregnancies (p-value = 0.001). Additionally, mothers diagnosed with pre-gestational diabetes demonstrated a substantial 3.73-fold elevated risk for having a baby diagnosed with Tetralogy of Fallot (p-value = 0.004). There was also a 2.18-fold increased risk association for mothers with a BMI of 30+ (p-value <0.001). Furthermore, the data indicated that males were more susceptible to having Tetralogy of Fallot than females, with a 1.52-fold elevated risk (p-value = 0.014).

Figure 13: Tetralogy of Fallot per 1,000 births, Queensland 2008 to 2021

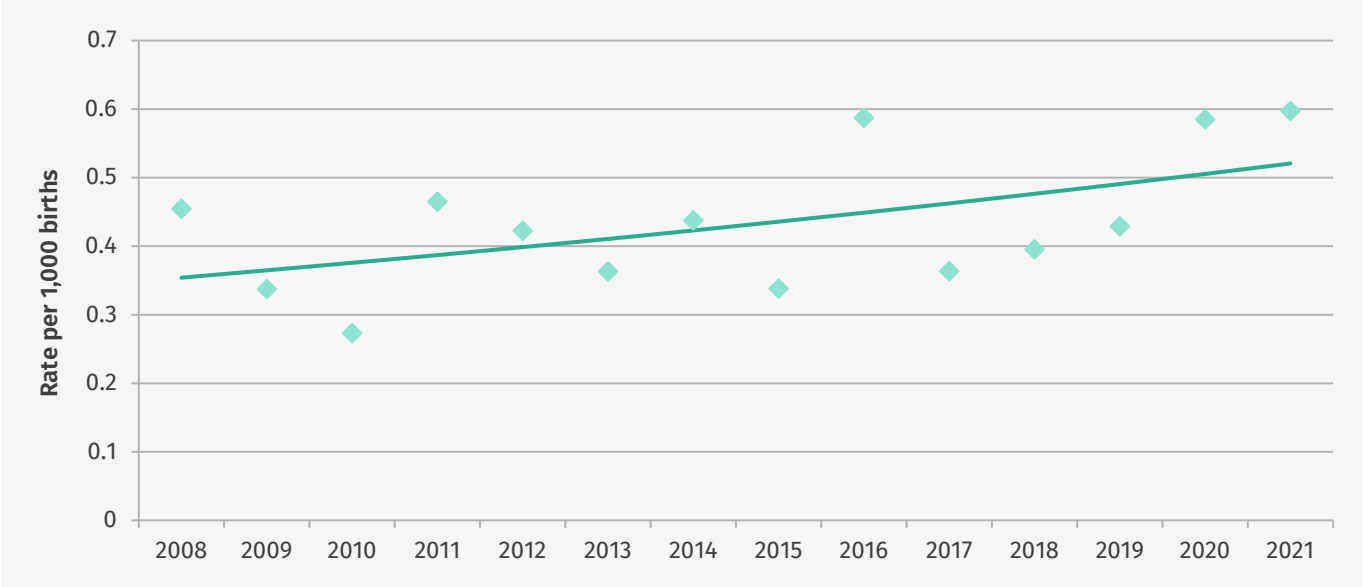


Table 9: Tetralogy of Fallot by selected maternal and child characteristics, 2017 to 2021

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	2	0.2	0.52 (0.13, 2.10), 0.357
	20-34 years	102	0.4	Reference
	35+ years	41	0.6	1.38 (0.96, 1.98), 0.084
Plurality [(b)]	Single	133	0.5	Reference
	Multiple	11	1.2	2.75 (1.49, 5.09), 0.001
Sex [(a)(b)]	Male	89	0.6	1.52 (1.09-2.13), 0.014
	Female	55	0.4	Reference
Pre-gestational diabetes	No pre-gestational diabetes	139	0.5	Reference
	Pre-gestational diabetes	6	1.7	3.73 (1.65, 8.44), 0.002
Pre-gestational hypertension	No pre-gestational hypertension	139	0.5	Reference
	Pre-gestational hypertension	6	1.5	3.36 (1.48, 7.60), 0.004

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
BMI [a][b]	Underweight <18.5	8	0.5	1.70 (0.80, 3.60), 0.164
	Normal 18.5-<25	47	0.3	Reference
	Overweight 25-29.9	34	0.5	1.45 (0.93, 2.25), 0.099
	Obese 30+	47	0.7	2.18 (1.46, 3.27), <.001
Smoking during pregnancy [a][b]	Smoked during pregnancy	19	0.5	1.18 (0.73, 1.90), 0.512
	Did not smoke during pregnancy	124	0.5	Reference
SEIFA [a]	Quintile 1 (most disadvantaged/ least advantaged)	27	0.4	1.12 (0.63, 1.98), 0.697
	Quintiles 2-4	91	0.5	1.30 (0.81, 2.08), 0.283
	Quintile 5 (most advantaged/least disadvantaged)	21	0.4	Reference

(a) excludes cases where characteristic was indeterminate, missing or unknown
(b) excludes terminations of pregnancy before 20 weeks gestation
(0.7% of tetralogy of fallot cases, and 0.3% of total births), as characteristic is not collected for these data.
(c) minor change in SEIFA boundaries occurred with changeover of ASGS structure on 1st July 2017
(d) Includes women whose Indigenous status was not stated
Source: Congenital Anomaly Linked File, Statistical Services Branch, Department of Health, Queensland
Queensland Perinatal Data Collection (QPDC), Department of Health, Queensland
Queensland Hospital Admitted Patient Data Collection (QHAPDC), Department of Health, Queensland

Congenital hypothyroidism

Congenital hypothyroidism (CH) is defined as thyroid hormone deficiency present at birth. A deficiency of thyroid hormone production may be due to complete absence of the thyroid gland, incomplete formation of the thyroid gland, abnormal hormone production by the thyroid gland, or abnormal pituitary gland function, all from birth.

It is critical diagnosis and treatment of CH is made at or near birth for optimal neurodevelopmental outcomes. Even mild hypothyroidism left untreated can lead to severe intellectual disability and growth problems.

Over the past 14 years from 2008 to 2021, there has been significant increase identified with the annual percentage change of 7.37 percent (95 percent CI: 4.29, 10.54; p-value <.001) as shown in Figure 14.

Data analysed for the past five years from 2017 to 2021 showed a 3.50-fold increased risk associated with multiple pregnancies (p-value <0.001). A 1.57-fold increased risk of was identified in mothers with a BMI of 30+ (p-value =0.02). A 1.74-fold increased risk (p-value = 0.009) was associated with mothers who smoked during pregnancy, while mothers in the most disadvantaged SEIFA quintile were also identified to have a significant 1.83-fold increased risk (p-value = 0.03) of a baby born with hypothyroidism as shown in Table 10.

Figure 14: Congenital hypothyroidism per 1,000 births, Queensland 2008 to 2021

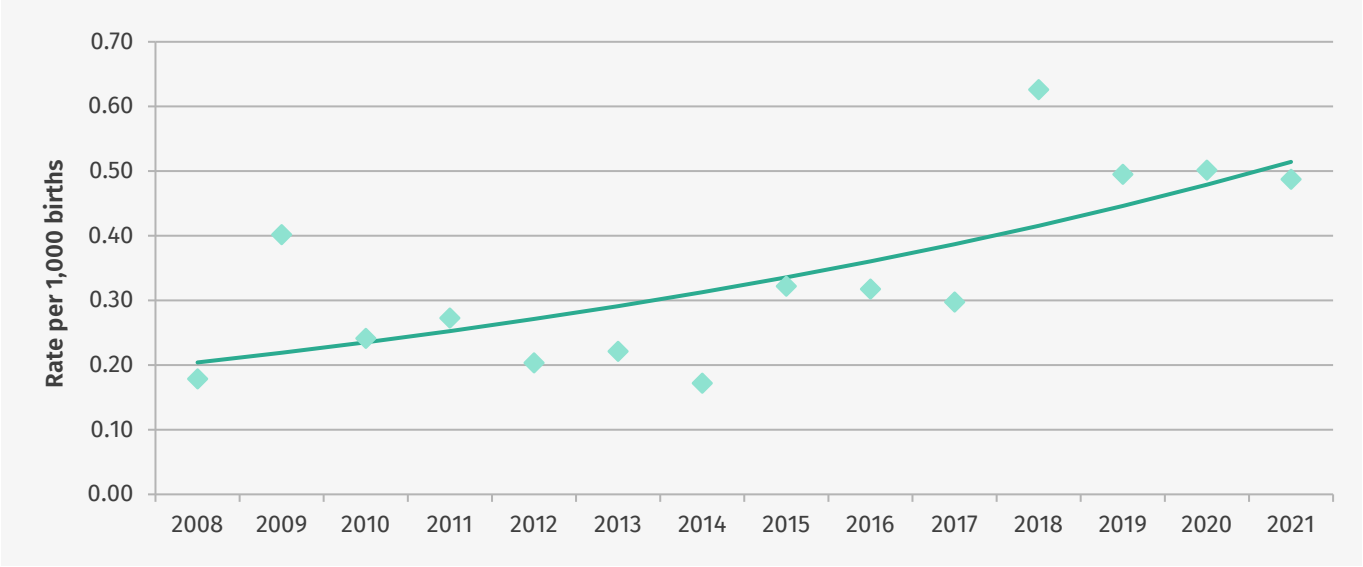


Table 10: Congenital hypothyroidism by selected maternal and child characteristics, 2020 and 2021

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Mother's age	<20 years	3	0.3	0.73 (0.23, 2.29), 0.586
	20-34 years	109	0.5	Reference
	35+ years	35	0.5	1.10 (0.75, 1.61), 0.627
Plurality [(b)]	Single	133	0.5	Reference
	Multiple	14	1.6	3.50 (2.02, 6.08), <.001
Sex [(a)(b)]	Male	76	0.5	Reference
	Female	71	0.5	0.99 (0.72, 1.37), 0.967
Pre-gestational diabetes	No pre-gestational diabetes	143	0.5	Reference
	Pre-gestational diabetes	4	1.1	2.41 (0.89, 6.52), 0.082
	No pre-gestational hypertension	144	0.5	Reference

Characteristic		Count	Rate per 1,000	RR (95% CI), p-value
Pre-gestational hypertension	Pre-gestational hypertension	3	0.8	1.62 (0.52, 5.08), 0.408
BMI [a][b]	Underweight <18.5	6	0.4	0.94 (0.41, 2.16), 0.880
	Normal 18.5-<25	64	0.4	Reference
	Overweight 25-29.9	28	0.4	0.88 (0.56, 1.37), 0.561
	Obese 30+	46	0.7	1.57 (1.08, 2.29), 0.020
Smoking during pregnancy [a][b]	Smoked during pregnancy	27	0.8	1.74 (1.15, 2.64), 0.009
	Did not smoke during pregnancy	119	0.4	Reference
SEIFA [a]	Quintile 1 (most disadvantaged/ least advantaged)	40	0.6	1.83 (1.06, 3.17), 0.030
	Quintiles 2-4	85	0.5	1.34 (0.81, 2.20), 0.250
	Quintile 5 (most advantaged/least disadvantaged)	19	0.3	Reference

(a) excludes cases where characteristic was indeterminate, missing or unknown
(b) excludes terminations of pregnancy before 20 weeks gestation (0% of congenital hypothyroidism cases, and 0.3% of total births), as characteristic is not collected for these data.

Perinatal cytomegalovirus infection

Cytomegalovirus (CMV) is a virus of the herpes family which infects people of all ages. Half of the population have been infected by young adulthood, with peaks of infection occurring in children under two years and during adolescence. Once infection has occurred, the virus remains dormant within the body.

During pregnancy, primary infection or reactivation can occur with a risk of transmission of CMV to the unborn baby – this is called congenital CMV. Women infected with CMV while pregnant have a risk of transmission to the fetus and unborn child (1 in 1,000 babies are estimated to have symptomatic perinatal CMV infection). The highest risk to the unborn baby occurs during primary infection in the first half of a pregnancy. Australian research suggests about six babies from every 1,000 will have been infected in utero. Of those six infected, one or two of them will develop permanent disabilities, which can include: hearing loss, vision loss, small head size, cerebral palsy, developmental delay, intellectual disability, and death (rare)[34].

CMV is spread via bodily fluid fluids (saliva, mucous, urine and breastmilk). Transmission can occur from the handling of contaminated tissues, nappies or children's toys with infectious droplets and transferring to a pregnant mother's eyes, nose, mouth or face.

Infection is most common in children under two years, with a higher incidence of CMV among those in day care. Pregnant women who already have young children, or who work with young children, are at the highest risk of contracting perinatal CMV.

Cytomegalovirus is the second most common cause of congenital malformation in Australia. Based on average global figures, it is estimated that each year approximately 400 children in Australia will be born with cytomegalovirus related disease[35]. The present surveillance of congenital CMV in Queensland is incomplete, as not all cases are reported to existing data repositories. The QMPQC has committed to determining the number of cases identified either during pregnancy or within 28 days after birth by acquiring individual instances of positive CMV PCR detections from diagnostic specimens collected during pregnancy or the perinatal period between the years 2017 and 2021 (Table 11). It is important to note that these reported numbers of perinatal CMV cases are likely an underestimate of the actual case rate, primarily due to the occurrence of delayed detection of perinatal acquired infection in some cases, and an incomplete record from all pathology providers. The total number identified for the five-year period 2017-2021 was 181 cases. Given CMV is likely underestimated in Queensland and there is limited awareness of cytomegalovirus infection in pregnancy among pregnant women and health care professionals (Shand 2018), increasing public awareness through graphics such as Infographic 1 should be forefront.

Currently no vaccine is available to prevent CMV infections, and the only prevention is to reduce the transmission of the virus using simple hygiene methods:

- Wash your hands with warm soapy water before and after preparing food, after feeding a young child, after handling children's toys, after going to the toilet or after changing a child's nappy.
- Wash toys, and other surfaces that come into contact with urine or saliva, with detergent and warm water.
- Children who are unwell should stay home from childcare or school.

Pregnant women particularly, should observe strict hygiene practices to avoid contact with infectious fluids – especially around young children.

- Do not place a child's dummy/pacifier into your mouth.
- Do not share a toothbrush with a young child.
- Do not share food or drinks or eating utensils with a young child.
- Avoid contact with saliva when kissing a young child.

[34] NSW Health: Cytomegalovirus (CMV) and pregnancy fact sheet

[35] Reduce your risk of CMV infection in pregnancy: Cerebral Palsy Alliance

Table 11: Perinatal CMV detections and sample types provided by Queensland pathology providers, 2017 to 2021

Pathology testing Provider	Antenatal Samples			Postnatal Samples		
	Amniocentesis	Placenta	Autopsy/ Tissue/SB^	DBS*/ Blood	Urine	Saliva
QH - Pathology Queensland	29	6	3	71	20	1
Mater Pathology	20	1	1	8	5	6
SNP#	1	0	0	3	5	1
QML Pathology	No Data Provided	No Data Provided	No Data Provided	No Data Provided	No Data Provided	No Data Provided
Total Positive Samples	50	7	4	82	30	8
Qld Cases of CMV	**61**			**120**		

^ SB- Stillbirth
*DBS-Dried blood spot card
SNP- Sullivan and Nicolaides Pathology

Figure 15: CMV Australia[36]

Good practice point

Encourage discussions with all women trying to conceive or who are pregnant regarding CMV and pregnancy, with a focus on simple hygiene measures to prevent transmission of the virus.

Educational resource: CMV Australia, Together we can Stop CMV[35]

[36] CMV Australia – Prevention Resources

Congenital syphilis

Congenital syphilis is the vertical transmission of a syphilis infection via the placenta to an unborn baby during pregnancy or at the time of birth, as confirmed using the Australian national notifiable diseases case definition. Congenital syphilis differs from adult disease in that *T.pallidum* is released straight into the bloodstream of the fetus, causing spirochetemia with early fetal spread to most organs, including the bones, kidneys, spleen, liver, and heart. This leads to widespread inflammation throughout these organ systems, resulting in various clinical manifestations ranging from fetal demise to being asymptomatic at birth, developing or being born with severe illness including but not limited to, anaemia and thrombocytopenia, bony abnormalities, hepatomegaly, lymphadenopathy, rash and fevers. Congenital syphilis that is untreated or undiagnosed during the neonatal period may progress during the first 4 years following birth to a state similar to a severe form of secondary syphilis seen in adults.

In Queensland during 2010 to 2021 there were 434 syphilis notifications (infectious/late latent) in pregnant women. Congenital syphilis cases continue to increase in Queensland and in all states in Australia except for Tasmania[37] .

Infectious syphilis in Queensland

There were 1,559 cases of infectious syphilis in women of reproductive age (15-44 years) notified between 2010-2021, with 57 percent reported in Aboriginal and Torres Strait Islander women from North Queensland and 23 percent reported in other Queenslander women from South East Queensland. In 2021, reproductive-aged Aboriginal and Torres Strait Islander women in North Queensland exhibited the highest rate of infectious syphilis notifications at 309.5 cases per 100,000 population, surpassing rates observed among Aboriginal and Torres Strait Islander women in other regions and for other Queensland women. A disproportionate number of syphilis notifications are in Queensland Aboriginal and Torres Strait Islander women of reproductive age (15-44 years), who represent 69 percent of cases from 2010-2021.

Syphilis in pregnant women

There were 266 cases of infectious syphilis in pregnant women notified between 2010 and 2021. Cases of infectious syphilis in pregnancy have been gradually increasing over time. The highest yearly number of notifications of infectious syphilis in pregnant women since 2010 was recorded in 2019 (38 notifications), where most cases were in Aboriginal and Torres Strait Islander women (61 percent). Of the 32 cases recorded in 2021, the majority were from North Queensland (47 percent), followed by South East Queensland (38 percent). Between 2010 and 2021, most cases of syphilis in pregnancy in South East Queensland region were in other Queenslander women (76 percent).

Recommendation 2:

Establish a Syphilis Expert Advisory Group for Queensland to provide expert advice to antenatal care and a support role to Hospital and Health Services in the review of SAC1 congenital syphilis cases. Monitor and evaluate adherence to testing and clinical management guidelines.

Good practice point

Referral offered to all Aboriginal and Torres Strait Islander women and women who are having an Aboriginal and/or Torres Strait Islander baby, to access maternity care through a First Nations specific Midwifery Group Practice (MGP) or an MGP model of care if available. Currently there are 12 GDF funded sites across Queensland. This includes six funded Hospital and Health Services and six Aboriginal and Torres Strait Islander Community Controlled Organisations, noting not all the funded sites offer MGP.

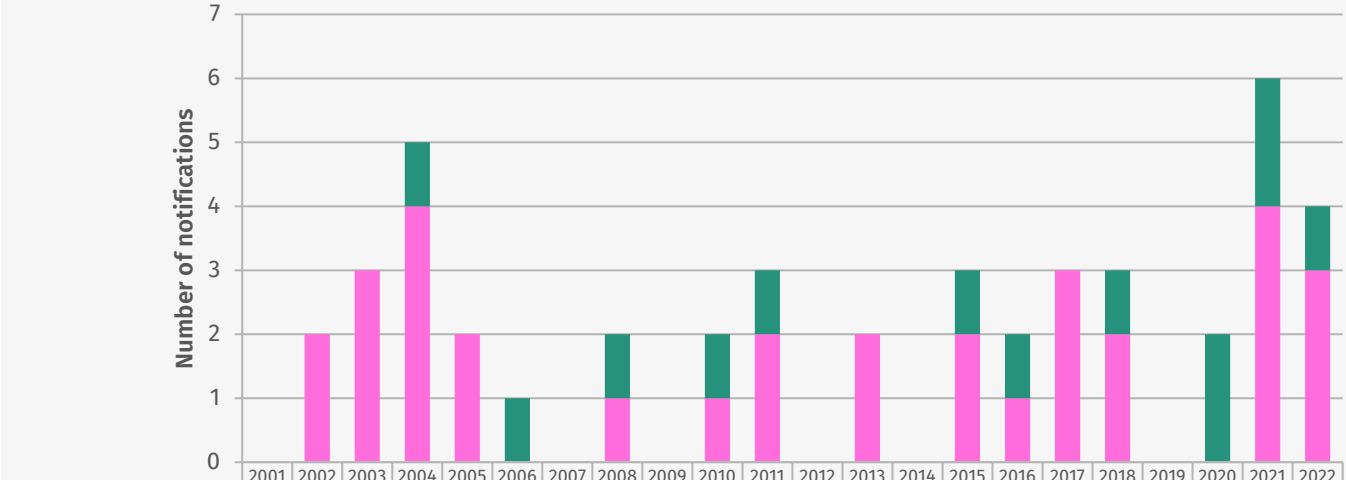
[37] National Notifiable Disease Surveillance System: Dashboard NINDSS Portal (health.gov.au)

Congenital syphilis

There have been 26 cases of congenital syphilis notified in Queensland since 2010 to 2021 (17 in Aboriginal and Torres Strait Islander infants and nine in other Queenslander infants). The increase in congenital syphilis cases is the result of the increasing number of infectious syphilis cases across remote, regional and more recently, metropolitan areas of Queensland.

Nine congenital syphilis cases were associated with intrauterine fetal deaths/stillbirths or died after birth (Seven reported from North Queensland, one from Central Queensland and one from Southeast Queensland, all in Aboriginal and Torres Strait Islander infants).

Figure 16: Notifications of congenital syphilis in Queensland, by Aboriginal and Torres Strait Islander status, 2010 to 2021



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Other Queenslanders	0	0	0	1	0	1	0	1	0	1	1	0	0	0	1	1	0	1	0	2	2	1
First Nations	0	2	3	4	2	0	0	1	0	1	2	0	2	0	2	1	3	2	0	0	4	3

Good practice point

Recognise congenital syphilis and managing infants appropriately:

- consider the diagnosis of congenital syphilis in any critically unwell infant; symptoms may include non-specific signs such as anaemia, thrombocytopaenia, hepatosplenomegaly, fever and rash
- complete parallel testing of infant and mother in all infants at risk of congenital syphilis, including rapid plasma reagin (RPR), infant syphilis antibodies (EIA IgM) and placental syphilis polymerase chain reaction (PCR)
- conduct follow-up serology at three, six and 12 months of age or until RPR is nonreactive to ensure treatment is effective
- treatment of congenital syphilis be 10 days of intravenous benzylpenicillin.

Good practice point

Adhere to Queensland Clinical Guidelines for antenatal care and treatment of women with syphilis in pregnancy to assist with:

- earlier antenatal testing and treatment: routine testing of all pregnant women three times throughout the antenatal period and for women identified at high risk it is recommended up to five times during a pregnancy
- improved monitoring of pregnant women after treatment
- better documentation of partner screening and treatment
- improved communication of maternal and infant management pathways with more frequent infant follow-up serology (seek Infectious Disease Specialist advice)[37]

Good practice point

Infants *at risk* of congenital syphilis require screening with:

a. RPR and Syphilis EIA IgM
b. Placental Syphilis PCR

Infants *diagnosed* with congenital syphilis require correct treatment with:

a. Benzyl Penicillin intravenous for 10 days
b. Follow-up serology at three, six and 12 months.

