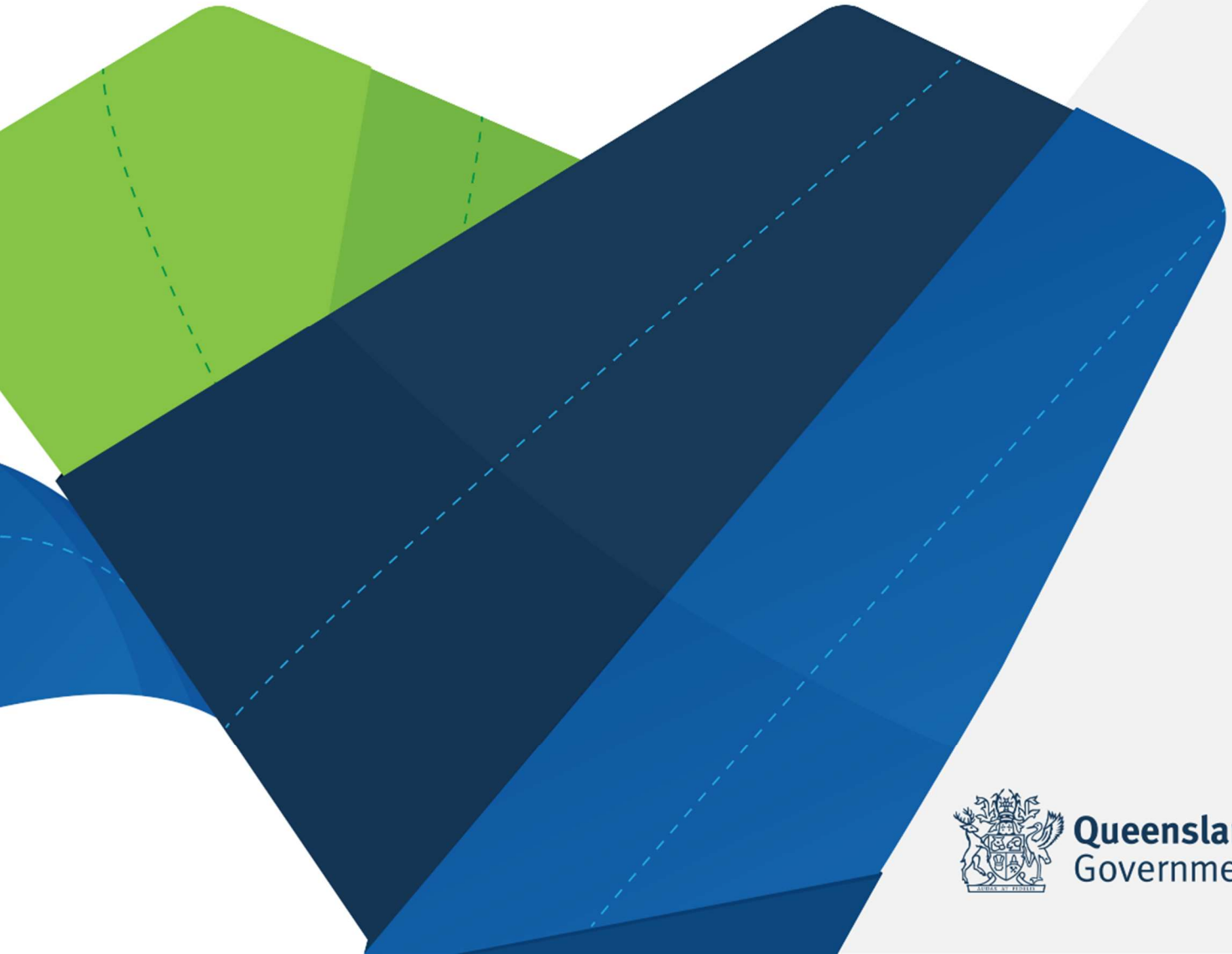
Review of selected 2022 Perinatal Deaths

Stillbirths (< 28 weeks) and Neonatal deaths (<22 weeks)



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Acknowledgement

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

Although a statistically rare event, a perinatal death brings a pregnancy to an end with anguish rather than celebration. Furthermore, many perinatal deaths occur suddenly and without explanation, which compounds the grief for all involved.

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 death, in the hope that future deaths may be prevented.

This report uses "Aboriginal and Torres Strait Islander " 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.

Executive Summary

The publication of the preliminary 2022 National Perinatal Data Collection (NPDC) data tables demonstrated an increase in the perinatal mortality rate for Queensland, from 10.8 per 1,000 births in 2021 to 12.3 per 1,000 births in 2022. On review, it was noted that that the rise was driven by an increase in stillbirths < 28 weeks and neonatal deaths between 20-21 weeks gestation (this could also be described as an increase in late second trimester miscarriages).

It was determined that a retrospective chart audit of the 158 deaths within this cohort would be undertaken, with the primary purpose of determining if there were any common contributing factors associated with these deaths.

The review was conducted using a combination of administrative data and patient information derived from medical records. This approach enabled a high degree of confidence in the review findings. However, it should be noted that reviewing a single year of data makes it difficult to determine the significance of findings, and there is minimal empirical evidence regarding causation and preventability of perinatal deaths at these gestations.

