Maternal, Newborn and Infant Clinical Outcome Review Programme

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

Saving Lives, Improving Mothers' Care

Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2021-23

Compiled report including supplementary material

September 2025

HQIP Healthcare Quality Improvement Partnership
University of Leicester
University of Birmingham
The Newcastle upon Tyne Hospitals NHS Foundation Trust
TIMMS
sands Saving babies' lives. Supporting bereaved families.
NHS Chelsea and Westminster Hospital NHS Foundation Trust
University of Oxford
Oxford Population Health
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Allison Felker, Roshni Patel, Rohit Kotnis,
Sara Kenyon, Marian Knight (Eds.)

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Key messages

from the surveillance report 2025

MBRRACE-UK
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In 2021-23, **257 women died** during or up to six weeks after pregnancy among 2,004,184 women giving birth in the UK

This represents a maternal death rate of **12.82 women** per 100,000 women giving birth

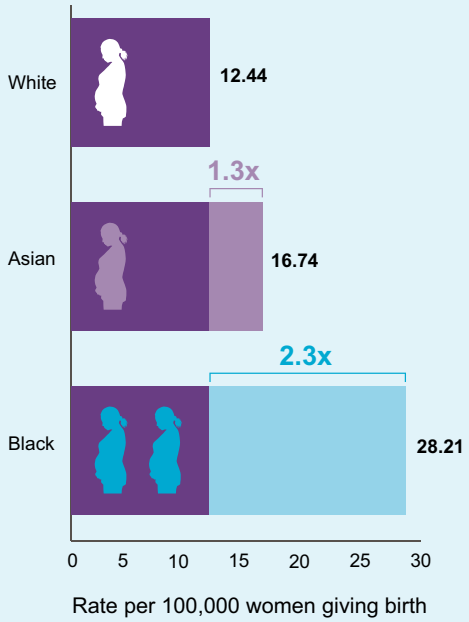
Leading causes of maternal deaths

1. Blood clots
2. Heart disease*
3. COVID-19*
4. Mental health conditions
5. Epilepsy and stroke

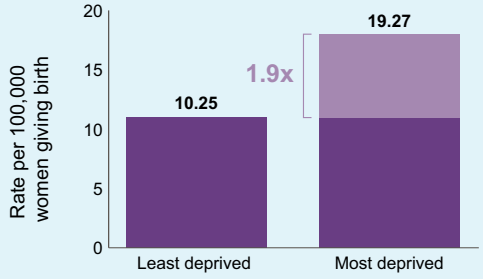
*Responsible for the same number of maternal deaths in 2021-23

Inequalities in maternal mortality

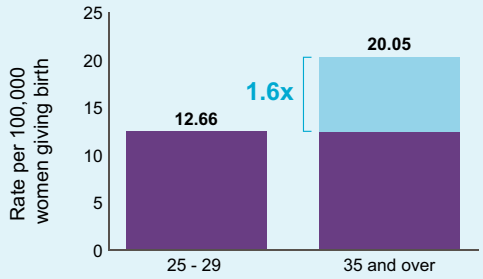
Ethnic group



Deprivation



Age



Key messages

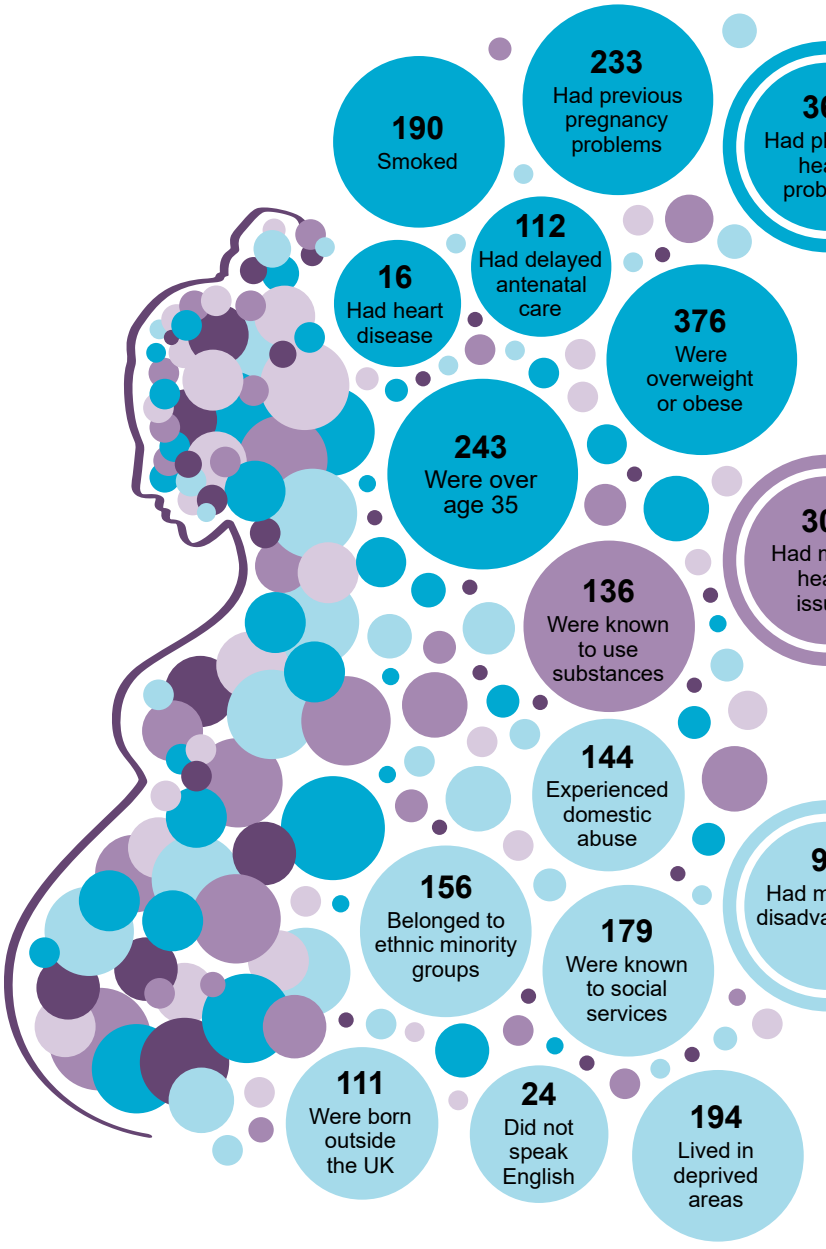
from the confidential enquiries 2025

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

A constellation of biases

The 2025 MBRRACE-UK report looks at the care of **643 women** who died during or up to one year after pregnancy in the UK and Ireland

Of these women, **583 (91%)** faced multiple interrelated challenges



Ready for pregnancy

The period before or between pregnancies is an ideal time to counsel women about their health, including **weight** or **smoking**, and to create a plan to manage pre-existing conditions

Perinatal mental health team (PMHT)

Women with **mental health issues** who are pregnant, recently pregnant or who have experienced the loss of a child through pregnancy loss, bereavement or custody loss, should receive PMHT referral and leadership

Individualised care

Many women experience multiple, severe disadvantages including **social service involvement, domestic abuse** and **deprivation** and may require additional supports and services

Key messages
from the report 2025

MBRRACE-UK
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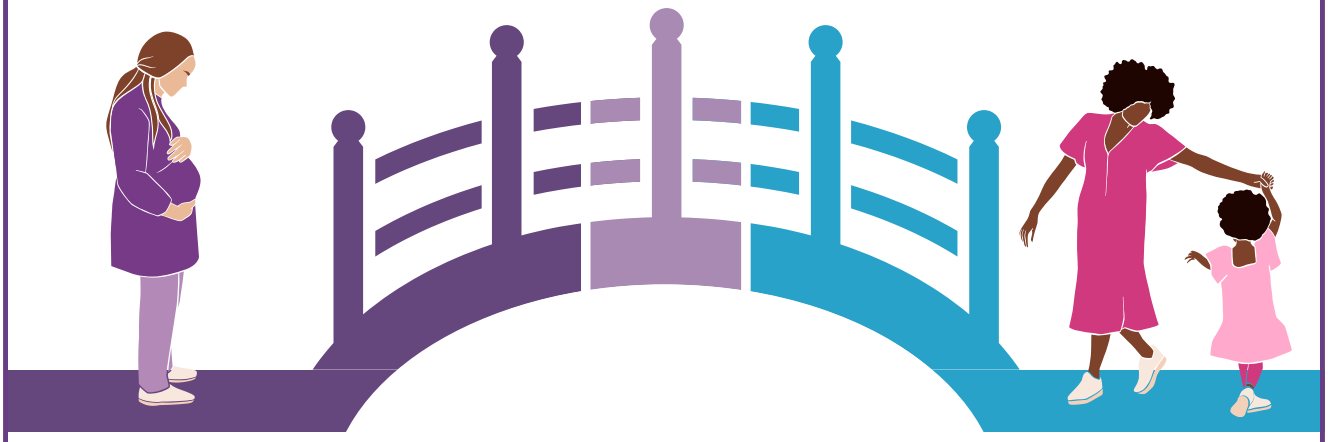
Bridging the gaps in maternity care



National recommendations for the care of women with medical and social challenges

Urgent referral pathways

Set up an urgent referral pathway to triage high-risk women for senior or specialist review in early pregnancy

Information sharing

Ensure codes for domestic abuse in women's records are used and information is shared appropriately in the event of safeguarding concerns

Discharge summaries

Discharge summaries for primary care should include a summary box of actions concerning conditions that require postnatal management

Executive summary

Introduction

This report, the twelfth MBRRACE-UK annual report of the Confidential Enquiries into Maternal Deaths and Morbidity, includes surveillance data on 611 women who died during or up to one year after pregnancy between 2021 and 2023 in the UK. In addition, it includes confidential enquiries into the care of women who died between 2021 and 2023 in the UK and Ireland from hypertensive disorders of pregnancy, cardiac disease, mental health-related causes, homicides and accidents.

The report also includes a Morbidity Confidential Enquiry into the care of women living in the most deprived areas of the UK. These women were selected from the MBRRACE-UK database of perinatal deaths for 2023. To compare the care these women received to a control population, women living in the least deprived areas were also sampled from the database of perinatal deaths and from national birth registers and matched based on region, ethnic group and age range within five years. The care of 33 women living in the most or least deprived areas was reviewed in depth for the Morbidity Confidential Enquiry. Seventeen women who were identified as having multiple disadvantages, including but not limited to deprivation, are included in Chapter 5: Lessons for the care of women with multiple disadvantages. Lessons from the care of other women included in the morbidity enquiry are discussed in other chapters of the report.

This report can be read as a single document; each chapter is also designed to be read as a standalone report as, although the whole report is relevant to maternity staff, service providers and policy-makers, there are specific clinicians and service providers for whom only specific chapters are pertinent. There are seven different chapters covering the following topics: 1. Introduction and methodology 2. Maternal mortality surveillance and epidemiology 3. Hypertensive disorders of pregnancy 4. Cardiac disease 5. Multiple disadvantages (including accidental deaths and homicides as well as women reviewed as part of the morbidity enquiry) 6. Mental health and 7. Pathology.

Methods

Maternal deaths are reported to MBRRACE-UK, Northern Ireland Maternal and Child Health (NIMACH) or to Maternal Death Enquiry (MDE) Ireland by the staff caring for the women, or through other sources including coroners, procurators fiscal and the general public. In addition, identification of deaths is cross-checked with records from the Office for National Statistics, National Records of Scotland and Public Health Scotland. For all women who die, MBRRACE-UK requests the full medical records, post-mortem reports and, where relevant, copies of any local reviews or investigations, including those conducted by the Maternity and Newborn Safety Investigations (MNSI) programme (previously part of the Healthcare Safety Investigation Branch (HSIB)). Full medical records are also requested for the women identified for the Morbidity Confidential Enquiry. All documents are fully anonymised prior to undergoing confidential review. Each woman's care is examined by multidisciplinary expert reviewers and assessed against current guidelines and standards (such as that produced by the National Institute for Health and Care Excellence (NICE) or relevant Royal Colleges and other professional organisations). Subsequently, the expert reviews are examined by a multidisciplinary writing group to enable the main themes for learning to be drawn out for the MBRRACE-UK report. The new national recommendations to improve future care are presented here, alongside a surveillance chapter reporting three years of UK statistical surveillance data.

Causes and trends

There was a statistically non-significant decrease in the overall maternal death rate in the UK between 2020-22 and 2021-23. When deaths due to COVID-19 were excluded, maternal death rates were similar to corresponding rates in the three previous overlapping triennia encompassing the years of the COVID-19 pandemic (2018-20, 2019-21, 2020-22).

Thrombosis and thromboembolism was the leading cause of maternal death in the UK in 2021-23 during or up to six weeks after the end of pregnancy. Cardiac disease and COVID-19 were the second most common causes of maternal death occurring at equal rates.

Rates for late maternal deaths occurring between six weeks and one year after the end of pregnancy continued to increase and were significantly higher in 2021-23 compared to 2018-20. Maternal suicides were the leading cause of deaths occurring between six weeks and one year after the end of pregnancy. As a whole, deaths from psychiatric causes accounted for 34% of maternal deaths during this period.

Inequalities in maternal mortality remained in 2021-23. Compared to women aged 25-29, women aged 35 or older were nearly two times more likely to die. While the maternal mortality rate for women from Black ethnic backgrounds continued to decrease in 2021-23, there remained a two-fold difference in maternal mortality rates for Black women

compared to White women. Asian women also had a slightly increased risk compared to White women. Women living in the most deprived areas continued to have a maternal mortality rate twice that of women living in the least deprived areas.

Lessons learned from the confidential enquires

This year's confidential enquiries into maternal deaths identified lessons learned from the care of women who died from hypertensive disorders of pregnancy, cardiac disease, mental health-related causes, homicide and accidents. This report also includes lessons learned from a morbidity confidential enquiry into women living in the most deprived areas of the UK, many of whom experienced multiple disadvantages.

Assessors identified many common themes across these topics including the importance of pre-pregnancy counselling and getting women 'ready for pregnancy'. This includes counselling women about their risk factors, optimising medications and discussing risk-reduction strategies such as weight loss or smoking cessation. Assessors emphasised that recognition of risk factors must also include social or mental health complexities, which should be considered alongside physical health. They recommended that an urgent referral pathway for women with high-risk medical conditions or complex social circumstances be established to triage women for senior or specialist consultation in early pregnancy. In order to determine which women may be at increased risk based on their social circumstances, assessors also recommended that women's social risk factors, including financial need and housing, are assessed and documented in a standardised way. This may require updates to current guidelines on the care of women with complex social factors, or the commissioning of more research in order to provide an evidence base for such an update.

Improvements in post-pregnancy care were also identified for many of the women included in the confidential enquiries. Assessors noted that risk assessments need to continue into the postnatal period as risk factors may develop or change during pregnancy. It is essential that the discharge summary provided to primary care includes an initial summary box to clearly indicate any medical, mental health or social conditions that require ongoing support and management. A clear postnatal plan for multidisciplinary care is needed in order to manage and monitor ongoing medications, such as antihypertensives, or provide follow-up for any safeguarding concerns. In the event of such concerns, information sharing across different services and agencies is important so that all those caring for the women are aware of her circumstances, including ongoing domestic abuse.

The confidential enquiry into the care of women who died from mental health-related causes once again emphasises the significant impact that the loss of a child, either through early pregnancy loss, bereavement or custody loss, can have on mental health. These women may require additional supports during and after pregnancy, regardless of how their pregnancy ends. This report highlights the importance of leadership from perinatal mental health teams, even in instances when women are not accepted for care under their services. Such supports should not exclude women who have lost their child or those with concomitant substance use.

It remains imperative that 'red flag' signs and symptoms or symptoms requiring repeat presentation are thoroughly investigated and that cardiac causes are considered as part of a differential diagnosis when women present with unexplained symptoms. In such instances, assessors emphasised the need for inquisitiveness and consideration of the whole picture, including women's personal and family history. This also applies to women with mental health issues, where deterioration can be extremely rapid. It is important to recognise decline and conduct an urgent assessment if women present with new symptoms, thoughts or acts of violent self-harm, or expressions of incompetency as a mother or estrangement from the infant.

Key messages to improve care

The majority of recommendations that MBRRACE-UK assessors have identified to improve care are drawn directly from existing guidance or reports and denote areas where implementation of existing guidance needs strengthening. All recommendations based on existing guidance are presented in the relevant chapters of the full, compiled report. Actions needed for which national guidelines are not available are presented below.

New national recommendations to improve care

1. Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation **[ACTION: Maternal Medicine Networks in England and Health Boards in devolved nations]**
2. Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care **[ACTION: Integrated Care Boards and Health Boards]**

3. Update guidelines on the care of women with complex social factors to include clear guidance for a standardised assessment and documentation of social risk factors at booking appointments and at least once more later in pregnancy. In the absence of sufficient evidence to update guidance, commission research to explore the unique care needs of vulnerable populations **[ACTION: National Institute for Health and Care Excellence (NICE) and National Institute for Health and Care Research (NIHR)]**
4. Develop guidance for information sharing within maternity services and across health services and other agencies in the event of safeguarding concerns. Ensure that codes for flagging domestic abuse are applied in women's records and are known to all those caring for her **[ACTION: National Institute for Health and Care Excellence (NICE)]**
5. Ensure specialist perinatal mental health teams undertake a leadership role for the care of pregnant or recently pregnant women with mental health conditions even if women are not accepted for care under their services. This should include a risk assessment, provision of advice and guidance, oversight for joint care planning and support to ensure rapid onward referral into other appropriate mental health services **[ACTION: Integrated Care Boards and Health Boards]**

Conclusions

This report includes the surveillance information for women who died during and after pregnancy in the UK in 2021-23. The maternal mortality rate for this period is non-statistically significantly lower than that reported in 2020-22 but remains higher than that reported in the last complete triennium, 2018-20. It was evident from the care of the women reviewed in the confidential enquires that many women are still falling through the gaps before, during and after pregnancy. As continually emphasised in MBRRACE-UK reports, the maternity population is increasingly complex and any care provided must be holistic and personalised to consider this complexity. This includes appropriate pre-pregnancy counselling, recognition of individual risk factors and development of a care plan that considers all aspects of women's health, not just physical conditions. Multidisciplinary care must continue after pregnancy ends, regardless of how the pregnancy ends or women's involvement with other services. Communication and interagency working remain essential to recognise complexities, coordinate care and prevent future maternal deaths.

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It is with grateful thanks that the MBRRACE-UK collaboration would like to acknowledge the contribution of the many healthcare professionals and staff from the health service and other organisations who were involved in the notification of maternal deaths, the provision of data and the assessment of individual deaths in both the UK and Ireland. Without the generous contribution of their time and expertise it would not have been possible to produce this report. It is only through this collaborative effort that it has been possible to conduct these confidential enquiries and to continue the UK tradition of national self-audit to improve care for women, babies and their families in the future. We would particularly like to thank all MBRRACE-UK lead reporters and other staff in trusts and health boards across the UK and Ireland who provided the information about women who died to enable the enquiries to be conducted.

We would also specifically like to thank Sara Kenyon for her longstanding contributions to the MBRRACE-UK collaboration, from its inception until her retirement in September 2025. Her dedication has been essential in ensuring the programme continues to deliver valuable insights aimed at improving outcomes for women and babies.

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Vicky Robinson, The Miscarriage Association

MBRRACE-UK Royal College and Professional Association Stakeholder Group and Representatives

Royal College of Obstetricians and Gynaecologists
Royal College of Midwives
Royal College of Paediatrics and Child Health
Royal College of Emergency Medicine
Royal College of Psychiatrists
Faculty of Public Health
Royal Society of Medicine
Royal College of Anaesthetists
Obstetric Anaesthetists' Association
Royal College of General Practitioners
Royal College of Nursing
Royal College of Pathologists
British Association of Perinatal Medicine
British Maternal and Fetal Medicine Society

Glossary of terms

BMI	Body mass index
BNP	B-type natriuretic peptide
BP	Blood pressure
CI	Confidence interval
CMACE	Centre for Maternal and Child Enquiries
CPR	Cardiopulmonary resuscitation
COVID-19	Coronavirus disease 2019
CT	Computed tomography
DASH	Domestic Abuse, Stalking and Honour Based Violence
ECG	Electrocardiogram
ESC	The European Society of Cardiology
EUPD	Emotionally unstable personality disorder
FIGO	The International Federation of Gynaecology and Obstetrics
GP	General practitioner
HELLP	Haemolysis, elevated liver enzymes and low platelets
HQIP	Healthcare Quality Improvement Partnership
HSIB	Healthcare Safety Investigation Branch
ICD-MM	International classification of diseases – Maternal mortality
ICU	Intensive care unit
IDVA	Independent Domestic Violence Advisor
IMD	Index of multiple deprivation
IQR	Interquartile range
IV	Intravenous
JRCALC	Joint Royal Colleges Ambulance Liaison Committee
MARAC	Multi-Agency Risk Assessment Conference
MASH	Multi-Agency Safeguarding Hub
MBRRACE-UK	Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK
MBU	Mother and Baby Unit
MCCD	Medical certificate cause of death
MDE Ireland	Maternal Death Enquiry Ireland
MEWS	Maternity Early Warning Score
$MgSO_4$	Magnesium sulphate
MNI-CORP	Maternal, Newborn and Infant Clinical Outcome Review Programme
MNSI	Maternity and Newborn Safety Investigations
MRI	Magnetic resonance imaging
NEWS	National Early Warning Score
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NIMACH	Northern Ireland Maternal and Child Health
NT-proBNP	N-terminal pro-B-type natriuretic peptide
PLGF	Placental growth factor
PMCT	Post-mortem computed tomography
PMH	Perinatal mental health
PMHT	Perinatal mental health team
PTSD	Post-traumatic stress disorder
RCOG	Royal College of Obstetricians and Gynaecologists
RCP	Royal College of Physicians
RCPath	Royal College of Pathologists
RH	Resuscitative hysterotomy
RR	Rate ratio (or relative risk)
RRR	Ratio of relative risks
SADS	Sudden arrhythmic death syndrome
SADS/MNH	Sudden arrhythmic death syndrome with a morphologically normal heart
SIGN	Scottish Intercollegiate Guidelines Network
SSRI	Selective serotonin reuptake inhibitor
VTE	Venous thromboembolism
WHO	World Health Organisation

Contents

1. Introduction and methods

Allison Felker and Marian Knight

1.1 The 2025 Saving Lives, Improving Mothers' Care report

In accordance with funder requirements, the findings of the Maternal, Newborn and Infant Clinical Outcome Review Programme (MNI-CORP), including the MBRRACE-UK Confidential Enquiries into Maternal Deaths and Morbidity are now released as multiple outputs instead of one report as previously produced.

The following outputs have been produced and are available online: ***www.npeu.ox.ac.uk/mbrrace-uk/reports***

1. A Data Brief with basic statistics concerning maternal mortality published online in advance of the reports. In 2025 this includes information on women who died between 2021 and 2023.
2. A State of the Nation report highlighting the key surveillance findings, new national recommendations and selected lessons learned from confidential enquiries. In 2021-23 this includes reviews of the care received by women who died from hypertensive disorders of pregnancy, cardiac disease, mental health-related causes, homicide and accidents and women living in the most deprived areas who did not die but who experienced morbidity.
3. This compiled report, which includes the full data on maternal mortality rates, the characteristics of the women who died and further lessons and quality improvement messages identified in the mortality and morbidity confidential enquiries. Also included in this compiled report are the background, aims and scope of work, details of methods and author lists.

1.2 Key to colour coding

Vignettes concerning the care of women who died are described in blue boxes.

Vignettes concerning the care of women who had severe morbidity but survived are described in purple boxes with the character M in the corner. M

Recommendations based on improvements to care identified by MBRRACE-UK reviewers, for which there is no current national guidance and which have not been noted in previous guidance or MBRRACE-UK reports are shown in purple boxes as below:

NEW National recommendations

New national recommendations are presented in purple boxes.

Clinical messages or multidisciplinary team training messages based on previous recommendations or existing guidance and identified by MBRRACE-UK reviewers as needing emphasis are presented in blue boxes.

Clinical or multidisciplinary team training messages

Clinical or multidisciplinary team training messages to emphasise previous recommendations or existing guidance are presented in blue boxes.

The majority of recommendations included in the report arise from existing national guidance or previous MBRRACE-UK reports. The source of these recommendations is cited within green boxes as below.

All existing guidance requiring improved implementation is presented in green boxes

NICE 2345

All new recommendations and existing recommendations identified by MBRRACE-UK reviewers as frequently needing improvement are highlighted in the key messages section at the start of each chapter. The professional groups who need to take action are indicated alongside new recommendations.

1.3 Terminology

MBRRACE-UK uses the terms ‘mother’ and ‘women’ throughout our reports to refer to those who are planning to become pregnant, are pregnant, or who have given birth. We acknowledge that not all people who are pregnant or give birth identify as women or mothers. It is important that evidence-based care for maternity, perinatal and postnatal health is inclusive and personalised to respect people’s gender identities.

2. Maternal Mortality in the UK 2021-23: Surveillance and Epidemiology

Allison Felker and Marian Knight

2.1 Key surveillance findings

There was a statistically non-significant decrease in the overall maternal death rate in the UK between 2020-22 and 2021-23. When deaths due to COVID-19 were excluded, maternal death rates were similar to corresponding rates in the three previous overlapping triennia encompassing the years of the COVID-19 pandemic (2018-20, 2019-21, 2020-22).

Thrombosis and thromboembolism was the leading cause of maternal death in the UK in 2021-23 during or up to six weeks after the end of pregnancy. Cardiac disease and COVID-19 were the second most common causes of maternal death occurring at equal rates.

Rates for late maternal deaths occurring between six weeks and one year after the end of pregnancy continued to increase and were significantly higher in 2021-23 compared to 2018-20. Maternal suicides were the leading cause of deaths occurring between six weeks and one year after the end of pregnancy. As a whole, deaths from psychiatric causes accounted for 34% of maternal deaths during this period.

Inequalities in maternal mortality remained in 2021-23. Compared to women aged 25-29, women aged 35 or older were nearly two times more likely to die. While the maternal mortality rate for women from Black ethnic backgrounds continued to decrease in 2021-23, there remained a two-fold difference in maternal mortality rates for Black women compared to White women. Asian women also had a slightly increased risk compared to White women. Women living in the most deprived areas continued to have a maternal mortality rate twice that of women living in the least deprived areas.

2.2 Causes and trends

Overall, 284 women died in 2021-23 during pregnancy or within 42 days of the end of pregnancy in the UK. The deaths of 27 women were classified as coincidental. Thus, in this triennium, 257 women died from direct and indirect causes, classified using ICD-MM (World Health Organisation 2012), among 2,004,184 maternities, a UK maternal death rate of 12.82 per 100,000 maternities (95% CI 11.30-14.49). This compares to the rate of 13.56 per 100,000 maternities (95% CI 12.00-15.26) in 2020-22 (rate ratio (RR) 0.95, 95% CI 0.79-1.13, p=0.522). Maternal mortality rates for each of the four UK nations were not significantly different from the overall UK rate, noting that these comparisons have very limited statistical power. As in previous MBRRACE-UK reports, information about deaths from the Republic of Ireland is not included in this chapter and therefore rates and numbers presented here are comparable with all previous reports.

There were 24 deaths directly attributed to COVID-19 infection in 2021, and six in 2022-23. If the 30 deaths directly caused by COVID-19 were excluded, the maternal mortality rate for 2021-23 would be 11.33 per 100,000 maternities (95% CI 9.90-12.90). This is not significantly different from the corresponding rates in the three previous triennia that encompass the years of the COVID-19 pandemic.

Table 2.1 and Figure 2.1 show rolling three-yearly maternal death rates since 2003 classified using ICD-MM. As in last year's report, there was no statistically significant change in maternal death rates between 2003-05 and 2021-23 (RR 0.92, 95% CI 0.77-1.09, p=0.508 for trend in rolling rates over time). This was also true when deaths directly due to COVID-19 were excluded (RR 0.81, 95% CI 0.68-0.97, p=0.079 for trend in rolling rates over time). Similarly, between 2003-05 and 2021-23, there were no statistically significant differences in the rate of direct maternal deaths (RR 0.86, 95% CI 0.67-1.11, p=0.858 for trend in rolling rates over time) or indirect maternal deaths (including deaths due to COVID-19) (RR 0.97, 95% CI 0.77-1.23, p=0.430 for trend in rolling rates over time). If the 30 deaths attributable to COVID-19 were excluded, the indirect maternal death rate in 2021-23 would be significantly lower than in 2003-05 (RR 0.76, 95% CI 0.59-0.98, p=0.001 for trend in rolling rates over time).

The progress towards the ambition to reduce maternal mortality by 50% between 2010 and 2025 in England (Department of Health 2017) can be assessed by comparing maternal death rates between the 2009-11 and 2021-23 triennia. Over this time, maternal mortality increased significantly (RR 1.21, 95% CI 1.01-1.44, p=0.035). If maternal deaths directly due to COVID-19 were excluded, rates between the two periods would be similar with a 7% increase maternal mortality in 2021-23 compared to 2009-11 (RR 1.07, 95% CI 0.88-1.28, p=0.491).

Discrete triennial rates since 2003 are shown in Table 2.2 and Figure 2.2. As this year's report marks the completion of a new triennium, these figures have been updated and show a sustained increase in maternal mortality since 2012-14. Compared to the last complete triennium, 2018-2020, the overall, direct and indirect rates of maternal mortality were higher in 2021-23, but these increases were not statistically significant (RR for overall maternal mortality 1.18, 95% CI 0.98-1.41, p=0.073; RR for direct deaths 1.13, 95% CI 0.86-1.47, p=0.375; RR for indirect deaths 1.22, 95% CI 0.95-1.57, p=0.105). If the nine deaths in 2018-20 and 30 deaths in 2021-23 that were attributable to COVID-19 were excluded, the overall maternal death rate in 2021-23 would remain non-statistically significantly higher than in 2018-2020, but the magnitude of this increase would be reduced (RR 1.08, 95% CI 0.89-1.31, p=0.405). There was no difference in the rate of indirect maternal death between 2018-20 and 2021-23 when deaths due to COVID-19 were excluded (RR 1.04, 95% CI 0.77-1.37, p=0.775).

Table 2.1: Three-year rolling average direct and indirect maternal mortality rates per 100,000 maternities, deaths classified using ICD-MM, UK 2003-23 (illustrated in Figure 2.1)

3-year period	Total UK maternities	Direct deaths			Indirect deaths			Total direct and indirect deaths		
		n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2003-05	2,114,004	143	6.76	5.70 - 7.97	152	7.19	6.09 - 8.43	295	13.95	12.45 – 15.64
2004-06	2,165,909	124	5.73	4.76 - 6.83	148	6.83	5.78 - 8.03	272	12.56	11.15 – 14.14
2005-07	2,220,979	120	5.40	4.48 - 6.46	139	6.26	5.26 - 7.39	259	11.66	10.32 – 13.17
2006-08	2,291,493	120	5.24	4.34 - 6.26	141	6.15	5.18 - 7.26	261	11.39	10.09 – 12.86
2007-09	2,331,835	112	4.80	3.95 - 5.78	142	6.09	5.13 - 7.18	254	10.89	9.59 - 12.32
2008-10	2,366,082	99	4.18	3.40 - 5.09	162	6.85	5.83 - 7.99	261	11.03	9.73 - 12.45
2009-11	2,379,014	90	3.78	3.04 - 4.65	163	6.85	5.84 - 7.99	253	10.63	9.36 – 12.03
2010-12	2,401,624	89	3.71	2.98 - 4.56	154	6.41	5.44 - 7.51	243	10.12	8.89 – 11.47
2011-13	2,373,213	83	3.50	2.79 - 4.34	131	5.52	4.62 - 6.55	214	9.02	7.85 – 10.31
2012-14	2,341,745	81	3.46	2.75 – 4.30	119	5.08	4.21 – 6.08	200	8.54	7.40 – 9.81
2013-15	2,305,920	88	3.82	3.06 – 4.70	114	4.94	4.08 – 5.94	202	8.76	7.59 – 10.05
2014-16	2,301,628	98	4.26	3.46 – 5.19	127	5.52	4.60 – 6.57	225	9.78	8.54 – 11.14
2015-17	2,280,451	87	3.82	3.06 – 4.71	122	5.35	4.44 – 6.39	209	9.16	7.96 – 10.50
2016-18	2,235,159	92	4.12	3.32 – 5.05	125	5.59	4.66 – 6.66	217	9.71	8.46 – 11.09
2017-19	2,173,810	78	3.59	2.84 – 4.48	113	5.20	4.28 – 6.25	191	8.79	7.58 – 10.12
2018-20	2,101,829	109	5.19	4.26 – 6.26	120	5.71	4.73 – 6.83	229	10.90	9.53 – 12.40
2019-21	2,066,997	113	5.47	4.51 – 6.57	128	6.19	5.17 - 7.36	241	11.66	10.23 – 13.23
2020-22	2,028,543	129	6.36	5.31 – 7.56	146	7.20	6.08 - 8.46	275	13.56	12.00 - 15.26
2021-23	2,004,184	117	5.84	4.83 – 7.00	140	6.99	5.88 – 8.24	257	12.82	11.30 – 14.49

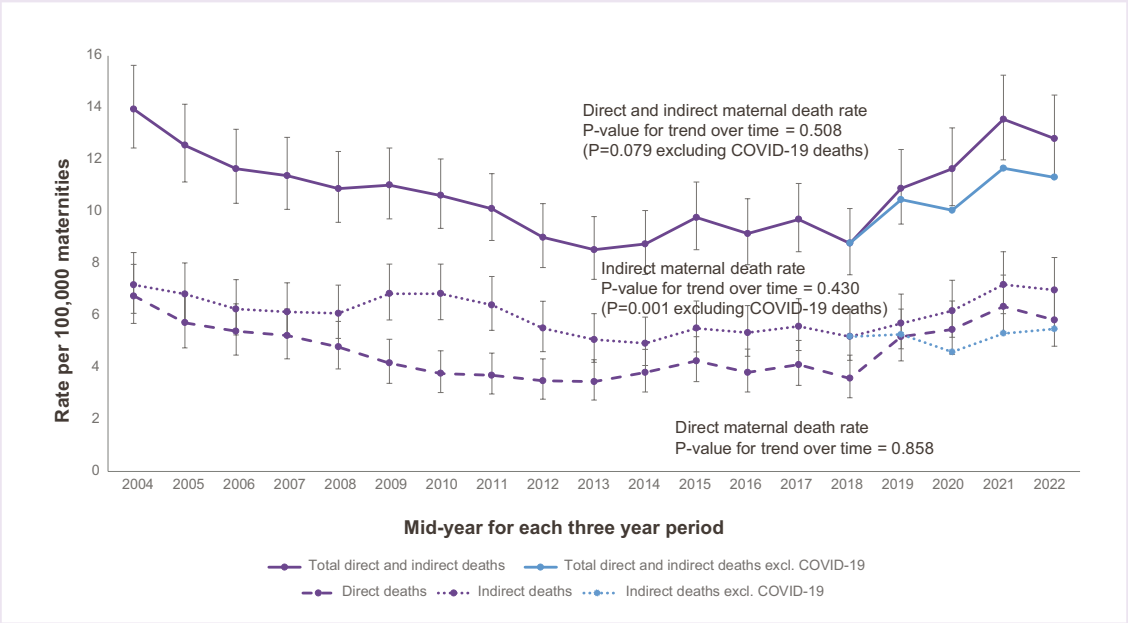
Sources: CMACE, MBRRACE-UK, Office for National Statistics, General Register Office for Scotland, National Records of Scotland, Northern Ireland Statistics and Research Agency

Table 2.2: Direct and Indirect maternal mortality rates per 100,000 maternities by discrete triennia, deaths classified using ICD-MM, UK 2003-23 (illustrated in Figure 2.2)

Triennium	Direct deaths			Indirect deaths			Total direct and indirect deaths		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2003–05	143	6.76	5.70 - 7.97	152	7.19	6.09 - 8.43	295	13.95	12.45 - 15.64
2006–08	120	5.24	4.34 - 6.26	141	6.15	5.18 - 7.26	261	11.39	10.09 - 12.86
2009-11	90	3.78	3.04 - 4.65	163	6.85	5.84 - 7.99	253	10.63	9.36 - 12.03
2012–14	81	3.46	2.75 - 4.30	119	5.08	4.21 - 6.08	200	8.54	7.40 - 9.81
2015-17	87	3.82	3.06 - 4.71	122	5.35	4.44 - 6.39	209	9.16	7.96 - 10.50
2018-20	109	5.19	4.26 - 6.26	120	5.71	4.73 - 6.83	229	10.90	9.53 - 12.40
2021-23	117	5.84	4.83 – 7.00	140	6.99	5.88 – 8.24	257	12.82	11.30 – 14.49

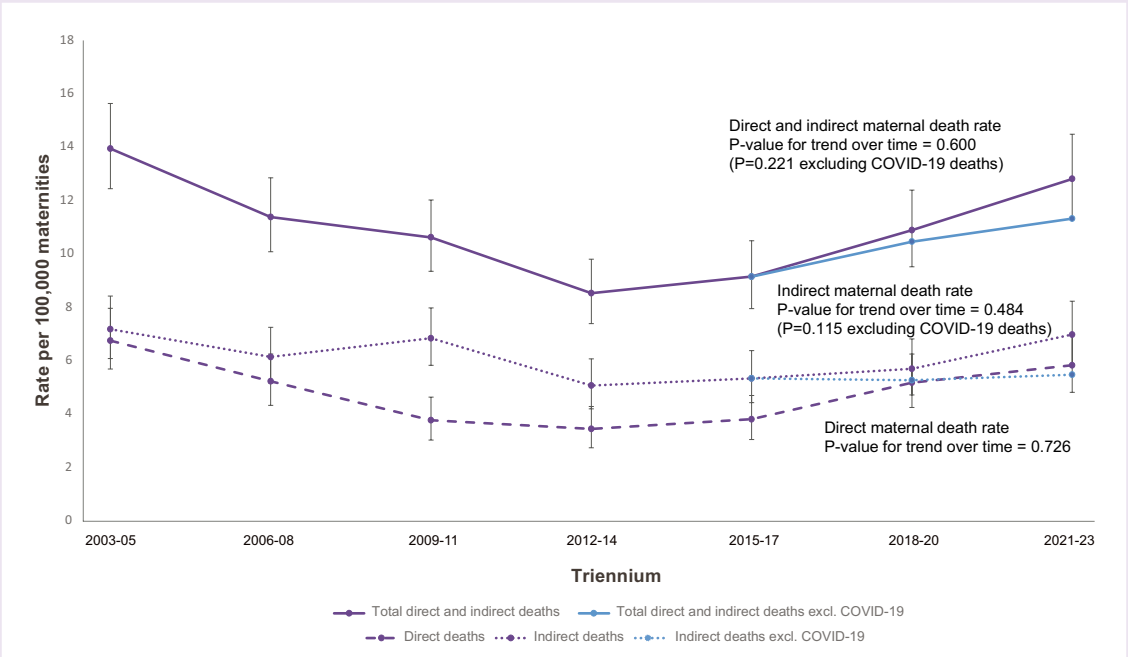
Sources: MBRRACE-UK, Office for National Statistics, General Register Office for Scotland, National Records of Scotland, Northern Ireland Statistics and Research Agency

Figure 2.1: Three-year rolling average direct and indirect maternal mortality rates per 100,000 maternities, deaths classified using ICD-MM and previous UK classification systems, UK 2003-23



Sources: CMACE, MBRRACE-UK

Figure 2.2: Direct and Indirect maternal mortality rates per 100,000 maternities by discrete triennia, deaths classified using ICD-MM, UK 2003-23



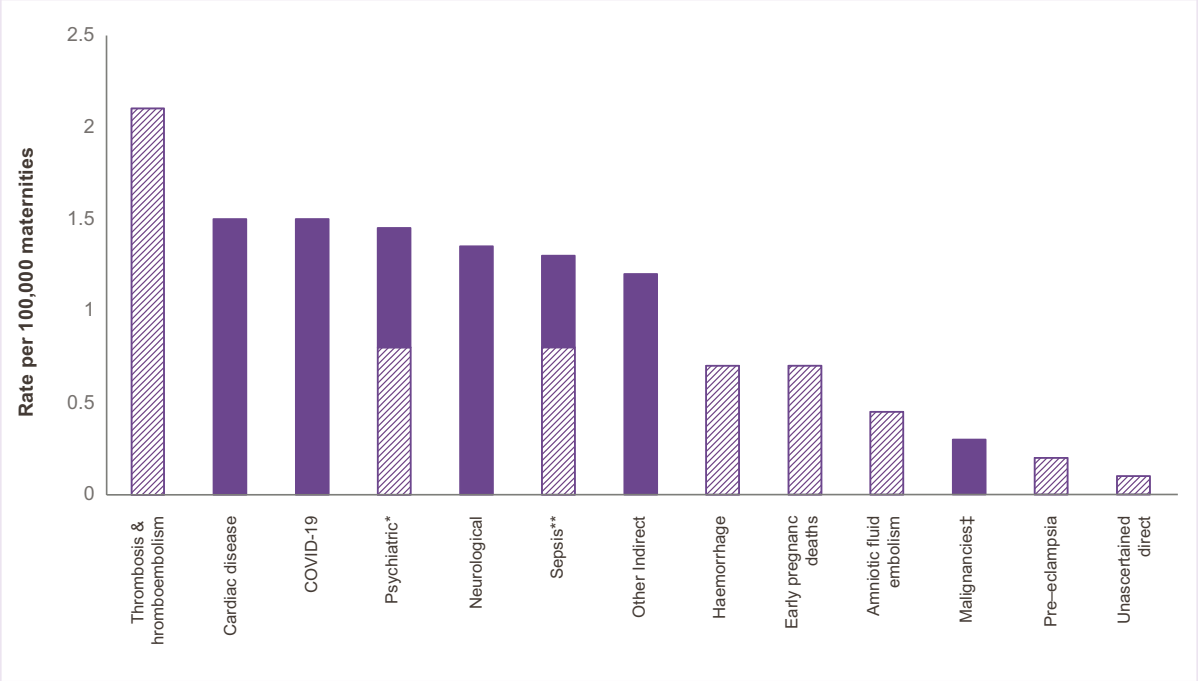
Sources: CMACE, MBRRACE-UK

Deaths due to individual causes

Maternal mortality rates by cause in the 2021-23 triennium are shown in Figure 2.3. For comparison, rolling three-year rates for individual causes are presented for five overlapping triennial reporting periods (2017-19, 2018-20, 2019-21, 2020-22 and 2021-23) in Table 2.3 and for five discrete, non-overlapping triennial periods (2009-11, 2012-14, 2015-17, 2018-20 and 2021-23) in Figure 2.4 and Table 2.4. As this report is the first in a new three-year cycle, Table 2.4 has been updated from the 2024 report. In order to more accurately compare rates of maternal deaths from specific causes, earlier years predating MBRRACE-UK reporting have been dropped from this table; these rates are still available in previous MBRRACE-UK reports.

Causes of maternal death classified according to ICD-MM subgroups are presented for 2021-23 in Figure 2.5 and as three-year rolling rates for overlapping triennia in Table 2.5.