Queensland Health initiatives to improve outcomes of congenital syphilis

Congenital syphilis prevention

Queensland Health has developed a system-wide response through *the Queensland Syphilis Action Plan 2023–2028* which was released by the Honourable Shannon Fentiman MP, Minister for Health, Mental Health and Ambulance Services, and Minister for Women, in Parliament on 14 February 2024.

The action plan targets nine priority areas under the pillars: Promote Health, Prevent Disease and Manage Risk.

The action plan has incorporated recommendations from *the QMPQC Congenital Syphilis Working Group Report March 2023* [39]for ongoing prevention and management of syphilis in pregnancy and to help prevent, manage and review cases of congenital syphilis. As such two recommendations have been actioned and completed:

1. Queensland Health has established three nursing/midwife positions during 2024 (one statewide, and two regional) to support women at risk safely through pregnancy, and to deliver training and system improvements for syphilis prevention in antenatal settings.
2. The Queensland Clinical Guideline: Syphilis in Pregnancy has been updated to include universal syphilis testing for all pregnant women, in each trimester, regardless of risk. This means all Queensland women are recommended to receive syphilis testing at first antenatal visit (preferably > 10 weeks gestation), at 26–28 weeks, and at 36 weeks (or at birth if the 36-week test was missed). The update is in recognition of the fact that syphilis can be acquired at any stage of pregnancy.

Reproductive genetic carrier screening

For many families, genetic carrier testing has long been out of reach, due to cost. From November 2023, every eligible Australian has access to a subsidised screening, following its addition to the Medicare Benefits Schedule (MBS)[40]. It is recommended that carrier screening be offered to all women planning a pregnancy or in the first trimester of pregnancy, regardless of family history or geographic origin.

[38] Maternity and Neonatal Clinical Guideline - Syphilis in pregnancy
[39] Congenital Syphilis Working Group Report - March 2023 | Queensland Maternal and Perinatal Quality Council (health.qld.gov.au)
[40] Australian Government, Department of Health and Aged Care: Reproductive carrier testing for cystic fibrosis, spinal muscular atrophy and fragile X syndrome

Table 12: Characteristics of Cystic Fibrosis, Fragile X Syndrome, and Spinal Muscular Atrophy and details about genetic testing[41]

Congenital anomaly condition	Prevalence and carrier frequency	Carrier testing	Detection rate of carrier test
Cystic fibrosis (CF)	One in 2,500; one in 25. Most common life-threatening recessive condition affecting Australian children.	Detection of common and severe variants in target population.	90%(a)
Fragile X Syndrome (FXS)	One in 4000 to one in 6000/one in 250. Most common known cause of inherited intellectual disability.	Sizing of CGG repeat in 5′ region of *FMR1* gene.	>99%
Spinal Muscular Atrophy (SMA)	One in 10,000/one in 40. SMA is the most frequent genetic cause of infant mortality.	Ascertaining *SMN1* copy number.	95%

CF Cystic Fibrosis FXS, FRAGILE X SYNDROME; SMA, Spinal Muscular Atrophy.
(a) For Victorian Clinical Genetics Services 38-variant panel.

The test covers cystic fibrosis (CF), spinal muscular atrophy (SMA) and fragile X syndrome (FXS), and is available to anyone who is pregnant, planning a pregnancy, and their reproductive partner if indicated. The three conditions covered by the test are inherited and have serious consequences for children. Knowing the chance of having a child with one of these conditions offers a couple reproductive choice especially if offered prior to a pregnancy. These three conditions are the most common inheritable genetic disorders, resulting in reduced life expectancy for those diagnosed. New, early treatments are also available for CF and SMA. Approximately five percent of Australians are a carrier for one or more of the conditions, and about one in 240 couples will both be carriers[42].

Reproductive carrier screening remains an optional test for parents, rather than a required one. If individuals have a strong family history of a known possible genetic condition, it is recommended they are referred directly to a specialist clinical genetics service for further discussion about genetic testing.

Good practice point

Refer patients with a family history of a known genetic condition to a clinical genetic service for further advice regarding reproductive genetic carrier screening.

Guideline: Maternity and Neonatal Clinical Guideline: Preconception and prenatal genetic screening

Provide detailed advice to parents planning a pregnancy or in early pregnancy to include the option of Medicare funded genetic screening for the three conditions (CF/FXS/SMA).

[41] Reproductive genetic carrier screening for cystic fibrosis, fragile X syndrome, and spinal muscular atrophy in Australia: outcomes of 12,000 tests (sciencedirectassets.com)
[42] Alison Dalton Archibald, et al, Reproductive genetic carrier screening for cystic fibrosis, fragile X syndrome, and spinal muscular atrophy in Australia: outcomes of 12,000 tests, Genetics in Medicine, Volume 20, Issue 5, 2018, Pages 513-523, ISSN 1098-3600

Consumer guidance

Women need to be informed regarding all available diagnostic testing and genetic screening, with clear explanation of the decision-making points that may come with the results of such tests. Several genetic screening tests are now available to aid in determining risk factors. However, these do not negate the need for diagnostic imaging such as morphology scans and should be used in conjunction to give women the most accurate assessment. Ensuring that women have access to high quality, interactive antenatal education to make a truly informed decision is paramount. Informing women through print and digital means can be helpful but it does not replace the need for face-to-face assessment and education.

Families receiving a congenital anomaly diagnosis can feel overwhelmed, especially with the language and terms used when discussing conditions. It is important that families receive continuity of care with medical teams to ensure the information given is consistent. Often families are left navigating a complex medical system with very little direction. Having a continuity of care midwife that supports the woman through her journey can help relieve much uncertainty.

Maternal mortality

Maternal death definition

According to the World Health Organisation[43] (WHO), a maternal death is the death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. This definition excludes deaths from accidental or incidental causes.

The definitions used by the QMPQC in this report include, in addition to the WHO definition, deaths from accidental, incidental deaths and deaths occurring more than 42 days after the end of pregnancy, that is, 43 days up to 365 days.

The QMPQC is initially notified of maternal deaths by the Queensland Department of Health. This information provides the QMPQC Maternal Mortality Sub-Committee (MMSC) with the ability, in most cases, to seek detailed information about each woman's antenatal, intrapartum and postnatal care and the circumstances surrounding her death. Health professionals who had primary responsibility for the care or treatment of a woman while she was pregnant or within 365 days after the end of her pregnancy, and who are aware of the maternal death of a woman, are required by legislation[44], to provide the QMPQC with a completed maternal death reporting form[45].

Information is also sought from the State Coroner when a maternal death is subject to a coronial investigation, or an autopsy has been performed. In-depth case review by the MMSC enables appropriate classification of each maternal death and contributing factors to be reviewed. Recommendations and good practice points are then developed, and data provided to the Australian Institute of Health and Welfare for national reporting.

Classification of maternal deaths

Deaths in pregnancy and for the first 365 days after the end of pregnancy are uncommon and are classified in several ways.

- **Direct deaths** are those that result from obstetric complications of the pregnant state (pregnancy, labour and puerperium), including deaths from interventions, omissions, inappropriate treatment or from a chain of events resulting from any of the above. They are complications of the pregnancy itself.
- **Indirect deaths** are those which result from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by physiological effects of pregnancy.
- **Incidental deaths** are those due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association. These deaths are not included in the calculation of the Maternal Mortality Ratio (MMR).
- **Late maternal death** is the death of a woman later than 42 days but within one year of giving birth or otherwise ending a pregnancy. These deaths are not included in the calculation of the MMR (see below).
- **Unclassified deaths** are those for which the review of the case by a multidisciplinary team could not determine a specific cause or do not agree with the diagnosis of death.

Classification of maternal suicide

The WHO has reclassified maternal suicide as a direct cause of maternal death. The QMPQC has endorsed this classification noting the difficulty in ascertaining pre-existing mental health conditions in some instances, and the relationship between

[43] World Health Organization, Maternal Mortality Ratio (per 100 000 live births), WHO 2017

[44] *Public Health Act 2005*, s 228F Maternal Deaths Statistics

[45] National Maternal Death Reporting Form

pregnancy and suicide and emphasising the significance of pregnancy and the first 12 months following as a significant psychosocial stressor.

However, after extensive review of two of the ten suicides, the committee classified one maternal death by suicide as incidental and the other as indirect. Both deaths occurred within 42-365 days post termination of pregnancy. Comprehensive review identified longstanding predisposing factors including mental health issues, psychosocial adversity and substance use disorder that predated the pregnancy.

Maternal mortality ratio (MMR) Australia

The MMR is defined as:

$$\frac{\text{Number of maternal deaths}}{\text{Number of women who gave birth}} \times 100{,}000$$

In 2020 and 2021, 42 deaths occurred during pregnancy or within 365 days of the end of a pregnancy. For the purpose of calculating the MMR, the WHO definition for maternal death is applied[46]. There were 12 maternal deaths (four direct deaths, three indirect death and five incidental deaths) which fit with this definition, giving an MMR of 5.80 per 100,000 births which is corresponds to the national rate of 5.8 per 100,000 births for the same period. (Note - this is not due to obstetric causes, but other causes such as worsening perinatal mental health and pregnancies complicated by various malignancies). There were 30 late maternal deaths for this period. These were classified as eight direct deaths, three indirect deaths, 18 incidental deaths and one which could not be classified.

The MMR in Queensland in the most recent four triennia are shown in Table 13 and have been explained in more detail in previous QMPQC reports[47].

Table 13: Maternal mortality ratios (MMR), Queensland and Australia, 2010-12 and 2019-21

Triennia	Direct	Indirect	Number of women who gave birth in Queensland	MMR Queensland	MMR Australia[48]
2010-2012	8	9	184,820	9.2	8.0
2013-2015	7	4	185,935	5.9	6.0
2016-2018	6	8	180,919	7.7	6.5
2019-2021	5	4	180,772	5.0	5.8

Includes direct and indirect deaths within 42 days of the end of pregnancy.

Classification of cause of maternal deaths

In this section, the broader definition of maternal death is used, including incidental and late maternal deaths.

Table 14 shows the classification of the 42 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy in the period 2020 and 2021. Twelve deaths were a direct result of the pregnancy and six indirect deaths (resulting from a pre-existing condition aggravated by the physiological effects of pregnancy) were reported. Twenty-three women died of incidental causes. One case could not be classified.

Table 14: Classification of maternal deaths in Queensland 2020 and 2021 (includes incidental and late deaths)

Maternal death timing	Classification	Total
Deaths during pregnancy	Direct Indirect Incidental	0 3 3
Deaths within 42 days of end of pregnancy	Direct Indirect Incidental	4 0 2
Deaths between 43 days and 365 days of end of pregnancy (i.e. late maternal deaths)	Direct Indirect Incidental Unclassified	8 3 18 1
Total		**42**

Includes all maternal deaths.

[46] World Health Organisation - Maternal mortality ratio
[47] QMPQC Mothers and Babies Reports – Resources and Reports
[48] Australian Institute of Health and Welfare (AIHW) 2021, Maternal deaths, viewed 11 May 2022

Cause of Queensland maternal death

Table 15 shows the cause of the 42 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy. Suicide (10), malignancy (7) and motor vehicle trauma (6) were the most prominent causes of death during 2020 and 2021. As the numbers are small on a population basis, care should be taken with interpretation.

Table 15: Causes of maternal deaths in Queensland 2020 and 2021

Cause of death	During Pregnancy/ 0-42 days postpartum Number	43-365 days postpartum Number
Total deaths	**12**	**30**
Direct		
Suicide	1	7
Amniotic fluid embolism	1	
Haemorrhage		
• Catastrophic intracranial haemorrhage	1	
Cardiac		
• Pulmonary Embolism	1	1
All direct deaths	**4**	**8**
Indirect		
Cardiac		
• Cardiomyopathy	1	
Epilepsy	2	
Homicide		1
Malignancy		
• Metastatic cervical cancer		1
Suicide		1
All indirect deaths	**3**	**3**
Incidental		
Cardiac		
• Pulmonary Embolism		2
Haemorrhage		
• Ruptured saccular aneurysm		1
• Posterior fossa haemorrhage		1
Homicide		1
Malignancy		
• Metastatic melanoma		1
• Metastatic colorectal cancer	1	2
• Metastatic carcinoma to peritoneum		1
• Metastatic oral carcinoma		1
Motor vehicle trauma	2	4
Respiratory		
• Asthma		1
• Respiratory infection (Rhinovirus)	1	
Smoke Inhalation		1

Cause of death	During Pregnancy/ 0-42 days postpartum Number	43-365 days postpartum Number
Substance related	1	1
Suicide		1
All incidental deaths	**5**	**18**
Unclassified		
Sudden death, cause undetermined		1
All unclassified deaths		**1**

Includes all maternal deaths.

Perinatal mental health

Postpartum suicide

As with the last *Mothers and Babies Report 2021*[49], suicide remains the most common cause of maternal mortality in the 43-365 days postpartum for Queensland mothers.

The period covered by this review being 2020 and 2021 were the first two years of the COVID-19 pandemic. Although the clinical notes reviewed by the committee did not document the implications or impact on the lives of women who tragically ended their lives through suicide during this period, research has identified an elevated occurrence of mental health issues, such as anxiety and depression, in the peripartum period associated with COVID-19[50,51]. Previous reports of the QMPQC have shown suicide proportions between 18 to 33 percent for the biennial period.

Table 16: Queensland maternal suicides for biennial reporting periods 2014 to 2021.

QMPQC Report Year	Years Reviewed	Suicides	Total Maternal Deaths	Percentage of Maternal Deaths
2017	2014 and 2015	10	57	18
2019	2016 and 2017	9	37	24
2021	2018 and 2019	12	36	33
2023	2020 and 2021	8	42	19

Changes in delivery of perinatal healthcare services may have led to reduced screening, detection, and treatment of mental illness. There was also a noted increase in contributors to poor perinatal mental health including domestic and family violence and social isolation. Another contributing factor could have been difficulty in accessing support and mental health care during pandemic times.[52]

It is important to continue to highlight maternal deaths by suicide and to review contributing factors that can be modified to influence this statistic. The development of the *Perinatal Mental Health Guidelines*[53] within the *Statewide Maternity and Neonatal Clinical Guidelines* will help to contribute to improving knowledge and skills in screening assessments and the referring of women at risk of perinatal mental illness. Maternal death by suicide remains as a public health issue which is of concern to the MMSC and requires considered attention.

There were 10 women that died due to suicide in 2020 and 2021.

[49] Report of the Queensland Maternal and Perinatal Quality Council 2021

[50] Ahmad M, Vismara L. The Psychological Impact of COVID-19 Pandemic on Women's Mental Health during Pregnancy: A Rapid Evidence Review. Int J Environ Res Public Health. 2021 Jul 2;18(13):7112.

[51] Polchleb C, Sung L. COVID-19 and pandemic perinatal mental health in Australia. Aust J Gen Pract. 2021 May 12;50. doi: 10.31128/AJGP- COVID-49. PMID: 33987630.

[52] Prevalence of domestic violence among women during the COVID-19 pandemic

[53] Guidelines in development: Perinatal mental health

Significant associations

Most women who died by suicide faced significant psychosocial adversity, including low levels of social support, homelessness, domestic violence, comorbid mental health difficulties, often longstanding and associated substance use disorders and were often subject to child protection concerns. Frequently, these women had histories of multiple adversities over their lifetime, including complex trauma and high burden of adverse childhood experiences.

Recommendation 3:

Raise awareness of education resources on suicide safety planning and access to acute mental health services that are available to healthcare professionals who support women and families in the peripartum.

Good practice point

That the loss of a baby or child, either by Termination of Pregnancy (ToP), miscarriage, stillbirth and neonatal death or by the child being taken into care increases the vulnerability to mental illness for parents, and they should receive additional monitoring and support.

Poor engagement

Engaging women who experience multiple and significant psychosocial adversities, mental health and comorbid substance use issues can be challenging. These women often have medical comorbidities in addition. Ensuring continuity of care is essential to promote individualised care and active participation in prenatal and postnatal care, as well as in the follow-up of child health. This includes mental health services, support for alcohol and substance use, and other support services aimed at effectively addressing these challenges.

Most suicides, along with deaths related to mental health issues, substance use, and psychosocial challenges, including domestic violence, occurred between 42 days and 1 year after pregnancy. Screening in pregnancy for mental health, substance use, and psychosocial adversity has significantly contributed to identifying high risk women in pregnancy and the early postpartum period. The current emphasis should shift towards promoting and providing resources for appropriate referral pathways to services that effectively address and support vulnerable women throughout all stages of pregnancy and the initial 1,000 days. All hospital maternity care providers should furnish a well-defined discharge plan for mental health follow-up. Additionally, midwives and child health nurses participating in postpartum care must ensure that suitable mental health and psychosocial follow-up is carried out. Though the challenges faced by vulnerable women can complicate their interaction with services, it is crucial to identify and understand the barriers, address their needs, offer personalised care, and be flexible with engagement timeframes. Achieving optimal care and preventing service duplication necessitate the establishment of robust communication and information exchange systems.

Good practice point

Coordinate services across mental health, general practice, child health and family support services and encourage ongoing engagement with women throughout the continuum of their maternal journey rather than just initiated in times of crisis. “Given the importance of the first 1000 days, it is critical new mothers and families are provided with high quality postnatal support.”

Domestic and family violence

Domestic violence, also referred to as intimate partner violence or family violence, is a significant concern in present-day Australia. This type of violence can initiate or escalate during pregnancy and the postpartum period. Women face an increased risk of domestic violence from their partners during these phases. Younger women and those with unplanned pregnancies are often emotionally and economically vulnerable, making them more susceptible to domestic violence. Women who have experienced sexual abuse from their partners also face a higher risk of abuse during pregnancy. Tragically, two women lost their lives due to domestic violence in Queensland in this report. Although domestic violence screening is conducted during hospital antenatal visits using mandatory psychosocial screening tools, various factors, such as barriers for women to disclose and system-related challenges, can influence the accuracy of screening.

The presence of domestic and family violence played a significant role in five maternal deaths. The adverse effects of violence against women encompass compromised physical health, diminished mental wellbeing, including conditions such as depression and anxiety disorders, alcohol use disorders, economic insecurity, and a consequential impact on parenting capacity. Safety concerns significantly contribute to poor mental health and instances of suicide during the peripartum period. Women with a history of mental health challenges face an elevated risk of experiencing domestic violence. Notably, there is a substantial correlation between domestic violence and suicidal behaviour. A connection exists between a history of domestic and family abuse in childhood and subsequent challenges in mental health and relationships in adulthood. Emphasizing the importance of inquiry and support for women enduring domestic violence during pregnancy and the initial postpartum year cannot be overstated.

Recommendation 4:

Raise awareness of the training and resources available to staff to prevent, identify and support the care of women experiencing family, domestic and sexual violence in the peripartum. (National Plan to End Violence against Women and Children 2022-2032, Commonwealth of Australia).

Access to mental health mother and baby unit and specialist perinatal psychiatric advice

Among the mothers who died by suicide, two of the deaths were related to difficulties with accessing joint mother and baby admission in a mother and baby unit[54,55]. Prior to April 2023, Queensland had only four mental health inpatient beds designated for mothers and their infants. The establishment of Catherine's House at Mater Hospital in Brisbane has expanded the bed capacity to 12, yet this figure still falls short of the recommended number of beds per delivered population. From the Position Statement on Perinatal Mental Health Services released by Royal Australian and New Zealand Collage of Psychiatrist[56], it estimates a requirement for one eight-bedded unit for every 15,000 deliveries. Moreover, these beds are primarily concentrated in the southeast corner of Queensland, posing difficulties for women residing in regional areas to access inpatient care.

Recommendation 5:

Support the continued, dedicated resourcing of additional mother-baby units throughout Queensland.

[54] Catherine's House for Mothers, Babies and Families
[55] Lavender Mother and Baby Unit
[56] Position Statement on Perinatal Mental Health Services RANZCP Oct 2021

Assessment of suicide risk

Screening with the Edinburgh Postnatal Depression Scale involves inquiring about thoughts of self-harm and suicide. It is crucial to integrate education and skills development for maternity care providers and services catering to women and their families. This includes assessing and appropriately referring of women facing mental health challenges, psychosocial adversity (including domestic violence), and suicidal ideation. Adequately resourced mental health pathways are essential, with a focus on recognising unique risk factors for suicide in women during the peripartum period.

Good practice point

Promote opportunities for interprofessional collaboration and training between mental health and maternity care providers, including joint initiatives between colleges and organisations.

Similar to the previous review of maternal deaths by suicide, the lack of awareness among acute adult mental health services about unique risk factors for suicidal ideation and/or behaviour during the peripartum period was noted. This includes comorbid mental health disorders, a history of complex trauma, personality disorders, alcohol and substance use disorders, psychosocial adversity (including domestic violence), and engagement with child protection services. Contributing factors also included reliance on cross-sectional assessments, underestimating the impact of long-term risk factors, failure to obtain collateral information from family and friends, and assessments in regional areas or outside regular hours with limited access to specialist perinatal mental health expertise.

Suicide risk assessments in peripartum women should be informed by knowledge of unique risk factors and warning signs associated with this patient population. This includes an awareness of symptoms and signs of postpartum psychosis and the increased risk of suicidality in mothers currently involved or with a history of involvement with Child Protection Services.

The *Queensland Health Guideline on Suicide Prevention Practice*[57] offers evidence-based guidance for identifying and responding to the needs of individuals at risk of suicide presenting to Mental Health and Alcohol and other Drugs Services (MHAOD). This guide is complemented by suicide risk assessment and management training provided by the Queensland Centre for Mental Health Learning. The guidelines recommend suicide safety planning intervention as a collaborative process involving staff, the individual and their family and friends. This assists the individual in managing suicidal thoughts while also reducing access to lethal means, which has proven efficacy in influencing outcomes for people experiencing suicidal ideation.

Suicide in women from immigrant communities

One of the women who died by suicide was from a culturally and linguistically diverse (CALD) community. Factors related to immigration and trauma experienced prior to immigration can contribute significantly to psychosocial stressors impacting on perinatal mental health.

Recommendation 6:

Provide access to education and training resources to strengthen the capacity of health professionals to care for women with perinatal mental health and psychosocial health concerns, throughout the continuum of perinatal and postnatal care.

[57] Queensland Health Guideline Suicide Prevention Practice.