A range of key findings are documented throughout this report, but in summary:

- There has been no increase in preventable perinatal deaths in 2022.
- There are no generalised interventions or modifiable factors which would change the outcome.
- The increase in perinatal mortality is an increase in late miscarriage, mostly at pre-viable gestations.
- The chart audit demonstrated that the clinical care provided to this cohort in most instances, aligned with best practice.
- The contributing factors identified in the review were consistent with known stillbirth risk factors and current risk screening:
    - Lower socioeconomic status
    - Elevated Body Mass Index (BMI)
    - Age <20 years
    - Indigenous status.

In addition, when compared to stillbirths ≥28 weeks (in the third trimester), the risk for perinatal death was much higher for women with BMI > 30 and those from the most disadvantaged socio-economic indexes for areas (SEIFA) quintile.

There were two additional findings that are important, but not directly related to the causes of perinatal death:

- There is a high number of women who are not accessing the recommended antenatal ultrasound scans.
- There were a significant number of misclassifications of causes of perinatal death within the Queensland Perinatal Data Collection.

The following recommendations have been made:

- Source data from other Australian jurisdictions: (a) 2022 perinatal death numbers and (b) Perinatal Society of Australian and New Zealand (PSANZ) classifications. This will help determine whether there has been a proportional rise in perinatal mortality rates and the identified causes of death according to PSANZ classifications, across other jurisdictions.
- Conduct an audit of Queensland 2023 PSANZ classifications to quantify misclassifications and identify trends in the causes of perinatal death compared to previous years.
- Strengthen mechanisms to adjust the initial recorded PSANZ classifications once placental histology and autopsy results become available.
- Consider strategies to increase the uptake of women accessing recommended antenatal ultrasounds.
- Conduct an analysis of the rate of perinatal mortality of known risk factors (lower socioeconomic status, elevated body mass index, age less than 20 years and indigenous status) from 2018-2023 and present to the QMPQC for consideration of further potential prevention strategies.
- Advocate that the Productivity Commission use the National Perinatal Data Collection as the source of comparison of perinatal deaths in their Report on Government Services (ROGS).

Glossary

Antepartum Haemorrhage	The mother had a vaginal bleed recorded in the perinatal record or any hospital admission after the date of conception and up to and including the birth record.
Body Mass Index (BMI)	Body Mass Index (BMI) is a person's weight in kilograms divided by the square of height in metres. A BMI of 18.5 to 24.9 suggests a healthy weight range. A BMI of 25 to 29.9.may indicate overweight. A BMI of 30 or higher may indicate obesity.
Fetal Morphology Ultrasound	A morphology ultrasound is a routine recommended antenatal test done between 18-22 weeks of pregnancy. It is an ultrasound to check the developing organs of the baby and checks for abnormalities as well as the position of the placenta.
IMPROVE	The aim of Improving Perinatal Review and Outcomes Via Education (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.
Neonatal death	A child born alive at any gestation (one whose heart has beaten after it has been completely expelled or extracted from its mother) and subsequently dies within 28 days of birth (a neonatal death).
Nuchal Fold Ultrasound	The nuchal fold ultrasound is a non-invasive screening test that measures the fold of skin seen at the back of the fetal neck during the second trimester of pregnancy. Increased thickness of the nuchal fold is a soft marker associated with multiple fetal anomalies, and is measured on a routine second trimester ultrasound.
Perinatal mortality	Defined in this report as all fetal deaths (stillbirths) of at least 20 weeks gestation or at least 400 grams birthweight and neonatal deaths (deaths of liveborn babies of any weight or gestation within the first 28 days of life).

Perinatal Society of Australian and New Zealand (PSANZ) classifications	The purpose of the PSANZ Perinatal Death Classification (PSANZ-PDC) is to identify the single most important factor which led to the chain of events which resulted in the perinatal death
Recommended minimum antenatal visits for gestational age	A measure of whether the mother had attended at least the recommended number of antenatal visits for the gestational age at which the baby was born; based on the Queensland Pregnancy Health Record. • Less than 20 weeks gestation; At least 2 visits • 20-24 weeks; At least 3 visits • 25-27 weeks; At least 4 visits • 28-30 weeks; At least 5 visits • 31-33 weeks; At least 6 visits • 34-35 weeks; At least 7 visits • 36-37 weeks; At least 8 visits • 38 weeks or more; At least 9 visits
Socio-Economic Indexes for Areas (SEIFA)	A tool developed by the Australian Bureau of Statistics that ranks areas in Australia according to relative socio-economic advantage and disadvantage. The information is based on the five-yearly census.
Stillbirth	Defined by the Registration of Births, Deaths and Marriages Act as a child who has shown no sign of respiration or heartbeat, or other sign of life after completely leaving the child's mother and who has been gestated for 20 weeks or more or weighs 400g or more.

