Maternal Medicine Network
South East London

NHS
Guy's and St Thomas'
NHS Foundation Trust

Maternal Maternal Mortality: a global perspective

Prof Catherine Nelson-Piercy
Consultant Obstetric Physician,
Guy's & St Thomas' Foundation Trust
Lead Obstetric Physician for
South East London Maternal Medicine
Network, London, UK

@nelson_piercy

EvelinaLondon

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Global Maternal Mortality

- *In 2020, an estimated 287 000 women globally died from a maternal cause*
- *800 maternal deaths every day*
- *One every two minutes*
- *Largely preventable.*

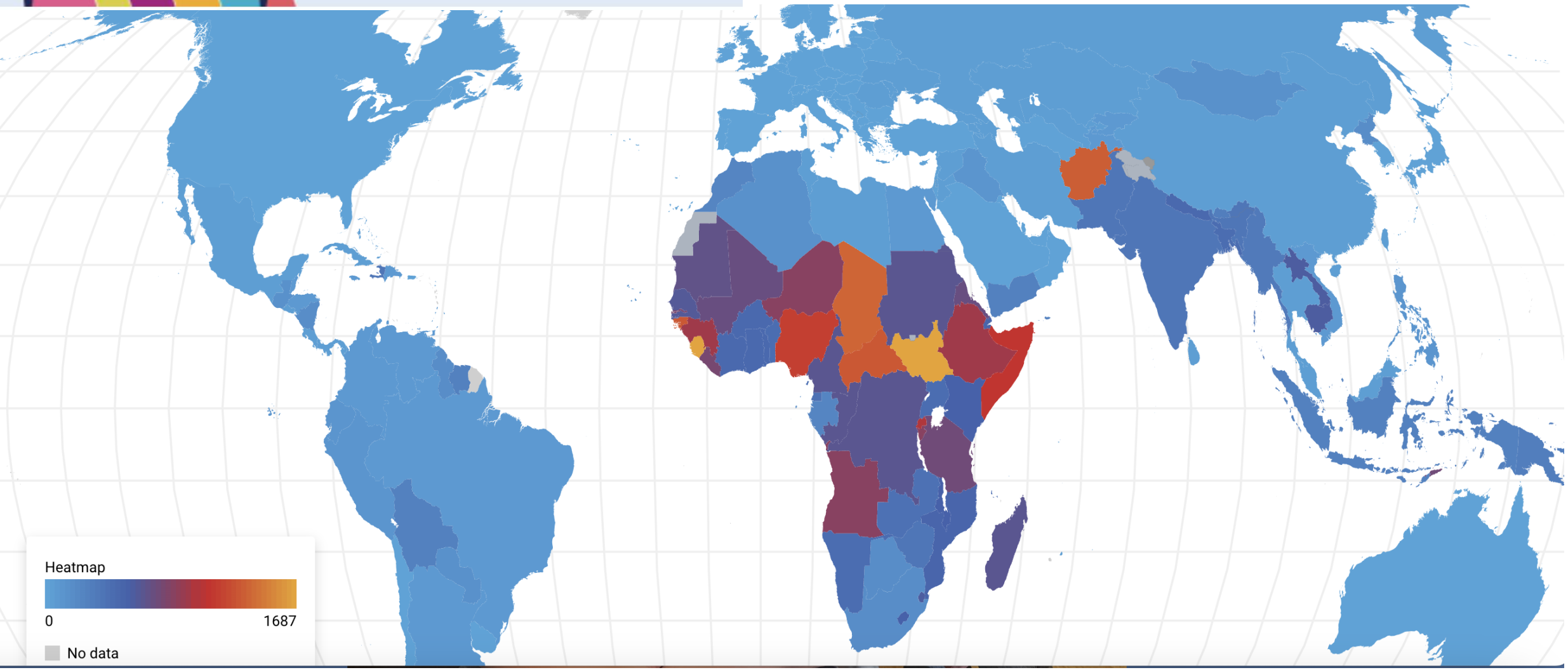
Asma Khalil et al., "A Call to Action: The Global Failure to Effectively Tackle Maternal Mortality Rates," *Lancet Global Health* 11, no. 8 (Aug. 2023): e1165–e1167. ↩

Maternal Mortality

Levels and Trends 2000 to 2020

World Health Organization

https://mmr2020.srhr.org/



Trend in MMR

World Health Organization
Data

← All indicators

Maternal mortality ratio (per 100 000 live births)

Number of maternal deaths during a given time period per 100 000 live births during the same time period. (SDG 3.1.1)

Topic: Global burden of disease

Group by organization: Please select...

Region: Please select...

or/and

Country: Afghanistan, Australia, India (8)

Show Data

Afghanistan × Australia × South Africa × South Sudan × India × United Kingdom × United States × Trinidad and Tobago ×

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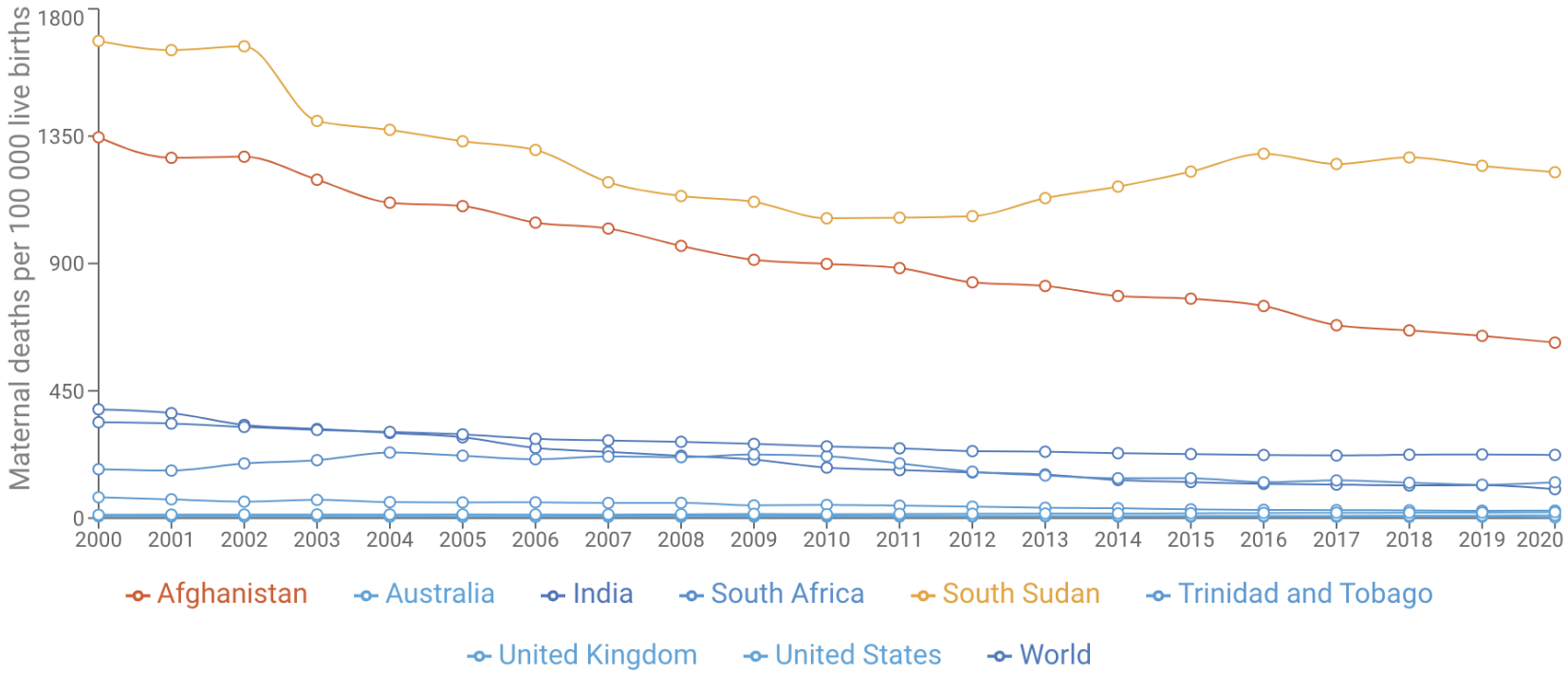
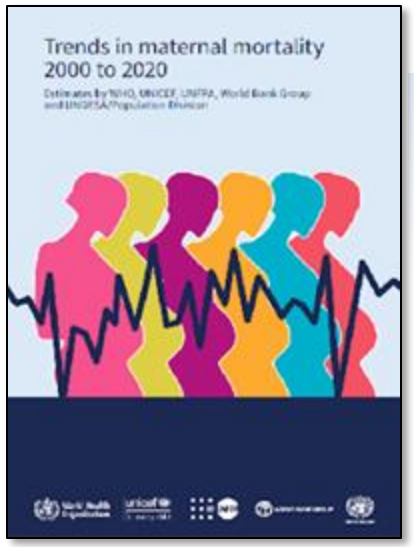