Figure 2.3: Maternal mortality rates by cause per 100,000 maternities, UK 2021-23



Hatched bars show direct causes of death, solid bars indicate indirect causes of death

*Rate for suicides (direct) is shown in hatched and rate for indirect psychiatric causes (drugs/alcohol) in solid bar

**Rate for direct sepsis (genital tract sepsis and other pregnancy-related infections) is shown in hatched and rate for indirect sepsis (influenza, pneumonia, others) in solid bar

‡Rate for indirect malignancies (breast/ovary/cervix)

Source: MBRRACE-UK

Table 2.3: Maternal mortality rates per 100,000 maternities, by cause and overlapping triennia, UK 2017-23

	2017-19			2018-20			2019-21			2020-22			2021-23		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
All Direct and Indirect deaths	191	8.79	7.58 – 10.12	229	10.90	9.53 – 12.40	241	11.66	10.23 – 13.23	275	13.56	12.00 - 15.26	257	12.82	11.30 – 14.49
Direct deaths															
Pregnancy-related infections - Sepsis*	13	0.60	0.32 - 1.02	17	0.81	0.47 - 1.29	15	0.73	0.41 – 1.20	18	0.89	0.53 - 1.40	16	0.80	0.46 – 1.30
Pre-eclampsia and eclampsia	6	0.28	0.10 – 0.60	8	0.38	0.16 – 0.75	9	0.44	0.20 – 0.83	7	0.35	0.14 – 0.71	4	0.20	0.05 – 0.51
Thrombosis and thromboembolism	20	0.92	0.56 – 1.42	29	1.38	0.92 – 1.98	33	1.60	1.10 – 2.24	43	2.12	1.53 - 2.86	42	2.10	1.51 – 2.83
Amniotic fluid embolism	7	0.32	0.13 – 0.66	9	0.43	0.20 – 0.81	8	0.39	0.17 – 0.76	8	0.39	0.17 – 0.78	9	0.45	0.21 – 0.85
Early pregnancy deaths	7	0.32	0.13 – 0.66	9	0.43	0.20 – 0.81	14	0.68	0.37 – 1.14	15	0.74	0.41 - 1.22	14	0.70	0.38 – 1.17
Haemorrhage	14	0.64	0.35 – 1.08	16	0.76	0.44 – 1.24	17	0.82	0.48 – 1.32	18	0.89	0.53 - 1.40	14	0.70	0.38 – 1.17
Anaesthesia	1	0.05	0.001 – 0.26	1	0.05	0.001 – 0.27	1	0.05	0.001 – 0.27	-	-	-	-	-	-
Psychiatric causes - Suicides	10	0.46	0.22 – 0.85	20	0.95	0.58 – 1.47	16	0.77	0.44 – 1.26	18	0.89	0.53 – 1.40	16	0.80	0.46 – 1.30
Malignancy - Direct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unascertained - Direct	-	-	-	-	-	-	-	-	-	2	0.10	0.01 – 0.34	2	0.10	0.01 – 0.36
All Direct deaths	78	3.59	2.84 – 4.48	109	5.19	4.26 – 6.26	113	5.47	4.51 – 6.57	129	6.36	5.31 – 7.56	117	5.84	4.83 – 7.00
Indirect deaths															
Cardiac disease	36	1.66	1.16 – 2.29	34	1.62	1.12 – 2.26	33	1.60	1.01 – 2.24	36	1.77	1.24 - 2.46	30	1.50	1.01 - 2.14
Indirect sepsis – Influenza	2	0.09	0.01 – 0.33	2	0.10	0.01 – 0.34	1	0.05	0.001 – 0.27	1	0.05	0.001 - 0.28	1	0.05	0.001 – 0.28
Indirect sepsis – Pneumonia/ others	8	0.37	0.16 – 0.73	6	0.29	0.11 – 0.62	7	0.34	0.14 – 0.70	6	0.30	0.11 - 0.64	9	0.45	0.21 – 0.85
Indirect sepsis – COVID-19	-	-	-	9	1.60	0.73 – 3.04	33	2.64	1.82 – 3.71	38	1.98	1.40 – 2.72	30	1.50	1.01 – 2.14
Other indirect causes	19	0.87	0.53 – 1.36	24	1.14	0.73 – 1.70	19	0.92	0.55 – 1.44	20	0.99	0.60 - 1.52	24	1.20	0.77 – 1.78
Indirect neurological conditions	33	1.52	1.04 – 2.13	27	1.28	0.85 – 1.87	22	1.06	0.67 – 1.61	25	1.23	0.80 - 1.82	27	1.35	0.88 – 1.96
Psychiatric causes – Drugs/alcohol/others	10	0.46	0.22 – 0.85	14	0.67	0.36 – 1.12	9	0.44	0.20 – 0.83	13	0.64	0.34 – 1.10	13	0.65	0.35 – 1.11
Indirect malignancies	5	0.23	0.07 – 0.54	4	0.19	0.05 – 0.49	4	0.19	0.05 – 0.50	7	0.35	0.14 – 0.71	6	0.30	0.11 – 0.65
All Indirect deaths	113	5.20	4.28 – 6.25	120	5.71	4.73 – 6.83	128	6.19	5.17 – 7.36	146	7.20	6.08 - 8.46	140	6.99	5.88 – 8.24
Coincidental deaths															
Homicide	4	0.18	0.05 – 0.47	4	0.19	0.05 – 0.49	5	0.24	0.08 – 0.57	6	0.30	0.11 – 0.64	7	0.35	0.14 – 0.72
Other coincidental deaths	16	0.74	0.42 – 1.20	14	0.67	0.36 – 1.12	15	0.73	0.41 – 1.20	15	0.74	0.41 – 1.22	20	1.00	0.61 – 1.54
All coincidental deaths	20	0.92	0.56 – 1.42	18	0.86	0.51 – 1.35	20	0.97	0.56 – 1.49	21	1.04	0.64 – 1.58	27	1.35	0.89 – 1.96
Late deaths	284	13.06	11.59 – 14.68	289	13.75	12.21 – 15.43	311	15.05	13.42 – 16.81	329	16.22	14.51 - 18.07	327	16.32	14.60 – 18.81

*Deaths due to genital/urinary tract sepsis, including early pregnancy deaths as a result of genital/urinary tract sepsis. Other deaths from infectious causes are classified under indirect causes.

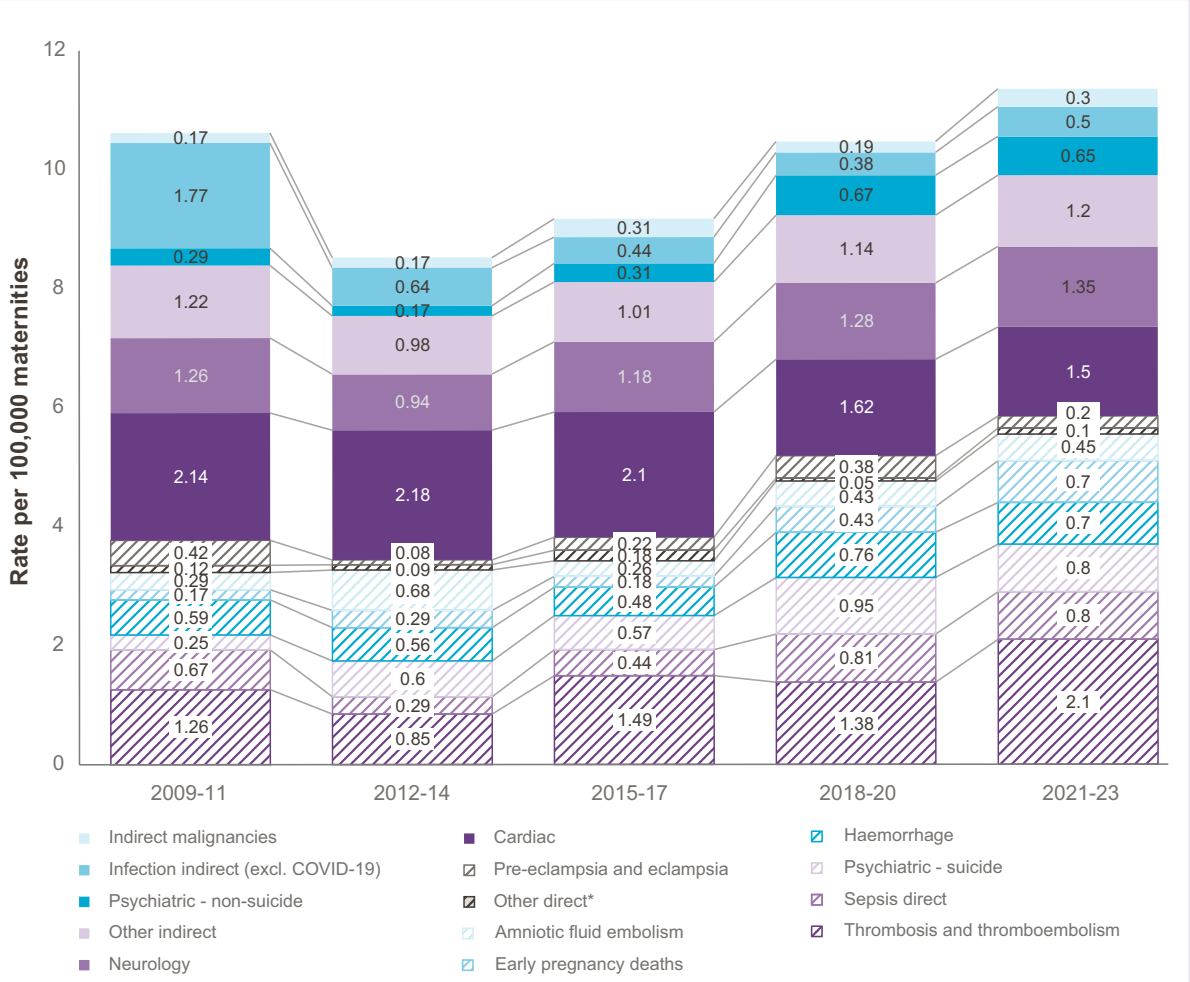
Source: MBRRACE-UK, Office for National Statistics, National Records Scotland, Northern Ireland Statistics and Research Agency

Table 2.4: Maternal mortality rates per 100,000 maternities, by cause and discrete triennia, UK 2009-23 (illustrated in Figure 2.4)

	2009-11			2012-14			2015-17			2018-20			2021-23		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
All Direct and Indirect deaths	253	10.63	9.36 – 12.03	200	8.54	7.40 – 9.81	209	9.16	7.96 – 10.50	229	10.90	9.53 – 12.40	257	12.82	11.30 – 14.49
Direct deaths															
Pregnancy-related infections - Sepsis*	16	0.67	0.38 – 1.09	7	0.29	0.12 – 0.61	10	0.44	0.21 – 0.81	17	0.81	0.47 - 1.29	16	0.80	0.46 – 1.30
Pre-eclampsia and eclampsia	10	0.42	0.20 – 0.77	2	0.08	0.01 – 0.31	5	0.22	0.07 – 0.51	8	0.38	0.16 – 0.75	4	0.20	0.05 – 0.51
Thrombosis and thromboembolism	30	1.26	0.85 – 1.80	20	0.85	0.52 – 1.32	34	1.49	1.03 – 2.08	29	1.38	0.92 – 1.98	42	2.10	1.51 – 2.83
Amniotic fluid embolism	7	0.29	0.12 – 0.61	16	0.68	0.39 – 1.11	6	0.26	0.10 – 0.57	9	0.43	0.20 – 0.81	9	0.45	0.21 – 0.85
Early pregnancy deaths	4	0.17	0.05 – 0.43	7	0.29	0.12 – 0.61	4	0.18	0.05 - 4.49	9	0.43	0.20 – 0.81	14	0.70	0.38 – 1.17
Haemorrhage	14	0.59	0.32 – 0.99	13	0.56	0.29 – 0.95	11	0.48	0.24 – 0.86	16	0.76	0.44 – 1.24	14	0.70	0.38 – 1.17
Anaesthesia	3	0.12	0.03 – 0.37	2	0.09	0.01 – 0.31	1	0.04	0.001 – 0.24	1	0.05	0.001 – 0.27	-	-	-
Psychiatric causes - Suicides	6	0.25	0.09 – 0.55	14	0.60	0.33 – 1.00	13	0.57	0.30 – 0.98	20	0.95	0.58 – 1.47	16	0.80	0.46 – 1.30
Malignancy - Direct	-	-	-	-	-	-	1	0.04	0.001 – 0.24	-	-	-	-	-	-
Other direct	-	-	-	-	-	-	2	0.09	0.01 – 0.32	-	-	-	2	0.10	0.01 – 0.36
All direct deaths	90	3.78	3.04 – 4.65	81	3.46	2.75 – 4.30	87	3.82	3.06 – 4.71	109	5.19	4.26 – 6.26	117	5.84	4.83 – 7.00
Indirect deaths															
Cardiac disease	51	2.14	1.60 – 2.82	51	2.18	1.62 – 2.86	48	2.10	1.55 – 2.79	34	1.62	1.12 – 2.26	30	1.50	1.01 - 2.14
Indirect sepsis – Influenza	27	1.13	0.75 – 1.65	1	0.04	0.001 – 0.24	1	0.04	0.001 – 0.24	2	0.10	0.01 – 0.34	1	0.05	0.001 – 0.28
Indirect sepsis – Pneumonia/others	15	0.63	0.35 – 1.04	14	0.60	0.33 – 1.00	9	0.39	0.18 – 0.75	6	0.29	0.11 – 0.62	9	0.45	0.21 - 0.85
Other indirect causes	29	1.22	0.82 – 1.75	23	0.98	0.62 – 1.47	23	1.01	0.64 – 1.51	24	1.14	0.73 – 1.70	24	1.20	0.77 - 1.78
Indirect neurological conditions	30	1.26	0.85 – 1.80	22	0.94	0.59 – 1.42	27	1.18	0.78 – 1.72	27	1.28	0.85 – 1.87	27	1.35	0.88 – 1.96
Psychiatric causes – Drugs/alcohol/others	7	0.29	0.12 – 0.61	4	0.17	0.05 – 0.44	7	0.31	0.12 – 0.63	14	0.67	0.36 – 1.12	13	0.65	0.35 – 1.11
Indirect malignancies	4	0.17	0.05 – 0.45	4	0.17	0.05 – 1.44	7	0.31	0.12 – 0.63	4	0.19	0.05 – 0.49	6	0.30	0.11 – 0.65
All Indirect deaths	163	6.85	5.84 – 7.99	119	5.08	4.21 – 6.08	122	5.35	4.44 – 6.39	120	5.71	4.73 – 6.83	140	6.99	5.88 – 8.24
Coincidental deaths	23	0.98	0.61 – 1.45	41	1.75	1.26 – 2.38	27	1.18	0.78 – 1.72	18	0.86	0.51 – 1.35	27	1.35	0.89 – 1.96

*Deaths due to genital/urinary tract sepsis, including early pregnancy deaths as a result of genital/urinary tract sepsis. Other deaths from infectious causes are classified under indirect causes.

Figure 2.4: Maternal mortality rates per 100,000 maternities, by cause and discrete triennia, UK 2009-23



Hatched bars show direct causes of death, solid bars indicate indirect causes of death

*Other direct causes of death include deaths due to anaesthesia, direct malignancy and unascertained direct causes

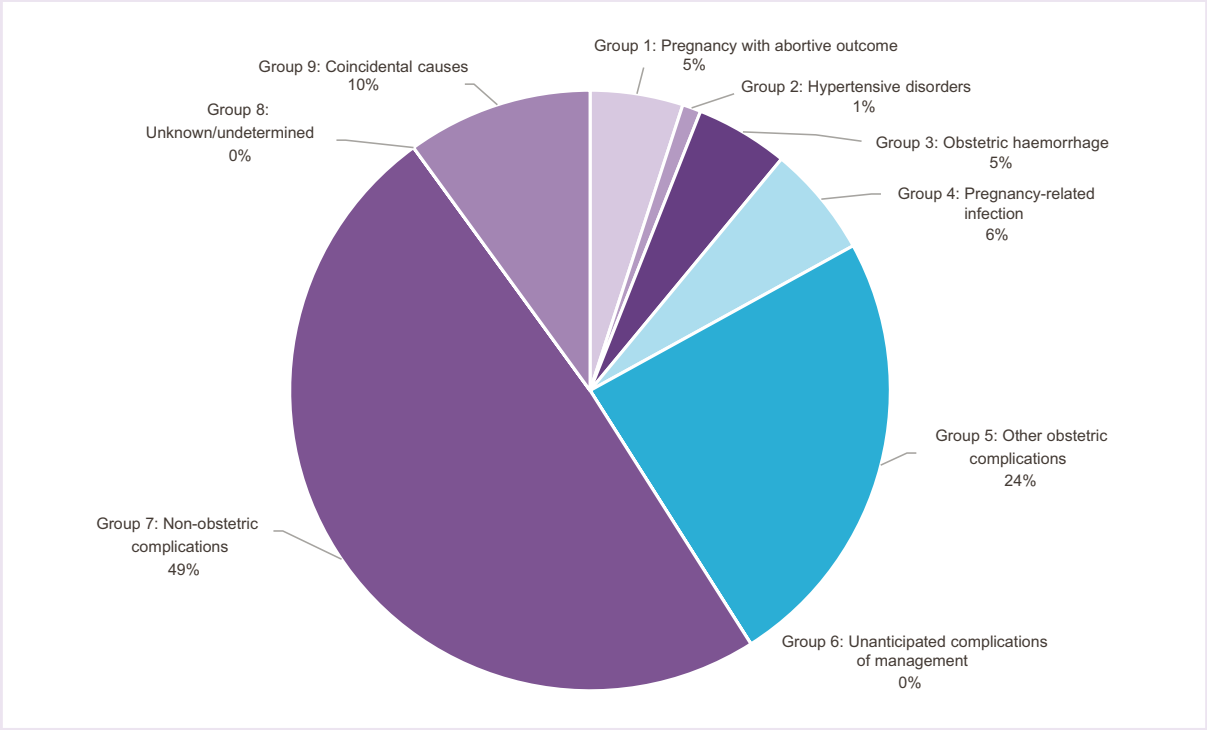
Source: MBRRACE-UK

Table 2.5: Maternal mortality rates per 100,000 maternities, by cause and overlapping triennia, causes of death classified using ICD-MM, UK 2017-23

Cause of death	2017-19			2018-20			2019-21			2020-22			2021-23		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
Direct causes															
Group 1: Pregnancy with abortive outcome	7	0.32	0.13 – 0.66	9	0.43	0.20 – 0.81	14	0.68	0.37 – 1.14	15	0.74	0.41 - 1.22	14	0.70	0.38 – 1.17
Group 2: Hypertensive disorders	6	0.28	0.10 – 0.60	8	0.38	0.16 – 0.75	9	0.44	0.20 – 0.83	7	0.35	0.14 - 0.71	4	0.20	0.05 – 0.51
Group 3: Obstetric haemorrhage	14	0.64	0.35 – 1.08	16	0.76	0.44 – 1.24	17	0.82	0.48 – 1.32	18	0.89	0.53 - 1.40	14	0.70	0.38 – 1.17
Group 4: Pregnancy-related infection	13	0.60	0.32 – 1.02	17	0.81	0.47 - 1.29	15	0.73	0.41 – 1.20	18	0.88	0.53 - 1.40	16	0.80	0.46 – 1.30
Group 5: Other obstetric complications	37	1.70	1.20 – 2.35	58	2.76	2.10 – 3.57	57	2.76	2.09 – 3.57	71	3.50	2.73 - 4.41	69	3.44	2.68 – 4.36
Group 6: Unanticipated complications of management	1	0.05	0.001 – 0.26	1	0.05	0.001 – 0.27	1	0.05	0.001 – 0.27	-	-	-	-	-	-
Indirect causes															
Group 7: Non-obstetric complications	113	5.20	4.28 – 6.25	120	5.71	4.73 – 6.83	128	6.19	5.17 – 7.36	146	7.20	6.08 - 8.46	140	6.99	5.88 – 8.24
Group 8: Unknown/ undetermined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coincidental causes															
Group 9: Coincidental causes	20	0.92	0.56 – 1.42	18	0.86	0.51 – 1.35	20	0.97	0.56 - 1.49	21	1.04	0.64 - 1.58	27	1.35	0.89 – 1.96

Source: MBRRACE-UK, Office for National Statistics, National Records Scotland, Northern Ireland Statistics and Research Agency

Figure 2.5: Proportion of maternal deaths by cause, classified using ICD-MM, UK 2021-23



Direct deaths

Thrombosis and thromboembolism (VTE) continued to be the leading cause of direct maternal deaths occurring during or within 42 days of the end of pregnancy in 2021-23 (Figure 2.3 and Table 2.3). The mortality rate from VTE remains unchanged from last year's report and was more than twice that of any other direct cause in 2021-23. The rate of maternal deaths due to VTE was 52% higher in 2021-23 than in 2018-20, the last complete triennium, though this increase is not statistically significant (RR 1.52, 95% CI 0.92-2.53, p=0.083).

After thrombosis and thromboembolism, suicide and pregnancy-related sepsis were the next most frequent direct causes of maternal deaths in 2021-23 occurring at equal rates (0.80 per 100,000 maternities (95% CI 0.46-1.30)). Note that, as described in previous reports, the majority of maternal deaths due to suicide occured between six weeks and a year after pregnancy suggesting that the improvements to care identified in Chapter 6 require ongoing consideration. The marginal increases in the rates of sepsis, suicide, obstetric haemorrhage and early pregnancy deaths observed in last year's report did not continue in 2021-23 (Table 2.3); there was; no statistically significant difference in the rate of maternal death due to these causes in 2021-23 compared to last year's report (2020-22) or the last complete triennium (2018-20).

The maternal death rate from pre-eclampsia and eclampsia was non-significantly decreased in 2021-23 compared to 2020-22 and 2018-20. Lessons for the care of women who died from pre-eclampsia and eclampsia are described in Chapter 3 of this report. Rates due to amniotic fluid embolism were non-significantly increased in 2021-23 compared to previous triennia and no deaths due to anaesthetic causes were identified in 2021-23 (Table 2.3).

Indirect deaths

Deaths due to indirect causes comprised just over half (54%) of direct and indirect maternal deaths in the UK in 2021-23. Cardiac disease and COVID-19 were the leading causes of indirect maternal death in 2021-23, each with a maternal mortality rate of 1.50 per 100,000 maternities (95% CI 1.01-2.14)(Figure 2.3 and Table 2.3). There was a decrease in the maternal mortality rate from cardiac disease since enhanced case ascertainment was introduced (2003-05) but this was not statistically significant (RR 0.66, 95% CI 0.40-1.06, p=0.072). After an observed increase in 2020-22, the rate of maternal deaths due to cardiac disease was non-significantly lower in 2021-23 than 2018-20 (RR 0.93, 95% CI 0.55-1.56, p=0.760) indicating a continuation of the downward trend observed in previous overlapping triennia (Table 2.3). The lessons for the care of women with cardiac disease described in Chapter 5 remain imperative for a continued reduction in maternal deaths.

The rate of maternal death due to COVID-19 continued to decline and, in 2021-23, was significantly reduced from its peak in 2019-21 (RR 0.57, 95% CI 0.33-0.96, p=0.026)(Table 2.3).

The third most common indirect cause of maternal death in the 2021-23 triennium were neurological conditions followed by deaths due to other indirect causes. Rates of maternal deaths due to these causes were increased in 2021-23 compared to 2020-22, but not significantly so. Rates of maternal deaths due to other psychiatric causes have been consistent across previous triennia and were the fifth leading cause of indirect maternal death in 2021-23 (Table 2.3). However, as for deaths due to suicide and as highlighted in Chapter 6, the majority of deaths due to substance use occurred between six weeks and a year after pregnancy.

International comparison

For international comparison, the maternal mortality ratios estimated for the UK using routinely reported data are presented in Table 2.6. As this report is the first in a three-year cycle, this table has been updated with a new maternal mortality ratio for 2021-23. As in 2018-20, the rate estimate from routine sources of data is much lower (just over half) than the actual rates as identified through MBRRACE-UK, which uses multiple sources of death identification. This emphasises the importance of the additional case identification and checking undertaken by the MBRRACE-UK team to give an accurate maternal mortality estimate.

Table 2.6: Maternal mortality ratios* per 100,000 live births, calculated based on deaths identified from routine sources of data, UK 1985-23

Triennium	No. of deaths identified through death certificates	Maternal mortality ratio	95% CI	Denominator number of live births
1985-87	2,268,766	174	7.67	6.61 - 8.90
1988-90	2,360,309	171	7.24	6.24 - 8.42
1991-93	2,315,204	150	6.48	5.52 - 7.60
1994-96	2,197,640	158	7.19	6.15 - 8.40
1997-99	2,123,614	128	6.03	5.70 - 7.17
2000-02	1,997,472	136	6.81	5.76 - 8.05
2003-05	2,114,004	149	7.05	6.00 - 8.27
2006-08	2,291,493	155	6.76	5.78 - 7.92
2009-11	2,405,251	134	5.57	4.67 - 6.60
2012-14	2,368,125	110	4.65	3.82 - 5.60
2015-17	2,317,363	95	4.10	3.32 - 5.01
2018-20	2,136,242	129	6.04	5.04 - 7.18
2021-23	2,030,431	140	6.90	5.80 – 8.14

*For the purposes of international comparison, this table reports the maternal mortality ratio per 100,000 live births and not the maternal mortality rate per 100,000 maternities (including live births and stillbirths) as elsewhere in the report

Sources: Office for National Statistics, General Register Office for Scotland, National Records of Scotland, Northern Ireland Statistics and Research Agency .

Women who died between six weeks and one year after the end of pregnancy

Rolling triennial rates of late maternal deaths are shown in Figure 2.6 and causes of late maternal deaths in Figure 2.7. In the triennium 2021-23, 327 women died between six weeks and one year after the end of pregnancy, representing a mortality rate of 16.32 per 100,000 maternities (95% CI 14.60-18.81). This compares to a late pregnancy-associated mortality rate of 13.66 per 100,000 maternities in 2009-11, the first MBRRACE-UK confidential enquiry report (RR 1.19, 95% CI 1.02-1.40, p=0.080 for trend in rolling rates over time). The rate of late deaths has been consistently rising across the previous overlapping triennia, and was significantly increased in 2021-23 compared to 2018-20 (RR 1.19 95% CI 1.01-1.39, p=0.034). Maternal suicides were the leading cause of deaths occurring between six weeks and one year after the end of pregnancy, surpassing deaths due to other psychiatric causes (Figure 2.7). As a whole, deaths from psychiatric causes accounted for 34% of maternal deaths during this period emphasising the importance of the lessons for mental health care illustrated in Chapter 6 of this report.

Figure 2.6: Rates of maternal deaths occurring between six weeks and one year after the end of pregnancy, UK 2009-23

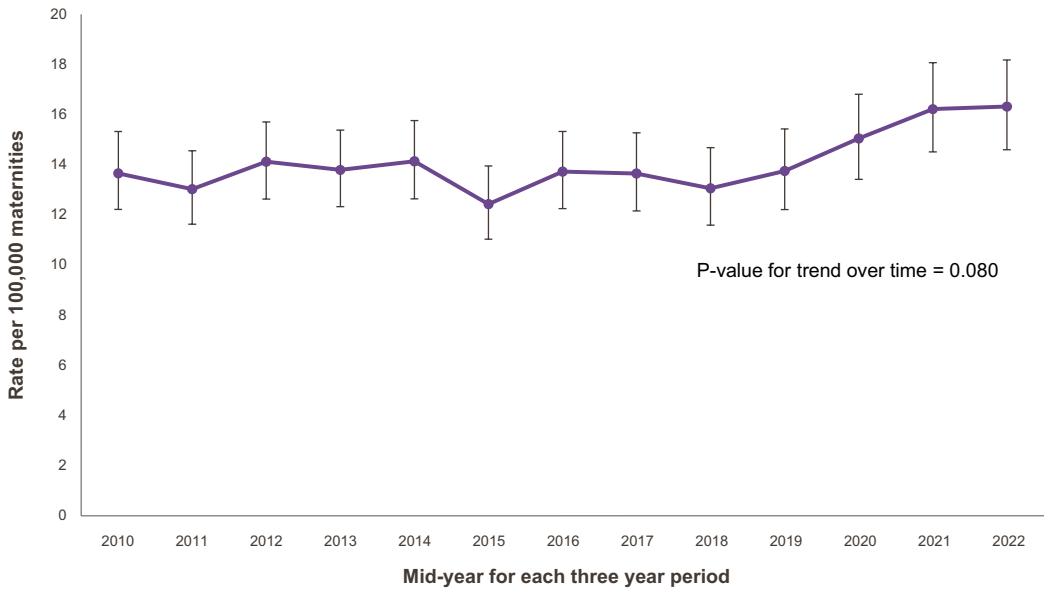
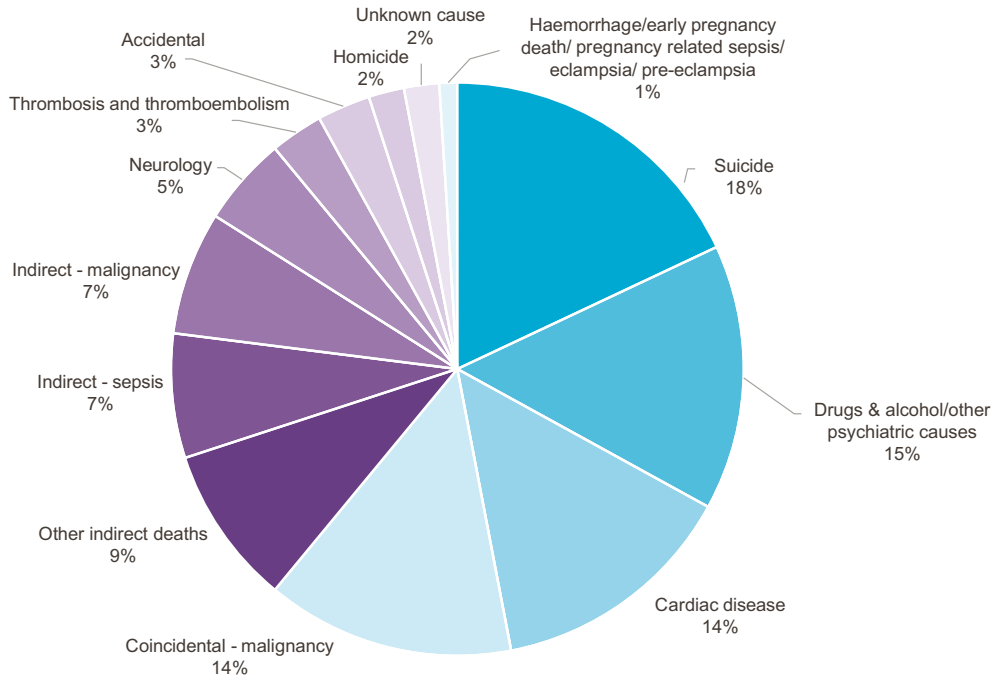


Figure 2.7: Proportion of maternal deaths by cause, amongst women who died between six weeks and one year after the end of pregnancy, UK 2021-23



2.3 The characteristics of women who died 2021-23

The women and babies

Of the 257 women who died from direct and indirect causes during or up to 42 days after the end of their pregnancy in 2021-23, 31% (80 women) were still pregnant at the time of their death. Of these women, 56 (70%) died while they were ≤20 weeks' pregnant. There were 177 women who were not pregnant at the time of their death, the majority of whom died 1-41 days after delivery or pregnancy loss (n=124)(Table 2.7).

Table 2.7: Timing of direct and indirect maternal deaths in relation to pregnancy, UK 2021-23

Timing of death	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Total (n=257) Frequency (%)
Antenatal period			
≤20 weeks	35 (30)	21 (15)	56 (22)
>20 weeks	3 (3)	21 (15)	24 (9)
On day of delivery or pregnancy loss	34 (29)	19 (14)	53 (21)
1 to 41 days after the end of pregnancy	45 (38)	79 (56)	124 (48)

Of the 177 women who were not pregnant at the time of their death, 32 (18%) experienced a pregnancy loss at ≤20 weeks' gestation. The remaining 145 women gave birth to 149 infants. Of these infants, 96 survived and 53 died (34 babies were stillborn and 19 died in the neonatal period). The 257 women who died in 2021-23 left behind a further 375 children from previous pregnancies. Thus, a total of 471 motherless children remain. The majority of the 145 women who gave birth did so in hospital (81%). A further 9% of women gave birth in an emergency department or an ambulance and 10% gave birth at home (Table 2.8).

Of the 145 women who gave birth at ≥20 weeks' gestation, 113 (78%) had a caesarean birth, thirty-five of which were a resuscitative hysterotomy (RH) performed as part of attempted resuscitation of the woman. There were a total of 38 babies born following a RH, of which 17 (45%) were born after 32 weeks' gestation. Seven out of the 17 babies born after 32 weeks' gestation survived (five were stillborn and five died in the neonatal period). Of the 21 babies delivered at 32 weeks' gestation or less, 3 survived, 11 were stillborn and 7 died in the neonatal period. Thus, of all 38 babies born following a RH, 10 (26%) survived, 16 (42%) were stillborn and 12 (32%) died in the neonatal period.

Table 2.8: Place of childbirth amongst women who died after giving birth at ≥20 weeks' gestation, UK 2021-23

Place of childbirth	Direct (n=63) Frequency (%)	Indirect (n=82) Frequency (%)	Total (n=145) Frequency (%)
Home	8 (13)	7 (9)	15 (10)
Hospital (except emergency department)	51 (81)	66 (80)	117 (81)
Emergency department or ambulance	4 (6)	9 (11)	13 (9)

Sociodemographic characteristics

The sociodemographic characteristics of women who died in 2021-23 are shown in Table 2.9.

The majority of women who died were over age 30, not in their first pregnancy and were from White ethnic backgrounds. The highest proportion of the women who died lived in the most deprived areas and for most women, they or their partners were employed and they were living with their partner. Almost all the women who died were able to speak or understand English.

Over a fifth of women who died in 2021-23 (22%), and whose place of birth was known, were born outside the UK. Women who died and who were born abroad were primarily from Asia (n=22, 41%, largely Pakistan and India), Africa (n=16, 30%, in particular Nigeria, South Africa, Ghana and the Democratic Republic of the Congo) and Eastern Europe (n=8, 15%, predominantly Poland, Slovakia and Lithuania) with the remainder (n=8, 15%) from other parts of Europe, the Americas, Australasia and the Caribbean (Table 2.9).

Overall, most of the women who died were UK citizens (n=224, 87%) including half of the women who were born outside the UK (n=27). For the 18 women who were born abroad and who were not UK citizens at the time of their death, the median time spent in the UK before they died was one year and nine months (range four days to 19 years). Three women were citizens of the European Union (17%), one was a refugee/asylum seeker, and most had another or unknown status in the UK (72%). Table 2.10 shows the rates of maternal death amongst women born in countries with the highest number of deaths. In 2021-23, the overall rate of maternal death amongst women born outside the UK was statistically significantly lower than the rate for women born in the UK (RR 0.70, 95% CI 0.51-0.95, p=0.017), but mortality rates for women from select countries were not statistically significantly different compared to women born in the UK.

Disparities in maternal mortality rates

It has been increasingly noted that women at severe disadvantage appear to be over-represented amongst the women who die in the UK. Amongst the women who died in 2021-23, 22% were subject to domestic abuse either prior to or during pregnancy (Table 2.9). This proportion has been continually increasing since MBRRACE-UK reporting began and, in 2021-23, was nearly four times higher than its nadir in 2012-2014. In addition, 7% of the women who died had a history of abuse as a child and 21% were known to social services (Table 2.9). The proportion of women with social service involvement was slightly decreased in 2021-23 compared to 2020-22, but remained higher than the 12% reported in 2012-14. It is worth noting, however, that social risk factors remain amongst the most poorly recorded data in women's medical records and so these figures may be a minimum estimate. For the women who died in 2021-23, 24% of their records were missing information about domestic abuse, 46% were missing information about a history of child abuse and 16% were missing information about social service involvement (Table 2.9).

Women are considered to have severe and multiple disadvantages if they have three or more of substance use, domestic abuse, previous abuse in childhood, recent arrival in the UK (≤5 years), status as a refugee or asylum seeker, a mental health diagnosis, female genital mutilation, or known learning difficulties (Table 2.11). For the 257 women who died during pregnancy or up to six weeks after pregnancy in the UK from direct or indirect causes, 35 (14%) were considered to have multiple disadvantages on the basis of the data available. As in past years, the main contributors to multiple disadvantages were a mental health diagnosis (88/90 women with multiple disadvantages), domestic abuse (84/90 women with multiple disadvantages) and substance use (75/90 women with multiple disadvantages). If all 611 women who died during or up to one year after pregnancy in the UK in 2021-23 are considered, 90 women (15%) had severe and multiple disadvantages (Table 2.11). This proportion is similar to the that reported in recent triennia but is more than double the 6% first reported in 2015-17. Lessons for the care of women with multiple disadvantages are highlighted in Chapter 5 of this report.

Table 2.9: Sociodemographic characteristics of women who died from direct and indirect causes, UK 2021-23

Characteristics	Direct (n=117) Frequency (%)	Indirect (n=138) Frequency (%)	Total (n=257) Frequency (%)
Age			
<20	1 (1)	2 (1)	3 (1)
20 – 24	10 (9)	6 (4)	16 (6)
25 – 29	32 (27)	34 (24)	66 (26)
30 – 34	33 (28)	38 (27)	71 (28)
35 – 39	26 (22)	43 (31)	69 (27)
≥ 40	15 (13)	17 (12)	32 (12)
Parity			
0	45 (38)	37 (26)	82 (32)
1 to 2	49 (42)	64 (46)	113 (44)
≥3	20 (17)	39 (28)	59 (23)
Missing	3 (3)	0 (0)	3 (1)
Ethnicity			
White European	79 (68)	97 (69)	176 (68)
Indian	6 (5)	4 (3)	10 (4)
Pakistani	3 (3)	14 (10)	17 (7)
Bangladeshi	1 (1)	2 (1)	3 (1)
Other Asian	5 (4)	4 (3)	9 (4)
Black Caribbean	4 (4)	4 (3)	8 (3)
Black African	6 (5)	11 (8)	17 (7)
Others/ Mixed	11 (9)	4 (3)	15 (6)
Missing	2 (2)	0 (0)	2 (1)
Woman's region of birth			
United Kingdom	82 (70)	108 (77)	190 (94)
Eastern Europe	3 (3)	5 (4)	8 (3)
Western Europe	2 (2)	1 (1)	3 (1)
Asia	10 (9)	12 (9)	22 (9)
Africa	7 (6)	9 (6)	16 (6)
Australia and North America	2 (2)	0 (0)	2 (1)
Central & South America & Caribbean	3 (3)	0 (0)	3 (1)
Missing	8 (7)	5 (4)	13 (5)
UK citizen			
Yes	94 (80)	130 (93)	224 (87)
No	11 (9)	7 (5)	18 (7)
Missing	12 (10)	3 (2)	15 (6)
Socioeconomic status (Index of multiple deprivation (IMD) of postcode of residence)			
First quintile (Least deprived)	13 (11)	13 (9)	26 (10)
Second quintile	15 (13)	15 (11)	30 (12)
Third quintile	28 (23)	21 (15)	49 (19)
Fourth quintile	24 (21)	29 (21)	53 (21)
Fifth quintile (Most deprived)	32 (27)	55 (39)	87 (34)
Missing	5 (4)	7 (5)	12 (5)
Socioeconomic status (Occupational classification)			
Employed (Either woman or partner)	73 (62)	103 (74)	176 (68)
Unemployed (Both)	15 (13)	23 (16)	38 (15)
Missing	29 (25)	14 (10)	43 (17)
Able to speak/understand English			
Yes	109 (93)	136 (97)	245 (95)
No	4 (3)	4 (3)	8 (3)
Missing	4 (3)	0 (0)	4 (2)
Living arrangements			
With partner	81 (69)	102 (73)	183 (71)
Living alone	11 (9)	12 (9)	23 (9)
With parents/extended family	11 (9)	8 (6)	19 (7)
Others	6 (5)	8 (6)	14 (5)
Missing	8 (7)	10 (7)	18 (7)
Domestic abuse (prior to pregnancy/ during pregnancy)			
Yes	27 (23)	29 (21)	56 (22)
No	54 (46)	85 (61)	139 (54)
Missing	36 (31)	26 (19)	62 (24)
History of abuse as a child			
Yes	11 (9)	6 (4)	17 (7)
No	47 (40)	75 (54)	122 (47)
Missing	59 (50)	59 (42)	118 (46)
Known to social services			
Yes	27 (23)	26 (19)	53 (21)
No	66 (56)	97 (69)	163 (63)
Missing	24 (21)	17 (12)	41 (16)

Table 2.10: Maternal mortality rates per 100,000 maternities, by mother's country of birth (select countries), UK 2021-23

Woman's country of birth	Maternities	Total Deaths^	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
UK	1,424,089*	190	13.34	11.51 – 15.38	1 (Ref)	-
Outside UK	580,095*	54	9.31	6.99 – 12.15	0.70	0.51 – 0.95
Specific countries						
Pakistan	50,033‡	7	13.99	5.63 – 28.82	1.05	0.42 – 2.20
India	56,409‡	5	8.86	2.88 – 20.68	0.66	0.21 -1.58
Nigeria	28,584‡	3	10.50	2.16 – 30.67	0.79	0.16 – 2.33

*Estimates based on proportions of births to UK and non-UK born mothers applied to the total number of maternities in the UK

‡Estimates based on the ratio of maternities to births applied to the number of births recorded in the mothers' countries of birth

^Country of birth not recorded for 14 women who died

Table 2.11: Proportion of women who died who had severe and multiple disadvantages*, UK 2021-23

	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Coincidental (n=27) Frequency (%)	Late Deaths (n=327) Frequency (%)	Total (n=611) Frequency (%)
Score <3	98 (84)	124 (89)	25 (93)	274 (84)	521 (85)
Score ≥3 (severe and multiple disadvantages)	19 (16)	16 (11)	2 (7)	53 (16)	90 (15)

*Three or more of substance use, domestic abuse, abuse in childhood, arrival in the UK within last 5 years, refugee or asylum seeker, mental health diagnosis, female genital mutilation, and known learning difficulties

As shown in Table 2.12, the rates of maternal mortality in 2021-23 varied by age, socioeconomic status and ethnic background of the women, factors that are known to be independently associated with an increased risk of maternal death in the UK (Nair, Kurinczuk et al. 2015, Nair, Knight et al. 2016).

The average age of women giving birth in the UK has been steadily rising and this was reflected in the characteristics of the women who died. In 2021-23, the median age amongst the women who died during or up to six weeks after pregnancy from direct and indirect causes was 32. To reflect these changing demographics, Table 2.12 shows the relative risk of maternal death using women aged 25-29 as the comparator. Compared to women aged 25-29, women aged 35 or older had significantly increased rates of maternal death (RR 1.58, 95% CI 1.15-2.19, p=0.003). This was largely driven by a nearly three-fold higher risk of death amongst women aged 40 and over (RR 2.53, 95% CI 1.61-3.92, p<0.001). Women aged 35-39 were also at an increased risk of death compared to women aged 25-29, but this was not statistically significant (RR 1.35, 95% CI 0.95-1.92, p=0.083). Notably, women aged 20-24, the previous reference category, had a statistically significantly lower risk of death compared to women aged 25-29 (RR 0.53, 95% CI 0.29-0.92, p=0.016).

In order to maintain consistency, Table 2.13 has been updated with re-calculated relative risks for the women who died in 2018-20 using women aged 25-29 as the reference group. Thus, this table will reflect relative risks different to those published in Tables 2.10 and 2.11 of the 2022 MBRRACE-UK report. There were no statistically significant differences in the relative risks for any age groups between 2018-20 and 2021-23 (Table 2.13). It is also worth noting that there were no statistically significant differences in the relative risks for any age groups between 2018-20 and 2021-23 when women aged 20-24 were used as the reference group.

Women living in the most deprived areas of England continued to have the highest maternal mortality rates emphasising the importance of the lessons for the care of these women learned in this year's morbidity confidential enquiry. In 2021-23, the mortality rate for women living in the most deprived areas was nearly two times higher than for women living in the least deprived areas (RR 1.88, 95% CI 1.18-3.08, p=0.004)(Table 2.12). However, as noted in previous reports, in recent years there has been an increase in maternal mortality in women living in all areas, including the least deprived areas (Figure 2.8). In 2021-23, the rate of maternal death amongst women living in the least deprived areas was 44% higher than the rate in 2018-20 (RR 1.44, 95% CI 0.75-2.80, p=0.241). This increase in the mortality rate of the group used as the baseline needs to be borne in mind when interpreting the relative risks and ratio of relative risks (Tables 2.12 and 2.13).

