Consultative Council on
Obstetric and Paediatric
Mortality and Morbidity

COVID-19 communique

A rapid report

Safer Care
Victoria

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VICTORIA State Government

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About this report

This rapid report examines 10 key maternity indicators for 2020 and compares these with similar time points in 2018 and 2019. This snapshot will inform the ongoing COVID-19 response in Victoria and contribute to national and international data on the effects of the COVID-19 pandemic. The aim of this report is to present data specific to Victoria on the effects of the COVID-19 pandemic that have been reported in the media and in national and international literature.

Please note: The findings in this report are preliminary. The data have yet to go through the usual validation processes due to the need for the rapid publication of this report.

Introduction

It has been said on many occasions that 2020 was a year like no other.

In Victoria, the last months of 2019 and the early months of 2020 were punctuated by widespread bushfires across the eastern states of Australia. There were more than 3500 bushfires in Victoria from November 2019 to February 2020 with widespread smoke across the state.[1,2] This led to a number of days where air quality reached hazardous levels due to bushfire smoke with impacts on areas of high population including in Melbourne and Geelong.[3] There were concerns about the impact on pregnant women, babies and children and this was further compounded by the mental health effects of people being displaced, losing their homes and the wider anxiety in the community. Once the bushfires abated in Victoria, it became clear that a more disruptive threat was emerging – the COVID-19 pandemic. A global pandemic was declared on 11 March 2020[4] and a state of emergency was declared in Victoria on 16 March 2020.[5]

Impact of the COVID-19 pandemic

In March 2020, it became clear that the COVID-19 pandemic would significantly impact maternity, neonatal and child health services. Considerable changes were made in every Victorian public and private maternity service at an unprecedented pace. Every woman receiving pregnancy care and giving birth from March 2020 has been directly affected by these changes, which equates to thousands of women, babies and families. There is an imperative to examine the impact of the changes to maternity and neonatal services in response to COVID-19, to determine the impact of these changes and the associated restrictions for women, babies and families.

From March to December 2020 various levels of restrictions in activity, movement and travel were placed on individuals and services across Victoria. Pregnancy appointments, including the initial hospital booking visit, became telehealth appointments using the phone and/or telehealth computer platform. Face-to-face appointments were reserved for pregnancy care in later gestations, or for women who had complex health conditions. Face-to-face and group pregnancy education programs were discontinued or replaced with online sessions. Limitations were placed on the number of support people permitted to be present during pregnancy care, labour and birth. In many settings, women were required to nominate only one support person.[7]

Restrictions were also implemented in the hospital after birth, with many restricting to a partner or a single support person for limited hours. Restrictions were also placed on visiting in the special care and neonatal intensive care units. In some instances, this resulted in only one parent being able to visit at a time for reduced hours. Many women were unable to have their partner or support person present during ultrasound appointments and other tests. Practices, such as access to water immersion for labour and birth, were restricted and at times discontinued. Hospital access was restricted, and many women felt scared to attend hospital for care. There were reports of increased demand for homebirth, both within the publicly-funded models and with private midwives due to a fear of the hospital or a fear of the impact of the restrictions.[8,9]

In October 2020, restrictions started to be lifted with increased travel within the city of Melbourne allowed, the lifting of the curfew and non-essential services beginning trade again. By November, the ring of steel was removed. Late November to early December 2020 marked the beginning of the 'new normal' with the lifting of the mandate for face masks to be worn outdoors and in cafes/restaurants and a gradual return to working in an out-of-home context. However, many hospital changes continued with the wearing of face masks still being mandated into 2021.

A number of global studies during the pandemic showed the impacts of the pandemic in relation to outcomes such as preterm birth and stillbirth – both positive and negative.[10] For example, one health region in Ireland reported a reduction in preterm birth of very low birthweight infants (VLBW) during the COVID-19 lockdown[11] and a similar study in Denmark reported similar reductions during the nationwide lockdown from a stable rate in the preceding five years.[12]

In relation to stillbirth, the impact seems to be in the opposite direction. A study undertaken in one hospital in England demonstrated an increase in the stillbirth rate during the pandemic.[13] These data however are not consistent, even within England. Data from the National Health Service hospital admissions in England were assessed from 1 April 2019 to 30 June 2020 and compared to similar time periods in 2019.[14] This showed no evidence of an increase in stillbirths regionally or nationally during the COVID-19 pandemic when compared with the same months in the previous year and despite variable community COVID-19 incidence rates in different regions.

In the US, a study of all births in two Penn Medicine hospitals in Philadelphia compared births during the pandemic period (March–June 2020) with the same months in 2018 and 2019 (pre-pandemic). This study did not show significant changes in preterm or stillbirth rates during the SARS-CoV-2 pandemic in a racially diverse urban cohort from two Philadelphia hospitals.[15]

In Australia, there have also been reports of indirect impacts on pregnant women. At Monash Health's three maternity units in Melbourne, an interrupted time series analysis comparing births from July to September 2020 and January 2018 to June 2020 showed a fall in preterm birth rates greater than trends over time observed in 2018 and 2019. The reduction was stronger in medically indicated than in spontaneous prematurity and there was no increase in stillbirth or undetected small for gestational age neonates. There were also fewer stillbirths across this service during lockdown (0.8%) compared with the previous year (1.5%).[16]

Bringing together routinely collected data from individual major public maternity and neonatal health services in Victoria accounting for around 44,000 births each year, the Collaborative Maternity and Newborn Dashboard for the COVID-19 pandemic (CoMaND) project[17] produced a periodic report of key health and service performance indicators during the COVID-19 pandemic. Data from CoMaND have highlighted a reduction in the total number of births, increases in induction of labour, birthweight >90th centile at all gestations and birthweight >4000 grams, maternal Body Mass Index (BMI) >25, gestational diabetes and born before arrival births.

Similar data from the whole of Victoria can now be collated and presented.

Approach to the rapid review

This analysis uses data from the Victorian Perinatal Data Collection (VPDC), a statutory data collection system that includes all births in Victoria, and the Victorian Admitted Episodes Database (VAED). All births in public hospitals, private hospitals and home births are included. VPDC data for 2020 is provisional.

The timeline of events in Victoria means that rapid reporting of direct and indirect effects by quarter is possible. Broadly:

- **Q1** (January to March 2020) was the immediate and aftermath of the bushfire season
- **Q2** (April to June 2020) was the period of what became known as the first lockdown
- **Q3** (July to September 2020) was the period of the second lockdown which included more stringent restrictions
- **Q4** (October to December 2020) heralded a recovery phase and advent of a 'new normal' period. This time included a gradual lifting of local, regional and state border closures and opening up to the rest of the country.

The findings are reported by quarter in 2020 compared with data from the same quarters in 2018 and 2019. Graphs presented overlay the rates per quarter with the mean rates and minimum and maximum per quarter for 2018 and 2019 to support visualising the 2020 rates.

Limitations

The findings are preliminary as the data have yet to go through the usual cleansing and validation processes due to the need for rapid reporting. This report includes terminations of pregnancy as these have not yet been removed as is usual practice. Details on the reviews of perinatal and maternal deaths for 2020 is also not included.

Outcomes

The outcomes reported are:

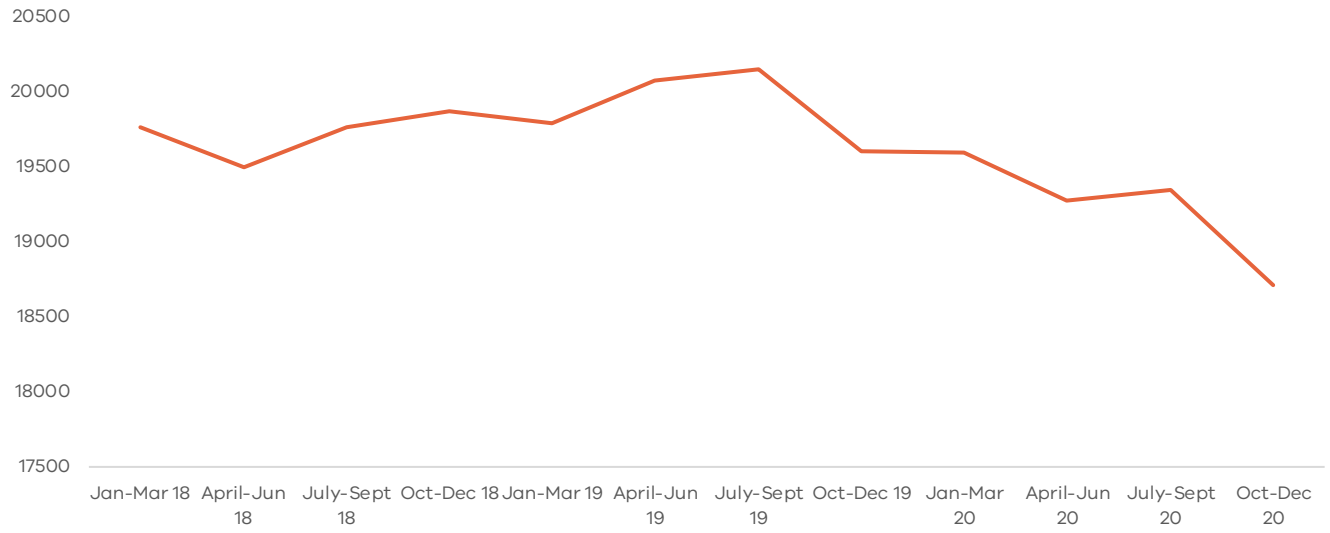
1. Preterm births
2. Unexpected stillbirth
3. Unplanned maternity and newborn readmissions
4. Fetal growth restriction
5. Large for gestational age
6. Low Apgar score
7. Severe pre-eclampsia/eclampsia
8. Born before arrival
9. Admission to special care nursery/neonatal intensive care units at term excluding congenital anomalies
10. Undiagnosed congenital anomalies

The definitions and methods of computation are presented in the Appendix.

