

# DON'T LET aHUS SNEAK PAST YOU

Get to know aHUS with  
four real Australian  
case studies

REGISTER TO VIEW VIDEOS

**ALEXION**<sup>®</sup>  
AstraZeneca Rare Disease

aHUS: atypical Haemolytic Uraemic Syndrome.

© 2022 All rights reserved. Alexion Pharmaceuticals Australasia  
Pty Ltd. ACN 132 343 036. Frenchs Forest, NSW 2086 Australia.  
April 2022. AU/UNB-a/0018.

## ORIGINAL ARTICLE

# Stillbirth risks and rates for Aboriginal and Torres Strait Islander women and their babies in North Queensland

Meegan Kilcullen<sup>1</sup>  , Yogavijayan Kandasamy<sup>2,3,4</sup> , David Watson<sup>4,5</sup> and Yvonne Cadet-James<sup>6</sup>

<sup>1</sup>College of Healthcare Sciences, James Cook University, Townsville, Queensland, Australia

<sup>2</sup>Department of Neonatology, The Townsville Hospital, Townsville, Queensland, Australia

<sup>3</sup>Mothers and Babies Research Centre, Hunter Medical Research Institute, John Hunter Hospital, The University of Newcastle, Newcastle, New South Wales, Australia

<sup>4</sup>College of Medicine and Dentistry, James Cook University, Townsville, Queensland, Australia

<sup>5</sup>Department of Obstetrics and Gynaecology, The Townsville Hospital, Douglas, Townsville, Queensland, Australia

<sup>6</sup>Indigenous Research and Education Centre, James Cook University, Townsville, Queensland, Australia

*Correspondence:* Dr. Meegan Kilcullen, College of Healthcare Sciences, James Cook University, Townsville, Queensland, Australia. Email: meegan.kilcullen@jcu.edu.au

*Conflict of Interest:* The authors report no conflicts of interest.

Received: 13 December 2020;  
Accepted: 22 July 2021

**Background:** The stillbirth rate for Australian Aboriginal and Torres Strait Islander infants remains higher than non-Indigenous rates. Risks for stillbirth include maternal factors such as ethnicity, age, geographic location, and physical health. Fetal risk factors include gestational age, birthweight and congenital anomalies. The total stillbirth rate for all babies born at the Townsville University Hospital during the study period was 11 per 1000 births.

**Aims:** To identify Aboriginal and Torres Strait Islander stillbirth rates, risk factors and causes in North Queensland.

**Materials and Methods:** A retrospective chart audit was conducted to identify Indigenous women who had experienced stillbirth in the Townsville University Hospital between January 2005 and December 2014.

**Results:** Thirty-two charts were available for audit. The stillbirth rate for non-Indigenous infants was 10.3 per 1000 births. The stillbirth rate for Indigenous infants was 11.7 per 1000 births. Almost half of the women lived in rural, remote or very remote areas. Maternal risk factors included poorer physical health, such as obesity, diabetes, hypertension, and smoking, fertility issues and lack of antenatal care. Fetal risk factors included congenital anomalies, including cardiac and skeletal abnormalities, placental disorders, and preterm birth.

**Conclusions:** Stillbirth risk remains higher for Aboriginal and Torres Strait Islander women and their babies. Supporting women to enhance their health is paramount, particularly during pregnancy. Further, increasing awareness of stillbirth risk factors through education for both women and healthcare professionals will support culturally responsive care for women and their families to mitigate stillbirth risk and enhance pregnancy outcomes in non-urban Queensland.

**KEYWORDS**

stillbirth, risk, rate, indigenous, North Queensland

## INTRODUCTION

The estimated worldwide stillbirth rate is 18.4 per 1000 birth and has declined from 24.7/1000 births in 2000.<sup>1</sup> While definitions of stillbirth differ across countries, there are clear disparities across population groups.<sup>2–11</sup> For example, in Latin America, the rate ranges from 3.1 to 24.9/1000 births, with over ten countries in that region with stillbirths over 10/1000 births.<sup>10</sup> In low to middle income countries, the rate is estimated at 26.4/1000 births with an average decline of 3% between 2010 and 2016.<sup>11</sup> In the USA, the estimated rate is 6.0/1000 births, with disparities between groups ranging from 4.9 for non-Hispanic White Americans, to 10.6 for non-Hispanic Black Americans.<sup>8</sup>