South Sudan	1222
Afghanistan	620
World	223



Trend in MMR

Group by organization | Region | Country

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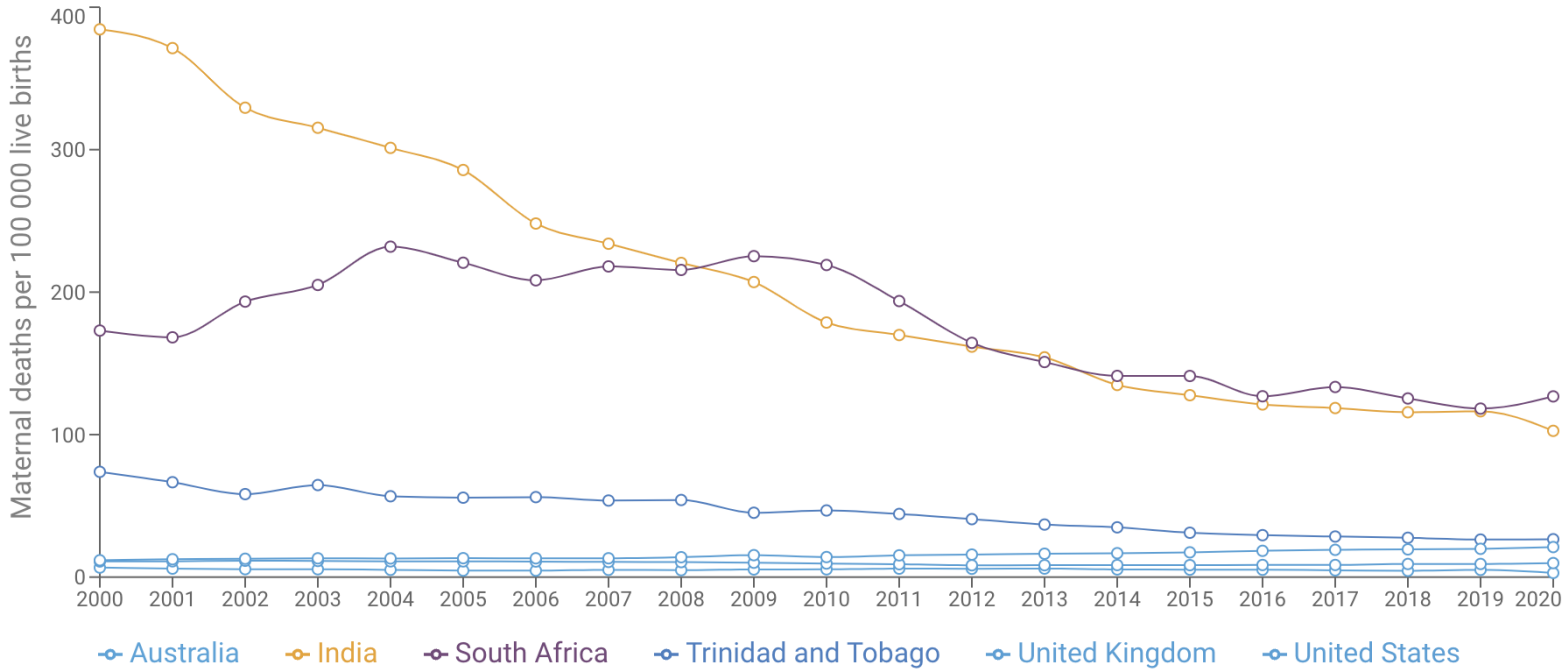

South Africa	127
India	103

Group by organization | Region | Country

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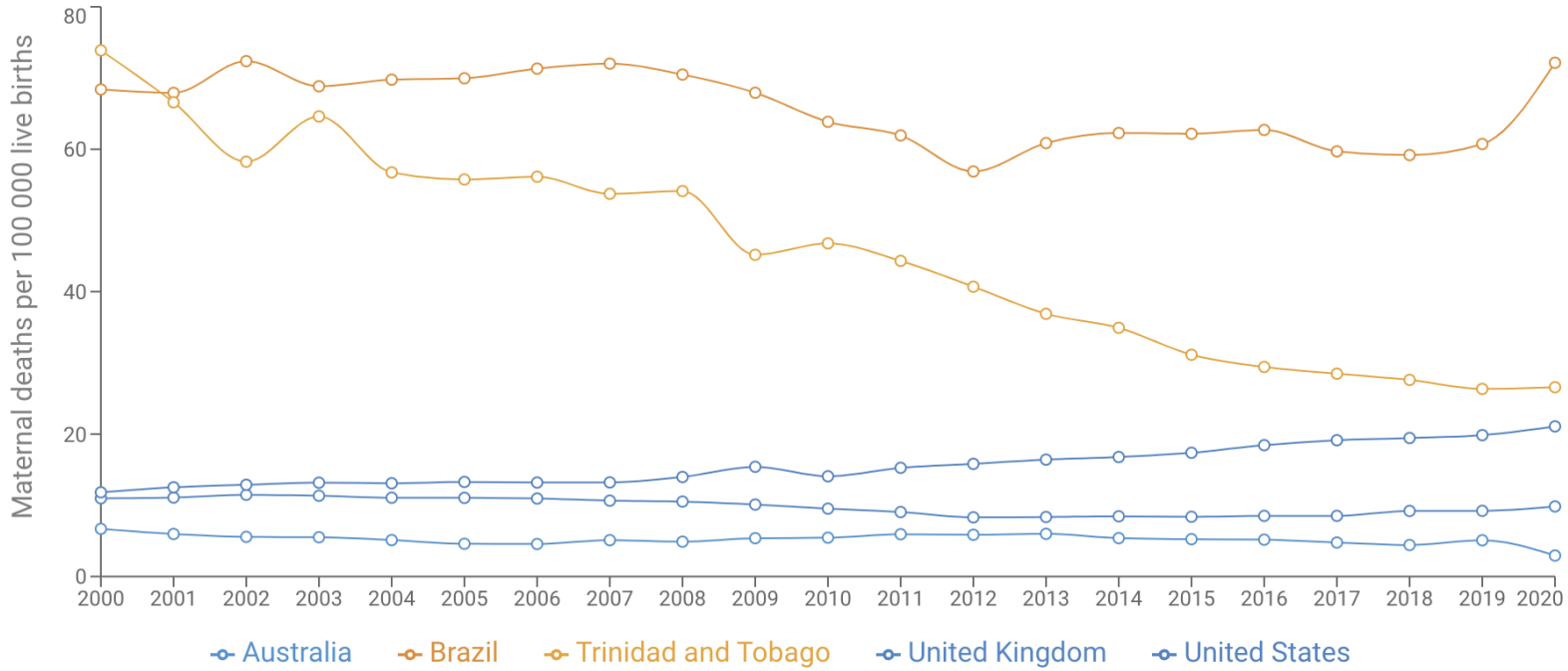
Australia × | United Kingdom × | United States × | Trinidad and Tobago × | Brazil × | Clear all