Good practice point

Provide staff with better understand suicide prevention pathways, including safety planning for women, consideration of access that women may have to various means of suicide, and unique stressors that pregnant, recently pregnant and postpartum woman may have. Particular attention should be given to those women currently involved with or who have a history of involvement with child protection services.

Adopt the *Queensland Health Guideline on Suicide Prevention Practice* at a widespread level throughout Queensland and by all services responding to suicidal crises.

Recommendation 7:

Provide access to education and training resources to strengthen the capacity of health professionals to care for women with perinatal mental health and psychosocial health concerns, throughout the continuum of perinatal and postnatal care.

Good practice point

Provide women with psychosocial and mental health adversities with individualised continuity of care during pregnancy and into post pregnancy, to ensure access and engagement with services. These women need multidisciplinary, multiagency care that have skilled staff to manage their complex needs including assertive outreach and have systems in place to ensure robust communication between services to avoid disengagement, fragmentation and duplication of care.

Trauma informed care

In some cases, missed antenatal appointments contributed to maternal deaths. This was contributed to by the history of complex trauma in some women. Women with a history of complex trauma are often less able to engage in high quality care. Complex trauma has a range of consequences including lower levels of education, reduced capacity for self-care, higher rates of substance use as a soothing behaviour and higher rates of mental illness. There are often higher rates of poverty and ongoing experiences of domestic violence that may make accessing medical care difficult. They may have been exposed to difficulties in accessing healthcare in the past.

Women who have Post Traumatic Stress Disorder (PTSD) due to complex trauma, previous birthing experiences, or for any other reason need greater attention when managing their care. This is to ensure health care is not triggering or leading to avoidance of continuing maternity care or dis-engagement, resulting in either harm or poor health outcomes. There is an urgent need for maternity health care providers to be educated about trauma informed care, and the role complex trauma has in women being able to engage in care[58].

Recommendation 8:

Raise awareness of training and resources available to healthcare professionals for unplanned pregnancies, complex trauma and the principles of trauma informed care.

Good practice point

Women with a history of complex trauma benefit from sensitive trauma informed care with support from multidisciplinary services through collaboration with maternity services, alcohol and other drugs services, mental health services, domestic violence services, continuity of midwifery care, general practice and other services as required.

[58] Blue Knot: resources for supporting patients effected by trauma

Consumer guidance

The suicide of women during or in the year after pregnancy is a tragedy for a family and the community, with enduring impact. Consumers commend the attention that has been paid in this and previous reports to perinatal mental health, and once again, echo the call for greater investment in this area, including increasing the capacity of in-patient mother-baby mental health services in Queensland.

Consumers also strongly support the emphasis in this report on trauma-informed care, and in particular, the need for training for health care professionals. While accessing sufficient and timely antenatal care is known to reduce the risk of poor perinatal outcomes, the reasons that this sometimes does not occur are complex. When women do not access the recommended minimum number of antenatal visits there is an opportunity to reorientate health services and develop models of care that are acceptable and accessible to women. Such models of care are likely to be relationship based, delivered in the community, close to where women live.
As part of trauma-informed practice, maternity care providers must be alert to the possibility that maternity care experiences can be traumatic, even when they seem 'normal' or 'necessary' from a professional viewpoint. Taking a trauma-informed approach offers an opportunity to meet the woman's needs and addresses reasons for disengagement.

Consumers encourage a focus on the review of serious maternal morbidity cases and women's experiences of care in addition to maternal death reviews to improve the safety and quality of maternity care in Queensland.

Malignancy in pregnancy

In each maternal mortality report in Queensland over the past eight years, there have been cases of women who have died after a late diagnosis of malignancy during pregnancy. The symptoms and signs of pregnancy can overlap with those of malignancy, for example, nausea and vomiting, abdominal distension and discomfort, breast changes, alterations in bowel habit, fatigue, iron deficiency anaemia and increasing pigmentation of skin lesions. It is important that any practitioner providing antenatal care does not ignore persisting symptoms and postpone relevant and indicated malignancy investigations because of pregnancy. It is vital that if a practitioner would normally investigate a symptom or sign, for example, bleeding from the rectum, if the woman was not pregnant, that they do so during pregnancy to avoid a delayed diagnosis of malignancy. Endoscopy, colonoscopy, and many radiological procedures can be safely performed during pregnancy if clinically indicated.

Delayed diagnosis of cervical cancer is a recurrent theme. If a woman presents with persistent vaginal bleeding, consideration should be given to the woman's cervical cancer screening history and her Human Papillomavirus (HPV) status. Continued vaginal bleeding throughout pregnancy requires attention and investigation. Women who have had limited or absent cervical screening need an updated cervical screening examination. Options for screening, including a self-test and/or speculum and clinical examination should be conducted during pregnancy.

Good practice point

Although most cases of cervical abnormalities are likely to be asymptomatic and identified through screening, it is important to consider non-obstetric causes when a pregnant woman reports vaginal bleeding.

Routine antenatal and postpartum care should include a review of the woman's cervical screening history. Women who are due or overdue for screening should be screened as per the Cervical cancer screening national clinical guidelines - Screening in pregnancy.

In some cases, advanced malignancy in pregnancy needs very careful consideration. The ethical debate of continuing a pregnancy while treatment is being administered needs to consider the impact of the cancer prognosis for the mother, and the likely outcome for the baby. In these cases, termination of pregnancy needs to be discussed and made available if requested for all women in this complex situation.

Recommendation 9:

Incorporate guidance to ensure cervical cancer as a differential diagnosis for antepartum haemorrhage into existing Queensland Clinical Guidelines as per the Cervical cancer screening national clinical guidelines - Screening in pregnancy.

Recommendation 10:

Ensure clinical training includes speculum examinations and diagnosis/exclusion of cervical cancer during pregnancy.

Intracranial haemorrhage

Intracranial haemorrhage (ICH) is a rare, yet potentially devastating event in pregnancy and remains a significant cause of maternal mortality. The risk of haemorrhage increases during the third trimester of pregnancy and is greatest during birth/parturition and the puerperium. Intracranial haemorrhage can be extradural, subdural, subarachnoid or intraparenchymal with the causes of bleeding potentially including trauma, arteriovenous malformations, aneurysms, preeclampsia/eclampsia and venous thrombosis. Three maternal cases were reviewed with ICH as the diagnosis of death. In some of the cases there were delays in recognition of clinical deterioration, in accurate diagnosis and in the provision of care, which may have affected the outcome.

Good practice point

Investigate cause of headaches resistant to treatment in postpartum women. Increase regular monitoring of patient's vital signs using Q-MEWT charts, conduct appropriate neurological and radiological investigations and promptly escalate the woman to consultant care if there are signs of clinical deterioration.

Postpartum events

Venous Thromboembolism (VTE)

Failure to follow clinical guidelines on postpartum thromboprophylaxis contributed to one maternal death in this report. The *Queensland Clinical Guideline Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium*[59] should be followed, particularly for women who have risk factors such as operative deliveries, higher BMIs, smoking, pregestational or gestational diabetes, hypertension, sepsis, and other co-morbidities.

In some of the cases reviewed, women were administered VTE prophylaxis; however, it was noted that the dose was inadequate or inappropriately administered for the patient's current BMI.

[59] Queensland Clinical Guidelines; Maternity and Neonatal Clinical Guideline- Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium

Good practice point

The postpartum period is a significant risk time for VTE. Consider adequate prophylaxis for all women, including dosing adjusted to twice daily for women with higher BMIs.

Demonstrate adherence to the Queensland Clinical Guideline Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium to an auditable standard.

Women presenting postpartum with respiratory symptoms, chest pain or other clinical features that suggest a pulmonary embolism (PE) should be adequately investigated and treated for VTE. Venous ultrasound or specific imaging to exclude a PE (CTPA/VQ scan) should be performed if there is any clinical concern, including in breastfeeding women.

In the event of a Medical Emergency Response Time call or a Code Blue activation for women postpartum, consider doing an ECG.

Ensure all wards and patient accessed areas are equipped with adult resuscitation equipment especially in the neonatology nursery.

Cardiomyopathy

Cardiomyopathy is a disease of the heart muscle which can lead to cardiac dysfunction and abnormal heart rhythms. Most cases of cardiomyopathy associated with pregnancy are dilated cardiomyopathy, which can be idiopathic, acquired or have a genetic component. The aetiology of one case where a woman had dilated cardiomyopathy was unclear. Therefore, it is recommended that first degree relatives seek medical advice regarding their own cardiovascular risks, including genetic testing if indicated.

Hypertension, obesity, and pregnancy are significant contributing conditions increasing the risk of cardiomyopathy. Hypertension can affect cardiovascular haemodynamics, which may increase strain on the heart in the setting of dilated cardiomyopathy. Pregnancy is known to involve haemodynamic changes such as an increase in circulating intravascular volume and relative haemodilution of red blood cells due to increased plasma volume and hence is a risk factor for cardiomyopathy. Obesity is a significant condition in pregnancy as it affects cardiovascular haemodynamics, which may increase strain on the heart in the setting of dilated cardiomyopathy.

Good practice point

In patients identified as high risk with increased BMIs and hypertension, perform a more thorough assessment of cardiac status, in line with the *Queensland Clinical Guideline Hypertension and pregnancy* and the *Queensland Clinical Guideline Obesity and pregnancy (including post bariatric surgery)*.

Recommend all first-degree relatives to seek medical advice including genetic screening, regarding personal cardiovascular risks.

Investigations of pre-existing conditions in pregnancy

Asthma and epilepsy

Women who are planning a pregnancy and have a pre-existing medical condition need access to appropriately trained health professionals (general practitioner, obstetrician, obstetric medicine physician, and or geneticist) who can provide suitable pre-conception advice. The women should be supported to optimise her medical condition prior to conception. Appropriate preconception advice is required regarding the impact of pregnancy on the condition, and the impact of the condition on pregnancy. Treatment issues during pregnancy need to be discussed, ideally prior to conception.

If a woman is pregnant and undergoing investigations for pre-existing medical conditions, practitioners providing care must be alert to the various physiological changes that occur in pregnancy and interpret the results of any test accordingly, to avoid misinterpretation and over investigation.

Lack of appropriate investigations and management of complex and chronic medical conditions remains a contributor to adverse events. Experienced physicians with expertise in pregnancy care need to be involved in complex decision making. In general, there are very few investigations that should be delayed until after pregnancy. If a decision is being made to delay investigation until after pregnancy, this should only be made by highly experienced clinicians, ideally with multi-disciplinary team review and input.

Medical disorders of pregnancy

The range and complexity of medical disorders of pregnancy contributing to maternal death, in some cases reviewed complex medical co-morbidities, contributed but were not the cause of death. An essential part of the multi-disciplinary team within birthing services needs to include appropriately skilled and qualified obstetric physicians.

Recommendation 11:

Review the Clinical Services Capability Framework - maternity module for maternity services to consider the requirement for Level 4 services to have access to obstetric medicine services.

Shared antenatal care

Many women have shared antenatal care provided by their primary maternity carer (eg. general practitioner or midwife) and the birthing facility health care professionals. Currently, the recommended mechanism for facilitating continuity of care and information exchange (clinical handover) is the Pregnancy Health Record (PHR).

Many sites in Queensland now have an ieMR. If electronic records are used, there is currently no easy way to ensure timely and accurate information sharing and maintenance of continuity of care between community and birthing facility health care professionals. This is a significant safety risk and may cause unnecessary duplication of care. Attention needs to be given by eHealth Queensland to find a satisfactory solution to this problem, in the interests of women and their safe pregnancy care.

Recommendation 12:

In sites using electronic medical records, implement mechanisms to ensure timely data sharing between hospital providers, GPs, midwives, and women.

The Pregnancy Health Record is an important opportunity for women to be actively involved in their care, and an important conduit for communication between clinicians. While the implementation of an integrated ieMR may have many benefits, this review of multiple cases highlighted gaps in communication between hospital and community-based maternity care providers. From a consumer point of view, the implementation of ieMR has diminished women's access to their health records. Consider strategies to rectify the fragmentation of care between hospital and community settings and reinstate information sharing with women.

Condition and postnatal plan at discharge

A familiar theme observed from the in-depth review of the 42 maternal cases was the poor quality of postnatal care and handover for the women. Formal clinical handover to primary and community care is essential for the continuum of care. All women need to be discharged with an agreed written postnatal care plan, which must be communicated in a timely way to the woman's primary carer.

Good practice point

Provide all women leaving hospital with an agreed documented postnatal care plan which includes details of the practitioner, medical practice or community centre providing follow-up care, significant issues requiring follow-up, and a contraceptive plan.

Ensure women who require medical or psychological follow-up have appropriate referrals at time of discharge.

Elements of the postnatal discharge plan should include:

- For women
  - Information about what to expect in the first six weeks postpartum
  - Baby's Personal Health Record (Red book)[60]
  - Child Health information: Your guide to the first 12 months[61]
  - When and how to seek care in the event of concerns.
- For midwives
  - Relevant clinical information about the pregnancy, labour and immediate postnatal period including:
    - Mode of delivery and with associated delivery outcomes including:
      - Perineal status
      - Estimated blood loss with pathology results.
  - Domestic and family violence/mental health concerns
  - Neonatal condition including:
    - Feeding status
    - Neonatal outcomes including:
      - Apgars/resuscitation
      - Neonatal complications.
- For general practitioners
  - Recommendations for routine five, seven day, and six-week Mother and Baby checks including cervical screening, contraception, perinatal mental health, immunisation and infant feeding
  - Identified pregnancy, birth or postnatal complications and recommended follow up (eg. anaemia, gestational diabetes mellitus (GDM), thyroid disease, hypertension, VTE, OASIS)
  - Consultation and referral pathways if required.

Good practice point

Provide all women with information on what to expect in the first six weeks postpartum in addition to the *Baby's Personal Health Record* (red book) and Child Health Information *Your guide to the first 12 months*.

If a decision is made to discharge a woman earlier than recommended, have the decision reviewed by senior medical staff and the multidisciplinary team, prior to discharge.

Make sure postnatal care is woman and family centred, recognising the challenges of caring for a newborn while recovering from birth.

Following a pregnancy complicated by hypertensive disorders of pregnancy, women have an increased risk in future pregnancies of gestational hypertension and pre-eclampsia as well as an increased risk of longer-term cardiovascular disease. Ensure these women have annual cardiovascular risk factor assessment including blood pressure, serum lipids and blood glucose level.

Women with gestational diabetes mellitus require lifelong screening for the development of Type 2 diabetes and cardiovascular disease. If planning future pregnancies, annual oral glucose tolerance testing (OGTT) or HbA1c is recommended and if no further pregnancies are planned, diabetes screening is recommended every three years.

[60] Personal health record (red book) information for Parents and Families

[61] Your guide to the first 12 months

Ensure postnatal appointments are of sufficient duration to meet the needs of women and babies in the puerperium, recognising the challenges that can be posed by adapting to the demands of a new infant while recovering from birth.

General practitioners providing puerperal care should have regular continuing professional development to ensure their practice is contemporary and evidence-based.

Autopsies following maternal death

The Maternal Mortality Sub-Committee reiterates the comments and recommendation included in the *three previous* QMPQC Reports[62] [63] [64] regarding the importance of establishing an accurate diagnosis in cases of unexpected and/or sudden death, in women who are pregnant or in the first 12 months postpartum. An autopsy is strongly recommended in cases where a cause of death is unclear. There were over 20 percent of women from 2004 to 2021 for which an autopsy was not performed (Table 13). A molecular autopsy is required if a cause of death is not identified through conventional autopsy. Additionally, clinicians need to be aware of referral pathways for first degree relatives of the deceased for clinical family screening and where appropriate, genetic testing of unexplained sudden cardiac death. The aim of these further steps is to identify causes of sudden unexplained cardiac death, most importantly inherited arrhythmias, in which there may be life-saving treatments available for other affected family members. This information needs to be provided to families for the purpose of informed decision-making about their own health. In a recent study led by Australian and New Zealand investigators, genetic testing revealed a likely cause of death in 27 percent of otherwise unexplained sudden cardiac deaths in the young (aged <35 years), and relevant clinical diagnoses in 13 percent of families referred for screening[65]. Genetics Health Queensland offers a Statewide Cardiac Genetics Service based at the Royal Brisbane and Women's Hospital (adults) and Queensland Children's Hospital (children).

Regional clinics and telehealth appointments are also available. The service offers family screening, genetic counselling and where appropriate genetic testing.

Recommendation 13:

Consider amending the *Queensland Coroners Act 2003* to include investigation of all maternal deaths (including late deaths), except where there is a clear and unequivocally diagnosed cause of death, for example, a known metastatic malignancy.

Good practice point

Emphasise that unexpected and/or sudden death in women of childbearing age has a broad differential diagnosis which should be considered in all cases. Clinical diagnosis does not override the importance of autopsy.

Sub-optimal care factors

The QMPQC considers the national reporting preference in relation to contributing factors when classifying maternal death cases (see Appendix D). Table 17 shows over 37 percent of women who died during 2004 to 2021 had contributing possible or significant sub-optimal care factors identified.

[62] Report of the Queensland Maternal and Perinatal Quality Council 2017. Page 42.
[63] Report of the Queensland Maternal and Perinatal Quality Council 2019. Page 54.
[64] Report of the Queensland Maternal and Perinatal Quality Council 2021. Page 41.
[65] Bagnall RD et al A Prospective Study of Sudden Cardiac Death among Children and Young Adults: N Engl J Med 2016;374:2441-52

Characteristics of women who died in the period 2004-2021

Table 17: Clinical characteristics of direct and indirect maternal deaths, Queensland 2004 to 2021 (death during pregnancy or within 42 days of giving birth)

Characteristic		2004-2021	%
Death classification	Direct	44	51.2
	Indirect	41	47.7
	Classification uncertain	1	1.2
Timing of death	Death occurred after a termination of pregnancy	8	9.3
	Death occurred after miscarriage	3	3.5
	Death occurred after the woman gave birth	53	61.6
	Death occurred in first trimester of pregnancy	7	8.1
	Death occurred in second trimester of pregnancy	8	9.3
	Death occurred in third trimester of pregnancy	7	8.1
Autopsy	Autopsy performed	67	77.9
	Autopsy not performed	19	22.1
Sub-optimal care factor(s)	Sub-optimal factor/s identified likely to have contributed to outcome (significant)	6	7.0
	Sub-optimal factor/s identified might have contributed to outcome (possible)	26	30.2
	Sub-optimal factor/s not identified or unlikely to have contributed to outcome (insignificant)	46	53.5
	Unknown/not stated	7	8.1
	Not applicable	1	1.2

Includes direct and indirect deaths within 42 days of the end of pregnancy.

Aboriginal and Torres Strait Islander women comprised 13.1 percent of maternal deaths from 2016 to 2021, but just 7.2 percent of all births in Queensland over the same period. Similar results are seen from 2010 to 2015 (Table 18). This indicates an ongoing elevated rate of Aboriginal and Torres Strait Islander maternal deaths. There is still a long way to go in closing the gap for Aboriginal and Torres Strait Islander women.

Co-designing services for Aboriginal and Torres Strait Islander peoples with Aboriginal and Torres Strait Islander communities and organisations will improve cultural safety whilst ensuring the service meets the needs of the community. The QMPQC encourages clinicians to continue to advocate for system changes and to continue to work collaboratively with Aboriginal and Torres Strait Islander staff, communities and community-controlled organisations to advocate for system change, that will improve outcomes. This system change will need to ensure strengthening of the multidisciplinary team to ensure that families have increased access to a range of clinical specialities that best suit their needs whilst focusing on increasing the Aboriginal and Torres Strait Islander workforce.

Table 18: Characteristics of women who died (direct and indirect deaths), and proportions of all women giving birth, Queensland, 2010 to 2021

	2010-2015				2016-2021			
	Maternal Deaths		Queensland		Maternal Deaths		Queensland	
	n	%	n	%	n	%	n	%
Aboriginal and Torres Strait Islander decent	6	14.0	22,606	6.1	8	13.1	26,001	7.2
Non- Aboriginal and Torres Strait Islander decent	37	86.0	348,149	93.9	53	86.9	335,690	92.8
First time mother	5	17.9	152,529	41.1	12	22.6	150,450	41.6
One/more previous birth	23	82.1	218,224	58.9	41	77.4	211,240	58.4
Less than 20 years	3	7.0	17,668	4.8	3	4.9	10,719	3.0
20-34 years	28	65.1	280,823	75.7	44	72.1	273,430	75.6
35+ years	12	27.9	72,264	19.5	14	23.0	77,542	21.4
Underweight	0	0.0	20,060	5.5	5	12.8	17,955	5.0
Normal	12	46.2	187,415	51.4	14	35.9	175,779	49.2
Overweight	6	23.1	85,886	23.6	7	17.9	85,907	24.0
Obese	8	30.8	71,211	19.5	13	33.3	77,882	21.8
Major cities	24	55.8	225,631	61.5	38	64.4	230,389	64.3
Inner regional	16	37.2	71,919	19.6	12	20.3	66,986	18.7
Outer regional	2	4.7	58,245	15.9	8	13.6	51,397	14.3
Remote/very remote	1	2.3	11,371	3.1	1	1.7	9,620	2.7

Includes all direct and indirect deaths.

Proportions are calculated as Proportion of women with available data for that characteristic. Totals for each characteristic vary depending on data completeness. BMI only available from July 2007.

Reporting of maternal deaths

Since the amendment in 2013 to the *Queensland Public Health Act 2005* (the Act) which mandates the reporting of maternal deaths by public and private health professionals, there has been vast improvement in the QMPQC's capacity to review and appropriately classify maternal deaths. This demonstrates the value of pursuing appropriate legislative amendment. Specifically, Division 3, Section 228F and 228 G of the Act outlines who is responsible for providing the notification about a maternal death and in what format. The National Maternal Death Report Form is the designated format for the reporting of all maternal deaths in Queensland.

Good practice point

All health professionals who had primary responsibility for the care or treatment of a woman while she was pregnant or within 365 days after the end of her pregnancy, and who are aware of the maternal death of a woman, are required by legislation[65] to provide the QMPQC with a National Maternal Death Report form completed with as much information as possible.

[66] *Public Health Act 2005, s 228F, 228G*

Queensland Health initiatives to improve maternal outcomes

Queensland Perinatal and Infant Mental Health (PIMH) initiatives

Enhancement to public inpatient mother-baby beds: Catherine's House, Mater Health Services:

An additional eight public mother-baby inpatient beds have opened at Catherine's House, Mater Health Services. These beds, added to those at the Lavender Unit on the Gold Coast, increase the total public Queensland inpatient perinatal and infant mental health bed stock to 12. Catherine's House and the Lavender Unit accept referrals from across Queensland, for women experiencing severe and complex mental illness and their newborn babies under 12 months of age.