Table 2.12: Maternal mortality rates per 100,000 maternities amongst different population groups, UK or England* 2021-23 (illustrated in Figures 2.8 and 2.9)

	Total maternities	Total deaths	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
Age						
<20	46,969	3	6.39	1.32 – 18.66	0.50	0.10 – 1.54
20–24	239,516	16	6.68	3.82 – 10.85	0.53	0.29 – 0.92
25–29	521,461	66	12.66	9.79 – 16.10	1 (Ref)	-
30–34	692,440	71	10.25	8.01 – 12.93	0.81	0.57 – 1.15
35–39	403,950	69	17.08	13.29 – 21.62	1.35	0.95 – 1.92
≥ 40	99,746	32	32.08	21.94 – 45.29	2.53	1.61 – 3.92
IMD Quintiles (England only*)						
I (Least deprived/ highest 20%)	243,864	25	10.25	6.63 – 15.13	1 (Ref)	-
II	275,778	27	9.79	6.45 – 14.24	0.96	0.53 – 1.72
III	305,730	46	15.05	11.02 – 20.07	1.47	0.88 – 2.49
IV	348,596	48	13.77	10.12 – 18.26	1.34	0.81 – 2.27
V (Most deprived/ lowest 20%)	404,857	78	19.27	15.23 – 24.04	1.88	1.18 – 3.08
Ethnic group (England only*)						
White (inc. not known)	1,246,066	155	12.44	10.56 – 14.56	1 (Ref)	-
Asian	221,073	37	16.74	11.78 – 23.07	1.35	0.91 – 1.94
Black	92,168	26	28.21	18.43 – 41.33	2.27	1.44 – 3.45
Chinese/ others	71,560	4	5.59	1.52 – 14.31	0.45	0.12 – 1.17
Mixed	40,088	9	22.45	10.27 – 42.61	1.80	0.81 – 3.52

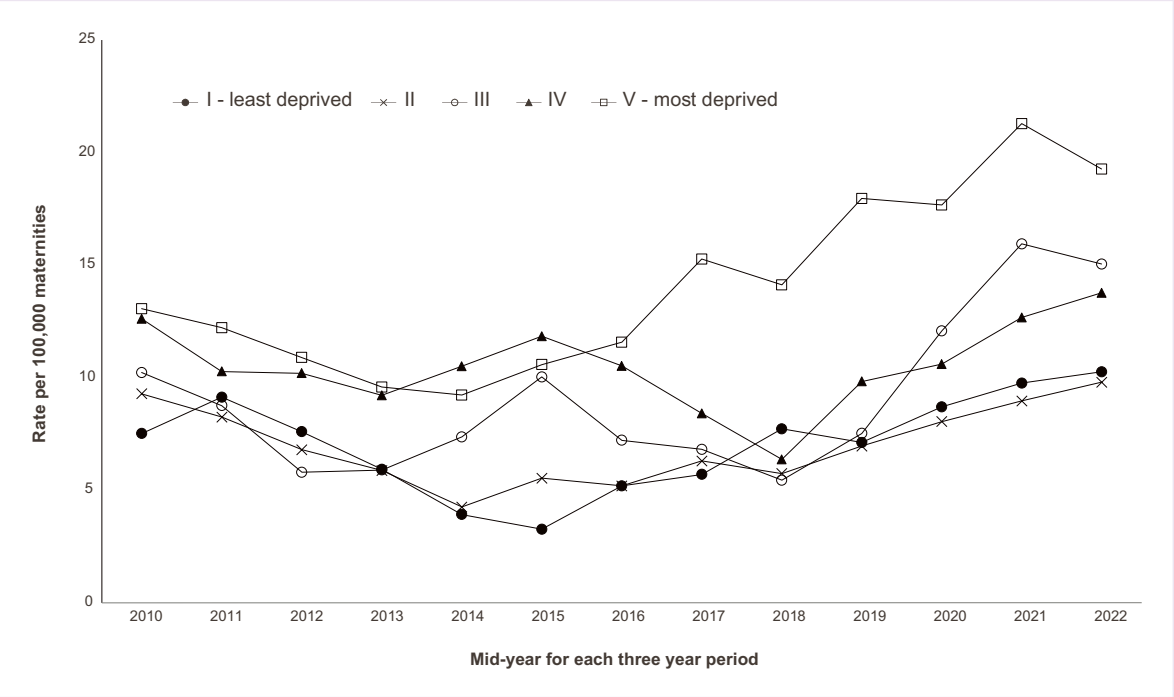
*Data for England only due to availability of denominator data

Table 2.13: Comparison of the relative risk of maternal death amongst different population groups between 2018-20 and 2021-23, UK or England* (illustrated in Figures 2.8 and 2.9)

	2018-20		2021-23		Ratio of the relative risks (RRR) (comparing 2020-22 with 2018-20)	95% CI	P-value
	Relative risk (RR)	95% CI	Relative risk (RR)	95% CI			
Age							
<20	1.76	0.76 – 3.60	0.50	0.10 – 1.54	0.28	0.06 – 1.37	0.117
20–24	0.97	0.57 – 1.60	0.53	0.29 – 0.92	0.55	0.25 – 1.19	0.126
25–29	1 (Ref)	-	1 (Ref)	-	-	-	-
30–34	1.14	0.78 – 1.67	0.81	0.57 – 1.15	0.71	0.42 – 1.19	0.196
35–39	1.51	1.01 – 2.27	1.35	0.95 – 1.92	0.89	0.52 – 1.53	0.682
≥ 40	2.89	1.70 – 4.80	2.53	1.61 – 3.92	0.88	0.44 – 1.73	0.703
IMD Quintiles (England only*)							
I (Least deprived/ highest 20%)	1 (Ref)	-	1 (Ref)	-	-	-	-
II	0.98	0.49 – 1.96	0.96	0.53 – 1.72	0.98	0.39 – 2.43	0.965
III	1.06	0.55 – 2.07	1.47	0.88 – 2.49	1.39	0.60 – 3.22	0.447
IV	1.38	0.77 – 2.58	1.34	0.81 – 2.27	0.97	0.44 – 2.15	0.943
V (Most deprived/ lowest 20%)	2.52	1.50 – 4.47	1.88	1.18 – 3.08	0.75	0.36 – 1.54	0.430
Ethnic group (England only*)							
White (inc. not known)	1 (Ref)	-	1 (Ref)	-	-	-	-
Asian	1.75	1.13 – 2.62	1.35	0.91 – 1.94	0.77	0.44 – 1.36	0.369
Black	3.96	2.32 – 5.65	2.27	1.44 – 3.45	0.57	0.31 – 1.07	0.080
Chinese/ others	0.89	0.32 – 1.99	0.45	0.12 – 1.17	0.51	0.12 – 2.18	0.360
Mixed	1.32	0.35 – 3.47	1.80	0.81 – 3.52	1.36	0.35 – 5.32	0.656

*Data for England only due to availability of denominator data

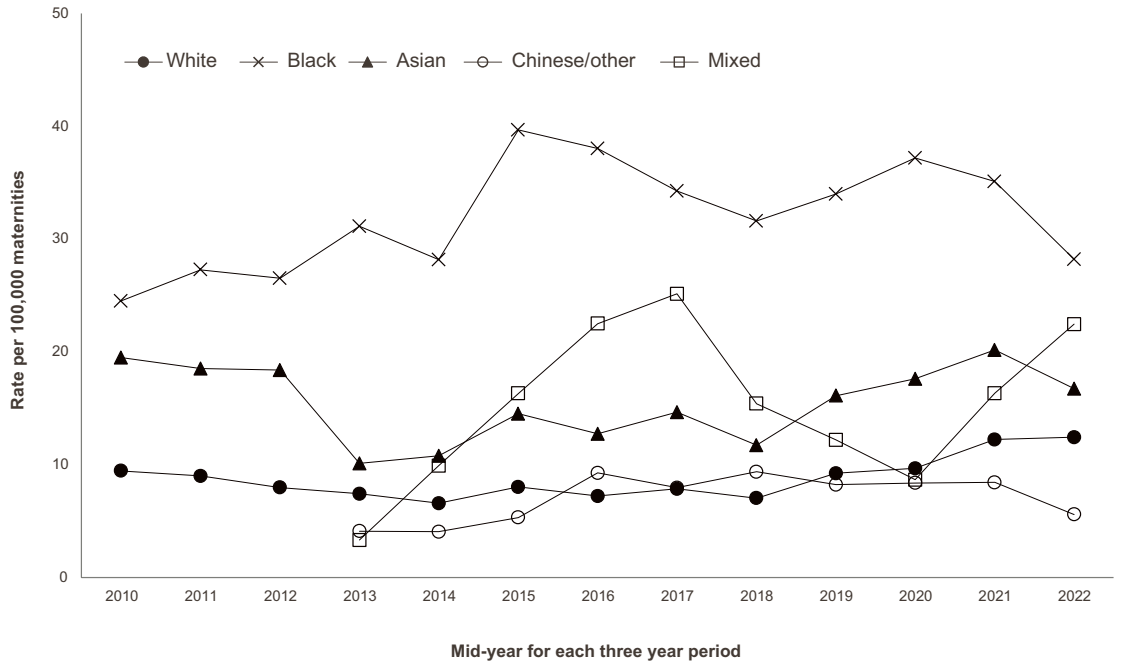
Figure 2.8: Maternal mortality rates per 100,000 maternities according to women's area of residence, England* 2009-23



*Data for England only due to availability of denominator data

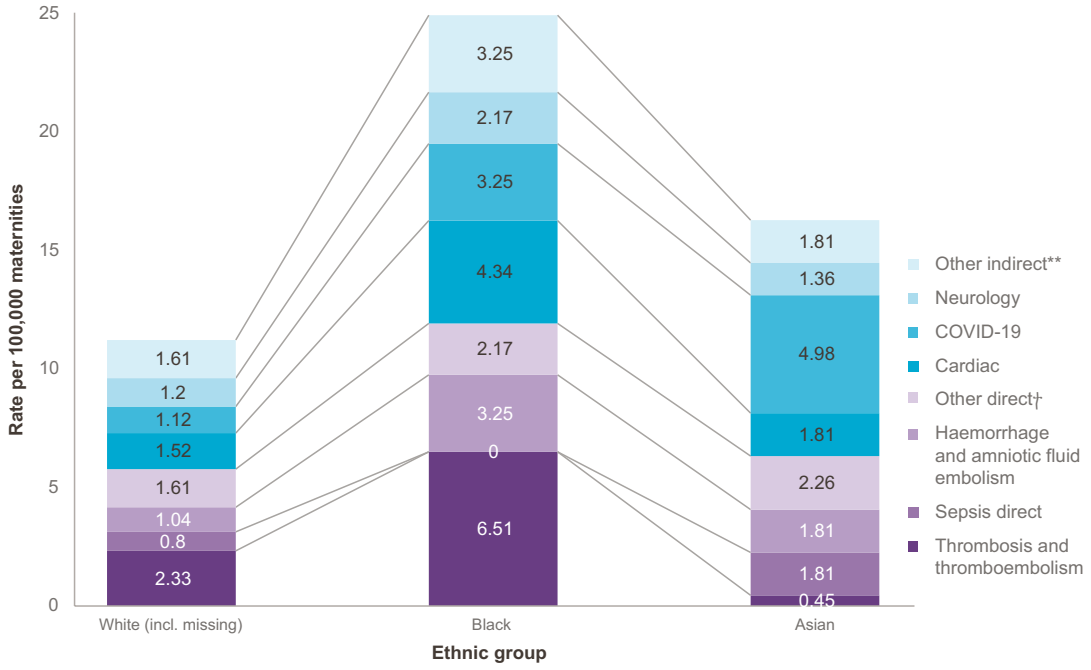
As noted in the 2016 report, we are no longer able to obtain denominator figures for specific ethnic groups, instead aggregate rates using larger ethnicity groupings are presented in Figures 2.9 and 2.10 and Tables 2.12 and 2.13. While the maternal mortality rate for women from Black ethnic backgrounds in England continued to decrease in 2021-23 (Figure 2.9), the risk of maternal death for Black women remained statistically more than two-fold higher compared to White women (RR 2.27, 95% CI 1.44-3.45, p<0.001) (Table 2.12). In 2021-23, the maternal mortality rate for Black women was the lowest it had been since 2013-15 but Black women still died from thrombosis and thromboembolism and cardiac disease at nearly three times the rate of White women (thrombosis and thromboembolism: RR 2.80, 95% CI 0.95-6.86, p=0.040; cardiac disease: RR 2.85, 95% CI 0.70-8.56, p=0.088) (Figure 2.10). After year-on-year increases, the mortality rate for women from Asian backgrounds was also lower in 2021-23 compared to the rate in 2020-22, but Asian women continued to have a non-statistically significant higher risk of maternal mortality compared to White women (RR 1.35, 95% CI 0.91-1.94, p=0.113) (Table 2.12). In 2021-23, Asian women died from COVID-19 at rates that were more than four times higher than that of White women (RR 4.43, 95% CI 1.82-10.50, p<0.001) (Figure 2.10). Maternal mortality rates amongst women from Mixed ethnic backgrounds continued to increase in 2021-23 and were almost two-fold higher compared to White women (RR 1.80, 95% CI 0.81-3.52, p=0.106) (Table 2.12), noting that low numbers of women from Mixed ethnic backgrounds mean that this rate is subject to high levels of random variation. As with deprivation, the continued increase in the mortality rate for White women, the group used as the baseline, must be borne in mind when interpreting the relative risks and ratio of relative risks for different ethnic groups (Figure 2.9 and Tables 2.12 and 2.13).

Figure 2.9: Maternal mortality rates per 100,000 maternities amongst women from different ethnic groups, England* 2009-23



*Data for England only due to availability of denominator data

Figure 2.10: Maternal mortality rates per 100,000 maternities, by select causes of death and ethnic group, England* 2021-23



*Data for England only due to availability of denominator data

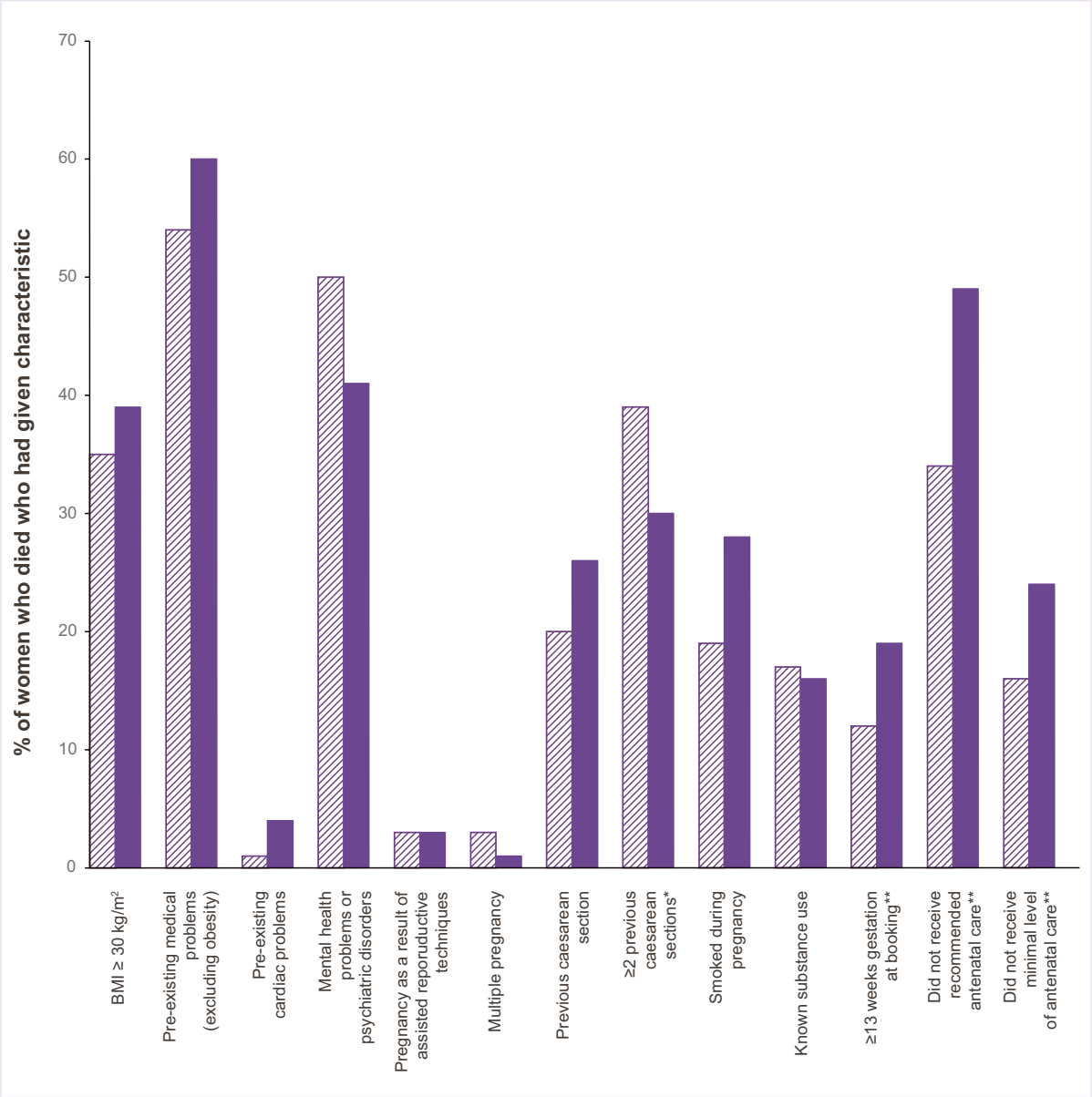
**Other indirect causes of death including general medical and surgical conditions, indirect malignancy, indirect sepsis (excluding COVID-19) and indirect psychiatric causes (drugs/alcohol/other)

†Other direct causes of death including early pregnancy deaths, pre-eclampsia and eclampsia, suicide and unascertained direct causes

Medical and pregnancy-related characteristics

Studies have shown that 66% of the increased risk of maternal death in the UK can be attributed to medical comorbidities (Nair, Knight et al. 2016). The medical and pregnancy-related characteristics of the women who died in 2021-23 are shown in Figure 2.11 and Tables 2.14-2.16.

Figure 2.11: Selected characteristics of women who died from direct or indirect causes, UK 2021-23



Hatched bars indicate direct causes of death, solid bars indicate indirect causes of death

*Amongst women who had a previous caesarean birth

**NICE recommended antenatal care: booked at ten weeks or less and no antenatal visits missed. Minimum level of care: booked at less than 13 weeks and 3 or fewer antenatal visits missed.

As has been demonstrated in MBRRACE-UK reports, women with medical complexities are increasingly overrepresented amongst the women who die during pregnancy or up to six weeks after pregnancy. Many of the women who died in 2021-23 were either overweight (BMI 25-29 kg/m^2, n=70, 27%) or obese (BMI ≥ 30 kg/m^2, n=96, 37%) and more than half (57%) were known to have pre-existing medical problems excluding obesity. While only a small proportion of the women who died had known pre-existing cardiac problems (2%), cardiac deaths were still the leading cause of indirect maternal deaths in the UK underscoring the importance of the lessons for care outlined in Chapter 4. Similarly, as the proportion of women with pre-existing mental health problems continued to increase in 2021-23, the lessons in Chapter 6 of this report are particularly pertinent (Table 2.14).

Table 2.14: Selected medical conditions and characteristics of women who died from direct and indirect causes, UK 2021-23 (illustrated in Figure 2.11)

Medical condition or characteristic	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Total (n=257) Frequency (%)
Body mass index (BMI kg/m^2)			
<18	2 (2)	3 (2)	5 (2)
18 – 24	30 (26)	36 (26)	66 (26)
25 – 29	34 (29)	36 (26)	70 (27)
≥ 30	41 (35)	55 (39)	96 (37)
Missing	10 (9)	10 (7)	20 (8)
Any pre-existing medical problem (excluding obesity)			
Yes	63 (54)	84 (60)	147 (57)
No	40 (34)	54 (39)	94 (37)
Missing	14 (12)	2 (1)	16 (6)
Pre-existing cardiac problems			
Yes	1 (1)	5 (4)	6 (2)
No	102 (87)	133 (95)	235 (91)
Missing	14 (12)	2 (1)	16 (6)
Mental health problems or psychiatric disorders			
Yes	59 (50)	58 (41)	117 (46)
No	44 (38)	74 (53)	118 (46)
Missing	14 (12)	8 (6)	22 (9)

Comparable to previous years' reports, in the 2021-23 triennium, eight women (3%) who died during or up to six weeks after pregnancy in the UK had a pregnancy as a result of an assisted reproductive techniques and there was a very small proportion of women who had multiple pregnancies (2%). Sixty women (23%) had at least one previous caesarean section with a third of these women having had two or more previous caesarean sections (Figure 2.11 and Table 2.15).

Table 2.15: Pregnancy-related characteristics of women who died from direct and indirect causes, UK 2021-23 (illustrated in Figure 2.11)

Characteristics	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Total (n=257) Frequency (%)
Pregnancy known to be as a result of assisted reproductive techniques			
Yes	4 (3)	4 (3)	8 (3)
No	113 (97)	136 (97)	249 (97)
Multiple pregnancy			
Yes	3 (3)	2 (1)	5 (2)
No	114 (97)	138 (99)	252 (98)
Previous caesarean section			
Yes	23 (20)	37 (26)	60 (23)
No	86 (74)	97 (69)	183 (71)
Missing	8 (7)	6 (4)	14 (5)
Previous caesarean numbers (amongst women who had a previous caesarean section)			
1	14 (61)	26 (70)	40 (67)
≥2	9 (39)	11 (30)	20 (33)

Other characteristics of women who died

Substance use and inadequate utilisation of antenatal care services are both independently associated with increased risk of maternal death in the UK (Nair, Kurinczuk et al. 2015, Nair, Knight et al. 2016). The prevalence of known substance use amongst women who died in 2021-23 did not differ from that noted in the previous reports, nor did the proportion of women who smoked. The proportion of women who died who received recommended levels of antenatal care was also similar; just over half (51%) of all women who received antenatal care, received the recommended level of care according to the National Institute for Health and Care Excellence (NICE) antenatal care guidelines (booking at ten weeks or less and no routine antenatal visits missed)(National Institute for Health and Care Excellence 2021)(Figure 2.11 and Table 2.16).

Table 2.16: Other characteristics women who died from direct and indirect causes, UK 2021-23 (illustrated in Figure 2.11)

Characteristics	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Total (n=257) Frequency (%)
Smoking			
Smoked during pregnancy	22 (19)	39 (28)	61 (24)
Non-smoker	72 (62)	91 (65)	163 (63)
Missing	23 (20)	10 (7)	33 (13)
Known substance use			
Yes	20 (17)	23 (16)	43 (17)
No	77 (66)	108 (77)	186 (72)
Missing	20 (17)	9 (6)	29 (11)
Received any antenatal care*			
Yes	76 (65)	115 (82)	191 (74)
No	41 (35)	25 (18)	66 (26)
Gestational age at booking in weeks (amongst women who received any antenatal care)			
≤10	61 (80)	77 (67)	138 (72)
11 – 12	5 (7)	15 (13)	20 (10)
≥13	9 (12)	22 (19)	31 (16)
Missing	1 (1)	1 (1)	2 (1)
Received recommended antenatal care† (amongst women who received any antenatal care)			
Yes	46 (61)	51 (44)	97 (51)
No	26 (34)	56 (49)	82 (43)
Missing	4 (5)	8 (7)	12 (6)
Received a minimum level of antenatal care† (among women who received any antenatal care)			
Yes	60 (79)	76 (66)	136 (71)
No	12 (16)	28 (24)	40 (21)
Missing	4 (5)	11 (10)	15 (8)

*Includes 17 women who died in early pregnancy (≤10 weeks' gestational age)

†NICE recommended antenatal care: booked at ten weeks or less and no antenatal visits missed. Minimum level of care: booked at less than 13 weeks and 3 or fewer antenatal visits missed.

Classification of quality of care

Table 2.17 and Figure 2.12 show the classification of care as agreed by assessors for the 263 women who died in 2021-23 and who are included in this year's confidential enquiry reports (including women who died between six weeks and a year after the end of pregnancy and women from the Republic of Ireland). Only the women whose case notes were available with sufficient information for an in-depth review are included. Amongst the 263 women who died and whose case notes were available, 21% were assessed to have received good care. For another 45%, assessors felt that improvements in care may have made a difference to their outcome.

Table 2.17: Classification of care received by women who are included in the confidential enquiry chapters, UK and Ireland 2021-23 (illustrated in Figures 2.12 and 2.13)

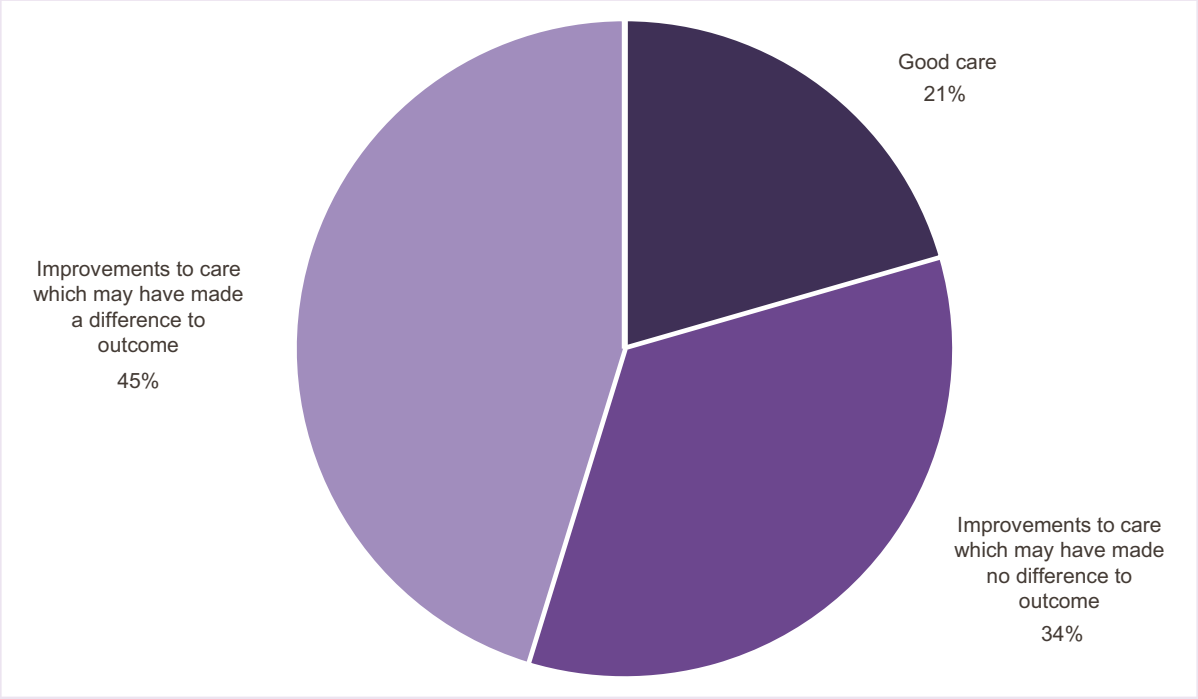
Classification of care received	Women who died* (n=263) Frequency(%)	Women living in the most and least deprived areas** (n=33) Frequency (%)
Good care	54 (21)	12 (36)
Improvements to care which would have made no difference to outcome	90 (34)	11 (33)
Improvements to care which may have made a difference to outcome	119 (45)	10 (30)

*Includes only women whose case notes were available with sufficient information for an in-depth review

**Does not include women from the Republic of Ireland

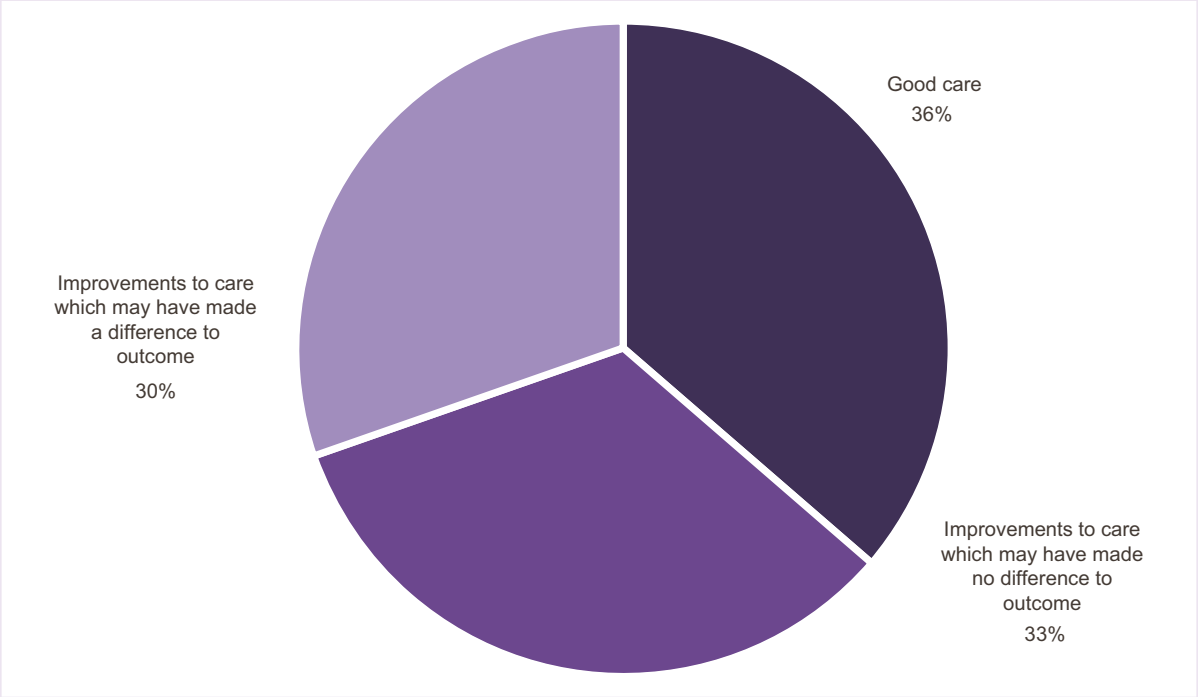
Opportunities to improve care were also identified for the majority of women living in the most and least deprived areas of the UK whose care was reviewed for the morbidity confidential enquiry (Table 2.17 and Figure 2.13). Of the 33 women included in the morbidity confidential enquiry, it was thought that improvements to care may have made a difference to the outcome for 30%. Improvements in care that would not have changed the woman's outcome were also identified for 33% of the women.

Figure 2.12: Classification of care received by women who died and who are included in the confidential enquiry chapters*, UK and Ireland 2021-23 (n=263)



*Includes only women whose case notes were available with sufficient information for an in-depth review

Figure 2.13: Classification of care received by the women who are included in the morbidity confidential enquiry into the care of women with deprivation, UK 2023 (n=33)



Local clinicians' reports

The proportion of reports received from local clinicians of those requested for the confidential enquiries steadily increased in past reports and was 90% for maternal deaths in 2021-23 (Table 2.18). Local clinicians' reports are absolutely essential to allow MBRRACE-UK assessors to fully take account of any local system factors impacting women's care. We are particularly grateful for the effort and commitment this represents and we urge clinicians to continue to return their reports in a timely manner and provide their personal reflections and lessons learned from women's care.

Table 2.18: Percentage of local clinicians' reports received for women whose care was examined for the confidential enquiry chapters, 2021-23

Specialty group	Percentage of reports requested that were received (%)
Obstetricians	86
Anaesthetists	93
Midwives	86
Critical Care Clinicians	94
Emergency Medicine Specialists	86
GPs	98
Physicians	84
Mental health	93
Total	**90**

Post-mortem examination

As outlined in the pathology chapter of this report (Chapter 7), there was substantial variation in the proportion of women who had a post-mortem examination and the quality of the post-mortems performed. A post-mortem examination was carried out for two thirds (66%) of all the women who died in the UK in 2021-23 (Table 2.19). Amongst the women who died during pregnancy and up to six weeks after pregnancy, 77% of the women who died from direct causes, 66% of the women who died from indirect causes and 56% of women who died from coincidental causes had a post-mortem examination. Of the women who died between six weeks and one year after the end of pregnancy (late deaths), 63% had a post-mortem examination. As noted in previous reports, establishing the cause of women's death with a high-quality autopsy is essential not only to improve future care, but to ensure any family counselling or testing is conducted where appropriate as highlighted for the women who died from cardiac causes (Chapter 4).

Table 2.19: Frequency of post-mortem examinations for maternal deaths, UK 2021-23

	Direct (n=117) Frequency (%)	Indirect (n=140) Frequency (%)	Coincidental (n=27) Frequency (%)	Late Deaths (n=327) Frequency (%)	Total (n=611) Frequency (%)
No post-mortem	27 (23)	47 (34)	12 (44)	121 (37)	207 (34)
Post-mortem completed	90 (77)	93 (66)	15 (56)	206 (63)	404 (66)

3. Lessons for the prevention and treatment of hypertensive disorders

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3.1 Key messages

New recommendations

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation **[ACTION: Maternal Medicine Networks in England and Health Boards in devolved nations]**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care **[ACTION: Integrated Care Boards and Health Boards]**

Existing guidance and recommendations requiring improved implementation

In women who have had pre-eclampsia or hypertension with early birth before 34 weeks, consider pre-pregnancy counselling to discuss possible risks of recurrent hypertensive disorders of pregnancy, and how to lower them for any future pregnancies (National Institute for Health and Care Excellence 2023)

Write a care plan for women with pre-eclampsia who have given birth and are being transferred to community care that includes all of the following (National Institute for Health and Care Excellence 2023):

- who will provide follow-up care, including medical review if needed
- frequency of blood pressure monitoring
- thresholds for reducing or stopping treatment
- indications for referral to primary care for blood pressure review
- self-monitoring for symptoms

When treating women with antihypertensive medication during the postnatal period, use medicines that are taken once daily when possible (National Institute for Health and Care Excellence 2023)

Advise women who have had a hypertensive disorder of pregnancy that this is associated with an increased risk of hypertension and cardiovascular disease in later life (National Institute for Health and Care Excellence 2023)

Advise women who have had a hypertensive disorder of pregnancy to discuss how to reduce their risk of cardiovascular disease, including hypertensive disorders, with their GP or specialist (National Institute for Health and Care Excellence 2023)

Measure and record the woman's blood pressure at every routine face-to-face antenatal appointment using a device validated for use in pregnancy, and following the recommendations on measuring blood pressure in the NICE guideline on hypertension in adults (National Institute for Health and Care Excellence 2021)

As part of the risk assessment for fetal growth restriction, blood pressure should be recorded using a digital monitor that has been validated for use in pregnancy (NHS England 2025b)

Offer pharmacological treatment to women if blood pressure remains above 140/90 mmHg. Aim for a target blood pressure of 135/85 mmHg or less once on hypertensive treatment (National Institute for Health and Care Excellence 2023)

In women with severe pre-eclampsia (blood pressure of 160/110 mmHg or more) offer pharmacological treatment to all women and measure blood pressure every 15-30 minutes until blood pressure is less than 160/110 mmHg (National Institute for Health and Care Excellence 2023)

During labour measure blood pressure hourly in women with hypertension (National Institute for Health and Care Excellence 2023)

Record the following observations during the first stage of labour: 4-hourly temperature, blood pressure and respiratory rate (National Institute for Health and Care Excellence 2025)

Offer placental growth factor (PLGF)-based testing to help rule out pre-eclampsia in women presenting with suspected pre-eclampsia (for example, with gestational hypertension) between 20 weeks and 36 weeks and 6 days of pregnancy (National Institute for Health and Care Excellence 2023)

3.2 Background

In the past 20 years, the number of women who die from hypertensive disorders of pregnancy in the UK and Ireland has decreased significantly. In the 2021-23 triennium this number remained in single figures but the rate of mortality was nearly four times higher than it was in 2012-14. Hypertensive disorders of pregnancy remain one of the leading causes of maternal death globally and one of the most common serious complication of pregnancy. It is imperative that there is a continued emphasis on education, prevention, early detection and management of hypertensive disorders in order to sustain and further reduce the low maternal death rate, while also reducing perinatal deaths.

3.3 The women who died

In 2021-23, six women died from hypertensive disorders of pregnancy in the UK and Ireland. Five women died during pregnancy or up to six weeks after pregnancy and one died between six weeks and one year after the end of pregnancy. The mortality rate due to hypertensive disorders in 2021-23 (0.28 per 100,000 maternities, 95% CI 0.10-0.60) was not statistically significantly different to 2018-20 (RR 0.79, 95% CI 0.22-2.58), and remained nearly four times higher than its nadir in 2012-14 (RR 3.52, 95% CI 0.63-35.63, p=0.197).

Four women died following intracranial haemorrhage; two women had eclamptic seizures and one was thought to have HELLP (haemolysis, elevated liver enzymes and low platelets) syndrome. Of the remaining two women, one died following eclamptic seizures and one had a liver rupture with suspected HELLP syndrome (Table 3.1).

Of the six women who died in 2021-23, half were aged 35 or older and the majority (n=5) were either overweight or obese. Half of the women were in their first pregnancy and the remaining half had chronic hypertension or previous pre-eclampsia. Half of the women were White, two thirds were born outside the UK or Ireland and almost all lived in the most deprived areas (IMD IV or V)(Table 3.2). None of the women who died had a multiple pregnancy or a pregnancy as a result of an assisted reproductive technology.

Table 3.1: Causes of death amongst women who died from hypertensive disorders of pregnancy, UK and Ireland 1997-23

	1997- 02§	2003-08§	2009-14¶	2015-17¶	2018-20¶	2021-23¶
Intracranial haemorrhage	16	18	7*	3*	2**	4*
Eclampsia/cerebral oedema	0	6	3	1	2	1
Pulmonary oedema	3	0	0	0	2	0
Hepatic rupture	2	1	0	0	0	1
Hepatic necrosis/ HELLP syndrome	9	5	4*	2*	2**	1*
Acute fatty liver of pregnancy	7	7	1	1	2	0
Total	**37**	**37**	**14**	**6**	**8**	**6**

*One woman died due to both intracranial haemorrhage and HELLP syndrome

**Two women died due to both intracranial haemorrhage and HELLP syndrome

§ Figures for the UK only

¶ Figures for the UK and Ireland

Table 3.2: The sociodemographic characteristics of women who died from hypertensive disorders of pregnancy, UK and Ireland 2021-23

Characteristics	Number of women (%) N=6
Age (in years)	
30-34	3 (50)
≥35	3 (50)
Body mass index (kg/m^2)	
18-24	1 (17)
≥25	5 (83)
Missing	
Parity	
0	3 (50)
1	3 (50)
Ethnicity	
White European	3 (50)
Other minority ethnic group	3 (50)
Region of birth	
UK/Ireland	2 (33)
Outside UK/Ireland	4 (67)
Socioeconomic status (Index of multiple deprivation (IMD) of postcode of residence)	
First – third quintile (least deprived)	1 (17)
Fourth/fifth quintile (most deprived)	4 (67)
Missing	1 (17)

3.4 Overview of care and new lessons to be learned

Pre-pregnancy counselling

An older White woman had both a family and personal history of essential hypertension and had developed pre-eclampsia in her previous pregnancy. She stopped her antihypertensive medications when she became pregnant. At booking her blood pressure (BP) was elevated and she was started on aspirin but no other action was taken. She was booked for consultant-led care and was seen at a consultant clinic five weeks later in the second trimester. Her BP remained elevated but there was no review of her history or medications. In her third trimester she was admitted to hospital with elevated BP. After a caesarean birth at term, she was reviewed by a resident doctor and was discharged without labetalol or a clear plan to manage her hypertension postnatally. Her BP continued to be poorly controlled and two weeks after giving birth she died from an intracranial haemorrhage.

Half of the women who died from hypertensive disorders in 2021-23 had pre-existing hypertension and were on antihypertensive medications prior to becoming pregnant. However, as for this woman and many others in this and past years' reports (Knight, Bunch et al. 2022, Knight, Bunch et al. 2023), there was little evidence of pre-pregnancy counselling amongst the high-risk women who died. As a result, some women's blood pressure (BP) was not controlled prior to pregnancy and others, including this woman, did not seem to be aware of the risks of becoming pregnant or of stopping or changing medication without proper management and monitoring. Guidelines from NICE recommend that women with chronic hypertension are referred to a specialist in hypertensive disorders of pregnancy prior to becoming pregnant in order to discuss antihypertensive treatments (National Institute for Health and Care Excellence 2023). It is essential to discuss the importance of medication adherence and to adjust medications to pregnancy-suitable alternatives before pregnancy in order to optimise their use.

In addition to a history of hypertension, this woman was over 40 years of age, which is associated with a risk of pre-eclampsia twice that of younger women (Trogstad, Magnus et al. 2011). Every woman who died from hypertensive disorders of pregnancy had at least two known risk factors for pre-eclampsia including a family or personal history

of hypertension, older age, nulliparity, a BMI greater than 35 kg/m^2, low socioeconomic status or Black ethnicity (Trogstad, Magnus et al. 2011, National Institute for Health and Care Excellence 2023). Women should be aware of their personal risks and receive appropriate pre-pregnancy counselling on how to mitigate risk and 'get ready for pregnancy'. This includes optimisation of BP control prior to pregnancy, which can be accomplished through either discussion on the safety of and importance of adherence to antihypertensive medications, or through the provision of lifestyle advice and support, which may help manage BP. As part of efforts to reduce inequalities in pre-conception health and care, a ***pre-conception toolkit*** was recently developed to signpost relevant and useful resources for healthcare providers (Blundell, Schoenaker et al. 2025)

Clinical message

'Get ready for pregnancy' – the period before conception, or between pregnancies, is an ideal time to counsel women about their health and address any physical or mental health conditions or social needs that may require management prior to becoming pregnant. Counselling should include, but is not limited to, optimisation of medications for chronic conditions, advice on weight management or smoking cessation and specialist referral to mental health or addiction services.

In women who have had pre-eclampsia or hypertension with early birth before 34 weeks, consider pre-pregnancy counselling to discuss possible risks of recurrent hypertensive disorders of pregnancy, and how to lower them for any future pregnancies.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Urgent referral of high-risk women

Given the high-risk nature of this woman's pregnancy, she was appropriately prescribed aspirin and referred for consultant-led care. However, she was not reviewed by a consultant until five weeks later. At this visit, there was no documented review of her hypertensive history or medications despite an elevated BP. As a result, she did not receive any hypertensive management until she was admitted to hospital in her third trimester. As highlighted in last year's enquiry into the care of women who died from thrombosis and thromboembolism (Felker, Patel et al. 2024), women with complex, high-risk conditions should be urgently referred and appropriately managed early in pregnancy. Assessors stressed the importance of senior consultation or specialist care as soon as possible without delays. This may necessitate very rapid referral, either before or after seeing a midwife for a booking appointment, in order to enable review by obstetrics, obstetric medicine or other specialists.

NEW **National recommendation**

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation.

Hospital discharge and transfer to primary care

The woman described above also had a significantly elevated BP after giving birth, but she was not reviewed by a senior doctor prior to her discharge from hospital. Assessors noted that it is commonly resident doctors who complete discharge summaries and considered that some women would benefit from more senior decision-making and input. When women with gestational hypertension are transferred to community care after birth, NICE recommends developing a care plan that includes the indication for referral, who is responsible for ongoing care, the frequency of BP monitoring, and thresholds for reducing or stopping treatment (National Institute for Health and Care Excellence 2023). There was clear evidence from the reviews of women with hypertension, including those with cardiac disorders, that discharge summaries for GPs and other communications with primary or community care could be improved. As for the woman above, there was often no guidance provided to GPs concerning ongoing medication requirements or BP targets. Frequently, discharge summaries also did not include clear instructions or a detailed plan

for postnatal care, including a time frame and whose responsibility it was to monitor the woman's hypertension and escalate concerns if needed. GP assessors emphasised that key information for action needs to be in a summary box at the beginning of the discharge letter.

Write a care plan for women with pre-eclampsia who have given birth and are being transferred to community care that includes all of the following:

- **who will provide follow-up care, including medical review if needed**
- **frequency of blood pressure monitoring**
- **thresholds for reducing or stopping treatment**
- **indications for referral to primary care for blood pressure review**
- **self-monitoring for symptoms**

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Similar improvements in the format and content of discharge summaries were noted for the care of women with complex social care needs and mental health conditions reviewed in Chapters 5 and 6 of this report. It is essential that complex conditions requiring ongoing management, including medical or mental health conditions or social vulnerabilities, are known about by GPs, community midwives and other services that have contact with women in the postnatal period. This information should be clearly and succinctly documented in discharge summaries and include an actionable plan with details on medications or safeguarding so that women continue to receive the care they need after the end of pregnancy.

NEW **National recommendation**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care.

While assessors emphasised the importance of senior oversight at discharge from hospital, they also felt that this may not be possible under current healthcare system pressures, which need to be addressed at a national level. Capacity limitations in postnatal wards may limit their ability to optimise women's BP prior to discharge and to develop a comprehensive plan for ongoing care. Assessors also noted that antihypertensive medications were not changed before discharging mothers. Upon leaving the hospital, several women, including the one above, remained on short-acting antihypertensives, such as nifedipine and labetalol, which required multiple daily doses. NICE guidance recommends that other medications may be better suited for women in the postnatal period to improve adherence and control BP (National Institute for Health and Care Excellence 2023).

When treating women with antihypertensive medication during the postnatal period, use medicines that are taken once daily when possible.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

As part of discharge to primary care assessors also highlighted the importance of informing women about the possible short- and long-term cardiovascular health consequences associated with pre-eclampsia or other hypertensive disorders of pregnancy. The International Federation of Gynaecology and Obstetrics (FIGO) committee recommends the adoption of resource-specific strategies to improve maternal long-term maternal cardiovascular health (Poon, Nguyen-Hoang et al. 2023) including a 'pregnancy passport' for health professionals to share with women (Nguyen-Hoang, Smith et al. 2023). The implementation of the FIGO pregnancy passport in the UK may help increase the awareness of cardiovascular risk and empower women to improve their cardiometabolic health.

Clinical message

'FIGO pregnancy passport' – There are tools available to help inform women, and those caring for them, about their future health risks after pregnancy complications. The ***pregnancy passport*** designed by The International Federation of Gynaecology and Obstetrics (FIGO) was created for women with pre-pregnancy or pregnancy-induced risk factors for cardiometabolic diseases. It is designed to be provided to women after childbirth and before discharge from hospital to facilitate screening and management. It includes advice on recommended follow-up checks and information about potential risks on future health, and offers interventions to reduce such risks.

Advise women who have had a hypertensive disorder of pregnancy that this is associated with an increased risk of hypertension and cardiovascular disease in later life.