Brazil 72

Trinidad and Tobago 27

USA 21

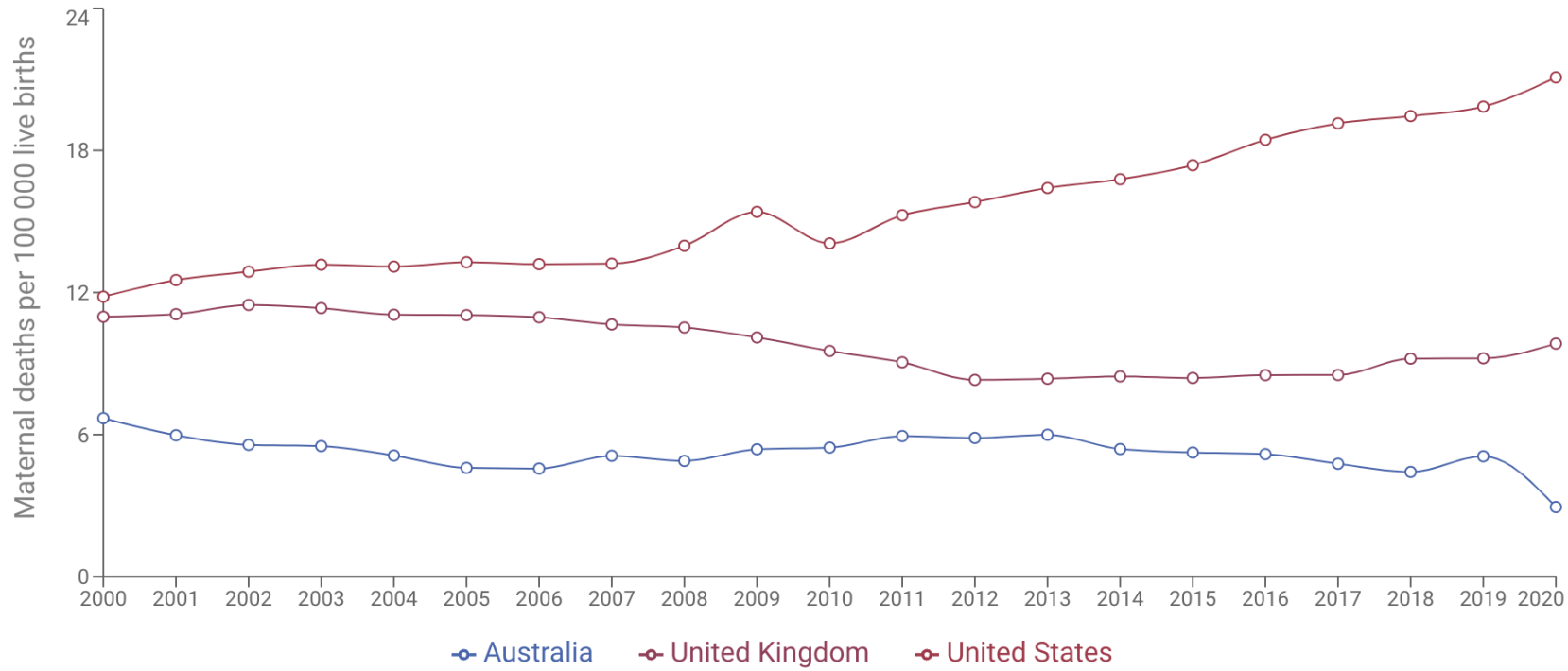
Data

Maternal mortality ratio (per 100 000 live births)

Group by organization | Region | Country

World | Please select... | Please select... | or/and | Australia, United Kingdom, U | 3 | Show Data

Australia × | United Kingdom × | United States × | Clear all



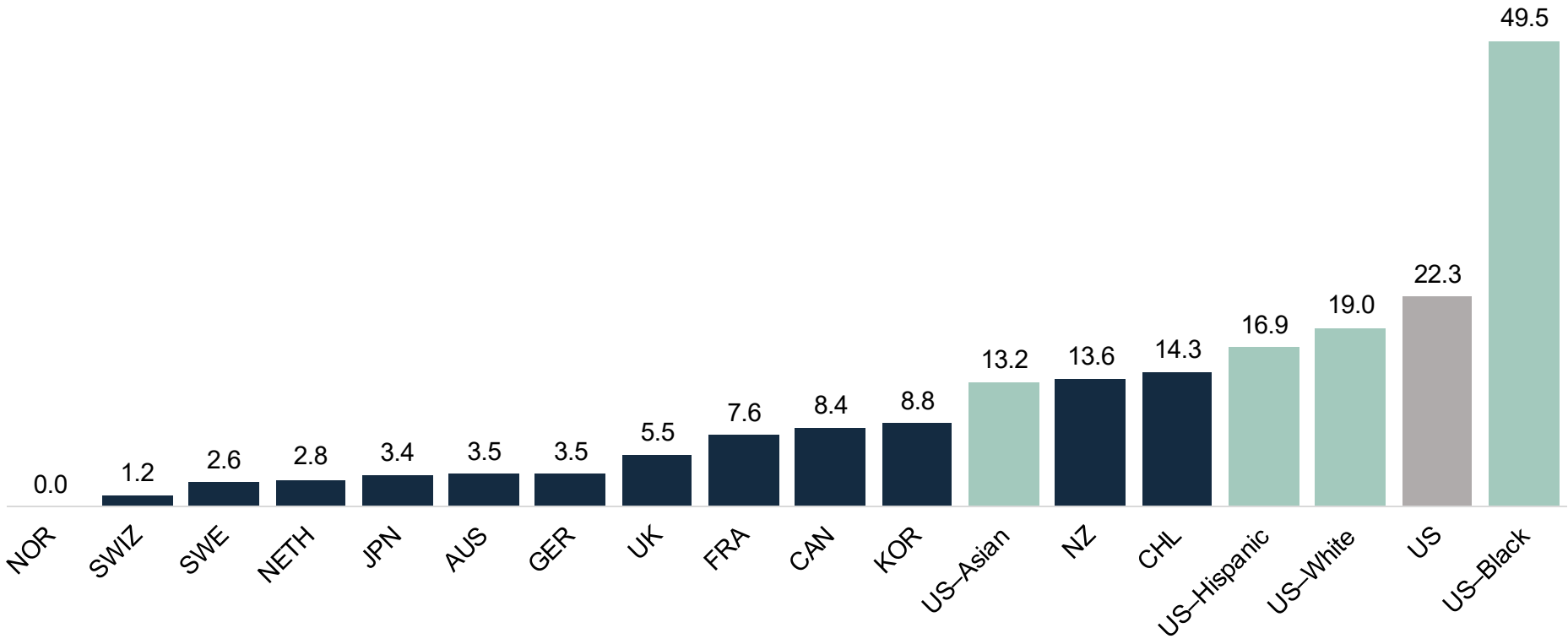
USA	21
UK	9.8
Australia	2.9

Table 4.1 Estimates of maternal mortality ratio (MMR), number of maternal deaths, lifetime risk and proportion of deaths among women of reproductive age that are due to maternal causes (PM), by United Nations Sustainable Development Goal (SDG) region, subregion and other grouping, 2020

SDG region and subregion	MMR[a] point estimate and range of uncertainty interval (UI: 80%)			Number of maternal deaths[b]	Lifetime risk of maternal death (1 in)[c]	PM point estimate (%)
	Lower UI	Point estimate	Upper UI			
World	**202**	**223**	**255**	**287 000**	**210**	**9.8**
Sub-Saharan Africa	**477**	**545**	**654**	**202 000**	**40**	**19.3**
Eastern Africa	304	351	412	50 000	63	15.5
Middle Africa	430	539	742	39 000	32	23.9
Southern Africa	131	157	186	2 200	240	3.1
Western Africa	616	754	1024	111 000	27	21.9
Northern Africa and Western Asia	**68**	**84**	**107**	**9 400**	**420**	**7.1**
Northern Africa	76	103	144	5 900	310	8.6
Western Asia	49	63	82	3 500	600	5.5
Central and Southern Asia	**114**	**129**	**149**	**48 000**	**340**	**6.0**
Central Asia	21	25	30	440	1 200	1.8
Southern Asia	118	134	155	47 000	330	6.1
Eastern and South-Eastern Asia	**62**	**74**	**92**	**18 000**	**850**	**3.2**
Eastern Asia	20	24	29	3 300	3 100	1.1
South-Eastern Asia	109	134	176	15 000	340	5.3
Latin America and the Caribbean	**79**	**88**	**99**	**8 400**	**580**	**4.3**
Caribbean	143	188	269	1 300	260	7.8
Central America	56	64	75	1 900	710	3.3
South America	76	86	100	5 200	610	4.3
Oceania (excluding Australia and New Zealand)	**120**	**173**	**255**	**540**	**170**	**7.7**
Melanesia	121	176	262	530	170	7.8
Micronesia	44	80	140	5	400	4.5
Polynesia	46	82	162	6	300	5.7
Australia and New Zealand	**3**	**4**	**4**	**13**	**16 000**	**0.5**
Europe and Northern America	**11**	**13**	**15**	**1 400**	**5 100**	**0.6**
Eastern Europe	9	11	15	310	6 500	0.3
Northern Europe	7	8	10	89	7 100	0.6
Southern Europe	5	6	6	62	16 000	0.4
Western Europe	5	6	7	110	9 800	0.5
Northern America	16	20	26	810	2 900	0.9

The United States continues to have the highest maternal death rate, with the rate for Black women by far the highest of any group.

Maternal deaths per 100,000 live births



Notes: The maternal mortality ratio is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. For more information on how maternal mortality is defined, see Organisation for Economic Co-operation and Development, "Maternal and Infant Mortality," in *Health at a Glance 2023: OECD Indicators* (OECD, 2023). 2015 data for FRA; 2017 data for UK; 2018 data for NZ; 2020 data for CAN and SWIZ; 2021 data for AUS, GER, JPN, KOR, NETH, and SWE; 2022 data for CHL (provisional) NOR, and US. Due to sample size limitations, data for US–AIAN cannot be displayed. AIAN = American Indian and Alaska Native. Asian Americans include a wide range of distinct communities. Such groupings are imperfect, as they mask significant difference in maternal mortality rates.