Enhancement to existing Specialist Perinatal and Infant Mental Health Services:

HHSs will receive an additional 21 Specialist Community PIMH clinical positions (12 Perinatal and nine Infant mental health positions). These specialist positions are embedded within existing community child and youth and adult mental health services and will provide assessment and treatment to PIMH consumers. In addition, these positions will work to develop local partnerships and service linkages with maternity/ midwifery, child health, peer-led perinatal programs, general practice, and other community support programs. This includes provision of consultation-liaison to this broader sector. These positions will be supported by an increase in specialist PIMH consultant psychiatry positions.

Enhancement to e-PIMH Telepsychiatry Service:

e-PIMH is a statewide telepsychiatry secondary consultation service supporting the social and emotional needs of expectant parents and families with infant and young children (birth to five years). e-PIMH provides equitable access to specialist perinatal and infant psychiatrists in a timely manner and reduce the need to travel for more intensive supports. An additional clinical support role has been funded to increase the capacity of the e-PIMH telepsychiatry service to support the focus on regional, rural and remote areas of Queensland, and to reduce gaps in the service system where they exist.

Enhancement to Statewide *Together in Mind* Perinatal and Infant Mental Health Day Program:

The *Together in Mind* (TiM) Program is a PIMH day program for women experiencing moderate to severe perinatal mental illness and their infants under nine months of age. The TiM Program is a six-week, one day per week program, collaboratively facilitated by adult mental health, infant mental health, and child health clinicians. All three clinicians work together with the mothers and infants attending the group to deliver psychoeducational information regarding their mental health and wellbeing, to support the mother's mental health needs and positive attachment with their infants. TiM is currently delivered in 12 HHSs. A Statewide TiM Program Coordinator has been funded to support the implementation of the program across Queensland. Additionally, HHSs have been provided with funding for TiM Coordinator positions to ensure their capacity to deliver the TiM program.

Perinatal and Infant Mental Health Statewide Consumer Carer Coordinator – Queensland Centre for Perinatal and Infant Mental Health:

The PIMH Statewide Consumer Carer Coordinator position has been enhanced to ensure that the consumer and carer voice is promoted within PIMH service development across Queensland, champion the needs of perinatal families, and empower consumers, families, and clinicians to work together collaboratively to codesign the PIMH continuum of care.

Perinatal and Infant Mental Health Statewide Aboriginal and Torres Strait Islander Coordinator – Queensland Centre for Perinatal and Infant Mental Health:

The PIMH Statewide Aboriginal and Torres Strait Islander Coordinator role works towards ensuring PIMH services are culturally safe and appropriate for First Nations families living in Queensland. This is achieved through networking, engagement and advocacy to ensure the right people are consulted with and involved in the decision-making processes for best possible PIMH outcomes for all First Nations families. The role works in collaboratively to provide a cultural lens to all work undertaken at the Queensland Centre for PIMH. The Aboriginal and Torres Strait Islander work has been enhanced by focussing on Men's Business and providing Jarjum clinical support.

Perinatal mortality

Stillbirth is defined by the *Queensland Public Health Act 2005* as a 'baby who has shown no signs of respiration or heartbeat, or other signs of life after completely leaving its mother, and who has been gestated for 20 weeks or more or weighs 400g or more'.

Live birth is defined by *the Act* as a 'baby whose heart has beaten after delivery of the baby is completed'.

Perinatal mortality is defined in this report as all stillbirths of at least 20 weeks gestation or at least 400 grams birthweight and neonatal deaths as births of live-born babies of any weight or gestation who die within the first 28 days of life. In Queensland between 2020 and 2021, there were 1,380 perinatal deaths resulting in a perinatal mortality rate of 11.2 per 1,000 births. This included:

- 982 stillbirths (8.0 per 1,000 births)
- 397 neonatal deaths (3.3 per 1,000 live births)
- When terminations of pregnancy are excluded, perinatal mortality results are:
  - 810 perinatal deaths (6.6. per 1,000 births)
  - 495 stillbirths (4.0 per 1,000 births)
  - 314 neonatal deaths (2.6 per 1,000 live births)
- The national perinatal mortality rate for the same period was 9.6 per 1,000 births (stillbirth rate 7.3 per 1,000 births and neonatal mortality rate 2.3 per 1,000 live births).[67] The stillbirth, neonatal death and perinatal mortality rates in Queensland are all higher than the corresponding national rates. However, comparisons with other jurisdictions are imprecise due to the variation in legislation and practices for reporting and registration of stillbirths in different Australian states. Furthermore, some states do not report terminations of pregnancy. CEQ is advocating to align the definition across all 3 reports: Report on Government Services (ROGS), AIHW and the Queensland PDC.
- There has been a statistically significant increase in the rate of stillbirths in Queensland over the decade 2012 to 2021 (annual percentage change: 1.8; 95 percent CI: 0.7, 2.8) while the incremental increase in neonatal death rate was not statistically significant (annual percentage change: 0.1; 95 percent CI: -1.4, 1.7).
- Higher perinatal mortality rates occur in hospitals where women with higher risk pregnancies give birth. Table 15 shows that the highest rates occur in hospitals where the rate of preterm birth and other associated risk factors is highest.
- The data in Table 19 must be carefully interpreted as no adjustments are made for the different populations using hospitals of different levels. For example, the higher rate of perinatal deaths in Level 6 hospitals can be accounted for by the higher neonatal death rate. This is directly related to their role in caring for babies who are born extremely preterm due to the neonatal intensive care facilities located in Level 6 hospitals.

[67] https://www.aihw.gov.au/reports/mothers-babies/stillbirths-and-neonatal-deaths

Table 19: Rate of perinatal mortality and selected perinatal/maternal risk factors, excluding terminations of pregnancy and babies with selected major congenital anomalies, by hospital peer group, 2020 and 2021

Peer Group	Stillbirth rate (a)	Neonatal death rate (b)	Perinatal death rate (a)	Preterm birth rate (c)	LBW (d)	% < 5 antenatal visits (e)	% smoking after 20 weeks (f)	% obese (g)
LEVEL 2/3	3.5	1.0	4.4	3.8	2.9	4.1	17.1	23.3
LEVEL 4/5	3.9	1.7	5.6	8.0	6.2	3.2	13.3	30.2
LEVEL 6	4.1	3.1	7.3	9.9	8.4	4.9	7.3	19.6
PRIVATE	2.8	1.4	4.3	8.2	5.2	1.2	0.3	16.9
TOTAL (h)	3.8	2.1	5.9	8.3	6.4	3.4	8.9	23.3

Peer group determined based on Clinical Services Capability Framework. See https://www.health.Queensland.gov.au/__data/assets/pdf_file/0024/444273/cscf-maternity.pdf for further details.
Birthing centres categorised as peer group of parent facility.
(a) Rate per 1,000 births.
(b) Rate per 1,000 livebirths; mortality within 28 days of birth.
(c) Rate of babies born prior to 37 weeks gestation per 100 births. Excludes records of unknown gestation.
(d) Low birthweight (lbw). Rate of babies <2500g per 100 livebirths. Excludes records of unknown birthweight.
(e) Rate per 100 births. Excludes babies born to mothers with unknown number of antenatal visits and births at less than 32 weeks gestation.
(f) Rate per 100 births. Excludes babies born to mothers of unknown smoking status after 20 weeks.
(g) Rate per 100 births. Excludes babies born to mothers of unknown BMI.
(h) Includes babies born at level 1 facilities, born before arrival, home birthed and born at not stated facility.

Deaths of Aboriginal and Torres Strait Islander babies

In Queensland and nationally, stillbirths and neonatal deaths occur at a higher rate among babies born to Aboriginal and Torres Strait Islander women than among babies born to non-Aboriginal and Torres Strait Islander women. In Queensland, in 2020 and 2021, the rate of stillbirth was 1.8 times higher, and the rate of neonatal deaths was 1.9 times higher among babies born to Aboriginal and Torres Strait Islander women compared to babies born to other women. There has been little change in this figure over the past decade. When death rates were explored within gestational age categories, a significant disparity in term stillbirths was found between babies born to Aboriginal and Torres Strait Islander women and babies born to other women. For Aboriginal and Torres Strait Islander people, the ongoing impact of colonisation has had a devastating effect. Factors such as cultural identity, family and kinship, country and caring for country, knowledge and beliefs, language and participation in cultural activities and access to traditional lands are the key determinants of health and wellbeing. These factors are interrelated and combine to affect the health of individuals and broader communities[68]. The disparity has been attributed to higher rates of maternal diabetes, perinatal infection, fetal growth restriction and unexplained antepartum fetal death in Aboriginal and Torres Strait Islander women[69].

Causes of perinatal deaths

The Perinatal Society of Australia and New Zealand (PSANZ) perinatal mortality classification system was developed for use in Australia and New Zealand as part of the process of clinical audit of perinatal deaths[70].

The classification system includes a PSANZ Perinatal Death Classification (PSANZ-PDC) for classifying the main obstetric antecedent factor that led to the chain of events resulting in the stillbirth or neonatal death, and a Neonatal Death Classification (PSANZ-NDC) for classifying the main condition in the neonatal period that caused the death. According to the Queensland Health perinatal data custodians, for approximately 50 percent of all perinatal deaths, the PSANZ classifications are assigned by the QMPQC's PMSC following consideration of all available clinical information for each perinatal death. Maternity

[68] AIHW- Determinants of health for Indigenous Australians
[69] Ibiebele I, Coory M, Boyle F, Humphrey M, Vlack S, Flenady V. Stillbirth rates among indigenous and non-indigenous women in Queensland, Australia: is the gap closing? BJOG 2014; DOI: 10.1111/14 DOI: 10.1111/14 DOI: 10.1111/1471- 0528.13047.

[70] PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Appendix J - Perinatal Mortality Classifications – Quick Reference Sheet.

services with experienced perinatal and maternal mortality review committees, independently classify their perinatal deaths and submit these to the QMPQC and Statistical Services Branch.

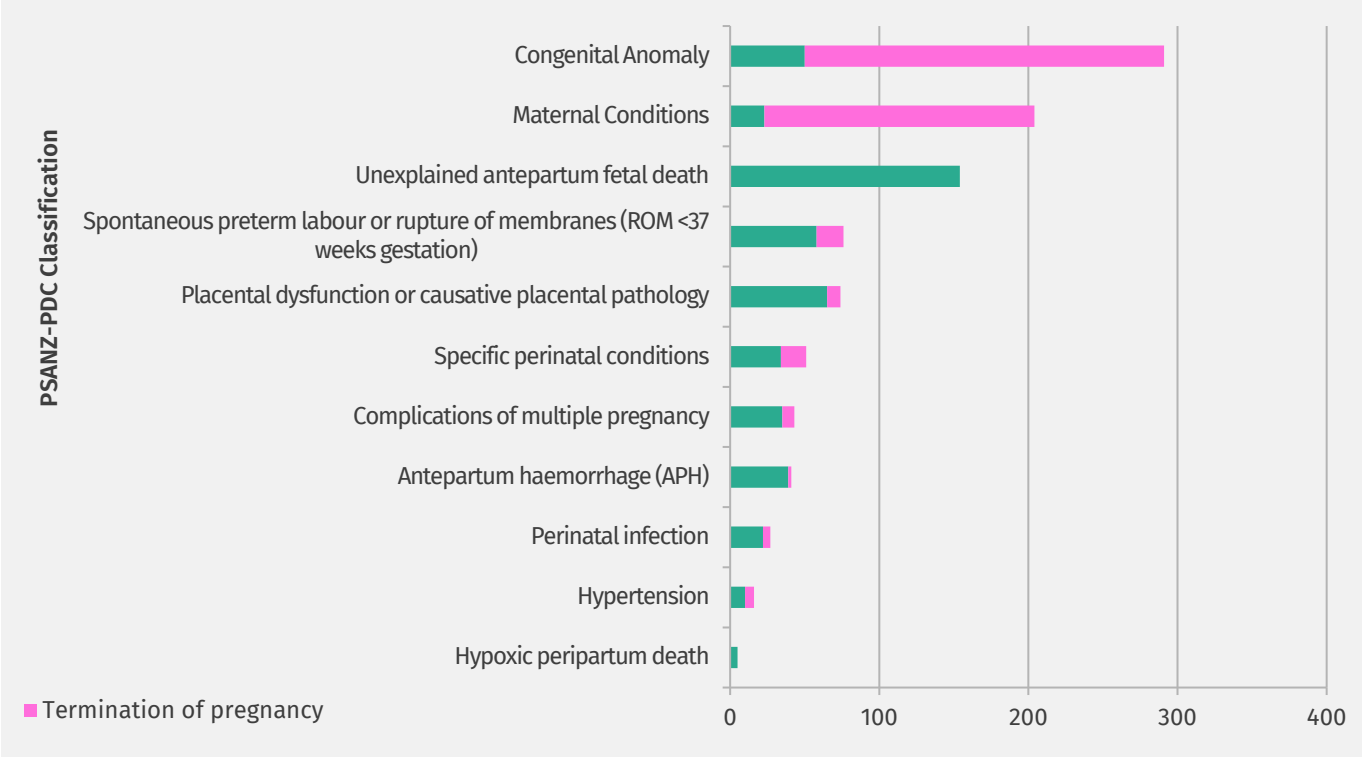
Figure 17 and Figure 18 illustrate the PSANZ-PDC classified causes of death for stillbirths and neonatal deaths in 2020 and 2021.The leading cause of stillbirths was congenital anomaly, accounting for 29.4 percent of all stillbirths in 2020 and 2021. Of note, terminations of pregnancy account for a large number of perinatal losses classified with the PSANZ codes:

a. Congenital anomaly
b. Maternal conditions

NB. The terminations of pregnancy for maternal conditions include terminations of pregnancy for maternal psycho-social reasons.

In 2020 and 2021, approximately one out of every six stillbirths (16 percent) were classified as unexplained. Notably, this proportion increased to 35.8 percent for term stillborn babies[71]. However, the proportion of stillbirths classified as unexplained is likely to be overestimated due to the sub-optimal uptake of perinatal investigations, particularly the number of families that decline an autopsy.

Figure 17: Stillbirths by PSANZ-PDC classification including those resulting from terminations of pregnancy Queensland, 2020 and 2021

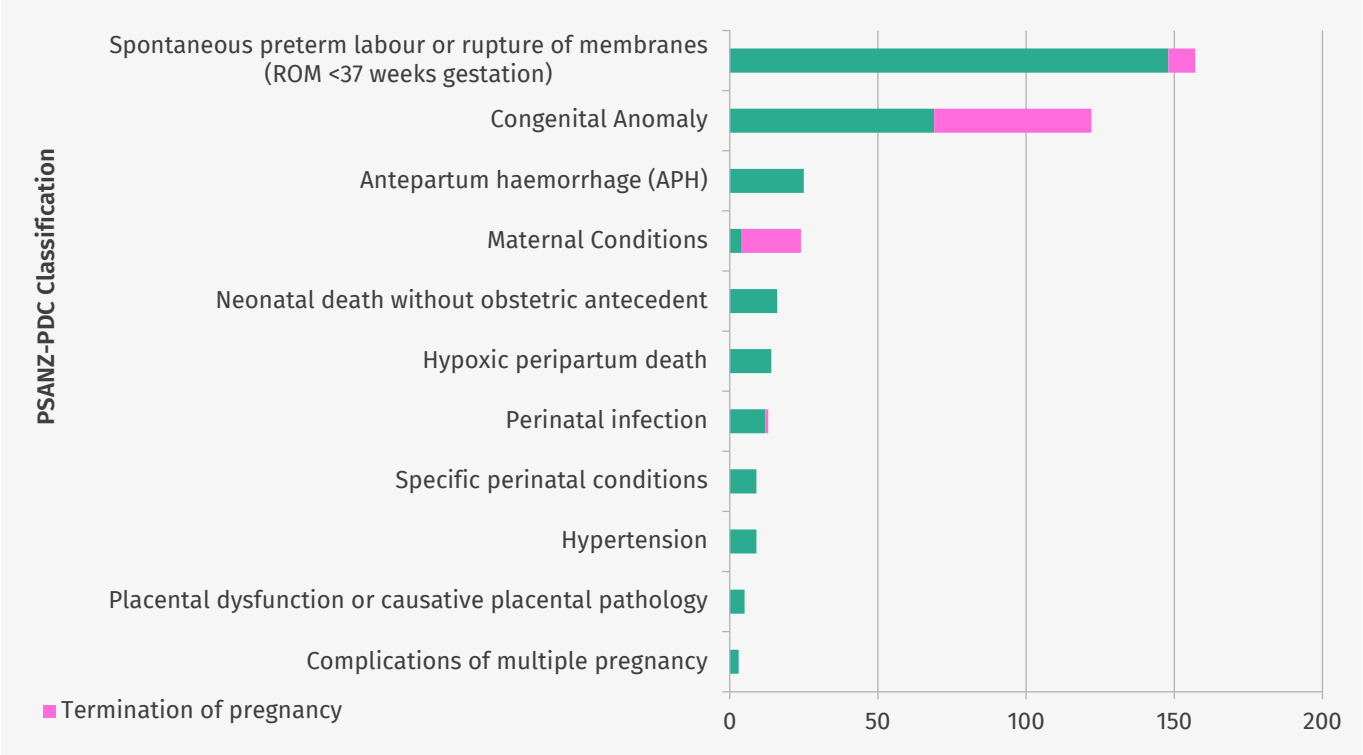


Termination of pregnancy for maternal psychosocial indications is specifically listed within the *Maternal conditions* in PSANZ-PDC classifications

[71] Queensland Health, Statistical Services Branch (2020). Causes of Perinatal Deaths, Queensland [Data file].

In 2020 and 2021, the leading PSANZ-PDC cause of neonatal deaths was spontaneous preterm birth (39.5 percent), followed by congenital anomaly (30.7 percent) (Figure 18).

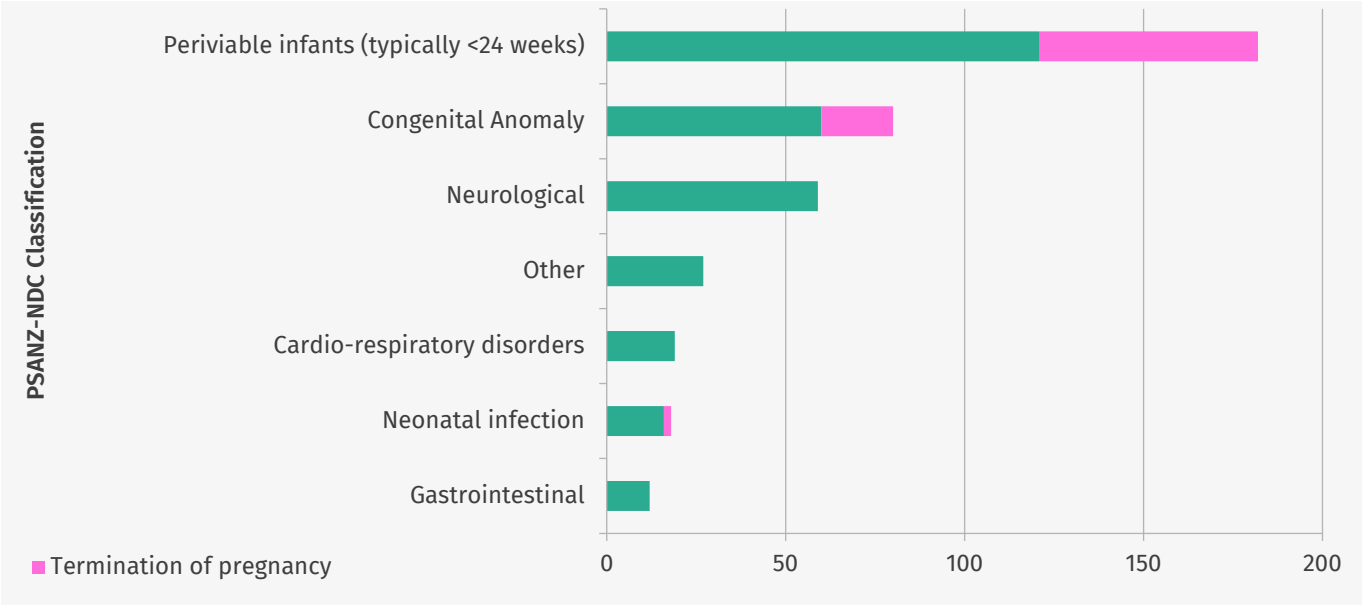
Figure 18: Neonatal deaths by PSANZ-PDC classification including those resulting from terminations of pregnancy, Queensland, 2020 and 2021



Termination of pregnancy for maternal psychosocial indications is specifically listed within the *Maternal conditions* in PSANZ-PDC classifications

Figure 19 shows the neonatal deaths by PSANZ-NDC classification. In 2020 and 2021, periviable infants born from 20 to 25 weeks of gestation was the leading cause of neonatal deaths by PSANZ-NDC classification.

Figure 19: Neonatal deaths by PSANZ-NDC classification as Proportion of all neonatal deaths, Queensland 2020 and 2021



Causes of death vary by factors such as gestational age, maternal age, plurality and Aboriginal and Torres Strait Islander status. An interactive list of PSANZ causes of death by these factors is available at https://www.health.Queensland.gov.au/hsu/dashboards/psanz.xlsm

While most stillbirths occur in the antepartum period, attention to intrapartum deaths is important due to the potential for prevention, particularly in late gestations. Trends in intrapartum deaths (excluding termination of pregnancies and congenital anomalies) over the period 2001 - 2021 (by triennia) show a steady decline from 0.8/1,000 to 0.3/1,000 births with the largest reduction seen for intrapartum stillbirths 25-28 weeks with a decline from 13.8/1,000 in the period 2001-2003 to 2.9/1,000 births in 2019-2021 (Table 20). The rate of intrapartum stillbirths at term was <0.1 per 1,000 births in 2019-2021 (8 deaths per 166,627 births).