Advise women who have had a hypertensive disorder of pregnancy to discuss how to reduce their risk of cardiovascular disease, including hypertensive disorders, with their GP or specialist.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Good care

A primiparous woman with a significant medical history including stage 4 kidney disease and malignant hypertension had received comprehensive counselling pre-pregnancy. Once pregnant, she was rapidly referred to a specialist multidisciplinary team that included a nephrologist and obstetrician. She had several admissions for hypertension control in early pregnancy and her blood pressure (BP) medications were adjusted as needed. Late in her second trimester, she was transferred to a tertiary unit with reduced fetal movements, severe hypertension and proteinuria. She was diagnosed with pre-eclampsia superimposed on chronic hypertension. She received multidisciplinary input for her BP and worsening renal function but an intrauterine death was confirmed the day after admission. Postnatally, her hypertension was managed by a renal specialist. M

Similar to the woman above, this woman, identified as part of this year's morbidity enquiry into the care of women from deprived areas, had a very high-risk pregnancy complicated by pre-eclampsia. However, unlike the first woman, she had extensive pre-pregnancy counselling about the risks of becoming pregnant and was counselled again in the first trimester at which point she decided to continue her pregnancy. She had an urgent referral for multidisciplinary, consultant-led care and had her medications reviewed and adjusted in early pregnancy in response to continued, uncontrolled hypertension. Despite multidisciplinary input, she had an intrauterine death for which she received appropriate bereavement care. After giving birth, she had further instances of elevated BP that were managed by her renal team.

3.5 Recurring lessons to be learned

Aspirin

A woman with a complex history of chronic hypertension and previous fetal loss associated with pre-eclampsia and fetal growth restriction died a few weeks after giving birth to a stillborn baby. She was taking nifedipine and labetalol but was hypertensive at booking. She was commenced on aspirin with a plan for home blood pressure (BP) monitoring. Serial ultrasounds showed fetal growth restriction but her BP appeared to be stable. At 26 weeks' gestation she was admitted with radiating chest pain, a significantly raised BP and new onset proteinuria. The majority of investigations focused on a cardiac cause and there was a delay in administrating antihypertensives and magnesium sulphate. Later that day she suddenly became hypotensive and an ultrasound showed an intrauterine fetal death with a possible liver capsule tear. A CT scan confirmed liver haematoma and she died of renal and hepatic failure despite full supportive care.

Assessors noted that there was evidence of good care in the provision of aspirin to high-risk women; all four women with pre-existing hypertension or a history of pre-eclampsia were appropriately prescribed low dose aspirin early in pregnancy as is recommended (National Institute for Health and Care Excellence 2023). This is in contrast to previous findings, including the 2019 MBRRACE-UK report, which recommended that a national Patient Group Direction be implemented to ensure the availability of aspirin for women who are advised to take it (Knight, Bunch et al. 2019). In response to this recommendation, a national Patient Group Direction was first released in February 2022 and most recently updated in February 2025 (NHS Specialist Pharmacy Service 2022). It remains essential that this direction is widely implemented to sustain the evidenced improvement in the provision of aspirin to women with recognised risk factors.

Antenatal blood pressure monitoring and management

This woman had a home BP monitor and was self-monitoring her BP. This was also the case for a number of women in the morbidity enquiry who had either chronic or pregnancy-associated hypertension. Self-monitoring of BP during pregnancy is becoming relatively widespread in the UK and evidence from a recent clinical trial suggests that self-monitoring of BP is safe with BP control equivalent to routine monitoring (Chappell, Tucker et al. 2022).

Of the women with hypertension who were not self-monitoring BP, assessors noted that most were monitored inconsistently during the antepartum and intrapartum periods. This included not performing regular BP measurements as at all routine antenatal appointments as is recommended (National Institute for Health and Care Excellence 2021). For women with chronic hypertension, additional antenatal appointments should be scheduled as needed, but especially if BP remains poorly controlled (National Institute for Health and Care Excellence 2023). In addition to consistent monitoring, recent recommendations from NHS England emphasise the importance of using correctly calibrated and validated monitors to record BP. Evidence suggests that digital BP monitors are less susceptible to performance errors than aneroid devices and require less frequent replacement and maintenance (NHS England 2025a). The use of digital monitors that have been validated for use in pregnancy is now mandated for risk assessment of fetal growth restriction as part of NHS England's Saving Babies' Lives Care Bundle: Version 3 (NHS England 2025b).

Measure and record the woman's blood pressure at every routine face-to-face antenatal appointment using a device validated for use in pregnancy, and following the recommendations on measuring blood pressure in the NICE guideline on hypertension in adults.

NICE NG201: Antenatal care (National Institute for Health and Care Excellence 2021)

As part of the risk assessment for fetal growth restriction, blood pressure should be recorded using a digital monitor that has been validated for use in pregnancy (NHS England 2025b)

There was also evidence of inconsistency in the response to elevated BP readings during pregnancy. Medications were sometimes not prescribed or adjusted in response to consistently elevated BP and it was sometimes felt by assessors that these elevated readings were accepted as a new baseline for women. For the woman above, there were significant delays in the management of her hypertension and diagnosis of pre-eclampsia while in hospital. When pre-eclampsia was eventually considered, she was appropriately treated with magnesium sulphate ($MgSO_4$) in addition to antihypertensives and her fluids were restricted to 80 mL/hour as is recommended (National Institute for Health and Care Excellence 2023). However, assessors emphasised that timely management of hypertension requires an urgent response to prevent further episodes and improve outcomes.

Control of hypertension

Most of the women included in this chapter died from acute cerebrovascular complications. It is important to recognise that severe hypertension is associated with an increased risk of acute cerebrovascular or cardiovascular events such as strokes or heart attack. Blood pressure control must be optimised, usually with a BP target lower than 140/90 mmHg during pregnancy. This should occur regardless of whether the woman has a confirmed diagnosis of pre-eclampsia as the absence of proteinuria, or other symptoms of pre-eclampsia, does not mitigate the risk of severe hypertension. Women with chronic hypertension also require continuous BP monitoring throughout pregnancy. When treating women with antihypertensive medications, clinicians should aim for a BP target of 135/85 mmHg or lower (National Institute for Health and Care Excellence 2023) and medications should only be discontinued or changed after proper review and consultation.

Offer pharmacological treatment to women if blood pressure remains above 140/90 mmHg. Aim for a target blood pressure of 135/85 mmHg or less once on hypertensive treatment.

In women with severe pre-eclampsia (blood pressure of 160/110 mmHg or more) offer pharmacological treatment to all women and measure blood pressure every 15-30 minutes until BP is less than 160/110 mmHg.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Recognition of pre-eclampsia at term

Three women presented with pre-eclampsia at term that was not recognised until they developed symptoms and signs of intracranial haemorrhage.

> A woman had a single episode of hypertension at 36 weeks' gestation that was not associated with proteinuria and resolved. Blood tests for platelets, liver enzymes, and urea and electrolytes were normal as were her fetal growth scans. Placental growth factor was not tested. She went into spontaneous labour at term and had a normal recorded blood pressure (BP) at the start of labour. She reported headaches as labour progressed but did not have further BP recordings or urinalysis. During the second stage of labour, she suddenly became disoriented with a BP of 180/120 mmHg and seizures. She was treated with magnesium sulphate and labetalol and had an assisted vaginal birth of a growth restricted baby 20 minutes later. After giving birth, a CT scan confirmed intracerebral haemorrhage and irreversible brain damage.

Apart from this being her first pregnancy, this woman was considered low-risk and did not appear to have any symptoms of pre-eclampsia until her rapid deterioration during labour. Assessors highlighted that women considered low-risk can develop unforeseen complications, and pre-eclampsia may not develop or be recognised for the first time until the intrapartum or early postpartum period (National Institute for Health and Care Excellence 2023). This woman's BP recordings were not repeated during labour including when she first experienced headaches. New onset headaches or headaches associated with other symptoms should be considered 'red flag' symptoms (Royal College of Physicians 2019, Knight, Bunch et al. 2020a) (Box 3.1). Assessors felt that improved recognition and investigation of her symptoms, including repeating observations, may have supported an earlier diagnosis and management of pre-eclampsia.

During labour measure blood pressure hourly in women with hypertension.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Record the following observations during the first stage of labour: 4-hourly temperature, blood pressure and respiratory rate

NICE NG235: Intrapartum care (National Institute for Health and Care Excellence 2025)

Box 3.1: Red flags in the history and examination of a pregnant patient presenting with headaches:

- Sudden-onset headache / thunderclap or worst headache ever
- Headache that takes longer than usual to resolve or persists for more than 48 hours
- Has associated symptoms – fever, seizures, focal neurology, photophobia, diplopia
- Excessive use of opioids

RCP Acute care toolkit 15 Managing acute medical problems in pregnancy (Royal College of Physicians 2019)

Placental growth factor (PLGF) testing

None of the women who died from hypertensive disorders of pregnancy had placental growth factor (PLGF) testing. Assessors emphasised the importance of PLGF testing in all women with hypertension during pregnancy, but especially for those with chronic hypertension where it is not always easy to identify superimposed pre-eclampsia. Pre-eclampsia can also be difficult to diagnosis in women with elevated BP who have normal urinalysis and blood tests. In both these instances, PLGF testing can help confirm or rule out pre-eclampsia in order to guide future management (National Institute for Health and Care Excellence 2022).

Offer placental growth factor (PLGF)-based testing to help rule out pre-eclampsia in women presenting with suspected pre-eclampsia (for example, with gestational hypertension) between 20 weeks and 36 weeks and 6 days of pregnancy.

NICE NG133: Hypertension in pregnancy: diagnosis and management (National Institute for Health and Care Excellence 2023)

Magnesium sulphate ($MgSO_4$)

A woman in her 40s with no medical history of note collapsed at home following a seizure at 38 weeks' gestation. She had had one previous instance of raised systolic pressure that fell when re-checked. Upon the arrival of paramedics the woman had a witnessed seizure and was treated with magnesium sulphate ($MgSO_4$). She was admitted to hospital and further $MgSO_4$ was given before an emergency caesarean birth. A CT scan showed significant intracerebral haemorrhage.

Magnesium sulphate ($MgSO_4$) should be considered as a first line treatment over other anticonvulsants for women with eclampsia (National Institute for Health and Care Excellence 2023). The pre-hospital team caring for this woman, identified a differential diagnosis of eclampsia and administered $MgSO_4$ as an anticonvulsant. However, for another woman who presented with symptoms of eclampsia out of hospital, the pre-hospital team administered midazolam to manage her seizures. Guidance from the Joint Royal Colleges Ambulance Liaison Committee (JRCALC) recommends that any woman over 20 weeks' gestation with a history of hypertension or pre-eclampsia and who experiences seizures should be treated with with $MgSO_4$, if available (Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and Association of Ambulance Chief Executives (AACE) 2022). The differential management of women with similar presentations highlights the variation in the availability of $MgSO_4$ within ambulance services. This variability in management also demonstrates the difficulty of accurately assessing acutely unwell women and administering treatment in line with an appropriate diagnosis. It is essential that pre-hospital clinicians are appropriately trained and supported to recognise the potential for diagnostic overshadowing and cognitive bias, especially for women who present with non-classical symptoms such as seizures without prior hypertension.

Ergometrine

A primiparous woman was considered low-risk for pre-eclampsia. She presented with ruptured membranes at term and a systolic blood pressure (BP) over 160 mmHg. Her BP settled after treatment with labetalol and there was no evidence of proteinuria. No beds were available and she was discharged with advice to return the next day. She attended the next day with a normal BP. Due to slow progress of labour, a decision was made for a category 2 caesarean birth under general anaesthesia at which point her BP was 160/90 mmHg. She had a major obstetric haemorrhage that was managed with ergometrine and carboprost. In recovery she reported a severe headache, nausea and blurred vision, which were attributed to her history of migraines. Her systolic BP remained above 160 mmHg and continued to rise despite IV labetalol. Magnesium sulphate was considered but not given as she had normal reflexes. She gradually became unresponsive and a CT confirmed intracranial haemorrhage.

This woman presented with significantly elevated BP 24 hours before birth and had elevated readings shortly before her caesarean section. However, when she experienced an obstetric haemorrhage, she was administered ergometrine, which is contraindicated in women with hypertension (Royal College of Obstetricians and Gynaecologists 2016). It is essential that clinicians are aware of the possibility of new onset hypertension in the intrapartum and postpartum periods so that they can promptly recognise it and treat women with appropriate anticonvulsant, antihypertensive and uterotonic medications.

End-of-life care and confirmation of death

Many of the women who died experienced intracranial haemorrhage and ultimately irreversible brain damage. Assessors noted many areas of good practice, particularly with regards to family support and bereavement care, which should be tailored to each family's individual needs in line with the Royal College of Obstetricians and Gynaecologists' (RCOG) recent good practice paper on managing events surrounding maternal deaths (Royal College of Obstetricians and Gynaecologists 2024). Assessors acknowledged that the care of women in critical care units is often provided by staff who are experienced with providing end-of-life care. However, they felt that being pregnant or recently pregnant may have resulted in variation in the consideration of organ donation for several of the critically ill women included in this chapter and others. Being pregnant or recently pregnant should not be a barrier to promoting a patient's wishes to participate in organ donation where donation is a possibility (General Medical Council 2014).

It should be noted that changes to the process of death certification for all deaths not referred to coronial services were introduced in England on 9th September 2024 (Department of Health and Social Care 2024). Under these reforms, senior clinicians have been contracted to act as medical examiners to provide independent scrutiny of deaths under statutory regulations. The revised medical certificate of cause of death (MCCD) also poses two questions relating to pregnancy:

1. Was the deceased person pregnant within the year prior to their death?
2. If the deceased person was pregnant within the year prior to their death, did the pregnancy contribute to their death?

3.6 Messages for pathologists

In this triennium, there were six deaths that were determined to be the result of hypertensive disorders of pregnancy; however, only two of these women had post-mortem examinations. For the other four women, the classification of the cause of death was based on clinical probability after review. Two further deaths that were originally reported to MBRRACE-UK as deaths due to eclampsia were re-classified as deaths due to sudden arrhythmic death syndrome with a morphologically normal heart (SADS/MNH) after pathology review of the post-mortem reports found no clinical evidence to support eclampsia.

For the two women who died from hypertensive disorders of pregnancy who did have post-mortem examinations, assessors felt that the execution and interpretation of findings could have been improved. They re-emphasised recommendations from the previous confidential enquiry into deaths due to hypertensive disorders, which stressed the importance of placental and kidney histopathology in order to confirm a diagnosis of pre-eclampsia and better understand contributory factors for fetal clinical outcomes (Knight, Bunch et al. 2022). It is known that cardiac arrest can imitate seizure-like movements. In these instances, placental pathology can contribute knowledge and certainty to the cause of death and can also help differentiate superimposed pre-eclampsia as a contributory factor for intracranial haemorrhage in women with chronic hypertension. As deaths due to pre-eclampsia are rare, it is likely that few pathologists will become confident in its post-mortem diagnosis; guidance from the Royal College of Pathologists (RCPath) on autopsies in instances of maternal deaths can help guide histopathological investigations (The Royal College of Pathologists 2024) and pathologists are encouraged to seek external opinions in difficult cases. Further messages for pathology are described in Chapter 7 of this year's report.

3.7 Conclusions

Notes for all six women were available for review and assessors felt that different care may have made a difference to the outcome for five of the women who died (83%)(Table 3.3). It is clear that there must be a continued drive to provide pre-pregnancy counselling to women with known risk factors for pre-eclampsia, especially those with a personal or family history of hypertension, in order to optimise their BP control prior to pregnancy. Once pregnant, high-risk women should be urgently referred to receive triage for senior or specialist review in early pregnancy. It is also essential that all women, even those considered low-risk, are appropriately monitored with consistent BP recordings and urinalysis taken throughout pregnancy as well as the intrapartum and immediate postpartum periods. At the point when women are discharged from hospital and require ongoing management of hypertension, this should be made clear to primary healthcare providers on discharge summaries. This should include a clear plan for the continued use of antihypertensive medications and BP targets. While deaths due to hypertensive disorders remain low in the UK and Ireland, many more women will be affected by pre-eclampsia and other hypertensive disorders that can have long-term effects on their health or that of their offspring. The messages for care outlined in this chapter remain critical to prevent adverse outcomes and ensure all women are aware of risks.

Table 3.3: Classification of care received by women who died from hypertensive disorders of pregnancy, UK and Ireland 2021-23

Classification of care received	Number of women (%) N=6
Good care	0 (0)
Improvements to care which would have made no difference to outcome	1 (17)
Improvements to care which may have made a difference to outcome	5 (83)

4. Lessons on cardiovascular care

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4.1 Key messages

New recommendations

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation **[ACTION: Maternal Medicine Networks in England and Health Boards in devolved nations]**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care **[ACTION: Integrated Care Boards and Health Boards]**

Existing guidance and recommendations requiring improved implementation

Women who are older, obese, smoke or have diabetes or a family history may be at greater risk of heart disease (Knight, Bunch et al. 2019)

Develop guidance for the use of brain natriuretic peptide (B-type natriuretic peptide) measurement in pregnancy (Knight, Bunch et al. 2022)

A persistent sinus tachycardia is a 'red flag' and should always be investigated, particularly when there is associated breathlessness (Knight, Bunch et al. 2019)

When assessing a woman with chest pain care should be given to review the presenting symptoms the woman had before she was given analgesia and abnormal electrocardiograms should not be ignored (Knight, Nair et al. 2016)

It is vital that autopsy is undertaken systematically for robust diagnosis of sudden arrhythmic death syndrome (SADS). All women who died from sudden cardiac arrest and who have a morphologically normal heart should have molecular studies performed at post-mortem with the potential for family screening as there is a real possibility of identifying an inherited channelopathy. Tissues should be retained for genetics and families followed-up (Knight, Nair et al. 2016)

A family history of sudden death of a young relative (aged less than 40) is important and may be an indication of inherited cardiac conditions (Knight, Bunch et al. 2019)

When aortic dissection occurs in a young woman, the underlying diagnosis should be assumed to be an inherited aortopathy until proven otherwise (Knight, Nair et al. 2016)

In all cases of aortic dissection a sample of spleen should be retained (or other appropriate sample for the local genetics laboratory) for potential genetic testing, and unless a non-heritable cause is identified, the family should be referred to the local cardiologist or geneticist for consideration of screening (Knight, Bunch et al. 2022)

Genetic counselling should state for women known to be carriers of any inherited condition, whether the associated genetic mutation is known or unknown, and whether they need a cardiovascular risk assessment in pregnancy. Anyone with a family history or genetic confirmation of aortopathy or channelopathy should be referred for cardiac assessment before pregnancy (Knight, Bunch et al. 2019)

Pregnancy is not recommended in patients with (or history of) aortic dissection (Regitz-Zagrosek, Roos-Hesselink et al. 2018)

Take a cardiac-specific history and suspect heart failure if there is not another likely cause of any of the following symptoms (National Institute for Health and Care Excellence 2019):

- breathlessness when lying down (ruling out aortocaval compression) or at rest
- unexplained cough, particularly when lying down or which produces frothy pink sputum
- paroxysmal nocturnal dyspnoea – being woken from sleep by severe breathlessness and coughing, which may produce pink frothy sputum and is improved by moving to an upright position
- palpitation (awareness of persistent fast heart rate at rest)

A raised respiratory rate, chest pain, persistent tachycardia and orthopnoea are important signs and symptoms of cardiac disease which should always be fully investigated. The emphasis should be on making a diagnosis, not simply excluding a diagnosis (Knight, Nair et al. 2016)

It is important to be mindful of the possibility of a cardiac diagnosis when repeated attempts are made to access medical care, particularly when extreme anxiety and breathlessness are prominent symptoms (Knight, Nair et al. 2016)

Ensure that guidance on care for pregnant women with complex social factors is updated to include a role for networked maternal medical care and postnatal follow-up to ensure that it is tailored to women's individual needs and that resources in particular target vulnerable women with medical and mental health comorbidities and social complexity (Knight, Bunch et al. 2023)

4.2 Background

Cardiovascular disease was the single leading cause of maternal death in the UK for over 20 years from 2000-02 until 2020-22 when it was surpassed by thrombosis and thromboembolism and COVID-19 (Felker, Patel et al. 2024). While this triennium, 2021-23, saw continued declines in the overall rate of maternal cardiovascular death, cardiac disease remained the leading cause of indirect maternal death during pregnancy or up to six weeks after pregnancy. Maternal cardiac deaths in 2021-23 were largely the result of acquired heart disease, reflective of the current maternity population who are entering pregnancy at older ages and with more risk factors and comorbidities such as obesity and hypertension. Evidence from this year's report also suggests that mental health comorbidities may be impacting the physical health or quality of care received by some women with heart disease. Proper recognition and assessment of women's individual risks and appropriate specialist multidisciplinary care remain crucial in order to see continued reductions in maternal cardiac deaths.

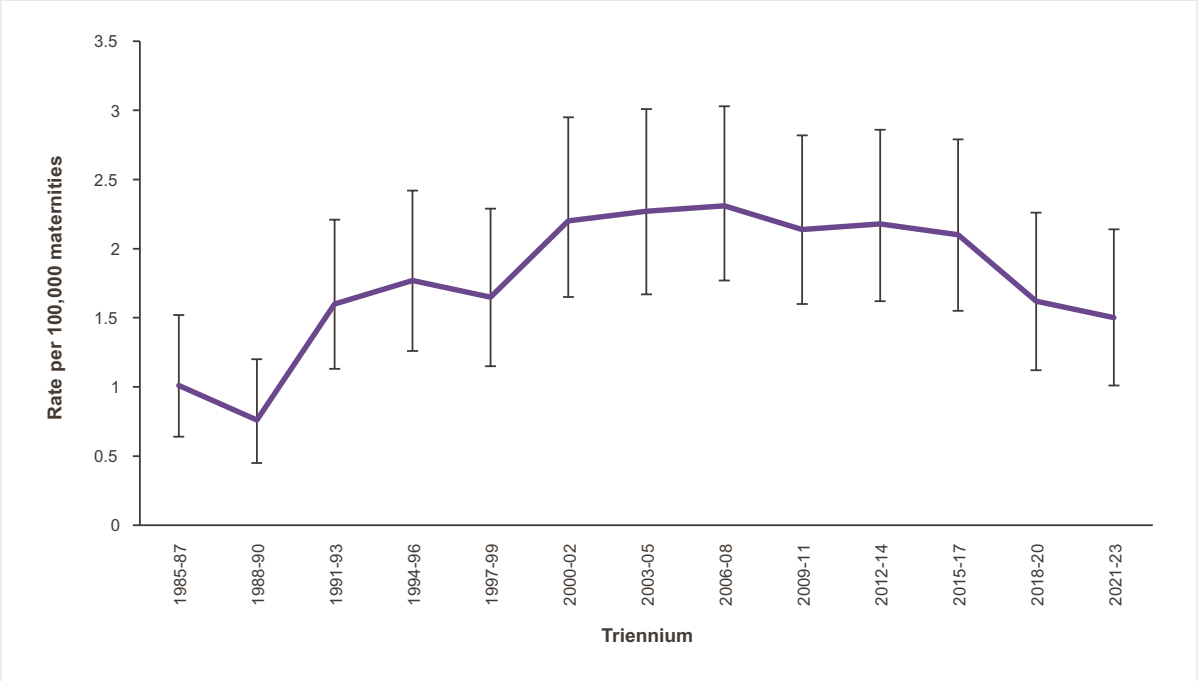
4.3 The women who died

Overall, 79 women in the UK and Ireland died from heart disease associated with, or aggravated by, pregnancy in 2021-23 (3.64 per 100,000 maternities, 95% CI 2.88-4.54) (Table 4.1). Of these women, 30 died in the UK during or up to six weeks after pregnancy, a maternal mortality rate of 1.50 per 100,000 maternities (95% CI 1.01-2.14)(Figure 4.1). This rate is non-statistically significantly lower than comparable rates in previous years' reports.

Table 4.1: Timing of maternal deaths due to cardiac causes in relation to pregnancy, UK and Ireland 2021-23

Timing of death	Number of women (%) N=79
Antenatal period/still pregnant	12 (15)
On day of delivery	7 (9)
1 to 42 days after the end of pregnancy	12 (15)
43-91 days after the end of pregnancy	12 (15)
92-182 days after the end of pregnancy	11 (14)
183-273 days after the end of pregnancy	11 (14)
274-364 days after the end of pregnancy	14 (18)

Figure 4.1: Maternal mortality rates* due to cardiac causes per 100,000 maternities, UK 1985-23



*Including only women who died during pregnancy or up to six weeks after the end of pregnancy in the UK

The causes of cardiovascular deaths are shown in Figure 4.2 and Table 4.2. Compared to the last two triennia, there was a shift in the leading causes of cardiovascular deaths in 2021-23. While deaths due to myocardial disease remained relatively consistent, there was a non-statistically significant increase in the rate of maternal deaths from ischaemic heart disease in 2021-23 compared to 2018-20 (RR 1.69, 95% CI 0.80-3.80, p=0.1445). Maternal mortality rates due to SADS/MNH were two-fold higher in 2021-23 compared to 2018-20 (RR 1.94, 95% CI 0.90-4.42, p=0.071). There were no deaths due to congenital heart disease or pulmonary arterial hypertension in 2021-23.

Figure 4.2: Proportion of cardiovascular deaths by cause, UK and Ireland 2021-23

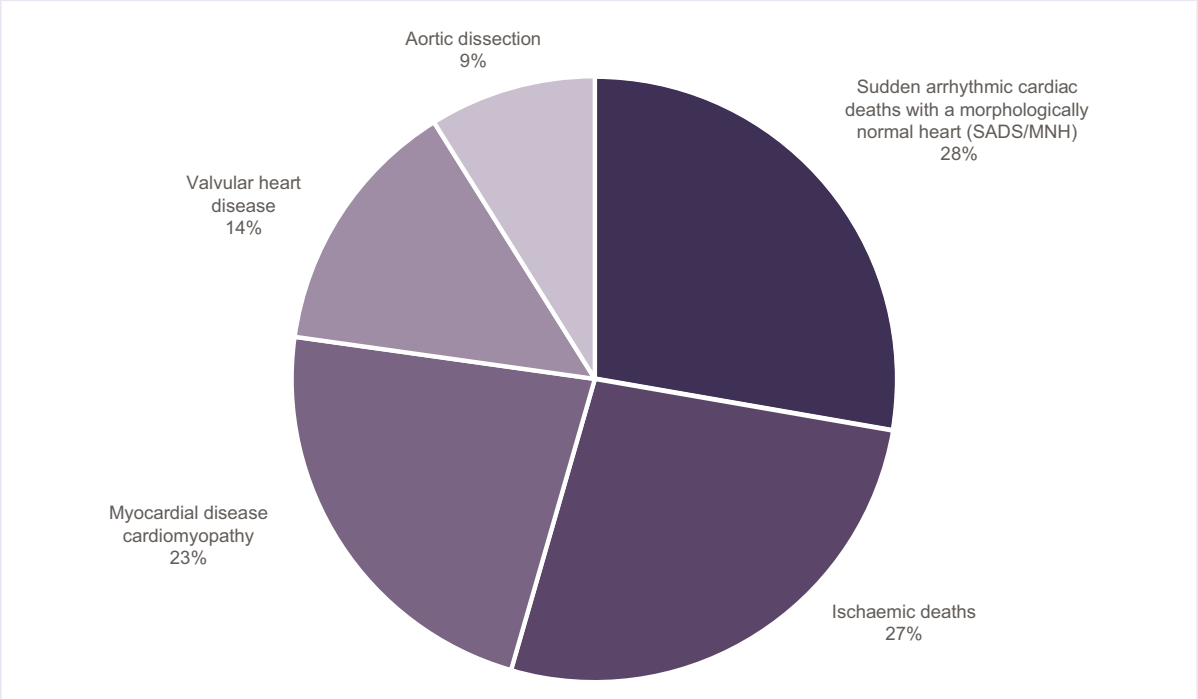


Table 4.2: Subclassification of cardiac deaths, UK and Ireland 2021-23

Subclassification	Number of women (%) N=79
Sudden arrhythmic cardiac deaths with a morphologically normal heart (SADS/MNH)	22 (28)
Ischaemic cardiac disease	21 (27)
Atherosclerosis	18
Coronary artery dissection	3
Myocardial disease/ cardiomyopathy	18 (23)
Left ventricular hypertrophy (LVH) with or without fibrosis	6
Left ventricular hypertrophy (LVH) in morbid obesity/hypertension	6
Myocarditis	1
Idiopathic myocardial fibrosis (IMF)	2
Defined cardiomyopathy	2
Ventricular disease (not otherwise specified)	1
Valvular heart disease	11 (14)
Valve disease	6
Endocarditis	5
Aortic dissection	7 (9)

Only 11% of the women who died from cardiovascular causes were known to have pre-existing cardiac problems, though most women had significant risk factors for cardiac disease (Table 4.3). Twenty-seven percent of the women who died were overweight (n=21) and a further 37% were obese (n=29); approximately a third of the women who were classified as obese had a BMI greater than 40 kg/m^2. More than half of the women (56%) had known pre-existing health conditions not including obesity and 34% were known to smoke.

Maternal mortality rates from cardiovascular disease generally increased with age. In 2021-23, women aged 35-39 were at a two-fold times higher risk of death and women aged 40 or over were at a three-fold times higher risk of death from cardiovascular disease compared to women aged 25-29 (Table 4.4). Women living in the most deprived areas of England had a nearly two-fold higher mortality rate from cardiovascular causes compared to women living in the least deprived areas (Table 4.4).

Table 4.3: Sociodemographic, medical and pregnancy-related characteristics of women who died from cardiac causes, UK and Ireland 2021-23

	Number of women (%) N=79
Age	
<24	10 (13)
25-29	13 (16)
30-34	22 (28)
35-39	26 (33)
≥40	8 (10)
Body mass index (BMI kg/m^2)	
<18	4 (5)
18-24	22 (28)
25-29	21 (27)
≥30	29 (37)
Missing	3 (4)
Pre-existing cardiac problems	
Yes	9 (11)
No	70 (89)
Pre-existing medical problems (excluding obesity)	
Yes	44 (56)
No	35 (44)
Smoking	
Smoked during pregnancy	27 (34)
Non-smoker	49 (62)
Missing	3 (4)
Ethnicity	
White European	59 (75)
Asian	7 (9)
Black	10 (13)
Other ethnicity	3 (4)

	Number of women (%) N=79
Woman's region of birth	
United Kingdom/Ireland	57 (72)
Outside UK/Ireland	19 (24)
Missing	3 (4)
Socioeconomic status (Index of multiple deprivation (IMD) of postcode of residence)	
I (Least deprived/ highest 20%)	11 (14)
II	7 (9)
III	16 (20)
IV	11 (14)
V (Most deprived/ lowest 20%)	26 (33)
Missing	8 (10)

Table 4.4: Maternal mortality rates per 100,000 maternities amongst women from different population groups who died from cardiac causes, UK and Ireland or England* 2021-23

	Total maternities	Total deaths^	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
Age (years)						
<24	300,975	10	3.32	1.59 – 6.11	1.40	0.55 – 3.46
25 – 29	548,818	13	2.37	1.26 - 4.05	1 (Ref)	--
30 – 34	749,481	22	2.94	1.84 – 4.44	1.24	0.60 – 2.68
35 – 39	456,078	26	5.70	3.72 – 8.35	2.41	1.19 – 5.10
≥ 40	114,206	8	7.00	3.02 – 13.8	2.96	1.06 – 7.70
IMD Quintiles (England only*)						
I (Least deprived/ highest 20%)	243,864	6	2.46	0.90 – 5.36	1 (Ref)	--
II	275,778	4	1.45	0.40 – 3.71	0.59	0.12 – 2.49
III	305,730	9	2.94	1.35 – 5.59	1.20	0.38 – 4.08
IV	348,596	9	2.58	1.18 – 4.90	1.05	0.33 – 3.58
V (Most deprived/ lowest 20%)	404,857	17	4.20	2.45 – 6.72	1.71	0.64 – 5.29

*Data for England only due to availability of denominator data

^IMD information was not available for one woman

4.4 Overview of care and new lessons to be learned

Appreciation and management of individual risk

An multiparous woman in her 40s died a week after giving birth. She had a strong family history of cardiac disease, multiple adversity and cardiac risk factors including a diagnosis of coronary artery disease with angina, obesity and smoking. She was not seen by a cardiologist until 32 weeks' gestation. At this visit she reported feeling fatigued with longstanding chest pain and shortness of breath. Her atypical symptoms were documented but a recent electrocardiogram and echocardiogram were reported as normal and no plans were put in place for intrapartum care. Three days after giving birth, she was noted to be hypertensive. At discharge the following day, her hypertension was not noted and the community midwife who visited a day later was not aware of her complex history. Maternal observations were not carried out. She collapsed at home the next day and could not be resuscitated. A post-mortem confirmed coronary artery thrombosis.

The care of this woman echoes many of the themes discussed in Chapter 3 on the management of women with hypertensive disorders including the need for pre-pregnancy counselling and getting 'ready for pregnancy'. Of all the women who died from cardiac disease in 2021-23, 29% had at least three previous pregnancies and assessors

felt there were missed opportunities for interpregnancy counselling. This included discussions around medication adherence and optimisation as mentioned in Chapter 3, and interventions to address modifiable risk factors such as obesity and smoking, which may help improve overall cardiometabolic health.

Clinical message

'Get ready for pregnancy' – the period before conception, or between pregnancies, is an ideal time to counsel women about their health and address any physical or mental health conditions or social needs that may require management prior to becoming pregnant. Counselling should include, but is not limited to, optimisation of medications for chronic conditions, advice on weight management or smoking cessation and specialist referral to mental health or addiction services.

Of the women who died from ischaemic heart disease, 19% had a history of hypertensive disorders of pregnancy and all had known risk factors including older maternal age, smoking, obesity, diabetes or a family history of cardiovascular disease (Box 4.1). In addition, four (20%) of the women who died from ischaemic heart disease were from South Asian ethnic backgrounds; South Asian women are known to have an increased risk of cardiovascular disease compared to White women (Scottish Intercollegiate Guidelines Network 2017). Assessors questioned whether there is adequate, dedicated risk screening for cardiac conditions at booking. This includes taking a cardiac obstetric history, as previous pre-eclampsia is an independent risk factor for future heart failure, coronary heart disease and stroke (Wu, Haththotuwa et al. 2017).

Box 4.1: Risk factors for ischaemic heart disease

- Older maternal age
- Smoking
- Obesity
- Diabetes
- Hypertension and/or pregnancy-associated hypertensive disorders
- Family history of premature coronary disease (< 55 years in men and < 65 years in women)
- Hypercholesterolaemia

Women who are older, obese, smoke or have diabetes or a family history may be at greater risk of heart disease (Knight, Bunch et al. 2019)

In addition to the risk factors described above, cannabis use was also noted amongst several of the women who died from ischaemic heart disease. While more evidence is required, emerging research suggests an association between cannabis use and an increased risk of premature cardiovascular disease (Jeffers, Glantz et al. 2024) further emphasising the need to complete a comprehensive risk assessment at booking.

Although the care of the woman described above included multidisciplinary discussion with an obstetric cardiologist, as is recommended (National Institute for Health and Care Excellence 2019), this consultation was delayed to the third trimester. As highlighted in the new recommendation, high-risk women should have urgent referral for senior, specialist review as soon as possible in pregnancy. Assessors felt that this woman would have benefited from being under the care of the local maternal medicine team who would have been able to coordinate and plan her care during and after pregnancy.

NEW **National recommendation**

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation.

The use of biomarkers in risk assessment and management

The woman above had established coronary artery disease, which is known to increase the risk of adverse events during and after pregnancy. When she presented with chest pain, she appropriately underwent an electrocardiogram (ECG) and echocardiography but there was no documented measurement of troponin levels, which is recommended for pregnant women with chest pain, especially in the context of coronary artery disease (Regitz-Zagrosek, Roos-Hesselink et al. 2018). Instead, her atypical symptoms were dismissed and no precautions were made including earlier management of ongoing anaemia, which may have helped reduce strain on her heart.

The European Society of Cardiology (ESC) recommend the measurement of troponin, in addition to ECG, in pregnant women with chest pain to help diagnose and manage coronary artery disease (Regitz-Zagrosek, Roos-Hesselink et al. 2018); however, there is no similar guidance for the use of natriuretic peptides, including B-type natriuretic peptide (BNP) and N-terminal pro B-type natriuretic peptide (NT-proBNP) in pregnant women with heart failure. Research evidence suggests that both BNP and NT-proBNP are stable throughout normal pregnancy (Sarma, Aggarwal et al. 2022) and have a high diagnostic accuracy (Sheikh, Ostadrahimi et al. 2021). Pregnancy-specific reference intervals for healthy pregnant women have also been defined (Dockree, Brook et al. 2021).

Develop guidance for the use of brain natiuretic peptide (B-type natriuretic peptide) measurement in pregnancy (Knight, Bunch et al. 2022)

Discharge summaries

At discharge the woman above did not have senior obstetric review or a clear postnatal plan to manage her ongoing hypertension. Information was not shared with the community team regarding her family, medical and obstetric history and, as a result, her risks were not appreciated and observations were not carried out when she reported feeling well. Women need to be made aware of their individual risks and be empowered to discuss their health with all those caring for them, regardless of the location.

Clinical message

'FIGO pregnancy passport' – There are tools available to help inform women, and those caring for them, about their future health risks after pregnancy complications. The ***pregnancy passport*** designed by The International Federation of Gynaecology and Obstetrics (FIGO) was created for women with pre-pregnancy or pregnancy-induced risk factors for cardiometabolic diseases. It is designed to be provided to women after childbirth and before discharge from hospital to facilitate screening and management. It includes advice on recommended follow-up checks and information about potential risks on future health, and offers interventions to reduce such risks.

A multiparous Asian woman had a history of hypertension. She was taking ramipril before pregnancy but did not receive any pre-pregnancy counselling. After she became pregnant, her medication was changed to nifedipine and then to labetalol due to headaches. She experienced severe hyperemesis and associated weight loss requiring admission and oral antiemetics. Her blood pressure (BP) remained difficult to control and she was seen at the general medical clinic for secondary hypertension screening. The clinic referred her for an echocardiogram, which showed a mildly dilated aorta. One week later, at 20 weeks' gestation, she presented to the emergency department with radiating chest pain, shortness of breath and vomiting. The obstetric team advised aortic dissection should be excluded but she did not have any imaging and was discharged with a diagnosis of gastritis. Her BP remained difficult to manage for the remainder of her pregnancy and during labour. Postnatally, she was mildly hypertensive and was discharged on day three without senior review, a plan for BP management or antihypertensive medications. She presented the next day with hypertension, headache and right upper quadrant pain but did not have a medical review and was discharged with labetalol. She collapsed two days later, one week after birth. Post-mortem confirmed an aortic dissection.

As discussed above, this woman would have benefitted from pre-pregnancy counselling including discussions of risk and the importance of medication adherence. She had several clear indicators of cardiac risk but these did not seem to be considered upon admission to the emergency department. The possibility of an aortic dissection was raised by the obstetric team but she did not have any cardiac investigations or imaging despite chest pain that was severe enough to wake her from sleep. Her BP was not well controlled for most of her pregnancy despite prescribed antihypertensive medications and referrals to specialist hypertension clinics. However, this did not appear to result in any escalation of care, including at discharge from hospital.

As discussed across this report, communication at discharge from the hospital to primary care was a major area in need of improvement for many of the women who died. Often, ongoing health concerns were not recognised, or were not properly managed. There were also instances where electronic patient record systems did not convey critical information to GPs resulting in missed opportunities for monitoring and intervention. Recognition of the severity or significance of cardiovascular risks is essential for postpartum care. This includes a documented plan for long-term hypertension control in order to mitigate the risk of future cardiovascular events. An integrated approach between maternity and primary care is therefore crucial, including a lower threshold for investigation or management of women with multiple underlying cardiovascular risk factors and postnatal hypertension.

NEW **National recommendation**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care.

Recognition of symptoms

A young woman had significant mental health issues and social complexities. During pregnancy, she faced numerous stressors. In light of her history, she received significant multi-agency support from social and mental health services. During pregnancy, she had multiple presentations outside of antenatal care including ten in the last trimester for reduced fetal movements, dizziness, itchiness, visual disturbances, abdominal pain, palpitations and shortness of breath. She was also increasingly anaemic and persistently tachycardic with low B12 and folate. Less than a month after birth she presented to the emergency department with sepsis and remained unwell after initial treatment. Further investigations resulted in a diagnosis of cardiomyopathy. Her cardiac function deteriorated and she died five months postpartum.

While the support that this woman received for her mental health and social vulnerabilities was commendable, assessors felt that these concerns may have dominated her care and overrode any assessment of physical symptoms. There was extensive documentation about her mental health and social risks within her medical records, but assessors noted that, despite her multiple attendances to the emergency department, there were no Maternity Early Warning Score (MEWS) charts to review and very few recorded observations. For instance, her BP and respiratory rate were seldom mentioned despite a persistent tachycardia. As noted in previous MBRRACE-UK reports, persistent tachycardia is a 'red flag' symptom that requires thorough investigation, particularly when there is associated chest pain or breathlessness (Knight, Nair et al. 2016, Knight, Bunch et al. 2019). This woman's tachycardia was attributed to her anaemia after a normal ECG without further investigation of the cause or efforts to better treat her severe anaemia, which persisted despite oral iron supplementation. There was evidence of similar dismissal of 'red flag' or repeat symptoms amongst most of the women reviewed. In several instances, assessors felt that the acceptance of abnormal symptoms or test results as normal may have prevented earlier recognition of underlying cardiac problems.

A persistent sinus tachycardia is a 'red flag' and should always be investigated, particularly when there is associated breathlessness (Knight, Bunch et al. 2019)

Assessors also noted that this woman's B12 and folate levels were low in the third trimester and continued to decrease postnatally. Folate was prescribed, but there was no consideration of her B12 levels. Low B12 can imply a dietary deficiency and assessors felt that malnourishment should have been considered. She had clear evidence of self-neglect related to her mental health problems and had many symptoms of malnutrition, including severe anaemia

that did not respond to oral iron supplementation, significant lymphopenia and a low BMI with further weight loss after pregnancy. Many of the women's atypical symptoms including itchiness, dizziness and visual disturbances could also be attributed to malnourishment. Malnourishment can put a strain on the heart and can be a cause of cardiomyopathy, which assessors felt should have been considered as contributory to her death.

Physical and mental health comorbidities

A non-English speaking woman had lived in the UK for five years. She was induced at term due to fetal growth restriction and had a vaginal birth. Five months after birth her infant was found unresponsive and resuscitation was unsuccessful. The woman expressed suicidal ideation and the police brought her to the emergency department. She was distressed and found to be tachycardic and hypertensive. She also reported chest pain and numb hands. An electrocardiogram showed a prolonged QTc interval but this was thought to be normal for this woman. A mental health referral was made where she disclosed a history of depression, alcohol use and domestic abuse. She was admitted to a mental health unit with a diagnosis of a grief reaction. While in the unit she experienced chest pain again, which was attributed to her psychological distress. She collapsed and died one hour later.

This woman was one of seven who died of cardiac causes who did not speak or understand English. Assessors felt that this woman's risk factors, mental health history and possible cardiac history were not fully captured due to language barriers. Although an interpreter was used for most antenatal visits, these consultations took place in the presence of her partner, which may have influenced her disclosure of information as has been discussed in previous MBRRACE-UK enquiries (Felker, Patel et al. 2024). This woman was visibly distressed but the focus was on her mental health in the context of her recent bereavement. As a result, her abnormal ECG and associated cardiac symptoms did not appear to be fully appreciated or appropriately followed-up. This woman did not have a post-mortem examination and so the exact cause of her death, including any potential genetic contribution, could not be fully explored. However, assessors felt this woman may have had long QT syndrome, which could also have been inherited by her child. They emphasised that, for women with unexplained cardiac death, including potential sudden arrhythmic death syndrome (SADS), a full autopsy is required including the retention of tissue for genetic analysis and potential family screening (Knight, Nair et al. 2016). Regardless of its underlying cause, a prolonged QTc interval can increase the risk of cardiac arrest, especially in the context of significant stress, and should have been properly investigated.

When assessing a woman with chest pain care should be given to review the presenting symptoms the woman had before she was given analgesia and abnormal ECGs should not be ignored (Knight, Nair et al. 2016)

It is vital that autopsy is undertaken systematically for robust diagnosis of sudden arrhythmic death syndrome (SADS). All women who died from sudden cardiac arrest and who have a morphologically normal heart should have molecular studies performed at post-mortem with the potential for family screening as there is a real possibility of identifying an inherited channelopathy. Tissues should be retained for genetics and families followed-up (Knight, Nair et al. 2016)

Nearly 40% of the women who died from cardiac disease, including the two previous women described above, had known mental health problems. Assessors felt that, for some women, the physical pathology they were experiencing was wrongly attributed to mental health conditions without further investigation or curiosity about the underlying cause. For instance, one woman's increased respiratory rate and low oxygen saturation were attributed to a panic attack when they were actually signs of significant deterioration, which led to cardiac arrest. For other women, assessors observed that their mental health may have affected their physical health. Eating disorders, which were noted amongst several women who died from SADS, are associated with cardiac abnormalities (Sachs, Harnke et al. 2016) and a greater incidence of cardiovascular disease (Tith, Paradis et al. 2020). Also, a high proportion of women who died from valvular heart disease (36%) were known to use substances and, in some instances, intravenous drug use was thought to be the cause of infective endocarditis. The lessons learned from the care of women who died from psychiatric causes, including substance use, are discussed in Chapter 6 of this report.

