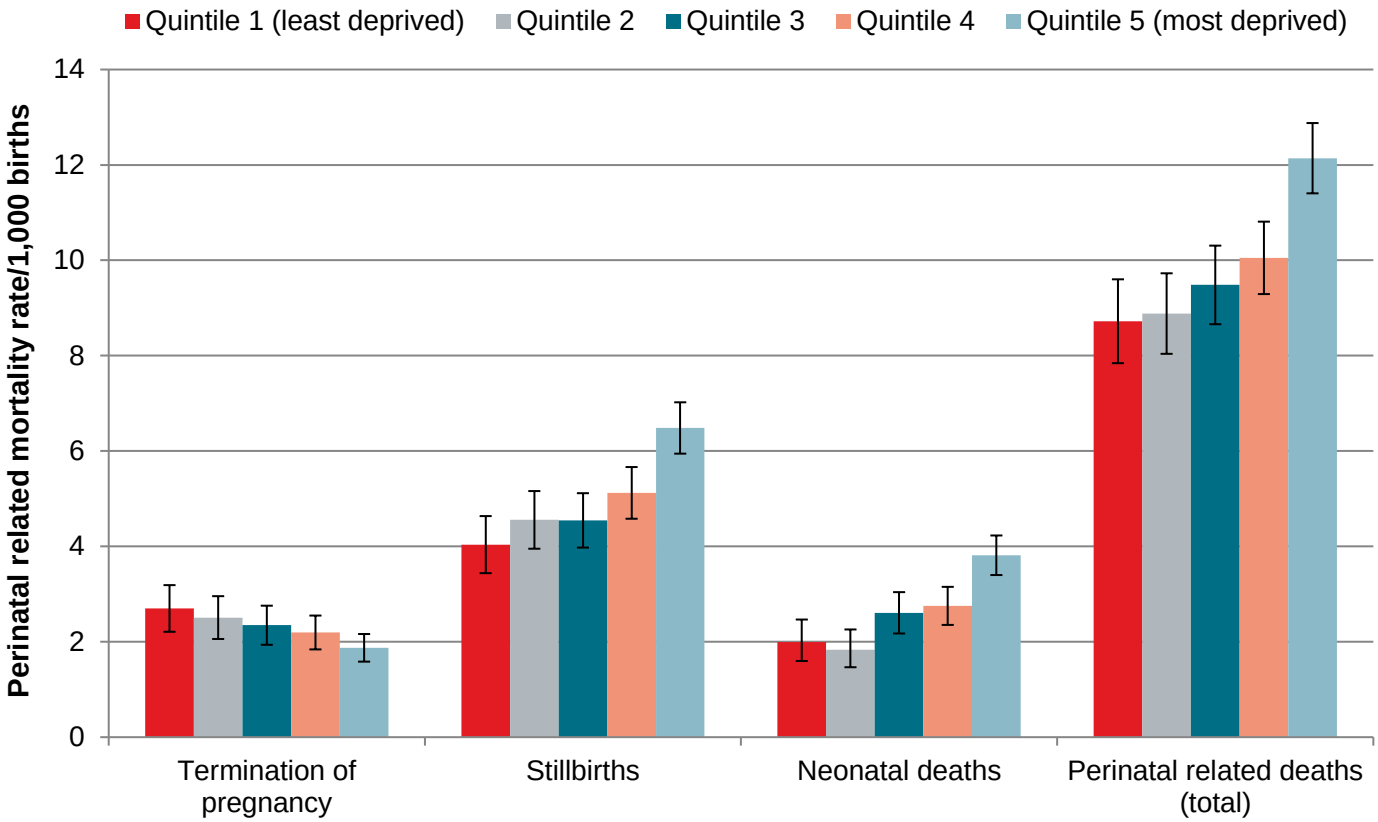
Socioeconomic deprivation

Perinatal related mortality varied significantly by NZDep2013 quintile. Babies of mothers living in quintile 5 (most deprived areas) had statistically significantly higher mortality rates than those in all other quintiles for all types of perinatal related mortality except termination of pregnancy (Figure 3.10 and Table 3.17). Although women living in NZDep2013 quintile 5 had a statistically significantly lower rate of termination of pregnancy than those in quintile 1, their rates for both stillbirth and neonatal death were significantly higher.