The rates of stillbirth for Indigenous peoples globally are generally much higher than rates for non-Indigenous people, ranging between 5.7/1000 births for Quebec's First Nations people,<sup>3</sup> 7.0/1000 births for Aotearoa New Zealand Māori people, and 7.5/1000 births for Pacific peoples.<sup>9</sup> In Australia, while the overall stillbirth rate is 7.0/1000 births, the stillbirth rate for Australian Aboriginal and Torres Strait Islander people<sup>11</sup> We respectfully refer to Aboriginal and Torres Strait Islander peoples as Indigenous people throughout the paper and acknowledge the distinct cultural groups remains stubbornly higher at 11.5/1000 births.<sup>4</sup> The stillbirth rates for Australian Indigenous people vary across states,<sup>2,6,7</sup> and while there has been a reported reduction in absolute numbers of Indigenous stillbirths,<sup>2</sup> overall there has been little reduction in rates since 2008 (11.2/1000 births).<sup>2,4,6</sup>

There are similarities in maternal risk factors for stillbirth across population groups. Demographic risk factors include maternal age (less risk between 20–35 years),<sup>2,11</sup> lower education, living in a non-urban area and lower gross domestic product country.<sup>10</sup> Poorer social contexts, including a lack of social support, financial and relationship issues, or domestic violence also increased the risk of stillbirth.<sup>2,5</sup> Stillbirth risk also rose for women with increasing numbers of births (>3), lower fertility,<sup>5,10</sup> delivered outside of area with a larger health facility,<sup>10</sup> or received no antenatal care.<sup>11</sup> However, others have noted a lack of risk for antenatal care,<sup>5</sup> particularly if mothers received more than eight antenatal care visits.<sup>7</sup> Maternal medical risk factors include hypertension,<sup>2,3,7</sup> diabetes,<sup>3,5,7</sup> smoking,<sup>3,7</sup> a body mass index over 40,<sup>2,5</sup> placental dysfunction, including antepartum haemorrhage, and preterm birth.<sup>4,7</sup>

Fetal risk factors include poor fetal growth,<sup>2,3,7,9</sup> congenital anomalies,<sup>3,4,9</sup> placental disorder,<sup>3</sup> gestational age and birthweight.<sup>5,9</sup> In Australia, the leading causes of Indigenous stillbirth are fetal congenital anomalies (16%) and spontaneous preterm birth (12%).<sup>4</sup> Other causes include being small for gestational age, low birthweight, with most families in low social-economic circumstances regardless of birth outcome.<sup>4</sup>

The Townsville University Hospital (TUH) provides tertiary perinatal care for people of North Queensland and has an annual birth rate of 10 000. The catchment area includes a population of over

720 000 people and an area of approximately 750 000 square kilometres. There is little accurate data across states to inform care for these women and families, and very few autopsies are conducted to enhance understanding of causation of stillbirth or potential risk factors.<sup>12</sup> In the current pilot study, we sought to identify Aboriginal and Torres Strait Islander stillbirth rates, risk factors and causes in the regional, rural and remote catchment of the TUH.

## MATERIALS AND METHODS

Approximately 8% of the Townsville population are people of Aboriginal and Torres Strait Islander descent. This percentage is significantly higher than the estimated Queensland (4.6%) and Australian (3.3%) Indigenous population. Further, in the research site, the Queensland outer regional, remote, and very remote numbers of Indigenous persons are 2.5 times higher than the national rate.<sup>13</sup> Approximately 40% of Queensland's Aboriginal and Torres Strait Islander population live in the TUH's catchment area.<sup>14</sup> The TUH is the tertiary referral service for northern and parts of central Queensland. The TUH Maternal Fetal Medicine (MFM) service provides care for high-risk pregnancies and early preterm births across the catchment area.

A retrospective chart audit was conducted to identify Indigenous women who had experienced stillbirth in the TUH between January 2005 and December 2014. A ten-year time frame was selected to ensure a sufficient number of cases available for analysis. Furthermore, MFM services became part of standard care since 2008. The local perinatal mortality audit data indicated 46 Indigenous stillbirths for this time period; however, only 32 patient charts were available for audit. Of these, 29 women identified as an Aboriginal woman and three identified as an Aboriginal and Torres Strait Islander woman. These 32 stillbirths represented 0.81% of all Indigenous births and 0.14% of all births at the TUH during the study time period. Most women were partnered or in a de facto relationship. Approximately

**TABLE 1** Aboriginal and/or Torres Strait Islander women who experienced stillbirth in regional North Queensland 2005–2014

