Understanding ethnic inequalities in stillbirth rates: a UK population-based cohort study

Ruth J Matthews,1 Elizabeth S Draper,1 Bradley N Manktelow,1 Jennifer J Kurinczuk,2 Alan C Fenton,3 Jacqueline Dunkley-Bent,1 Ian Gallimore,1 Lucy K Smith,1 On behalf of the MBRRACE-UK Collaboration

ABSTRACT

Objectives To investigate inequalities in stillbirth rates by ethnicity to facilitate development of initiatives to target those at highest risk.

Design Population-based perinatal mortality surveillance linked to national birth and death registration (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK).

Setting UK.

Participants 4391 569 singleton births at ≥24 weeks gestation between 2014 and 2019.

Main outcome measures Stillbirth rate difference per 1000 total births by ethnicity.

Results Adjusted absolute differences in stillbirth rates were higher for babies of black African (3.83, 95% CI 3.35 to 4.32), black Caribbean (3.60, 95% CI 2.65 to 4.55) and Pakistani (2.99, 95% CI 2.58 to 3.40) ethnicities compared with white ethnicities. Higher proportions of babies of Bangladeshi (42%), black African (39%), other black (39%) and black Caribbean (37%) ethnicities were from most deprived areas, which were associated with an additional risk of 1.50 stillbirths per 1000 births (95% CI 1.32 to 1.67). Exploring primary cause of death, higher stillbirth rates due to congenital anomalies were observed in babies of Pakistani, Bangladeshi and black African ethnicities (range 0.63–1.05 per 1000 births) and more placental causes in black ethnicities (range 1.97 to 2.24 per 1000 births). For the whole population, over 40% of stillbirths were of unknown cause; however, this was particularly high for babies of other Asian (60%), Bangladeshi (58%) and Indian (52%) ethnicities.

Conclusions Stillbirth rates declined in the UK, but substantial excess risk of stillbirth persists among babies of black and Asian ethnicities. The combined disadvantage for black, Pakistani and Bangladeshi ethnicities who are more likely to live in most deprived areas is associated with considerably higher rates. Key causes of death were congenital anomalies and placental causes. Improved strategies for investigation of stillbirth causes are needed to reduce unexplained deaths so that interventions can be targeted to reduce stillbirths.

INTRODUCTION

The worldwide COVID-19 pandemic has highlighted the unacceptable health inequalities experienced by individuals from different ethnic groups, and the issue is receiving the global attention it has long deserved. In the UK, reports of ethnic inequalities in maternal mortality1 have highlighted this issue and sparked the Fivexmore campaign to change black women’s maternal health outcomes (https://www.fivexmore.com). Stillbirths are a major health burden with large disparity between and, importantly, within countries.2-4 Ethnic inequalities in stillbirth rates have been noted in a number of high-income countries including Australia,5 New Zealand,6 North America7 and Europe8,9 with rates often over double for migrant mothers or minority ethnic groups compared with those of white ethnicity. Recent national stillbirth data for the UK10 and England and Wales11 similarly report stillbirth rates to be around twice as high in babies of black ethnicity and 60% higher in babies of Asian ethnicity compared with babies of white ethnicity.

Research into ethnic inequalities in stillbirth rates is limited, and little is known about differences in the causes of stillbirth between ethnic groups. Studies including stillbirth cause are lacking detailed information on
cause of death.\textsuperscript{7,11} Minority ethnic groups in the UK are typically more socioeconomically disadvantaged and likely to have poorer health outcomes than the white population\textsuperscript{11,12} and may have different age profiles because of migration patterns or cultural differences in timing of motherhood. It is therefore important to consider the impact these factors have on the association between ethnicity and stillbirth.\textsuperscript{13,14}

Stillbirth rates are higher in the UK than many other comparable high-income countries, and are decreasing more slowly.\textsuperscript{2,15} Despite targets set by the governments across the UK to reduce stillbirths by between 35\% and 50\%;\textsuperscript{16-18} alongside a number of initiatives aimed at improving maternity services and care\textsuperscript{19-23} improvements remain gradual. A greater impact on stillbirth rates may be achieved through better understanding of the multiple disadvantages that lead to higher risks of stillbirth\textsuperscript{2,24} and the differences in the causes of death between ethnicities, so that initiatives can be targeted towards those most in need and reduce evident inequalities in stillbirth rates. Here, we explore recent trends in UK stillbirth rates by ethnicity, the extent to which associations between ethnicity and stillbirth are mediated by socioeconomic deprivation and maternal age, and whether cause of death varies between ethnic groups.