Figure 3.10: Perinatal related mortality rates (per 1,000 births, with 95% CIs) by NZDep2013 quintile 2014–2018



Sources: Numerator: PMMRC's perinatal data extract 2014–2018; Denominator: MAT births 2014–2018.

Table 3.17: Perinatal related mortality rates (per 1,000 births) by NZDep2013 quintile 2014–2018

Deprivation quintile	Total births		Fetal deaths						Neonatal deaths			Perinatal related deaths (total)		
			Termination of pregnancy			Stillbirths								
	N=300,205		n=673			n=1,545			n=828			n=3,046		
	N	%	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate
1 (least deprived)	43,338	14.4	117	17.4	2.70	175	11.3	4.04	86	10.4	2.00	378	12.4	8.72
2	47,844	15.9	120	17.8	2.51	218	14.1	4.56	87	10.5	1.83	425	14.0	8.88
3	53,671	17.9	126	18.7	2.35	244	15.8	4.55	139	16.8	2.61	509	16.7	9.48
4	66,956	22.3	147	21.8	2.20	343	22.2	5.12	183	22.1	2.75	673	22.1	10.05
5 (most deprived)	85,907	28.6	161	23.9	1.87	557	36.1	6.48	325	39.3	3.82	1,043	34.2	12.14
Unknown	2,489	0.8	<3	x	s	8	0.5	-	8	1.0	-	18	0.6	-

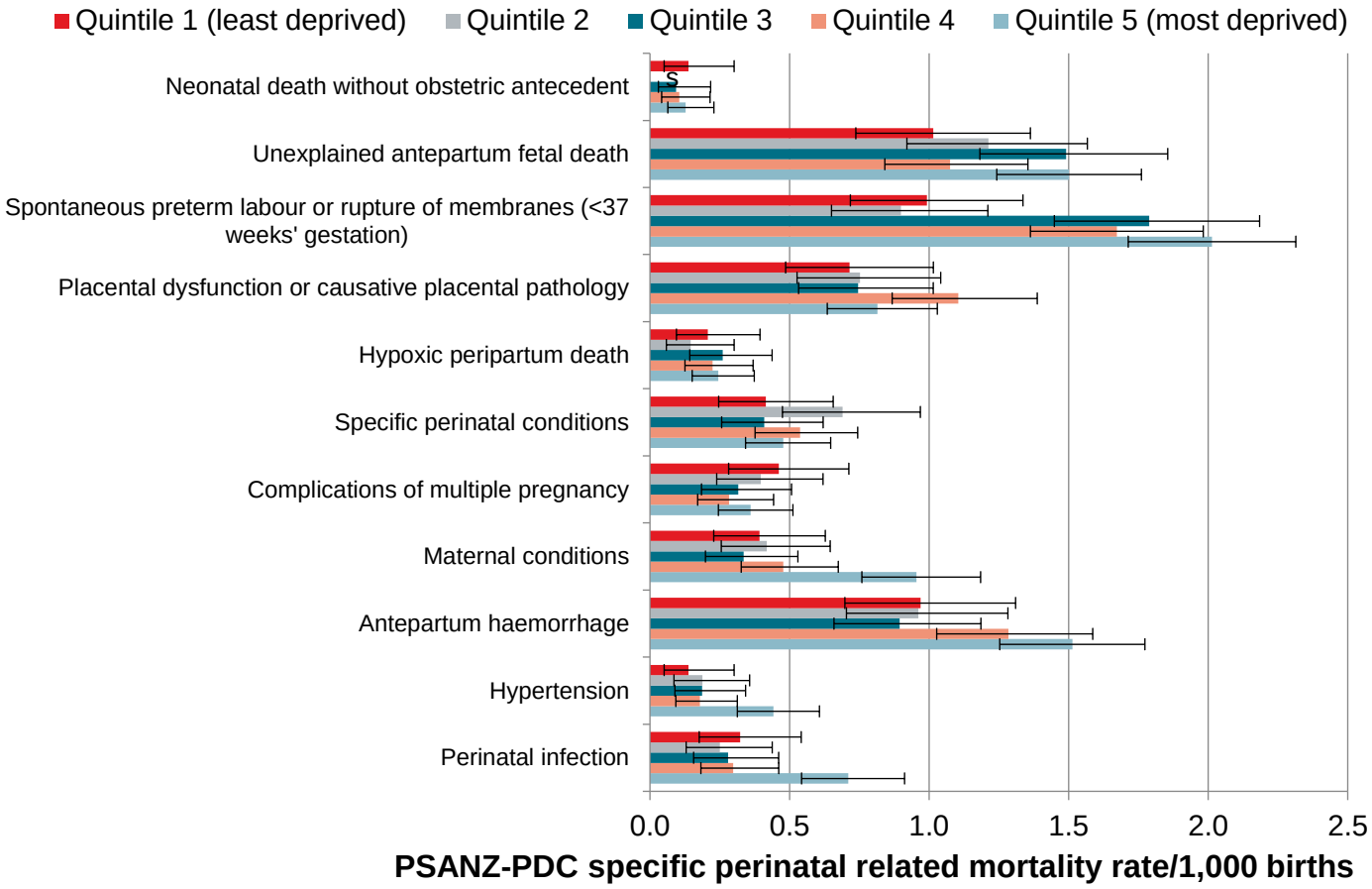
'x' indicates percentage not calculated due to small numbers.