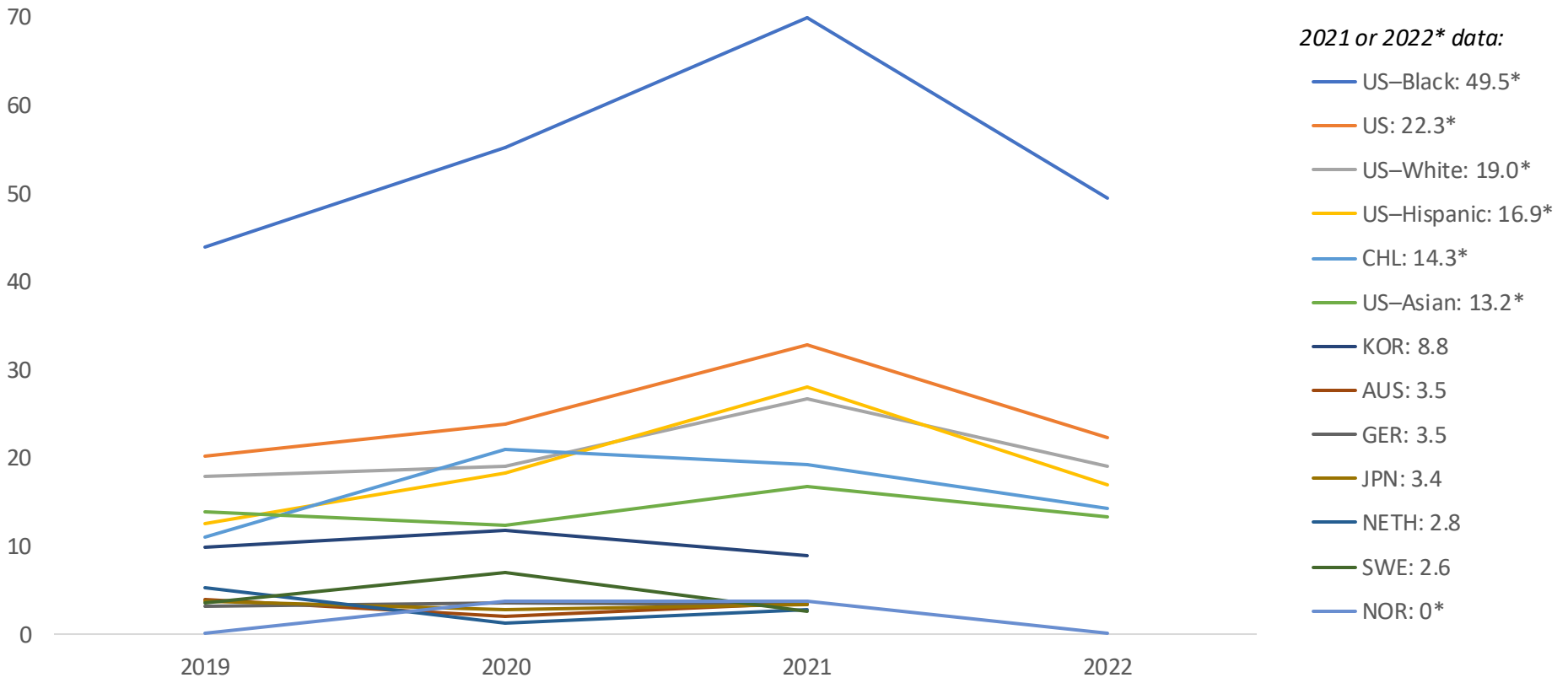
Data: All country data from OECD Health Statistics 2023 extracted on February 29, 2024, except data for US are 2022 data from the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, mortality and natality data files, "Maternal Mortality Rates in the United States, 2022."

Source: Munira Z. Gunja et al., *Insights into the U.S. Maternal Mortality Crisis: An International Comparison* (Commonwealth Fund, June 2024). https://doi.org/10.26099/cthn-st75

The Commonwealth Fund

While the maternal mortality rate increased in several countries during the COVID-19 pandemic, the rate has begun to decline since then.

Maternal deaths per 100,000 live births in countries with available data



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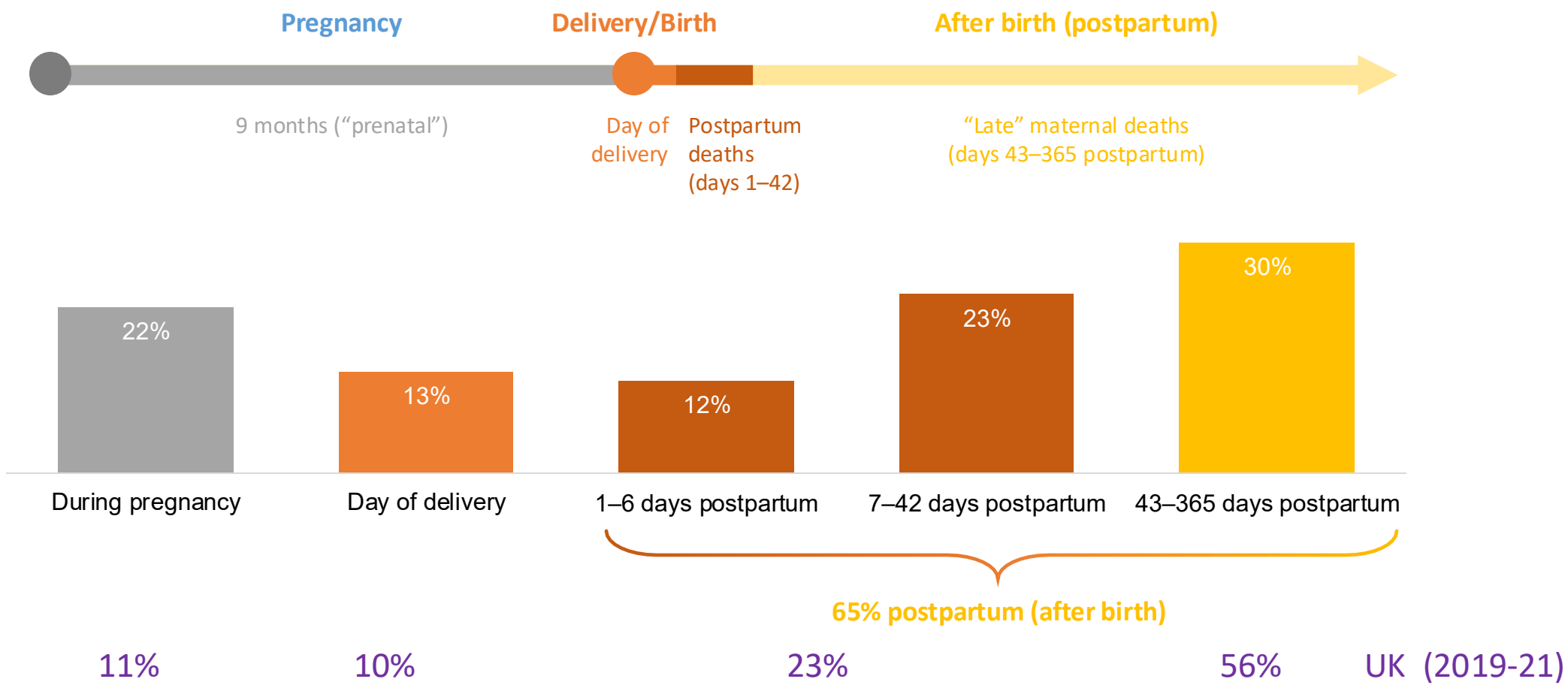
Source: Munira Z. Gunja et al., *Insights into the U.S. Maternal Mortality Crisis: An International Comparison* (Commonwealth Fund, June 2024). https://doi.org/10.26099/cthn-st75

The Commonwealth Fund

Two-thirds of U.S. pregnancy-related deaths occur during the postpartum period.

Distribution of pregnancy-related deaths by timing of death in relation to pregnancy, 2017–2019



Notes: Data from Maternal Mortality Review Committees in 36 US states; specific timing information is missing (n=2) or unknown (n=14) for 16 (1.6%) pregnancy-related deaths.

Data: Susanna Trost et al., *Pregnancy-Related Deaths: Data from Maternal Mortality Review Committees in 36 US States, 2017–2019* (Centers for Disease Control and Prevention, 2022).