Key findings

1.	There has been no increase in preventable <28-week gestation stillbirths
2.	There are no generalised interventions which would change the outcome
3.	The increase in perinatal mortality is due to an increase in late miscarriage, mostly at pre-viable gestations
4.	The chart audit demonstrated that the clinical care provided to this cohort aligned with best practice
5.	Queensland should advocate that the Productivity Commission use the National Perinatal Data Collection as the source of comparison of perinatal deaths to improve consistency and the quality of data collection in their ROGs report
6.	The leading cause of death for perinatal deaths in this review was spontaneous preterm labour or rupture of membranes. There were more deaths with this PSANZ classification than in previous years
7.	Stillbirths and neonatal deaths were associated with more chorioamnionitis than in previous years
8.	The chart audit identified that approximately 20% of reported PSANZ classifications were incorrect
9.	Women in this cohort appeared to be younger than the 'All QLD births' population, but not younger than women experiencing stillbirth ≥ 28 weeks
10.	Women in this cohort were more likely to have higher BMIs than all mothers who gave birth in Queensland. In addition, they were also generally in the **more** obese categories than women experiencing stillbirths at later gestations
11.	Women in this cohort were more likely to reside in the most disadvantaged localities
12.	Indigenous women within the audit cohort were over-represented in each of the stillbirth risk factors considered
13.	Women in this cohort were less likely to have had the recommended antenatal ultrasounds
14.	All women who had an antepartum haemorrhage were reviewed by a medical officer
15	All women who experienced a neonatal death and had an identified shortened cervix, received appropriate management
16.	There is no conclusive evidence to link the COVID-19 virus with perinatal mortality in this cohort

Audit team

The audit team was comprised of personnel who had knowledge and expertise in the areas of obstetrics, maternal fetal medicine, midwifery, data analytics and patient safety.

Members:

- Professor Ted Weaver, Co-Chair Queensland Maternal and Perinatal Quality Council, Senior Medical Officer, Sunshine Coast University Hospital
- Dr. Johanna Laporte, Chair Perinatal Mortality Sub-Committee, Maternal Fetal-Medicine Specialist, Royal Brisbane and Women's Hospital
- Imogen Kettle, Clinical Midwife Consultant- Perinatal Mortality Projects, Clinical Excellence Queensland
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Background

Australian Institute of Health and Welfare (AIHW) preliminary 2022 data tables from the National Perinatal Data Collection (NPDC) demonstrated an increase in the perinatal mortality rate for Queensland, from 10.8 per 1,000 births in 2021 to 12.3 per 1,000 births in 2022. The rise was driven by an increase in stillbirths less than (<) 28 weeks and neonatal deaths between 20-21 weeks' gestation (this could also be described as an increase in late miscarriages). The Minister requested a response to the RoGS data released 2 February 2024 which demonstrated an increase in the Queensland Perinatal Mortality rate from 10.1/1,000 births in 2021 to 11.5/1,000 births in 2022 and Queensland having the second highest perinatal mortality of all jurisdictions.

There are well established differences in perinatal mortality rates reported by RoGs and AIHW, due to differences in data sources, but regardless, the Queensland rate is higher than in previous years, and the second highest in Australia.

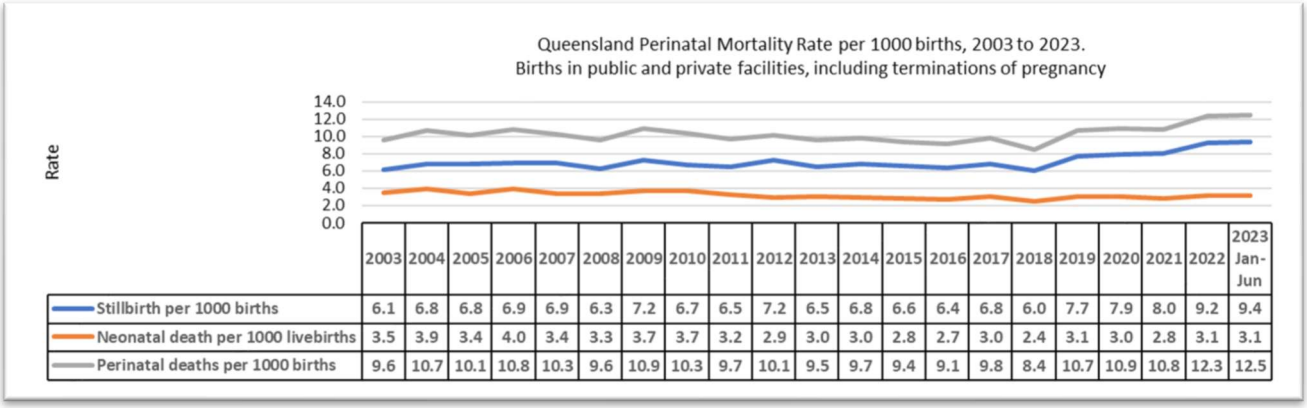
It was determined that a chart audit of stillbirths (<28 weeks' gestation) and neonatal deaths at 20-21 weeks' gestation should be conducted in order to determine if there were any common contributing factors.

Perinatal Mortality

The perinatal death (or perinatal mortality) rate of a jurisdiction is the sum of the stillbirth rate and neonatal death rate. It is important to note that both stillbirth and neonatal deaths can occur at non-viable gestations. As the clinical distinction between a 20-week stillbirth and 20-week neonatal death is often uncertain, and the causative factors behind these events are likely similar, the stillbirth and neonatal death groups are combined for the majority of the analysis in this report (n=158).

The Queensland perinatal mortality rate has been increasing since 2018, primarily due to an increase in the stillbirth rate. The longitudinal trend in perinatal mortality is demonstrated in Figure 1 below. This figure includes births from the public and private sectors, and also includes terminations of pregnancy over 20 weeks gestation (which can be either a stillbirth or neonatal death).