's' indicates rate suppressed due to small numbers.

Sources: Numerator: PMMRC's perinatal data extract 2014–2018; Denominator: MAT births 2014–2018.

This variation in mortality rates by deprivation was most marked for deaths due to spontaneous preterm delivery, for which mortality rates generally increased with increasing deprivation. Other causes of death had little significant variation by deprivation (Figure 3.11 and Table 3.18). This pattern has been stable over time, with no significant changes in mortality rates by deprivation over the period 2007–2018. Table 3.19 presents the rates of perinatal related death by deprivation over time for the period 2009–2018.

Figure 3.11: Perinatal death classification (PSANZ-PDC) specific perinatal related mortality rates (per 1,000 births, with 95% CIs) (excluding congenital anomalies) by NZDep2013 quintile* 2014–2018



* Excludes 13 babies with unknown NZDep2013 quintile.

's' indicates rate suppressed due to small numbers.

Sources: Numerator: PMMRC's perinatal data extract (excluding congenital anomalies) 2014–2018; Denominator: MAT births 2014–2018.

Table 3.18: Perinatal death classification (PSANZ-PDC) specific perinatal related mortality rates (per 1,000 births) (excluding congenital anomalies) by NZDep2013 quintile* 2014–2018

Perinatal death classification (PSANZ-PDC)	Quintile 1 (least deprived)			Quintile 2			Quintile 3			Quintile 4			Quintile 5 (most deprived)		
	N=43,338			N=47,844			N=53,671			N=66,956			N=85,907		
	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate
Perinatal infection	14	5.6	0.32	12	4.2	0.25	15	4.1	0.28	20	4.1	0.30	61	7.8	0.71
Hypertension	6	2.4	0.14	9	3.2	0.19	10	2.7	0.19	12	2.5	0.18	38	4.8	0.44
Antepartum haemorrhage	42	16.8	0.97	46	16.2	0.96	48	13.2	0.89	86	17.7	1.28	130	16.5	1.51
Maternal conditions	17	6.8	0.39	20	7.0	0.42	18	4.9	0.34	32	6.6	0.48	82	10.4	0.95
Complications of multiple pregnancy	20	8.0	0.46	19	6.7	0.40	17	4.7	0.32	19	3.9	0.28	31	3.9	0.36
Specific perinatal conditions	18	7.2	0.42	33	11.6	0.69	22	6.0	0.41	36	7.4	0.54	41	5.2	0.48
Hypoxic peripartum death	9	3.6	0.21	7	2.5	0.15	14	3.8	0.26	15	3.1	0.22	21	2.7	0.24
Placental dysfunction or causative placental pathology	31	12.4	0.72	36	12.7	0.75	40	11.0	0.75	74	15.3	1.11	70	8.9	0.81
Spontaneous preterm labour or rupture of membranes (<37 weeks' gestation)	43	17.2	0.99	43	15.1	0.90	96	26.3	1.79	112	23.1	1.67	173	22.0	2.01
Unexplained antepartum fetal death	44	17.6	1.02	58	20.4	1.21	80	21.9	1.49	72	14.8	1.08	129	16.4	1.50
Neonatal death without obstetric antecedent	6	2.4	0.14	<3	x	s	5	1.4	0.09	7	1.4	0.10	11	1.4	0.13

* Excludes 13 babies with unknown NZDep2013 quintile.