Source: Munira Z. Gunja et al., *Insights into the U.S. Maternal Mortality Crisis: An International Comparison* (Commonwealth Fund, June 2024). https://doi.org/10.26099/cthn-st75

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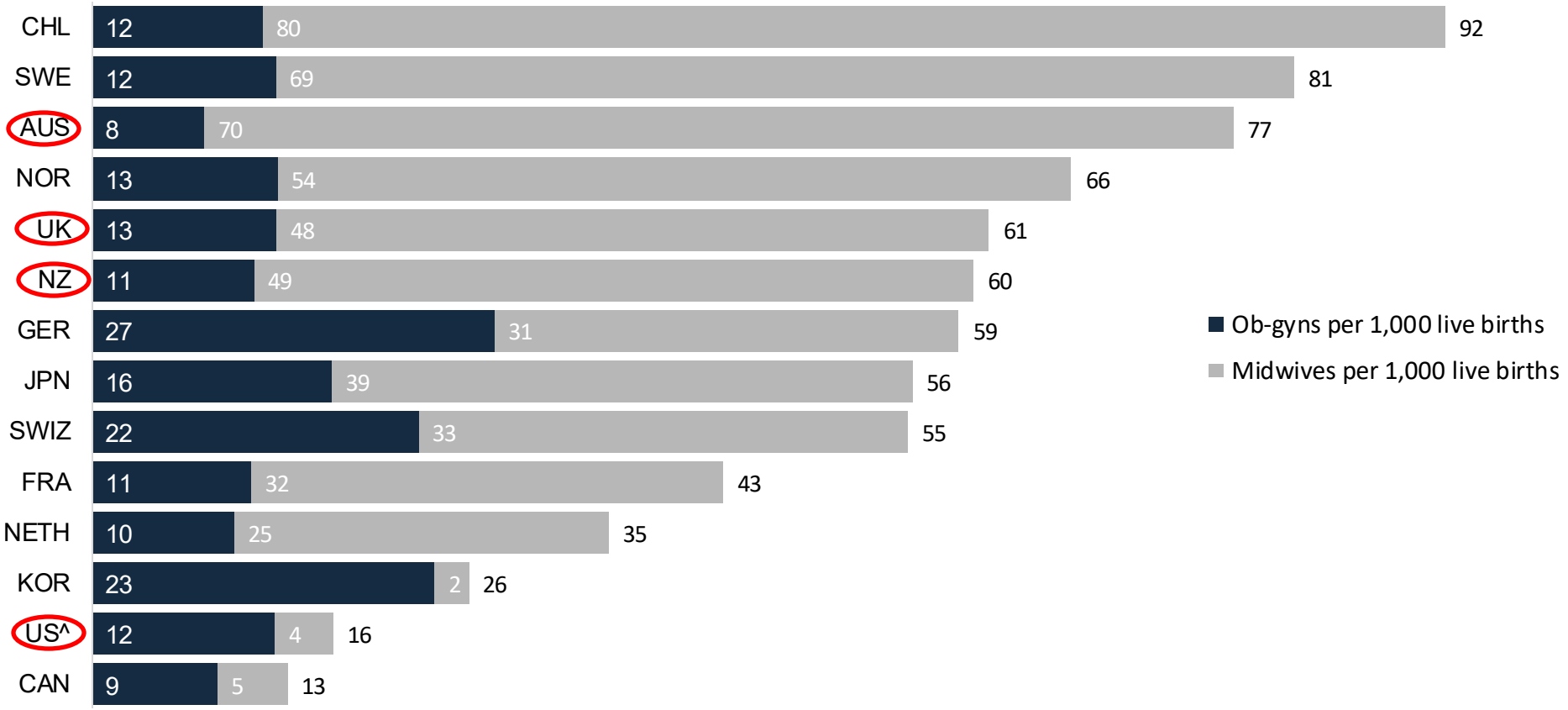
The U.S. and Canada continue to have the lowest supplies of midwives and ob-gyns.

*Number of providers (head counts) per 1,000 live births**



Note: * The sum figures shown to the right of the horizontal bars do not reflect the total maternity care workforce, since primary care physicians/family practitioners also deliver some care in many countries (not shown here). Each sum may not reflect the arithmetic sum of figures shown for ob-gyn and midwife providers because calculations were performed on exact figures, while the graph presents rounded figures.

Data: OECD Health Statistics 2023 data extracted on February 29, 2024, representing "practicing midwives" for all countries except CAN, CHL, and US, where data reflect midwives "licensed to practice." Data for professionals "licensed to practice" tend to be higher than data for "professionally active," while numbers of "practicing" professionals tend to be the lowest. 2021 data for FRA, GER, NETH, NZ, NOR, SWIZ, and US (ob-gyns); 2020 data for AUS, CAN, CHL, JPN, KOR (ob-gyns), SWE, and UK; 2016 for US (midwives); 2015 for KOR (midwives).

Source: Munira Z. Gunja et al., *Insights into the U.S. Maternal Mortality Crisis: An International Comparison* (Commonwealth Fund, June 2024). https://doi.org/10.26099/cthn-st75

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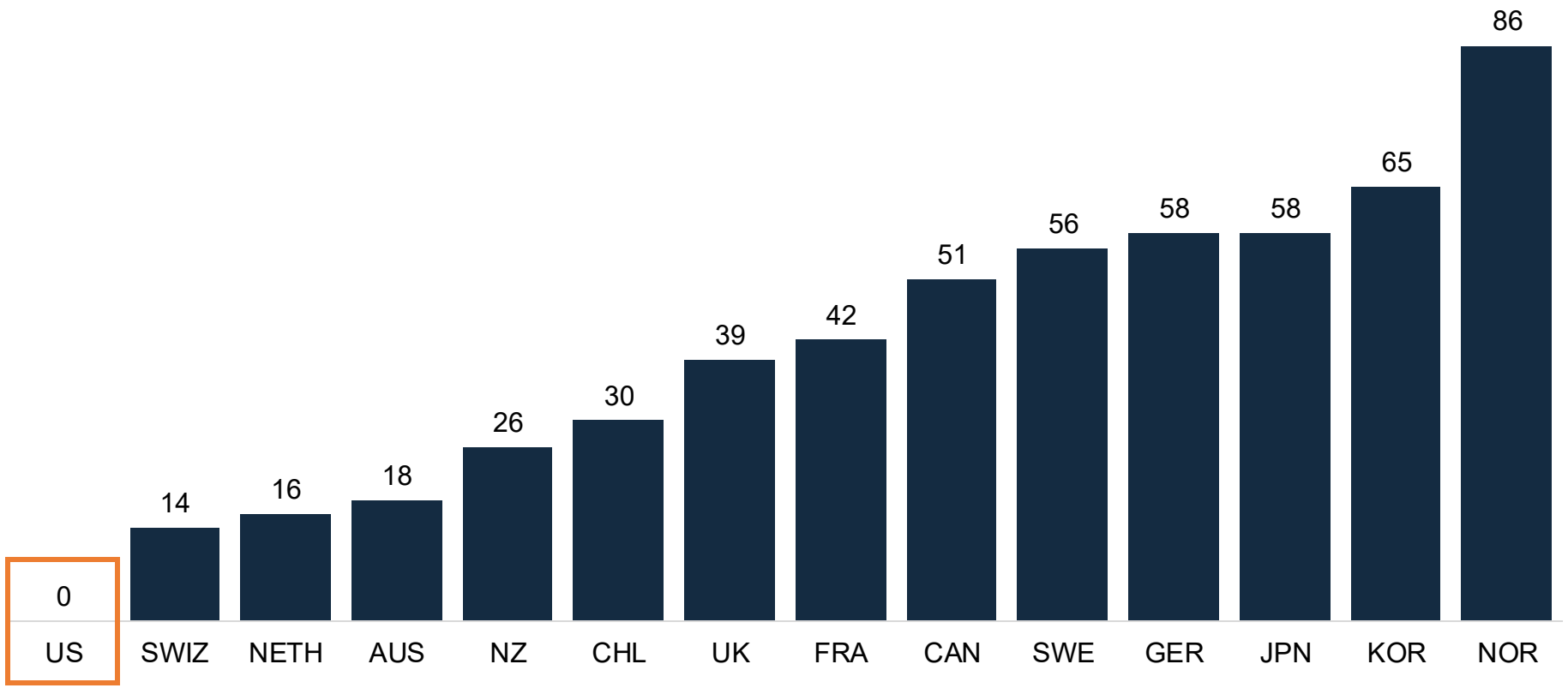
The U.S. stands alone as the only high-income country where there is no federally mandated paid leave policy.

Total weeks of federally mandated paid maternity, parental, and home care leave available



Notes: All country numbers reflect 2022 data. Information refers to paid maternity, paternity, parental and home-care leave entitlements to care for young children in place as of April 2022. Data reflect entitlements at the national or federal level only. It is assumed that: the relevant birth is of a healthy single child who is the first child in the household. For more details on assumptions, methodology, and definitions, see Organisation for Economic Co-operation and Development, "PF2.1. Parental Leave Systems," last updated Dec. 2022. SWE does not have a separate maternity leave scheme. For AUS, it is assumed that mothers take the first 12-week block of Parental Leave Pay right after birth are recorded as maternity leave. For NZ, the weeks of primary care leave are recorded as maternity leave. For JPN, the periods of parental leave that are earmarked for fathers and mothers must be used simultaneously if both parents are to use the entirety of their entitlement.

Data: OECD Health Statistics, 2023.