4.5 Recurring lessons to be learned

Pre-pregnancy counselling

A young woman in her second pregnancy had a family history of thoracic aortic disease and confirmed *MYH11* mutation. She was known to a genetic team and routinely monitored prior to pregnancy but did not receive pre-pregnancy counselling. She had maternal medicine input and was seen by a cardiologist in her second trimester. A plan was made for surveillance echocardiography during pregnancy and for six months postpartum. She had two echocardiograms postnatally that did not show any change in the thoracic aortic root size. Nine months after birth she presented with palpitations, headache and chest pain radiating to the jaw and neck. Cardiology was consulted and advised a CT angiogram, which was thought to show aortic root dilation but no evidence of dissection. She was discharged with a diagnosis of migraine and advised to return if symptoms recurred. She died at home three days later and the post-mortem confirmed aortic dissection. A retrospective review of her CT angiogram by a cardiothoracic radiologist identified a Type A (ascending) aortic dissection.

This woman had a very strong family history of aortic dissection but did not receive pre-pregnancy counselling, including a cardiac assessment, as has been previously recommended by MBRRACE-UK (Knight, Bunch et al. 2019). The need for comprehensive pre-pregnancy counselling has been a consistent message in this and previous MBRRACE-UK reports and the focus of a recently developed ***pre-conception toolkit*** (Blundell, Schoenaker et al. 2025). However, many of the women who died from cardiac disease received limited, if any, pre-pregnancy counselling. Assessors felt that these women could have been better informed of their risks should they become pregnant, as well as any actions they could take to minimise these risks prior to pregnancy.

Aortic dissection

Think aorta

The woman above received specialist, multidisciplinary input during pregnancy and had serial echocardiograms during pregnancy and postpartum that were found to be normal. When she presented with symptoms typical of an aortic dissection, this was appropriately considered but she was not reviewed by a consultant cardiologist. Her CT angiogram was delayed until late at night and no specialist radiologist was available to review it prior to her discharge from hospital. When her CT scan was subsequently reviewed after her death, evidence of a dissection was found. Assessors felt that different imaging modalities and review by senior clinicians may have resulted in her admission and urgent referral to cardiothoracic surgeons.

The recommendation to 'Think Aorta' has been repeatedly stated in MBRRACE-UK reports. Many of the women who died from aortic dissection, including this woman, presented with typical symptoms including severe chest pain radiating to the back, jaw, neck or shoulder, shortness of breath, dizziness and blurred vision. Although aortic dissection was considered for this woman, it was ultimately dismissed and she was instead given a likely diagnosis of migraine. This was the case for most of the women who died from aortic dissection whose symptoms were attributed to other causes including gastritis, stress and labour. Of the seven women who died from aortic dissection, only one had a definitive diagnosis at the time she presented with symptoms.

Inherited risk

The woman described above was one of four women who died from aortic dissection (n=4/7, 57%) who had a family history of sudden death due to aortic dissection or cardiac disease. Consideration of the family history is important as it can indicate the possibility of a heritable aortopathy or other clinically relevant cardiac gene mutation. This was the case for this woman and one other who were found to have a mutation of the *MYH11* gene, which is associated with an increased risk of familial thoracic aortic dissection (Takeda, Morita et al. 2015). This woman's family history and genetic mutation were known about prior to her death but assessors felt that not all those involved in her care may have known about these or recognised their significance. At post-mortem no tissue sample was retained for genetic testing. Pathology assessors re-emphasised the importance of retaining splenic samples from women who die from aortic dissections for potential genetic testing. In young women, an inherited aortopathy should be assumed as the underlying diagnosis until proven otherwise and, unless a non-heritable cause is identified, the family should be referred for consideration of genetic screening (Knight, Nair et al. 2016, Knight, Bunch et al. 2022). This did appear to be the case for the other woman whose *MYH11* mutation was first identified at post-mortem at which point efforts were made to ensure family screening.

A family history of sudden death of a young relative (aged less than 40) is important and may be an indication of inherited cardiac conditions (Knight, Bunch et al. 2019)

When aortic dissection occurs in a young woman, the underlying diagnosis should be assumed to be an inherited aortopathy until proven otherwise (Knight, Nair et al. 2016)

In all cases of aortic dissection a sample of spleen should be retained (or other appropriate sample for the local genetics laboratory) for potential genetic testing, and unless a non-heritable cause is identified, the family should be referred to the local cardiologist or geneticist for consideration of screening (Knight, Bunch et al. 2022)

Genetic counselling should state for women known to be carriers of any inherited condition, whether the associated genetic mutation is known or unknown, and whether they need a cardiovascular risk assessment in pregnancy. Anyone with a family history or genetic confirmation of aortopathy or channelopathy should be referred for cardiac assessment before pregnancy (Knight, Bunch et al. 2019)

Two women who died from aortic dissection had Marfan syndrome, which is associated with a high risk of aortic dissection in pregnancy (Regitz-Zagrosek, Roos-Hesselink et al. 2018). Two further women had conditions that may have increased their risk of aortic dissection; one had Gorlin-Chaudhry-Moss syndrome, which is recently thought to be associated with aortopathy (Legué, François et al. 2020) and the other had a Chiari malformation with a suspected underlying connective tissue disorder. Heritable connective tissue disorders, including Marfan and Ehlers-Danlos syndromes, occur in approximately 1% of patients with Chiari malformations and concomitant presentation is more common in younger females (Clarke, Reyes et al. 2023). It is important that women with conditions conferring a high-risk of aortic dissection receive appropriate monitoring before, during and after pregnancy.

Aortic surgery complications

Two women died following elective thoracic aortic aneurysm repair. Both women had undergone previous aortic surgeries and both had a termination of pregnancy prior to their re-do operation. One woman died during the surgery and the other developed a postoperative Type A dissection. The care of these two women highlights that aortic surgery is high-risk and even a shortened pregnancy may increase the risk of aortic dissection.

Pregnancy is not recommended in patients with (or history of) aortic dissection.

ESC Guidelines for the management of cardiovascular diseases during pregnancy (Regitz-Zagrosek, Roos-Hesselink et al. 2018)

Pre-hospital care

A woman moved to the UK in her second trimester. She attended maternity triage with abdominal pain and decreased fetal movements. A scan showed a normally grown fetus and her blood pressure was normal. A booking appointment was made and she was commenced on thromboprophylaxis. A month later she had sudden onset shortness of breath. Her family contacted 999 and the call was triaged as category 2; however, they were advised that taking her to the nearest emergency department would be quicker than waiting for an ambulance. They called again ten minutes later when she became unresponsive and the call was triaged as category 1. The first ambulance crew arrived ten minutes after the second call followed by the second ambulance crew and operational manager. There were access difficulties and she was carried down several flights of stairs while staff continued CPR using a mechanical device. An obstetric team were pre-alerted to her arrival and a resuscitative hysterotomy was carried out in the emergency department, one hour after her collapse. She died from myocardial ischaemia secondary to atherosclerosis.

Of the 79 women who died from cardiac causes, 61 collapsed outside of the hospital. Of these women, 20 (33%) were pregnant at the time of collapse and 13 were over 20 weeks' gestation. Eight of the women who were over 20 weeks' gestation at the time of their collapse had a RH. One additional woman who had a cardiac arrest in hospital also had a RH. Resuscitative hysterotomy was considered, but not deemed appropriate, for four further women. Of the eight women who had an RH following an out of hospital cardiac arrest, four had the procedure performed before transfer to hospital. The importance of early RH has been emphasised in past MBRRACE-UK reports (Felker, Patel et al. 2024) as a means to increase the likelihood of a return of spontaneous circulation in women over 20 weeks' gestation if there is no response to CPR after four minutes (Chu, Johnston et al. 2020, Resuscitation Council UK 2021).

Assessors noted that not all pre-hospital teams have the ability to perform this procedure. Only pre-hospital doctors attending as part of an enhanced care team can perform a RH in the pre-hospital setting. There is limited evidence concerning the success of RH when performed out of hospital but if an enhanced care team is dispatched and arrives in a timely manner, then an RH should be undertaken in the pre-hospital setting. Ambulance clinicians are required to consider the risks and benefits of staying on-scene and waiting for an enhanced care team or transporting the woman to hospital. Although maintaining manual uterine displacement and effective life support during conveyance to the hospital can be challenging, this may be required in order to perform a RH.

As also noted in past MBRRACE-UK reports (Felker, Patel et al. 2024), several women who died from cardiac causes experienced delays in pre-hospital care. This woman's family was initially recommended to convey the women to the hospital themselves as there was no ambulance available, demonstrating the impact of wider system pressures on the ability to provide timely emergency care. The National Pre-hospital Maternity and Newborn Care group have recently developed a Pre-hospital Maternity Decision Tool to help guide assessment of pregnant and recently pregnant women. The tool has MEWS parameters embedded within it and highlights other red flags to guide on-scene management and timeliness of transfer to hospital (Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and Association of Ambulance Chief Executives (AACE) 2024).

This woman's flat was difficult to access and this created challenges in extrication. This was also the case for several other women who died or whose care was reviewed for the morbidity enquiry. Assessors felt that this may have affected the time on-scene and transfer to hospital for definitive management. A protracted extrication can also affect the ability to continue resuscitation. This may provide some context to the poorer outcomes experienced by women living in areas of deprivation.

Clinical message

'Difficulties in extrication' - Women living in deprived areas may experience delays in ambulance response times or transfer to the hospital due to difficulties in access to or from their residence. In the event an ambulance is needed, it is recommended that women are moved close to the exit of their property if possible. Unlocking doors or removing obstacles can facilitate access and expediate extrication.

Recognition of symptoms

Confirmation bias

A woman died several weeks after experiencing an early miscarriage. She had a history of miscarriage as well as type 1 diabetes, asthma, hypertension and a previous pulmonary embolism. She also had a family history of pulmonary embolism and stroke. She presented to the emergency department with chest tightness and shortness of breath that was worse on exertion and not relieved using an inhaler. An electrocardiogram showed sinus tachycardia and a CT pulmonary angiogram was negative. She was diagnosed with a chest infection and discharged home. She collapsed two weeks later and could not be resuscitated. Occlusive coronary atheroma was found on post-mortem examination.

Assessors identified several examples where the clinical focus was on pulmonary embolism or asthma when women presented with chest or cardiac-related symptoms, such as shortness of breath or cough. As illustrated in this vignette, the potential of heart disease as a cause of chest pain was often not considered for the women who died. Assessors felt this was due to a misconception that the maternity population is at little or no risk of cardiac disease, particularly ischaemic heart disease, because of their relatively young age. This assumption should be challenged, especially with the increasing prevalence of risk factors such as obesity and older maternal age. It is critically important to exercise a high degree of suspicion for cardiac disease in this population; when pregnant or postpartum women

present with chest pain, acute coronary syndrome should always be considered in the differential diagnosis. There were several women who presented to the emergency department with cardiac symptoms, who were discharged from hospital without a firm diagnosis. Often this occurred without senior clinical assessment or review of diagnostic imaging reports, as was the case for this woman. It is not enough to exclude pulmonary embolus or another diagnosis, an explanation for the chest pain should be sought.

Take a cardiac-specific history and suspect heart failure if there is not another likely cause of any of the following symptoms:

- **breathlessness when lying down (ruling out aortocaval compression) or at rest**
- **unexplained cough, particularly when lying down or which produces frothy pink sputum**
- **paroxysmal nocturnal dyspnoea – being woken from sleep by severe breathlessness and coughing, which may produce pink frothy sputum and is improved by moving to an upright position**
- **palpitation (awareness of persistent fast heart rate at rest).**

NICE NG121: Intrapartum care for women with existing medical conditions or obstetric complications and their babies (National Institute for Health and Care Excellence 2019)

A raised respiratory rate, chest pain, persistent tachycardia and orthopnoea are important signs and symptoms of cardiac disease which should always be fully investigated. The emphasis should be on making a diagnosis, not simply excluding a diagnosis (Knight, Nair et al. 2016)

Repeat presentations and 'red flag' symptoms

An older multiparous woman had numerous risk factors for ischaemic heart disease. She smoked and had a history of pre-eclampsia and a family history of heart disease. She was not started on aspirin for pre-eclampsia prophylaxis despite her increased risk. Her antenatal care was uneventful and she was discharged two days after a caesarean birth. Postnatally she reported shoulder pain to her health visitor who gave advice on positioning and directed her to contact her GP if pain recurred. Three weeks after giving birth she reported similar pain to her GP. She was not found to have breathlessness or calf pain and was given advice about when to re-consult with no further investigations performed. She was found dead at home less than two weeks later. Post-mortem confirmed coronary artery thrombosis secondary to severe coronary artery atheroma.

This woman had numerous risk factors for ischaemic heart disease. During pregnancy she was appropriately risk assessed for gestational diabetes and thrombosis, but there did not seem to be any consideration of the cardiac risk associated with her previous pre-eclampsia or other risk factors. This also appeared to be the case after she had given birth when assessments were aimed at excluding a potential pulmonary embolism rather than considering heart disease as a cause of her shoulder pain. Assessors noted that heartburn during pregnancy and shoulder pain after birth are common presentations and may not prompt more thorough cardiac investigations. However, they considered that, in light of this woman's history, there may have been opportunities for earlier diagnosis of ischaemic heart disease.

It is important to be mindful of the possibility of a cardiac diagnosis when repeated attempts are made to access medical care, particularly when extreme anxiety and breathlessness are prominent symptoms (Knight, Nair et al. 2016)

The Royal College of Physicians (RCP) toolkit highlights 'red flag' symptoms associated with cardiac disease including chest pain and atypical pain (Box 4.2). It is a reminder of the need to investigate unusual or persistent symptoms in pregnant and recently pregnant women.

Box 4.2: Red flags in a pregnant woman presenting with chest pain:

- Pain requiring opioids
- Pain radiating to arm, shoulder, back or jaw
- Sudden-onset, tearing or exertional chest pain
- Associated with haemoptysis, breathlessness, syncope or abnormal neurology
- Abnormal observations

RCP Acute care toolkit 15: Managing acute medical problems in pregnancy (Royal College of Physicians 2019)

Multidisciplinary care

Good care

A woman in her 30s with no significant medical history was booked for consultant-led care and had an uneventful pregnancy and birth. Seven months after giving birth she presented to the emergency department with shortness of breath and a recent history of fatigue and lethargy. She had multiple investigations including an echocardiogram, CT pulmonary angiogram and CT. The resulting working diagnosis was multi-organ failure secondary to native aortic valve endocarditis. She was admitted to the ICU and received multidisciplinary care with input from specialist teams in the hospital and other centres before organ support was withdrawn and she died.

This woman's symptoms were thoroughly examined when she presented to the emergency department with ambiguous symptoms. Pulmonary embolism was ruled out as a possibility and a cardiac cause was considered and appropriately investigated by echocardiogram. This need for diagnostic curiosity has been emphasised in many past MBRRACE-UK reports (Knight, Nair et al. 2016, Knight, Bunch et al. 2020a, Felker, Patel et al. 2024). This woman is one of many included in this year's confidential enquiries who had appropriate multidisciplinary input into her care and review from senior specialists, which are repeated MBRRACE-UK recommendations.

Maternal medicine networks

A multiparous woman with complex medical, mental and social circumstances died a week after the birth of her child. She had a history of asthma, heart disease, depression, substance use, homelessness and domestic abuse. She booked late for antenatal care and found it difficult to attend antenatal appointments. In the third trimester she presented with shortness of breath when lying flat and a nocturnal cough. She was referred for an echocardiogram but did not attend the appointment. She had a late preterm caesarean birth for fetal growth restriction. Postnatally, she had a worsening productive cough with significant wheeze, a raised respiratory rate and low oxygen saturation. A panic attack, asthma, chronic obstructive pulmonary disease and pneumonia were considered as potential diagnoses but she continued to deteriorate and died. Rheumatic valve disease with severe mitral stenosis and right heart failure was diagnosed at post-mortem.

This woman had many symptoms that should have prompted a suspicion of heart failure (National Institute for Health and Care Excellence 2019), but the focus of investigations appeared to be on a respiratory cause. She also had many 'red flag' symptoms of breathlessness (Box 4.3) that were not appropriately recognised and investigated.

Box 4.3: Red flags in a pregnant woman presenting with breathlessness:

- Sudden onset breathlessness
- Orthopnoea
- Breathlessness with chest pain or syncope
- Respiratory rate >20 breaths per minute
- Oxygen saturation <94% or falls to <94% on exertion
- Breathlessness with associated tachycardia

RCP Acute care toolkit 15: Managing acute medical problems in pregnancy (Royal College of Physicians 2019)

This woman missed many appointments, including for an echocardiogram that may have helped provide an earlier diagnosis of her underlying condition. As discussed more in Chapter 5, non-attendance is a common occurrence amongst women with medical, mental health and social complexities, and assessors noted several instances of good care where women's vulnerabilities were appropriately recognised and extensive efforts were made by healthcare professionals, particularly midwives, to engage women and build a trusting relationship.

For this woman, assessors felt that there was no senior oversight for her care and noted that she may have benefited from referral to a maternal medicine network. Maternal medicine networks were developed in England to reduce inequalities in care and ensure that women who need specialist care and advice are able to access it. During the three-year period (2021-23) covered by this year's report, many areas were still finalising their network structures. As such, there is variable involvement of the maternal medicine networks in the care of the women who died. It is also worth noting that, even with the development of these networks, regional differences in service specification, including who is considered eligible for care, may produce inequities in access. This also holds true in other devolved nations where maternal medicine networks have not been developed. Assessors re-emphasised a continued need to define pathways for referral for women with multiple and complex problems (Knight, Bunch et al. 2019) so that those who need it can benefit from access to specialist, multidisciplinary care.

Postnatal care

A woman in her 30s had a complicated history of substance use and endocarditis leading to mitral valve replacement. She had older children who were not in her care and her current pregnancy was unplanned. She booked early at her local hospital and a care plan was made in conjunction with a tertiary centre 150 miles away. There was liaison between the two centres but she missed several appointments because of transport difficulties. She had an uneventful late preterm caesarean birth and self-discharged two weeks later. Care was transferred back to the local hospital. Eight months postnatally she was admitted under cardiology with endocarditis. She reported substance use and a safeguarding referral was made. She took her own discharge before completing her six-week antibiotic course. She was readmitted three months later with a further episode of infective endocarditis. She took her own discharge and died four days later.

This woman had many examples of good care during pregnancy. Her social circumstances were recognised and efforts were made to provide money for transport and arrange home visits. She had an early referral for specialist care and her cardiac obstetric team considered the difficulties she faced reaching the tertiary centre and liaised appropriately with the local team. There was also multidisciplinary planning for birth and good handover back to local care when she took her own discharge from the tertiary centre after giving birth. However, as is often reported by MBRRACE-UK, this multidisciplinary care did not continue postnatally. This woman had not been using intravenous drugs for several years prior to pregnancy, but there appeared to be no curiosity about why she started again postnatally. There was a safeguarding referral put in place for her children, but it was not clear what the outcome of this was and whether it may have contributed to her declining health. There was also no evidence that the woman's social or mental health were considered when she took her own discharge after developing endocarditis three months postnatally. It is imperative that multidisciplinary support for women with physical, mental health or social complexities continues postnatally in order to recognise and appropriately respond to deteriorating health.

Clinical message

'Need for inquisitiveness' – When women present with unexplained symptoms or declining physical or mental health it is important to ask why and consider the whole picture. This includes the recognition of symptoms in the context of personal and family history as well as consideration of mental health problems and social risk factors or stressors that may impact health and how women engage with healthcare.

Ensure that guidance on care for pregnant women with complex social factors is updated to include a role for networked maternal medical care and postnatal follow-up to ensure that it is tailored to women's individual needs and that resources in particular target vulnerable women with medical and mental health comorbidities and social complexity (Knight, Bunch et al. 2023)

Integrated care after death

A multiparous woman in her 30s with no significant medical history or known risk factors died nine days after a caesarean birth. Her antenatal care and birth were uneventful. She had good postnatal care with three home visits by community midwives after discharge with no reported symptoms or concerns. On the day of her death, she appeared well but was found unresponsive an hour later. Resuscitation attempts were appropriate but ultimately unsuccessful. The family were well supported after her death with a bereavement midwife attending to offer support.

There were some examples of exemplary care and multidisciplinary working at the time of death as seen in the care of this woman. However, there were other examples of siloed care, which was often exacerbated by geographical distance between units. There were also instances where disparate electronic patient record systems restricted the sharing of relevant clinical information between clinical teams, different specialities and between hospital and community teams.

A young woman in her first pregnancy had no known risk factors or family history of cardiac disease. She presented to the emergency department with nausea and vomiting at 22 weeks' gestation and was diagnosed with pyelonephritis. She was admitted and treated with IV antibiotics. Senior specialist advice was sought when she did not initially respond to treatment. She recovered well and was discharged with oral antibiotics. At 28 weeks' gestation she was found dead at home. The cause of death was determined to be Sudden Arrhythmic Death Syndrome (SADS). Maternity services were not informed of her death and continued to pursue missed appointments.

Assessors noted that this woman's pyelonephritis was appropriately managed in line with NICE guidance. However, after her death, there was no communication between the hospital and the community midwife who continued to try and contact her at home until they were informed by a close relative that the woman had died. There were several other women where limitations of information sharing resulted in appointments being chased after the woman had died, which caused significant distress for families.

Appropriate follow-up

Electrocardiograms (ECGs)

A woman who did not smoke and had no significant medical history had hyperemesis in early pregnancy that required several hospital admissions. During one admission, at 8 week's gestation, an electrocardiogram (ECG) showed borderline Right Bundle Branch Block (RBBB). A few weeks later she reported chest pain and had a CT pulmonary angiogram that was inconclusive and an ECG that showed long QTc. This was not investigated further and no referral was made to cardiology. She was discharged with thromboprophylaxis. She had several episodes of back and neck pain and worsening

anaemia that was not treated until the third trimester. Shortly after a caesarean birth near term, while still in the operating suite, she had a cardiac arrest. She was transferred to the ICU and had a CT pulmonary angiogram and head CT en route, which were normal. An echocardiogram showed slight thickening of the left and right ventricles. Cardiology review suggested hypertrophic obstructive cardiomyopathy and recommended cardiac MRI and CT coronary angiogram if she recovered. Over the next few hours she became increasingly unstable, had another cardiac arrest and could not be resuscitated. Mild left ventricular hypertrophy was identified at post-mortem. There was no comment on the right heart and the cause of death was given as peripartum cardiomyopathy.

There were several instances of missed opportunities to recognise and follow-up abnormal ECGs. This woman had two abnormal ECGs in early pregnancy, neither of which were followed-up and neither of which prompted escalation of care or senior or specialist review. Assessors noted that the first ECG, performed at 8 weeks' gestation, occurred in the emergency department when the woman was admitted for hyperemesis and before she was booked for antenatal care. The results of this ECG, which showed borderline Right Bundle Branch Block (RBBB) did not appear to be known to anyone else involved in her care; it was only discovered during review after her death. The provision of early antenatal care by gynaecology or teams in early pregnancy assessment units can introduce communication barriers due to different electronic systems and locations. For this woman, some of the information from her early admissions was entered into her maternity record, but it appears this potentially critical finding was not.

When she had her second ECG a few weeks later, it showed a prolonged QTc but this was not investigated further. This woman would have benefited from a cardiology review and repeat ECG after potassium replacement in order to accurately assess her risk and provide an earlier diagnosis of an underlying cardiomyopathy or channelopathy.

On post-mortem examination, this woman's fatal cardiac arrest was attributed to peripartum cardiomyopathy; however, assessors noted that this is rare and relies on clinical diagnosis rather than pathology as it is largely a diagnosis of exclusion. They felt that the ECG findings and incomplete investigation of the heart did not provide sufficient evidence to support this diagnosis. They also noted that there was no tissue retained for genetic testing and therefore no investigations of potential inheritable conditions or channelopathies that may have led to the prolonged QTc, and a missed opportunity for family screening.

4.6 Conclusions

Deaths due to cardiovascular disease continue to be among the leading causes of maternal death in the UK. While most women who died from cardiac disease in 2021-23 did not have diagnosed pre-existing cardiac problems, most had significant risk factors for cardiac disease. As such, pre-pregnancy counselling remains important to improve the care of women with known cardiovascular disorders or potential risk factors. This includes optimisation of medications before they become pregnant as well as discussions on risk reduction including weight loss or smoking cessation. It remains imperative that signs and symptoms of cardiac disease, including typical 'red flag' symptoms or symptoms requiring repeat presentation, are thoroughly investigated and a cardiac cause is considered as part of the differential diagnosis. While medical complexities are often recognised for women with cardiac disease, evidence from this enquiry suggests that more attention must be paid to social risk factors and mental health comorbidities that can impact how women engage with care and how their symptoms are interpreted. The need to continue multidisciplinary care into the postnatal period through proper communication at discharge from hospital and ongoing management plans was also highlighted in the care of the women who died.

There was sufficient information to assess the care of all 79 women who died from cardiovascular disease. Of these women, opportunities to improve care were identified for almost all (86%). Assessors felt that different care was unlikely to change the outcome for 38 women (48%) but may have made a difference to the outcome for 30 of the women who died (38%).

Table 4.5: Classification of care received by women who died from cardiovascular causes, UK and Ireland 2021-23

Classification of care received	Number of women (%) N=79
Good care	11 (14)
Improvements to care which would have made no difference to outcome	38 (48)
Improvements to care which may have made a difference to outcome	30 (38)

5. Lessons for the care of women with multiple disadvantages

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5.1 Key messages

New recommendations

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation **[ACTION: Maternal Medicine Networks in England and Health Boards in devolved nations]**

Update guidelines on the care of women with complex social factors to include clear guidance for a standardised assessment and documentation of social risk factors at booking appointments and at least once more later in pregnancy. In the absence of sufficient evidence to update guidance, commission research to explore the unique care needs of vulnerable populations **[ACTION: National Institute for Health and Care Excellence (NICE) and National Institute for Health and Care Research (NIHR)]**

Develop guidance for information sharing within maternity services and across health services and other agencies in the event of safeguarding concerns. Ensure that codes for flagging domestic abuse are applied in women's records and are known to all those caring for her **[ACTION: National Institute for Health and Care Excellence (NICE)]**

Existing guidance and recommendations requiring improved implementation

Develop a UK-wide specification for identifying and recording the number and nature of social risk factors, updated throughout the perinatal care pathway, in order to offer appropriate enhanced support and referral (Draper, Gallimore et al. 2023b, Draper, Gallimore et al. 2023a)

In order to inform mapping of their local population to guide service provision, commissioners should ensure that the following are recorded: The number of women presenting for antenatal care with any complex social factor. Examples of complex social factors in pregnancy include: poverty; homelessness; substance use; recent arrival as a migrant; asylum seeker or refugee status; difficulty speaking or understanding English; age under 20; domestic abuse. Complex social factors may vary, both in type and prevalence, across different local populations (National Institute for Health and Care Excellence 2010)

Healthcare professionals should be given training on multi-agency needs assessment and national guidelines on information sharing (National Institute for Health and Care Excellence 2010)

Develop or adapt clear protocols and methods for sharing information, both within and between agencies, about people at risk of, experiencing, or perpetrating domestic violence and abuse. Clearly define the range of information that can be shared and with whom (this includes sharing information with health or children's services on a perpetrator's criminal history (National Institute for Health and Care Excellence 2014)

Take note of the Data Protection Act and professional guidelines that address confidentiality and information sharing in health services. This includes guidelines on how to apply the Caldicott guardian principles to domestic violence. It also includes guidelines on: seeking consent from people to share their information, letting them know when, and with whom, information is being shared, and knowing when information can be shared without consent (National Institute for Health and Care Excellence 2014)

Tell the woman that the information she discloses will be kept in a confidential record and will not be included in her hand-held record (National Institute for Health and Care Excellence 2010)

Ensure frontline staff in all services are trained to recognise the indicators of domestic violence and abuse and can ask relevant questions to help people disclose their past or current experiences of such violence or abuse. The enquiry should be made in private on a one-to-one basis in an environment where the person feels safe, and in a kind, sensitive manner (National Institute for Health and Care Excellence 2014)

Ensure there are integrated care pathways for identifying, referring (either externally or internally) and providing interventions to support people who experience domestic violence and abuse, and to manage those who perpetrate it (National Institute for Health and Care Excellence 2014)

Healthcare professionals should be given training on the social and psychological needs of women who use substances (National Institute for Health and Care Excellence 2010)

Ensure maternity services deliver personalised care, which should include identifying and addressing the barriers to accessing specific aspects of care for each individual (Draper, Gallimore et al. 2023b, Draper, Gallimore et al. 2023a)

Ensure that guidance on care for women with complex social factors is updated to include a role for networked maternal medical care and postnatal follow-up to ensure that it is tailored to women's individual needs and that resources in particular target vulnerable women with medical and mental health comorbidities and social complexity (Knight, Bunch et al. 2023)

5.2 Background

The deaths of pregnant or postpartum women due to accidents or homicide are considered 'coincidental' to pregnancy (World Health Organisation 2012) and therefore excluded from global maternal mortality figures. However, simply being pregnant or recently pregnant can affect the care that women receive, including during resuscitation events after an accident. It can also increase the risk of seemingly unrelated events, such as esclated incidences of domestic abuse (Lewis 2007). Previous MBRRACE-UK reports identified that women who died from accidental causes or homicide often experienced multiple disadvantages, including significant mental health challenges, and suicidal intent was a potential contributing factor in several accidental deaths (Knight, Bunch et al. 2019). Many women who died from these 'coincidental' causes of death also experienced significant levels of deprivation (Knight, Tuffnell et al. 2015, Knight, Bunch et al. 2019). Deprivation has consistently been linked to a higher risk of maternal mortality and is the topic of this year's MBRRACE-UK morbidity confidential enquiry, which examines the care of women who were living in the most deprived areas and who did not die but did experience a perinatal loss or other complication. As for the women who died from accidental causes and homicide, many women included in the morbidity enquiry experienced multiple disadvantages. This chapter therefore includes the characteristics and lessons learned from the care of women who died due to accidents or homicide as well as a subset of women whose care was examined for the morbidity confidential enquiry.

5.3 The women who died

Accidental deaths

In 2021-23, 15 women died from accidental causes in the UK and Ireland, a mortality rate of 0.69 per 100,000 maternities (95% CI 0.39-1.14). Four women were undelivered at the time of their death and one had a RH. Of the remaining 10 women, nine died between six weeks and one year after the end of pregnancy. Two thirds of the women (n=10) died as the result of road traffic accidents, two from crush injuries and three from other causes (fire, drowning and electrocution).

As in previous years (Knight, Bunch et al. 2019), most (53%) of the women who died from accidental deaths had at least one element of disadvantage. Nearly half of the women (47%) were living in the most deprived areas (IMD IV and V). Many had social risk factors including domestic abuse (33%), a history of abuse as a child (20%) and social service involvement (33%). Half (53%) had known mental health problems and 20% had known substance use (Table 5.1). Other sociodemographic, medical and pregnancy-related characteristics of the women who died from accidental deaths are shown in Table 5.2.

Table 5.1: Elements of disadvantage and social risk factors amongst women with multiple disadvantages, UK and Ireland 2021-23*

Characteristics	Accidental deaths Number of women (%) N=15	Homicides Number of women (%) N=14	Deprivation (morbidity enquiry) Number of women (%) N=17
Socioeconomic status (Index of multiple deprivation (IMD) of postcode of residence)			
First – third quintile (least deprived)	6 (40)	2 (14)	7 (41)
Fourth/fifth quintile (most deprived)	7 (47)	8 (57)	10 (59)
Missing	2 (13)	4 (29)	0 (0)
Domestic abuse (prior to pregnancy/ during pregnancy)			
Yes	5 (33)	7 (50)	4 (24)
No	8 (53)	5 (36)	12 (71)
Missing	2 (13)	2 (14)	1 (6)
History of abuse as a child			
Yes	3 (20)	1 (7)	0 (0)
No	7 (47)	5 (36)	7 (41)
Missing	5 (33)	8 (57)	10 (59)
Known to social services			
Yes	5 (33)	5 (36)	2 (12)
No	10 (67)	6 (43)	14 (82)
Missing	0 (0)	3 (21)	1 (6)
Mental health problems or psychiatric disorders			
Yes	8 (53)	7 (50)	12 (71)
No	7 (47)	5 (36)	5 (29)
Missing	0 (0)	2 (14)	0 (0)
Known substance use			
Yes	3 (20)	6 (43)	1 (6)
No	12 (80)	6 (43)	14 (82)
Missing	0 (0)	2 (14)	2 (12)
Unemployed (woman and partner)			
Yes	2 (13)	3 (21)	13 (76)
No	11 (73)	9 (64)	2 (14)
Missing	2 (13)	2 (14)	2 (14)

*Including all women who died from accidental causes and homicide in the UK and Ireland 2021-23 and women included in this year's morbidity confidential enquiry into the care of women living in the most deprived areas of the UK who were determined to have multiple disadvantages on the basis of the data available

Table 5.2: The sociodemographic, medical and pregnancy-related characteristics of women who died from accidental causes and homicide, UK and Ireland 2021-23

Characteristics	Accidental deaths Number of women (%) N=15	Homicides Number of women (%) N=14
Age		
<25	2 (13)	1 (7)
25 – 34	9 (60)	8 (57)
≥ 35	4 (27)	5 (36)
Body mass index (BMI kg/m^2)		
18-24	8 (53)	6 (43)
25-30	2 (13)	4 (29)
≥30	5 (33)	2 (14)
Missing	0 (0)	2 (14)
Ethnicity		
White European	12 (80)	10 (71)
Other minority ethnic group	3 (20)	4 (29)

Deaths due to homicide

In 2021-23, 14 women died as the result of homicide in the UK, a mortality rate of 0.65 per 100,000 maternities (95% CI 0.35-1.08). Five women were still pregnant at the time of their death and one died on the day of delivery following a RH. One woman was killed between one and 42 days after the end of pregnancy and seven were killed between six weeks and one year after the end of pregnancy.

All but one woman (n=13, 93%) were murdered by their partner or former partner. Of the women murdered by their partner, six (46%) had reported domestic abuse and information about domestic abuse was missing for two (14%). Six women (43%) were killed by stabbing, four by blunt force trauma (29%), three by strangulation (21%) and one (7%) by another method.

The social risk factors of the women who died from homicide are shown in Table 5.1; almost all the women who died by homicide (n=11, 79%) had at least one element of disadvantage. The other sociodemographic, medical and pregnancy-related characteristics of the women who died are shown in Table 5.2.

5.4 The women whose care was reviewed for the morbidity enquiry

A stratified random sample of women who were living in the most deprived areas was drawn from the MBRRACE-UK database of perinatal deaths. To compare the care these women received to a control population, women living in the least deprived areas were also sampled from the database of perinatal deaths and national birth registers and matched based on region, ethnic group and age range within five years. Of the 41 women identified from the two databases, records were received for 33 women. Only women who had identified elements of disadvantage, including but not limited to deprivation, are included in this section (n=17). Lessons from the care of other women included in the morbidity enquiry are discussed elsewhere in this report.

Of the 17 women with elements of disadvantage included in this section, most (n=10, 59%) were from the most deprived areas (Table 5.1). The main elements of disadvantage were mental health conditions (n=12, 71%), domestic abuse (n=4, 24%) (Table5.1) and financial need (n=5, 29%). Two women had recently arrived in the UK, one of whom did not speak or understand English. Two further women were born abroad and did not speak or understand English but it was not clear how long they had been in the UK prior to their pregnancy. Due to the nature of the sampling, all but one woman included in this section experienced a perinatal loss event. The other sociodemographic, medical and pregnancy-related characteristics of the women who were reviewed as part of the morbidity enquiry are shown in Table 5.3.

Table 5.3: The sociodemographic characteristics of women living in the most and least deprived areas who did not die but who had multiple disadvantages, UK 2023

Characteristics	Deprivation (morbidity enquiry) Number of women (%) N=17
Age	
<25	4 (24)
25 – 34	12 (71)
≥ 35	1 (6)
Body mass index (BMI kg/m^2)	
18-24	4 (24)
25-30	4 (24)
≥30	6 (35)
Missing	3 (18)
Ethnicity	
White European	8 (47)
Black	4 (24)
Asian	2 (12)
Other ethnic group	2 (12)

5.5 Overview of care and new lessons to be learned

Recognition of complex care needs

A young woman in her third pregnancy was living in a deprived area and was known to both mental health and social services prior to pregnancy. She booked late for antenatal care after several missed appointments. She disclosed multiple social risk factors at booking but was placed on a low-risk pathway based on her obstetric history. Continuity of care was challenging during her pregnancy and she missed multiple midwife appointments despite repeated attempts to contact her. A safeguarding referral to social services was made in the second trimester but not followed-up. She continued to see her GP throughout her pregnancy, but the GP was not aware of her missed appointments. She had a placental abruption and gave birth to a stillborn infant at 30 weeks' gestation. A bereavement midwife attempted to contact the woman but received no response. M

This woman had significant complexities relating to her mental health and social vulnerabilities. However, despite her significant history, she was referred for low-risk, midwifery-led care. Assessors felt that this may represent siloed thinking where the focus on a woman's obstetric history or physical health conceals other needs that may require specialist input early in pregnancy. They reiterated the need for a separate, urgent referral pathway for high-risk women as outlined in Chapters 3 and 4. Assessors felt that this woman would have also benefited from a longer booking appointment in order to develop a coordinated care plan and address any accommodations that could be made to improve engagement. Multi-agency needs assessments, including safeguarding, are recommended for the care of women with complex social factors (National Institute for Health and Care Excellence 2010); however, it is clear from the review of the women in this section that integrated planning is highly varied in practice. While there were some examples of good care and high quality of support for women with multiple adversity, this was inconsistent depending on what services were available within that hospital or region. For instance, some women were offered vouchers for transport or free data for their phone, but these supports were not available in all places. Having robust systems in place to ensure equity of care in all regions is essential to improving outcomes.

NEW **National recommendation**

Set up an urgent referral pathway in early pregnancy for women with high-risk medical conditions or complex social circumstances to ensure they receive early triage for senior or specialist consultation.

There was also evidence of significant variability in the way that information relating to social risk factors was assessed and recorded within maternity notes. There is no current standard for how to discuss and record women's social risk factors and assessors felt that the 'tick box' nature of electronic maternity records may prevent any depth of understanding about women's personal circumstances. While this woman's social complexity was asked about and documented, this did not happen for many of the women whose care was reviewed. In many instances, women were either not asked about or did not disclose information about social risk factors such as substance use or domestic abuse to their maternity team. Assessors noted the difficulty clinicians face when relying on self-referral and women's willingness to disclose information that is often sensitive or stigmatised. This is particularly true at booking appointments when women have not yet developed a trusted relationship with their healthcare provider. There must be time to revisit conversations around social risk factors later in pregnancy when women may feel more comfortable sharing information.

NEW **National recommendation**

Update guidelines on the care of women with complex social factors to include clear guidance for a standardised assessment and documentation of social risk factors at booking appointments and at least once more later in pregnancy. In the absence of sufficient evidence to update guidance, commission research to explore the unique care needs of vulnerable populations.

Develop a UK-wide specification for identifying and recording the number and nature of social risk factors, updated throughout the perinatal care pathway, in order to offer appropriate enhanced support and referral (Draper, Gallimore et al. 2023b, Draper, Gallimore et al. 2023a)

Assessment and recording of deprivation

The majority of women who died from accidental deaths or homicide were living in the most deprived areas. This included 56% of the women who died in road traffic accidents, which mirrors national figures showing an association between road casualties and high deprivation (Department for Transport 2023). However, assessors noted that maternity records are not designed to assess and record information about deprivation including insecure housing, refugee status or financial need. This was particularly apparent in the care of women who did not die but who were living in deprived areas where assessors were specifically asked to look for recording of social risk factors in the maternity notes. Only two women had documented housing insecurity, one of whom was also said to have no complex social factors or safeguarding needs. Both of these women and three further women also had documented financial difficulties. Assessors thought that any standardised assessment of complex social factors should be extended to more consistently capture other elements of deprivation, including housing, financial difficulties and social or family support that may impact women's ability to engage in care.

In order to inform mapping of their local population to guide service provision, commissioners should ensure that the following are recorded: The number of women presenting for antenatal care with any complex social factor. Examples of complex social factors in pregnancy include: poverty; homelessness; substance use; recent arrival as a migrant; asylum seeker or refugee status; difficulty speaking or understanding English; age under 20; domestic abuse. Complex social factors may vary, both in type and prevalence, across different local populations.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

Interagency working for complex women

The woman above missed 15 appointments with midwifery services. However, this information was not known to her GP, whom she was seeing regularly throughout her pregnancy. Additionally, while assessors commended the efforts made to follow-up missed appointments, they felt that this was not recognised as a potential 'red flag' given this woman's many social complexities. As such, they thought that there was a missed opportunity for earlier referral for safeguarding and social services involvement when a pattern of non-attendance was first seen during her booking appointment. There is a duty for all healthcare professionals to share relevant information that may affect the care a woman receives or her outcome (Knight, Bunch et al. 2021). Interagency working and direct communication can help improve continuity of care and ensure that pertinent information is not missed.

A British born Asian woman in her early 30s experienced domestic abuse perpetrated by her new husband. A few weeks prior to becoming pregnant she reported her husband to the police and a Multi-Agency Risk Assessment Conference (MARAC) deemed her high-risk with an active alert. This alert was in her GP records but was not identified at her booking appointment. She did not disclose domestic abuse at booking and no safeguarding concerns were documented. It is not clear if her husband was in attendance. At 15 weeks' gestation she was admitted to hospital with palpitations and shortness of breath. Her MARAC alert was noted by emergency department staff and an abusive episode was witnessed while in hospital. The woman disclosed domestic abuse but did not want police involvement. A Domestic Abuse, Stalking and Honour Based Violence (DASH) risk assessment was completed but no further action was taken. She was discharged with contact details for support groups. The following day she was seen by a community midwife but there was no discussion of domestic abuse or safeguarding. One week later she was killed by her husband.

Domestic abuse was documented for nearly half of the women who were killed by their partner or a former partner. However, it was clear from the care of this woman and others, that disjointed services and limited communication between different healthcare providers and agencies meant that this information was not known to all those caring for her. This was true even in instances where there had been previous multi-agency involvement including Multi-Agency Risk Assessment Conferences (MARACs) or Multi-Agency Safeguarding Hub (MASH) referrals (Box 5.1). This woman had a MARAC alert in place that was noted in her GP records but was not identified by the community midwife at booking. Another woman who was killed by her partner had a MARAC alert put in place during preg-

nancy for domestic abuse, but this was closed after it was discovered that the woman had miscarried. There was no follow-up by general adult safeguarding. Assessors stressed the importance of ensuring that women are continuously supported through interagency working and joined-up communication. Whenever safeguarding concerns are noted, there should be clear integrated care pathways for referral and escalation so that vulnerable women do not fall through the gaps (National Institute for Health and Care Excellence 2014).

NEW **National recommendation**

Develop guidance for information sharing within maternity services and across health services and other agencies in the event of safeguarding concerns. Ensure that codes for flagging domestic abuse are applied in women's records and are known to all those caring for her.

Healthcare professionals should be given training on multi-agency needs assessment and national guidelines on information sharing.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

Develop or adapt clear protocols and methods for sharing information, both within and between agencies, about people at risk of, experiencing, or perpetrating domestic violence and abuse. Clearly define the range of information that can be shared and with whom (this includes sharing information with health or children's services on a perpetrator's criminal history.)

Take note of the Data Protection Act and professional guidelines that address confidentiality and information sharing in health services. This includes guidelines on how to apply the Caldicott guardian principles to domestic violence. It also includes guidelines on: seeking consent from people to share their information, letting them know when, and with whom, information is being shared, and knowing when information can be shared without consent.

NICE PH50 Domestic violence and abuse: multi-agency working (National Institute for Health and Care Excellence 2014)

Box 5.1: Domestic abuse assessment and response (*safelives.org.uk*)

The **Domestic Abuse, Stalking and Honour Based Violence (DASH)** risk identification assessment and management model was implemented across all police services in the UK from March 2009. The DASH checklist is an evidence-based, multi-agency tool used by police officers and other frontline professionals to identify and evaluate the risks posed to all people experiencing domestic abuse. It also includes an assessment on what needs to be done to keep the individual and any children safe. For people at high-risk, this may require a referral to a relevant risk management panel.

The **Multi-Agency Risk Assessment Conference (MARAC)** is a meeting that brings together representatives from different agencies including police, social and child protection services, healthcare practitioners (GPs and midwives), local housing or health authorities and Independent Domestic Violence Advisors (IDVAs) to share information and create a plan to offer protection.

Independent Domestic Violence Advisors (IDVAs) are trained professionals who provide specialist support to individuals experiencing domestic abuse. They offer practical advice, emotional support and advocacy to help survivors navigate complex systems, such as family courts, social services and the healthcare system.