'x' indicates percentage suppressed due to small numbers.

's' indicates rate suppressed due to small numbers.

Sources: Numerator: PMMRC's perinatal data extract (excluding congenital anomalies) 2014–2018; Denominator: MAT births 2014–2018.

Table 3.19: Perinatal related mortality rates (per 1,000 births) by NZDep quintile and year 2009–2018

Deprivation quintile	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N
1 (least deprived)	76	9,103	80	9,028	103	8,828	80	8,969	59	8,316	93	8,602	74	8,373	69	8,816	70	8,922	72	8,625
2	106	9,539	104	9,782	99	9,551	89	9,545	78	9,378	77	9,321	83	9,478	91	9,797	93	9,763	81	9,485
3	120	12,101	117	12,161	116	11,684	106	11,772	126	10,791	118	10,703	90	10,732	99	10,857	104	10,874	98	10,505
4	178	15,189	155	15,206	152	14,788	140	14,715	114	13,566	138	13,469	138	13,436	127	13,471	118	13,364	152	13,216
5 (most deprived)	249	18,586	251	18,638	195	17,774	254	17,750	220	17,571	229	17,435	189	17,252	224	17,177	205	17,112	196	16,931
Unknown	<3	685	<3	634	<3	618	<3	535	3	515	4	550	4	512	<3	488	3	443	5	496

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Rate	Rate	Rate	Rate	Rate	Rate	Rate	Rate	Rate	Rate
1 (least deprived)	8.35	8.86	11.67	8.92	7.09	10.81	8.84	7.83	7.85	8.35
2	11.11	10.63	10.37	9.32	8.32	8.26	8.76	9.29	9.53	8.54
3	9.92	9.62	9.93	9.00	11.68	11.02	8.39	9.12	9.56	9.33
4	11.72	10.19	10.28	9.51	8.40	10.25	10.27	9.43	8.83	11.50
5 (most deprived)	13.40	13.47	10.97	14.31	12.52	13.13	10.96	13.04	11.98	11.58
Unknown	-	-	-	-	-	-	-	-	-	-

