

Ethnic disparities in severe maternal morbidity and the contribution of deprivation: A population-based causal analysis

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Introduction

- Severe maternal morbidity (SMM), or life-threatening events which happen in pregnancy and around the time of birth, such as haemorrhage or eclampsia, occur in around 1-2% of all births (1).
- In the United Kingdom (UK), individuals from minoritised ethnic groups have an increased risk of adverse maternal health outcomes such as SMM (1, 2). A disproportionate number of women from minoritised ethnic groups also live in the most socioeconomically deprived areas of England (1, 2), areas marked by limited access to income, education, employment, and housing, and living in a deprived area itself significantly increases the risk of adverse maternal health outcomes (1, 3).
- Since both minoritised ethnicity and neighbourhood deprivation are associated with SMM and strongly associated with each other, there is a need to disentangle their respective impacts on SMM regarding their plausible roles in the causal pathway.
- Therefore, this study aimed to examine the association between ethnicity and SMM in England, focusing on the gradient effects of deprivation, as well as a potential mediator, on the risk of SMM across disaggregated ethnic groups. The study also aimed to provide a more detailed understanding of the intersection between ethnicity and neighbourhood deprivation and any increased risk of SMM

Methods

Database: Hospital Episode Statistics Admitted Patient Care

Setting: All hospital births in National Health Service (NHS) facilities in England between January 1st, 2013, and March 31st, 2023.

Population: A cohort of 3,839,156 women aged 10–55 years with births of ≥ 20 weeks’ gestation.

Exposure: Ethnicity in 10 groups

Outcomes: A modified English Maternal Morbidity Outcome Indicator (EMMOI), a composite outcome of SMM.

Study Design: Population-based retrospective cohort study

Statistical Analysis Plan: Multivariable Poisson regression was used to estimate adjusted risk ratios (RR) for SMM across ten ethnic groups compared to White women. Causal mediation analysis was used to calculate the proportion of the association mediated by deprivation.

Results

For the final study population of 3,839,156 women the overall risk of SMM was 1.75%.

Table 1: The association between ethnicity and severe maternal morbidity.

	Total Number of women	Number of women with SMM	Model 1: adjusted for age and year of birth	Model 2: adjusted for age, parity, and year of birth
	N (%)	N (%)	RR [95% CI]	RR [95% CI]
White	2,939,689 (76.6)	45,889 [1.6]	1 [ref]	1 [ref]
Black or Black British - Caribbean	37,046 (1.0)	978 [2.6]	1.68 [1.58–1.79]	1.74 [1.63–1.85]
Black or Black British - African	119,491 (3.1)	3,596 [3.0]	1.88 [1.82–1.95]	1.96 [1.89–2.02]
Asian or Asian British - Indian	135,491 (3.5)	2,833 [2.1]	1.29 [1.25–1.35]	1.29 [1.24–1.34]
Asian or Asian British - Pakistani	149,880 (3.9)	3,423 [2.3]	1.46 [1.41–1.51]	1.53 [1.48–1.58]
Asian or Asian British - Bangladeshi	56,646(1.5)	1,653 [2.9]	1.83 [1.74–1.92]	1.97 [1.88–2.07]
Mixed	74,342 (1.9)	1,488 [2.0]	1.21 [1.15–1.27]	1.22 [1.15–1.28]
Other	190,615 (5.0)	4,114 [2.2]	1.34 [1.29–1.38]	1.32 [1.28–1.37]
Other Asian	99,498 (2.6)	2,507 [2.5]	1.54 [1.48–1.61]	1.55 [1.48–1.61]
Other Black	36,458 (0.9)	1,033 [2.8]	1.79 [1.68–1.90]	1.85 [1.74–1.96]

Results

Figure 1: Risk ratios (95%) of SMM adjusted for age, parity, and year of childbirth for each ethnic group and IMD quintile compared to White women living in the least deprived IMD quintile