Figure 1 Queensland Perinatal Mortality rate, Births in public and private facilities, including terminations of pregnancy, 2003- June 2023.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 Jan-Jun
Stillbirth per 1000 births	6.1	6.8	6.8	6.9	6.9	6.3	7.2	6.7	6.5	7.2	6.5	6.8	6.6	6.4	6.8	6.0	7.7	7.9	8.0	9.2	9.4
Neonatal death per 1000 livebirths	3.5	3.9	3.4	4.0	3.4	3.3	3.7	3.7	3.2	2.9	3.0	3.0	2.8	2.7	3.0	2.4	3.1	3.0	2.8	3.1	3.1
Perinatal deaths per 1000 births	9.6	10.7	10.1	10.8	10.3	9.6	10.9	10.3	9.7	10.1	9.5	9.7	9.4	9.1	9.8	8.4	10.7	10.9	10.8	12.3	12.5

2022 Queensland perinatal mortality data

In Queensland in 2022, there were a total of 61,380 births and 756 perinatal deaths, resulting in a perinatal death rate of 12.3/1000 births.

The 756 deaths occurred across the **public and private sectors**, and are comprised of:

- 309 terminations of pregnancy
- 295 stillbirths
- 152 neonatal deaths.

Review scope

The scope of this review was a subset of the Queensland 2022 perinatal deaths and included 158 stillbirths and neonatal deaths that occurred in public maternity facilities.

- terminations of pregnancy were not in scope.

The subset groups were determined by the gestation weeks where a change in rate was apparent:

- 20–27-week stillbirths (n=129) and
- 20 and 21-week neonatal deaths (n=29).

Counts of each perinatal death type are summarised (Table 1).

Table 1 Counts of stillbirth and neonatal death (2020-2023)

GEST WEEKS	2020		2021		2022	
	Stillbirth	Neonatal Death	Stillbirth	Neonatal Death	Stillbirth	Neonatal Death
20	27	13	31	7	**37**	**15**
21	18	10	15	12	**28**	**14**
22	15	9	14	20	**14**	7
23	11	11	5	12	**12**	10
24	7	9	10	9	**12**	6
25	8	8	7	5	**14**	7
26	12	3	7	4	**8**	7
27	2	4	5	4	**4**	1
Total	100	67	94	73	**129**	67
	167		167		196	

Data sources

The review was conducted using a combination of administrative data and patient information derived from medical records (Table 2). This comprehensive approach enables a high degree of confidence in the review findings.

Table 2 Chart audit data sources

Data Collection	Data provided
Perinatal Data Collection	Longitudinal perinatal mortality rates; all AIHW fields; Unit Record level Perinatal Data Collection (PDC) fields for 158 in-scope deaths
PSANZ classifications	PSANZ classification codes assigned to each case
Pregnancy Hand-Held Record (PHR)	Ethnicity of mothers, pregnancy care visits
AUSLAB	Placental histology, autopsy reports, feto-maternal haemorrhage indicators, cytogenetics
Integrated electronic medical records (ieMR)	Additional case notes to inform cervical length, history of trauma and other relevant clinical variables
Notifiable Conditions System (NOCS)	COVID infection and vaccination data
Radiology reports	Nuchal translucency and fetal morphology ultrasound reports

Limitations of this review

Statistical limitations:

The sample size is small and may limit inference to the population level.

The review was confined to 2022 data.

Clinical uncertainty:

There is minimal empirical evidence regarding causation and preventability of perinatal deaths at 20-27 weeks, which limits an evidence-based approach to the clinical review.

Even after a comprehensive review, it is not always possible to determine a cause of perinatal death, particularly at gestation age <28 weeks. As such, comprehensive perinatal death review is recommended to be undertaken for deaths at gestations ≥ 28 weeks (Qld Clinical Guidelines, 2023).

Comparisons of perinatal death rates between jurisdictions and data sources

There are two national data collections of perinatal deaths:

- the Australian Bureau of Statistics (ABS) collates data for all deaths registered in Australia to from the ABS Death Registrations collection.
- the Australian Institute of Health and Welfare (AIHW) collates data from state and territory Perinatal Data Collections to form the National Perinatal Data Collection (NPDC).

There are also two different annual publications of perinatal mortality rates that use different data collections:

- ROGs which reports fetal and neonatal mortality from the ABS Deaths Registration collection.
- Australian Institute of Health and Welfare Australia's Mothers and Babies which reports fetal and neonatal mortality from the NPDC.

Different data sources make comparisons between jurisdictions difficult.

Additionally, there are differences between legislative definitions of stillbirths and data collection and verification practices across jurisdictions that may impact on numbers reported to the ABS and NPDC, particularly regarding Termination of Pregnancy. Some of these include:

- in all jurisdictions registration of stillbirths requires notification by a doctor or coroner and by one or both parents. In Queensland, alternative informants may provide the second part of a notification to fully register a perinatal death.
- in Queensland stillbirths are registered as a birth and a death, whereas in the majority of jurisdictions (apart from Western Australia) they are only registered as a 'stillbirth' as part of the birth registration process. This may make inclusion in vital statistics more likely for stillbirths occurring in Queensland and Western Australia.
- in South Australia, terminations of pregnancy are explicitly excluded from vital statistics reporting (that is, birth and death registrations), but are included in the data reported to the NPDC.
- Queensland Health undertakes data validation processes to ensure these data collections align. Not all jurisdictions undertake these data validation processes, creating discrepancies between the data collections.