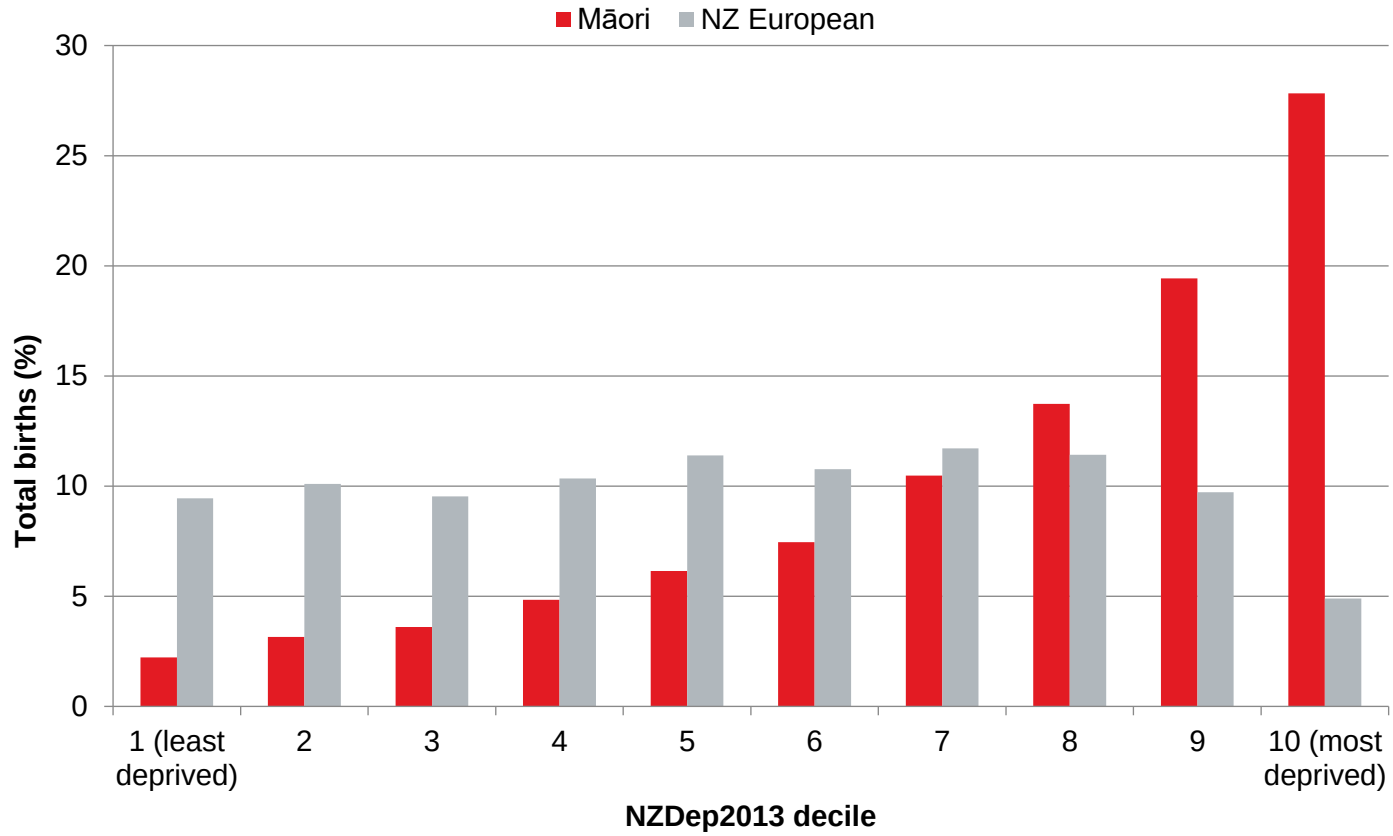
Sources: Numerator: PMMRC's perinatal data extract 2009–2018; Denominator: MAT births 2009–2018.

When examining the effect of deprivation on Māori and New Zealand Europeans, it is important to consider how deprivation levels are distributed in these two groups. Figure 3.12 shows the distribution of all infants born in Aotearoa/New Zealand by residential NZDep2013 decile over the period 2009–2018. Deprivation deciles, as the name implies, divide the population of Aotearoa/New Zealand into 10 groups (deciles), with 10% of the population in each one. For babies of New Zealand European mothers, approximately 10% of the population lives in each decile, with the exception of decile 10, in which 5% of this group lives. In contrast, very few Māori babies are born into NZDep2013 deciles 1 to 5, while nearly half (47%) are born into deciles 9 and 10, compared with 15% of babies born to New Zealand European mothers for these two deciles combined. Clearly the distribution of deprivation between babies of Māori and New Zealand European mothers is unequal.

In this context, Figure 3.13 shows the perinatal related mortality rate by NZDep2013 decile. Overall, mortality rates increase with increasing deprivation for babies of both Māori and New Zealand European mothers. Those in decile 10 have the highest mortality rates.