**METHODS**

Data on all singleton live births and stillbirths from 24 weeks gestation to mothers resident in England, Wales,
Scotland and Northern Ireland between 1 January 2014 and 31 December 2019 were obtained from the Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE-UK) perinatal mortality surveillance programme linked to birth notification and registration data. In January 2013, the Healthcare Quality Improvement Partnership commissioned the MBRRACE-UK collaboration to collect UK perinatal mortality surveillance data. MBRRACE-UK links detailed information on all deaths reported by UK hospitals with data on all births from the Patient Demographic Service (formerly the NN4B birth notification system) and birth and death registration data from the Office for National Statistics for England and Wales, National Records Scotland and Information Services Division for Scotland and the Northern Ireland Maternity System for Northern Ireland. MBRRACE-UK use stillbirth registrations from statutory notifications to ensure complete ascertainment of stillbirths.

Information about the baby’s ethnicity is obtained via linkage with birth notification data for all births. We categorise baby’s ethnicity as: white, Indian, Pakistani, Bangladeshi, other Asian, black Caribbean, black African and other black, mixed ethnicities, and other (including Chinese). Minor variations in ethnicity classification between the four UK countries prevented reporting rates for more specific ethnicity groupings for babies of mixed ethnicity at the UK level as well as for minority white ethnic groups. Where routine ethnicity data were missing for a stillborn baby, we used ethnicity as recorded in MBRRACE-UK surveillance data.

We used the Children in low-income families local measure as an estimate of socioeconomic deprivation. This is an area based measure of the proportion of children living in families that are either in receipt of out-of-work benefits or in receipt of tax credits with a reported income that is less than 60% of the national median income. We allocated this to mother’s postcode of residence at the time of birth through data linkage at the small area level. We ranked all areas in the UK by deprivation score, dividing them into five groups with approximately equal numbers of births in each quintile. Birth notification data were also used to provide information about maternal age, which was grouped into 5 year age bands (<20 years, 20–24, 25–29, 30–34, 35–39 and 40+ years).

Stillbirths were classified based on timing of death as intrapartum if the baby was known to be alive at the onset of the care episode which led to birth, and antepartum if the baby was not alive at onset of care or if the timing of death was unknown (n=559). Cause of death was classified by local MBRRACE-UK reporters at each hospital using the Cause of Death and Associated Conditions (CODAC) classification system into the following first level categories: Infection, Intrapartum, Congenital Anomaly, Fetal, Cord Related, Placental Related, Maternal, or Unknown.

Table 2 Adjusted disparities in rates of stillbirth for ethnic groups, deprivation quintile and maternal age for births in the UK: 2014–2019