Findings

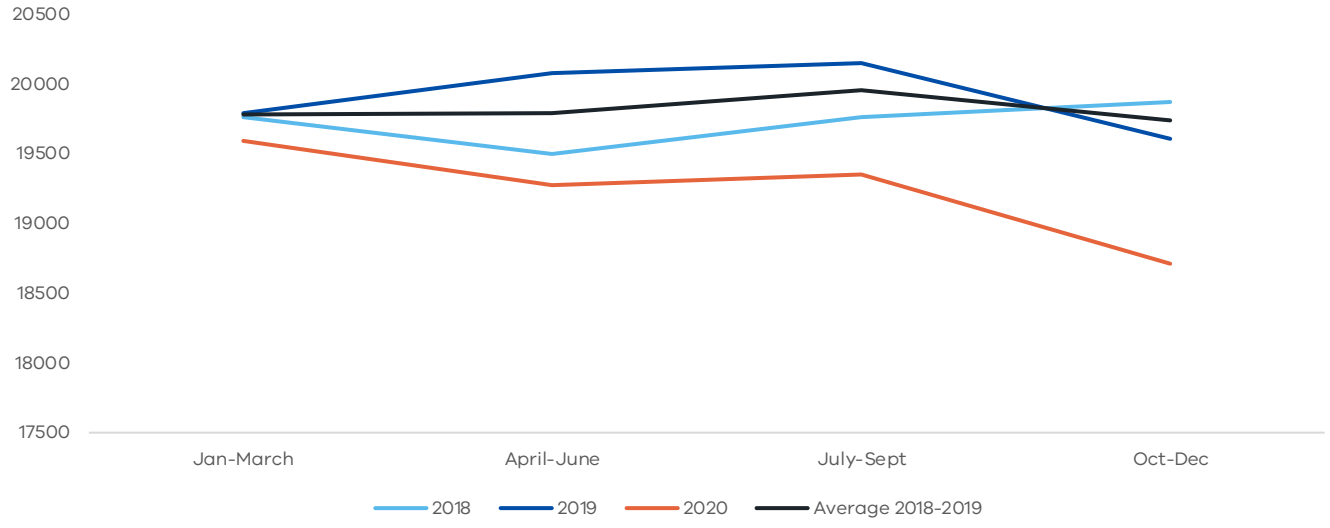
In 2018, 77,720 women gave birth to 78,900 babies (including terminations of pregnancy). In 2019, 78,423 women gave birth to 79,627 babies (including terminations of pregnancy). And in 2020, data to date indicates that 75,809 women gave birth to 76,935 babies (including terminations of pregnancy).

Figure 1: Total births per quarter, Victoria, 2018–2020



Since the July to September 2019 quarter, the total number of births have been declining each quarter. There were 3.4 per cent fewer births in 2020 when compared to 2019 and the total number of births was lower for each quarter.

Figure 2: Number of births by year and quarter, Victoria, 2018–2020



COVID-19 infections in pregnant or postpartum women

A total of 97 women tested positive to SARS-CoV-2 while pregnant in 2020. The clinical characteristics, care, and outcomes for these women and their babies has been captured in the CHOPAN registry[18] and will be published by that group.

1. Preterm births

The rate of preterm birth in Victoria ranged between 8.1 per cent and 9.2 per cent through 2018 to 2020.

The rate of preterm birth in Q1 and Q2 2020 reflected the same pattern observed in 2018 and sat at, or just below, the minimum observed in the same quarters in 2018 and 2019. The rate of preterm birth for both Q3 and Q4 2020 sat outside the 2018/2019 ranges. Overall, the rate of preterm birth in 2020 was significantly lower (8.3%) in 2020 when compared to 2019 (9%) and 2018 (8.7%) ($p<0.001$).

Figure 3: Preterm birth rate (<37 weeks) by year and quarter, Victoria, 2018–2020

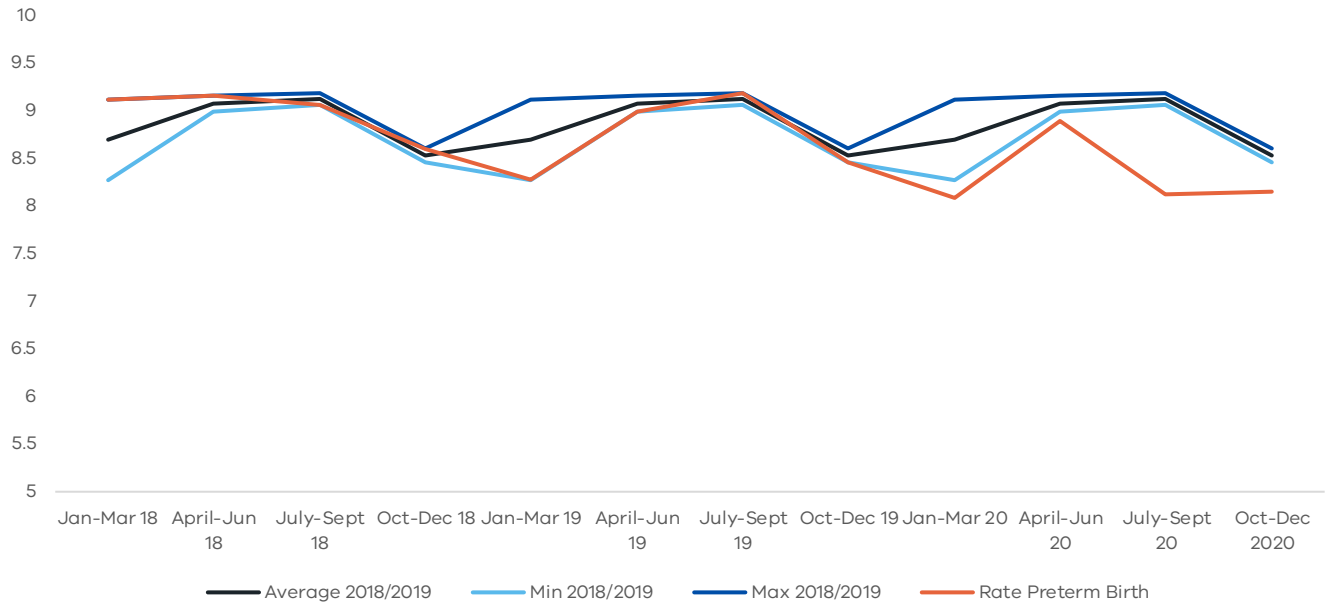


Table 1: Proportion of preterm birth <37 weeks by quarter per 100 births, Victoria, 2018–2020

	Q1	Q2	Q3	Q4
2018	9.1%	9.2%	9.1%	8.6%
2019	8.3%	9%	9.2%	8.5%
2020	8.1%	8.9%	8.1%	8.2%

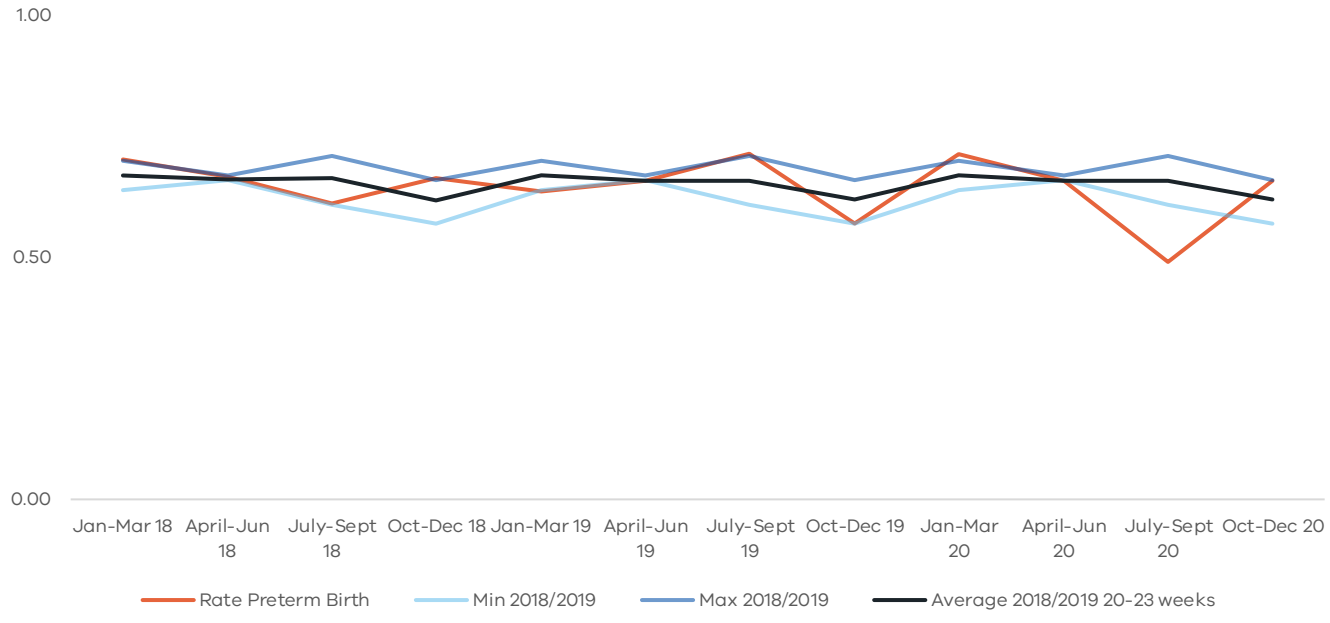
While the rate of preterm birth overall was significantly different in 2020 when compared to 2018 and 2019, this association was not true for all gestation groups. The rates of preterm birth by gestation group and for each quarter in 2018 to 2020 are presented in **Table 2.**