Assessors identified many examples in the care of the women included in this section where safeguarding issues should have been identified but were missed and emphasised the need to 'make every contact count'. When the above woman's MARAC alert was flagged in the emergency department, she initially denied domestic abuse until an abusive episode was witnessed. There was similar evidence of non-disclosure from other women who later disclosed domestic abuse or whose domestic abuse was known about to other services. Guidance from NICE recommends a one-to-one consultation in a secure environment and without the woman's partner on at least one occasion to facilitate discussion of sensitive issues, including domestic abuse (National Institute for Health and Care Excellence 2010). It is not clear if this always happened, especially when women were assessed by teleconsultation and it was not known if partners were listening. Assessors emphasised that domestic abuse and coercive control can be incredibly complex. Women experiencing domestic abuse may minimise their partner's behaviour or deny any abuse out of fear that it will worsen their situation or lead to stigmatisation or child removal. It is essential that staff are trained to

recognise and support women experiencing domestic abuse. This includes the recognition that some groups such as minority ethnic populations, people with disabilities or communication difficulties and LGBTQ+ people may face additional barriers in accessing support services (National Institute for Health and Care Excellence 2014).

Multidisciplinary team training message

'Make every contact count' - Maternity staff, or other frontline staff in contact with pregnant or recently pregnant women, should be trained to recognise the risks and indicators of domestic abuse including the increased risk in pregnancy and association with childhood adversity, mental health and substance use. Staff should know how to ask relevant questions and create a secure environment to facilitate disclosure of current or past domestic abuse. Training must also include guidance on how to respond to disclosures of domestic abuse in a sensitive manner that ensures women's safety and staff should be aware of local referral pathways for specialist services. Any training provided must be trauma-informed and culturally sensitive in order to recognise the complexities of coercive control including how individual characteristics may impact disclosure (National Institute for Health and Care Excellence 2016).

5.6 Recurring lessons to be learned

Domestic abuse

Domestic abuse is any controlling, coercive, threatening or violent behaviour from one person towards another person who is personally connected to them. It can encompass a single incident or an ongoing pattern of behaviours. It is important to highlight that not all domestic abuse will be violent and in some instances, homicide will be the first incident with physical injuries (Monckton Smith 2020). Therefore, it is necessary to recognise all the ways that domestic abuse can manifest including physical or sexual abuse, violent or threatening behaviour, controlling or coercive behaviour, economic abuse or psychological, emotional or other abuse (UK Public General Acts 2021). While anyone can be impacted by domestic violence, it most frequently impacts women and children; an estimated one in four women will experience domestic abuse in their lifetime. Pregnant and postpartum women are at an increased risk of domestic abuse; thirty percent of all domestic abuse begins in pregnancy and 40-60% of women who experience domestic abuse are abused during their pregnancy, often with escalating frequency and severity (Lewis 2007).

Amongst the women who died in 2021-23, 22% had recorded experiences of domestic abuse (Chapter 2). For the women included in this chapter, the proportion was even higher ranging from 24% amongst women in the deprivation morbidity enquiry to 50% of the women who were killed (Table 5.1). As is repeatedly noted by MBRRACE-UK, these numbers are likely an underestimation of the true prevalence as data regarding domestic abuse is often missing from women's records, either because the woman is not asked or feels unable to disclose this information. Although guidance emphasises the importance of asking women about domestic abuse on at least one occasion (without their partner present) (National Institute for Health and Care Excellence 2010) and to repeat risk assessments at every antenatal appointment (National Institute for Health and Care Excellence 2021), this is not often the case. Evidence from the care of women included in this chapter also suggests that healthcare providers were not always provided with the training required to recognising the risks or signs of potential domestic abuse and, if disclosed, to respond appropriately through safeguarding and referral for specialist support.

Recognition

A White British born woman in her late 30s requested a caesarean section for the birth of her first child due to a fear of dying in labour. She had a severe anxiety disorder and was noted to have a history of adverse childhood events and sexual assault. Throughout pregnancy she was under the care of the perinatal mental health team and social services. She continued to drink alcohol but did not use any other substances. She was seen by the crisis team eight months after giving birth and admitted to hospital following an overdose 11 months postnatally. A week after she was discharged, she was stabbed to death by her partner, a few days before her child's first birthday. There was no documentation of domestic abuse.

Four of the women included in this chapter had a known history of abuse as a child; however, many more, including this woman, had evidence of other adverse childhood experiences including parental substance use and mental illness. Adverse childhood experiences and a repeating pattern of trauma was also documented amongst the women

who died from psychiatric causes (Chapter 6). These findings emphasise the importance of addressing broader societal and systematic issues and highlight the need for improved identification, intervention and support services for pregnant women with multiple disadvantages, including those at risk of domestic abuse.

Assessors felt that this woman's adverse childhood experiences were well recognised and she was provided with good perinatal mental health (PMH) support throughout her pregnancy. The link between adversity in childhood and mental health problems, including substance use is well-established (Hughes, Bellis et al. 2017). A growing body of evidence also suggests that adverse childhood experiences can affect the formation of future relationships (Schütze, Geraedts et al. 2020) and can increase the risk of both perpetrating and experiencing domestic abuse (Zhu, Exner-Cortens et al. 2024). While this woman did not disclose any domestic abuse during her pregnancy, assessors emphasised the importance of recognising potential indicators of domestic abuse, including adverse childhood experiences, alcohol or substance use and mental health problems (Box 5.2) (National Institute for Health and Care Excellence 2016). This woman was known to use alcohol and had been admitted for an overdose shortly before she was killed, but this was not recognised as a potential 'red flag' by those caring for her.

Box 5.2: Indicators of possible domestic violence or abuse

- Symptoms of depression, anxiety, post-traumatic stress disorder, sleep disorders
- Suicidal tendencies or self-harming
- Alcohol or other substance use
- Unexplained chronic gastrointestinal symptoms
- Unexplained gynaecological symptoms, including pelvic pain and sexual dysfunction
- Adverse reproductive outcomes, including multiple unintended pregnancies or terminations
- Delayed pregnancy care, miscarriage, premature labour and stillbirth
- Genitourinary symptoms, including frequent bladder or kidney infections
- Vaginal bleeding or sexually transmitted infections
- Chronic unexplained pain
- Traumatic injury, particularly if repeated and with vague or implausible explanations
- Problems with the central nervous system – headaches, cognitive problems, hearing loss
- Repeated health consultations with no clear diagnosis
- Intrusive 'other person' in consultations, including partner or spouse, parent, grandparent or an adult child (for elder abuse).

NICE QS116 Domestic violence and abuse (National Institute for Health and Care Excellence 2016)

Trust and disclosure

As noted earlier, more than 30% of domestic abuse incidents begin during pregnancy (Lewis 2007); however, half of the women who were killed by their partners had not reported domestic abuse at the time of their death. A recent study conducted in the UK found that less than 0.5% of pregnant women in the UK disclosed domestic abuse and this rate decreased after COVID-19 lockdowns (Hildersley, Easter et al. 2022). This is in contrast to national figures that showed an increase in domestic abuse-related contacts during the COVID-19 pandemic (Office for National Statistics 2020) and is likely an underestimation of the actual prevalence.

A young Pakistani woman had limited English and required an interpreter. Financial difficulties were noted at booking and she was taking medication for anxiety and depression. It was noted that these medications were for 'marital problems' but she not disclose any domestic abuse when she was seen alone on several occasions. At an appointment with a community midwife in the third trimester, a fetal heart rate was not detected. The woman gave a history of reduced fetal movements in the preceding days. She also disclosed that she had separated from her husband almost a year prior due to domestic abuse and was currently living in temporary accommodation. An intrauterine death was confirmed and she gave birth to a stillborn baby. There was a short interpregnancy interval before the woman booked again in another maternity unit. Her language and financial needs were documented at booking but there was nothing noted about her mental health problems or previous domestic abuse. M

The care of this woman, included in this year's morbidity enquiry, demonstrates both the variability in the recording of social risk factors at booking and the hesitation that many women feel around the disclosure of domestic abuse. Many women who experience domestic abuse may encounter barriers to disclosing their situation or seeking assistance, often due to feelings of shame, isolation or limited social support. Fear can also act as a barrier to disclosure as many women worry that revealing their situation may make it worse or result in the removal of their children (Bacchus, Mezey et al. 2003, Heron and Eisma 2021). Research suggests that barriers imposed by healthcare services such as limited continuity of care, short appointment times and an inadequate provision of privacy can also impact disclosure (Heron and Eisma 2021). As recommended by NICE guidance, enquiries into domestic abuse should be made at every antenatal contact (National Institute for Health and Care Excellence 2021) and take place in a safe, private environment (National Institute for Health and Care Excellence 2016). Women are more likely to disclose information after establishing a relationship with their healthcare provider and continuity of carer is essential to build this trust.

How women perceive their healthcare providers' competency and attitude toward domestic abuse can also be either a barrier or facilitator to disclosure (Heron and Eisma 2021). Individuals may live with domestic abuse for years before seeking assistance. It is crucial that their first contact for help is empathetic and supportive to instil trust and encourage future disclosures. As previously stated, healthcare providers should receive comprehensive training to competently and respectfully hold conversations related to abuse. This includes providing assurances to women that any information they share will remain confidential. Additionally, healthcare providers must be equipped with the necessary skills and resources to effectively support and safeguard women who disclose experiences of domestic abuse.

Tell the woman that the information she discloses will be kept in a confidential record and will not be included in her hand-held record.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

Ensure frontline staff in all services are trained to recognise the indicators of domestic violence and abuse and can ask relevant questions to help people disclose their past or current experiences of such violence or abuse. The enquiry should be made in private on a one-to-one basis in an environment where the person feels safe, and in a kind, sensitive manner.

NICE PH50 Domestic violence and abuse: multi-agency working (National Institute for Health and Care Excellence 2014)

Safeguarding

As noted previously, several of the women who were killed by their partners had previous investigations and multi-agency involvement for domestic abuse that were not known about by all those caring for her. Improvements in safeguarding and interagency working were also noted for women included in the morbidity confidential enquiry.

A woman had several previous pregnancies during which she experienced domestic abuse from her partner. He remained on probation for these offences. She presented to the emergency department with chest pain and vaginal bleeding and an ultrasound revealed a pregnancy of approximately 16 weeks' gestation. She was discharged from the emergency department after investigations for her chest pain and was offered a booking appointment, but this was not followed up. Over a month later she called an ambulance with significant abdominal pain and vaginal bleeding. She had still not booked with maternity services and her partner was unaware of the pregnancy. She asked to be taken from the house to the ambulance where she gave birth to a non-viable baby. In hospital after the birth, she initially denied domestic abuse but later disclosed this information after a conversation was overheard. A referral was made to a safeguarding midwife who found several reports of domestic abuse in the preceding weeks. M

This woman had experienced domestic abuse in previous pregnancies and her husband was currently on probation after being convicted of assaulting her a few years prior; however, no one involved in her care appeared to be aware of this domestic abuse. The need to develop guidance for information sharing in the event of safeguarding concerns has been emphasised in this chapter as a new recommendation and remains true for all women regardless of women's outcomes or how and when they first contact services.

This woman had several previous pregnancies and yet had not self-referred for antenatal care. There appeared to be no communication or clear referral pathway between the emergency department and her GP or a community midwife in order to coordinate a booking appointment when she presented in her second trimester. For women who do not self-refer to antenatal services, referral for a timely booking appointment is essential so that they can be appro-

priately risk assessed, including for domestic abuse. It is likely that a timelier referral may have helped identify this woman's risk. Similarly, when domestic abuse was identified, a referral was made to a safeguarding midwife who identified the woman's history of domestic abuse; however, it does not appear that there was an onward follow-up from social services. There also did not appear to be any mention or consideration of her other children who were living in an unsafe environment with a known perpetrator of domestic abuse. As such, this woman and her children remained at significant risk. Assessors noted that, while there were many good examples of clinicians recognising the signs of domestic abuse, isolated acts of awareness are not sufficient for safeguarding. Better coordination of care and multi-agency working, including a potential MARAC or MASH referral (Box 5.1), is required to help safeguard women and children against future abuse.

Ensure there are integrated care pathways for identifying, referring (either externally or internally) and providing interventions to support people who experience domestic violence and abuse, and to manage those who perpetrate it.

NICE PH50 Domestic violence and abuse: multi-agency working (National Institute for Health and Care Excellence 2014)

Mental health

In 2021-23, almost half of the women who died during or up to six weeks after pregnancy had mental health problems and suicide and substance use were the leading causes of maternal death between six weeks and one year after pregnancy (Chapter 2). The care of women who died from psychiatric causes are discussed in detail in Chapter 6, but it is important to consider the impact of mental health on the care of women who died from other conditions, or experienced a morbidity. Fifty-nine percent of the women included in this chapter (n=27) had known mental health problems. Amongst women included in this chapter from the deprivation morbidity enquiry, mental health conditions were the most commonly reported element of disadvantage; seventy-one percent of these women had a known mental health condition.

As in previous years (Knight, Bunch et al. 2019) mental health was raised as a potential contributory factor for several women who died from accidental causes. One woman's death was reclassified as a suicide following review and assessors felt that suicidal intent may have featured in the death of one other woman. This was also true of accidental deaths where substance use may have played a role. Three of the women who died from accidental deaths were known to use substances and assessors felt that substance use directly contributed to one of these women's deaths. However, as noted in Chapter 7, post-mortem examinations for women who died in accidents often did not include sufficient information around the circumstances of the death, including toxicology reports, to reach a definitive conclusion about the underlying intent. While the association between substance use and road traffic accidents is well documented, it is essential to review these findings within a wider social context. As mentioned, many of the women who died from accidental deaths had adverse childhood experiences and significant social risk factors. Also, as for the women reviewed in Chapter 6, several of the women who died from accidental causes had their children removed from their care before their death. The cumulative effect of trauma and the emotional impact of child removal can exacerbate feelings of isolation and hopelessness and contribute to risky behaviour. These intersecting challenges highlight the importance of holistic and compassionate support systems that address not only substance use but also the underlying social and emotional factors (De Backer, Felker et al. 2025).

Healthcare professionals should be given training on the social and psychological needs of women who use substances.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

Obesity and multimorbidity

Obesity is a major global health issue and a significant risk factor for adverse health outcomes including maternal morbidity and mortality. Recent statistics show that the prevalence of obesity is 12% higher in the most deprived areas of England compared to the least deprived areas (Stiebahl 2025). This disparity is even starker for women. Data from 2021 showed that 40% of women living in the most deprived areas were obese compared to just 19% in the least deprived areas (NHS Digital 2022).

A woman in her late 30s with a BMI >50 kg/m^2 was in the second trimester of pregnancy when she was struck by a car as a pedestrian. Paramedics arrived quickly and she was transferred by helicopter to a trauma centre where an obstetric team was pre-alerted to her arrival. She was peri-arrest upon arrival in the emergency department where she had a resuscitative hysterotomy. There were challenges securing her airway and difficulty gaining IV access due to her weight. She was transferred for CT and then moved to theatre for surgery but she died as a result of her injuries.

Of the women who died from accidental causes, 33% had a BMI ≥30 kg/m^2 and 25% of these women were considered severely obese (BMI ≥40 kg/m^2). While assessors felt that this woman had good care overall, they noted that her weight may have been an impediment to her care. There were challenges gaining intravenous access that required the use of bilateral humeral interosseous line placements. However, assessors noted that this is not always possible in pre-hospital settings and so may limit on-scene management. Assessors felt that there were several other women who died from accidental causes whose weight may have contributed directly to their death or impacted the care they received. Evidence from a recent systematic review showed an association between higher BMI and an increased severity of injuries and mortality following road traffic accidents (Homaie Rad, Khodadady-Hasankiadeh et al. 2020). This finding re-emphasises the importance of getting 'ready for pregnancy' as illustrated in other chapters of this report. A structured approach is required in order to deliver effective weight management strategies to improve the health of women with obesity and multimorbidity.

Clinical message

'Get ready for pregnancy' – the period before conception, or between pregnancies, is an ideal time to counsel women about their health and address any physical or mental health conditions or social needs that may require management prior to becoming pregnant. Counselling should include, but is not limited to, optimisation of medications for chronic conditions, advice on weight management or smoking cessation and specialist referral to mental health or addiction services.

Pre-hospital care

For the woman in the previous section, resuscitation protocols were followed appropriately by pre-hospital and emergency teams and included RH, which can facilitate the return of spontaneous circulation in women >20 weeks' gestation (Chu, Johnston et al. 2020, Resuscitation Council UK 2021). This intervention was possible as the hospital was pre-alerted to her arrival and able to assemble a multidisciplinary team, including an obstetrician and anaesthetist, as is recommended (Chu, Johnston et al. 2020, Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and Association of Ambulance Chief Executives (AACE) 2022). However, despite many instances of good care, assessors still noted delays in transfer of many women to hospital for definitive management and inconsistent on-scene management as highlighted in last year's report (Felker, Patel et al. 2024).

A multiparous woman was involved in a road traffic accident in the third trimester. She had a complex social history and a BMI > 50 kg/m^2. She was in cardiac arrest when emergency medical teams arrived. Significant attempts at resuscitation including advanced life support and bilateral thoracostomies were performed on-scene. A resuscitative hysterotomy was considered but not performed due to a prolonged resuscitation period.

Unlike the woman in the previous section, this woman did not have a RH. Assessors noted the ongoing challenges associated with the timely recognition and delivery of RH in pre-hospital settings (Battaloglu and Porter 2017, Felker, Patel et al. 2024). While current guidance recommends that a RH should be performed within five minutes of maternal collapse to optimise maternal and fetal outcomes (Chu, Johnston et al. 2020), there are often delays in undertaking this procedure. For this woman, assessors felt that the decision not to perform a RH was appropriately made considering the woman's BMI, the extensive nature of her injuries and limitations imposed by the location of the accident.

This woman's care also underscores the importance of proper training and simulation for pre-hospital teams to enable timely and confident decision-making in high-risk obstetric emergencies. The pre-hospital Maternity Decision Tool discussed in Chapter 4 can help guide on-scene management (Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and Association of Ambulance Chief Executives (AACE) 2024), but a clear framework to support decision-making around where and when to perform a RH is essential to avoid delays and optimise outcomes. Systems should also consider the impact of geography, access, and equipment when determining the feasibility of on-scene interventions. As mentioned in Chapter 4, this includes challenges in extrication from high-rise buildings, proper-

ties without lift access or homes with narrow stairwells or cluttered environments, which are often more common for women living in areas of deprivation. Such obstacles can delay ambulance response times and subsequent transfer to hospital and should be considered when planning on-scene management.

Clinical message

'Difficulties in extrication' - Women living in deprived areas may experience delays in ambulance response times or transfer to the hospital due to difficulties in access to or from their residence. In the event an ambulance is needed, it is recommended that women are moved close to the exit of their property if possible. Unlocking doors or removing obstacles can facilitate access and expediate extrication.

Care in emergency departments

A woman moved to the UK in early pregnancy and lived in a deprived area. In the third trimester she presented to the emergency department with abdominal pain. An intrauterine death was confirmed by a consultant obstetrician and a diagnosis of placental abruption was made. In response to a deteriorating Maternity Early Warning Score (MEWS) a caesarean section was performed with involvement from senior anaesthetists and obstetricians. M

This woman had several aspects of good care in the emergency department. She was appropriately assessed by an obstetrician as has been previously recommended for pregnant and postpartum women who present to the emergency department with medical problems (Knight, Bunch et al. 2018). She was also assessed with MEWS, which should be used to monitor pregnant women wherever they receive care (Knight, Bunch et al. 2022). However, this was not the case for all women whose care was reviewed, as assessors noted evidence of continued use of the National Early Warning Score (NEWS), which resulted in inaccurate assessment of women's conditions. There were also instances where women were denied imaging in the emergency department because they were pregnant despite evidence that most imaging modalities are safe during pregnancy (Felker, Patel et al. 2024).

Engaging women with multiple disadvantages

Coordinated care

As noted previously in this chapter, there were wide variations in the quality of support provided to women with multiple disadvantages. While some women received excellent care to help them navigate complex issues such as housing, travel and parenting support, others did not have the same access to services, either because their needs were not recognised or supports were not available in their region.

A young woman who spoke very little English and had no family support was living in a deprived area. She had arrived in the UK a few months before the birth of her first baby who was born prematurely and required cardiac surgery. Shortly before her baby's discharge from the neonatal unit, she booked her second pregnancy. During this pregnancy she faced financial difficulties and challenges navigating systems while also caring for her older, unwell child. At her 20-week scan, fetal growth restriction and a suspected congenital anomaly were noted. An interpreter was not present at this appointment. She had multiple subsequent appointments at different hospitals throughout the remainder of her pregnancy. At 34 weeks' gestation an ultrasound scan confirmed a stillbirth. No interpreter was provided to deliver this news and she was not provided with bereavement support. M

Assessors felt there was no curiosity about this woman's life and circumstances. Her financial difficulties were noted but there was no consideration of monetary support to enable attendance at appointments. As was found in a previous MBRRACE-UK morbidity confidential enquiry into the care of recent migrant women with language needs (Felker, Patel et al. 2024), this woman's need for an interpreter was noted, but interpreters were only provided sporadically and were notably absent during sensitive discussions. There also did not appear to be any consideration of the care needs of her older child when multiple appointments were scheduled across different locations. When maternity care is planned between more than one hospital, even within the same trust or health board, healthcare professionals need to carefully consider the risks and benefits of splitting care across sites. This woman would have benefitted

from a more coordinated approach to care planning from both tertiary and local services. While the assessment of social complexities is essential to recognise women's circumstances, this alone is not sufficient. There must also be an offer of ongoing support and joined-up care to improve outcomes.

> A young woman living in a less deprived area was pregnant for the first time with twins. She had a history of mental health problems and disclosed domestic abuse during her pregnancy. Her twins developed twin-to-twin transfusion syndrome, requiring specialist care at a fetal medicine unit. There was coordinated planning from the local and tertiary care teams to support her travel to specialist appointments. Her mental health was monitored and she was appropriately safeguarded when her relationship with her partner worsened. At 30 weeks' gestation, she had a caesarean birth. One twin was born in poor condition and could not be resuscitated, the other was admitted to the neonatal unit and recovered well. She had appropriate bereavement care and ongoing mental health and safeguarding support postnatally. M

In contrast to the previous woman, this woman's care was coordinated across multiple maternity services and other agencies and there were many examples of good communication and support. Her financial circumstances were considered and she was provided with the means to travel to appointments at a distant tertiary centre. She was also appropriately risk assessed and provided with support for her mental health and domestic abuse.

While both the women in this section faced significant and multiple disadvantages, the differences in their care demonstrates the impact of area of residence on the availability of supports and services. A 'postcode lottery' such as this should not be deemed acceptable; maternity services should be equipped to provide equitable care for all women, regardless of the woman's social circumstances.

Appointment burden

Women with multiple disadvantages often have a higher number of antenatal appointments due to multiple social, mental health and medical comorbidities. Such schedules can be difficult to adhere to; however, women were often discharged from services after missing one appointment without the offer of another appointment, investigation into why this occurred, or an understanding of multiple other appointments they had scheduled. A recent study investigating the care of women with social service involvement who died demonstrated the often overwhelming schedule of appointments and the burden of care placed on women with multiple disadvantages (De Backer, Felker et al. 2025). Assessors re-emphasised a need to be proactive in follow-up when appointments are missed including attempting to facilitate alternative methods of engagement or aligning appointments to provide a more holistic approach to care (Felker, Patel et al. 2024). They also re-stated the need to consider all of a woman's risk factors and complexities to provide appropriate, individualised care and improve engagement.

Ensure maternity services deliver personalised care, which should include identifying and addressing the barriers to accessing specific aspects of care for each individual (Draper, Gallimore et al. 2023b, Draper, Gallimore et al. 2023a)

Ensure that guidance on care for women with complex social factors is updated to include a role for networked maternal medical care and postnatal follow-up to ensure that it is tailored to women's individual needs and that resources in particular target vulnerable women with medical and mental health comorbidities and social complexity (Knight, Bunch et al. 2023)

Electronic patient records

The nationwide shift from paper-based to electronic patient records (Department of Health and Social Care 2025) offers numerous advantages for antenatal care including standardised documentation, improved data sharing among healthcare professionals, increased accessibility, enhanced auditing capabilities, and the potential to empower women through better access to information. However, this transition has also presented several challenges that may impact the care women receive as well as the reviews of their care.

Previous MBRRACE-UK reports highlight the challenges that women with financial difficulties face when appointment reminders are sent over text or when maternity notes require internet access (Felker, Patel et al. 2024). This 'digital exclusion' can greatly impact the ability of women to self-advocate and participate in informed decision-making. As discussed in this chapter, a 'tick box' proforma was added to many electronic records to support midwives who are required to complete multiple forms at each antenatal visit to assess and re-assess risk in line with national guidelines (National Institute for Health and Care Excellence 2021, Department of Health and Social Care 2025). While such an approach may be efficient and acceptable for low-risk women, these formats are often insufficient for those with

complex needs. Assessors noted that electronic records frequently do not include space for additional commentary, which limits more nuanced conversations around social risk factors and may paradoxically increase risk. To address this, assessors suggested that electronic records would benefit from a 'Complex Social Factors' tick-box, which is also accompanied by prompts for free-text entries with unlimited characters. This would encourage documentation of individual circumstances such as housing, employment, finances, transportation needs, family support and literacy to act as an additional safety net for women with multiple disadvantages.

Experienced MBRRACE-UK assessors have noted persistent difficulties when reviewing care documented using electronic patient records (Knight, Bunch et al. 2023). It is likely that this is even more challenging in busy clinical settings, especially when multiple electronic systems are used, or during emergencies. Assessors have described electronic records as 'endlessly repetitive' with excessive duplication of prior notes but without crucial, detailed information including that relating to women's social histories. Improved consistency of electronic patient records across hospitals and updated interfaces that are more tailored to clinical need can help facilitate care including the recognition of warning signs and red flags.

5.7 Conclusions

The women included in this chapter had varied outcomes but experienced many similarities in the care they received on the basis of their multiple disadvantages. Assessors re-emphasised a common message to recognise women's individual circumstances including medical, mental health and social complexities. In order to achieve this, women's social risk factors must be appropriately assessed and documented in a standardised way. This should include elements of deprivation such as financial need and housing, which may impact women's ability to access and engage with care. It is essential that risks are continuously assessed throughout pregnancy and the postnatal period to facilitate disclosure and provide ongoing support when needed. This is particularly true for women experiencing domestic abuse who may face many barriers to disclosure and who require continuity of care and compassion from healthcare providers. For many women with known social risk factors, early referral for senior or specialist review and coordinated, multidisciplinary care can help improve outcomes. Information must be shared across different services and agencies so appointment schedules can be streamlined and safeguarding information is known to all those involved in women's care.

Amongst the 15 women who died from accidental causes, 53% were found to have received good care (Table 5.4). Improvements to care were noted for seven women, and assessors felt that improvements to care may have made a difference to the outcome for three women (20%).

For the 14 women who were murdered, sufficient information was available to review the care of 13. For these 13 women, assessors felt that seven (54%) received good care and identified improvements to care that may have made a difference to the outcome for five women (38%)(Table 5.4).

Four of the 17 women (24%) included in this section from the morbidity confidential enquiry were thought to have received good care. For six women (35%), improvements in care were identified that would not have made a difference to their outcome and improvements in care that may have made a difference were noted for seven (41%)(Table 5.4).

Table 5.4: Classification of care received by women with multiple disadvantages*, UK and Ireland 2021-23

Classification of care received	Accidental deaths Number of women (%) N=15	Homicides Number of women (%) N=13	Deprivation (morbidity enquiry) Number of women (%) N=17
Good care	8 (53)	7 (54)	4 (24)
Improvements to care which would have made no difference to outcome	4 (27)	1 (8)	6 (35)
Improvements to care which may have made a difference to outcome	3 (20)	5 (38)	7 (41)

*Including women who died from accidental causes and homicide in the UK and Ireland 2021-23 and women included in this year's morbidity confidential enquiry into the care of women living in the most deprived areas of the UK who were determined to have multiple disadvantages on the basis of the data available

6. Improving mental health care

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6.1 Key messages

New recommendations

Ensure specialist perinatal mental health teams undertake a leadership role for the care of pregnant or recently pregnant women with mental health conditions even if women are not accepted for care under their services. This should include a risk assessment, provision of advice and guidance, oversight for joint care planning and support to ensure rapid onward referral into other appropriate mental health services **[ACTION: Integrated Care Boards and Health Boards]**

Update guidelines on the care of women with complex social factors to include clear guidance for a standardised assessment and documentation of social risk factors at booking appointments and at least once more later in pregnancy. In the absence of sufficient evidence to update guidance, commission research to explore the unique care needs of vulnerable populations **[ACTION: National Institute for Health and Care Excellence (NICE) and National Institute for Health and Care Research (NIHR)]**

Develop guidance for information sharing within maternity services and across health services and other agencies in the event of safeguarding concerns. Ensure that codes for flagging domestic abuse are applied in women's records and are known to all those caring for her **[ACTION: National Institute for Health and Care Excellence (NICE)]**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care **[ACTION: Integrated Care Boards and Health Boards]**

Existing guidance and recommendations requiring improved implementation

Commissioning bodies should ensure that providers of specialist Perinatal Mental Health Teams have sufficient resource to advise, and in complex or high-risk cases, be involved, in mental health assessments when in normal working hours (Knight, Bunch et al. 2022)

Ensure that referral with mental health concerns on more than one occasion is considered a 'red flag' which should prompt clinical review, irrespective of usual access thresholds or practice (Knight, Bunch et al. 2020b)

Ensure there are clear and explicit pathways into specialist perinatal mental health care, which take into account all other aspects of perinatal mental health provision, including specialist roles within midwifery and obstetric services, in order to avoid any confusion over roles and responsibilities (Knight, Bunch et al. 2021)

Ensure specialist services have the capacity to assess and manage all women who require secondary care mental health services, and be able to adjust for the altered (generally lowered) thresholds for assessment in the perinatal period. This should not prevent shared management of women already engaged with another service, where this is in their best clinical interests (Knight, Bunch et al. 2021)

Ensure perinatal mental health services do not exclude patients on the basis of diagnosis, where they would ordinarily be seen by general adult mental health teams (Knight, Bunch et al. 2021)

Liaison, crisis and home treatment staff should have specific training, at induction and continuing professional development, in understanding the distinctive features and risks of perinatal mental illness if they are to provide emergency and out-of-hours care for pregnant and postnatal women. Formal links should be made with local specialist perinatal mental health services to facilitate training (Knight, Bunch et al. 2018)

Women admitted to Mother and Baby Units are at particular risk whilst on leave or immediately following discharge… Mother and Baby Units should be reminded of the importance of ensuring robust aftercare plans for their patients (Knight, Tuffnell et al. 2015)

Assessments should always include a review of previous history and always take into account the findings of recent presentations and escalating patterns of symptoms, their severity and any associated abnormal behaviour (Knight, Tuffnell et al. 2015)

Loss of a child, either by miscarriage, stillbirth and neonatal death, or by the child being taken into care increases vulnerability to mental illness for the mother and she should receive additional monitoring and support (Knight, Tuffnell et al. 2015)

Recognise the importance of a trauma history in the assessment of risk. Involve specialist Perinatal Mental Health Teams where there is a history of significant involvement with secondary mental health services or significant risk, particularly if it is a first pregnancy (Knight, Bunch et al. 2022)

Healthcare professionals should be given training on the social and psychological needs of women who use substances (National Institute for Health and Care Excellence 2010)

Disengagement from care should be regarded as a potential indicator of worsening mental state. All professionals involved in the woman's care should be informed of non-attendance and assertive follow-up arranged when there is already concern regarding mental state or prior evidence of risk (Knight, Bunch et al. 2018)

Women with substance use are often more vulnerable and at greater risk of relapse in the postnatal period, even if they have shown improvement in pregnancy. Ensure they are reviewed for re-engagement in the early postpartum period where they have been involved with addictions services in the immediate pre-conception period or during pregnancy (Knight, Bunch et al. 2021)

Women should receive continuity of mental health care. Where more than one mental health team is involved, there should be a clearly identified individual who coordinates care (Knight, Bunch et al. 2018)

There is a clear duty on all health professionals to pass on relevant information that may affect the care a woman receives during pregnancy or alter her outcomes (Knight, Bunch et al. 2021)

GPs should inform maternity services of any past psychiatric histories and maternity services should ensure that the GP is made aware of a woman's pregnancy and enquire of the GP about past psychiatric history (Knight, Tuffnell et al. 2015)

In order to facilitate discussion of sensitive issues, provide each woman with a one-to-one consultation, without her partner, a family member or legal guardian present, on at least one occasion (National Institute for Health and Care Excellence 2010)

Establish triage processes to ensure that women with mental health concerns can be appropriately assessed, including face-to-face if necessary, and access specialist perinatal mental health services in the context of changes to the normal processes of care... Perinatal mental health services are essential and face-to-face contact will be necessary in some circumstances. There is a clear role for involvement of the lead mental health obstetrician or midwife in triage and clinical review (Knight, Bunch et al. 2020b)

Recognise that women who have a mental health problem (or are worried that they might have) may be (National Institute for Health and Care Excellence 2020b):

- unwilling to disclose or discuss their problem because of fear of stigma, negative perceptions of them as a mother or fear that their baby might be taken into care
- reluctant to engage, or have difficulty in engaging, in treatment because of avoidance associated with their mental health problem or dependence on alcohol or drugs.

Be alert to factors, such as cultural stigma or fear of child removal, which may influence the willingness of a woman or her family to disclose symptoms of mental illness, thoughts of self-harm or substance use (Knight, Bunch et al. 2022)

When prescribing drugs for associated mental health conditions to people who self-harm, take into account the toxicity of the prescribed drugs in overdose. For example, when considering antidepressants, selective serotonin reuptake inhibitors (SSRIs) may be preferred because they are less toxic than other classes of antidepressants (National Institute for Health and Care Excellence 2020a)

6.2 Background

Mental health challenges remain one of the leading contributers to maternal death in the UK. Suicides are now the most common cause of maternal death in the period between six weeks and one year after the end of pregnancy and mental health conditions as a whole account for over one third of deaths in this period (Chapter 2). This report covers the period of 2021-23, encompassing the latter half of the COVID-19 pandemic, which greatly impacted mental health amongst pregnant and postpartum women and exacerbated pre-existing mental health problems (Delanerolle, McCauley et al. 2023). Recent survey findings have shown that suicidal ideation amongst women six months postpartum was significantly higher in 2020, the first year of the pandemic, compared to 2018 (Despotis, Harrison et al. 2025). This is in keeping with the increase in the rate of maternal death due to suicide observed in this year's report compared to 2017-19. While rates of deaths due to substance use remain unchanged, the proportion of women who died who had substance use has been steadily increasing necessitating coordinated care across mental health, addictions and social services.

Specialist PMH services have continued to expand since the previous MBRRACE-UK confidential enquiry into deaths due to mental health-related conditions and are now meant to offer support for women from conception to two years after birth (NHS England 2019, Cantwell 2023). However, there are still a number of challenges for service delivery including availability in certain areas and provision of support for women with concurrent substance use (Cantwell 2023). In keeping with this, there are a number of repeated and new lessons to be learned about the role of perinatal mental health teams (PMHTs) in supporting women during and after pregnancy.

6.3 The women who died

Overall, 155 women died from psychiatric causes during pregnancy or in the year after the end of pregnancy in the UK and Ireland in 2021-23, a maternal mortality rate of 7.14 per 100,000 maternities (95% CI 6.06-8.36). Thirty-four women died during or up to six weeks after the end of pregnancy (1.57 per 100,000 maternities, 95% CI 1.09-2.19) and 121 died between six weeks and one year after the end of pregnancy (5.58 per 100,000 maternities, 95% CI 4.63-6.66).

The sociodemographic characteristics of the women who died from psychiatric causes in 2021-23 are shown in Table 6.1.

Deaths due to suicide

Eighty-eight women died by suicide in the UK and Ireland during pregnancy or up to one year after the end of pregnancy in 2021-23, a maternal mortality rate of 4.06 per 100,000 maternities (95% CI 3.25-5.00). This is statistically significantly higher than the rate of 2.64 per 100,000 maternities for 2017-19 (RR 1.54, 95% CI 1.10-2.17, p=0.009) but similar to the rate reported in the 2022 MBRRACE-UK report for deaths due to suicide in 2020.

The women who died by suicide had a median age of 31 (IQR 21-41 years). In contrast to previous years, only a small proportion (n=3, 3%) of women who died by suicide were teenagers (6.11 per 100,000 teenagers giving birth). This rate is significantly decreased compared to the rate of 27.01 per 100,000 maternities reported in 2020 (RR 0.23, 95% CI 0.04-1.16, p=0.047) and nearly half the rate reported in the 2017-19 triennium (RR 0.56, 95% CI 0.09-2.44, p=0.416). Almost half the women who died by suicide (47%) were from the most deprived areas (IMD IV or V) noting that for many women this information was not available as they were residing in Northern Ireland or the Republic of Ireland. Many women had known social risk factors including domestic abuse (39%) and social services involvement (41%); twenty-two women (25%) had three or more elements of disadvantage. The majority of women who died by suicide received antenatal care (64%); however, only a third received NICE recommended levels of care (Table 6.1).

Deaths due to substance use

In 2021-23, 67 women died in relation to substance use in the UK and Ireland during pregnancy or up to one year after pregnancy, a maternal mortality rate of 3.09 per 100,000 maternities (95% CI 2.39-3.92). This is not statistically significantly different from rates of deaths associated with substance use in 2017-19 or 2020.

Women who died from causes related to substance use were similar in age to women who died by suicide; they had a median age of 30 years (IQR 20-43 years). Almost all the women who died from substance use were White (91%), almost half had had at least three previous pregnancies (n=29, 42%) and more than half were living in the most deprived areas (IMD IV or V, 54%). More than half had three or more elements of disadvantage (52%) including domestic abuse (55%) and social services involvement (78%). While the majority of women who died from substance use received antenatal care (79%), most did not receive the recommended or minimum level of care (Table 6.1)

Table 6.1: Sociodemographic, medical and pregnancy-related characteristics of women who died from suicide or substance use, UK and Ireland 2021-23

Characteristics	Suicide Number of women (%) N=88	Substance use Number of women (%) N=67
Age		
<20	3 (3)	1 (1)
20-24	13 (15)	8 (12)
25 – 29	25 (28)	20 (30)
30 – 34	26 (30)	17 (25)
35 – 39	12 (14)	14 (21)
≥ 40	9 (10)	7 (10)
Parity		
0	15 (17)	8 (12)
1 to 2	41 (47)	23 (34)
≥3	17 (19)	29 (43)
Missing	15 (17)	7 (10)
UK or Irish citizen		
Yes	66 (75)	63 (94)
No	5 (6)	0 (0)
Missing	17 (19)	4 (6)
Ethnicity		
White incl. missing	77 (88)	61 (91)
Other ethnicity	11 (13)	6 (9)
Socioeconomic status (Index of multiple deprivation (IMD) of postcode of residence)		
First quintile (Least deprived)	12 (14)	1 (1)
Second quintile	6 (7)	9 (13)
Third quintile	7 (8)	12 (18)
Fourth quintile	14 (16)	11 (16)
Fifth quintile (Most deprived)	27 (31)	25 (37)
Missing	22 (25)	9 (13)
Domestic abuse (prior to pregnancy/ during pregnancy)		
Yes	34 (39)	37 (55)
No	30 (34)	14 (21)
Missing	24 (27)	16 (24)
History of abuse as a child		
Yes	12 (14)	12 (18)
No	29 (33)	21 (31)
Missing	47 (53)	34 (51)
Known to social services		
Yes	36 (41)	52 (78)
No	34 (39)	10 (15)
Missing	18 (20)	5 (7)
Received any antenatal care		
Yes	56 (64)	53 (79)
No	18 (20)	10 (15)
Not known	14 (16)	4 (6)
Gestational age at booking in weeks (amongst women who received any antenatal care)		
≤10	27 (48)	20 (38)
11 – 12	11 (20)	6 (11)
≥13	15 (27)	26 (49)
Missing	3 (5)	1 (2)
Received recommended antenatal care† (amongst women who received any antenatal care)		
Yes	19 (34)	11 (21)
No	34 (61)	40 (75)
Missing	3 (5)	2 (4)
Received a minimum level of antenatal care† (amongst women who received any antenatal care)		
Yes	36 (64)	19 (36)
No	16 (29)	30 (57)
Missing	4 (7)	4 (8)

†NICE recommended antenatal care: booked at ten weeks or less and no antenatal visits missed. Minimum level of care: booked at less than 13 weeks and three or fewer antenatal visits missed.

Pregnancy or postnatal loss

As has been noted in previous reports, the majority of the women who died by suicide died in the postnatal period (Figure 6.1). Thirty-eight women had experienced a known loss (Figure 6.1 and Table 6.2). Of these women, 16 had an early pregnancy loss, including miscarriage, ectopic pregnancy or termination of pregnancy, five experienced a perinatal death and 17 had their infant taken into care. An additional six women were known to social services with ongoing child protection proceedings or child in need plans and, of the 11 women who died by suicide while they were still pregnant, 8 had older children in care or were known to social services.

As for deaths due to suicide, the majority of deaths related to susbtance use occurred in the postnatal period (Figure 6.2) and women with known loss events were overrepresented amongst the women who died (Figure 6.2 and Table 6.2). Of the 46 women who experienced a known loss event, the majority (n=27, 59%) had their child taken into care; four further women were known to social services and had ongoing care proceedings. Fourteen women (30%) experienced an early pregnancy loss with half undergoing a termination of pregnancy.

Table 6.2: Perinatal loss or threatened loss amongst women who died by suicide or substance use, UK and Ireland 2021-23

Type of loss	Suicide Number of women (%) N=88	Substance use Number of women (%) N=67
Early pregnancy loss	7 (8)	7 (10)
Termination of pregnancy	9 (10)	7 (10)
Stillbirth or neonatal death	5 (6)	5 (7)
Infant removed into care or care of relatives	17 (19)	27 (40)
Ongoing social services proceedings	6 (7)	4 (6)
No known loss events	44 (50)	17 (25)

Figure 6.1: Number of women who died by suicide during pregnancy or up to one year after pregnancy, by timing of death and known loss, UK and Ireland 2021-23

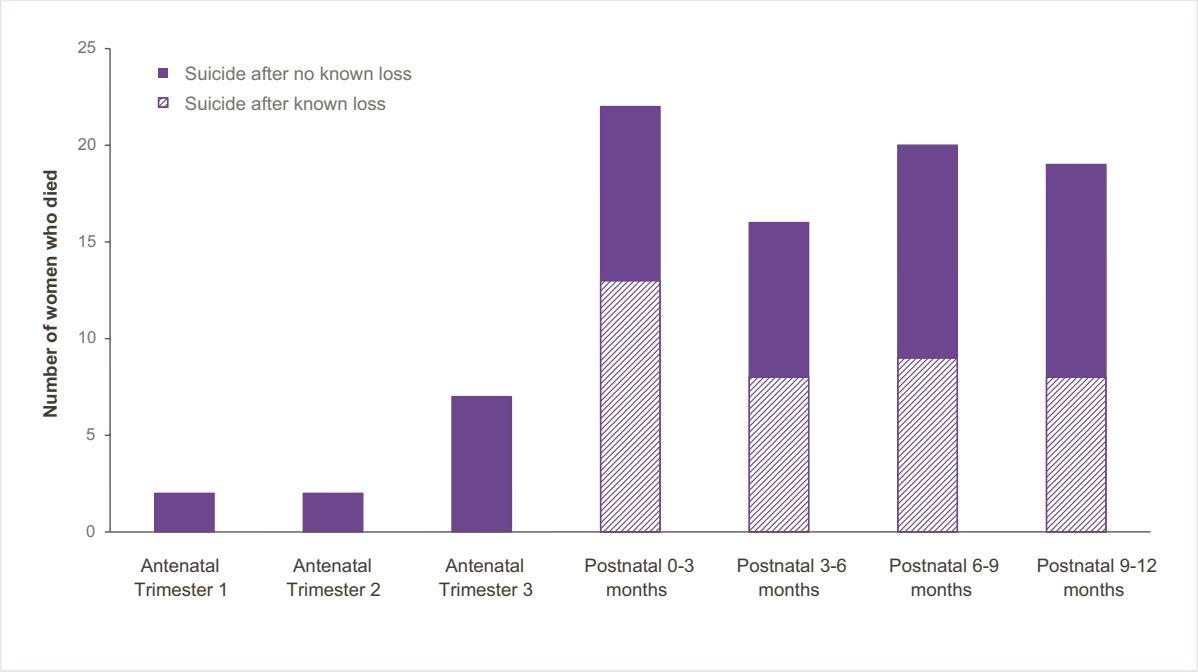
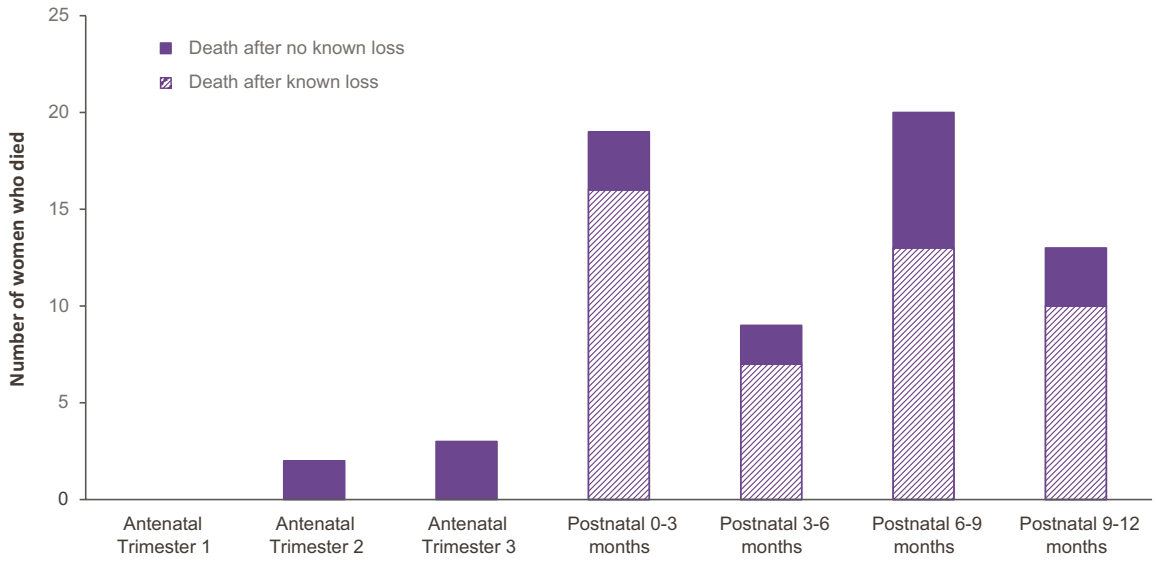


Figure 6.2: Number of women who died from substance use during pregnancy or up to one year after pregnancy, by timing of death and known loss, UK and Ireland 2021-23



Mode of suicide

As in previous years, the majority of women who died by suicide, died violently (Table 6.3). The commonest mode of suicide in 2021-23 was hanging (n=58, 66%). Ten women died of intentional overdose; half took multiple substances, which included codeine for three women. Other substances used included propranolol, pregabalin, paracetamol, mirtazapine, citalopram and insulin. All other modes of suicide occurred at much lower proportions (<10%).