Table 20: Rates of intrapartum death (excluding congenital abnormalities and terminations of pregnancy), by triennia and gestational age, babies whose births were recorded in Queensland facilities, 2001 to 2021

Gestation weeks	Years	Intrapartum deaths	Births	Rate (per 1,000 births)
25-28	2001-2003	9	651	13.8
	2004-2006	6	709	8.5
	2007-2009	4	736	5.4
	2010-2012	6	781	7.7
	2013-2015	3	688	4.4
	2016-2018	3	707	4.2
	2019-2021	2	678	2.9

Gestation weeks	Years	Intrapartum deaths	Births	Rate (per 1,000 births)
29-36	2001-2003	6	10,810	0.6
	2004-2006	10	12,443	0.8
	2007-2009	4	13,822	0.3
	2010-2012	7	14,447	0.5
	2013-2015	3	14,853	0.2
	2016-2018	2	14,815	0.1
	2019-2021	3	14,165	0.2
37+	2001-2003	23	136,434	0.2
	2004-2006	14	148,209	0.1
	2007-2009	26	167,404	0.2
	2010-2012	16	170,905	0.1
	2013-2015	18	171,581	0.1
	2016-2018	6	166,396	0.0
	2019-2021	8	166,627	0.0

Excludes babies born at less than 20 gestation weeks, babies with unknown gestation weeks, and babies who died prior to commencement of birth.
Intrapartum deaths are deaths of babies whose heartbeat ceased during labour but before birth, as recorded in the heartbeat field in the Queensland Perinatal Data Collection.
Terminations of pregnancy/congenital abnormalities are defined by at least one of the following:

- A PSANZ Perinatal Death Classification (PSANZ-PDC) category 1 (Congenital anomalies, including terminations for congenital anomalies) recorded for the baby.
- An ICD-10-AM code of P96.4 (termination of pregnancy, affecting fetus and newborn) recorded as a cause of death for the baby.
- An ICD-9-CM code of 779.6 (termination of pregnancy (fetus)) recorded as a cause of death for the baby.
- Where the baby was a singleton, an ICD-10-AM code of 0O4 (medical abortion) recorded for the mother.
- Where the baby was a singleton, an ICD-9-CM code of 635 (legally induced abortion) recorded for the mother.

The coding of terminations of pregnancy has not been individually checked prior to 2005. Terminations of pregnancy prior to 2005 should be interpreted with caution.

Perinatal mortality review

Investigating the causes of stillbirth and neonatal deaths

The purpose of an autopsy is to accurately identify the cause/s of death. Autopsy results contribute to clinical audit and assist with identification of factors contributing to the death. Perinatal autopsy examinations require written consent from the parent/s following informed discussions. A full and detailed perinatal autopsy, including all ancillary investigations performed by an appropriately trained and experienced perinatal pathologist, is the gold standard for investigation of stillbirths and neonatal deaths. The autopsy investigations include microbiology, radiology, and appropriate molecular genetics, as well as the detailed and careful macroscopic dissection and histology.

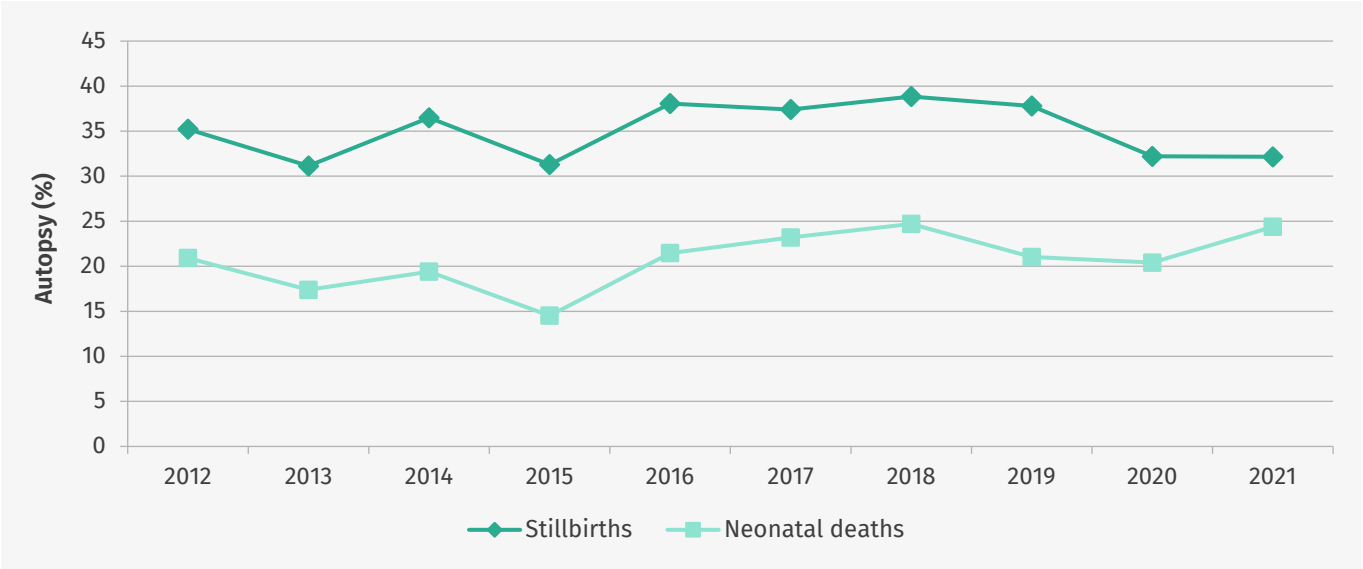
It is important to ensure high quality perinatal autopsies are performed by experienced perinatal pathologists. Most other states and territories in Australia have established specific centres to undertake these autopsies. Identified specific centres with expertise and experience in performing perinatal autopsies are located at the Royal Brisbane and Women's Hospital, Mater Hospital Brisbane, Sunshine Coast University Hospital and Gold Coast University Hospital. Appropriate staffing including perinatal pathologist, mortuary staff and laboratory staff are required to ensure that these centres can provide appropriate and detailed perinatal autopsies and post-mortem investigations for Queenslanders who suffer a perinatal death. Appropriate skilled pathologists are also necessary to ensure detailed accurate reporting of placentas for all intrauterine deaths.

Recommendation 14:

Appropriately resourcing and follow-up with Queensland Health tertiary perinatal pathology centres to ensure that timely, high-quality perinatal and neonatal autopsy investigations, including placenta pathology, can be conducted by perinatal pathologists.

There is no legal requirement in Queensland to perform an autopsy in all cases of stillbirth and neonatal death. Less than one third of stillborn babies had an autopsy in 2020 and 2021 (32.2 percent) compared to the national autopsy uptake rate of 43 percent for 2021. The autopsy rate for stillbirths has fluctuated over time with a decline in 2020 and 2021. The rate of neonatal death autopsy in 2020 and 2021 was much lower than stillbirth autopsy rates at only 22.4 percent with a national rate of 33 percent for 2021[72] (Figure 20). In perinatal deaths occurring after 34 weeks' gestation, placental histological examination by a pathologist was conducted in almost all (93.3 percent) cases. This represents good compliance with current recommendations and guidelines for perinatal mortality investigations and will be highlighted in future webinar education series.

Figure 20: Proportion of stillbirths and neonatal deaths autopsy undertaken, Queensland, 2012 to 2021



Low perinatal autopsy rates are also of concern internationally and have been attributed to lack of appropriately skilled pathologists; poor staff knowledge and confidence; negative attitudes about the value of autopsy; parents' difficulty in making the decision at a time of intense grief; controversy over past practices of organ retention, and complex consent requirements. Parents need clear and consistent information delivered in a timely and sensitive manner to enable informed decision-making. Where stillbirth or neonatal death is anticipated, these discussions can be had sensitively during the antenatal period. Counselling parents about the option of an autopsy should be carried out by a senior health care professional who has a detailed understanding about the procedure. This should also occur in collaboration with a clinician who has an established relationship with the family[73].

Informed Consent - Autopsy | Queensland Health

Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health[74]

[72] Australia's mothers and babies: Stillbirths and neonatal deaths

[73] PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Section 4 - Perinatal Autopsy Including Placental Assessment.

[74] Perinatal and Fetal Autopsy Consent and Clinical Summary | Queensland Health

Good practice point

Offer the option of a high-quality autopsy examination to all parents following, or who are anticipating, a perinatal death with counselling on the procedure provided by a senior clinician working in collaboration with a clinician, ideally the known midwife, with whom the family has an established relationship.

In addition to the offer of autopsy, obtain as a minimum for all stillbirths, a comprehensive maternal and pregnancy history plus placental histopathology; testing for feto-maternal haemorrhage; cytogenetics, molecular and other investigations, as indicated according to the PSANZ Guidelines.

Give parents the opportunity to discuss the results of all investigations with someone skilled and experienced in this specialised field, recognising that in some cases this may require a referral to a tertiary perinatal centre.

Ensure all staff working in maternity facilities attend an IMPROVE (Improving Perinatal Review and Outcomes via Education) workshop to help increase the uptake of perinatal autopsies and investigations in Queensland.

The PSANZ bi-national guidelines on perinatal mortality recommend core investigations for both stillbirths and neonatal deaths[75]. The Queensland Clinical Guidelines have adopted the guideline for stillbirth investigation[76].

The PSANZ Guideline recommendations align with the WHO Guidelines, which recommend that all maternity services implement high quality perinatal mortality audit, including classification and consideration of contributing (sub-standard care) factors for every stillbirth and neonatal death[77, 78].

Stillbirths and neonatal deaths are rare events in smaller centres. This can result in a lack of experience in perinatal mortality audit. The PMSC has discussed how best to address this issue and a 'hub and spoke' model has been suggested (i.e., where smaller hospitals link to their larger regional counterpart for support in the management of perinatal mortality audit).

It is acknowledged that healthcare providers prefer to evaluate their own care and can do so effectively through Perinatal and Maternal Mortality Review Committees (PMMRCs) and comprehensive clinical incident analysis. Perinatal mortality audit undertaken at the local level is recommended by the QMPQC. After changes prompted by the QMPQC in 2016, to Section 29(1) of the *Hospital and Health Boards Regulation 2012*, where stillbirths were included as a reportable event, the QMPQC developed a guidance paper to assist HHSs in determining which stillbirths required in-depth analysis[79].

Queensland Health initiatives to improve perinatal outcomes

Clinical Midwife Consultant Audit – Patient Safety and Quality, Clinical Excellence Queensland

CEQ has provided continued resourcing for a senior midwifery consultant to:

- oversee core priority maternity projects
- provide advice on a range of existing or emerging clinical issues
- embed improvement and safety across the systems
- liaise with a range of key maternity stakeholders
- support maternity services with their perinatal mortality review processes incorporating standardised tools into their case audits.

[75] PSANZ Clinical Practice Guidelines for Care Around Stillbirth and Neonatal Death.
[76] Queensland Maternity and Neonatal Clinical Guidelines.
[77] Rate of perinatal mortality and selected perinatal risk factors, 2010-12p., and post-natal death 2008-10p., by Hospital and health Service of usual residence, compared with Queensland
[78] World Health Organisation. Making every baby count: audit and review of stillbirths and neonatal deaths.
[79] Comprehensive clinical incident analysis following stillbirth – Criteria for stillbirth analysis. QMPQC webpage – Resources and Reports.

The clinical midwife consultant resource provides discipline specific input across all areas of perinatal mortality review with a focus on reviewing the quality of perinatal mortality reviews and identifying modifiable components of the healthcare system to improve perinatal outcomes.

The Perinatal Mortality Audit Project

In 2023, the Perinatal Mortality Audit project was developed to support individual clinicians' and each health service's capacity to perform systematic, timely and robust perinatal mortality case reviews and audit. A toolkit was developed to provide resources to assist Hospitals and Health Services to effectively conduct perinatal mortality reviews and to identify preventable contributing factors for improvement planning.

The newly developed resources include:

- Intrauterine Fetal Death (IUFD) Triage checklist
- Perinatal Morbidity and Mortality meeting process map
- Local HHS excel data storage spreadsheet.

Training was developed for clinicians and a series of three webinars were held to support the completion of the review tools. A series of case scenarios were presented, which demonstrated the use of the tools in action and how Hospitals and Health Services can incorporate them into their perinatal mortality reviews to identify preventable contributing factors for improvement planning.

Safer Baby Bundle

Queensland Health has worked collaboratively with key stakeholders to implement the Stillbirth Centre of Research Excellence (CRE) evidence-based care guidelines, with the aim to reduce stillbirth rates (≥28 weeks and excluding terminations of pregnancy and congenital anomalies) by 20 percent by 2025, across Queensland. This has involved the roll out of the *Safer Baby Bundle* as an improvement project across 45 hospitals and all 15 eligible HHSs in Queensland over a two-year period (2021 and 2022).

The five bundle elements are targeted at improving antenatal education and care of pregnant women and their families. Evidence suggests these five elements are modifiable risk factors thought to influence stillbirth outcomes ≥ 28 weeks. Implementing all five bundle elements into standard antenatal care has demonstrated statistically significant improvement in performance indicators pre-post implementation, with no adverse effect on induction of labour or caesarean section rates.

Due to the relatively rare nature of stillbirth and the reporting periods for perinatal data, the overall outcome measure (stillbirth rates) will continue to be monitored by CEQ and reported over a longer timeframe.

Preterm birth prevention

Queensland Health has partnered with the Australian Preterm Birth Prevention Alliance, Women's Healthcare Australasia and the Institute of Healthcare Improvement, to safely reduce the rate of preterm and early term birth by 20 percent by 2024. Seven evidence-based strategies proven to safely reduce preterm and early term birth are being implemented into standard maternity care in HHSs across the state between 2022-24.

The Australian Preterm Birth Prevention Alliance and the Stillbirth CRE have collaborated to prepare a joint position statement on safe timing of birth; in the absence of a medical or obstetric reason for early planned birth, women should be encouraged to continue their pregnancy until 39 weeks or later to enable the baby to develop fully.

Queensland Health is supporting the seven maternity services participating in the 'Every Week Counts' National Preterm Birth Prevention Collaborative with improvement science expertise and change management ideas to implement the seven strategies in day-to-day practice.

The Queensland Preterm Birth Prevention Program (QPTBPP) is using a different approach by providing on-site education to HHSs not participating in the 'Every Week Counts' National Preterm Birth Prevention Collaborative, to provide them with the same key messaging. Education has been delivered to 236 maternity health professionals (obstetric, midwifery and allied health) across 8 HHSs and 19 hospitals. The QPTBPP have also provided GP obstetricians and GPs with bespoke education, and a dedicated forum for private obstetricians in 2024.

IMPROVE Program

In partnership with the Centre of Research Excellence in Stillbirth (Stillbirth CRE) and PSANZ,

CEQ has continued its support of ongoing education of health professionals on care practices around perinatal mortality by co-funding IMPROVE (Improving Perinatal Review and Outcomes via Education) workshops throughout Queensland. The aim of IMPROVE is to increase the uptake of best practice in investigating and reporting the causes and contributing factors of perinatal deaths, as well as discussions and consent for autopsy (see Appendix D). IMPROVE is an interactive, skills-based workshop which involves small groups of learners rotating around six interactive learning stations and involves a short introduction and formative assessment, all delivered by experienced and trained educators.

IMPROVE workshops

In 2022, there were six workshops held throughout Queensland Health Maternity HHS's in both metropolitan and regional areas including Rockhampton, Townsville, Sunshine Coast, Logan, Redcliffe and Brisbane. Approximately 189 clinicians participated in the six completed workshops.

IMPROVE Train the trainer workshops

In February and March 2022, a Commonwealth grant provided funding to the Stillbirth CRE to plan and deliver two virtual IMPROVE Train the Trainer workshops, the aim of which was to increase the cohort of IMPROVE educators located throughout Queensland. Approximately 44 clinicians of various backgrounds including obstetrics and gynaecology, neonatology, midwifery, and social work attended the training workshops. After this initial training, 29 clinicians were then supervised by an experienced IMPROVE facilitator to deliver education in a nominated station. They were subsequently credentialled as IMPROVE educators to deliver future workshops to maternity care clinicians.

For further information about upcoming workshops or to arrange a workshop, email the Stillbirth CRE team at improve@mater.uq.edu.au. You can access the eLearning module at www.learn.stillbirthcre.org.au

Home Fetal Doppler Patient Safety Alert

Since 2019, the QMPQC PMSC has reviewed four clinical incidents where mothers concerned by a lack of fetal movement, have been falsely reassured by an apparent fetal heartbeat heard on a home fetal heart monitor. This caused a delay in presenting to a maternity facility for review. The delay in presentation for assessment, may have been a contributing factor to the babies later being either stillborn or in one instance, dying shortly after birth. The absence of any training requirement to use these monitors may falsely reassure women who experience decreased fetal movements or have other concerns about their baby.

Following a notification from the QMPQC in 2022, CEQ issued a Patient Safety Communique to inform clinicians of the potential risks associated with the use of home fetal heart monitors in pregnancy. In response to the risk to expectant parents, the Therapeutic Goods Administration (TGA) is currently undertaking a review of the safety signals, benefits and harms associated with home use fetal heart monitors.

Promotional material was distributed widely by CEQ via maternity networks with internal and external stakeholders and included posters, social media tiles and flyers.

Contributing Factors Case Review Project

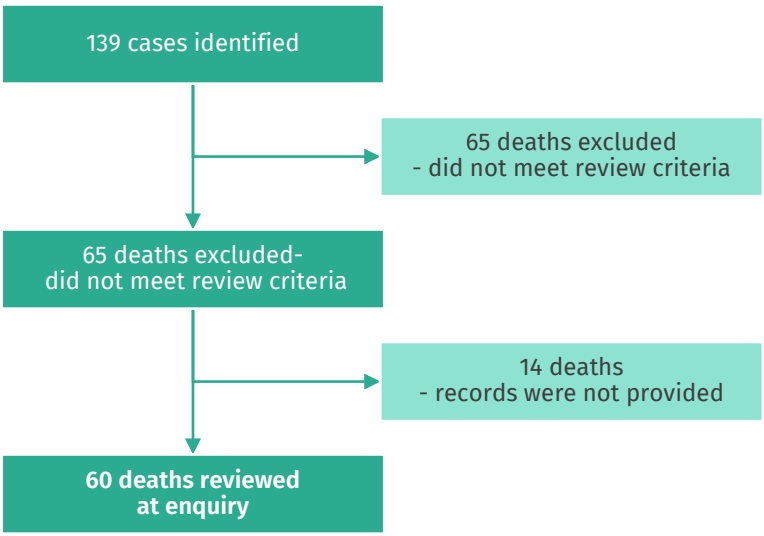
The PMSC has retrospectively undertaken a review of selected perinatal deaths for three successive years. The findings for 2018 and 2019 have been reported in previous QMPQC Reports.

The following is a summary presenting the findings of the third perinatal confidential enquiry undertaken by the PMSC for cases occurring in 2020. The full report of the findings of the third perinatal review project is available in Appendix G. The review inclusion criteria included all stillbirths and neonatal deaths of 34 weeks gestation or more up to 28 days of age, excluding major lethal congenital anomalies.

The aim of the review process was to systematically identify and classify modifiable components of the health care system. This includes a broad spectrum of organisational and/or management factors, personnel factors and barriers for women accessing care.

In the 2020 cohort, 60 perinatal deaths were reviewed by a multidisciplinary expert group: 43 stillbirths and 17 neonatal deaths. (Flowchart: 1).

Flowchart 1: Flow chart for 2020 perinatal deaths selected for confidential enquiry



Perinatal mortality case review findings are classified against the AIHW required options to enable standardised national reporting, as recommended in the PSANZ Clinical Guidelines on Care around Stillbirth and Neonatal Death. Each case is reviewed and assessed to identify if any of the 33 recognised potential contributing factors are identified in each case.

Contributing factors are identified across three broad categories;

1. Women accessing and engaging with care
2. Personnel (staff factors relating to professional care and service provision)
3. Organisation and/or management factors

Contributing factors are categorised as follows;

- Significant – Contributing factors identified were likely to have contributed to the outcome.
- Possible - Contributing factors identified that might have contributed to the outcome.
- Insignificant - Contributing factors identified but unlikely to have contributed to the outcome.
- Undetermined - Insufficient information available.
- Unknown.

Additional detail regarding this review process is available in Appendix E.

The review of perinatal deaths is the key to improving perinatal outcomes by: (a) identifying potentially avoidable deaths and (b) using the examination of clinical circumstances surrounding these deaths, to improve the safety and quality in healthcare system. Contributing factors were identified in 58.3 percent of perinatal deaths – 53.5 percent of stillbirths and 70.6 percent neonatal deaths reviewed. This represents a decrease of four percent (4 percent) in contributing care factors of the reviewed perinatal mortality cases from the previous report, and 9.9 percent) from the 2018 report. However, despite the decrease in the percentage of cases with contributing care factors, the percentage of those that had **significant** contributing care factors has increased to 26.7 percent from 2019. The results of the reviews highlight ongoing gaps in care and missed opportunities (Table 21).

Of the 60 perinatal deaths reviewed, seven were babies of women who identified as Aboriginal and/or Torres Strait Islander peoples. Of concern, all of the seven cases (100 percent) had sub-optimal care factors which contributed to the perinatal death. This is significantly higher than the rate for women who do not identify as Aboriginal and Torres Strait Islander people. A broad range of factors contributed to this outcome including: infrequent antenatal care, lack of referral to culturally safe care models of care, family violence, socio-economic stress, homelessness, inadequate self- management of diabetes, substance use and fear of contracting COVID-19.

Table 21: Contributing factors in perinatal deaths 34 weeks or more gestation excluding congenital abnormalities, Queensland, 2018-2020

Year	2018	2019	2020
Number of deaths reviewed	66	85	60
Cases with contributing factor/s identified	45 (68.2%)	53 (62.3%)	35 (58.3%)
Cases with significant contributing factor/s identified	20 (30.3%)	18 (21.1%)	16 (26.7%)

Key maternal characteristics

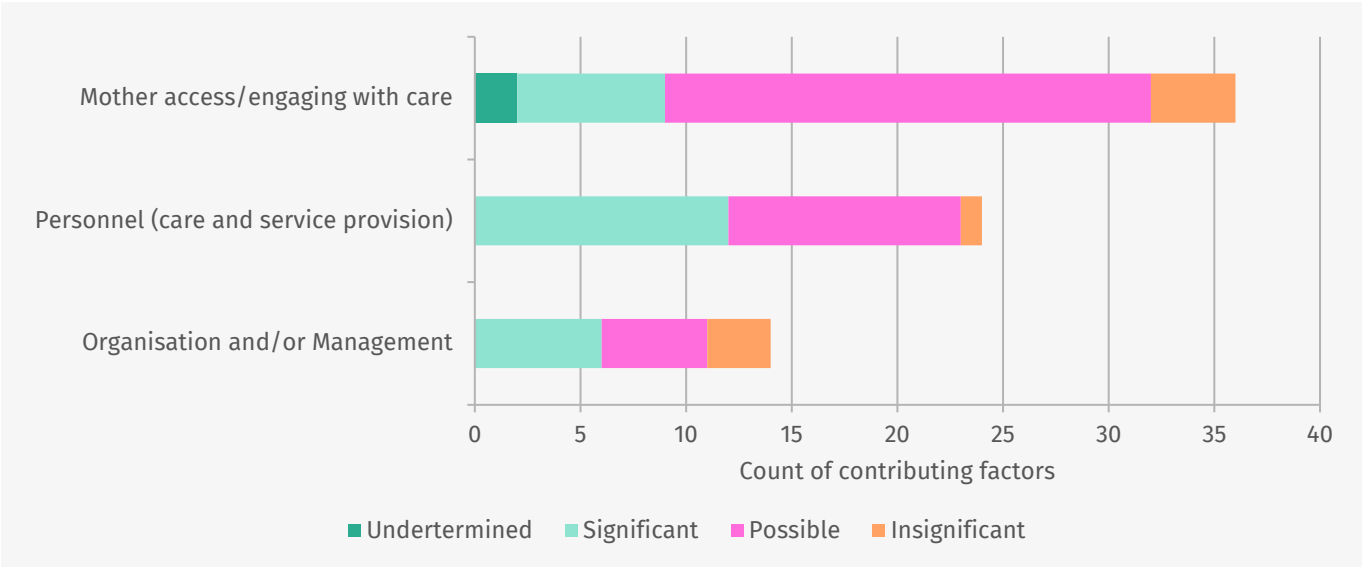
Characteristics of the included cases were compared with all similar Queensland births that did not result in a perinatal death. While numbers were very small and should be interpreted with caution, the perinatal deaths included in this review appeared to be higher amongst babies born to women of these categories (Figure 21).