Source: Munira Z. Gunja et al., *Insights into the U.S. Maternal Mortality Crisis: An International Comparison* (Commonwealth Fund, June 2024). https://doi.org/10.26099/cthn-st75

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Dobbs vs. Jackson: US Abortion Law

EDITORIALS

US abortion restrictions are causing widespread harm

Policy makers must prioritise the lives and health of women and children

Terry McGovern,[1] Ira Memaj,[1] Samantha Garbers[2]

- Restricting access to abortion increases maternal mortality[1]
- Total abortion ban would result in 210 extra maternal deaths per year[2]
  - 24% rise overall
  - 39% rise in non-Hispanic Black women
- States banning abortion also refuse to expand Medicaid which is proven to reduce maternal mortality[3]

[1]*Addante et al. The association between state-level abortion restrictions and maternal mortality in the United States, 1995-2017. Contraception2021;104:496-501.*

[2]*Stevenson AJ, Root L, Menken J. The maternal mortality consequences of losing abortion access. SocArxiv 2022. [Preprint.]* https://osf.io/preprints/socarxiv/7g29k

[3] Mc Govern et al. BMJ 2024; 386

Sustainable Development Goal 3.1

- To reduce the global maternal mortality ratio (MMR) to less than 70 maternal deaths per 100 000 live births by 2030

- MMR are INCREASING in USA and UK

- USA

2019	20·1 deaths per 100 000 livebirths
2020	23·8 deaths per 100 000 livebirths
2021	32·9 deaths per 100 000 livebirths

- USA between 2020 and 2021

< 25 years old	20·4 deaths per 100 000 livebirths
> 40 years old	138·5 deaths per 100 000 livebirths

SDG to reduce MMRs

Box 5.1 Global targets for reducing maternal mortality

SDG target 3.1: By 2030, reduce the global maternal mortality ratio (MMR) to less than 70 maternal deaths per 100 000 live births (1).

Ending preventable maternal mortality (EPMM): By 2030, every country should reduce its MMR by at least two thirds from the 2010 baseline, and the average global target is an MMR of less than 70 maternal deaths per 100 000 live births.

EPMM supplementary national target: By 2030, no country should have an MMR higher than 140 maternal deaths per 100 000 live births (twice the global target).

Country targets for 2030 depend on 2010 baseline levels of MMR, to increase equity in maternal mortality, as follows.

- **For countries with an MMR less than 420 in 2010: reduce the MMR by at least two thirds from the 2010 baseline by 2030.**
- **For countries with an MMR greater than 420 in 2010: the rate of decline should be steeper so that in 2030, no country has an MMR greater than 140.**
- **For all countries with low baseline MMR in 2010: achieve equity in MMR for vulnerable populations at the subnational level (2).**

BOX 5.2 ■ STRATEGIC FRAMEWORK FOR ENDING PREVENTABLE MATERNAL MORTALITY (EPMM)

Guiding principles for EPMM

- Empower women, girls and communities.
- Protect and support the mother–baby dyad.
- Ensure country ownership, leadership and supportive legal, technical and financial frameworks.
- Apply a human rights framework to ensure that high-quality reproductive, maternal and newborn health care is available, accessible and acceptable to all who need it.

Cross-cutting actions for EPMM

- Improve metrics, measurement systems and data quality to ensure that all maternal and newborn deaths are counted.
- Allocate adequate resources and effective health-care financing.

Five strategic objectives for EPMM

- Address inequities in access to and quality of sexual, reproductive, maternal and newborn health care.
- Ensure universal health coverage for comprehensive sexual, reproductive, maternal and newborn health care.
- Address all causes of maternal mortality, reproductive and maternal morbidities, and related disabilities.
- Strengthen health systems to respond to the needs and priorities of women and girls.
- Ensure accountability to improve quality of care and equity.

Source: WHO, 2015 *(2)*.

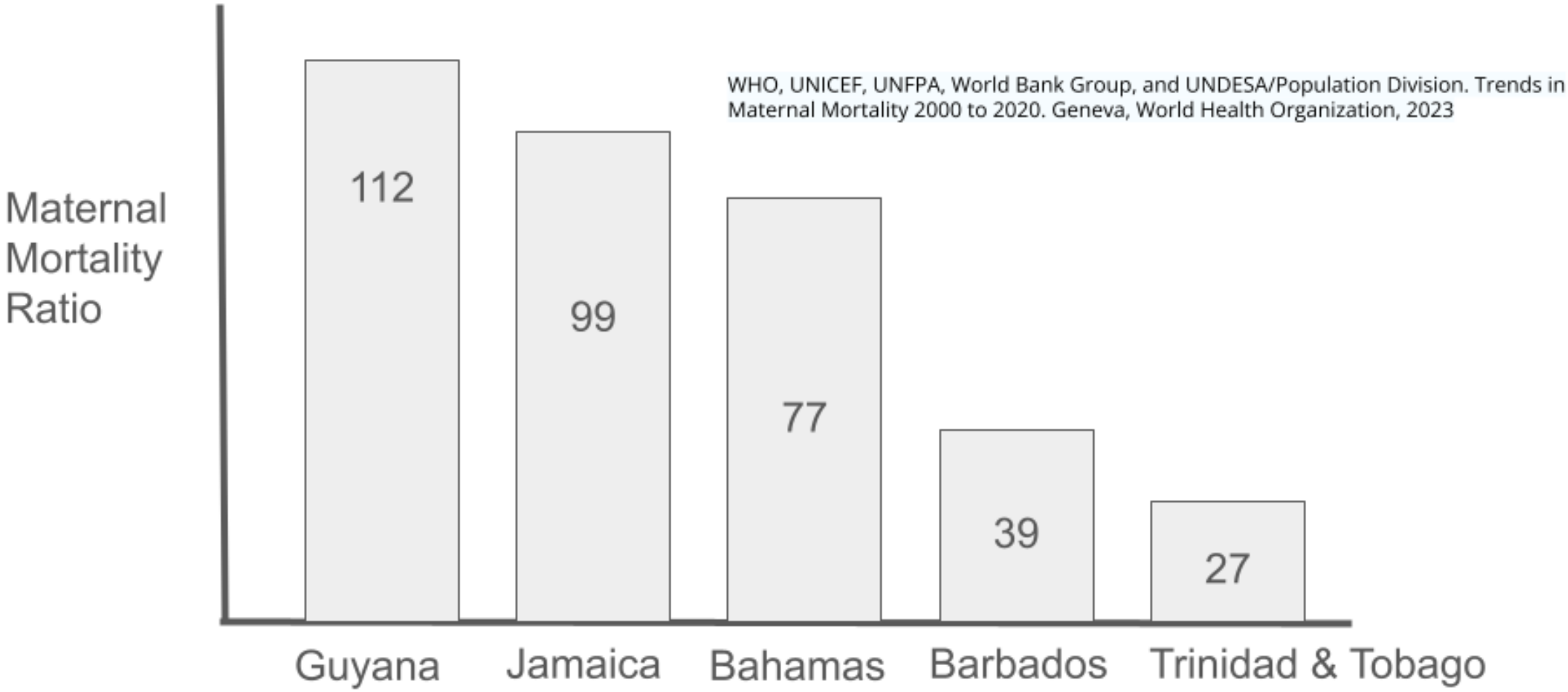
Mahmoud Fathalla (1935-2023)

- Founder of ‘Safe Motherhood Initiative’ in 1987
- Director of WHO special programme on human reproduction (1989-92)
- Director of FIGO (International Federationof Gynaecology and Obstetrics) (1994-97)

“Mothers are not dying because of diseases we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving.”

“Society has an obligation to fulfil a woman’s right to life and health, when she is risking death to give us life”

Comparative Data in the West Indies



WHO, UNICEF, UNFPA, World Bank Group, and UNDESA/Population Division. Trends in Maternal Mortality 2000 to 2020. Geneva, World Health Organization, 2023

MMR 2000-2020

8 countries recorded substantial increases in MMRs:

Venezuela (182·8%)

Cyprus (107%)

Greece (101·1%)

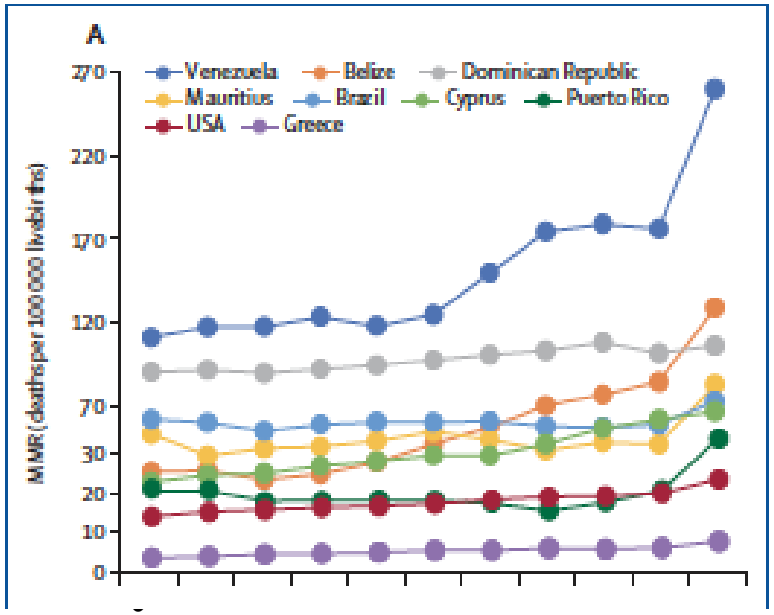
USA (77·9%),

Mauritius (62·1%),

Puerto Rico (55·9%),

Belize (51·3%),

Dominican Republic (36%)