Table 2: Births by gestation group and quarter, Victoria, 2018–2020

Quarter	20–23 weeks	24–27 weeks	28–31 weeks	32–36 weeks	37 weeks plus
Q1 2018	0.70	0.46	0.67	7.28	90.89
Q2 2018	0.67	0.33	0.81	7.35	90.85
Q3 2018	0.61	0.47	0.73	7.25	90.94
Q4 2018	0.66	0.50	0.67	6.76	91.39
Q1 2019	0.64	0.33	0.72	6.58	91.73
Q2 2019	0.66	0.39	0.68	7.27	91.01
Q3 2019	0.71	0.47	0.76	7.24	90.81
Q4 2019	0.57	0.45	0.61	6.83	91.54
Q1 2020	0.71	0.36	0.71	6.31	91.91
Q2 2020	0.66	0.47	0.80	6.96	91.11
Q3 2020	0.49	0.36	0.63	6.65	91.87
Q4 2020	0.66	0.40	0.79	6.31	91.84

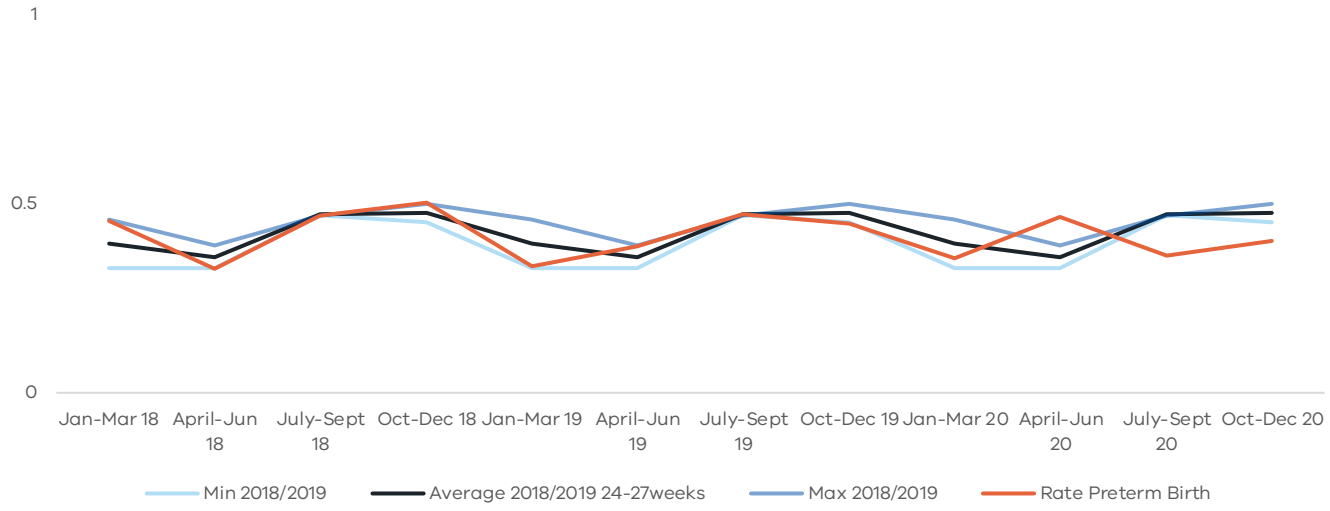
The rate of preterm babies born **20–23 weeks** in Q1 and Q2 2020 was consistent with the average rates in 2018 and 2019. The rate of babies born 20–23 weeks in Q3 was lower compared to 2018/2019 average rate, but this returned to the historical range in Q4 2020. Overall, the rate of preterm birth 20–23 weeks in 2020 was 0.63 per cent which was **not significantly different** to the rate in 2018 (0.66%) and 2019 (0.66%) (p=0.74).

Figure 4: Rates of birth at 20–23 weeks, by quarter relative to the lowest, highest and average rate seen per quarter, Victoria, 2018–2020



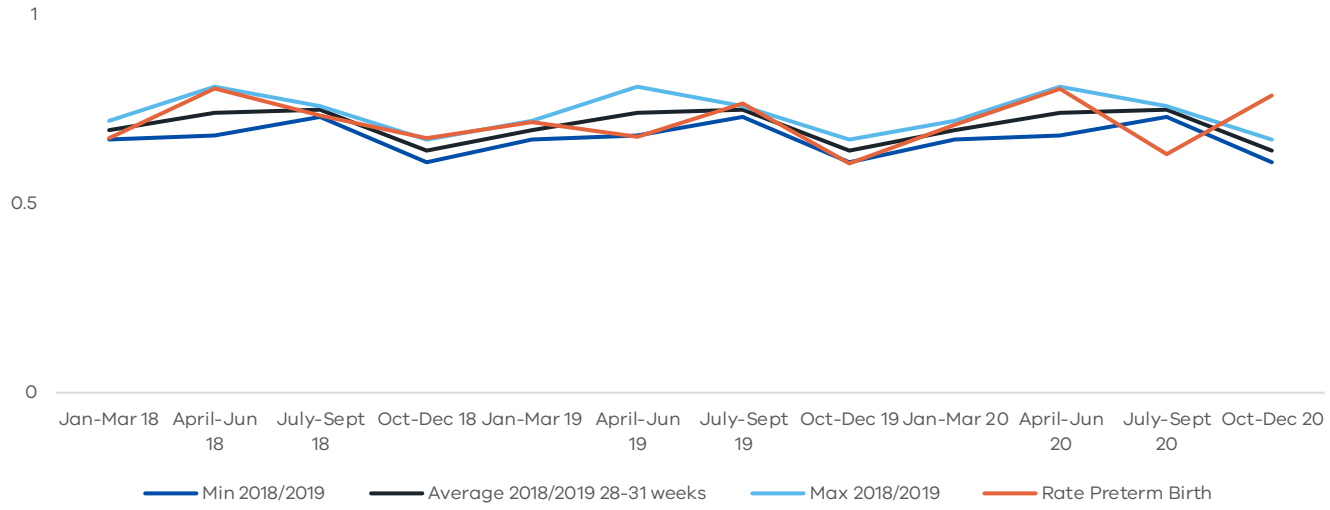
The rate of preterm babies born **24–27 weeks** in Q2 2020 was slightly higher than what was observed in Q2 2018 and 2019. However, for Q3 and Q4 2020 the rate of preterm babies 24–27 weeks was less than in the same quarters of 2018 and 2019. Overall, the rate of preterm birth 24–27 weeks in 2020 was 0.40 per cent which was **not significantly different** to the rate in 2018 (0.44%) and 2019 (0.41%) (p=0.40).