Due to these differences, it is difficult to compare Queensland's perinatal mortality rate to that of other Australian jurisdictions. The Audit team considers this to be a significant issue, rendering it impossible to accurately compare perinatal mortality rates across Australia.

Review Considerations

The review set out to answer five (5) questions.

1. What were the causes of perinatal death?
2. What were the maternal characteristics of the cohort?
3. Was care provided according to recommended guidelines?

4. Can we determine if COVID was a contributing factor?
5. Were there any common contributing factors?

What were the causes of perinatal death?

The causes of perinatal deaths are classified according to the PSANZ Classification System, as part of Queensland's perinatal mortality review process. The classification identifies the single most important maternal/fetal factor which led to the chain of events that resulted in the death.

The most common causes for perinatal death for this cohort were:

- **PSANZ Classification Group 10**: Spontaneous preterm labour or rupture of membranes (39.2%).
- **PSANZ Classification Group 11**: Unexplained antepartum fetal death (19.6%)
- **PSANZ Classification Group 9**: Placental dysfunction/pathology (13.3%)

- A full list of the PSANZ classifications for this cohort can be found in **Appendix 1.**

Sub-categories of PSANZ Classification Group 10: Spontaneous pre-term labour or rupture of membranes

There was a notable increase in PSANZ Classification Group 10 which refers to the death of a normally formed, appropriately grown preterm baby following spontaneous onset of preterm labour or spontaneous rupture of membranes. Furthermore, there was an increase in the diagnosis of histological chorioamnionitis (maternal inflammatory response) which is assigned when there is histological evidence of inflammation or infection of the placenta and membranes (Table 3).

Key finding: Perinatal mortality in this cohort was associated with more **chorioamnionitis** than in previous years

Table 3 PSANZ Classification group 10 sub-categories

PSANZ Classification Group 10 sub-category	2020	2021	2022
10.11 Spontaneous preterm with histological chorioamnionitis	27	21	**39**
10.12 Spontaneous preterm without histological chorioamnionitis	9	4	**12**
10.2 Spontaneous preterm preceded by prem cervical shortening	1	5	**10**
10.17 No chorioamnionitis, no examination of placenta			1
10.19 Unspecified or not known whether placenta examined		3	
10.13 with clinical evidence of chorioamnionitis, no examination of placenta	1	1	
Total	38	34	62

PSANZ misclassifications

There were 32/158 (20.3%) misclassifications identified from the chart audit. This was identified from histopathology and autopsy reports. Of note, the PSANZ causes of death were analysed with the amended classifications.

Note: The PSANZ classification is not used in the calculation of perinatal deaths in either the AIHW or the Productivity Commission's reports.

Key finding: The chart audit identified that *approximately 20% of reported PSANZ classifications were incorrect*. It is important to improve the accuracy of classifications of death as these data inform the epidemiological trends at both state and national data reporting levels.

What were the maternal characteristics of the cohort?

One of the foundations of antenatal care is the identification of maternal risk factors for proper pregnancy planning and childbirth. These risk factors have a role to play in risk modification during pregnancy and include maternal age, BMI, socioeconomic factors and ethnic belonging.

The audit cohort was compared against two reference groups:

- All Queensland births in 2022
- Stillbirths at ≥ 28 weeks (3rd trimester).

N.B. Comparisons were not made to neonatal deaths at later gestations as this classification extends to 28 days after birth.

Key variables highlighted in the demographic comparison were:

- Age
- BMI
- Indigenous status
- Socioeconomic status (determined by SEIFA of residence).

Remoteness (defined by the Australian Statistical Geography Standard) and parity were also evaluated but did not show any influence on the results.

Age

Maternal age is a known risk factor for stillbirth. Women aged < 20 years or ≥ 35 years are more likely to experience stillbirth (Table 4).

Table 4 Age comparison of All QLD births versus women who had a stillbirth at <28 weeks and ≥ 28 weeks

Maternal Age (yrs.)	All QLD births 2022		Stillbirths ≥ 28 weeks		Audit cohort	
	n	%	n	%	n	%
<20	1,399	2.3%	10	7%	12	**7.6%**
20-34	44,540	74.3%	89	65%	107	67.7%

35-39	11,516	19.2%	28	21%	30	19.0%
40+	2,466	4.1%	9	7%	9	5.7%
Total	**59,921**	**100%**	**136**	**100%**	**158**	**100%**

Key finding: Women in this cohort appeared to be younger than the All-QLD births population, but not younger than women experiencing stillbirth ≥ 28 weeks.

Maternal BMI

There is a pronounced increase in the risk of stillbirth with increasing BMI. A woman is classified as obese if her BMI is 30 or higher. Obese 2 and Obese 3 women should be treated as high-risk obstetric patients, with increased antenatal surveillance and specialist input (Table 5).