<table>
<thead>
<tr>
<th>Baby’s ethnicity</th>
<th>Base models Rate difference (95% CI)</th>
<th>Multivariable model Rate difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Indian</td>
<td>1.66 (1.25 to 2.06)</td>
<td>1.71 (1.30 to 2.11)</td>
</tr>
<tr>
<td>Pakistani</td>
<td>3.26 (2.85 to 3.67)</td>
<td>2.99 (2.58 to 3.40)</td>
</tr>
<tr>
<td>Bangladeshi</td>
<td>2.51 (1.86 to 3.16)</td>
<td>2.18 (1.54 to 2.83)</td>
</tr>
<tr>
<td>Other Asian</td>
<td>1.41 (0.92 to 1.90)</td>
<td>1.27 (0.79 to 1.76)</td>
</tr>
<tr>
<td>Black Caribbean</td>
<td>4.14 (3.19 to 5.08)</td>
<td>3.60 (2.65 to 4.55)</td>
</tr>
<tr>
<td>Black African</td>
<td>4.32 (3.84 to 4.80)</td>
<td>3.83 (3.35 to 4.32)</td>
</tr>
<tr>
<td>Other black</td>
<td>4.18 (3.04 to 5.31)</td>
<td>3.76 (2.62 to 4.89)</td>
</tr>
<tr>
<td>Mixed</td>
<td>0.45 (0.19 to 0.71)</td>
<td>0.27 (0.02 to 0.53)</td>
</tr>
<tr>
<td>Other</td>
<td>0.45 (0.09 to 0.82)</td>
<td>0.25 (−0.10 to 0.60)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deprivation Band</th>
<th>Base models Rate difference (95% CI)</th>
<th>Multivariable model Rate difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most deprived versus least deprived quintile</td>
<td>2.08 (1.91 to 2.24)</td>
<td>1.50 (1.32 to 1.67)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Base models Rate difference (95% CI)</th>
<th>Multivariable model Rate difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 years</td>
<td>1.47 (1.09 to 1.85)</td>
<td>1.41 (1.01 to 1.80)</td>
</tr>
<tr>
<td>20–24 years</td>
<td>0.88 (0.69 to 1.07)</td>
<td>0.78 (0.58 to 0.97)</td>
</tr>
<tr>
<td>25–29 years</td>
<td>0.15 (0.00 to 0.30)</td>
<td>0.05 (−0.09 to 0.19)</td>
</tr>
<tr>
<td>30–34 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35–39 years</td>
<td>0.65 (0.47 to 0.82)</td>
<td>0.57 (0.40 to 0.75)</td>
</tr>
<tr>
<td>40+ years</td>
<td>2.12 (1.76 to 2.49)</td>
<td>1.88 (1.51 to 2.25)</td>
</tr>
</tbody>
</table>

*Separate models for ethnicity, deprivation and maternal age, each model adjusted for country of residence and year of birth.
†Multivariable model including ethnicity, deprivation and maternal age (also adjusted for country of residence and year of birth).

Statistical analysis

We calculated the observed stillbirth rate (per 1000 total births) by ethnicity, deprivation quintile, maternal age, country of residence at time of birth and year of birth. Binomial regression models with identity link were fitted to explore the absolute difference in stillbirth rates separately for ethnicity, deprivation quintile (fitted as a continuous variable after assessment of linearity) and maternal age, with variance adjusted for clustering within small area (lower super output area or data zone). These models were adjusted for country of residence (England, Scotland, Wales and Northern Ireland) to allow for differences in policy between the devolved nations that may influence stillbirth rates, and year of birth, to allow for differences in stillbirth rates over time. Multivariable models were then fitted including all factors to take into account confounding of maternal age and deprivation on estimates of ethnic differences in stillbirth rates. Interactions were fitted between ethnicity and deprivation quintile to explore whether the effect of deprivation varied by ethnicity. Trends in ethnic inequalities over time were explored by fitting interactions with year of birth.
Sensitivity analyses

Multivariable models reported here are on a complete case basis, but repeating analyses including individuals with missing data for covariates using an additional category for those with missing data did not materially affect the results. Causes of death were examined before and after exclusion of stillbirths where the primary cause of death was congenital anomalies, because of the association with access and choices surrounding termination of pregnancy for fetal anomaly.

The excess stillbirth rate associated with ethnicity was calculated by applying the stillbirth rate observed for babies of white ethnicity to the number of births for each other ethnic group and comparing this number to the observed number of stillbirths for that ethnic group.

All analyses were conducted in STATA/IC V.16.0.

Patient and public involvement

The ongoing MBRRACE-UK collaboration includes patient and public involvement (PPI) representatives and bereaved parents. The MBRRACE-UK collaboration has also established a third sector stakeholder group comprising representatives from all relevant national mother and baby charities. The PPI stakeholder group is consulted about the programme at an annual meeting held face to face in the past and remotely during the global pandemic. We consult them by email between the annual meetings.