Figure 5: Rates of birth at 24–27 weeks, by quarter relative to the lowest, highest and average rate seen per quarter, Victoria, 2018–2020



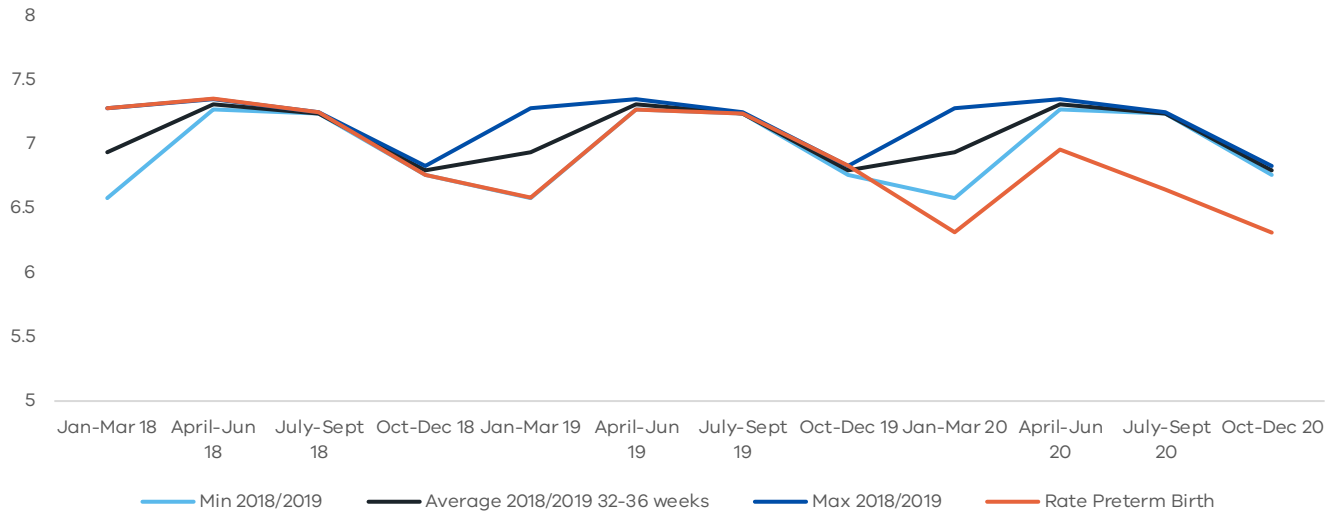
The rate of preterm babies born **28–31 weeks** in Q1 and Q2 2020 was consistent with the rates in 2018 and 2019 for the respective quarters. The Q3 2020 rate sat lower and the Q4 rate sat higher than the rates in 2018 and 2019 for the respective quarters. Overall, the rate of preterm birth 28–31 weeks in 2020 was 0.73 per cent which was **not significantly different** to the rate in 2018 (0.72%) and 2019 (0.69%) (p=0.63).

Figure 6: Rates of birth at 28–31 weeks, by quarter relative to the lowest, highest and average rate seen per quarter, Victoria, 2018–2020



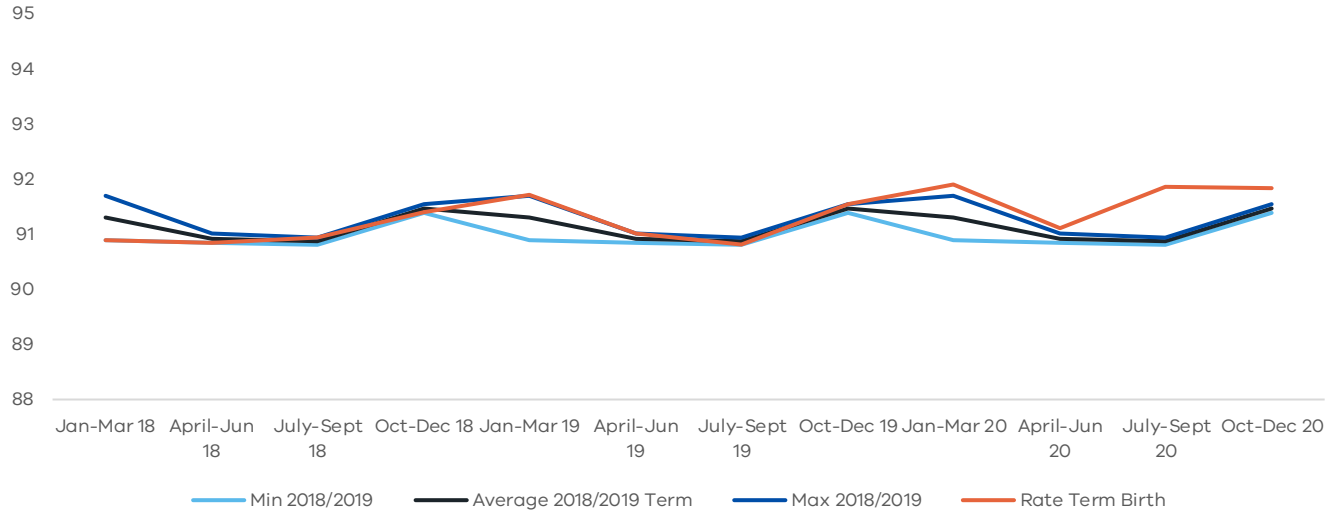
The rates of preterm babies born **32–36 weeks** were consistently lower in all quarters of 2020 when compared to the average rates in 2018 and 2019. Overall, the rate of preterm birth 32–36 weeks in 2020 was 6.6 per cent which was **significantly different** to the rate in 2018 (7.2%) and 2019 (7%) (p<0.001).

Figure 7: Rates of birth at 32–36 weeks, by quarter relative to the lowest, highest and average rate seen per quarter, Victoria, 2018–2020



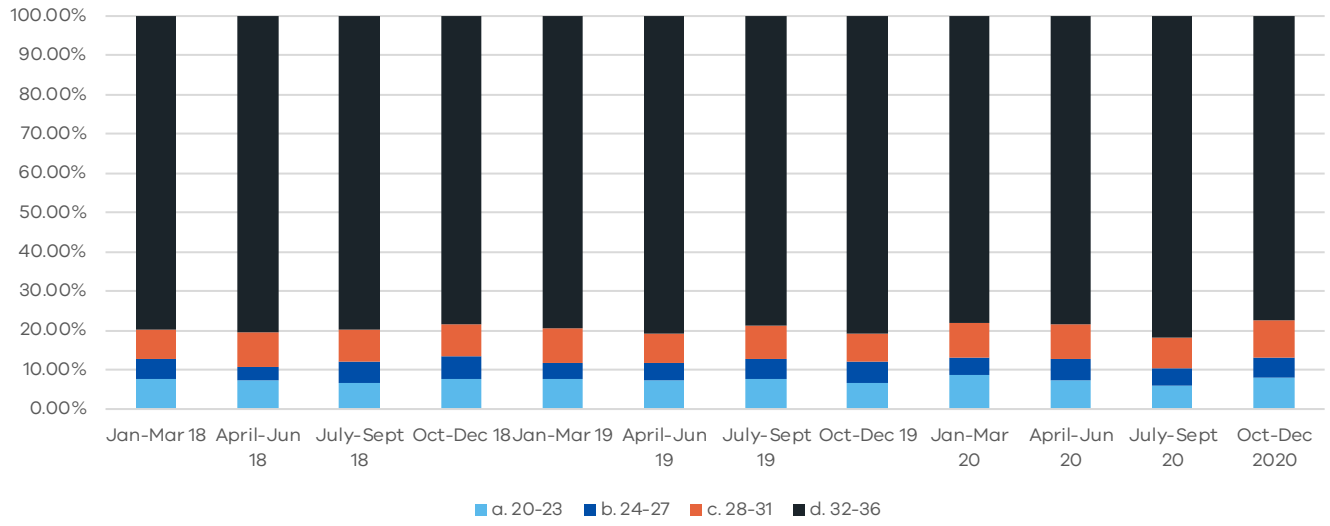
The rates of babies born at **term gestation** were consistently higher in all quarters of 2020 when compared to the average rates in 2018 and 2019. Overall, the rate of term births in 2020 was 91.7 per cent which was significantly higher to the rate in 2018 (91%) and 2019 (91.3%) (p<0.001). The increased rate of term births in 2020 mirrored the fall in births at 32–36 weeks' gestation.

Figure 8: Rates of birth at term, by quarter relative to the lowest, highest and average rate seen per quarter, Victoria, 2018–2020



When examining the preterm birth rates at metropolitan and rural hospitals in Victoria, there were no differences in the changes in rates relative to what was observed in 2018 and 2019. **Figure 9** presents the proportion of preterm births by gestational age group over time.

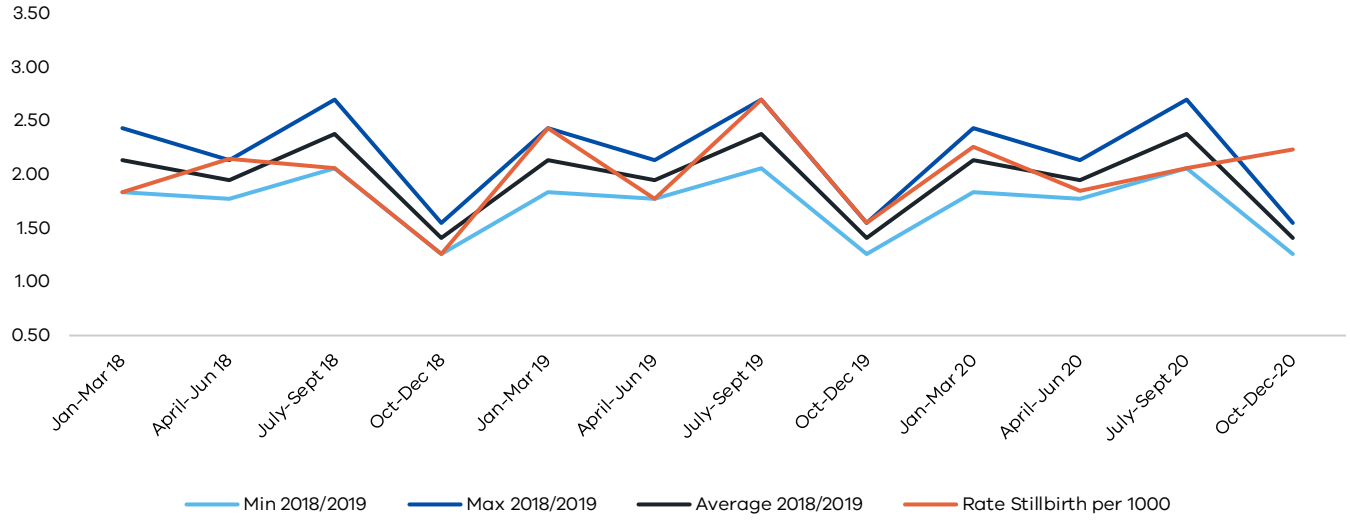
Figure 9: Proportion of preterm births by gestational range and quarter, Victoria, 2018–2020



2. Unexpected stillbirth

The rates of unexpected stillbirths in Q1, Q2 and Q3 2020 were consistent with the average rates in 2018 and 2019 for the respective quarters (**Figure 10**). However, the rate of stillbirth in Q4 was higher than the respective quarters in 2018 and 2019. Overall, the rate of unexpected stillbirth in 2020 was 2.1 per 1000 births which was **not significantly different** to the rate in 2018 (1.8 per 1000 births) and 2019 (2.1 per 1000 births) (p=0.36).