Table 5 BMI comparison of All QLD births versus women who had a stillbirth at (a) <28 weeks and (b) ≥ 28 weeks

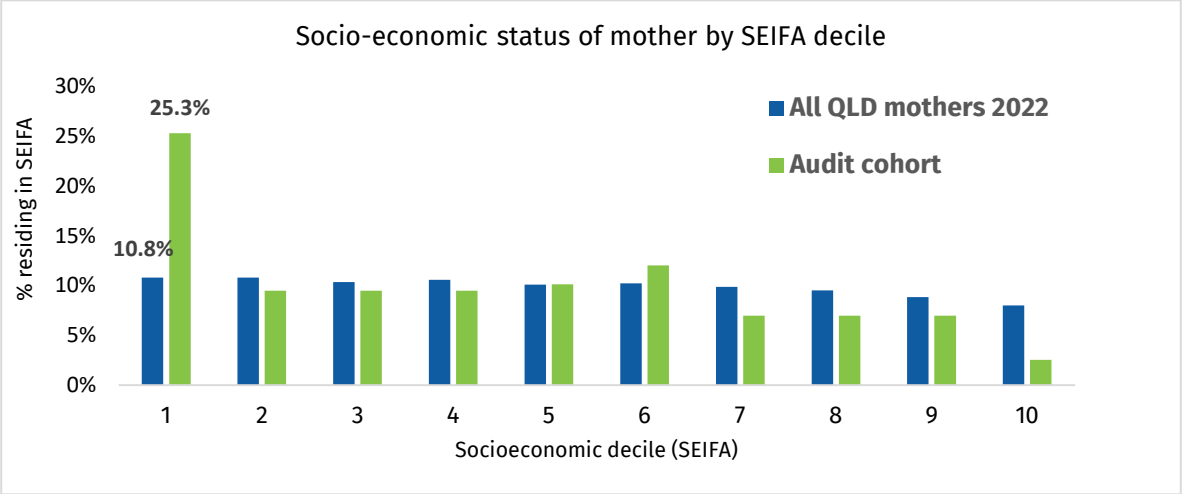
Maternal BMI	All QLD births 2022		Stillbirths ≥ 28 weeks		Audit cohort	
	n	%	n	%	n	%
Underweight <18.5	2,355	3.9%	10	7%	8	5.1%
Normal 18.5-24.9	27,159	45.3%	56	41%	34	21.5%
Overweight 25-29.9	15,161	25.3%	30	22%	43	27.2%
Obese 1: 30-34.9	8,330	13.9%	13	10%	20	12.7%
Obese 2: 35-39.9	3,857	6.4%	8	6%	20	12.7%
Obese 3: 40+	2,473	4.1%	18	13%	18	11.4%
Unknown	586	1.0%	1	1%	15	9.5%
Total	**59,921**	**100%**	**136**	**100%**	**158**	**100%**

Key finding: Women in this cohort were more likely to have **higher BMIs** than mothers in the ALL-QLD births group. They were also generally in the more obese categories than women experiencing stillbirths ≥ 28 weeks

Socio-economic status

Socioeconomic disparities in stillbirth outcomes are an important determinant. Women living in poor socioeconomic conditions have twice the risk of a stillbirth compared to women living in more advantageous ones (Flenady et al 2016) (Figure 2).

Figure 2 Socio-economic status of the review cohort by SEIFA decile



Key finding: Women in the audit cohort were more likely to reside in the most disadvantaged **SEIFA region (**25% vs 11%)

Indigenous status

Across Queensland, rates of adverse perinatal outcomes among babies born to Indigenous women are higher than among babies born to non-Indigenous women. The stillbirth rate for Indigenous infants in Queensland remains higher than non-Indigenous rates. In Qld, 7.8% of all QLD birth mothers were of Aboriginal and/or Torres Strait Islander ethnicity, compared to 14.6% within the audit cohort. There is a disparity in all the key variables highlighted in the demographic comparison of this report (Table 6).

Table 6 Key variables by indigenous status of mothers in the cohort

Contributing Factor	Non-indigenous mothers within cohort (n= 135)	Indigenous mothers within cohort (n=23)
Underweight BMI	3.7 %	13%
Age < 20 years	7.6%	30.4%

Key finding: Indigenous women within the audit cohort were over-represented in each of the stillbirth risk factors considered.

Nuchal scan not performed	42.2%	56.5%
Morphology scan not performed	20.%	52.2%
Smoking	8.1%	17.4%
SEIFA 1 (disadvantage)	19.3%	60.9%

Summary- maternal characteristics

The typical woman that experienced a stillbirth or neonatal death within this review cohort:

- Younger age
- Higher BMI
- Lower socio-economic status
- Identified as Indigenous
- Were less likely to have had pregnancy ultrasounds.

These characteristics are consistent with known high-risk groups and current guidelines and processes of care explicitly address these risks.

Note: Although diabetes and hypertension are well established obstetric risks, they are not diagnosed or rarely significant in the early stages of pregnancy that this review considers.

Was care provided according to recommended guidelines?

Due to the gestation of pregnancies in this review, the impact pregnancy care had on the clinical outcome is limited. For most women, pregnancy care up to 20 weeks' gestation typically occurs in the primary care setting.

Recommended pregnancy ultrasounds

Pregnancy scans are an important aspect of detecting and managing risks in the pregnancy, e.g., cervical length, presence of congenital anomalies.