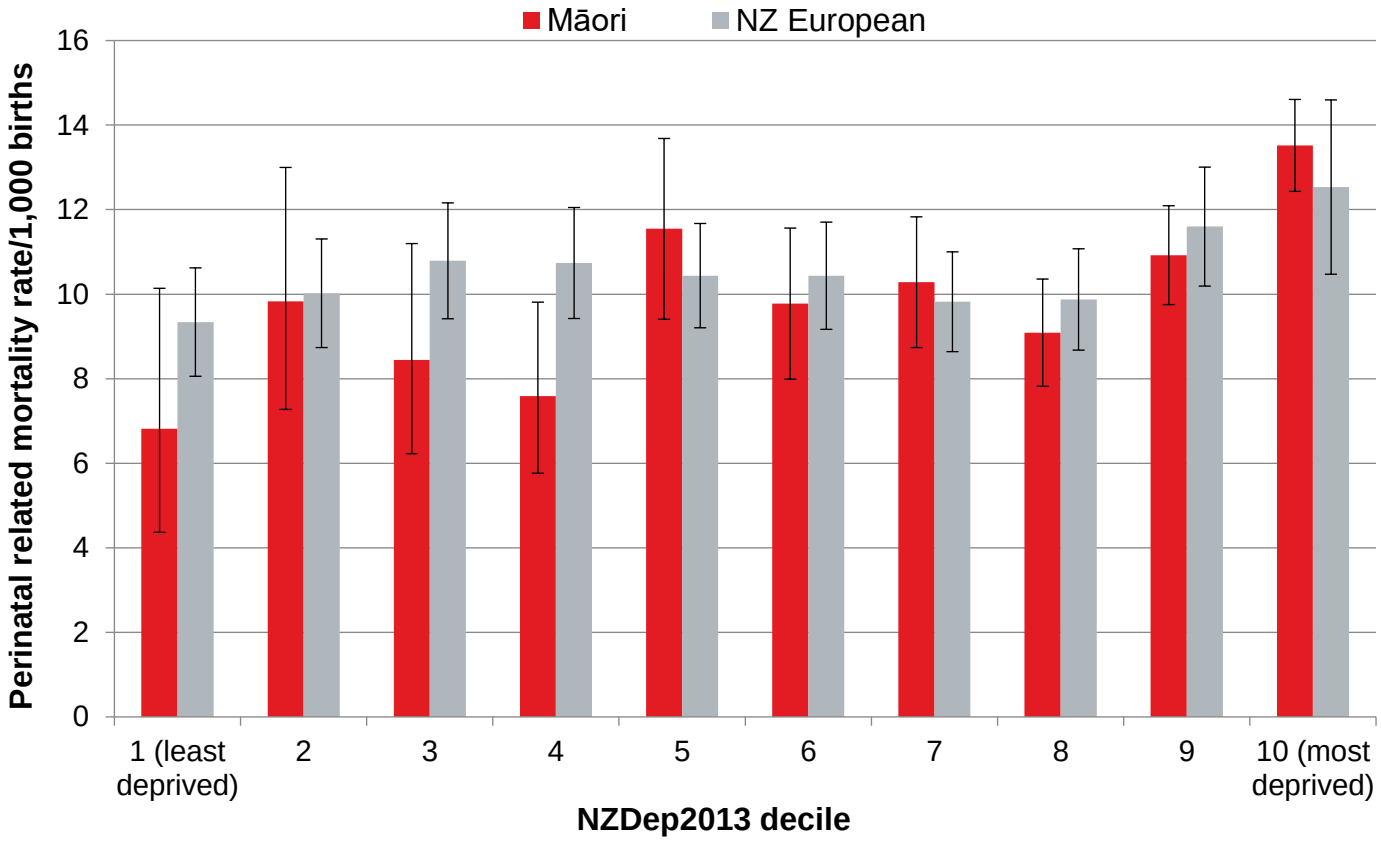
Because Māori mortality rates are highest in babies in decile 10 areas, and the proportion of Māori babies born into decile 10 areas is high, Māori are disproportionately affected by perinatal related mortality. Figure 3.14 presents the number of deaths by NZDep2013 decile, and shows that Māori communities living in decile 10 areas experience the burden of perinatal related mortality, with nearly twice as many deaths in this group as in any other.

Figure 3.12: All births by NZDep decile, Māori and New Zealand European 2009–2018