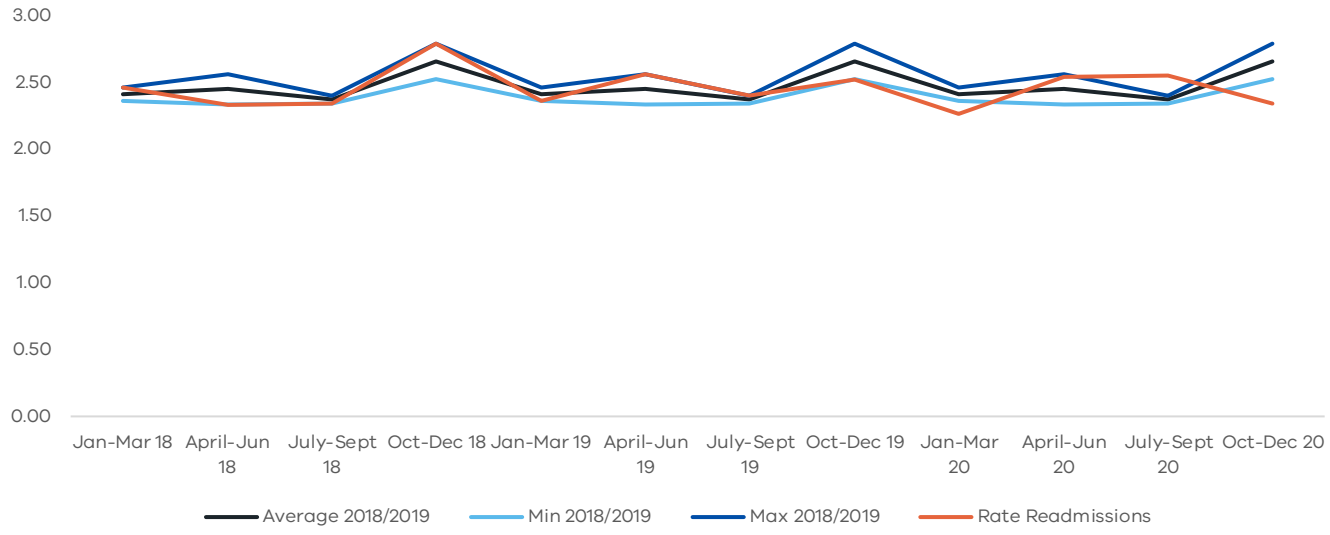
Figure 10: Rate of stillbirths per 1000 births greater than or equal to 28 weeks, Victoria, 2018–2020



3. Unplanned maternity and newborn readmissions

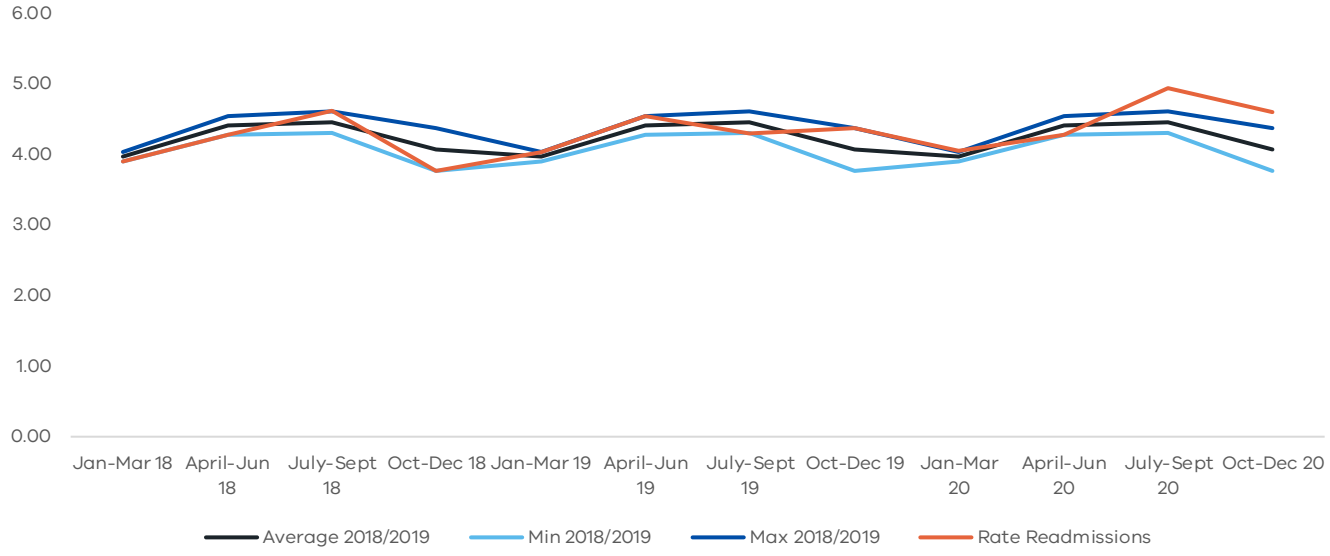
The rates of unplanned maternity readmissions in 2020 sat lower in Q1 and Q4, but higher in Q3 when compared to the respective quarters 2018 in 2019 (**Figure 11**). Overall, the rate of maternity readmissions in 2020 was 2.43 per cent which was **not significantly different** to the rate in 2018 (2.5%) and 2019 (2.5%) (p=0.8).

Figure 11: Percentage of mothers who were readmitted to hospital, Victoria, 2018–2020



The rates of newborn readmissions were similar in Q1 and Q2, but slightly higher in Q3 and Q4 2020 than the respective quarters in 2018 and 2019 (**Figure 12**). Overall, the rate of baby readmissions in 2020 was 4.5 per cent which was **significantly different** to the rate in 2018 (4.1%) and 2019 (4.3%) (p=0.3).

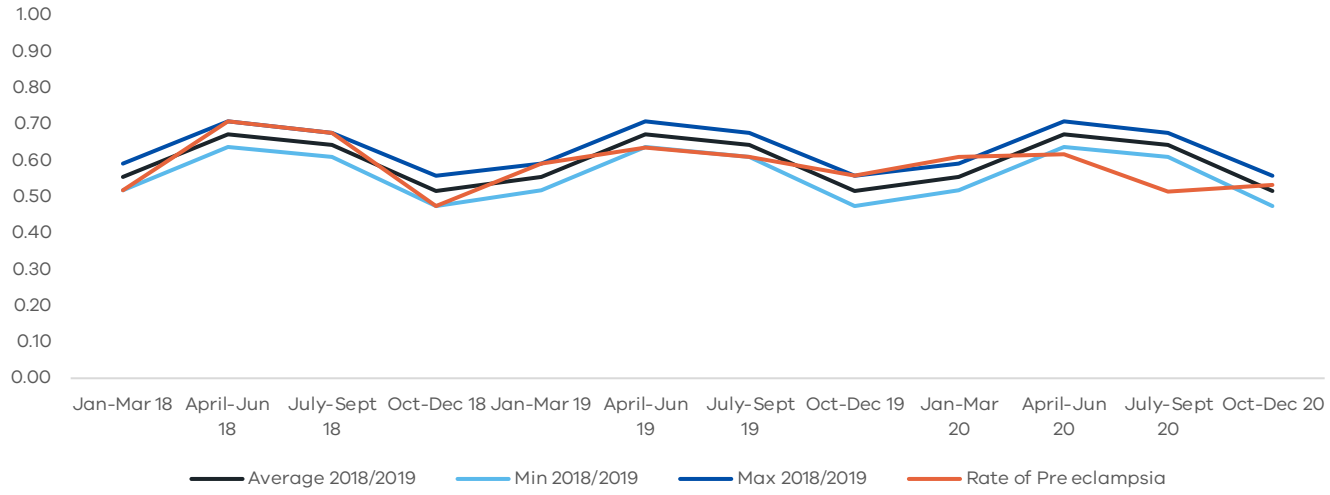
Figure 12: Percentage of newborns who have been readmitted to hospital, Victoria, 2018–2020



4. Severe pre-eclampsia/eclampsia

The rates of severe preeclampsia/eclampsia were similar in Q1, Q2, Q4 and were lower in Q3 in 2020 than the respective quarters in 2018 and 2019 (**Figure 13**). Overall, the rates of severe preeclampsia/eclampsia in 2020 was 0.57 per cent which was **not significantly different** to the rate in 2018 (0.59%) and 2019 (0.6%) (p=0.7).