Despite the availability of non-invasive prenatal testing (NIPT) to detect certain genetic abnormalities, it is recommended that a nuchal translucency ultrasound is performed. This scan provides a comprehensive evaluation of the developing baby's anatomy and detects 50-60 % of major fetal structural abnormalities. In addition, the blood work that is part of the nuchal fold test is important to highlight the possibility of certain complications of pregnancy developing such as poor fetal growth, preeclampsia and placental insufficiency.

In this cohort, 67/158 (42%) women did **not** have a nuchal scan. This scan is an ultrasound performed in the second trimester that measures the fold of skin behind the baby's neck. Increased thickness is a soft marker associated with multiple fetal anomalies. The number of

women not having a nuchal scan is a much higher percentage than the All-Qld birth group, of which 26% did not have a nuchal fold ultrasound (Table 7).

Table 7 Comparison of nuchal fold scan uptake for All QLD births versus women in the audit cohort

Nuchal scan (12-14 weeks)	All QLD births		Audit cohort	
	n	%	n	%
Yes	44,012	73.5%	91	57.6
No	15,773	26.3%	67	42.4%

In this cohort, 32/158 (20%) women did **not** have a morphology scan. The morphology scan checks the size of the baby, the developing organs and the position of the placenta. The number of women not having morphology ultrasounds is a much higher percentage than the All-Qld birth group, of which 7 % did not have a morphology scan (Table 8).

Table 8 Comparison of morphology scan uptake for All QLD births versus women in the audit cohort

Morphology scan (20-22 weeks)	All QLD births		Audit cohort	
	n	%	n	%
Yes	55,564	92.7%	126	79.7%
No	4,219	7.0%	32	20.3%

Key finding: Women in this cohort were less likely to have had the recommended **antenatal ultrasounds**.

Obstetric ultrasound fees

In most instances, there are out-of-pocket costs associated with these scans which may impact on uptake (Table 9).

Table 9 Pregnancy ultrasound fees

	Nuchal ultrasound	Morphology ultrasound
% with no out-of-pocket costs	11%	46%
Typical fees	$345	$243
Medicare rebate	$62	$88
Qld women typically pay	**$283**	**$155**

Ref: https://medicalcostsfinder.health.gov.au/services/Q55707/oh?specialty=022201

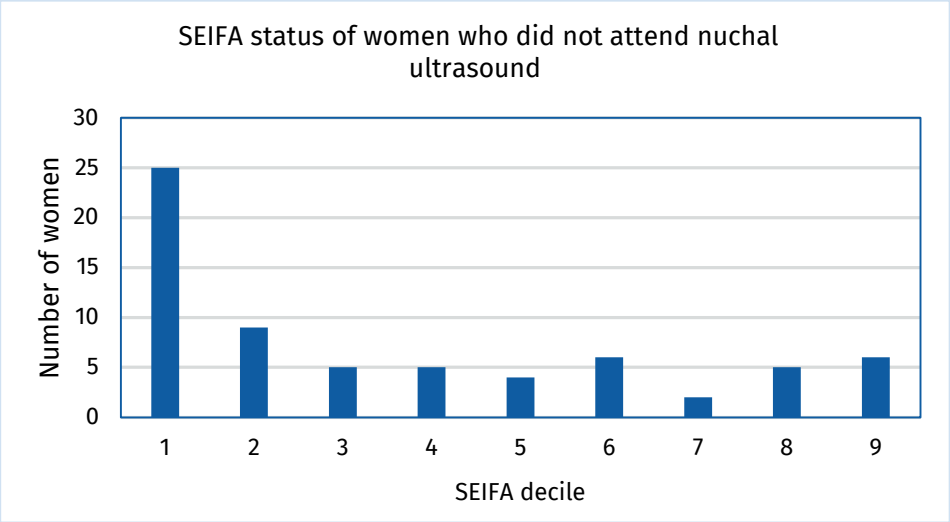
The average gap fee is: (a) $155 for a morphology ultrasound and (b) $283 for a nuchal ultrasound.

Ultrasound scanning and socio-economic decile

For the women that did not have a nuchal scan, 25/67 (37%) resided in the most disadvantaged SEIFA.

The combined effect of social deprivation and low uptake of nuchal fold ultrasounds is more pronounced for vulnerable women living in these areas. (Figure 3).

Figure 3 SEIFA status of women who did



Ultrasound cervical length measurement

The use of ultrasound screening of cervical length at routine mid-trimester fetal morphology assessment is a strong evidenced based intervention to safely lower the rate of preterm birth (Preterm Birth Prevention Alliance, 2024). Of the 126 women who had a morphology ultrasound, 106/126 (84.1%) had a documented cervical length obtained from the 20-week morphology scan. There were 19 (18%) women in this cohort who had an identified shortened cervix (<25mm). Appropriate management of a shortened cervix was implemented in 100% of the group that experienced a neonatal death i.e., vaginal progesterone and /or surgical cerclage.

Key finding: All women who experienced a neonatal death and had an identified shortened cervix, received appropriate management.

Antepartum haemorrhage (APH)

Antenatal vaginal bleeding at any stage in the pregnancy has a known epidemiological association with pregnancy loss (Karimi et al, 2024).

- 61/158 (38.6%) of the audit cohort experienced antepartum haemorrhage (APH) during their pregnancy
- Only 2/61(3.2%) of the APH were associated with direct abdominal trauma

- 61/61 (100%) of the women who experienced an APH were reviewed by a medical officer (best practice).