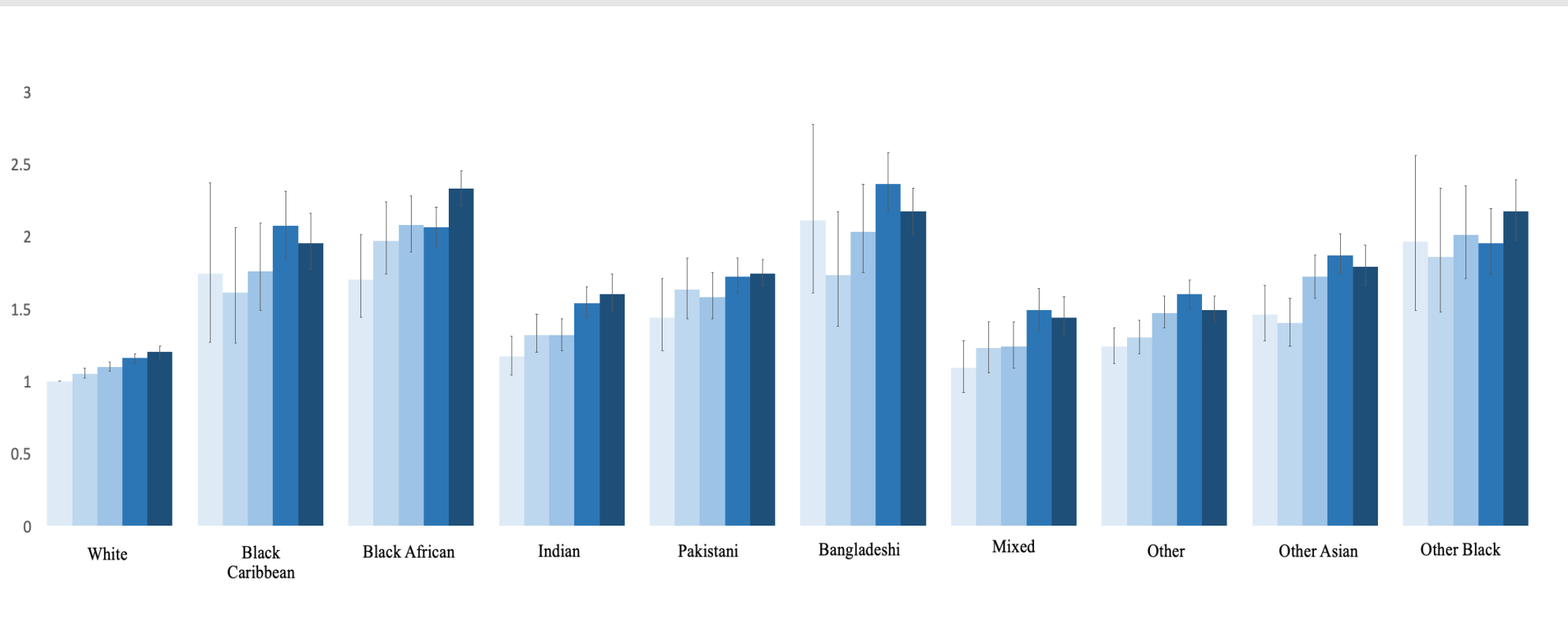


Table 2: Results from the mediation analyses for the association between ethnicity and SMM with deprivation as mediator, adjusting for age, parity, pre-existing medical conditions and year of childbirth.

Ethnicity	Natural Indirect Effects (RR [95%CI])	Natural Direct Effects (RR [95%CI])	Total Effects (RR [95%CI])	Proportion mediated [95%CI]
Black or Black British - Caribbean	1.04 [0.93, 1.16]	1.64 [1.42, 1.89]	1.71 [1.56, 1.87]	0.09 [-0.17, 0.34]
Black or Black British - African	1.11 [1.06, 1.18]	1.87 [1.75, 2.01]	2.09 [1.99, 2.19]	0.20 [0.11, 0.29]
Asian or Asian British - Indian	1.04 [1.02, 1.05]	1.30 [1.21, 1.38]	1.34 [1.26, 1.43]	0.13 [0.08, 0.19]
Asian or Asian British - Pakistani	1.07 [1.01, 1.14]	1.47 [1.37, 1.59]	1.58 [1.51, 1.66]	0.18 [0.03, 0.33]
Asian or Asian British - Bangladeshi	1.01 [0.91, 1.13]	1.97 [1.74, 2.23]	2.00 [1.87, 2.14]	0.03 [-0.18, 0.23]
Mixed	1.05 [1.02, 1.08]	1.16 [1.07, 1.26]	1.22 [1.13, 1.32]	0.27 [0.08, 0.46]
Other	1.04 [1.02, 1.06]	1.29 [1.22, 1.36]	1.34 [1.28, 1.41]	0.15 [0.07, 0.23]
Other Asian	1.04 [1.01, 1.07]	1.53 [1.43, 1.64]	1.59 [1.49, 1.69]	0.10 [0.04, 0.17]
Other Black	1.04 [0.94, 1.14]	1.87 [1.65, 2.12]	1.93 [1.77, 2.11]	0.07 [-0.11, 0.26]

Discussion

- Women from minoritised ethnic groups were disproportionately represented in the most deprived areas, with Black (African, Caribbean, and Other Black) and Asian (Pakistani and Bangladeshi) women most likely to reside in the most deprived IMD quintile and more likely to experience SMM.
- The probability of SMM was greatest for women living in the fourth and fifth most deprived quintiles of areas compared to the least deprived areas, in each of the ethnic groups.
- Most of the association between women from minoritised ethnic groups compared to White women and SMM was not mediated by deprivation. However, small numbers in some minoritised ethnic groups (Black Caribbean, Other Black, and Bangladeshi) residing in the least deprived areas limited the ability to effectively study the mediation effects in these populations.
- These findings underscore the need for research and policies that address not only social, economic, and environmental factors but also other underlying causes of persistent risks faced by minoritised ethnic women. Additionally, future research is needed to examine the role of various socioeconomic disadvantage measures on the association between ethnicity and SMM and maternal mortality, including individual metrics, to more adequately reflect the lived experiences of diverse populations.

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