RESULTS

Between January 2014 and December 2019, there were 4 391 569 singleton births at or above 24 weeks gestation to mothers resident in the UK, of which 16 013 ended in stillbirth (3.65 per 1000 total births, 95% CI 3.58 to 3.71). Of these, 14 633 were antepartum (3.33 per 1000, 95% CI 3.27 to 3.39) and 1380 intrapartum (0.31 per 1000, 95% CI 0.29 to 0.34). Information about ethnicity was available for 93% of all births and 98% of stillbirths; of the 4 076 056 births with information on ethnicity, 76% were classified as white, 10% Asian (including Indian, Pakistani, Bangladeshi and other Asian groups), 5% black (including black Caribbean, black African and other black groups), 6% mixed and 3% other ethnicities (see table 1).

Table 1 shows the number and rate of stillbirths by ethnicity, socioeconomic deprivation, maternal age, year and country of residence. Stillbirth rates were substantially higher in babies of black (7.58 per 1000, 95% CI 7.19 to 7.99) and Asian (5.66 per 1000, 95% CI 5.42 to 5.90) ethnicities compared with babies of white (3.40 per 1000, 95% CI 3.33 to 3.47), mixed (3.77, 95% CI 3.52 to 4.03) and Chinese or other (3.80, 95% CI 3.45 to 4.17) ethnicities. Aggregating the Asian ethnicities masked higher stillbirth rates of 6.57 per 1000 (95% CI 6.17 to 6.99) for babies of Pakistani ethnicity and 5.82 per 1000 (95% CI 5.21 to 6.51) for babies of Bangladeshi ethnicity compared with babies of Indian ethnicity (4.97 per 1000, 95% CI 4.58 to 5.38). Stillbirth rates were universally high for babies of black ethnicity, with rates of over 7 per 1000 births (table 1). Stillbirth rates increased with socioeconomic deprivation, from 2.70 per 1000 (95% CI 2.58 to 2.81) in the least deprived quintile, to 4.80 per 1000 (95% CI 4.64 to 4.96) in the most deprived quintile. Stillbirth rates were highest in the youngest (<20 years) and oldest (>40 years) mothers (table 1). There was an 18% decrease in stillbirth rates over 6 years (table 1).

Absolute differences in stillbirth rates between ethnicities, adjusted for year of birth and country of residence, before and after additional adjustment for deprivation and maternal age are shown in table 2. The absolute difference in stillbirth rates was slightly attenuated after adjustment for deprivation and maternal age; here, we discuss the adjusted rates. Adjusted stillbirth rates were 3.6 per 1000 higher or more for babies of black ethnicities compared with babies of white ethnicity, equating to a doubling of risk (table 2). For babies of Asian ethnicity, the absolute rate difference compared with babies of white ethnicity was highest for babies of Pakistani, (2.99 per 1000, 95% CI 2.58 to 3.40) and Bangladeshi ethnicities (2.18 per 1000, 95% CI 1.54 to 2.83). This relates to a 61%–88% increased risk compared with babies of white ethnicity. For babies of Indian and other Asian ethnicities, the adjusted absolute differences were less, but still significantly higher than babies of white ethnicity (table 2). After adjustment, babies born to mothers living in the most deprived quintile had an increased absolute rate difference of 1.5 stillbirths per 1000 total births compared with the least deprived quintile (1.50, 95% CI 1.32 to 1.67).

Figure 1 shows the proportion of total births (live and stillbirths) within each deprivation quintile for each ethnicity (for underlying numbers see online supplemental table S1). The colour of the bars depicts the stillbirth rate for babies within each ethnic group and deprivation quintile. This highlights that a much higher proportion of babies of Bangladeshi (41.7%), black African (39.2%), other black (38.8%) and black Caribbean (37.3%) ethnicities are born to mothers living in the most deprived quintile. It also highlights the increased stillbirth rates experienced by babies of black African, other black and black Caribbean ethnicities across deprivation quintile, and similarly for babies of Bangladeshi and Pakistani ethnicities. The combined impact of living in the most deprived quintile for a baby of black African ethnicity leads to an increase in stillbirth rate of 5.70 per 1000 (95% CI 5.03 to 6.38) compared with babies of white ethnicity born to mothers living in the least deprived quintile. Despite the far higher proportion of babies of Bangladeshi, black African, other black and black Caribbean ethnicities living in most deprived areas, ethnic inequalities were similar across socioeconomic deprivation quintiles (p-value for interaction=0.31). There was no evidence of ethnic inequalities in stillbirth rates changing significantly between 2014 and 2019, shown by a non-significant interaction between ethnicity and year in the adjusted model (p=0.22).