Results

There were 74 individual contributing factors identified from the review of selected 2020 perinatal deaths. 25 were deemed significant contributing factors (33.8 percent), 39 were possible contributing factors (52.7 percent), 8 were rated as insignificant contributing factors (10.8 percent) and in 2 (2.7 percent) instances, the contributing factor rating was undetermined. (Figure 22). In many instances, more than one contributing factor was found for each perinatal death reviewed.

Figure 21: Key maternal characteristics in perinatal deaths 34 weeks or more gestation, excluding congenital abnormalities

Figure 22: Contributing factors by type and link to outcome in perinatal deaths 34 weeks or more gestation excluding congenital abnormalities, Queensland, 2020



NB: Some cases in the review cohort had more than one contributing factor

Key findings

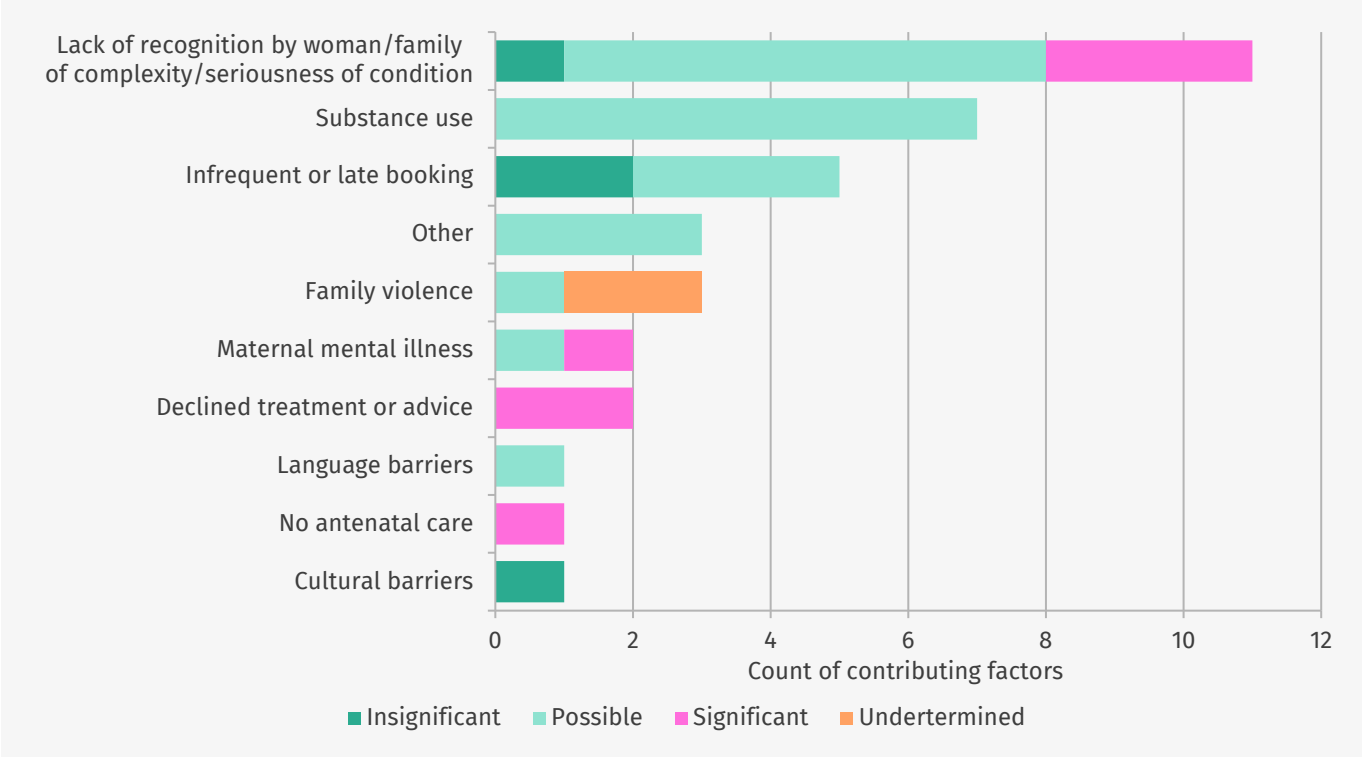
Clinical practice improvement areas by PSANZ contributing factors categories.

1.

Women accessing and engaging with care

Of the cases reviewed which had contributing factors, 48.6 percent identified concerns with women engaging with recommended care providers. Within this category, only 20 percent of the identified contributing factors were classified as **significant** (Figure 23).

Figure 23: Clinical practice improvement area by PSANZ mother accessing and engaging with care contributing factor category



Key clinical practice improvement areas were:

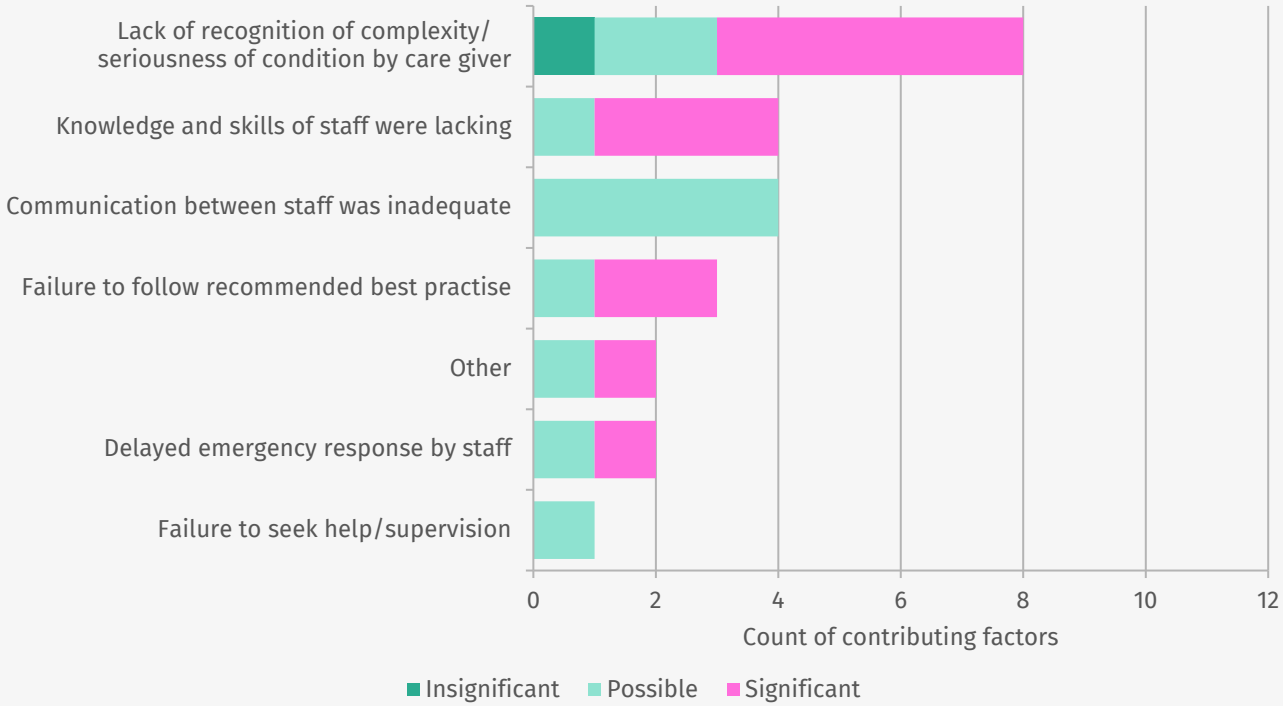
- Delayed presentation for decreased fetal movements
- Anxiety related to the COVID-19 pandemic deterred women from presenting for care in three instances
- Disengagement from maternity care providers
- The use of home fetal dopplers delayed presentation for review in two cases.

2.

Personnel factors

Of the cases reviewed which had contributing factors, 31.1 percent identified concerns with healthcare personnel. Within this category, 52 percent of the identified contributing factors were classified as **significant** (Figure 24).

Figure 24: Clinical practice improvement area by PSANZ personnel contributing factor category



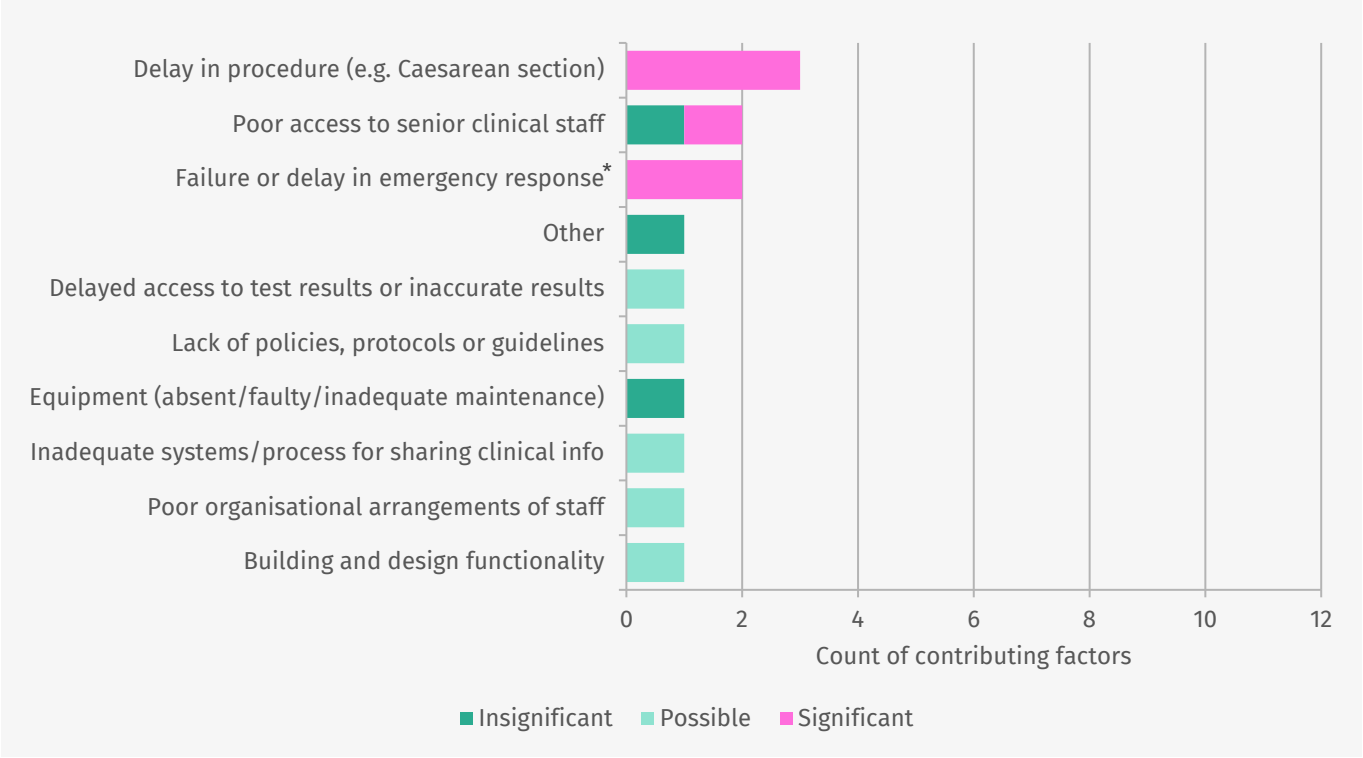
Key clinical practice improvement areas were:

- Incorrect classification /degree of urgency of lower uterine segment caesarean section (LUSCS)
- Missed identification of fetal growth restriction
- Lack of recognition of complex obstetric conditions
- Delay in emergency response
- Lack of communication between health service providers.

3.

Organisation and/or management factors (13.5 percent). Within this category, 60 percent of the identified contributing factors were **significant.** Thus, despite this being the least frequent category of contributing factors, this group had the greatest percentage of sub-optimal care factors that were considered to have significantly contributed to the outcome (Figure 25).

Figure 25: Clinical practice improvement area by PSANZ organisation and/or management contributing factor category



* Failure or delay in emergency response relates to delays in performing emergency caesarean sections

Key clinical practice improvement areas were:

- Delayed timing of lower uterine segment caesarean section (LUSCS)
- Poor access to senior staff- staff in theatre, consultant uncontactable
- Delay in emergency response due to acuity in birth suite.

Fetal growth assessment

In 23.3 percent of the stillbirths reviewed, the fetal weight was below the 10th centile, thus indicating these babies were small for gestational age. Furthermore, 50 percent of these babies demonstrated significant growth restriction where the fetal weight was less than the 3rd centile. As highlighted in previous reports, appropriate screening for fetal growth restriction is a key aspect of reducing perinatal mortality.

Recommendation 15:

Standardise perinatal mortality reviews at all maternity services and incorporate the APMCAT into local perinatal mortality reviews. Classify the resulting underlying causes of stillbirths using the PSANZ perinatal mortality classification system and include a systematic assessment of contributing factors.

Good practice point

Screen all pregnant women for risk factors for fetal growth restriction at initial visit and at every subsequent antenatal visit. Plot symphysis fundal height measurements on a growth chart in the second and third trimester of pregnancy. Provide timely access to serial growth and well-being ultrasound scans where appropriate, with follow-up arranged with a senior clinician.

Warn all expectant parents about the risks of using a home fetal doppler and not to delay presentation to a maternity facility if they are concerned about their baby's wellbeing.

All maternity services are encouraged to access the Perinatal Mortality Review Toolkit which includes checklists and step-by-step reference documents to assist HHS's to conduct comprehensive perinatal death reviews.

The QMPQC continues to utilise communication avenues to warn all expectant parents about the risks of using a home fetal doppler and not to delay presentation to a maternity facility if they are concerned about their baby's wellbeing. As a result of this advice from QMPQC, CEQ notified the Therapeutic Goods Administration (TGA), contributing to their review of the safety signals, benefits and harms associated with these devices.

Appendix A
Abbreviations and acronyms

ABS	Australian Bureau of Statistics
ACM	Australian College of Midwives
AIHW	Australian Institute of Health and Welfare
ASGS	Australian Statistical Geography Standard
Apgar	**A**ppearance, **P**ulse, **G**rimace response to foot stimulation, **A**ctivity and **R**espiration
APMCAT	Australian Perinatal Mortality Clinical Audit Tool
ART	Assisted reproductive technology
BMI	Body Mass Index
CALF	Congenital Anomaly Linked File
CASC	Congenital Anomalies Sub-Committee
CDB	Communicable Diseases Branch
CHD	Congenital Heart Defect
CHO	Chief Health Officer
CI	Confidence Interval
CEQ	Clinical Excellence Queensland
COPE	Centre of Perinatal Excellence
CPD	Continuing Professional Development
CPSS	Clinical Planning and Service Strategy
CRE	Centre of Research Excellence (Stillbirth)
CSCF	Clinical Services Capability Framework
CSWG	Congenital Syphilis Working Group
CTPA	Computed Tomographic Pulmonary Angiography
DDG	Deputy Director- General
FGR	Fetal Growth Restriction
GDM	Gestational Diabetes Mellitus
GP	General Practitioner
HEAPS	Human Error and Patient Safety
HPSP	Healthcare Purchasing and System Performance
HHS	Hospital and Health Service
ICD-9-CM	The International Classification of Diseases, Ninth Revision, Clinical Modification
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
ieMR	Integrated Electronic Medical Record
IMPROVE	Improving Perinatal Review and Outcomes Via Education
LBW	Low Birth Weight
LOS	Length of Stay

LUSCS	Lower Uterine Segment Caesarean Section
MHAOD	Mental Health Alcohol and Other Drugs
MMR	Maternal Mortality Ratio
MMSC	Maternal Mortality Sub-Committee
NeoMedQ	Neonatal Medicines
NBST	Newborn Bloodspot Testing
NDC	Neonatal Death Classification
NHMRC	National Health and Medical Research Council
NTD	Neural Tube Defects
OCMNO	Office of the Chief Nurse and Midwifery Officer
OCMwO	Office of the Chief Midwife Officer
OECD	Organisation for Economic Co-operation and Development
PE	Pulmonary Embolism
RCA	Root Cause Analysis
PDC	Perinatal Death Classification
PHR	Pregnancy Handheld Record
PMMRC	Perinatal and Maternal Mortality Review Committee
PMSC	Perinatal Mortality Sub-Committee
RPR	Rapid Plasma Reagin
PCR	Polymerase Chain Reaction
PDC	Perinatal Data Collection
POS	Pulse Oximetry Screening
PSANZ	Perinatal Society of Australia and New Zealand
PSANZ-NDC	Perinatal Society of Australia and New Zealand Neonatal Death Classification
PSANZ-PDC	Perinatal Society of Australia and New Zealand Perinatal Death Classification
PTSD	Post Traumatic Stress Disorder
QCG	Queensland Clinical Guidelines
QMNCN	Queensland Maternity and Neonatal Clinical Network
QCYCN	Queensland Child and Youth Clinical Network
QHAPDC	Queensland Hospital Admitted Patient Data Collection
QMPQC	Queensland Maternal and Perinatal Quality Council
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RoGS	Report of Government Services
SEIFA	Socio-Economic Indexes for Areas
SES	Socioeconomic Status
SEQ	South East Queensland
SGA	Small for Gestational Age
ToP	Termination of Pregnancy
VTE	Venous thromboembolism
WHO	World Health Organization

Appendix B
Data sources used in this report

This report is based on the:

- Queensland Perinatal Data Collection (PDC)
- Queensland Hospital Admitted Patient Data Collection
- Queensland Death Registrations and Master Linkage File data.

It relates primarily to the two calendar years 2020 and 2021. Trend analysis is based on data for a 10-year period (from 2012), unless otherwise noted. Data are accurate at time of publication, although subsequent changes to the perinatal data collection may occur.

Appendix C
Membership of the Queensland Maternal and Perinatal Quality Council, 2020 and 2021

Council

Membership	Position
Professor Leonie Callaway (Co-Chair)	Director of Research, Women's and Newborn Services; Royal Brisbane and Women's Hospital and Executive Director of the Women's and Children's Stream, Metro North Hospital and Health Service
Professor Ted Weaver (Co-Chair)	Senior Medical Officer, Obstetrics and Gynaecology, Sunshine Coast Hospital and Health Service
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat, Patient Safety and Quality, Clinical Excellence Queensland
Dr Johanna Laporte (PMSC Chair)	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Nikki Whelan (MMSC Chair)	Private Consultant Obstetrician and Gynaecologist
Dr Renuka Sekar (CASC Chair)	Clinical Lead, Maternal and Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
A/ Professor Tim Donovan	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Joanne Ellerington	Manager, Data Collections – QHAPDC and QPDC, Statistical Collections and Integration Unit, Statistical Services Branch, Queensland Health
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Imogen Kettle	Clinical Midwife Consultant- Perinatal Mortality Projects, Patient Safety and Quality, Clinical Excellence Queensland.
Dr Diane Payton	Anatomical Pathologist, Pathology Queensland
Dr Simon Maffey	Deputy Director, Obstetric Anaesthesia, Department of Anaesthesia, Mater Health Services
Marcia Morris	Acting Nursing and Midwifery Director, Women, Children and Families, Caboolture Hospital, Metro North Hospital and Health Service
Dr Melissa Cairns	General Practitioner/GP Liaison Officer, Metro North Hospital and Health Service and Brisbane North Primary Health Network
Anne Bousfield	Clinical Midwifery Consultant, South West Hospital and Health Service
Pauline McGrath	Senior Genetic Counsellor, Children's Health Queensland
Dr John Clift	Senior Medical Officer, Anaesthesia, Rockhampton Hospital

Membership	Position
Dr Lucy Cooke	Neonatologist and Medical Director, Neonatal Retrieval Service – Southern and Central Queensland and Northern New South Wales, Metro North Hospital and Health Service
Dr Elisabeth Hoehn	Medical Director, Queensland Centre for Perinatal and Infant Mental Health, Child and Youth Mental Health Service, Children's Health Queensland
Courtney Hala	Statewide Aboriginal and Torres Strait Islander Perinatal and Infant Mental Health Coordinator, Child and Youth Mental Health Service, Children's Health Queensland
Dr Joanne Frost	O&G Registrar, RANZCOG. Project Officer Perinatal research, Women's and Newborn Services, Royal Brisbane and Women's Hospital, PhD Candidate, Faculty of Medicine, The University of Queensland.
Dr Huda Safa	Senior Staff Specialist Obstetrics and Gynaecology, Mater Health Services
Tammy Doyle	Safety Improvement Support Officer/Patient Safety Officer Clinical Governance/ Woman's and Childrens Services, Sunshine Coast Hospital and Health Service
Cherie Boniface	Clinical Midwifery Consultant, Maternal Fetal Medicine Townsville University Hospital, Townsville Hospital and Health Service
Dr Jake Parker	General Practitioner, Senior Medical Officer, Torres and Cape Hospital and Health Service
Dr Simone Naughton	Midwife, Regional Maternity Services Coordinator, Cairns and Hinterland Hospital Health Service
A/Prof Alka Korthari	Clinician Research Fellow, Senior Staff Specialist (Obstetrics and Gynaecology), Redcliffe hospital, Metro North Health and Hospital Service
Kaylene Matthews	Acting Midwifery Unit Manager of Midwifery Group Practice, Sunshine Coast Hospital and Health Service
Ahlia Griffiths	Consumer Representative
Jenna Fletcher	Consumer Representative
Marce Green	Consumer Representative
Dr Rebecca Jenkinson	Consumer Representative
Kirstine Sketcher-Baker	ex-officio as Executive Director Patient Safety and Quality, Clinical Excellence Queensland,
Melleesa Cowie	ex-officio as Director Nursing Clinical Governance, patient Safety and Quality, Clinical Excellence Queensland
Liz Wilkes	ex-officio as Chief Midwife Officer, Office of the Chief Midwife Officer, Clinical Excellence Queensland
Melina Connors	ex-officio as First Nations Midwifery director, Office of the Chief Midwife Officer, Clinical Excellence Queensland
Amanda Ostrenski	ex-officio as Queensland Maternal Neonatal Clinical Network Co-Chair
Dr Peter Ganter	ex-officio as Queensland Maternal Neonatal Clinical Network Co-Chair
Dr Jocelyn Toohill	ex-officio as Director of Midwifery, Office of The Chief Midwife Officer
Professor Rebecca Kimble	ex-officio as Queensland Clinical Guidelines
Professor Julie McEniery	ex-officio as Chair, Queensland Paediatric Quality Council
Diane Cruice	ex-officio Queensland Paediatric Quality Council secretariat
Jodie Osborne	ex-officio Queensland Paediatric Quality Council secretariat