Demographic	Mean	Range
Age (years)	30.25	16–39
GA (weeks + days)	27 + 6	20–40 + 5
Birth weight (g)	1240	145–3780
# of pregnancies	4	1–9
Queensland location	<i>n</i>	%
Regional centre	18	56.25
Rural	2	6.2
Remote	9	28.13
Very remote	1	3.13
Metro	1	3.13
Interstate	1	3.13

GA, gestational age.

half of the women lived in a regional centre, while almost 50% lived in the greater rural/remote/very remote area. See Table 1 for demographic details of the women and infants. Ethics approval for this study was obtained from the Townsville University Hospital Health Research Ethics Committee (15/QTHS/91).

## RESULTS

The Indigenous and non-Indigenous stillbirth rate for births at The Townsville University Hospital in North Queensland are similar (see Table 2).

Of the 32 identified patient charts, stillbirths included 18 (56%) female infants and 14 (44%) male infants. Stillbirth occurred in the second ( $n = 17$ ; 53%) and third ( $n = 15$ ; 47%) trimesters. Results of 12 (37.25%) autopsies were recorded. Other families either declined permission to autopsy, were not asked or the reason for not conducting an autopsy was not recorded in the chart. As indicated in Table 3, most stillbirths were of high-risk pregnancies and approximately a quarter of women attended less than two antenatal appointments.

**TABLE 2** Indigenous and non-Indigenous stillbirth rates in North Queensland: 2005–2014

	Total births	Stillbirths	/1000 rate
Indigenous births	3936	46	11.7
Non-Indigenous births	19250	198	10.3
All births	23186	244	11

## Cause of death – autopsy and other postpartum investigation results

We used the Perinatal Society of Australia and New Zealand's Clinical Practice Guideline<sup>15</sup> to classify the causes of stillbirth. Autopsy was carried out on 12 of the fetuses. In nine fetuses, the cause of death was classified as congenital anomaly ( $n = 4$ ), placental dysfunction ( $n = 3$ ), perinatal infection ( $n = 1$ ) and maternal condition ( $n = 1$ ). Table 4 provides a more detailed diagnosis for stillbirth. In the remaining 20 fetuses, cause of death was determined in five fetuses (perinatal infection ( $n = 2$ ), placental dysfunction ( $n = 3$ )) based on other tests such as placental histopathological examination and culture. In the majority of the patients without autopsy, cause of death could not be identified.

## DISCUSSION

The Aboriginal and Torres Strait Islander stillbirth rates in North Queensland (11.5/1000) are approximately twice the non-Indigenous stillbirth rates in Australia<sup>2,4,6,7</sup> and the USA,<sup>8</sup> however, they reflect those of other global disadvantaged groups.<sup>8,10,11</sup> The

**TABLE 3** Maternal medical history and social factors

Antenatal care	<i>n</i>	%
No antenatal appts	5	15.6
<2 antenatal appts	3	9.4
High-risk pregnancies	17	53.13
Medical history†		
Type 2 diabetes	3	9.4
Type 1 diabetes	2	6.25
Hypertension	3	9.4
Body mass index >30	4	12.5
Anaemia	1	3.13
Hypothyroidism	1	3.13
Previous pregnancies	<i>N</i>	
Total number	100	(range 1–9)
Live births	62	
Miscarriage	25	
Stillbirth	1	
Neonatal death	1	
Termination	3	
Ectopic pregnancy	1	
First birth	6	
Twins	1	
Gynaecological diagnoses	<i>n</i>	
Cervical intraepithelial neoplasia	6	
Sexually transmitted infection‡	5	
Endometriosis	3	
Bacterial vaginosis	2	
Hep B	1	
Polycystic ovary syndrome	1	
Social factors	<i>n</i>	
Family support	23	
Domestic violence	4	
Child safety involvement	3	
Substance use	4	
Smokers	20	
Mental health diagnoses	3	

†Some women had more than one condition.

‡Including chlamydia 9.4%, herpes 3.13%, syphilis 3.13%.