By applying the rate of stillbirth for babies of white ethnicity to all other ethnic groups, we estimated that 1869 stillbirths could potentially have been prevented over the 6 years from 2014 to 2019 if ethnic inequalities did not exist, a 12% reduction in stillbirths. The largest reduction in the number of stillbirths would be in the Pakistani (527 stillbirths) and black African (559 stillbirths) groups.

**Figure 2** shows the cause of stillbirth by baby’s ethnicity. Stillbirth rates for most causes showed similar patterns to overall differences by ethnicity (figure 2). Stillbirth rates with no known cause were much higher in babies of black African (2.99 per 1000, 95% CI 2.70 to 3.29), black Caribbean (2.90 per 1000, 95% CI 2.30 to 3.49) than babies of white ethnicity (1.29 per 1000, 95% CI 1.25 to 1.33), but also higher in babies of Asian ethnicities (ranging
Stillbirth rates (per 1000 total births) where the primary cause was a congenital anomaly were substantially higher for babies of Pakistani, Bangladeshi, black African and other black ethnicities. Rates of congenital anomalies for babies of Indian ethnicity (0.24 per 1000, 95% CI 0.16 to 0.33) were similar to babies of white ethnicity. Babies of black ethnicities had around double the rate of stillbirths associated with placental causes compared with babies of white ethnicity (figure 2).

Since the percentage of stillbirths due to congenital anomalies is likely to be influenced by both access and choices around prenatal screening and termination of pregnancy, we reviewed the percentage of deaths attributed to each cause excluding congenital anomalies (figure 3). In total, over 40% of stillbirths were recorded as unknown cause. The proportion of stillbirths of unknown cause was higher in babies of Bangladeshi (58.2%), Indian (51.5%) and other Asian (60.0%) ethnicities compared with all other ethnicities, where the proportion recorded as unknown cause was 43% to 47%. Conversely, a lower proportion of deaths attributed to placental causes was observed for these groups (figure 3).

DISCUSSION
Stillbirth rates for singleton births in the UK have decreased by 18% between 2014 and 2019, but ethnic inequalities persist. Crude stillbirth rates are highest in babies of black African, black Caribbean and Pakistani ethnicities and adjusting for deprivation and maternal age only marginally attenuated this increased risk. The increased risks associated with deprivation were consistent for all ethnic groups. However, higher proportions of babies of black Caribbean, black African, Bangladeshi and Pakistani ethnicities were born to mothers living in the most deprived areas placing them at additional risk. Rates of stillbirth attributed to unknown causes were high, with particularly high rates for babies of black ethnicities, and accounted for high proportions of stillbirths for babies of Asian ethnicities. Key causes of stillbirth were placental-related causes and congenital anomalies, which had higher rates in babies of black ethnicities.

A major strength of our study is the use of high-quality population surveillance data for mortality over a 6-year period, with complete ascertainment of stillbirths from 24 weeks gestation including termination of pregnancies. This ensures generalisability to the UK population as well as providing detailed information on cause of death and facilitating exclusion of termination of pregnancies from stillbirth estimates. Few high-income countries have similar active national programme of stillbirth surveillance. Our large sample size allowed exploration of ethnicity with more granularity as recommended by Khunti et al to avoid combining groups with different cultural, religious, social and economic experiences. This highlighted differences in stillbirth rates between babies of Indian, Pakistani and Bangladeshi ethnicities not seen in previous studies which looked at aggregated data. However, surveillance data have limitations associated with routine data. Routine ethnicity classification is in principle self-defined, but in reality may be assigned by the health professional completing the notification with potential for misclassification. Misclassification has been found to be a particular issue for more granular mixed and other ethnic groups; here, we report on granular Asian and black ethnic groups where misclassification is
less of a problem, and aggregated mixed or other ethnic groups.