MMRs are increasing in many countries 2010-2020

Asma Khalil et al., "A Call to Action: The Global Failure to Effectively Tackle Maternal Mortality Rates," *Lancet Global Health* 11, no. 8 (Aug. 2023): e1165–e1167. ↩

US Maternal Deaths 2018-2021

- 2018- 658 mothers (17.4 / 100,000 maternities)
- 2019- 754 mothers (20.1 / 100,000 maternities)
- 2020- 861 mothers (23.8 / 100,000 maternities)
- 2021- 945 mothers (26.4 / 100,000 maternities)

With thanks to Ken Chen

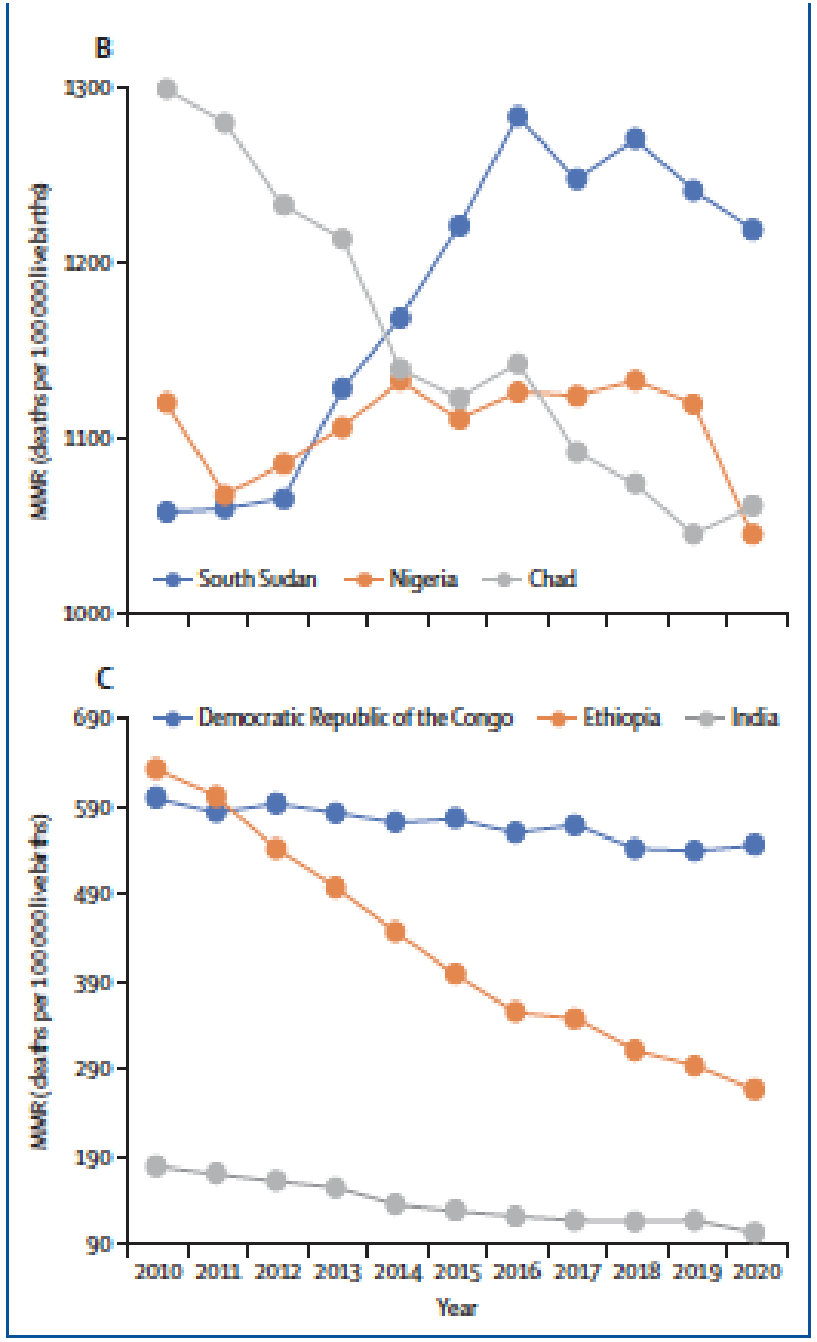


Figure: MMR estimates for the period 2010-20

In 3 sub-Saharan African countries, the MMR in 2020 exceeded 1000 deaths per 100 000 livebirths: South Sudan (1223), Chad (1063), and Nigeria (1047; figure B).
This is > 1/100 women !

Nigeria alone recorded 82 000 deaths in 2020, representing 28·5% of global maternal deaths

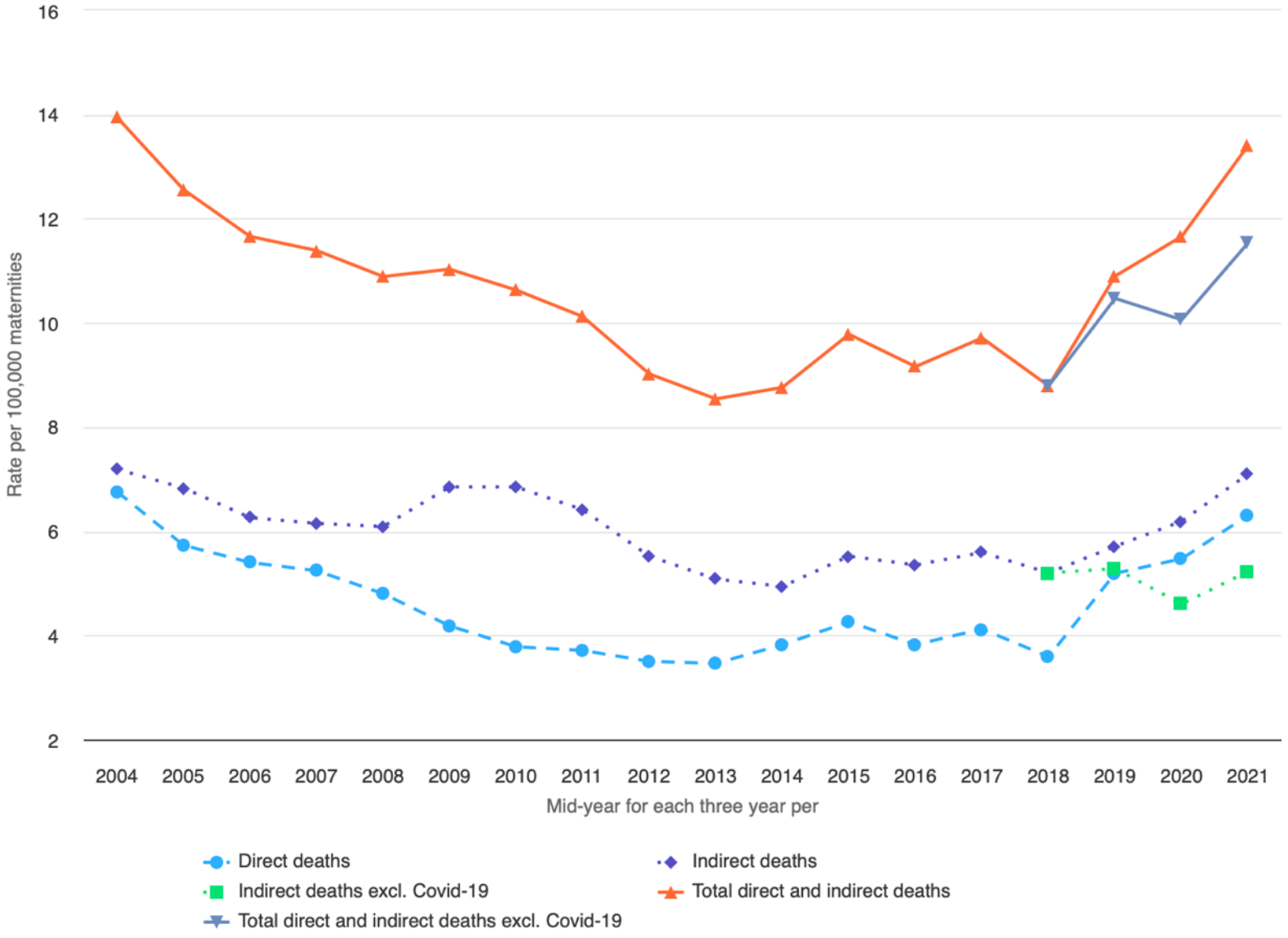
> 10 000 deaths in 2020

Asma Khalil et al., "A Call to Action: The Global Failure to Effectively Tackle Maternal Mortality Rates," *Lancet Global Health* 11, no. 8 (Aug. 2023): e1165–e1167. ↩