Table 6.3: Mode of death amongst women who died by suicide, UK and Ireland 2021-23

Mode of death	Suicide Number of women (%) N=88
Hanging	58 (66)
Overdose	10 (11)
Drowning	3 (3)
Traffic/train	6 (7)
Fall from height	7 (8)
Other	4 (5)

Mental health diagnoses

As in previous reports, the attribution of a mental health diagnosis for the women who died remained challenging due to limited availability of mental health records for review. As such, many diagnoses were inferred by assessors using information in maternity or primary care records and/or based on a pattern of symptoms described.

On the basis of the information available, 68 women who died by suicide had known mental health problems; 59 (67%) had a known mental health diagnosis prior to pregnancy and nine women (10%) received a diagnosis either during pregnancy or in the postnatal period. The majority of women had multiple diagnoses with most experiencing anxiety and/or depression. Of the 59 women who had a mental health diagnosis prior to pregnancy, 37 (63%) had a history of self-harm and/or attempted suicide. Twenty-four women who died by suicide (27%) were known to use substances.

Fifty-three women who died due to substance use (79%) were thought to have a diagnosed mental health condition, the majority of which were diagnosed prior to pregnancy. Anxiety and depression were the most common diagnoses amongst the women who died from substance use. Many women had emotionally unstable personality disorder (EUPD) and/or bipolar disorder (n=14, 21%) and seven women had post-traumatic stress disorder (PTSD). Eighteen women who were diagnosed with a mental health disorder before pregnancy had a history of self-harm or past suicide attempts. Ten women expressed suicidal ideation or had episodes of self-harm and/or attempted suicide in the postnatal period; all but two of these women had experienced a known loss.

6.4 Overview of care and new lessons to be learned

Leadership from the perinatal mental health team (PMHT)

A multiparous woman in her 30s had a history of severe depression, anxiety, eating disorder, post-traumatic stress disorder, substance use and previous suicide attempts. She had many complex social risk factors and was known to social services as her older children were under child in need plans. After her booking appointment, a referral was made to perinatal mental health services but it did not sufficiently convey the woman's significant mental health history or other risk factors. This referral was declined when she had a miscarriage. Further referrals to the primary care recovery service for trauma-focussed cognitive behavioural therapy were dependent on her remaining sober and were delayed. She was not under the care of secondary psychiatric services. In the months after her miscarriage she expressed suicidal ideations and feelings of social isolation that were exacerbated after her children were removed from her care. She died by suicide four months after her miscarriage.

Capacity of specialist PMH services was expanded across England in 2019 (NHS England 2019), but, as has been apparent in past reports, many of the women included in this enquiry did not have input from a specialist PMHT. For women who were referred to a PMHT, many had no further visits scheduled after a single missed appointment and others, such as this woman, had their referrals declined because they were no longer pregnant or had lost custody of their child. The restrictive referral criteria for specialist PMH assessment has been highlighted in previous reports (Knight, Bunch et al. 2021). Assessors noted that the role of the psychiatrist and PMHT should be in managing risk, not simply medical treatment. For high-risk women with complex circumstances, early referral and assessment is essential, even if the woman is considering a termination of pregnancy or they experience an early pregnancy loss or child removal. In instances where women do not meet the criteria for specialist PMHT care, clear leadership from specialist PMHTs is still necessary to ensure any future care is coordinated and women do not fall through the gaps.

NEW **National recommendation**

Ensure specialist perinatal mental health teams undertake a leadership role for the care of pregnant or recently pregnant women with mental health conditions even if women are not accepted for care under their services. This should include a risk assessment, provision of advice and guidance, oversight for joint care planning and support to ensure rapid onward referral into other appropriate mental health services.

Senior specialist involvement

The importance of senior clinical involvement has been recognised in previous MBRRACE-UK reports. The Royal College of Psychiatrists states that, in addition to caring for patients, psychiatrists must be able to manage complexities related to the illness. This includes taking part in social work hearings for both child protection and vulnerable adults (Royal College of Psychiatrists 2010). During times of high demand, it may be tempting to delegate attendance at safeguarding conferences to less experienced staff but, for high-risk women with complex mental health conditions or circumstances, senior psychiatric insight is essential to recognise this complexity and appropriately assess risks. Senior mental health input is also valuable in order to communicate risks to other non-mental health professionals involved in care to help develop a multidisciplinary management plan. Psychiatrists have unique training across a breadth of specialities including general medicine, psychology and social science; this training helps enable an understanding of the intersection between physical, mental and social conditions including how such comorbidities can compound the risk of adverse outcomes.

Commissioning bodies should ensure that providers of specialist Perinatal Mental Health Teams have sufficient resource to advise, and in complex or high-risk cases, be involved, in mental health assessments when in normal working hours (Knight, Bunch et al. 2022)

Early pregnancy loss

This woman's social and mental health history were documented and her risk was appropriately recognised. Had she not miscarried and been cared for by a specialist PMHT, assessors felt her outcome may have been different. Instead, she was referred back into general mental health care services where she faced significant delays in treat-

ment as this was contingent on participation in a drug rehabilitation programme for which there was a six-month waiting list. Responsibility for care and risk management does not end with the loss of a pregnancy either by miscarriage or termination. While an offer of ongoing care in perinatal services may not be appropriate, this should not prevent the provision of advice or onward referral with appropriate follow-up. For more complex or high-risk women who are not under the care of mental health services or have their care spread across multiple services, engagement with early pregnancy or maternity services may offer an opportunity to coordinate future care and mitigate risk. In such instances, a one-off assessment and signposting by the PMHT would be beneficial. Where other agencies such as social care are involved, it is important to ensure that they are aware of what interventions, such as addiction support or domestic abuse services, may be helpful to encourage and support woman to access services.

A young woman requested a termination of pregnancy early in her fifth pregnancy. She had several documented social risk factors and known mental health problems including post-traumatic stress disorder, substance use and a history of self-harm and suicidal ideation. She had four previous caesarean births with three living children in care. Due to her obstetric history, her GP referred her to secondary care and an appointment for termination was scheduled for six weeks later. While awaiting this appointment she was assessed by the community mental health team who advised her to self-refer for talking therapies. She missed her scheduled appointment for termination as she did not have the funds necessary for transport. A new appointment was made but she faced further delays due to uncertainty around which service was responsible for facilitating her transport and specialist availability. In light of her continuing pregnancy, a safeguarding review was conducted by child services in the second trimester. A week later she had a termination. The day after her termination, she was referred to community mental health services with worsening mental health due to the stress of obtaining a termination. She died two days later of an overdose.

Nine women died by suicide following a termination of pregnancy. When a termination of pregnancy is considered or sought, this can prevent an appropriate referral to a PMHT. It is important to recognise that not all women considering a termination of pregnancy will complete the procedure. Further, women with complex lives, including mental health or financial difficulties, may encounter barriers in accessing these services. The transport challenges and resultant delays that this woman experienced when trying to obtain her termination caused her significant stress and contributed to the deterioration of her mental health. This was exacerbated by discussions of child removal that were initiated due to her ongoing pregnancy. While her mental health challenges were recognised, she was not referred to a PMHT and assessors felt that the advice to self-refer for talking therapy introduced another unnecessary barrier to care. When women are considering a termination of pregnancy, waiting to provide PMH support until 24 weeks' gestation, at which point termination is no longer possible, will only delay appropriate assessment and intervention. PMHTs should consider referrals for high-risk women until their termination is complete at which stage the PMHT can then determine a plan for appropriate ongoing care.

Involvement of multiple services

Both of the women above had significant social complexities and high-risk mental health conditions but there appeared to be no sense of urgency in providing mental health care. There was evidence of similar instances where excessive caution or delay in arranging a mental health assessment may have impacted women's care and outcomes. The first woman above had been referred to eight separate mental health services prior to, during and shortly after pregnancy and had escalating risks in the postnatal period. Repeated referrals should be considered a 'red flag' and prompt rapid review regardless of usual thresholds for access or practice (Knight, Bunch et al. 2020b). Despite the number of referrals made for this woman, it is not clear if she was receiving or engaging with treatment at the time of her death. This was common amongst the women who died, who often had numerous services involved in their care, but little clarity over the roles and responsibilities of each. In instances where more than one mental health team is involved in a woman's care, it is important to develop an integrated care plan that clearly indicates the responsibility of each healthcare professional including a named individual to coordinate care (National Institute for Health and Care Excellence 2020b) (Knight, Bunch et al. 2018); assessors felt this responsibility could lie with the PMHT.

Ensure that referral with mental health concerns on more than one occasion is considered a 'red flag' which should prompt clinical review, irrespective of usual access thresholds or practice (Knight, Bunch et al. 2020b)

Early discharge from services

A young woman died four weeks after an unplanned ectopic pregnancy. She was known to the health visiting team as her older child had additional needs. She had a provisional diagnosis of emotionally unstable personality disorder and a history of self-harm with numerous social complexities. She had previously been under the care of a community mental health team but was discharged from services after a missed appointment. After her pregnancy ended, she was seen by her GP but she did not receive an appropriate mental health assessment or safety netting. Her GP referred her back to the community mental health team, but she died a week before her scheduled appointment.

As for the women discussed earlier in this chapter, a referral to a PMHT was not considered for this woman due to an early pregnancy loss. Instead, she was referred back to community services that had previously discharged her for 'non-attendance'. Assessors noted similar concerns for other women around early discharge from mental health services after a single missed appointment. While there is an understandable need to minimise non-attendance, it is important to consider individual circumstances such as childcare responsibilities or financial difficulties that can impact engagement as discussed in Chapter 5 of this report. Many women with mental health conditions will have complex histories of trauma and disrupted relationships, which can impact trust in healthcare professionals and engagement with services. Decisions around the number of missed appointments before discharge should be made on an individual basis with consideration of history and risk and not based on a blanket policy. When it proves difficult to engage a woman in care, there should be communication and coordination with other professionals, such as midwives, to help assess women's ongoing needs including their mental state. For this woman, her missed appointment occurred while she was admitted to hospital for her ectopic pregnancy. This information did not appear to be known to the community mental health team, nor was this pregnancy loss, and its potential impact on her mental state, considered when she was re-referred into mental health services.

Proactive care

A woman in her 30s with a diagnosis of emotionally unstable personality disorder, bipolar disorder, a history of multiple suicide attempts, medical comorbidities and known domestic abuse was referred to the perinatal mental health team (PMHT) in early pregnancy but did not meet their criteria. She presented to the emergency department in the second trimester in distress after a fight with her partner but left before being seen due to a long wait. There was no further referral to the PMHT or appropriate safeguarding for domestic abuse. She separated from her partner three months later in the third trimester. After she gave birth there was no discharge planning and there did not appear to be any plans in place for her safeguarding or mental health support. She died by suicide eight months postnatally after expressing both intent and a prior attempt.

This woman was one of 37 (24%) who died from psychiatric causes who had a diagnosis of EUPD or bipolar disorder, both of which are associated with significant risks during pregnancy and the postpartum period, particularly in the context of previous suicidal ideation. Despite this, she did not meet the threshold for review by specialist PMH services. Guidance from the Scottish Intercollegiate Guidelines Network (SIGN) and NICE recommend that women with complex mental illnesses receive multidisciplinary care in the perinatal period with a documented care plan and continuity of care across different settings (National Institute for Health and Care Excellence 2020b, Scottish Intercollegiate Guidelines Network 2023). While this woman's diagnosis was known to the PMHT, it is unclear if her risk assessment and referral captured the complexity or extent of her psychiatric history including her previous suicide attempts. This also appeared to be the case when she was re-assessed after presentation to the emergency department at which point it was agreed that she did not require a referral for specialist PMH services. Assessors stressed the importance of lower thresholds for assessment during pregnancy and the early postpartum as these are incredibly vulnerable times for women with mental health disorders (Knight, Bunch et al. 2018, Knight, Bunch et al. 2021).

Forward planning

For several woman, it was documented in their maternity notes that their mental health appeared to improve during pregnancy and in the early postnatal period. Assessors noted that this 'honeymoon' phase in pregnancy, where complex trauma becomes relatively stable, is a period when preventative care planning can help build trust and make it easier to access care in future crises or when mental health declines. It was felt that there were missed opportunities to recognise women's stressors and red flags, including relationship breakdowns, and take a proac-

tive approach to manage risk in the immediate, short and long-term (Knight, Bunch et al. 2021). When the woman above was discharged, there was no forward planning for mental health support or safeguarding and, as a result, her care after pregnancy was disjointed with multiple GP contacts and referrals to different services that were either declined due to previous non-engagement or not followed-up. There was also no escalation or sense of immediacy when her mental health continued to deteriorate. Guidance from SIGN and NICE stress the importance of coordinated planning of postnatal care for women with severe mental illness and emphasise the importance of immediate risk management and urgent mental health assessment for women who are at risk of suicide as this woman was (Scottish Intercollegiate Guidelines Network 2023).

Clinical message

'Recognise decline' – Deterioration of mental health in pregnancy or the postnatal period can be extremely rapid. It is important to recognise and act on 'red flags' including a significant change in mental state or the emergence of new symptoms, thoughts or acts of violent self-harm, or expressions of incompetency as a mother or estrangement from the infant. These symptoms must not be underestimated and should prompt early review, urgent assessment and intervention.

Referral pathways

As previously noted by MBRRACE-UK, there need to be clear and explicit pathways into specialist PMH care (Knight, Bunch et al. 2021); however, it was evident from the care of many women included in this year's enquiry that pathways for PMHT care remained unclear. In some instances, a specialist obstetrician or midwife was involved in care without any specialist PMHT support. The development of specialist obstetrician and midwife roles has helped ensure that women with mental health conditions, who are often vulnerable, receive quality of care equivalent to women with medical comorbidities. Often, they also improve communication between maternity services and PMHTs. However, these roles are not a replacement for secondary care mental health services and do not have the capacity to provide specialist community care or the expertise to manage severe mental illness on their own.

Clinical pressures can lead to difficulties or delays in the referral process. This is made more difficult when referrals do not include sufficient information for appropriate triage by PMHTs. Assessors noted several instances, including the women above, where referrals were declined on the basis of insufficient information without seeking additional clarification from those making the referral. As such, women who may have benefited from specialist support did not receive it. It is important that reasonable steps are taken to seek any missing information in referrals. If the referrer is not contactable, communicating with other individuals involved in care or contacting the woman directly can help clarify current support needs.

Ensure there are clear and explicit pathways into specialist perinatal mental health care, which take into account all other aspects of perinatal mental health provision, including specialist roles within midwifery and obstetric services, in order to avoid any confusion over roles and responsibilities (Knight, Bunch et al. 2021)

Ensure specialist services have the capacity to assess and manage all women who require secondary care mental health services, and be able to adjust for the altered (generally lowered) thresholds for assessment in the perinatal period. This should not prevent shared management of women already engaged with another service, where this is in their best clinical interests (Knight, Bunch et al. 2021)

Diagnostic exclusion

A consistent message in past MBRRACE-UK reports has been around referrals to PMHTs that were declined on the basis of diagnostic exclusion (Knight, Bunch et al. 2021). As was the case for the woman above, referrals were most commonly declined for women with diagnosed personality disorders or concomitant substance use. Women with personality disorders are potentially more vulnerable to emotional disturbances around the transition to parenthood and the risk is greater in first pregnancies, where there is no prior experience of how they have managed this transition. Women with diagnosed personality disorders can present with a broad range of severity and a PMHT can help identify those at risk of serious deterioration, much like anticipating the relapse of psychosis. The period of engagement with maternity services may present an opportunity for PMHTs to reinforce past therapeutic work, develop crisis plans and work with other agencies such as social services for future safeguarding.

Ensure perinatal mental health services do not exclude patients on the basis of diagnosis, where they would ordinarily be seen by general adult mental health teams (Knight, Bunch et al. 2021)

A woman was known to use alcohol and other substances. She had numerous adverse childhood experiences including parental mental health problems and substance use. She had been under the care of a mental health team since adolescence and had numerous social complexities including domestic abuse, insecure housing and recent incarceration. During pregnancy she reported significant alcohol use and had several presentations in the emergency department related to domestic abuse. She engaged with antenatal care and social services throughout her pregnancy. A referral was made to the perinatal mental health team but this was declined. A later request from the mother to access a Mother and Baby Unit, which required her to abstain from drugs and alcohol, was also declined. Her baby was removed from her care at birth and she had minimal contacts with mental health services postnatally. She died from an overdose four months after giving birth.

This woman remained engaged with maternity services throughout her pregnancy and expressed a desire to improve her lifestyle. This included a request to access to a Mother and Baby Unit (MBU) in order to demonstrate her ability to care for her baby; however, this request was denied on the basis of her ongoing substance use. She was also referred to a PMHT but this referral was declined due to the involvement of social services and the likelihood that her child would be removed from her care. As discussed previously, women who lose custody of their children are exceptionally vulnerable and should not be denied specialist mental health support on the basis of child removal. Also, in line with national guidance, women should not be denied secondary mental health care on the basis of substance use (Public Health England 2017). The perinatal period may offer an opportunity where there is a greater motivation to reduce or abstain from substance use and several models of integrated care have shown promise in improving perinatal outcomes for pregnant women with substance use (Townsel, Irani et al. 2023). While admission to a MBU may not have been an appropriate choice for this woman, assessors felt that she would have benefited from input from the PMHT.

A woman in her first pregnancy had a history of substance use and mental health problems. She denied substance use in pregnancy but reported low mood. A referral to the perinatal mental health team was declined as it did not indicate any 'perinatal-specific' mental health needs. She had a very preterm vaginal birth and her baby was admitted to the neonatal unit. After birth she disclosed ongoing alcohol use that began before pregnancy. Her mental health declined severely postnatally and she was offered community counselling. Following an overdose several months after birth, her baby was removed from her care and her health continued to decline until she died by suicide three months later.

Several women's referrals to PMHTs were declined on the basis that their mental health disorder was not 'perinatal'. Assessors emphasised that, if a woman's condition warrants secondary mental health care and she is pregnant or recently pregnant, then this should constitute a 'perinatal' disorder and care should be provided by a PMHT.

6.5 Recurring lessons to be learned

Hospital admission

A woman in her 30s died by suicide 11 months after the birth of her second child. She had a history of child abuse and severe postnatal depression after the birth of her first child. Her mental health declined in pregnancy prompting a referral to the perinatal mental health team (PMHT) in the second trimester. A few weeks after the referral she had a mental health crisis and was detained under the Mental Health Act. A diagnosis of emotionally unstable personality disorder was made and she engaged with the PMHT. Shortly after giving birth she had a voluntary admission to a Mother and Baby Unit. Upon discharge she had several mental health crises including an overdose, which resulted in another admission under the Mental Health Act and the loss of custody of her two children. She was discharged under the care of a home crisis and community mental health team who were in regular contact with her until her death.

This woman had many aspects of good care, especially from the PMHT who engaged her in care from early pregnancy into the postnatal period, including after her children were removed from her care. However, assessors noted that there may have been missed opportunities to recognise escalating risk when she began to disengage from home

crisis teams in the weeks prior to her death. Previous recommendations from MBRRACE-UK have emphasised the importance of training non-specialist mental health teams, especially crisis and liaison teams about perinatal mental illness (Knight, Bunch et al. 2018). An understanding of the unique features of mental illness in this population, and the lower threshold for intervention, is essential to offer treatment and reduce adverse outcomes.

Liaison, crisis and home treatment staff should have specific training, at induction and continuing professional development, in understanding the distinctive features and risks of perinatal mental illness if they are to provide emergency and out-of-hours care for pregnant and postnatal women. Formal links should be made with local specialist perinatal mental health services to facilitate training (Knight, Bunch et al. 2018)

Mental Health Act

There were a number of women whose care was reviewed where there appeared to be excessive caution or delay in arranging a Mental Health Act assessment. While the Mental Health Act code of practice (Department of Health 2015) encourages the 'least restrictive option' it also recognises the need to consider and balance the circumstances of each particular individual and decision. The nature of certain mental health disorders, notably postpartum psychosis or personality disorders, is often linked to uncharacteristic and potentially risky behaviour and this should be borne in mind when considering admission or community-based treatment. When a woman does not have the capacity to make decisions about their own care and treatment, it may be appropriate to consider detention under the Mental Health Act as was the case for this woman.

Mother and Baby Units (MBUs)

Assessors felt that the above woman's extended admission to a MBU after the birth of her child was appropriate; however, this was not always the case.

> A woman with a history of depression had declining mental health after the birth of her second child. Her GP made an urgent referral to a perinatal mental health team (PMHT) and she was seen two days later. That same day she took an overdose and was admitted to a Mother and Baby Unit (MBU). She was treated for a depressive psychosis and was discharged to the care of a crisis team. She was readmitted to the MBU several months later but was transferred to an acute psychiatric ward after discussion with the PMT and her husband. Her baby returned home. She had a further suicide attempt while admitted but was discharged to a home treatment team. She died by suicide two weeks after discharge.

Assessors felt that this woman was prematurely discharged without full treatment and management of her symptoms. With a first episode puerperal psychosis, there should be an expectation of a full recovery at the time of discharge, even if this requires extended admission to a MBU. This did not appear to be the case with this woman whose symptoms persisted resulting in readmission several months later. On readmission, she requested that her baby go home, but it is not clear if she had the capacity to make this request or if the PMHT assessed her capacity for decision-making as recommended in past reports (Knight, Tuffnell et al. 2015). It was also not clear if this request was recognised as a potential 'red flag' symptom of an expression of incompetency as a mother or estrangement from the infant (Box 6.1). As it was, she was transferred to an acute ward where she attempted suicide and was again discharged despite persistent symptoms. Assessors felt that those caring for her, including the PMHT, did not appear to take an overarching view of her risk.

Women admitted to Mother and Baby Units are at particular risk whilst on leave or immediately following discharge…Mother and Baby Units should be reminded of the importance of ensuring robust aftercare plans for their patients (Knight, Tuffnell et al. 2015)

Box 6.1: 'Red Flag' presentations which should prompt urgent senior psychiatric assessment

- Recent significant change in mental state or emergence of new symptom
- New thoughts or acts of violent self-harm
- New and persistent expressions of incompetency as a mother or estrangement from the infant

(Knight, Tuffnell et al. 2015)

Consideration of children

A woman had longstanding mental health problems requiring inpatient admission as an adolescent. She was known to mental health services, addictions services and social services and her two older children were in her care. She engaged with antenatal care and had a preterm emergency caesarean birth for fetal distress. She attempted suicide several months after giving birth and was voluntarily admitted to a mental health unit. While admitted she reported worsening mood and alcohol use since the birth of her baby. She was discharged two weeks later with a referral for counselling and addictions support. Around the time of her discharge, referrals to children's social services were made and a temporary agreement was put in place for her to have supervised contact with her three children. A child protection conference was held a month later and she was told she would not be getting custody of her children. She died by suicide a few days later.

Although this woman had significant mental health support, there was no record of her being referred to or seen by a PMHT during pregnancy or after her discharge. This woman had acted violently towards herself, which is a 'red flag' presentation and should have prompted urgent senior psychiatric assessment (Box 6.1).

Assessments should always include a review of previous history and always take into account the findings of recent presentations and escalating patterns of symptoms, their severity and any associated abnormal behaviour (Knight, Tuffnell et al. 2015)

This woman's stay in hospital after her suicide attempt was short and she was discharged partially on the basis that her children were considered a protective factor against her risk of future suicide. During her admission there had not yet been a referral to children's social services; however, when this referral was made by her GP at the time of her discharge, this did not appear to be considered as part of an ongoing risk assessment. Nor was her ex-partner's reluctance for the children to be in her care. Thus, she was discharged in part on the basis of a protective factor that was no longer in place.

Assessors felt that the idea of children as a protective factor against suicide and substance use should be challenged and not taken as a matter of fact, even if the woman herself expresses this feeling. Some women may be too unwell to keep themselves safe despite a desire to protect their children from harm. Assessors also noted that often the focus on children as a protective factor may prevent more comprehensive assessment and management of their risk. Indeed, for a number of women who died by suicide or substance use, children were present in the home and witnessed immediate events leading up to their mother's death. In a few instances, children were required to call emergency services for their mothers. The loss of a mother compounded by this undue trauma is a powerful reminder of the intergenerational effects of these maternal deaths.

Support following loss

As discussed in several past MBRRACE-UK reports (Knight, Bunch et al. 2021, Knight, Bunch et al. 2022), there was evidence from the review of care of women who died from psychiatric conditions in 2021-23 of declining mental health and escalating risky behaviour after child loss. This included early loss due to termination of pregnancy or miscarriage as well as perinatal death and removal or threatened removal of children. Women are more at risk following a perinatal loss event and require good communication, coordinated care and additional support.

Loss of a child, either by miscarriage, stillbirth and neonatal death, or by the child being taken into care increases vulnerability to mental illness for the mother and she should receive additional monitoring and support (Knight, Tuffnell et al. 2015)

Support following custody loss

Nineteen percent of the women who died by suicide and 40% of the women who died due to substance use in 2021-23 had their child removed from their care. An additional 10 women had threatened removal due to ongoing care proceedings.

A woman in her 30s lost custody of her child shortly after their birth. Her older children from a different partner were also in care. She was a care leaver herself and had several social complexities including insecure housing and substance use. She had a history of anxiety and depression and a diagnosis of emotionally unstable personality disorder. Before birth, her baby was placed on an interim care order and a week after birth, a court order was made to place the baby in foster care. She was extremely distressed by this decision and her GP referred her to both the perinatal mental health team and community mental health team. Both services declined the referral. Seven months postpartum she was told that her child would be permanently removed from her care. She died by suicide the next day.

This woman faced significant barriers accessing mental health services. Assessors noted that this woman's GP was actively trying to help her but the PMHT declined the referral as her baby 'was in foster care and not with her'. A follow-up referral to a community mental health team was also declined after the woman was triaged and it was felt to be unnecessary. The loss of child custody is a distinct type of loss that is ambiguous and without resolution. It is often accompanied by grief that is not validated or acknowledged (Russell, Turner et al. 2025) and associated with complex psychosocial risk factors and stigma including exclusion from mental health services (Broadhurst and Mason 2020).

There was no evidence that this woman was provided with appropriate supports at the time of the initial care proceeding or following the court order to place her baby in foster care. This was the case for many women whose children were removed. As has been previously reported, child safeguarding processes often do not take into account the needs of the mother, and any multidisciplinary care that was provided does not continue after child removal (Knight, Tuffnell et al. 2015). Although it may be appropriate in some instances to remove children from women's care, it is vitally important that professionals are compassionate and forward thinking. Assessors suggested that a specialist care pathway to provide support for the mother should be initiated alongside the child when the possibility of child removal is first raised. Such forward planning can help lessen the trauma of this experience and reduce the chance of disengagement with mental health services after child removal.

Assessors also highlighted the importance of specialist advocacy for women with threatened child removal in navigating court proceedings. Plans to support mothers are often rushed and inadequate relying on existing support services. While mental health services may provide psychological or emotional support, they do not have the legal expertise to help women navigate these processes. The provision of advocate support can help women feel validated and respected regardless of the outcome of care proceedings (Russell, Turner et al. 2025).

Support following bereavement

Fourteen women who died from suicide or substance use experienced an early pregnancy loss and 16 further women died following a termination of pregnancy. Five women experienced a stillbirth and five had a neonatal death. These losses can be extremely difficult and are often isolating. While all of these women will experience a sense of loss or grief, not all will receive appropriate bereavement support and some may develop prolonged grief and significant mental illness as a result of their loss.

A young woman with mental health issues and substance use was found to be pregnant when she presented to the emergency department following an incident of domestic abuse. She was referred to the early pregnancy clinic and safeguarded but she did not engage with services. She had a first trimester miscarriage. She died by suicide two months later.

While there is no clear association between miscarriage or termination of pregnancy and subsequent mental illness (Vlachou, Iakovou et al. 2024), this woman had well-established risk factors for significant psychiatric morbidity, including pre-existing mental illness, substance use, domestic abuse, limited social support, and younger age (American Psychological Association 2008). Women with these risk factors need enhanced follow-up and clear care pathways; however as noted earlier in this chapter, this was not often the case for women who experienced early pregnancy losses.

A woman with a complex medical and mental health history had three previous pregnancies that ended before 22 weeks' gestation. In her most recent pregnancy, she experienced a first trimester miscarriage. She had not yet booked for antenatal care but was seen by psychiatric services. She reported that she had stopped using substances since becoming pregnant. After her miscarriage she had ongoing contact with addictions services and presented on several occasions with groin infections linked to intravenous drug use. She died of an overdose 11 months after her miscarriage.

This woman had multiple miscarriages but it is unclear if she was offered mental health support following any of these losses. It appeared that this pregnancy was wanted and she expressed a desire to reduce her substance use as she was concerned about its effect on her baby. After her most recent miscarriage she had ongoing, active involvement from community addiction services but her substance use continued resulting in several admissions for sepsis. The hospital liaised with addictions services during her admissions, but there was no evidence of communication with mental health services.

> An older woman conceived her second child by *in vitro* fertilisation. She had no history of mental health problems and uncomplicated antenatal care. She had an elective caesarean birth at term and no problems were reported for her or her baby in the early weeks following birth. Three months after birth, her baby suddenly died. The woman expressed feelings of guilt, low mood, anxiety and an acute grief reaction. She was not sleeping. She had counselling and support from her GP and the child death team. She took an overdose a few weeks after her baby's death and had a brief two-day admission during which she expressed suicidal ideation. She was referred to a mental health liaison team and then discharged under the care of a crisis home treatment team. She died by suicide two days after discharge.

The loss of a child is devastating and the additional burden of guilt that often accompanies sudden, unexpected deaths can put mothers at high-risk of severe mental morbidity, even in the absence of other risk factors or previous mental health problems. A suicide attempt in this context, especially those with other associated 'red flag' symptoms, such as insomnia, may require an extended inpatient admission.

The importance of relationships

In addition to the loss of a child, several women who died experienced other stressors including relationship difficulties or bereavement due to the recent death of partners or family members, which in some instances were also by suicide or substance use.

> A vulnerable young woman had experience of care as a child and a history of depression and substance use. Her pregnancy was unplanned and her relationship with the baby's father was complicated. Domestic abuse was not noted at booking but was disclosed later in pregnancy following the woman's separation from her partner. She reported a low mood throughout pregnancy and was struggling to deal with the stress of her relationship. Referrals were made for safeguarding but not to a perinatal mental health team (PMHT). Her ex-partner was present at the birth but a child protection order was put in place due to his ongoing aggression. Four months after she gave birth, her ex-partner died by suicide. The woman's mood continued to deteriorate after his death and she expressed suicidal ideation coupled with insomnia. She was referred to the PMHT but died by suicide before she could be assessed.

This woman was one of 41 who died by suicide who experienced the breakdown of a close relationship or had an argument with their partner around the time of their death. Women experiencing relationship difficulties may face compounding stressors such as new or escalating domestic abuse, demands for paternity testing and reduced support networks. This woman also experienced a significant bereavement around the time of her death as was the case for 11 other women who died by suicide. For five of these 11 women, this bereavement was due to the suicide of a partner, friend or family member. The psychological impact of relational trauma, instability and bereavement can contribute to worsening mental health, affecting both maternal wellbeing and infant outcomes (Forray and Yonkers 2021, Reid, Pratt et al. 2022). Perinatal services should know how to identify and respond to psychosocial risk factors, especially those related to relationship conflict and loss. Pertinent information about psychosocial risk factors must also be communicated to others involved the woman's care. It was not clear if this woman's broader circumstances were communicated to the PMHT during her referral.

Complex care needs and multiple disadvantages

Trauma history

Almost all of the women who died from psychiatric causes in 2021-23 had some element of disadvantage. Amongst the women who died from suicide, 24% were considered to have severe and multiple disadvantages; for women who died from substance use, this figure was 52%. Many of these women had a history of childhood trauma and several were care leavers or had a family history of suicide or substance use. There were also many women who had a history

of trauma in adulthood, were living in unstable housing or who had interacted with the criminal justice system. As mentioned in Chapter 5, many of the women who died from psychiatric causes causes also had adverse childhood experiences, which are associated with mental health problems and substance use (Hughes, Bellis et al. 2017).

Recognise the importance of a trauma history in the assessment of risk. Involve specialist Perinatal Mental Health Teams where there is a history of significant involvement with secondary mental health services or significant risk, particularly if it is a first pregnancy (Knight, Bunch et al. 2022)

Healthcare professionals should be given training on the social and psychological needs of women who use substances.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

A woman in her 20s had multiple social vulnerabilities beginning in childhood. She and her partner were both care leavers and had previous criminal justice involvement. They were known to use substances and were living in temporary accommodation with a limited support network. She booked early for antenatal care and a plan was made for multi-agency involvement. She was commenced on methadone but had limited engagement with maternity and addictions services. She was not registered with a GP practice due to recent changes in her housing. Attempts were made for follow-up but the baby was put on a child protection register due to non-engagement. After a caesarean birth, her baby was admitted to a neonatal unit with withdrawal symptoms. The woman continued to disengage while her baby was in hospital and a decision was made for the baby to be taken into care. Her mental health deteriorated and she died of an overdose less than three months after giving birth.

This woman's lifestyle, including insecure housing, made it difficult to engage in care. She was not registered with a GP as the homeless GP she saw when first pregnant discharged her from services when she moved into temporary accommodation. However, assessors noted there was good follow-up during the antenatal period and the woman made efforts to engage with the supports that were offered. This included abstaining from substances and participating in methadone substitution therapy. These supports seemed to fall away after the woman learned that her child was to be taken into care at which point she disengaged further and started using substances again.

It is important to recognise that women with a history of complex trauma can be particularly vulnerable to declining mental health and increasingly risky behaviour during the perinatal period. This vulnerability is often heightened if the woman experiences a perinatal loss, including through social service involvement. These women need proactive monitoring and follow-up for non-attendance. This includes identifying any potential barriers to accessing services. As outlined in last year's report, women have different needs that should be taken into account when providing individualised care (Felker, Patel et al. 2024). Women with complex trauma may require a flexible approach and more consistent care that is delivered compassionately using a trauma-informed approach to build trust and respect. It is important to maximise opportunities when women do engage in care to develop strategies for continued, future engagement.

Disengagement from care should be regarded as a potential indicator of worsening mental state. All professionals involved in the woman's care should be informed of non-attendance and assertive follow-up arranged when there is already concern regarding mental state or prior evidence of risk (Knight, Bunch et al. 2018)

Women with substance use are often more vulnerable and at greater risk of relapse in the postnatal period, even if they have shown improvement in pregnancy. Ensure they are reviewed for re-engagement in the early postpartum period where they have been involved with addictions services in the immediate pre-conception period or during pregnancy (Knight, Bunch et al. 2021)

Stress

A grand multiparous woman in her 30s had a history of serious mental health problems. She had a diagnosis of emotionally unstable personality disorder and previous suicide attempts requiring psychiatric admission. She had several older children with behavioural difficulties including attention deficit hyperactivity disorder and autism. Before she became pregnant, her mental health was managed under primary care. Once pregnant, she was referred for specialist perinatal mental health support. She expressed suicidal ideation on several occasions during pregnancy but declined offers of admission. After giving birth, she was diagnosed with comorbid depression. Admission to a Mother and Baby unit was considered but she received home-based treatment instead. A referral to social services was made, she reported improved mood and there was no further involvement. Over the next several months she began to self-harm and disengage from care before she died by suicide.

Assessors noted that this woman's home life was very stressful but felt that those caring for her did not seem to recognise this. Instead, her older children's behaviour, which sometimes included serious violence, were viewed as separate problems not impacting on her health. Several women reviewed for this chapter had older children with additional needs but often this was not recognised as a factor contributing to their mental health problems. It is important to consider the whole family when assessing risk including any supports that may or may not be in place. With this woman's mental health history, assessors felt that the stress caused by her home environment severely exacerbated her vulnerability. A referral to children's social care was made postnatally, but assessors questioned why there was not more consistent, ongoing involvement, including when the woman began self-harming and stopped engaging in care. They felt that attempts to individualise care from early pregnancy may have helped facilitate ongoing support and provide the woman with coping mechanisms to help reduce stress.

Appointment burden

A woman in her 20s had a history of adverse childhood experiences and previous involvement with social care and the criminal justice system for her substance use. She also had ongoing social and mental health complexities. She had one previous child who had been placed in foster care shortly after birth and her most recent pregnancy was unplanned. She denied substance use at booking and had negative screening on urine toxicology at all antenatal appointments. She engaged with care and was seen by a specialist substance use midwife but did not have mental health support. In her second trimester it was determined that her older child would be placed up for adoption. She reported increased anxiety and isolation following this decision. She presented on several occasions in the second trimester with vaginal bleeding and abdominal pain requiring multiple hospital admissions. She had spontaneous rupture of membranes at 23 weeks' gestation and was admitted for inpatient management. Her baby died shortly after birth contributing to worsening mental health. Postnatally, multiple services initially attempted to support her but she was discharged from perinatal psychiatry services after a missed appointment. She died of an unintentional overdose four months after birth.

Women with complex care needs, including medical and mental health comorbidities or social risks, often have input from many services, agencies and professionals requiring a high volume of appointments (De Backer, Felker et al. 2025). As discussed in the next section, these appointments are often not coordinated across services, resulting in appointment schedules that can be difficult to adhere to, especially for women with already complex lives. For one woman, 33 different services were involved in her care. Often the burden of this level of fragmented care was not recognised and women were sometimes discharged from services or labelled as 'poor attenders' or 'non-engagers' after a single non-attendance despite having engaged with the majority of their care.

Figure 6.3 shows the appointment schedule for the woman described above. She was in regular contact with her older child in foster care and had expressed a hope to regain custody. Although she had a complex history, it did not appear that she was using substances during her pregnancy and she engaged well with antenatal care. She was referred to the PMHT after birth but assessors felt that she would have benefitted from a much earlier referral and assessment in view of her older child's adoption order. After she was accepted for PMHT services, she was discharged after a single missed appointment without direct transfer to another service. As seen in Figure 6.3, almost all supports and attempts to engage this woman in care fell away shortly after she gave birth.

Figure 6.3: Visual representation of care received during and after pregnancy for a woman with multiple complexities*

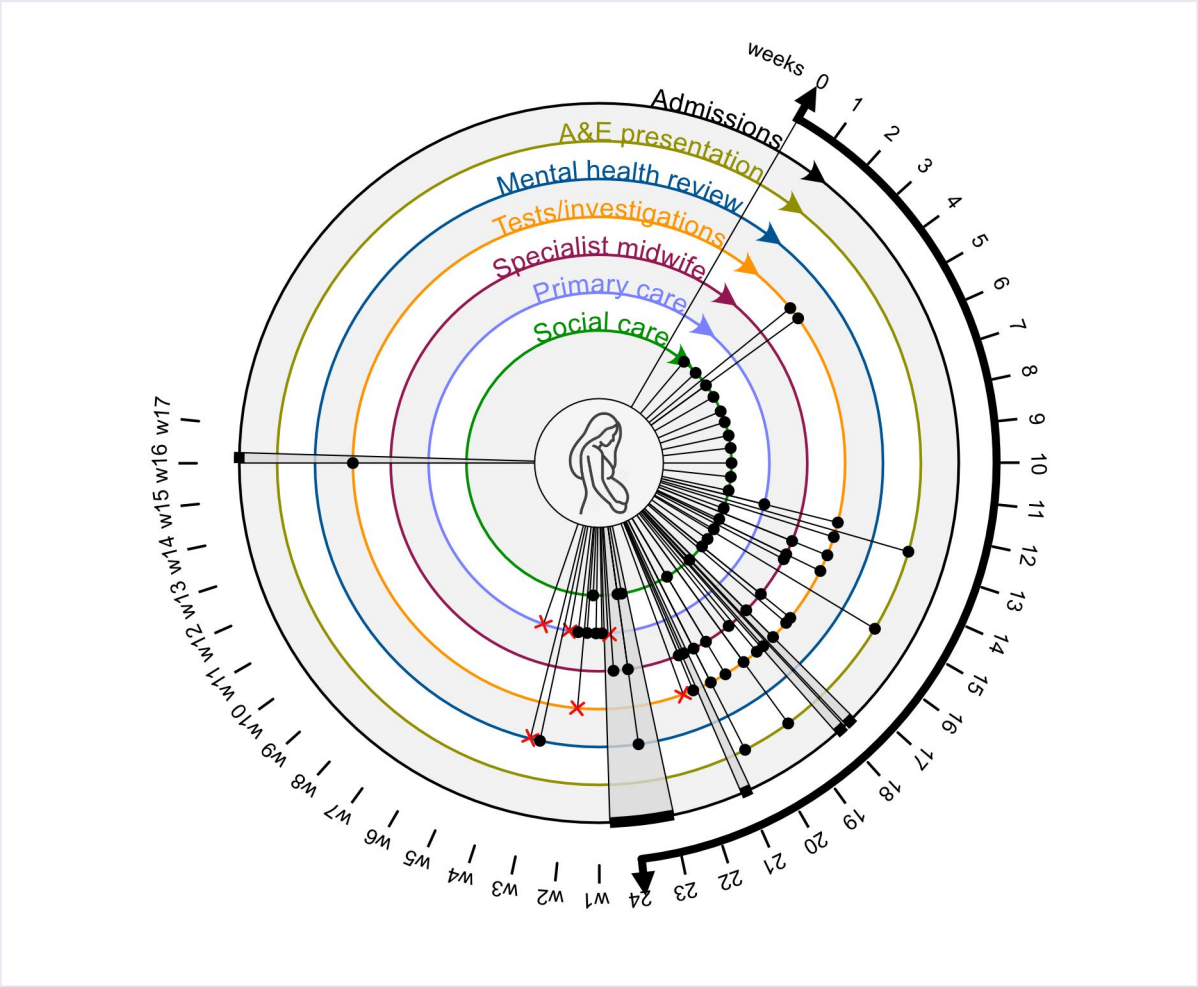


Figure courtesy of Kaat De Backer

*Pregnancy is presented by gestational week and marked by an external arrow from the time of conception to birth (0-24). The postnatal period is presented as the number of weeks after birth until the woman's death (w1-w17). Appointments attended are indicated by a circle and missed appointments are indicated with a red 'X'. Sections shaded in grey represent inpatient admissions.

Multi-agency working and joined-up communication

Multi-agency working

As discussed above, there were many women who died who were known to multiple services or healthcare providers; however, as noted in Chapter 5, these services were often operating in silos without a coordinated approach to care. This included limited communication between services, which meant that the overall picture was not clear. Communication difficulties were often compounded by the digitisation of notes and variation in electronic systems within hospitals and across services. It is essential that services communicate with each other in an accurate and timely manner. The single patient record announced as part of the NHS's new 10 Year Health Plan (Department of Health and Social Care 2025) may help ensure that each professional involved in a woman's care is aware of the whole picture and able to provide appropriate care tailored to the woman's individual needs.