Measurement of deprivation is limited to area level data on income deprivation. In addition, there is a lack of information in the birth notification data regarding mother’s country of birth, gravidity and previous stillbirths as well as other potentially modifiable risk factors such as antenatal attendance and smoking during pregnancy. Therefore, residual confounding cannot be ruled out. MBRRACE-UK are currently undertaking a confidential enquiry to review the quality of care provision for black mothers who experience a stillbirth or neonatal death which will facilitate greater understanding than can be attained through routine data surveillance alone.

Our finding of increased stillbirth rates in babies of black and Asian ethnicities is consistent with other UK28 29 32 and international studies7 but few studies have explored differences in cause of death by ethnicity and limited cause of death, but not for stillbirth.11 Our finding of inequalities in stillbirth rates caused by congenital anomalies could be influenced by access and choices surrounding termination of pregnancies, with Pakistani mothers in particular less likely to choose to terminate their pregnancy when an anomaly is identified, while termination rates are also lower in more deprived areas.35 There may be differences in provision and/or uptake of antenatal screening for Pakistani women,34 a population where consanguinity is also more prevalent.35

Further emphasis on the need for collecting detailed information on cause of death in national surveillance programmes will aid our understanding of the high rates of stillbirth experienced by babies of black and Asian ethnicities and improve our ability to monitor and reduce stillbirth inequalities.36 Efforts to increase uptake of post mortem37 and other investigations after stillbirth could reduce the numbers of stillbirths of unknown cause seen in our study and in other high-income countries.36

The International Stillbirth Alliance is in the process of developing and evaluating a hybrid classification system building on the strengths of existing classification systems such as CODAC and incorporating the principles of the WHO International Statistical Classification of Diseases and Related Health Problems application to deaths during the perinatal period (ICD-PM) classification. This should address the limitations of current classification systems such as the lack of sufficient detail on placental pathology resulting in large proportions of unexplained stillbirth.39 These strategies will facilitate the design of services to address the specific needs of the populations they serve and reduce unacceptable ethnic inequalities.

Twitter
Ruth J Matthews @RuthJMatthews

Acknowledgements
We would particularly like to thank all MBRRACE-UK Lead Reporters and other staff in NHS Trusts, Health Boards and Health and Social Care Trusts across the UK and those from the Crown Dependencies, whose contribution made it possible to collect the MBRRACE-UK data and conduct this analysis.

Collaborators
Charlotte Bevan (1), Janet Scott (1), Marian Knight (2), Peter Smith (2), Rosnhi Patel (3), Sara Kenyon (4) (1) Stillbirth and Neonatal Deaths (SANDS) Charity (2) National Perinatal Epidemiology Unit, Nuffield Department of Population Health, University of Oxford (3) Chelsea and Westminster Hospital NHS Foundation Trust, London(4) Institute of Applied Health Research, University of Birmingham

Contributors
The corresponding author attests that all listed authors meet authorship criteria and that no other meetings the criteria have been omitted. JJK is the Principal Investigator holding the grant to deliver the Maternal, Newborn and Infant Clinical Outcome Review programme by the MBRRACE-UK collaboration. ESD leads the perinatal arm of the MBRRACE-UK programme. ESD, ACF, BM and LKS are members of the MBRRACE-UK collaboration. Contributions are as follows: funding: ESD, JJK, BM, LKS; supervision: ESD, BM LKS; conceptualisation and study design: JD-B, ESD, JJK, BM, RJM, LKS; data curation: IG, BM, RJM; methodology: BM, RJM, LKS; statistical analysis, visualisation and original draft: RJM, LKS. All authors were involved with reviewing, critically appraising and editing the manuscript. All authors have approved the final version. RJM is guarantor.

Funding
The MBRRACE-UK collaboration is commissioned by the Healthcare Quality Improvement Partnership (HQIP) to deliver the Maternal, Newborn and Infant Clinical Outcome Review Programme on behalf of NHS England, the devolved Governments of Wales, Scotland and Northern Ireland, and the Governments of the British Crown Dependencies.