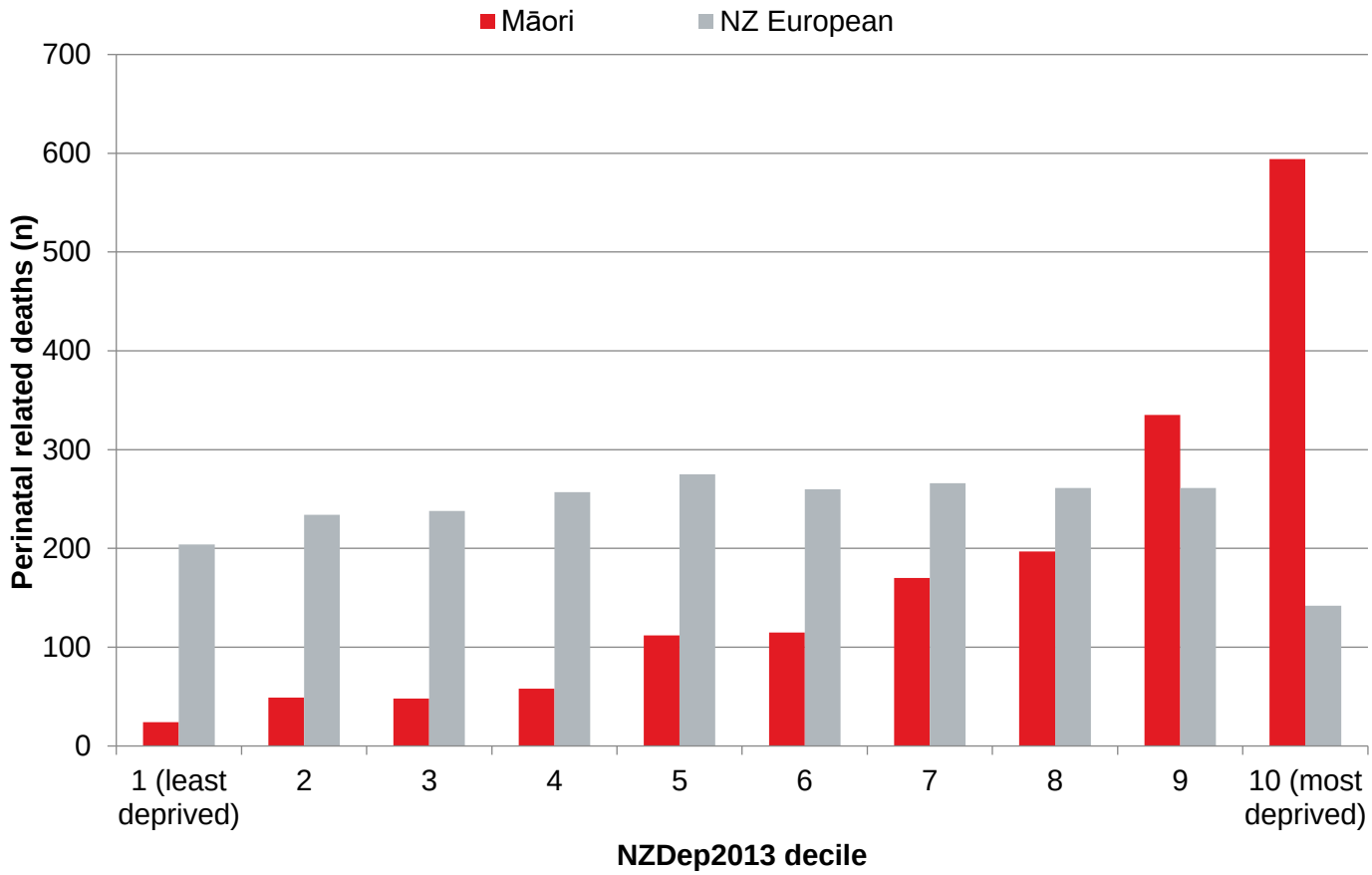
Source: MAT births 2009–2018.

Figure 3.13: Perinatal related mortality rates (per 1,000 births, with 95% CIs) by NZDep decile, Māori and New Zealand European 2009–2018



Sources: Numerator: PMMRC's perinatal data extract 2009–2018; Denominator: MAT births 2009–2018.

Figure 3.14: Perinatal related mortality (number of deaths) by NZDep decile, Māori and New Zealand European 2009–2018



Source: PMMRC's perinatal data extract 2009–2018.

Poverty

It is a consistent and enduring finding in this report series that living in the most deprived areas of Aotearoa/New Zealand is associated with increased mortality in babies. Area deprivation, as measured by NZDep2013, can only provide information on the area that people live in, rather than on their individual circumstances. However, the finding is clear and consistent that mortality increases with increasing area-level deprivation.

To hypothesise about how living in a deprived area might contribute to poor health outcomes, we have considered the literature on poverty. While we are not measuring individual-level poverty in this report, there is likely to be a strong correlation between a higher prevalence of poverty and living in a high-deprivation area.