**TABLE 4** Cause of death determined from autopsy

Classification	Diagnosis
Congenital anomalies	i. Skeletal dysplasia
	ii. Abnormal respiratory epithelium
	iii. Cardiomyopathy
	iv. Neural tube defect
Placental dysfunction	i. Maternal vascular perfusion (2 fetuses)
	ii. Chorioamnionitis
Perinatal infection	i. Group B <i>Streptococcus</i> infection
Maternal conditions	i. Poorly controlled type 2 diabetes mellitus

stillbirth rates in the current manuscript are approximately twice that of other First Nations peoples in Quebec (5.7)<sup>3</sup> and Aotearoa New Zealand and Pacific peoples (7.0 and 7.5 respectively),<sup>9</sup> and on parity with the overall Australian Indigenous stillbirth rates.<sup>2,4,6,7</sup> More than half of the women in the current study lived in a regional centre and more than a third lived in rural, remote, or very remote areas. Such geographical isolation from large tertiary healthcare facilities has been identified as a risk factor for stillbirth.<sup>10</sup> Distance is often a deterrent to receiving health care. Women often travel many hours for health care thus increasing the burden on these women during pregnancy.

As others have identified, social risk factors were also identified in the current study. These factors included smoking (62.5%),<sup>3,7</sup> other substance use (12.5%), and domestic violence.<sup>2,5</sup> While others have identified a lack of social support as a risk factor,<sup>2,5</sup> in the current study, despite these poor social indicators, almost three-quarters of women enjoyed family support. Mental health and mood disorders were also present for women in the current study. These disorders may also represent risks for these women. It may be that poorer mental health disrupted help-seeking and receiving standard care when attending routine appointment. Given the relationship between mental health and stillbirth, it is important for healthcare professionals to conduct mental health screening during the perinatal period.

Maternal risk factors in the current study are similar to those identified by others, including increased number of pregnancies and fertility issues, including miscarriage,<sup>5,10</sup> and receiving little to no antenatal care.<sup>11</sup> Other identified maternal risk factors include diabetes<sup>3,5,7</sup> and hypertension.<sup>2,3,7</sup> While body mass index (BMI) >40 has been identified by others as stillbirth risk,<sup>2,5</sup> in the current study, a BMI >30 was present for several women. It may be that a lower BMI, but still in the obese range, with concomitant risk of diabetes and hypertension, contributes risk of stillbirth for Aboriginal and Torres Strait Islander women.

Mirroring the leading causes of Indigenous stillbirth in Australia,<sup>4,7</sup> the causes identified in our study included congenital anomalies, including skeletal and cardiac anomalies,<sup>3-5,7,9</sup> placental disorders<sup>3,4,7</sup> and hydrops. For those women who did not consent for autopsy after stillbirth, other test results also identified placental disorders, including structural and functioning disorders, hydrops, hypoxia, fetal infection and cord restrictions as stillbirth risk factors. Additionally, maternal infection and autoimmune disorder were also present in those women who experienced stillbirth.

## Limitations

Only 32 cases were included in this study and this is an important limitation of study. Nevertheless, the paucity of information in this area makes the information obtained by this study valuable despite its sample size. There was a discrepancy between the identified number of Indigenous stillbirths and available charts for audit in the current study. Therefore, stillbirth risks identified in these charts is unknown and may not be represented in the current study. There was difficulty reviewing all the individual patient

records and for those cases we were reliant on summary perinatal mortality data following review of each perinatal death, as some paper charts could not be located or had been destroyed. During the time period of the chart audit (2005–2014), all charts were paper-based with hand-written notes. Given the complex nature of health care for vulnerable women, complete files often comprised several charts. Knowledge of how many charts to include was required so that all charts were ordered and retrieved. Further, the financial implications of charging work groups within the hospital for file retrieval may have further hampered gathering complete data. A further difficulty was a lack of consistency in taxonomy, particularly in the use of acronyms, between files and encounters, which often made it difficult to group similar experiences and greatly increased the time to complete the audit. The hospital has since moved to an electronic system for medical records. Moving to the electronic system may improve the record keeping for actual numbers of stillbirths and retrieving of files for audit.