Competing interests
None declared.

Patient consent for publication
Not applicable.

Ethics approval
England and Wales: National Information Governance Board ECC 5-05 (f)/2012 (from 10.10.2012) and the Confidentiality Advisory Group of the Health Research Authority 15/CAG/0119 (from 01.05.2015); Health & Social Care Information Centre (HSisin). Data Access Advisory Group:DARS-NIC-359651-H3R1P-v5.2.Scotland - The NHS Scotland Caldicott Guardian: 2014-62 MBRRACE-UK Programme – Update (2013-05) the Public Benefit and Privacy Panel for Health and Social Care (1920-0131) and The Privacy Advisory Committee, ISD, NHS Northern Services Scotland: PAC16/14. Due to the different data privacy arrangements in Northern Ireland, only deidentified data are provided to the MNICORP programme. Approval gained for collection of patient identifiable data and access to statutory data without consent.

Provenance and peer review
Not commissioned; externally peer reviewed.

Data availability statement
Data may be obtained from a third party and are not publicly available. Data may be requested from the data controller, the Healthcare Quality Improvement Partnership (HQIP), A Data Access Request Form can be obtained from https://www.hqip.org.uk/national-programmes/accessing-ncaopp-data/#.XQeml_lKhjU.

Supplemental material
This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access
This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID id
Ruth J Matthews http://orcid.org/0000-0003-2688-4580

REFERENCES
1 Knight M, Bunch K, Tuffnell D. Saving Lives, Improving Mothers’ Care - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2015-17.
Table S1: Percentage (number) of births, and stillbirth rate per 1,000 total births (number) by deprivation quintile and baby’s ethnicity in the UK: 2014 to 2019 (Numbers used in Figure 1)

<table>
<thead>
<tr>
<th>BABY’S ETHNICITY</th>
<th>DEPRIVATION QUINTILE</th>
<th>Least deprived quintile</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Most deprived quintile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total births</td>
<td>Stillbirths</td>
<td>Rate (n)</td>
<td>Total births</td>
<td>Stillbirths</td>
<td>Rate (n)</td>
</tr>
<tr>
<td>White</td>
<td>22.72 (705,826)</td>
<td>2.73 (1,924)</td>
<td></td>
<td>21.69 (673,889)</td>
<td>3.00 (2,024)</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>16.86 (20,871)</td>
<td>3.83 (80)</td>
<td></td>
<td>21.06 (26,081)</td>
<td>4.41 (115)</td>
<td></td>
</tr>
<tr>
<td>Pakistani</td>
<td>6.22 (10,348)</td>
<td>4.74 (49)</td>
<td></td>
<td>10.21 (16,977)</td>
<td>5.36 (91)</td>
<td></td>
</tr>
<tr>
<td>Bangladeshi</td>
<td>4.06 (2,334)</td>
<td>4.71 (11)</td>
<td></td>
<td>7.5 (4,314)</td>
<td>5.8 (25)</td>
<td></td>
</tr>
<tr>
<td>Other Asian</td>
<td>12.34 (9,607)</td>
<td>3.85 (37)</td>
<td></td>
<td>16.54 (12,876)</td>
<td>4.82 (62)</td>
<td></td>
</tr>
<tr>
<td>Black Caribbean</td>
<td>4.81 (1,527)</td>
<td>3.93 (6)</td>
<td></td>
<td>9.11 (2,895)</td>
<td>6.91 (20)</td>
<td></td>
</tr>
<tr>
<td>Black African</td>
<td>5.25 (6,929)</td>
<td>6.06 (42)</td>
<td></td>
<td>8.67 (11,435)</td>
<td>7.52 (86)</td>
<td></td>
</tr>
<tr>
<td>Black other</td>
<td>5.96 (1,315)</td>
<td>5.32 (7)</td>
<td></td>
<td>9.17 (2,022)</td>
<td>6.43 (13)</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>17.35 (40,155)</td>
<td>3.01 (121)</td>
<td></td>
<td>17.88 (41,362)</td>
<td>3.72 (154)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>13.11 (15,149)</td>
<td>3.37 (51)</td>
<td></td>
<td>14.59 (16,859)</td>
<td>3.20 (54)</td>
<td></td>
</tr>
</tbody>
</table>
UK stillbirths among black and South Asian communities still double those of rest of population

This is despite overall decline in rates in recent years

Key causes placental issues and birth defects, but unknown in more than half of cases

Despite an overall decline in stillbirths across the UK in recent years, rates among black and South Asian communities are still around double those of the rest of the population, finds an analysis of monitoring data, published in the open access journal *BMJ Open*.