Research on the relationship between individual and area-level poverty in Aotearoa/New Zealand is rare. However, one study, which looked only at a single area, found that while household-level socioeconomic status (as measured by an occupation-based index) did vary, the majority of households in high-deprivation areas were also considered to have low socioeconomic status.[26]

About 682,500 people, or one in seven households, live in poverty in Aotearoa/New Zealand, including around 220,000 children.[27] Poverty is not just limited to those receiving benefits, although it is common in this group. Plum et al[28] found that in households where at least one adult identified as being of Māori ethnicity (prioritised), 8.6%

[26] Jamieson LM, Thomson WM. 2006. Adult oral health inequalities described using area-based and household-based socioeconomic status measures. *Journal of Public Health Dentistry* 66(2): 104–9.

[27] New Zealand Council of Christian Social Services. nd. Facts about poverty in New Zealand. URL: https://nzccss.org.nz/work/poverty/facts-about-poverty/#:~:text=There%20is%20poverty%20amidst%20prosperity,households%2C%20including%20around%20220%2C000%20children (accessed 26 June 2020).

[28] Plum A, Pacheco G, Hick R. 2019. *In-work Poverty in New Zealand*. Auckland: New Zealand Work Research Institute.

experienced in-work poverty, compared with 5.9% of New Zealand Europeans. Other ethnic groups with higher rates of in-work poverty than New Zealand Europeans were Pacific peoples (9.5%), Asians (9.4%) and MELAA (9.5%).

Poverty can impact on health directly, in that people are unable to afford primary care, unable to pay for prescription medicines and less likely to have health insurance. Indirect ways in which poverty can contribute to poor health outcomes include food insecurity,[29] less access to transport and the stress of living with inadequate resources.[30,31] Lowly paid jobs are also less likely to allow employees the flexibility to have time off work to attend appointments. For those living in rural areas, poverty is compounded by difficulties of geographical access to health care.[32] The stress of living in poverty can affect all facets of life, reducing the control individuals have over their lives. Acting through a number of different pathways, poverty is associated with certain adverse perinatal outcomes, such as pre-eclampsia and preterm birth.[33]

Body mass index (BMI)

This report uses BMI as a proxy indicator of risk to the health of both the mother and baby. Higher BMI also has implications for the provision of care, as we discussed in our 13th report.[34]

Our analysis of data from both MAT (Table 3.20 and Figure 3.15) and the PMMRC (Table 3.21) shows that mortality from stillbirths, neonatal deaths and perinatal related deaths overall increased with increasing maternal BMI. Due to incomplete matching between the two data sets, some individuals who were in the PMMRC data set were not in MAT, and in other situations individuals in MAT could not be matched to the PMMRC records. Using PMMRC data for maternal BMI (numerator) had the net effect of reducing the number of women in BMI category 30.0–34.9 and increasing the numbers of women in BMI categories 35.0–39.9 and ≥40.0. This suggests that MAT records underestimate true maternal BMI.

[29] Smith C, Parnell WR, Brown RC, et al. 2012. Balancing diet and the budget: food purchasing practices of food-insecure families in New Zealand. *Nutrition & Dietetics* 70: 278–85.

[30] Saunders P. 1998. Poverty and health: exploring the links between financial stress and emotional stress in Australia. *Australian and New Zealand Journal of Public Health* 22(1):11–6.

[31] Carter KN, Kruse K, Blakely T, et al. 2011. The association of food security with psychological distress in New Zealand and any gender differences. *Social Science & Medicine* 72(9): 1463–71.

[32] Pearce J, Witten K, Hiscock R, et al. 2008. Regional and urban–rural variations in the association of neighbourhood deprivation with community resource access: a national study. *Environment and Planning* 40: 2469–89.

[33] Nagahawatte NT, Goldenberg RL. 2008. Poverty, maternal health, and adverse pregnancy outcomes. *Annals of the New York Academy of Sciences* 1136: 80–5.

[34] PMMRC. 2019. *Te Pūrongo ā-Tau Tekau mā Toru o te Komiti Arotake Mate Pēpi, Mate Whaea Hoki | Thirteenth Annual Report of the Perinatal and Maternal Mortality Review Committee: Te tuku pūrongo mō te mate me te whakamate 2017 | Reporting mortality and morbidity 2017.* Wellington: Health Quality & Safety Commission. URL: https://www.hqsc.govt.nz/assets/PMMRC/Publications/13thPMMRCreport/13thPMMRCAnnualReportWebFINAL.pdf (accessed 18 September 2020).