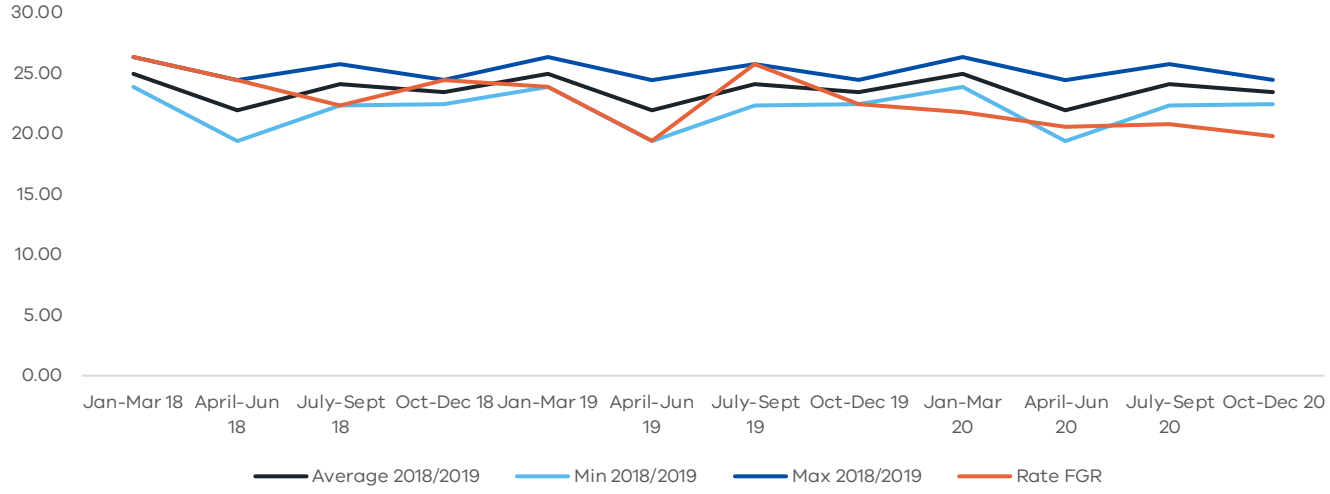
Figure 13: Rate of severe pre-eclampsia/eclampsia in women during pregnancy per 1000 pregnancies, Victoria, 2018–2020



5. Fetal growth restriction

The rates of undetected fetal growth restriction (FGR) continued to fall over 2020. The rates of FGR were lower in Q1, Q3 and Q4 2020 than the respective quarters in 2018 and 2019 (**Figure 14**). The rates of FGR in 2020 was 20.7 per cent which was **not significantly different** to the rate in 2018 (24%) and 2019 (23%) (p=0.09).

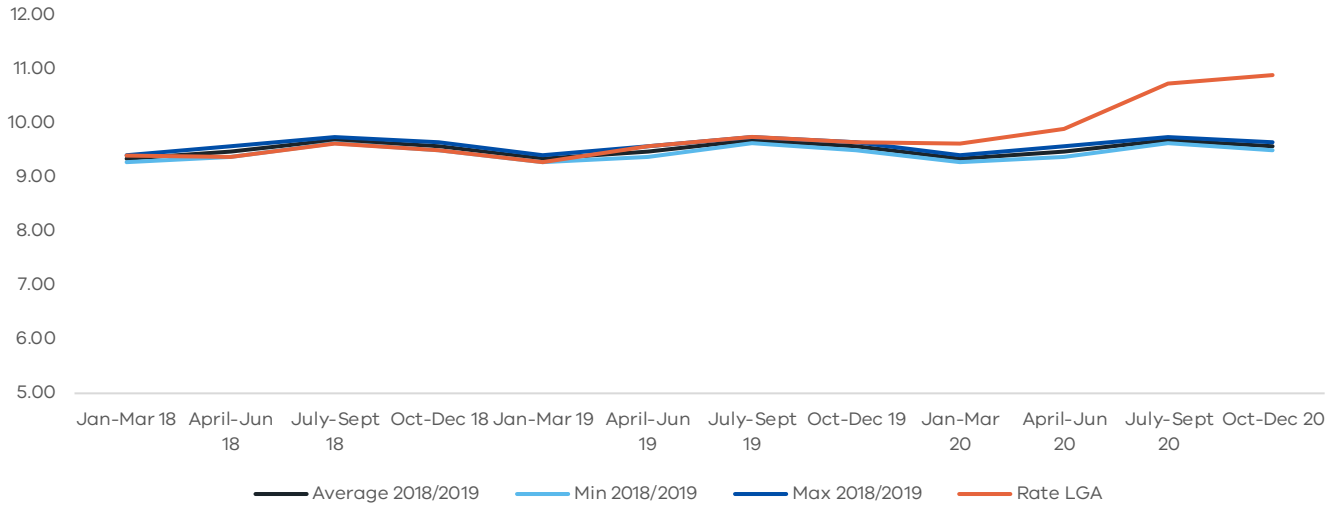
Figure 14: Proportion of severely growth restricted singleton babies who were born at or after 40 weeks' gestation, Victoria, 2018–2020



6. Large for gestational age

The rates of large for gestational age (LGA) were higher for all quarters in 2020 when compared to the respective quarters in 2018 and 2019 (**Figure 15**). The rates of LGA in 2020 was 10.3 per cent which was **significantly higher** than the rate in 2018 (9.5%) and 2019 (9.6%) (p=0.001).

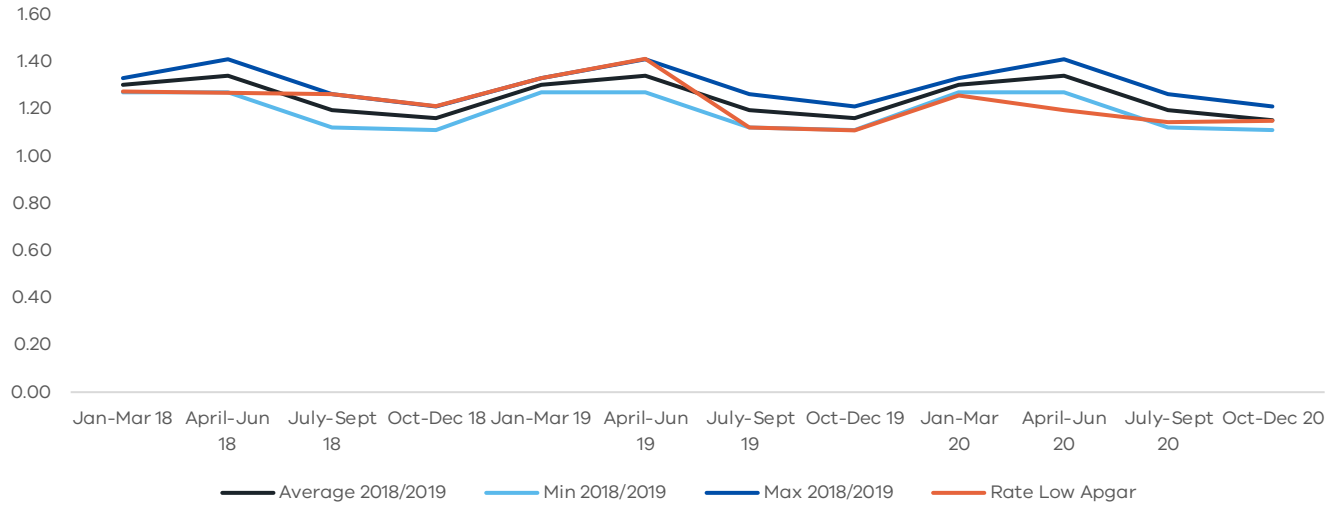
Figure 15: Proportion of singleton newborn babies who were born large for their gestational age and sex, per 100 babies, Victoria, 2018–2020



7. Low Apgar score

The rates of low Apgar score were slightly lower for Q1 and Q2, but consistent in Q3 and Q4 in 2020 when compared to the respective quarters in 2018 and 2019 (**Figure 16**). The rates of low Apgar score in 2020 was 1.2 per cent which was **not significantly different** to the rate in 2018 (1.3%) and 2019 (1.2%) (p=0.49).