Placental issues and birth defects are among the key causes in these groups, but the cause isn’t known in more than half of cases, the findings show.

Stillbirth rates are higher in the UK than in many other comparable high-income countries, and are falling more slowly, despite government targets to cut rates by up to 50%.

Ethnic minorities in the UK are typically more disadvantaged and likely to have poorer health outcomes than their white counterparts. But there’s not much research into ethnic inequalities in stillbirth rates, and little is known about differences in the causes of stillbirth between ethnic groups.

In a bid to plug this knowledge gap, the researchers analysed data from the Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE-UK) programme from 2014 to 2019.

MBRRACE-UK collects information on all live and stillbirths, including ethnicity, for mothers resident in each of the 4 UK countries.

Ethnicity is categorised as: white; Indian; Pakistani; Bangladeshi; other Asian; black Caribbean; black African and other black; mixed ethnicities; and other (to include Chinese).

Levels of deprivation were assessed by linking the mother’s residential postcode at the time of the birth to local measures showing the proportion of children living in families either in receipt of unemployment benefits or tax credits, and with a reported household income less than 60% of the national average.

Maternal age, another potentially influential factor, was grouped into 5 year age bands from under 20 to more than 40.

Between January 2014 and December 2019, 4,391,569 singleton babies at or above 24 weeks were born to mothers resident in the UK. Of these, 16,013 ended in
stillbirth, giving a rate of 3.65/1000 births: 14,633 occurred before birth (3.33/1000) and 1380 during birth (0.31/1000).

The overall stillbirth rate fell by 18% from 2966 (3.96/1000 births) in 2014 to 2241 (3.24/1000 births) in 2019.

Social and financial disadvantage was associated with a higher stillbirth rate: 4.80/1000 births for the most deprived areas compared with 2.70 for the least deprived.

Age at birth was also associated with higher rates: 4.81/1000 births for mums under 20 and 5.42 for those aged 40 and above.

Information about ethnicity was available for most births: 76% were classified as white: 10% Asian (including Indian, Pakistani, Bangladeshi and other Asian groups); 5% black (including black Caribbean, black African and other black groups); 6% mixed; and 3% other ethnicities.

Black African and black Caribbean mothers experienced an additional 4 stillbirths per 1000 births compared with White mothers; there were an additional 3 stillbirths per 1000 births for Pakistani mothers after adjusting for differences in maternal age and deprivation.

Higher proportions of babies of Bangladeshi (42%), black African (39%), other black (39%) and lack Caribbean (37b%) ethnicities were born to mothers living in the most deprived areas, compared with 18% of white babies. Living in these areas was associated with an additional risk of 1.5 stillbirths/1000 births.

Higher stillbirth rates due to birth defects were observed among stillborn babies of Pakistani, Bangladeshi, and black African ethnicities while placental issues were evident among mothers of all black ethnicities.

Across the whole UK population, the cause was unknown in over 40% of cases, but this was even higher for babies of other Asian (60%), Bangladeshi (58%), and Indian (52%) ethnicities.

The researchers acknowledge that they can’t rule out the influence of potentially important risk factors that weren’t universally accounted for, and that ethnicity may have been misclassified.

But the study used high quality population data over a 6-year period, with complete ascertainment of stillbirths from 24 weeks of pregnancy, including terminations, they point out. Few other high-income countries have similar active national stillbirth monitoring programmes.

They conclude: “Improved strategies for investigation of stillbirth causes are needed to reduce unexplained deaths so that interventions can be targeted to reduce stillbirths.”