Key finding: All women who had an antepartum haemorrhage were reviewed by a medical officer.

Can we determine if COVID-19 was a contributing factor?

There has been speculation in the literature regarding the impact of COVID-19 on pregnancy. However, there is currently no evident epidemiological impact.

For this review, there was not sufficient relevant data available in order to fully explore the impact of COVID-19 in this cohort. From the information that was available, it was determined that:

- 51/158 women (32.3%) were vaccinated.
- 21/158 (13.3%) reported a COVID-19 infection during the pregnancy. (But as asymptomatic infection can occur, the true prevalence of COVID in this cohort is uncertain).
- There were no instance of serious infection or hospitalisation.
- For the 21 women that reported COVID-19 in their pregnancy the **leading** PSANZ classifications were:
    - 7/21 Spontaneous pre-term labour or SROM (PSANZ 10)
    - 4/21 Unexplained antepartum death (PSANZ 11)
    - 3/21 Placental dysfunction (PSANZ 9).

Were there any common contributing factors?

The contributing factors identified in the review were consistent with known stillbirth risk factors and current risk screening.

- Lower socioeconomic status
- Elevated BMI
- Age <20
- Indigenous status.

These findings support the current Safer Baby Bundle (2024) screening practices that are embedded into the first visit to an antenatal clinic within Queensland public hospitals.

Though sourced from a very small sample size, the findings regarding participation in the recommended antenatal ultrasound scans may indicate the need for women from the lowest socioeconomic regions to receive additional support to have these scans. These scans enable early detection of fetal abnormalities that are incompatible with life, and feto-maternal risks that require intervention (e.g., cervical cerclage) to continue the pregnancy safely. The ability of women to access these scans is likely impacted by the fact that sonography referrals arise in the context of primary care and are typically only performed by private (non-bulk billed) sonographers.

Statistical modelling

Additional analyses were undertaken to determine whether any of the stillbirth risk factors identified in the audit cohort were ***statistically*** significant in comparison to 2 different reference groups. As for the audit cohort, terminations of pregnancy were excluded from the reference groups.

Analysis I: Audit cohort vs All other births (Qld)

Analysis I compared the prevalence of risk factors in the audit cohort (n=158) to the prevalence of these factors in all other births in Queensland (n=60,910). Statistically significant factors were then considered in a logistic regression model.

Analysis I results

When compared to all other births in Queensland, the relative risk of perinatal death was:

- 2.6 times higher in women under 20 years old relative to women 20-34.
- 2.3 times higher in obese women (BMI ≥ 30) relative to those with normal BMI (18.5-24.9).
- 1.5 times higher in women who didn't have a Nuchal ultrasound relative to those who had the scan.

Analysis II: Audit cohort Stillbirths vs Stillbirths ≥ 28 weeks (Qld)

Analysis II compared the prevalence of risk factors in the stillbirth audit cohort (n=129) to the prevalence of these factors in other stillbirths (≥ 28 weeks) in Queensland (n=295). Statistically significant factors were then considered in a logistic regression model.

Analysis II results

When compared to stillbirths ≥ 28 weeks in Queensland, the relative risk of stillbirth was:

- 2.7 times higher for women from the most disadvantaged socioeconomic quintile relative to those from the most advantaged.
- 2.1 times higher in obese women (BMI ≥ 30) relative to those with normal BMI (18.5-24.9).

N.B. Although the absence of a morphology scan was also found to be statistically significant in both Analysis I and II, for many of the audit cases the perinatal death occurred within the same time window as the scan was due (20-22 weeks gestation), which limits the validity of the finding.

Summary

Based on a chart audit of 158 selected perinatal deaths:

- There has been **no increase** in preventable perinatal deaths.
- There are no generalised interventions which would change the outcome.
- The increase in perinatal mortality is an increase in late miscarriage, mostly at pre-viable gestations.
- The chart audit demonstrated that the clinical care provided to this cohort aligned with best practice.
- The contributing factors identified in the review were consistent with known stillbirth risk factors and current risk screening
    - Lower socioeconomic status
    - Elevated BMI
    - Age <20
    - Indigenous status.

Of note, when compared to stillbirths ≥28 weeks in Queensland, the risk for perinatal death was much higher for women with BMI > 30 and those from the most disadvantaged SEIFA quintile.

Additional findings

The chart audit has highlighted:

- There are a high number of women who are not accessing routine ultrasound screening.
- There are a significant number of PSANZ misclassifications which have been provided by HHS's to Statistical Services Branch, who are the data custodians of perinatal data.

Appendix

Appendix 1

The complete list of PSANZ classifications for the reviewed cohort.

PSANZ classification of review cohort	n	%
Spontaneous preterm labour or SROM	62	39.2%
Unexplained antepartum fetal death	31	19.6%
Placental dysfunction/pathology	21	13.3%
Congenital anomaly	10	6.3%
Antepartum haemorrhage	9	5.7%
Specific perinatal conditions	7	4.4%
Perinatal infection	6	3.8%
Hypertension	5	3.2%
Complications of multiple pregnancy	4	2.5%
Hypoxic peripartum death	3	1.9%
Total	**158**	**100%**

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