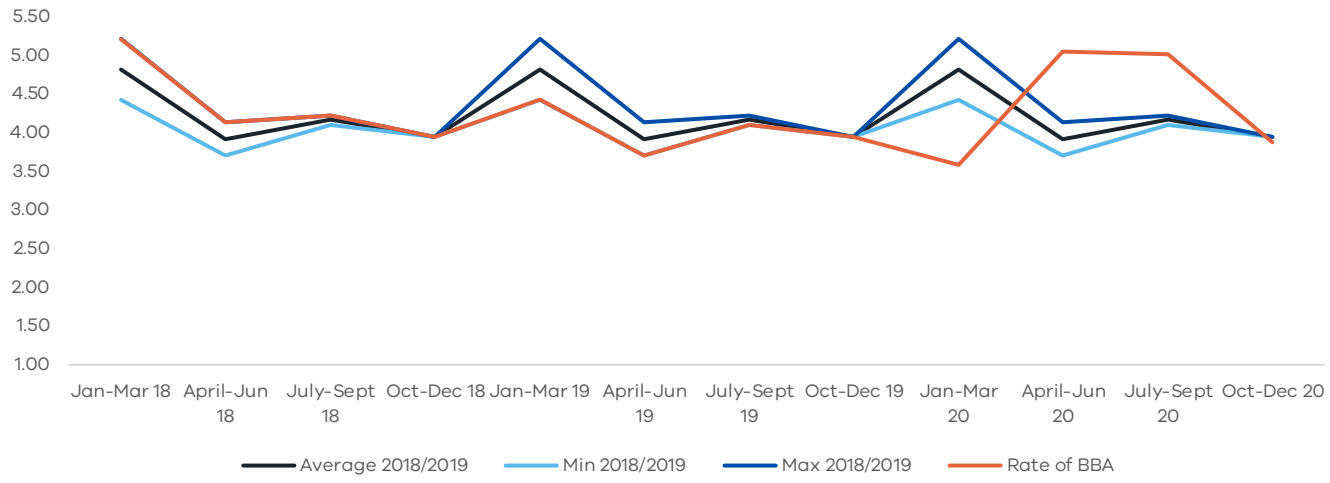
Figure 16: Proportion of babies who had an Apgar score <7 at 5 minutes, Victoria, 2018–2020



8. Born before arrival at hospital

The proportion of women giving birth before arrival (BBA) at hospital for planned hospital births was lower in Q1 but higher in Q2 and Q3 2020 when compared to the average rate in the respective quarters of 2018 and 2019 (**Figure 17**). The rates of BBA returned to levels similar to 2018 and 2019 in Q4 2020. The rates of BBA in 2020 was 4.4 per 1000 births which was **not significantly different** to the rate in 2018 (4.4 per 1000) and 2019 (4.0 per 1000) (p=0.50).

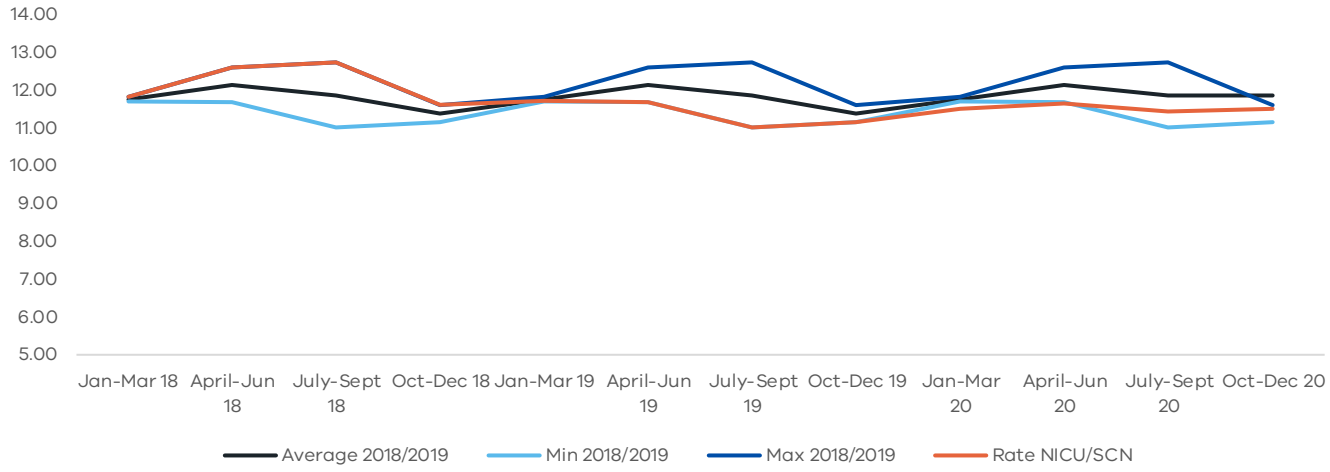
Figure 17: Proportion of women who gave birth before arrival at hospital for a planned hospital birth (per 1000 cases), Victoria, 2018–2020



9. Newborn admission to SCN/NICU at term excluding congenital anomalies

The proportion of babies admitted to SCN/NICU was slightly lower in Q1 but consistent in Q2, Q3 and Q4 2020 when compared to the average rate in the respective quarters of 2018 and 2019 (**Figure 18**). The rates of babies admitted to SCN/NICU in 2020 (11.5%) and 2019 (11.4%) were **significantly different** to the rate in 2018 (12.2%) (p<0.001).

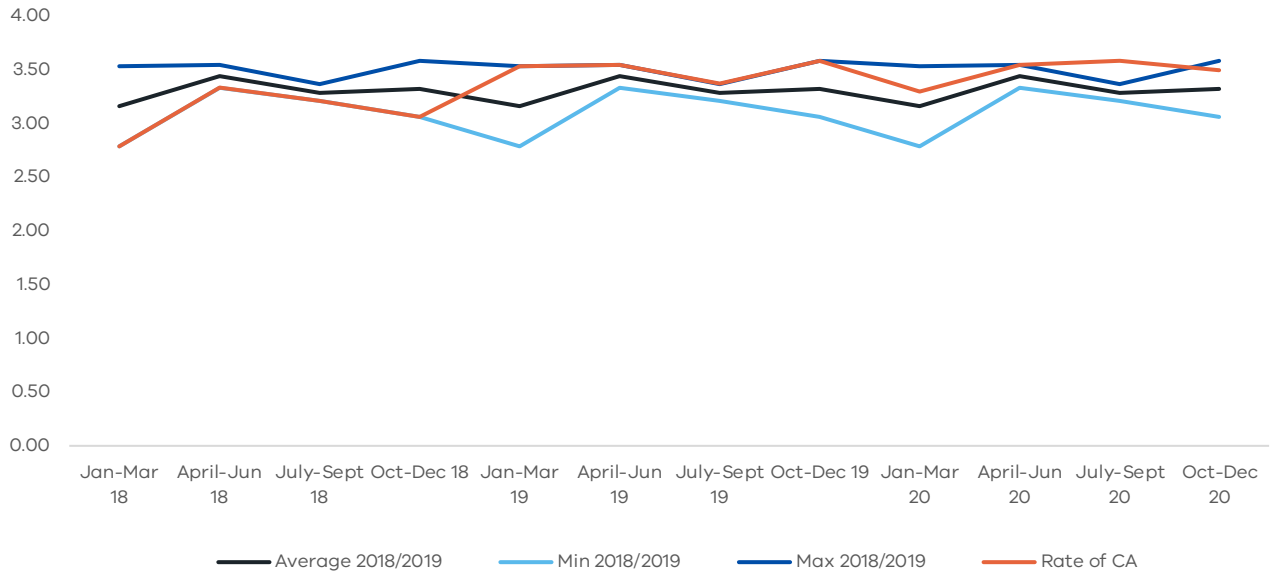
Figure 18: Admission to SCN/NICU at term excluding congenital abnormalities, Victoria, 2018–2020



10. Undiagnosed congenital anomalies

The rates of undiagnosed congenital anomalies were consistent for Q1, Q2 and Q4 2020 when compared to the respective quarters in 2018 and 2019 (**Figure 19**). The rate in Q3 however was higher. The overall annual rates of undiagnosed congenital anomalies were **significantly different** to 2020 (3.5%) and 2019 (3.5%) when compared to 2018 (3.1%); ($p<0.001$).

Figure 19: Proportion of births diagnosed with congenital abnormalities, Victoria, 2018–2020



Commentary

This communique provides a snapshot of 10 key maternal and newborn health outcomes from the Victorian maternity and neonatal system in 2020 and compared these with similar data from the previous two years.

Interestingly, there was a reduction in the overall number of births in 2020.

In relation to global concerns about preterm birth and stillbirth rates, overall, there seems to be a reduction in preterm birth rate. This is driven by a fall in the births at 32–36 weeks' gestation and a small increase in term births (>37 weeks' gestation). There was no change in the rate of stillbirths although an assessment of causes undertaken by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) may reveal changes especially in Q4 2020.

As described earlier, reduced preterm birth has been reported in other countries.[11, 12, 19] One hypothesis is that COVID-19 lockdown changed people's living environment, reducing physical interactions, increasing the focus on hygiene and reducing the incidence of systemic maternal inflammation and infections such as seasonal influenza.[12] It is possible that in Victoria the emphasis on reducing infections through the promotion of maternal influenza and pertussis vaccination was associated with the changes in preterm birth.