Perinatal Mortality Sub-Committee

Membership	Position
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Deborah Birthisel	Clinical Midwife, Birth Suite, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Diane Payton	Anatomical Pathologist, Pathology Queensland
Teresa Walsh	Director and Midwife, New Life Midwifery Pty Ltd
Dr Richard Mausling	Staff Specialist, Neonatology, Mater Health Services
Dr Christoph Lehner	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
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Karen McGill	Director Statistical Analysis and Linkage Statistical analyst SSB Stats Analysis Unit, Health Stats Centre, Qld Health
Miles Utz	Senior Analyst, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Courtney Hala	Statewide Aboriginal and Torres Strait Islander Perinatal and Infant Mental Health Coordinator, Child and Youth Mental Health Service, Children's Health Queensland
Cherie Boniface	Clinical Midwifery Consultant, Maternal Fetal Medicine Townsville University Hospital, Townsville Hospital and Health Service

Membership	Position
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Emma Porter	Clinical Midwifery Consultant, Perinatal Loss Coordinator and Perinatal Morbidity and Mortality Lead, Mater Mothers Hospital South Brisbane
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Azure Rigney	Consumer Representative
Elly Marie	Consumer Representative
Leah Hardiman	Consumer Representative
Katie Allan	Consumer Voice – Postpartum Doula

Maternal Mortality Sub-Committee

Membership	Position
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Dr William Parsonage	Staff Specialist, Cardiology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Rebecca Williams	Regional Director Forensic Pathology, Forensic and Coronial Services, Townsville University Hospital, Townsville Hospital and Health Service
Dr Susan Roberts	Clinical Lead, Lavender Mother and Baby Unit, Perinatal Psychiatrist, Gold Coast University Hospital, Gold Coast Hospital and Health Service
Dr Fiona Britten	Endocrinologist and Obstetric Physician, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Melissa Cairns	General Practitioner/GP Liaison Officer, Metro North Hospital and Health Service and Brisbane North Primary Health Network

Membership	Position
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Catherine Rawlinson	Service Development Leader, Queensland Centre for Perinatal and Infant Mental Health, Children's Health Queensland Hospital and Health Service
Dr Bruce Maybloom	Private General Practitioner and Perinatal Epidemiologist
Dr Thangeswaran Rudra	Senior Consultant, Obstetrics and Gynaecology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
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Marcia Morris	Acting Nursing and Midwifery Director, Women, Children and Families, Caboolture Hospital, Metro North Hospital and Health Service
Dr Joanne Frost	O&G Registrar, RANZCOG. Project Officer Perinatal research, Women's and Newborn Services, Royal Brisbane and Women's Hospital, PhD Candidate, Faculty of Medicine, The University of Queensland.
Tara Denaro	Clinical Nurse Consultant, Strong Start to Life, Aboriginal and Torres Strait Islander Leadership Team, Metro North Hospital and Health Service
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Dr Jake Parker	General Practitioner, Senior Medical Officer, Torres and Cape Hospital and Health Service

Congenital Anomaly Sub-Committee

Membership	Position
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Professor Timothy Donovan (Previous Chair)	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat, Patient Safety and Quality, Clinical Excellence Queensland
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Unit, Statistical Services Branch, Queensland Health
Dr Diane Payton	Anatomical Pathologist, Pathology Queensland
Dr Nikki Whelan	Private Consultant Obstetrician and Gynaecologist

Membership	Position
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Pauline McGrath	Senior Genetic Counsellor, Children's Health Queensland
Dr Susan Ireland	Neonatologist Senior Staff Specialist at the Neonatal Unit Townsville University Hospital, Townsville Hospital and Health Service
Miles Utz	Statistical analyst SSB Stats Analysis Unit, Health Stats Centre, Qld Health
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Melanie McKenzie	Consumer representative
Ahlia Griffiths	Consumer Representative

Congenital Syphilis Working Group

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Alison Thompson	Director, Blood Borne Viruses and Sexually Transmissible Infections Unit, Communicable Diseases Branch
Dr Diane Rowling	Senior Medical Officer, Metro North Public Health Unit
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Professor Paul Colditz (Co-Chair)	Neonatologist, Director, Perinatal Research Centre and Head of School of Clinical Medicine, The University of Queensland,

Membership	Position
Dr Mandy Seel (Co-Chair)	Public Health Physician – Sexual Health, Public Health Unit, Metro North Hospital and Health Service.
Dr Annie Preston-Thomas	Public Health Medical Officer – Sexual Health Tropical Public Health Services, Cairns and Hinterland Hospital and Health Service
Professor Vicki Flenady	Director, Centre of Research Excellence in Stillbirth, Mater Research Institute – The University of Queensland
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat, Patient Safety and Quality, Clinical Excellence Queensland

Perinatal Mortality Contributing Factors Case Review Panel

Membership	Position
Dr Johanna Laporte (Chair)	Maternal Fetal Medicine Specialist, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Deborah Birthisel	Clinical Midwife, Birth Suite, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Professor Tim Donovan	Neonatal Medicine and Consultant Neonatology, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Christoph Lehner	Registrar, Maternal Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Dr Admire Matsika	Specialist Consultant Anatomical Pathologist, Mater Pathology
Teresa Walsh	Director and Midwife, New Life Midwifery Pty Ltd
Leah Hardiman	Consumer representative
Dr Nikki Whelan	Private Consultant Obstetrician and Gynaecologist
Imogen Kettle	Clinical Midwife Consultant- Perinatal Mortality Projects, Patient Safety and Quality, Clinical Excellence Queensland.
Dr Janet Sharpe	Staff Specialist Neonatologist, Sunshine Coast Hospital and Health Service
Dr Poliana De Barros Medeiros	Neonatologist, NHMRC Centre of Research Excellence in Stillbirth (Stillbirth CRE) Mater Health Services
Dr Sarah Tozer	QMPQC Co-ordinator and Secretariat, Patient Safety and Quality, Clinical Excellence Queensland

Appendix D
IMPROVE program

The PSANZ has developed Clinical Practice Guidelines for Perinatal Mortality to improve standards in clinical practice around the time of a perinatal death and partners with the Stillbirth CRE to maintain and disseminate the guidelines. The IMPROVE (Improving Perinatal Review and Outcomes via Education) program has been developed for maternity health care professionals to enhance the uptake of these guidelines. IMPROVE uses the Structured, Clinical, Objective, Referenced, Problem-orientated, Integrated and Organised (SCORPIO) educational model designed for skills training[80] which involves small groups of learners rotating around six interactive learning stations that are each facilitated by an experienced educator.

IMPROVE involves a short introductory lecture, six learning stations and formative assessment.

The learning covers:

- communicating with parents about perinatal autopsy
- autopsy and placental examination
- investigation of perinatal deaths
- examination of babies who die in the perinatal period
- audit and classification of perinatal deaths
- psychological and social aspects of perinatal bereavement.

The workshops are designed for health care professionals including obstetricians, midwives, neonatal nurses, neonatologists, pathologists, bereavement specialists, social workers, or those interested from a policy or public health perspective. IMPROVE workshops provide an opportunity for participants to understand the PSANZ Perinatal Mortality Guidelines in an interactive way.

A booklet of program materials is provided for each participant covering key aspects of the PSANZ Guidelines and other relevant documentation specific to that region. A certificate of completion is provided at the end of the IMPROVE program.

This activity is endorsed with four MidPlus points from the Australian College of Midwives. Eligible fellows of Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) can claim five CPD points in the Clinical Expertise domain.

[80] Gardiner P, Kent A, Flenady V et al. IMproving Perinatal Mortality Review and Outcomes Via Education; An educational program for health care professionals on best practice around the time of a perinatal death. *BMC Pregnancy Childbirth*. 2016 Nov 25;16(1):376

IMPROVE e-Learning

The IMPROVE eLearning module was formally launched in 2020. The eLearning module covers similar content to the face-to-face workshop, in an interactive way that users can complete at their own pace.

The workshop has been accredited by Australian College of Midwives, RANZCOG and Australian College of Rural and Remote Medicine, with CPD points available upon successful completion.

The eLearning module can be accessed at www.learn.stillbirthcre.org.au.

To arrange an IMPROVE workshop, please contact the IMPROVE Team:

Telephone: 07 3163 3829 Email: improve@mater.uq.edu.au

Appendix E
Classification of mortality contributing factors

Maternal and perinatal mortality case review findings are classified against the AIHW required options to enable standardised national reporting, as recommended in the *PSANZ Clinical Guidelines on Care around Stillbirth and Neonatal Death*[81]:

- sub-standard factor/s identified but unlikely to have contributed to outcome (insignificant)
- sub-standard factor/s identified but might have contributed to outcome (possible)
- sub-standard factor/s identified likely to have contributed to outcome (significant)
- no sub-standard care factors identified
- contributing factor assessment not undertaken.

PSANZ Guidelines categorisation of sub-standard factors for perinatal deaths by type of factor using the Australian Perinatal Mortality Clinical Audit Tool (APMCAT)[82]

Were factors relating to organisational and/or management identified? (for example, inadequate supervision of staff, lack of appropriate clinical management protocols, lack of communication between services. If yes, please specify each question based on the following rates: *1- Insignificant. Sub-standard factors identified but unlikely to have contributed to the outcome* *2- Possible- Sub-standard factors identified might have contributed to the outcome* *3- Significant. Sub-standard factors identified were likely to have contributed to the outcome* *4- Undetermined. Insufficient information available* *5- Unknown* Please state the specific factors and include any relevant comments.
Poor organisational arrangements of staff
Inadequate education and training
Lack of policies, protocols or guidelines
Inadequate numbers of staff
Poor access to senior clinical staff
Failure or delay in emergency response
Delay in procedure (for example, caesarean section)
Inadequate systems/process for sharing of clinical information between services
Delayed access to test results or inaccurate results
Equipment (for example, faulty equipment, inadequate maintenance or lack of equipment)
Building and design functionality (for example, space, privacy, ease of access, lighting, noise, power failure, operating theatre in distant location)
Other reason/Unknown

[81] *PSANZ Clinical Guidelines on Care around Stillbirth and Neonatal Death*
[82] PSANZ Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Appendix E - Australian Perinatal Mortality Clinical Audit Tool. Page 31.

Were factors relating to personnel identified? (staff factors relating to professional care and service provision). If yes, please specify as per options 1 – 5 above.
Knowledge and skills of staff were lacking
Delayed emergency response by staff
Failure to maintain competence
Communication between staff was inadequate
Failure to seek help/supervision
Failure to follow recommended best practice
Lack of recognition of complexity or seriousness or condition by care giver
Other reason/Unknown

Were barriers to accessing/engaging with care identified? (for example, no; infrequent or late booking for antenatal care; woman declined treatment/advice)
No antenatal care
Infrequent or late booking
Declined treatment or advice
Obesity impacted on delivery of optimal care (for example, USS)
Substance use
Family violence
Lack of recognition by the woman or family of complexity of seriousness of condition
Maternal mental illness
Cultural barriers
Language barriers
Not eligible to access free care
Environmental (for example, isolated, long transfer, weather prevented transport)
Other reason/Unknown

Appendix F
Queensland Clinical Guidelines

The primary objectives of *Queensland Clinical Guidelines* (QCG) are to provide clinical guidance informed by contemporary evidence, and to minimise inappropriate variation in clinical care. QCG has become a 'source of truth' for many associated and complimentary Queensland Health maternity documents and resources including the Pregnancy Health Record, ieMR, statewide clinical forms and local HHS policy and procedures.

QCG was established by Queensland clinicians in 2008 and works in close partnership with both the QMNCN and the QMPQC. The guidelines and resources are a valuable support to the QMPQC in improving the safety and quality of maternity and neonatal care in Queensland. Recent cooperation includes inclusion of QMPQC recommendations into the QCG Newborn assessment (routine) guideline for pulse oximetry screening and newborn bloodspot testing (NBST).

QCG has established an effective methodology for developing clinical guidelines and is progressively expanding into areas beyond the foundational maternity and neonatal disciplines. Recent collaborations have included Safer infant sleeping with the Paediatric Quality Council, and Rheumatic heart disease and pregnancy with the Queensland Aboriginal and Torres Strait Islander Rheumatic Heart Disease Action Plan 2020 and 2021 group.

Currently there are 46 maternity and neonatal guidelines, and 78 neonatal medicine monographs (NeoMedQ) available on the QCG website. Each guideline is accompanied by implementation resources including a guideline supplement, education presentation, knowledge assessment and consumer information.

Guidelines, implementation resources and the NeoMedQ can be accessed at https://www.health.Queensland.gov.au/qcg

Appendix G
Contributing Factors Case Review Project

The reporting of perinatal mortality contributing factors is recommended for HHSs and highly recommended by the *Queensland Clinical Guideline for Stillbirth* as well as being referenced in the *National Stillbirth Action and Implementation Plan*. As the AIHW moves towards establishing a national minimum data set, it is timely for Queensland Health to develop processes to assist maternity services to undertake reviews, collect information and facilitate reporting requirements.

This report presents the findings of the third perinatal confidential enquiry carried out retrospectively as part of the PMSC body of work. The PMSC undertook a review of selected perinatal deaths that occurred in 2020 after 34 weeks' gestation to identify contributing factors relating to care (sub-standard care factors). Of note, the review process was placed on hold for eight months due to the disruptions and restrictions of the COVID-19 pandemic. The review of perinatal deaths is the key to improving perinatal outcomes by identifying potentially avoidable deaths and using the examination of clinical circumstances surrounding these deaths, to improve the safety and quality in healthcare systems. The aim of the review process was to systematically identify and classify modifiable components of the health care system. This includes a broad spectrum of organisational and/or management factors, personnel factors and barriers for women accessing care.

Contributing factors are categorised as follows;

- *Significant – Contributing factors identified that were likely to have contributed to the outcome.*
- *Possible - Contributing factors identified that might have contributed to the outcome.*
- *Insignificant - Contributing factors identified but unlikely to have contributed to the outcome.*
- *Undetermined - Insufficient information available.*
- *Unknown.*

In 58 percent of the reviewed perinatal deaths, contributing factors were identified that may have **significantly**, possibly or insignificantly contributed to the outcome. This represents a decrease of four percent (4 percent) in contributing factors of the reviewed perinatal mortality cases from the previous 2021 report, and thirteen percent (13 percent) from the 2018 report. However, despite the decrease in the percentage of cases with contributing factors, the percentage of those that had significant contributing factors has increased to 33.8 percent. The results of the reviews continue to echo critical gaps in care and missed opportunities.

Method

Inclusion criteria

A retrospective audit of all Queensland stillbirths and neonatal deaths of 34 weeks gestation or more up to 28 days of age, excluding major congenital anomalies over the period 1 January 2020 to 31 December 2020, was performed.

Case selection and data sources

All perinatal deaths fulfilling the inclusion criteria were identified through the Queensland PDC. The Queensland PDC also provided maternal demographic information for each included perinatal death.

Clinical information for each included perinatal death was sought by the QMPQC Clinical Midwife Consultant from the Directors of Obstetrics (or equivalent) and/or a Patient Safety and Quality Officer at each of the services where the perinatal death occurred. The requested information included the following:

- Pregnancy hand-held records
- Queensland Health HHS records
- Private Maternity Hospital records
- Digital records (ieMR)
- Human Error and Patient Safety (HEAPS), multi-incident analysis and Root Cause Analysis (RCA) reports
- Completion of the APMCAT .

In addition, further information was sourced from:

- General practitioners
- Private obstetric specialists
- Private practice midwives
- Internal and external pathology providers' records
- Medical Imaging service providers' records
- Coroner's reports.

Assessment of contributing factors

A multidisciplinary expert group conducted face-to-face reviews of each perinatal death to determine the presence of contributing factors and if present, the degree to which the relevant factor contributed to the death. The assessment of quality care provision was determined in the following aspects of the pathway of care:

- Antenatal care
- Intrapartum care
- Postnatal care
- Neonatal care
- Post-mortem investigations (autopsy, placental histology and chromosome analysis).

The APMCAT recommended by the *PSANZ Guidelines for Care around Stillbirth and Neonatal Death*, was used to allocate contributing factors to one of three major groups[83]:

- organisation/management (e.g. inadequate supervision of staff, lack of appropriate clinical management protocols, lack of communication between services)
- personnel (e.g. staff factors relating to professional care and service provision)
- Accessing/engaging with care (e.g. no antenatal care; infrequent or late booking for antenatal care; women declined treatment/advice).

The contribution of each factor to the death was then specified as:

- insignificant (sub-optimal factors identified but unlikely to have contributed to the outcome)

[83] Care around the time of stillbirth and neonatal death guidelines group. Clinical Practice Guideline for Care Around Stillbirth and Neonatal Death. Version 3, NHMRC Centre of Research Excellence in Stillbirth. Brisbane, Australia, March 2018.

- possible (sub-optimal factors identified–might have contributed to the outcome)
- significant (sub-optimal factors identified–were likely to have contributed to the outcome).

The multidisciplinary expert group consisted of nine members including: a perinatal pathologist, maternal fetal medicine specialist, an obstetrician, senior midwives from the private and public sector, a neonatologist and a consumer representative. Panel meetings were always face-to-face with discussions generally lasting four hours, with up to 10 cases reviewed at each session. The PMSC Chair and QMPQC Clinical Midwifery Consultant ensured there was consistency and standardisation of the process and that the objectives of the reviews were met.

Sub-standard care was determined as being present if care was not managed according to accepted evidence-based best practice[84]. The Queensland Maternity and Neonatal Clinical Guidelines was the primary point of reference used by the panel. Other evidence-based sources included the *National Clinical Practice Guidelines: Pregnancy Care*[85], RANZCOG and reputable peak international sources such as the Royal College of Obstetricians and Gynaecologists[86].

Results

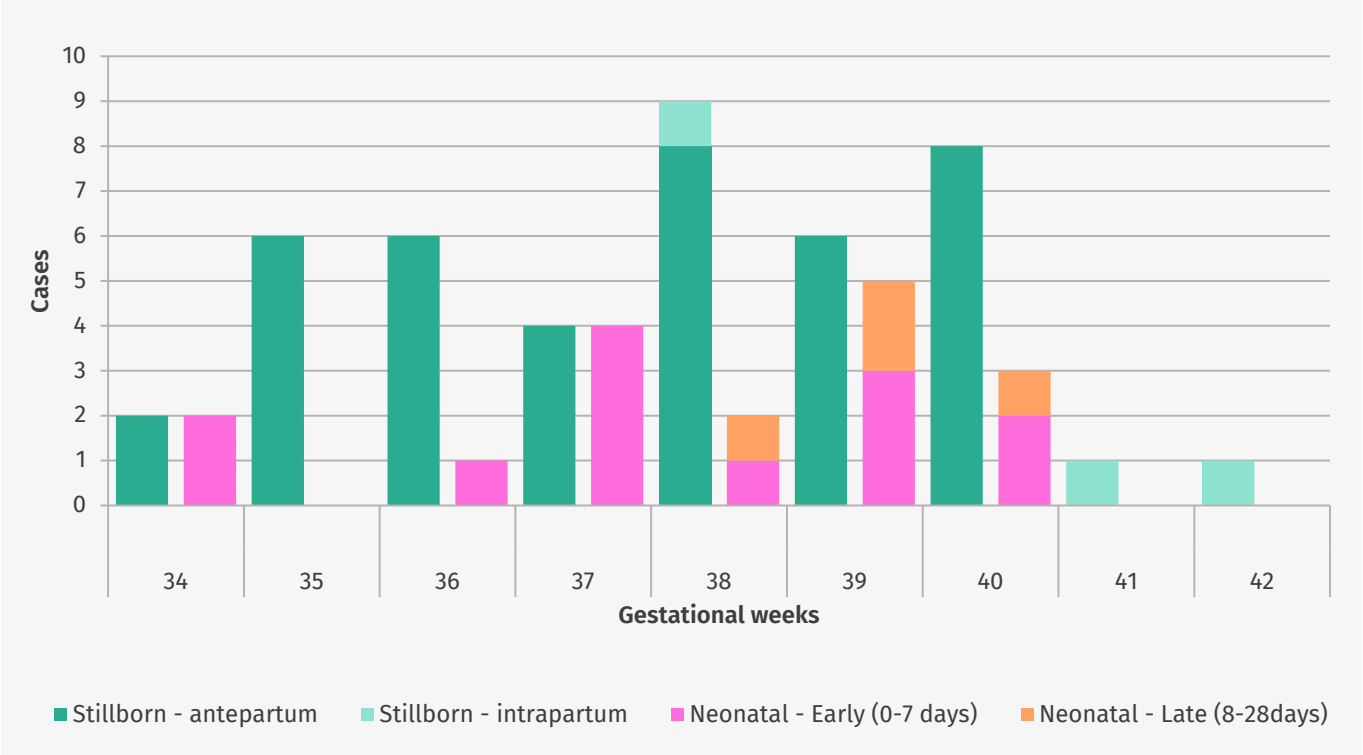
There were 139 perinatal deaths identified from the QPDC as being potentially eligible for inclusion (87 stillbirth and 52 neonatal deaths). Of these, 65 perinatal deaths were excluded upon further screening due to the presence of a major congenital abnormality. Of the remaining 74 deaths (56 stillbirths and 18 neonatal deaths), fourteen deaths were unable to be reviewed due to information not being provided: eleven deaths in the private sector, two in the public sector and one homebirth, leaving 60 perinatal deaths included in the enquiry (Flowchart 1).

Timing of perinatal deaths

Most stillbirths (93 percent) occurred before labour commenced. In relation to neonatal deaths, the majority (76.5 percent) occurred in the early neonatal period (Figure 26).

[84] Queensland Maternity and Neonatal Clinical Guidelines.
[85] Department of Health (2019). *Clinical Practice Guidelines: Pregnancy Care*. Canberra: Australian Government Department of Health.
[86] Royal College of Obstetricians and Gynaecologists (RCOG). Guidelines and research services.