A multiparous woman had complex social circumstances, known substance use and a history of mental health challenges. She had a history of non-engagement that did not improve when she became pregnant. She initially sought a termination but decided to continue the pregnancy. Her vulnerabilities were noted at booking and she had input from many services including maternity, addictions support, social services and community mental health teams who attempted to engage her. Her baby was removed from her care at birth after which her mental health and substance use worsened. She died by suicide six months after giving birth.

Assessors considered that this woman received good care within the limits of existing services as there was evidence of multiple attempts at engagement. She was referred to a specialist mental health midwife but assessors felt that more senior oversight may have improved continuity of care and allowed for a longitudinal view of her history to better identify her escalating risks. In practice, her mental health care was being delivered by addictions services. Although it is not always clear from women's records whether addictions services were provided by health or third sector organisations, there are recognised challenges of interagency working between all mental health and addictions services. Thus, the offer of joined-up care, which may improve engagement, is often not possible.

A multiparous woman died from an overdose a few weeks after giving birth. She had older children in care due to substance use and domestic abuse. She had a number of mental and physical comorbidities including depression, post-traumatic stress disorder, a known heart condition and mobility issues. She booked early but frequently missed appointments. She presented to the emergency department on several occasions for hyperemesis, abdominal pain, shortness of breath, chest pain and COVID-19 infection. She denied any suicidal ideation but had known ongoing substance use. She had a caesarean birth at term and the baby was taken into care. She reported deteriorating mental health at discharge but it is uncertain if a referral was made for further assessment. One month postnatally, she was admitted for a wound infection and again reported deteriorating mental health. She was referred for psychiatric liaison but this did not occur before she died a few weeks later.

This woman was known to many services due to her medical, mental and social complexities. However, despite many people knowing that she was vulnerable, there did not appear to be any oversight to understand the compounding impact of all her risk factors. This was particularly apparent when she was admitted with a wound infection postnatally. The psychiatric liaison team did not consider her to be 'immediate' risk and she was given an appointment over a month later by which point she had died. She also did not have any involvement of the PMHT after expressing deteriorating mental health around the time her baby was removed from her care. This woman's care illustrates how fragmentation, both between emergency and maternity services and within mental health services, may impact the continuity of care that is essential to help improve women's outcomes. There is a need for improved awareness of how vulnerable women engage with care, including acute presentation to emergency departments, and better understanding of the concerns around non-attendance in this group of women.

Women should receive continuity of mental health care. Where more than one mental health team is involved, there should be a clearly identified individual who coordinates care (Knight, Bunch et al. 2018)

Medical comorbidities

Forty-one of the women who died from substance use (61%) had medical comorbidities. Such comorbidities may require specialist input and coordinated care and can contribute to the burden of appointments women face. While some medical comorbidities such as infections or malnutrition due to eating disorders may be attributed in part to mental health conditions or substance use, other comorbidities may exacerbate these conditions. For instance, several women had chronic pain requiring the use of opioids. Chronic pain can adversely affect physical activity, sleep and independence and is associated with a two-fold increased risk of death by suicide (Chincholkar and Blackshaw 2023). Substance use is also associated with a hypersensitivity to pain, which can lead to an escalation of opioid use, thus contributing to worsening substance use (Schaffer, Fogelman et al. 2023) and an increased risk of suicide (Chincholkar and Blackshaw 2023).

Information sharing

A woman in her 30s booked for antenatal care in the first trimester. At booking she disclosed a history of depression but did not report any current mental health problems. No safeguarding concerns or relationship difficulties were noted. Her pre-pregnancy alcohol use was documented as <15 units/week with no current use. Her pregnancy was uncomplicated and she had a late preterm vaginal birth. Seven months after giving birth she died by suicide following an argument with her partner while under the influence of alcohol. Post-mortem and primary care notes indicated a much more extensive history of depression, self-harm, substance use and domestic abuse than were disclosed to maternity services.

This woman did not disclose her history of mental health issues, substance use or domestic abuse to maternity services. However, four weeks prior to pregnancy, she had presented to her GP with escalating depression and alcohol dependency after her relationship with her partner ended. Her alcohol intake was documented as >60 units/week in the two months prior to booking. There was no record of communication between maternity services and primary care that could have revealed this woman's significant complexity. Although her antenatal care was uneventful, assessors felt that this was a missed opportunity to engage her with interventions and support that may have improved her outcome. Effective information sharing and consistent record-keeping, such as the newly announced single patient record (Department of Health and Social Care 2025), are key components of quality care, especially for women with complex psychosocial needs. When relevant concerns are known to some professionals but not shared with others in order to inform a comprehensive care plan, opportunities for timely intervention can be missed.

There is a clear duty on all health professionals to pass on relevant information that may affect the care a woman receives during pregnancy or alter her outcomes (Knight, Bunch et al. 2021)

GPs should inform maternity services of any past psychiatric histories and maternity services should ensure that the GP is made aware of a woman's pregnancy and enquire of the GP about past psychiatric history (Knight, Tuffnell et al. 2015)

Be proactive about substance use

A multiparous woman denied mental health issues or drug and alcohol use at booking. She was triaged as low-risk and had many instances of non-attendance for antenatal care. She had an uncomplicated vaginal birth near term. Postnatally there were delays in her GP check and baby's registration and immunisation. This was followed-up but not explored further. Six months after giving birth she reported COVID-19 related anxiety to her GP. Four months later she collapsed at home and could not be resuscitated. Toxicology results indicated cocaine metabolites consistent with heavy, ongoing use. The police were familiar with her substance use; her GP and maternity services were not.

It is notable that this woman was known to police for her substance use but she never disclosed this information to her GP or maternity services. There were also many safeguarding referrals in place to social services. Assessors felt that, had this information been shared with primary care, her declining mental health six months postpartum would have been more appropriately recognised and safeguarded. As it was, the limitations in information sharing meant that her declining mental health went unnoticed.

As noted in Chapter 5, the assumption of willingness of women to disclose information that is often stigmatised or sensitive should be challenged. Clinicians must proactively ask about social risk factors, including substance use, using a standardised assessment. Several women who died from substance use were asked about alcohol use or smoking by their GPs but there was no evidence of discussions around the use of other substances. Similarly, a number of women who disclosed previous substance use were not asked about ongoing use in pregnancy.

NEW **National recommendation**

Update guidelines on the care of women with complex social factors to include clear guidance for a standardised assessment and documentation of social risk factors at booking appointments and at least once more later in pregnancy. In the absence of sufficient evidence to update guidance, commission research to explore the unique care needs of vulnerable populations.

Safeguarding

A vulnerable young migrant woman with no support network or stable housing died by suicide early in her third trimester. She was known to police following numerous episodes of domestic abuse in the year prior. Her pregnancy was unplanned and unbooked until late in the second trimester after multiple non-attendances. A safeguarding midwife and social worker were notified of her non-engagement and coordinated her booking. Her partner was present at booking and she denied any mental health issues or domestic abuse. Shortly after booking, a Multi-Agency Risk Assessment Conference (MARAC) was held following a further police investigation. She was signposted to support services but no other care plan was implemented. She died by suicide one month later.

This woman had extensive efforts from several agencies to try and engage her with care; however, coordination between services was limited. The information known to police in relation to domestic abuse was not routinely shared with all relevant services. Assessors noted that there did not seem to be an appreciation of the risk of pregnancy in relation to domestic abuse and felt that a better understanding of these risks is required for all agencies caring for women in order to provide appropriate safeguarding support. Although this woman was assigned a safeguarding midwife for her non-attendances, she did not appear to have a senior named individual to provide clinical or safeguarding leadership.

NEW National recommendation

Develop guidance for information sharing within maternity services and across health services and other agencies in the event of safeguarding concerns. Ensure that codes for flagging domestic abuse are applied in women's records and are known to all those caring for her.

At her booking appointment, this woman did not disclose domestic abuse as her partner was present. She also did not disclose mental health needs and, as such, there were no opportunities to assess her suicide risk. Assessors emphasised the need to ask women about sensitive issues without their partner present on at least one occasion (National Institute for Health and Care Excellence 2010). For vulnerable women, assessments must be repeated whenever there are opportunities to do so.

Multidisciplinary team training message

'Make every contact count' - Maternity staff, or other frontline staff in contact with pregnant or recently pregnant women, should be trained to recognise the risks and indicators of domestic abuse including the increased risk in pregnancy and association with childhood adversity, mental health and substance use. Staff should know how to ask relevant questions and create a secure environment to facilitate disclosure of current or past domestic abuse. Training must also include guidance on how to respond to disclosures of domestic abuse in a sensitive manner that ensures women's safety and staff should be aware of local referral pathways for specialist services. Any training provided must be trauma-informed and culturally sensitive in order to recognise the complexities of coercive control including how individual characteristics may impact disclosure (National Institute for Health and Care Excellence 2016).

In order to facilitate discussion of sensitive issues, provide each woman with a one-to-one consultation, without her partner, a family member or legal guardian present, on at least one occasion.

NICE CG110 Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors (National Institute for Health and Care Excellence 2010)

Social service involvement

Almost half of the women who died by suicide (41%) and 78% of the women who died from substance use were known to social services. As noted before, social service involvement for these women often focused solely on the care of the child without adequate support for the mother. It is essential that social service involvement is timely and considers the safety and wellbeing of both the mother and child. Often risk can be underestimated or protective factors assumed without sufficient evidence or re-assessment when circumstances change. Ongoing assessment including consideration of changing relationship dynamics, parenting capacity and mental health is required in order to appropriately safeguard women and children. Typically this will require coordinated care between social services, maternity care, mental health teams and addictions support. Clear communication, shared responsibility and consistency are essential to ensure that safeguarding is part of both mental health and maternity care.

Postnatal support

As has been a common theme in MBRRACE-UK reports, and as illustrated in Figure 6.3, multidisciplinary support appeared to fall away postnatally. For many of the women who died from psychiatric causes, postnatal care was often not multidisciplinary and without senior oversight to coordinate care. As noted in Chapters 3 and 4, communication between secondary and primary care was often limited and information provided in discharge summaries was insufficient in order to develop a coordinated plan for ongoing mental health concerns, medication requirements and safeguarding needs.

NEW **National recommendation**

Discharge summaries for primary care should clearly indicate in an initial summary box the key conditions that require ongoing support or management and a clear plan for postnatal care. Detailed information about medical, mental health and social complexities and ongoing medications, monitoring requirements or safeguarding concerns must be included to facilitate a clear plan for postnatal care.

Face-to-face risk assessment

Most women included in this report were cared for during the COVID-19 pandemic. As such, many were frequently assessed over telephone without face-to-face contact. The limitations of virtual consultations have been discussed in past MBRRACE-UK reports in relation to recognition of abnormal physical symptoms (Knight, Bunch et al. 2023, Felker, Patel et al. 2024) and mental health problems (Knight, Bunch et al. 2020b, Knight, Bunch et al. 2022). Multiple studies have shown that the pandemic led to increased rates of poor mental health amongst pregnant and postpartum women and exacerbated underlying mental health problems due to increased isolation and stress (Delanerolle, McCauley et al. 2023). Assessors emphasised the importance of face-to-face assessment for mental health problems, especially if there are repeated concerns.

Establish triage processes to ensure that women with mental health concerns can be appropriately assessed, including face-to-face if necessary, and access specialist perinatal mental health services in the context of changes to the normal processes of care... Perinatal mental health services are essential and face-to-face contact will be necessary in some circumstances. There is a clear role for involvement of the lead mental health obstetrician or midwife in triage and clinical review (Knight, Bunch et al. 2020b)

Birth trauma and critical illness

A young woman had a history of complex trauma including several adverse childhood experiences, previous domestic abuse and sexual assault. In a previous pregnancy she had postpartum haemorrhage and sepsis requiring a prolonged stay in the ICU. She was diagnosed with post-traumatic stress disorder following this birth. She was known to community mental health services and had a history of self-harm and suicidal ideation. Her subsequent pregnancy ended in a medical termination in the first trimester. She was seen by her GP following the termination and no mental health concerns were noted. She died by suicide three months later.

Severe maternal morbidity and maternal critical illness are associated with significant psychological morbidity (Lewkowitz, Rosenbloom et al. 2019, Blackman, Ukah et al. 2024). This woman was diagnosed with PTSD following a previous traumatic birth and the stress of her ICU admission was frequently noted as the primary cause of her worsening mental health. One in five patients experience PTSD following critical care admission (Righy, Rosa et al. 2019) and guidelines emphasise the importance of a structured psychological assessment and management of psychological morbidity following critical illness (National Institute for Health and Care Excellence 2009, The Faculty of Intensive Care Medicine and Intensive Care Society 2022). This is especially relevant to obstetric patients who may experience the compounding effects of birth trauma, which can significantly impact mental health.

> In her current pregnancy, a woman expressed a desire for an elective caesarean birth after a previous traumatic emergency caesarean birth due to failed instrumental delivery. She was increasingly anxious about birth but system pressures from COVID-19 meant there was no availability to discuss birth options. She went into spontaneous labour before her scheduled caesarean section and experienced a traumatic vaginal birth. It is not clear if the woman was involved in the decision to proceed with a vaginal birth. She was diagnosed with postnatal depression and died seven months later by suicide.

Physical and psychological birth trauma, including a perceived loss of control and unmet expectations during labour and birth, may contribute to the development of postnatal depression (Ayers, Bond et al. 2016, Arnold, Völkel et al. 2025). Complications following instrumental deliveries such as pelvic floor dysfunction may further compound this risk (Swenson, DePorre et al. 2018). This woman had an instrumental birth despite a previous traumatic experience and a stated desire to not repeat these events. Assessors noted that there was little clarity in the documented procedure and it was not clear if other options were provided or what the rationale was for the chosen approach. Even in urgent situations, it is important to empower women in decision-making through respectful, clear and supportive communication.

Culture, stigma and mental health

> A woman with a history of depression started to experience anxiety associated with the COVID-19 pandemic. This worsened as her pregnancy progressed and she became increasingly withdrawn and had trouble sleeping. She did not disclose any mental health concerns to her maternity team out of fear of judgement. Postnatally, she self-referred to her GP on multiple occasions with low mood but declined two separate referrals to the perinatal mental health team for fear of being labelled. Her family expressed safeguarding concerns and she was admitted to hospital. Upon discharge she had several virtual appointments with a psychiatrist but was reluctant to try cognitive behavioural therapy. At her last appointment, three days prior to her death by suicide, the psychiatrist reported no concerns about self-harm or safeguarding.

There are many factors that contribute to non-disclosure of mental health symptoms by women and their families. This woman was one of several who delayed seeking referral or declined treatment due to mental health stigma and fear of judgement. For some women, assessors felt that cultural stigma may have influenced their willingness, and their family's willingness, to disclose symptoms. Studies show that women from certain ethnic backgrounds are less likely to report mental health problems due to perceived ideas around motherhood. In some cultures it is also unacceptable to speak about emotions or problems outside of the family or home environment (Watson, Harrop et al. 2019). The complex nature of trauma and social adversity also means that women from some ethnic minority or cultural backgrounds have an inherit mistrust of healthcare professionals and services, which can affect disclosure and engagement with services (Conneely, Packer et al. 2023)

When women experience stigma related to mental health they often rely on clinicians proactively asking about mental wellbeing rather than seeking help. As noted in previous reports (Knight, Bunch et al. 2021), assessors felt that there were a number of missed opportunities to ask women about mental health and offer referral for support. Healthcare professionals should use every opportunity to ask women about their mental health using a trauma-informed, culturally sensitive approach to facilitate disclosure.

Recognise that women who have a mental health problem (or are worried that they might have) may be:

- **unwilling to disclose or discuss their problem because of fear of stigma, negative perceptions of them as a mother or fear that their baby might be taken into care**
- **reluctant to engage, or have difficulty in engaging, in treatment because of avoidance associated with their mental health problem or dependence on alcohol or drugs.**

NICE CG192: Antenatal and postnatal mental health: clinical management and service guidance (National Institute for Health and Care Excellence 2020b)

Be alert to factors, such as cultural stigma or fear of child removal, which may influence the willingness of a woman or her family to disclose symptoms of mental illness, thoughts of self-harm or substance use (Knight, Bunch et al. 2022)

Prescribing issues

Propranolol

A woman died by propranolol overdose eight months after giving birth. She had a history of anxiety and depression, including a previous suicide attempt over ten years earlier. She reported low mood and suicidal thoughts in the second trimester and was referred to perinatal mental health (PMH) services. She was discharged from PMH services after she did not contact them to schedule a review. There was no follow-up for her mental health. Eight months postpartum she contacted her GP with suicidal thoughts and poor sleep and was prescribed propranalol. Several days later a health visitor made an urgent referral to mental health services. She was given an appointment a week later as she was not considered acutely unwell but she died before this happened.

This woman was in significant distress but her history and 'red flag' symptoms were not fully recognised. As noted in previous reports (Knight, Bunch et al. 2018, Knight, Bunch et al. 2022), it was not clear if her GP considered the risk of overdose in the context of her suicidal ideation. There have been several safety alerts about the use of propranolol, especially in the postpartum period, and it is not recommended for the treatment of anxiety due to the recognised risk of harm from overdose. Instead, NICE guidance recommends a selective serotonin reuptake inhibitor (SSRI) as the first line treatment for anxiety in people who self-harm as they are less toxic than other antidepressants. NICE guidance also states that, when prescribing medication for someone at risk of suicide, the prescriber should take into account the risk of toxicity and limit the amount of medicine available (National Institute for Health and Care Excellence 2020a).

When prescribing drugs for associated mental health conditions to people who self-harm, take into account the toxicity of the prescribed drugs in overdose. For example, when considering antidepressants, selective serotonin reuptake inhibitors (SSRIs) may be preferred because they are less toxic than other classes of antidepressants.

NICE CG113 Generalised anxiety disorder and panic disorder in adults: management (National Institute for Health and Care Excellence 2020a)

Polypharmacy

A woman had a history of domestic abuse, substance use, depression and self-harm. During pregnancy her history was noted and she had sporadic involvement of mental health services but was discharged back to her GP due to non-engagement. She was initiated on sertraline for low mood. She had a preterm birth and the baby was put up for adoption. Postnatally, she reported increased suicidality and self-harm and her medications were changed from sertraline to mirtazapine. She was also prescribed co-codamol for back pain Three months after giving birth she contacted her GP following a traumatic event and was prescribed diazepam for acute distress. In the subsequent months she had regular repeat prescriptions for mirtazapine, co-codamol and diazepam. She died from a mixed prescription drug overdose eight months after giving birth.

This woman's dependence on prescribed medications, particularly co-codamol, was documented in her notes. Her mental health deteriorated after her baby was placed up for adoption, but previous non-engagement with services meant that she was not accepted for secondary or tertiary mental health care. Instead, she was discharged back to primary care where she continued to be prescribed large amounts of multiple medications despite a known dependence, history of substance use and complex social circumstances. For high-risk individuals, small amounts of medications should be prescribed at a time, with continuity of prescriber where possible, and regular touch points with a clinician for a mental health review. Electronic flags on patients' notes can be helpful to highlight potential safeguarding concerns, such as early requests for medication, to the clinical team including clinical pharmacists. Any problems with discontinuation of medications should be highlighted when prescriptions are issued and a plan for tapering medications should be discussed with the patient and highlighted to the clinical team.

6.6 Conclusions

This report emphasises once more the importance of PMHT leadership and specialist input for women who experience mental health challenges during pregnancy or in the period after. It is essential that this support is considered for every woman in the perinatal period and does not inappropriately exclude those who have lost their child through early pregnancy loss, bereavement or children's social care involvement. As highlighted in previous reports, these women are particularly vulnerable to mental illness and should receive additional monitoring and support. Women with substance use who require mental health support should also not be denied access to these services as there is a well-established association between concomitant mental health problems, substance use and social complexities including adverse childhood experiences. As such, there must be coordinated multi-agency working in order to provide ongoing support and safeguarding for vulnerable women. This should consider the impact of other stressors such as birth trauma, critical illness and relationships as well as the influence of culture and stigma on mental health and disclosure. One in four to one in five women will develop a mental health problem during pregnancy or the first year after childbirth (Howard, Molyneaux et al. 2014, Office for Health Improvement and Disparities 2025). The messages learned from this confidential enquiry remain critical to ensure that mental health conditions are recognised and appropriately managed in order to prevent future maternal deaths.

Sufficient information was available to assess the care of 83 women who died by suicide and all 67 of the women who died from substance use. Assessors identified improvements in care for the majority of women who died from psychiatric causes and felt that different care may have made a difference to the outcome for 53 women who died by suicide (64%) and 23 women who died from substance use (34%). Eleven percent of women who died from suicide and 28% of women who died from substance use were thought to have received good care on the basis of the information available.

Table 6.4: Classification of care received by women who died by suicide or substance use, UK and Ireland 2021-23

Classification of care received	Suicide Number of women (%) N=83*	Substance use Number of women (%) N=67
Good care	9 (11)	19 (28)
Improvements to care which would have made no difference to outcome	21 (25)	25 (37)
Improvements to care which may have made a difference to outcome	53 (64)	23 (34)

*Includes only women whose case notes were available with sufficient information for an in-depth review

7. Messages for pathologists

Samantha Holden, Allison Felker, Esther Youd, Lisa Barker, Sebastian Lucas and Marian Knight

7.1 Key messages

Existing guidance and recommendations requiring improved implementation

Full autopsy, including the examination of the cranial cavity, with the pathologist present at the evisceration; weight, height, BMI and ethnicity should be documented in the report. There is an increasing move towards non-invasive radiological post-mortem investigation (PMCT) but a full post-mortem, with histology, is strongly advised in maternal death cases (The Royal College of Pathologists 2024)

Pre-eclampsia/eclampsia deaths may occur in the community between antenatal visits; thus, brain, kidney, liver and placental/uterine histopathology can be critical in making the diagnosis at autopsy (The Royal College of Pathologists 2024)

It is extremely important to accurately categorise maternal cardiac deaths, therefore pathologists should follow standard cardiac pathology guidelines when performing such autopsies and seek appropriate expert help, particularly when the diagnosis is unclear (Knight, Bunch et al. 2019)

In all cases of aortic dissection a sample of spleen should be retained (or other appropriate sample for the local genetics laboratory) for potential genetic testing, and unless a non-heritable cause is identified, the family should be referred to the local cardiologist or geneticist for consideration of screening (Knight, Bunch et al. 2022)

Histology evaluation of the aorta is important to try to distinguish features of connective tissue disorders from features of hypertension and other acquired aetiologies (consensus statements from the Society for Cardiovascular Pathology and the Association for European Cardiovascular Pathology)(Halushka, Angelini et al. 2016, Knight, Bunch et al. 2022)

Coronary artery lumens should be assessed according to the Davies criteria (Davies 1999) with particular attention if 1 mm or less (Knight, Bunch et al. 2019)

The heart [should be retained] in cases of suspected sudden cardiac death with a morphologically normal heart; consider referral for specialist cardiac opinion and taking an appropriate sample, such as snap-frozen splenic tissue, should genetic testing be required (The Royal College of Pathologists 2024)

Pathologists should take care to describe and document external findings including injuries and findings pertinent to the cause of death (Knight, Bunch et al. 2018)

Specific drug names should be used in reporting the woman's cause of death (Knight, Bunch et al. 2018)

7.2 Background

There is a legal requirement in the UK that a MCCD be written and recorded. If it is not possible to complete this certificate accurately, the death may be referred to a coroner (or procurator fiscal in Scotland) to perform an autopsy and further investigate the underlying causes of death. Such a referral is required if the death was 1) unnatural or violent, 2) the cause of death is unknown or 3) the death occurred in custody or state detention (Department of Health and Social Care 2024). In terms of maternal deaths, the first criterion relates to accidental deaths, such as road traffic accidents, homicide and deaths due to psychiatric causes. The second criterion encompasses most other maternal deaths where the woman did not have a known, pre-existing condition such as cancer. Thus, while maternal deaths are rare, the UK historically boasted one of the highest rates of maternal autopsy amongst high-income countries (Lucas 2019). This is also due in large part to a well-established system of confidential enquiries, which have been reviewing maternal deaths since 1952 (currently run by the MBRRACE-UK collaboration).

Recently, questions relating to maternal death have been added to MCCDs in England and Wales; this has been in place in Scotland for several years. These questions include asking whether the woman was pregnant within the year prior to her death, when this pregnancy occurred in relation to death, and whether pregnancy was thought to contribute to her death (Department of Health and Social Care 2024). While meant to facilitate recording of maternal deaths, these questions do not necessarily capture all the women who die and who are reviewed as part of MBRRACE-UK confidential enquiries. Guidance from RCPath recommends that medical examiners ensure they have tried to ascertain whether a woman may have had a pregnancy (The Royal College of Pathologists 2024), but

this may not always be possible in instances where the woman had an early pregnancy loss in the year prior. The second question on the MCDD also does not capture women who died from causes thought to be 'coincidental' to pregnancy but whose care may have been impacted by their pregnancy.

A high-quality autopsy is essential to establish a woman's cause of death and to improve the accuracy of maternal mortality data. They are also crucial to help improve future care and ensure that any required family counselling or testing is undertaken. While maternal deaths can be complex and many pathologists may not encounter one in their career, it is clear that there are improvements to be made to the quality and completeness of maternal autopsies. This chapter outlines some of the pathology messages and lessons learned from the review of women who died during pregnancy or up to a year after pregnancy from accidents, homicides, suicide, substance use, hypertensive disorders of pregnancy and cardiac disease in the UK and Ireland between 2021-23.

7.3 General messages

Rates of post-mortem examination in the UK

The proportion of women who died during pregnancy or up to a year after pregnancy in the UK who had a post-mortem examination has remained fairly consistent since MBRRACE-UK reporting began (Table 7.1). Of all the women who died, around two-thirds had a post-mortem examination with the majority performed under coronial or procurator fiscal authority. The women who died who did not have post-mortems performed were primarily those who died between six weeks and one year after the end of pregnancy and those who died from a well-documented pathology such as cancer. For most of these women, pathology assessors felt that a post-mortem examination was not required.

Table 7.1: Frequency of post-mortem examinations amongst women who died during or up to one year after pregnancy, by overlapping triennia, UK 2015-23

	2015-17 Number of women (%) N=549	2016-18 Number of women (%) N=547	2017-19 Number of women (%) N=495	2018-20 Number of women (%) N=536	2019-21 Number of women (%) N=573	2020-22 Number of women (%) N=625	2021-23 Number of women (%) N=611
No post-mortem	119 (22)	139 (25)	137 (28)	169 (32)	188 (33)	216 (35)	206 (34)
Post-mortem completed							
Hospital	23 (4)	33 (6)	38 (8)	32 (6)	19 (3)	11 (2)	10 (2)
Coroner/ procurator fiscal	341 (62)	335 (61)	303 (61)	335 (63)	366 (64)	398 (64)	395 (65)
Records not available	66 (12)	40 (7)	17 (3)	0 (0)	0 (0)	0 (0)	0 (0)

It is important to note that the figures presented in Table 7.1 may be masking substantial changes in the proportion of post-mortem examination amongst women included in global mortality figures, specifically those who died during pregnancy or up to six weeks after pregnancy from direct and indirect causes. In 2015-17, the proportion of post-mortem examinations amongst this group of women was 92% for direct causes of death and 84% for indirect causes of death. These figures remained relatively consistent until the first triennia covering the COVID-19 pandemic (2018-20), when they dropped to 88% and 74%, respectively. Of the women who died during pregnancy or up to six weeks after pregnancy in 2021-23, just 77% of women who died from direct causes and 66% of women who died from indirect causes in the UK had a post-mortem examination.

Although not currently captured in MBRRACE-UK surveillance, pathology assessors noted that the rate of non-invasive post-mortems appears to be increasing amongst women who died. This includes autopsies consisting of only an external examination or an external examination coupled with the use of radiography such as a post-mortem computed tomography (PMCT) scan. Guidance from the RCPath recommends a full post-mortem for maternal deaths (The Royal College of Pathologists 2024). Assessors also emphasised the importance of a thorough examination, particularly when there is no clear cause of death, or the cause of death given is a diagnosis of exclusion. For instance, several women who had clinical signs of hypoxic ischaemic encephalopathy with an otherwise negative autopsy, did not have their brains examined. Similarly, one post-mortem gave the cause of death as unascertained, but only the gastric content and toxicology were examined.

Full autopsy, including the examination of the cranial cavity, with the pathologist present at the evisceration; weight, height, BMI and ethnicity should be documented in the report. There is an increasing move towards non-invasive radiological post-mortem investigation (PMCT) but a full post-mortem, with histology, is strongly advised in maternal death cases.

RCPath G100 Guidelines on autopsy practice: Maternal deaths (The Royal College of Pathologists 2024)

Clinical history and clinicopathological correlation

When performing a post-mortem examination, pathologists should have access to the full clinical notes, as these may affect the interpretation of the findings. For a number of the women who died, the woman's history and circumstances around her death were not always comprehensive. This made it difficult to assess what information was available to the pathologist from the post-mortem report. In some jurisdictions, the coroner or procurator fiscal will not allow their summary of a woman's history to be included in the autopsy report. In such instances, this information should be included elsewhere in the report, either at the beginning or in the clinicopathological correlation. For several women who died, it appeared that the pathologist did not have access to or consider the medical notes and, for others, they appeared to use the medical examiner's second-hand summary instead of the medical notes. Both these scenarios can result in misinterpretation or missed vital clinical information, which may have helped inform the cause of death. For instance, for one woman who died from infective endocarditis, the pathologist was not aware of her history of tuberculosis and HIV infection.

In addition to the woman's history, a number of post-mortem reports did not include a sufficient discussion of the relevant findings and clinicopathological correlation. One of the key components of a standard autopsy report are the conclusions and the supporting reasoning (The Royal College of Pathologists 2025). This section provides an important opportunity to draw together the woman's medical history, circumstances of her death and autopsy findings to support the given cause of death.

Adherence to published guidelines

While the majority of post-mortem reports assessed as part of this year's confidential enquiries were of good standard, there were some that were missing key, basic information, such as the height and weight of the woman who died (The Royal College of Pathologists 2024). These data are essential for interpretation of findings. For pregnant or recently pregnant women, weight recorded at post-mortem can be used as a comparison to the booking weight to determine if the woman had significant weight gain or loss, which may suggest an underlying pathology that should be considered. The weight of the deceased person is also required in order to evaluate the expected heart weight and any pathological enlargement.

In addition to the RCPath's guideline on maternal death autopsies (The Royal College of Pathologists 2024), other guidelines, such as those for deaths in patients with epilepsy (The Royal College of Pathologists 2019) or for sudden death with likely cardiac pathology (The Royal College of Pathologists 2022), should be referred to where relevant. Lucas 2019 provides a comprehensive overview of how maternal death autopsies can help inform obstetricians and other health professionals (Lucas 2019).

7.4 Specific messages for maternal deaths included in the 2021-23 confidential enquiries

Pre-eclampsia and eclampsia

Deaths due to pre-eclampsia and other hypertensive disorders of pregnancy are rare and, as such, very few individuals performing post-mortem examinations will become confident in its diagnosis. Of the six women who died from hypertensive disorders of pregnancy in 2021-23, only two (33%) had a post-mortem examination and assessors noted improvements that could be made to both.

A thorough autopsy is essential in order to differentiate pre-eclampsia from other possible diagnoses. As discussed in Chapter 3, many women had hypertensive disorders of pregnancy superimposed on chronic hypertension. For others, hypertension was not associated with proteinuria and no women had PLGF testing to clinically diagnose pre-eclampsia. When the cause of death is reliant on clinical diagnosis due to the absence of a post-mortem examination, such inconsistent investigations can introduce uncertainty. Most of the women who died from pre-eclampsia had intracranial haemorrhage, but it was not always apparent whether this was due to eclampsia, chronic hypertension or another neurological cause as the brain was not examined. Similarly, some women were diagnosed with HELLP syndrome in the absence of liver histology as is recommended for diagnosis (The Royal College of Pathologists 2024).

Assessors emphasised the importance of multiorgan histopathology when pre-eclampsia or eclampsia is suspected. In difficult instances, histological examination of the renal cortex may help to identify glomerular endotheliosis, a key feature of pre-eclampsia (The Royal College of Pathologists 2024). Consultation with a specialist in renal histopathology can help confirm the diagnosis. Placental or uterine histopathology is also recommended in order to identify placental infarcts, decidual vasculopathy or other features of maternal vasculature, which may indicate placental changes due to pre-eclampsia (Burton, Redman et al. 2019). Such evaluation can also help provide insight into fetal outcomes in instances of growth restriction or fetal loss.

Pre-eclampsia/eclampsia deaths may occur in the community between antenatal visits; thus, brain, kidney, liver and placental/uterine histopathology can be critical in making the diagnosis at autopsy.

RCPath G100 Guidelines on autopsy practice: Maternal deaths (The Royal College of Pathologists 2024)

Cardiac-related deaths

In total, 68 of the 79 women who died from cardiac causes in 2021-23 had a post-mortem examination. Assessors felt that there were many examples of good autopsies amongst the women who died but re-emphasised the need for detailed descriptions of the woman's history, circumstances and clinical findings. They noted that better understanding of cardiac conditions may have improved some of the post-mortems including more consistent histological and toxicology examination and retention of tissues for family testing.

It is extremely important to accurately categorise maternal cardiac deaths, therefore pathologists should follow standard cardiac pathology guidelines when performing such autopsies and seek appropriate expert help, particularly when the diagnosis is unclear (Knight, Bunch et al. 2019)

Aortic dissection

Five of the seven women who died from aortic dissection in 2021-23 had post-mortem examinations. The remaining two women died in hospital from dissections confirmed by CT on the background of a known genetic connective tissue disorder. Therefore, assessors felt that the decision not to undertake an autopsy for these two women was appropriate. Although aortic dissection may be related to the massive haemodynamic changes occurring during pregnancy, particularly in the third trimester or puerperium, consideration should always be paid to the possibility of an underlying connective tissue disorder. Aortic dissections related to connective tissue disorders can occur at any stage of pregnancy.

Genetic material was retained for three of the women who died from aortic dissection and who had autopsies. As highlighted in Chapter 4, retaining splenic samples from women who die from aortic dissections is essential in order to conduct potential genetic testing. An inherited aortopathy should be assumed as the diagnosis in young women, and the family should be referred for consideration of genetic screening, unless another cause is identified (Knight, Nair et al. 2016, Knight, Bunch et al. 2022, The Royal College of Pathologists 2024).

In all cases of aortic dissection a sample of spleen should be retained (or other appropriate sample for the local genetics laboratory) for potential genetic testing, and unless a non-heritable cause is identified, the family should be referred to the local cardiologist or geneticist for consideration of screening (Knight, Bunch et al. 2022)

For the five women who did have an autopsy, histology was taken in four cases. For one woman, an underlying connective tissue disorder was included in the conclusion of the report but there was no histology of the aorta. Assessors felt that this was not an appropriate conclusion in the absence of this examination. Within the four post-mortems that did have histological examination, assessors noted the use of outdated terminology, such as 'cystic medial necrosis', which should no longer be used. The appropriate nomenclature for the description of medial degeneration can be found in the consensus guidelines published by the Society for Cardiovascular Pathology and the Association of European Cardiovascular Pathology (Halushka, Angelini et al. 2016).

Histology evaluation of the aorta is important to try to distinguish features of connective tissue disorders from features of hypertension and other acquired aetiologies (consensus statements from the Society for Cardiovascular Pathology and the Association for European Cardiovascular Pathology)(Halushka, Angelini et al. 2016, Knight, Bunch et al. 2022)

Ischaemic heart disease

Seventeen of the 21 women who died from ischaemic heart disease had a post-mortem examination. For several of these women, the terminology used for the cause of death was not felt to be appropriate. For instance, the terms 'cardiac arrest' and 'sudden cardiac death' describe a mode of death rather than a pathology and 'cardiac arrhythmia' cannot be determined as the cause of death from an autopsy.

There were several instances where ischaemic heart disease was diagnosed after the intact heart was sent to a cardiac pathologist without examination by the local pathologist, as is recommended for diagnosis. When the coronary artery lumen is less than 1 mm, atheroma should be regarded as significant to the cause of death. Lesser degrees of stenosis should be considered in relation to other pathologies before reaching a conclusion on the cause of death (The Royal College of Pathologists 2022).

Coronary artery lumens should be assessed according to the Davies criteria (Davies 1999) with particular attention if 1 mm or less (Knight, Bunch et al. 2019)

Sudden arrhythmic death syndrome (SADS)

All 22 women who died from SADS had a post-mortem examination. Sudden deaths where there is no cardiac anomaly may indicate SADS provided there is a morphologically normal heart and negative general autopsy findings, including full histology and toxicology (The Royal College of Pathologists 2022, The Royal College of Pathologists 2024). One woman whose death was attributed to SADS did not have toxicology testing despite an initial negative autopsy. This judgement was made based on her personal history and assessors felt this was inappropriate. In a negative autopsy, toxicology should always be taken as it is one of the key criteria for a diagnosis of SADS. For all instances of SADS, it is also strongly recommended that the heart is retained for either expert cardiac opinion or specialist histological examination in order to determine if there is an underlying cause for the death.

Of the women who died from presumed SADS, only 38% had a splenic sample retained for potential genetic testing as is recommended for potentially inheritable disorders (The Royal College of Pathologists 2022, The Royal College of Pathologists 2024). Sample retention does not require any specialist equipment; a tissue sample can be stored in the freezer using a universal container or in RNAlater, which does not require freezing.

The heart [should be retained] in cases of suspected sudden cardiac death with a morphologically normal heart; consider referral for specialist cardiac opinion and taking an appropriate sample, such as snap-frozen splenic tissue, should genetic testing be required

RCPath G100 Guidelines on autopsy practice: Maternal death (The Royal College of Pathologists 2024)

Cardiac myocardial disease

All but one woman who died from cardiac myocardial disease had a post-mortem examination (n=17/18 women). In general, assessors felt that the knowledge and understanding of peripartum cardiomyopathy could be improved. This is not unexpected since this is a rare complication of pregnancy and therefore an uncommon condition for most pathologists. In two women's autopsies the cause of death was attributed to peripartum cardiomyopathy because the woman was pregnant; however, assessors felt that the circumstances of the death and the woman's medical history did not support the diagnosis. Peripartum cardiomyopathy is a diagnosis of exclusion and the pathology findings are often non-specific (The Royal College of Pathologists 2024). Where pathologists do not have experience of peripartum cardiomyopathy, or other rare cardiomyopathies, they should consult with an expert before making such a diagnosis.

For a number of women, assessors felt that the histology, macroscopic description of the heart and the interpretation of the findings could have been improved. One woman's heart was described as 'normal' but weighed close to 600g, a heart to body weight ratio of 0.8% (normal = <0.5%). There did not appear to be any consideration of why her heart was enlarged. Similarly, some women's deaths were attributed to left ventricular hypertrophy without consideration of the woman's medical history of hypertension or morbid obesity, which assessors felt were contributing factors in six women's deaths.

Cardiac valvular heart disease

Seven of the 11 women who died from valvular heart disease had a post-mortem examination. This included four out of six women who died from valve disease and three out of five women who died from endocarditis.

Accidental deaths and homicides

As noted in the background for this chapter, there is a legal requirement under the Notifications of Deaths Regulations 2019 to report unnatural or violent deaths to the coroner (Department of Health and Social Care 2024). This includes accidental deaths and homicides.

Thirteen of the 15 women who died from accidental causes had a post-mortem available for review at the time of report writing. Of the two remaining women, one's post-mortem was received later and one had been referred to the coroner but the status of the post-mortem report was unknown. For twelve of the women who died, the cause of death stated in the post-mortem report was deemed to be appropriate by pathology assessors. For one woman where it was not, assessors felt there was too little information regarding the circumstances of her death to reach a definite conclusion.

Ten of the women had a cause of death attributed to a road traffic collision. Six women died after giving birth and four were still pregnant at the time of their accident. For the women who were still pregnant, there was consideration by the assessors as to whether pregnancy should have been included in part 2 of the cause of death.

For several of the women who died in road traffic collisions, there was limited discussion of circumstances surrounding the collision. In general, assessors noted missing details relating to the use of seatbelts or whether mobile phones or substance use may have contributed to the collision. There were also some women where there appeared to be limited clinical curiosity and consideration of possible medical history. For instance, one woman's autopsy consisted only of a post-mortem CT scan with no external examination or toxicological assessment. The CT scan showed a subarachnoid haemorrhage in the absence of a skull fracture. Assessors noted that an underlying aneurysm should have been explored as a cause of the haemorrhage. If such an aneurysm was present, this may have changed the cause of death and had onward implications for family members.

All 14 women who died by homicide had a post-mortem examination; however only seven reports were available for review. Assessors felt that all seven examinations were performed to a good standard.

Psychiatric deaths

As for accidental deaths and homicides, deaths due to psychiatric conditions should be considered unnatural or violent and prompt a referral to the coroner (Department of Health and Social Care 2024); however, this did not appear to be the case for all the women who died from suicide or substance use. Where post-mortem examinations were performed, assessors noted varying degrees of completeness.

Suicide

Eighty-two of the 88 women who died by suicide had a post-mortem examination. Two further women had records of inquest. Most deaths due to suicide occurred between six weeks and one year after the end of pregnancy and the majority of suicides in pregnant and recently pregnant women are violent in nature. The WHO ICD-MM (World Health Organisation 2012) considers suicide a direct maternal death and these deaths are reported as such by MBRRACE-UK. It is recommended that all suicides include pregnancy in part 2 of the cause of death (The Royal College of Pathologists 2024). While known psychiatric conditions are not typically recorded on the death certificate in instances of maternal suicide, assessors recommended also including an established diagnosis of puerperal psychosis and/or postpartum depression in part 2 of the cause of death due to its inherent relationship with pregnancy.

For some women who died by suicide, there were examples of inappropriate or insensitive language noted in the post-mortem reports. For example, the use of the term 'strangulation' implies the involvement of a third party and should be avoided. Instead, '1a. Hanging' is a reasonable phrase to use. Similarly, the phrase 'commit suicide' is outdated from a time when suicide was considered a criminal offence. The use of this phrase is no longer recommended. Alternative suggestions for less stigmatising and more sensitive language include 'took their own life' or 'died by suicide'.

There were several women's deaths by suicide where assessors felt more information was needed. For example, one woman whose cause of death was attributed to paracetamol toxicity was noted to have 'fresh incised wounds' without any further description or consideration. Another woman's autopsy contained limited description and interpretation of injuries following a fall from height. Domestic abuse was noted in her history but there was no consideration of potential third-party involvement. Her toxicology results were also not felt to be adequately interpreted.

Pathologists should take care to describe and document external findings including injuries and findings pertinent to the cause of death (Knight, Bunch et al. 2018)

Substance use

Of the 67 women whose deaths were attributed to substance use, 65 had a post-mortem examination. Of the two women who did not have a post-mortem report available for assessment, one had a referral to a coroner and one did not have a post-mortem as her death was attributed to pre-existing alcohol-related cirrhosis.

Of the women who had an autopsy, there were several where a toxicological cause of death was the sole consideration based on the woman's history. For most of these women there was no histology of their organs or examination of their brain. Assessors felt that in some instances, had the toxicological analyses not identified a cause of death, the woman would have had an unascertained cause of death due to limited alternative investigations. While it is important to consider a woman's history and circumstances, this should not preclude the investigation of other possible causes of death.

In several autopsies, cardiac blood was used for toxicology. This is an inappropriate site for sampling due to the effects of post-mortem redistribution and the impact on the interpretation of drug levels. Blood samples for toxicology should always be taken from peripheral sites, typically the femoral veins.

There were many deaths due to substance use where the cause of death was stated as 'multiple drug toxicity' or similar phrasing. If multiple substances are involved in a death, each specific name should be included in the cause of death to inform drug-related death statistics.

Specific drug names should be used in reporting the woman's cause of death (Knight, Bunch et al. 2018)

A number of women died from causes related to alcohol use and assessors felt that there was a limited understanding around these deaths. They thought that consideration should be given to acute toxicity (in line with individual tolerance), ketoacidosis, as well as the many possible alcohol-related organ pathologies. Sudden unexpected death in alcohol misuse (SUDAM) (Templeton, Carter et al. 2009) is a well-recognised and preferable term to use in place of 'fatty liver disease'.

7.5 Conclusions

While the proportion of maternal deaths that undergo a post-mortem examination is high in the UK compared to other developed countries, there are still many lessons to learn in order to improve the quality and completeness of maternal autopsies.

Pathologists are reminded to:

- Include a summary of the woman's clinical history to help establish what was known and provide context for the interpretation of autopsy findings
- Include a clinicopathological correlation as part of general good practice
- Formulate a cause of death that describes the pathology, not the mode of death
- Document essential biometric data such as height and weight
- Try to avoid making assumptions – not every finding should be automatically attributed to pregnancy and the presence of medications at the scene of death does not automatically indicate a death related to substance use
- Include the specific drug names in the cause of death for deaths due to substance use

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