The missed detection of FGR was a theoretical concern given the shift to telehealth for pregnancy care. However, this was not borne out. The rate of FGR continued to fall over 2020, potentially in relation to Safer Care Victoria's Safer Baby Collaborative.[19]

The proportion of LGA babies has increased. The rates of LGA in 2020 was 10.3 per cent which was significantly higher to the rate in 2018 (9.5%) and 2019 (9.6%) (p=0.001). This may be related to changes in the diagnosis of gestational diabetes or missed opportunities to detect higher fetal growth than normal due to increased use of telehealth for pregnancy care. Changes in gestational diabetes testing and management during lockdown periods may also be associated with the increase in larger babies. Despite the increase in LGA births NICU admissions did not increase over the time period, although previous reductions in 2018 and 2019 have been reversed.

The rate of being BBA did increase in Q2 and Q3 2020 when compared to the average rate in the respective quarters of 2018 and 2019. This correlates with the stage four restrictions on movement during lockdown which may have meant women delayed attending hospital, sometimes until it was too late.

Overall, the lack of identified impact on these key outcomes for women and babies at a statewide level is encouraging. However, the current VPDC data is limited in that it cannot report on mental health outcomes or the experiences of women and families. Other outcomes, such as breastfeeding, separation of mother and baby and quality of care, are also not included in this analysis. Further research needs to be conducted to fully understand the indirect impact of the COVID-19 pandemic changes on women and babies in Victoria to direct the approaches to returning to ways of working prior to the pandemic and meeting the needs of women, babies, families and services.

A further limitation is the lack of statewide data about women's experiences and their psychological health during this period. National qualitative and quantitative data has reported significant impacts on women and partners[7, 21, 21] across Australia and many women from Victoria were included in these studies. The findings highlighted that becoming a mother during the COVID-19 pandemic in Australia was a profound experience for women. In particular, the sense of isolation, and limited availability of social and peer support were common experiences.[21] Many partners and support persons were also negatively impacted by restrictions in maternity services during the pandemic.[22]

Suggestions for improvement

Improvement 1: More agile data systems are needed

More agile data systems need to be developed, or the current systems enhanced, so additional variables can be added as needed (e.g. COVID-19 infection, bushfire smoke exposure) and data can be obtained more quickly across the system.

The bushfires and COVID-19 pandemic in 2020 showed the need for agile data collection systems at a statewide level that can collect information in a timely manner to guide public health policy. There is currently no capacity to include new variables in the VPDC to accommodate issues such as those seen in 2020. The need to develop systems such as CoMaND is evidence that the current system is not agile enough.

Improvement 2: Women's experiences of this time are important

Consideration needs to be made to include a statewide survey of the experiences of women during the pandemic in Victoria.

While this report has shown few differences over time in key clinical outcomes, the experiences of women and their partners have been completely different and there are concerns about immediate and long-term harm in terms of mental health. It is a significant limitation that there were reduced means to collect information at a statewide level about women's experiences of care during the pandemic.

Improvement 3: An analysis of the impacts on priority populations is needed

A detailed analysis of the impacts of COVID-19 on priority populations should be undertaken to further inform policy responses. This should include a data linkage study to track the impacts beyond the neonatal period into the first year of life.

This report does not consider the outcomes of sub-populations in Victoria. It is important to explore disaggregated impacts of the bushfires and COVID-19 pandemic on priority populations such as Aboriginal and Torres Strait Islander people, migrant and refugee people, those with mental health conditions and people in the child protection system. Longer-term impacts on child health, especially growth and development given the disrupted maternal and child health services, is also required.

Improvement 4: A state-based survey

Consideration needs to be made to develop and implement a statewide survey to capture what changes to clinical care were made in different settings including recommendations for best practice in telehealth. This could also examine which elements of the changes should be retained post COVID-19 pandemic and which should be reversed.

This report has focused on the indirect impact of the events of 2020. There is no current system that enables collection of data regarding testing for, and infection with, SARS-COV-2 during pregnancy or after birth. That means there is no way to systematically track the outcomes of women with COVID-19 and their babies. Fortunately, CHOPAN was established as a national registry but this requires each health service to submit detailed human research ethical approval processes and not all in Victoria are able to do this in a timely manner. In addition, there is no data available on testing for COVID-19 in the pregnant population.

Improvement 5: Plan for the next pandemic

Future pandemic preparedness needs to include collection of data on pregnancy status and these data need to be able to be linked to the VPDC to ensure effective tracking of outcomes for pregnant women with the diseases of interest.

Appendix: Definitions and computations used in the report

Outcomes	Definition	Computation
Admission to special care nursery (SCN)/neonatal intensive care unit (NICU) at term excluding congenital anomalies	Proportion of babies at 37 or more weeks gestation who are admitted to either the SCN/NICU who have no congenital abnormalities.	**Denominator:** Number of babies who were born live (i.e. birth status=1) at 37 or more weeks gestation and had no congenital anomalies detected antenatally (i.e. NOT 3 or 5). **Numerator:** Number of babies who meet the denominator criteria and who were admitted to special care nursery or neonatal intensive care unit or were transferred to higher level care during the birthing episode, i.e.: • Admission to SCN/NICU - baby = 1 (SCN) or 2 (NICU), or • Reason for transfer out =1 (higher level of care).
Born before arrival (BBA)	Proportion of women who gave birth before arrival at hospital for planned hospital births.	**Denominator:** Number of women who: a) planned to give birth in hospital, and b) gave birth at 20 or more weeks gestation. **Numerator:** Number of women who meet the denominator criteria and gave birth before arrival at hospital, i.e. a) actual birth setting is home, in transit or other; and b) the intended setting of birth was changed during labour; and the reason for the change is unintended/unplanned
Fetal Growth Restriction (FGR)	Proportion of severely growth restricted singleton babies (defined as birthweight below the third centile, corrected for gestational age, plurality and sex) who were born at or after 40 weeks gestation	**Denominator:** Number of singleton babies (live and stillborn) with severe FGR who were born at 32 or more weeks gestation. **Numerator:** Number of babies who meet the denominator criteria and were born at 40 or more weeks gestation
Large for gestational age (LGA)	Proportion of all singleton newborn babies who weigh more than the 90th centile of the same gestational age and sex.	**Denominator:** Number of singleton babies whose gestational age is more than 27 weeks. **Numerator:** Number of babies who meet the denominator criteria and weigh more than the 90th centile for babies of the same gestational age and sex.

Outcomes	Definition	Computation
Low Apgar score	Measures the wellbeing of babies at 37 or more weeks gestation and without congenital anomalies at birth.	**Denominator:** Number of singleton, liveborn babies at 37 or more weeks gestation with no congenital anomalies. **Numerator:** Number of babies who meet the denominator criteria and had Apgar score<7 at 5 mins.
Preterm births	Proportion of babies who are born preterm.	**Denominator:** Number of babies who are born at 20 or more weeks gestation. **Numerator:** Number of babies who meet the denominator criterion and were born at <37 weeks gestation, disaggregated into the following groups to align with Victoria's Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) reporting: • 20-23 weeks • 24-27weeks • 28-31 weeks • 32-36 weeks
Severe pre-eclampsia/eclampsia	Proportion of women who were diagnosed with either severe pre-eclampsia or eclampsia during pregnancy.	**Denominator:** Number of women who gave birth at 20 or more weeks gestation. **Numerator:** Number of women who meet denominator criteria and who had any of the following diagnoses: • O141 – Severe pre-eclampsia • O142 – HELLP syndrome • O15x – Eclampsia
Undiagnosed congenital anomalies	Proportion of babies born at 20 or more weeks gestation with congenital abnormalities diagnosed before or during the birth episode	**Denominator:** Number of births (including stillbirths and terminations) with an estimated gestational age of 20 or more weeks. **Numerator:** Number of babies who meet the denominator criteria and were born with a congenital abnormality.
Unexpected stillbirth	Proportion of eligible births that resulted in a stillbirth	**Denominator:** Number of births the meet the following criteria: a) gestational age greater than or equal to 28 weeks b) birthweight greater than or equal to 400 grams c) no congenital anomalies. Exclusions: Birth status = 9 (i.e. not stated/ inadequately described) **Numerator:** Number of babies who meet the denominator criteria and who were stillbirth

Outcomes	Definition	Computation
Unplanned maternity and newborn readmissions	Rate of unplanned and potentially preventable readmissions of women and babies within 28 days of discharge from hospital, respectively, following a birthing admission.	**Denominator:** • Mothers: Number of women provided admitted postnatal care prior to discharge. • Babies: Number of babies discharged from a health service, excluding stillbirths and neonatal deaths prior to discharge. **Numerator:** • Mothers: The number of women readmitted to any health service (with a potentially preventable readmission principal diagnosis code) within 28 days of a birthing admission. • Babies: The number of babies readmitted to any health service (with a potentially preventable readmission principal diagnosis code) within 28 days of discharge. Babies who are readmitted on the same day of discharge are excluded. Note: These are existing measures in the Performance Monitoring Framework (PMF) and use definitions as described in the PMF (refer to the PMF for the list of potentially preventable readmission diagnosis codes). Also, in accordance with the PMF, the scope only includes births in public hospitals.

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