Figure 26: Perinatal death by timing and gestational age (weeks)



Key maternal characteristics

Characteristics of the included cases were compared with all similar Queensland births that did not result in a perinatal death (Table 22). While numbers are very small and should be interpreted with caution, the perinatal deaths included in this review appeared to be higher amongst babies born to women of these categories:

Figure 27: Key maternal characteristics in perinatal deaths 34 weeks or more gestation, excluding congenital abnormalities

Table 22: Maternal demographics and place of birth of included perinatal deaths compared with all births, 34 weeks or more gestation Queensland, 2020

Characteristic	All Qld		Perinatal deaths	
	Number	%	Number	%
Aboriginal and/or Torres Strait Islander	**4,153**	**7.3**	**7**	**8.2**
Nulliparous	**23,980**	**42.3**	**33**	**38.8**
Maternal BMI				
Underweight <18.5	2,639	4.7	4	6.7
Normal 18.5-<25	27,178	47.9	32	53.3

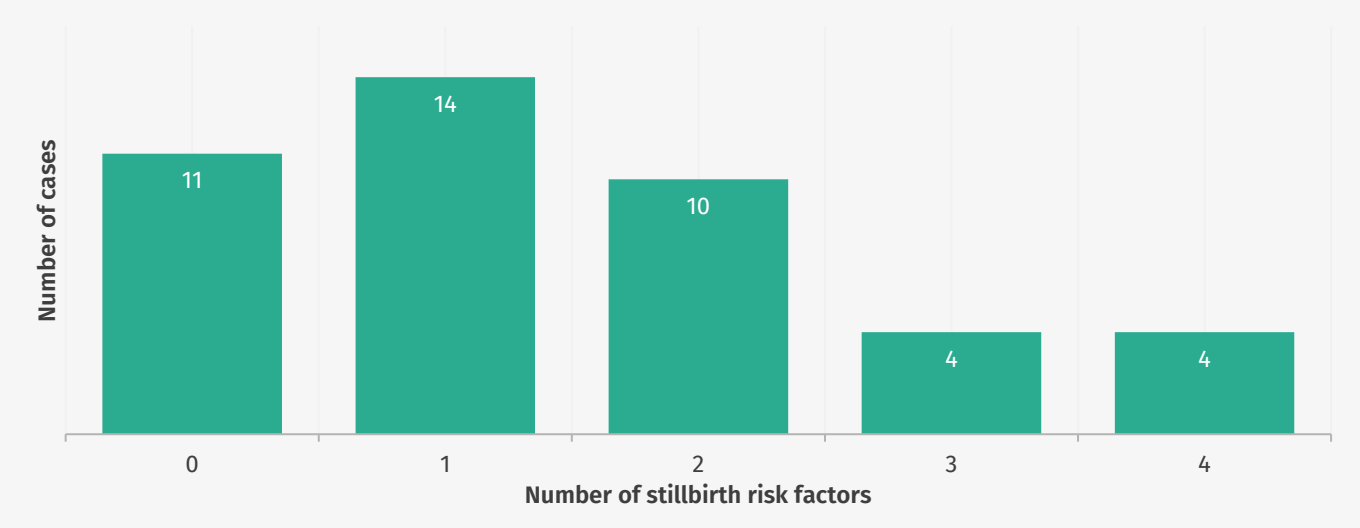
Characteristic	All Qld		Perinatal deaths	
	Number	%	Number	%
Overweight 25-29.9	13,897	24.5	12	20.0
Obese 1 30- 34.9	7,082	12.5	7	11.8
Obese 2 35-39.9	3,398	6.0	4	6.7
Obese 3 40+	2,186	3.9	1	1.7
Maternal Age				
<20	1,532	2.7	4	6.7
20-34	42,614	75.1	48	80.0
35-39	10,387	18.3	8	13.3
40+	2,214	3.9	0	0
Pre-existing and/or arising in pregnancy conditions				
Hypertension	4,199	7.4	4	6.7
Diabetes	9,543	16.8	7	11.7
Smoking before 20 weeks	6,310	11.2	13	21.7~
Facility type				
Public facilities	43,887	77.3	55	91.7
Private facilities	12,609	22.2	5	8.3
Home/free births	251	0.4	0	0
Maternal Country of Birth				
Australia	40,934	71.3	43	71.7
Other Oceania and Antarctica	3,624	6.4	0	0.0
Europe	2,788	4.9	5	8.3
Africa	2,026	3.6	4	6.7
Southern Asia	2,597	4.6	3	5
North-East Asia	1,915	3.4	2	3.3
South-East Asia	2,015	3.6	1	1.7
Central Asia	163	0.3	1	1.7
Northern America	500	0.9	1	1.7
Other Americas	555	1.0	0	0.0
Antenatal visits				
<2	219	0.4	0	0
2 to 4	1,744	3.1	7	11.7
5 to 7	7,744	13.7	10	16.7
8+	46,973	82.9	43	71.7

(p) data preliminary and subject to change
~ Smoking before 20 weeks gestation

Risk factors for stillbirth

A series of maternal characteristics have been shown to be associated with an increased risk of stillbirth. In this review, well known risk factors[87] for stillbirth were present in most included perinatal mortality cases (74.4 percent). Furthermore, 41.9 percent of the perinatal deaths had more than one risk factor (Figure 27).

Figure 28: Count of stillbirth risk factors per case



Causes of perinatal deaths included in the review

The causes of perinatal deaths were classified according to the PSANZ Perinatal Mortality Classification System, version 2.3 (2020). The PSANZ Perinatal Mortality Classification System classifies all perinatal deaths (stillbirths and neonatal deaths) by the single most important factor that led to the chain of events which resulted in the death.

The most commonly classified causes of all perinatal deaths in this cohort were unexplained antepartum death (28.3 percent). Other frequent causes of death were placental dysfunction/pathology (23.3 percent), antepartum haemorrhage (15.0 percent), hypoxic peripartum death (10.0 percent) and lastly maternal conditions such as gestational diabetes (6.7 percent) (Table 23).

Table 23: Primary causes of included perinatal deaths by the PSANZ perinatal death classification (PSANZ PDC)

Perinatal death classification	Stillborn	Neonatal death	Grand Total
Unexplained antepartum fetal death	16	1	17
Placental dysfunction/pathology	12	2	14
Antepartum haemorrhage	4	5	9
Hypoxic peripartum death	2	4	6
Maternal conditions	4	0	4

[87] Queensland Maternity and Neonatal Clinical Guidelines. Stillbirth Care.

Perinatal infection	3	1	4
Specific perinatal conditions	2	1	3
Neonatal death without obstetric antecedent	0	2	2
Hypertension	0	1	1
Grand Total	**43**	**17**	**60**

For neonatal deaths, the most frequent primary PSANZ NDC category was neurological causes: hypoxic ischaemic encephalopathy (HIE) was the cause in 64.7 percent of neonatal deaths (Table 24).

Table 24: Primary causes of included neonatal deaths by the PSANZ neonatal death classification (PSANZ NDC)

Neonatal Death Classification	Cases
Acquired viral infection	1
Hypoxic ischaemic encephalopathy/Perinatal asphyxia	11
Neonatal anaemia/hypovolaemia	1
Other neurological	1
Other specified multisystem failure	1
Perinatal bacterial infection (early onset < 48 hrs)- Positive culture of a pathogen	1
Unsuccessful resuscitation in infants of 28 weeks gestation or more without an obvious sentinel event	1
Grand Total	**17**

Contributing factors

The review panel found that in more than half of the perinatal deaths reviewed, there were critical gaps in care. Contributing factors were identified in 58.3 percent of perinatal deaths – 53.5 percent of stillbirths and 70.6 percent neonatal deaths reviewed (Table 25).

Table 25: Contributing factors in perinatal deaths 34 weeks or more gestation excluding congenital abnormalities, Queensland, January to December 2020.

	Stillbirths	Neonatal deaths	Perinatal deaths
Number of deaths reviewed	43 (77.6%)	17 (22.4%)	60 (100%)
Cases with contributing factor(s) identified	23 (53.5%)	12 (70.6 %)	35 (58.3%)

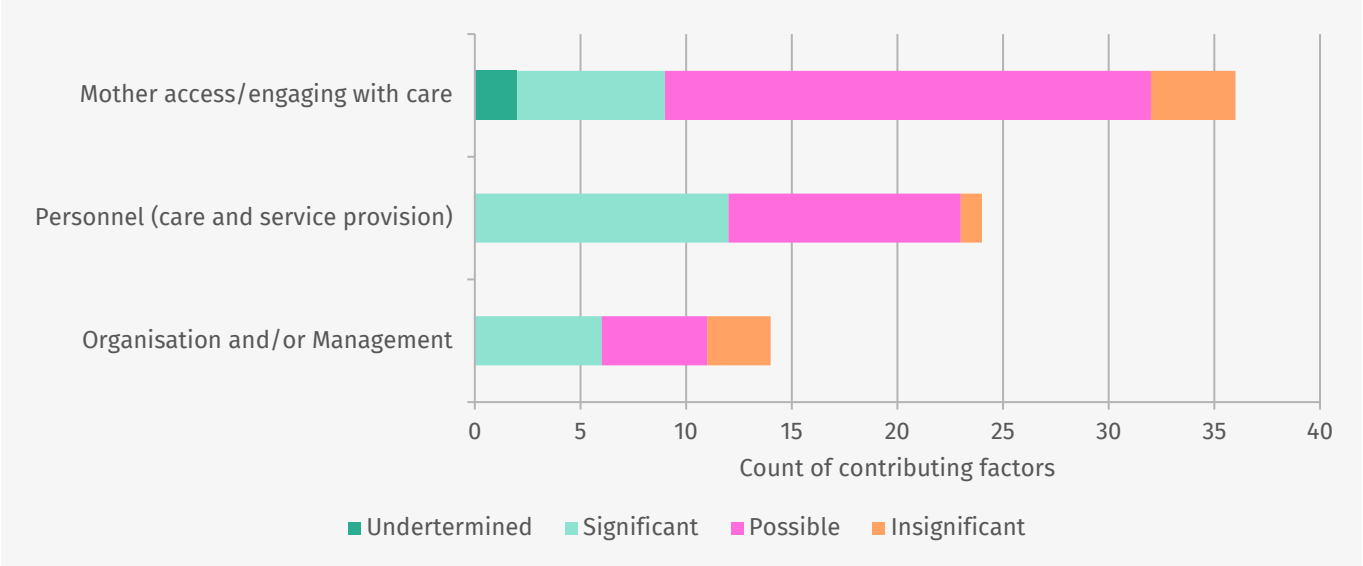
There were 74 individual contributing factors identified from the review of selected perinatal deaths. 25 were significant (33.8 percent), 39 were possible (52.7 percent), 8 were rated as insignificant (10.8 percent) and in 2 (2.7 precent) instances, the contributing factor rating was undetermined. (Figure 23). In many instances, more than one contributing factor was found for each perinatal death reviewed (Table 26).

Table 26: Contributing factors rating and count

Specific factor rating	Undetermined	Insignificant	Possible	Significant	Grand total
Total	2	8	39	25	74

The contributing factors covered a broad spectrum of organisational and or management factors, personnel factors and barriers for the pregnant woman accessing or engaging with care (Figure 28).

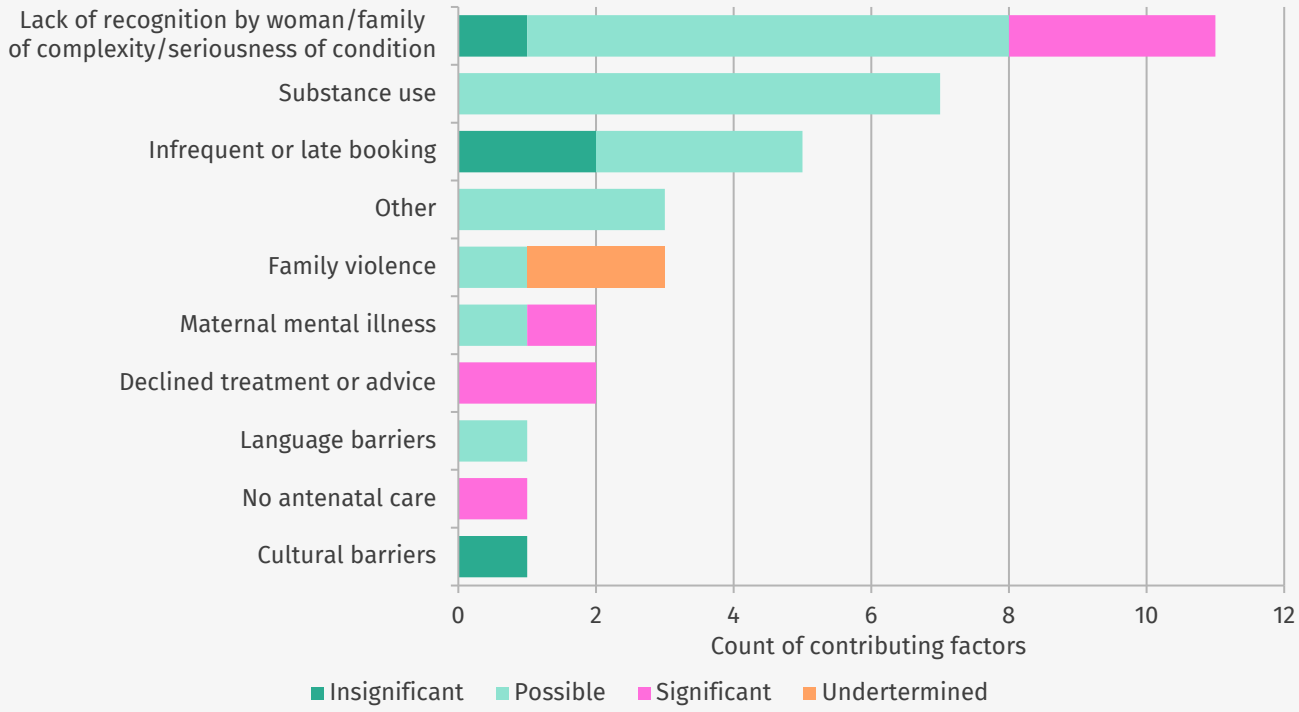
Figure 29: Contributing factors by type and link to outcome in perinatal deaths 34 weeks or more gestation excluding congenital abnormalities, Queensland, January 2020 to December 2020



Key findings

When examined by the PSANZ factors related to care categories, the most frequent category of contributing factors was classified as: women accessing and engaging with care (48.6 percent, eg. infrequent antenatal care, late booking for antenatal care, delayed presentation for decreased fetal movements, anxiety around COVID-19 and women declining treatment or advice). This was followed by personnel (32.4 percent, eg. staff factors relating to professional care and recognition of complex or serious conditions). The least frequent category was related to organisation and/or management (18.9 percent, eg. delay in procedures and poor access to senior clinicians) (Figure 29).

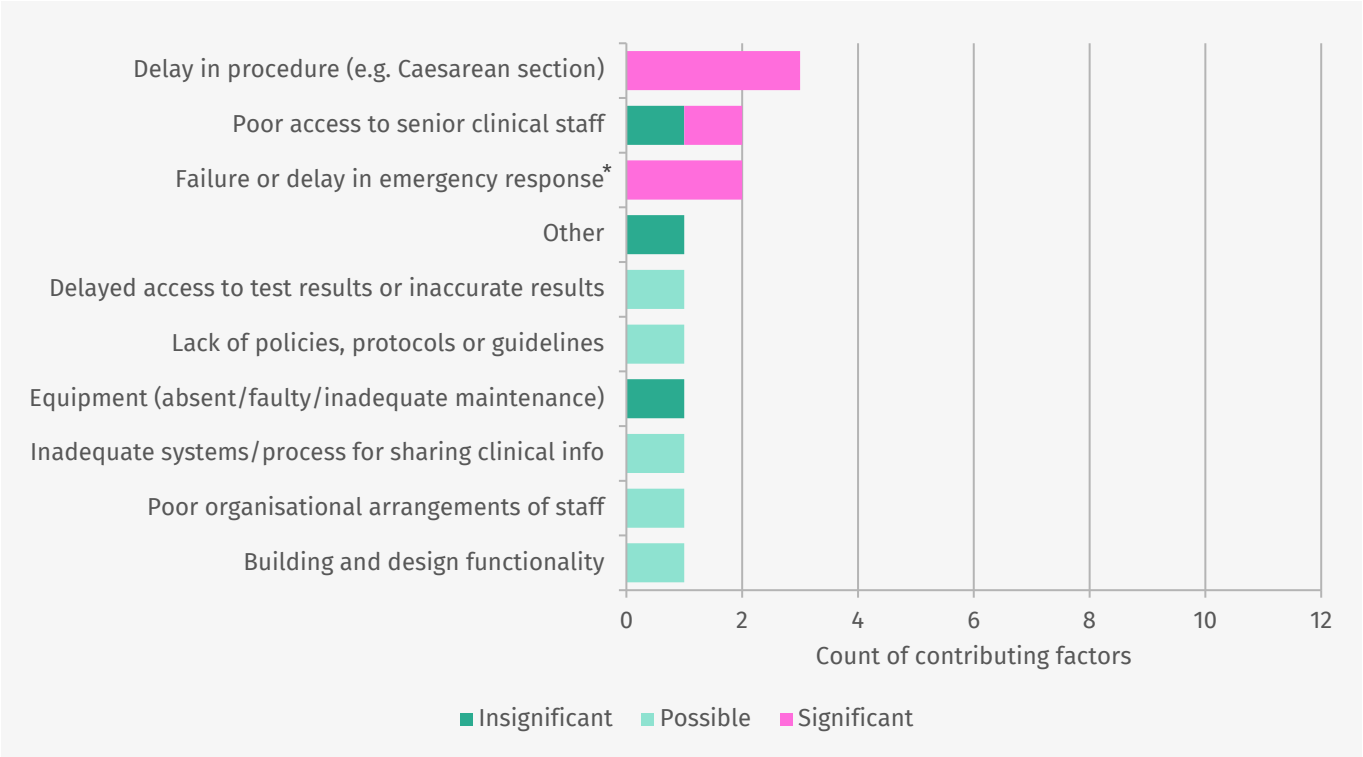
Figure 30: Clinical practice improvement area by PSANZ mother accessing and engaging with care contributing factor category



Key clinical practice improvement areas were:

- delayed presentation for decreased fetal movements.
- anxiety related to the COVID-19 pandemic, which deterred women from presenting for care
- smoking and illicit drug use
- disengagement from maternity care providers
- the use of home fetal dopplers delayed presentation for review in two cases.

Figure 31: Clinical practice improvement area by PSANZ organisation and/or management contributing factor category

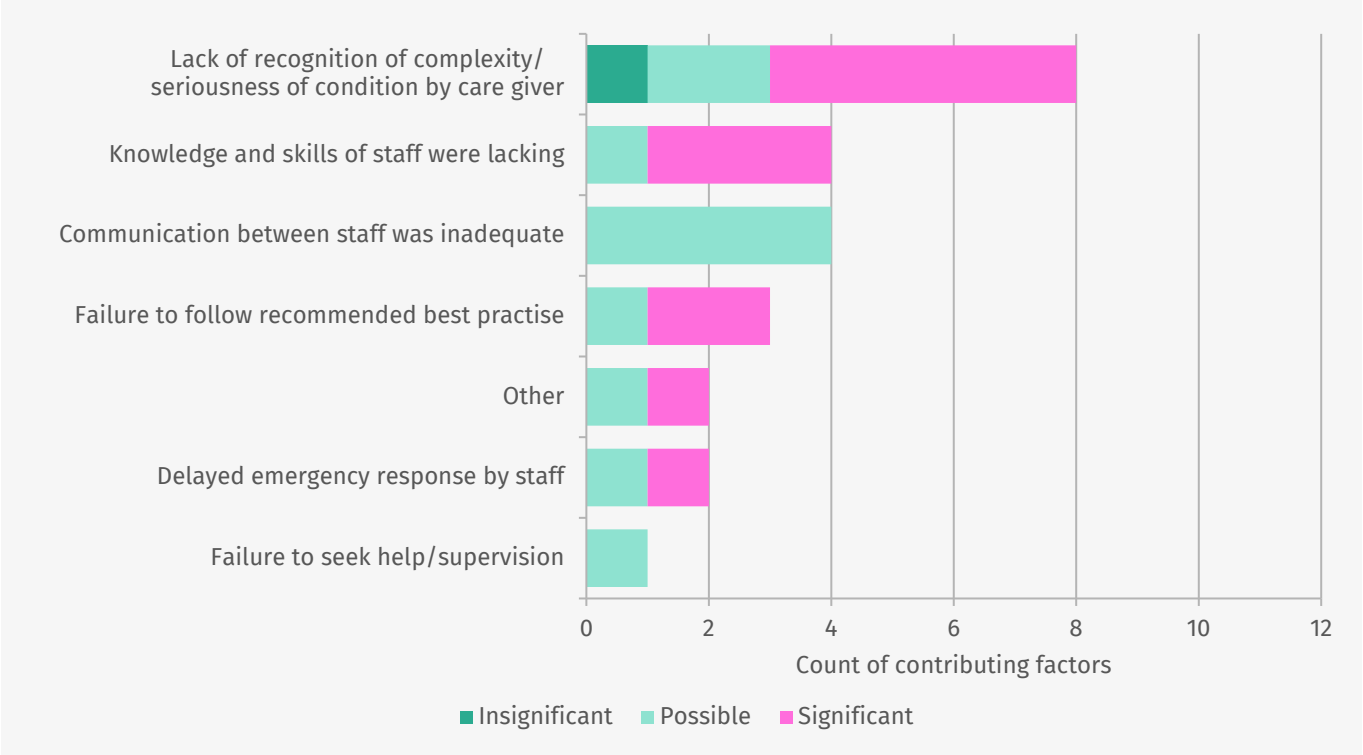


* Failure or delay in emergency response relates to delays in performing emergency caesarean sections

Key clinical practice improvement areas were:

- Incorrect classification /degree of urgency of lower uterine segment caesarean section (LUSCS)
- Missed identification of fetal growth restriction
- Lack of recognition of complex obstetric conditions
- Delay in emergency response
- Lack of communication between health service providers

Figure 32: Clinical practice improvement area by PSANZ personnel contributing factor category



Key clinical practice improvement areas were:

- Delayed timing of lower uterine segment caesarean section (LUSCS)
- Poor access to senior staff- staff in operating theatre, on-call consultant uncontactable.
- Delay in emergency response due to acuity in birth suite.

Fetal growth assessment

In 23.3 percent of the stillbirths reviewed, the fetal weight was below the 10th centile, thus indicating these babies were small for gestational age. Furthermore, 50 percent of these babies demonstrated significant growth restriction where the fetal weight was less than the 3rd centile. As highlighted in previous reports, appropriate screening for fetal growth restriction is a key aspect of reducing perinatal mortality.