## Conclusions

In Australia, the rates of Indigenous stillbirth are almost twice as high as non-Indigenous stillbirth; however, this was not the case in this study. Indigenous and non-Indigenous stillbirth rates recorded in North Queensland were similar (11.7 and 10.3 respectively) and higher than the national average (Indigenous 11.5 vs non-Indigenous 7). This rate is unacceptably high. However, the tertiary referral service for northern and parts of central Queensland and the high stillbirth rate may reflect the high-risk pregnancies referred to our MFM service, especially preterm complications as reflected in mean gestation of our Indigenous stillbirths of 27 weeks gestation. Additionally, for our regional, rural, remote, and very remote women, it may be that living in a non-urban area is a strong contributing factor for stillbirth in all cases. Overall, risk factors in the current study were similar to those reported globally, with similar risk factors reported across Indigenous communities across Australia. The current study highlights the need for mental health screening to support women to gain access to healthcare services. As others have noted, increased access to antenatal care appears to ameliorate stillbirth risk. The rates of substance use, including smoking and other substances, and gynaecological issues were also high in this study. Supporting women to enhance their health is paramount, particularly during pregnancy. Leveraging established family kinship support networks may provide a holistic approach to supporting women during the perinatal period. Further, increasing awareness of stillbirth risk factors through education for both women and healthcare professionals will help to provide culturally responsive care for women and their families in order to mitigate stillbirth risk and enhance pregnancy outcomes in non-urban Queensland.

## ACKNOWLEDGEMENTS

This study was supported by The Townsville Hospital and Health Service Study, Education and Research Trust Fund. We would

like to acknowledge the generous support of the project Cultural Advisory Committee members and the research team – Ms Cherie Boniface, Ms Jessica Bowron and Ms Jenna Singleton-Bray. We acknowledge and thank the women in the study who gave generously of their time and knowledge.

## REFERENCES

1. Blencowe H, Cousens S, Jassir FB *et al*. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis. *Lancet Glob Health* 2016; **4**(2): e98–e108.
2. Adane AA, Bailey HD, Marriott R *et al*. Disparities between Aboriginal and non-Aboriginal perinatal mortality rates in Western Australia from 1980 to 2015. *Paediatr Perinat Ep* 2019; **33**(6): 412–420.
3. Auger N, Park AL, Zoungrana H *et al*. Rates of stillbirth by gestational age and cause in Inuit and First Nations populations in Quebec. *Can Med Assoc J* 2013; **185**(6): E256–E262.
4. Australian Institute of Health and Welfare. *Australia's Mothers and Babies 2018: In Brief. Perinatal Statistics Series No. 36. Cat. no PER 108*. Canberra: AIHW, 2020.
5. de Graaff EC, Wijs LA, Leemaqz S, Dekker GA Risk factors for stillbirth in a socio-economically disadvantaged urban Australian population. *J Matern-Fetal Neo M* 2017; **30**(1): 17–22.
6. Farrant BM, Shepherd CCJ. Maternal ethnicity, stillbirth and neonatal death risk in Western Australia 1998–2010. *Aust NZ J Obstet Gynecol* 2016; **56**(5): 532–536.
7. Ibiebele I, Coory M, Smith GCS *et al*. Gestational age specific stillbirth risk among Indigenous and non-Indigenous women in Queensland, Australia: a population based study. *BMC Pregnancy Childbirth* 2016; **16**(1): 159.
8. MacDorman MF, Reddy UM, Silver RM. Trends in stillbirth by gestational age in the United States, 2006–2012. *Obstet Gynecol* 2015; **126**(6): 1146–1150.
9. Ministry of Health. *Fetal and Infant Deaths 2016*. Wellington: New Zealand Government, 2019.
10. Pingray V, Althabe F, Vazquez P *et al*. Stillbirth rates in 20 countries of Latin America: an ecological study. *BJOG -Int J Obstet Gy* 2018; **125**(10): 1263–1270.
11. Saleem S, Tikmani SS, McClure EM *et al*. Trends and determinants of stillbirth in developing countries: results from the Global Network's Population-Based Birth Registry. *Reprod Health* 2018; **15**(1): 100.
12. Kilcullen ML, Kandasamy Y, Watson D, Cadet-Jame Y. Decisions to consent for autopsy after stillbirth: Aboriginal and Torres Strait Islander women's experiences. *Austr NZ J Obstet Gynaec* 2019; **60**(3): 350-354.
13. Australian Bureau of Statistics. *Estimates of Aboriginal and Torres Strait Islander Australians*. Canberra: Australian Bureau of Statistics, 2018.
14. Australian Bureau of Statistics. *2011.0 - Census of Population and Housing: Reflecting Australia - Stories from the Census, 2016*. Canberra: Australian Bureau of Statistics, 2019.
15. Flenady V, Oats J, Gardener G *et al*. *Clinical Practice Guideline for Care around Stillbirth and Neonatal Death. Version 3, Section 4*. Brisbane: NHMRC Centre of Research Excellence in Stillbirth, 2018. Table 3 (Continuous)