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

Figure 1: Direct and indirect maternal mortality rates per 100,000 maternities using ICD-MM and previous UK classification systems; three-year rolling average rates 2003-2022

Sources: CMACE, MBRRACE-UK



13.41 per 100,000 maternities

11.54 / 100,000

Compared to 8.79 /100,000 in 2017-2019, (RR **1.53,** 95% CI 1.26-1.85, p<0.001)

- PE is now the commonest cause of maternal death
- Cardiac disease remains the leading (non COVID) indirect cause of death

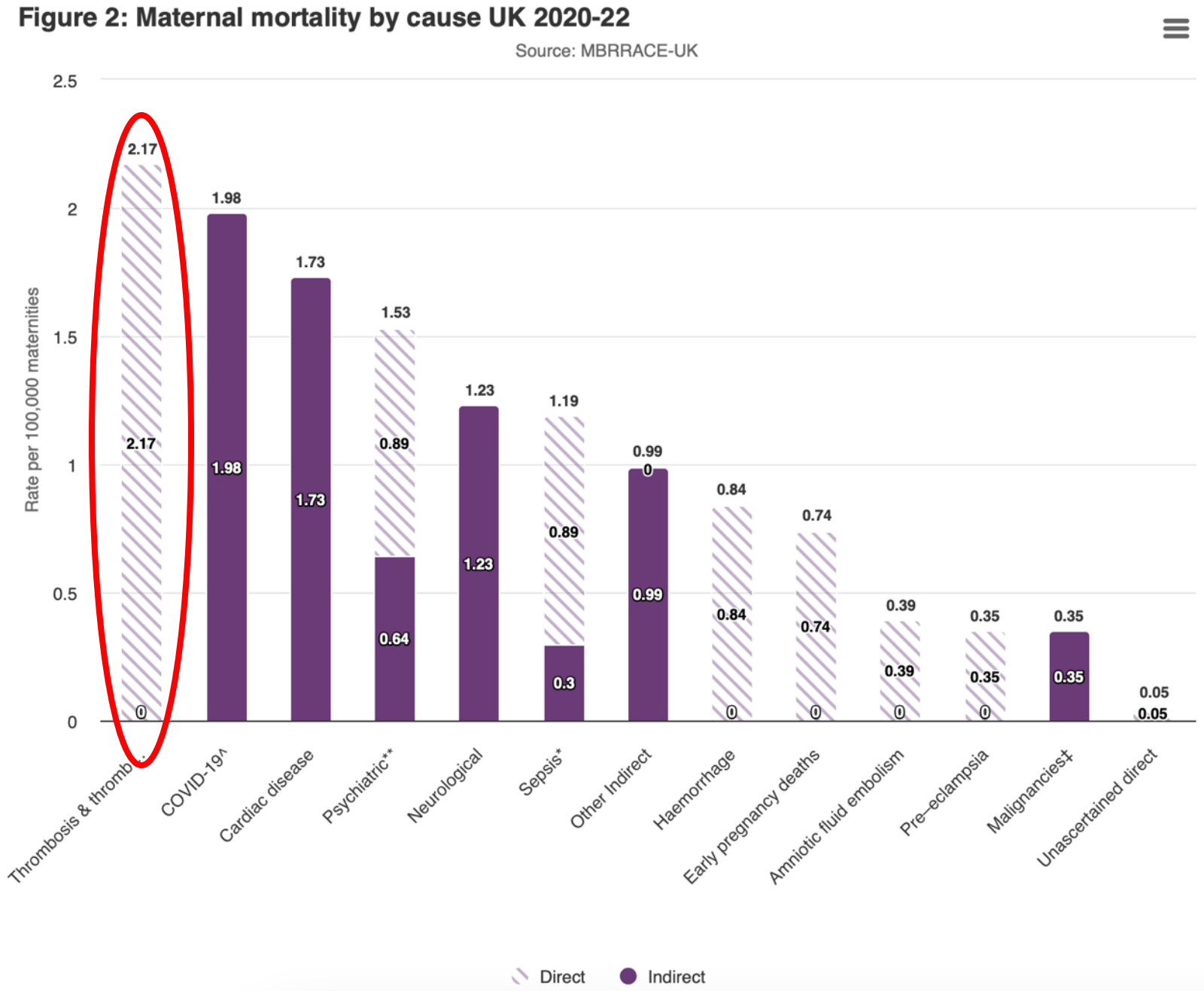


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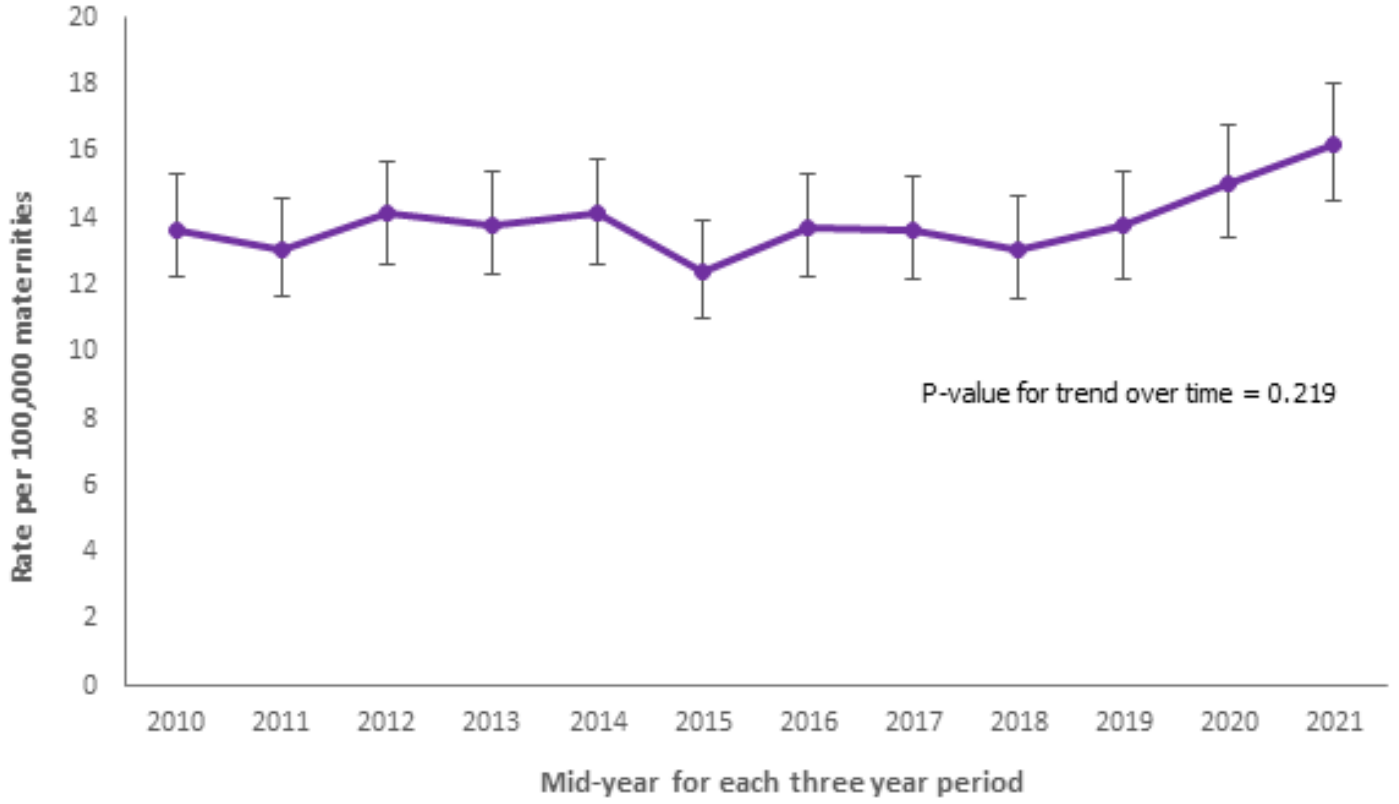
Figure 2.5: Pregnancy-associated maternal mortality rates six weeks to one year after the end of pregnancy, UK, 2009-2022



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Causes of death amongst women who died between six weeks and one year after the end of pregnancy, UK 2020-22

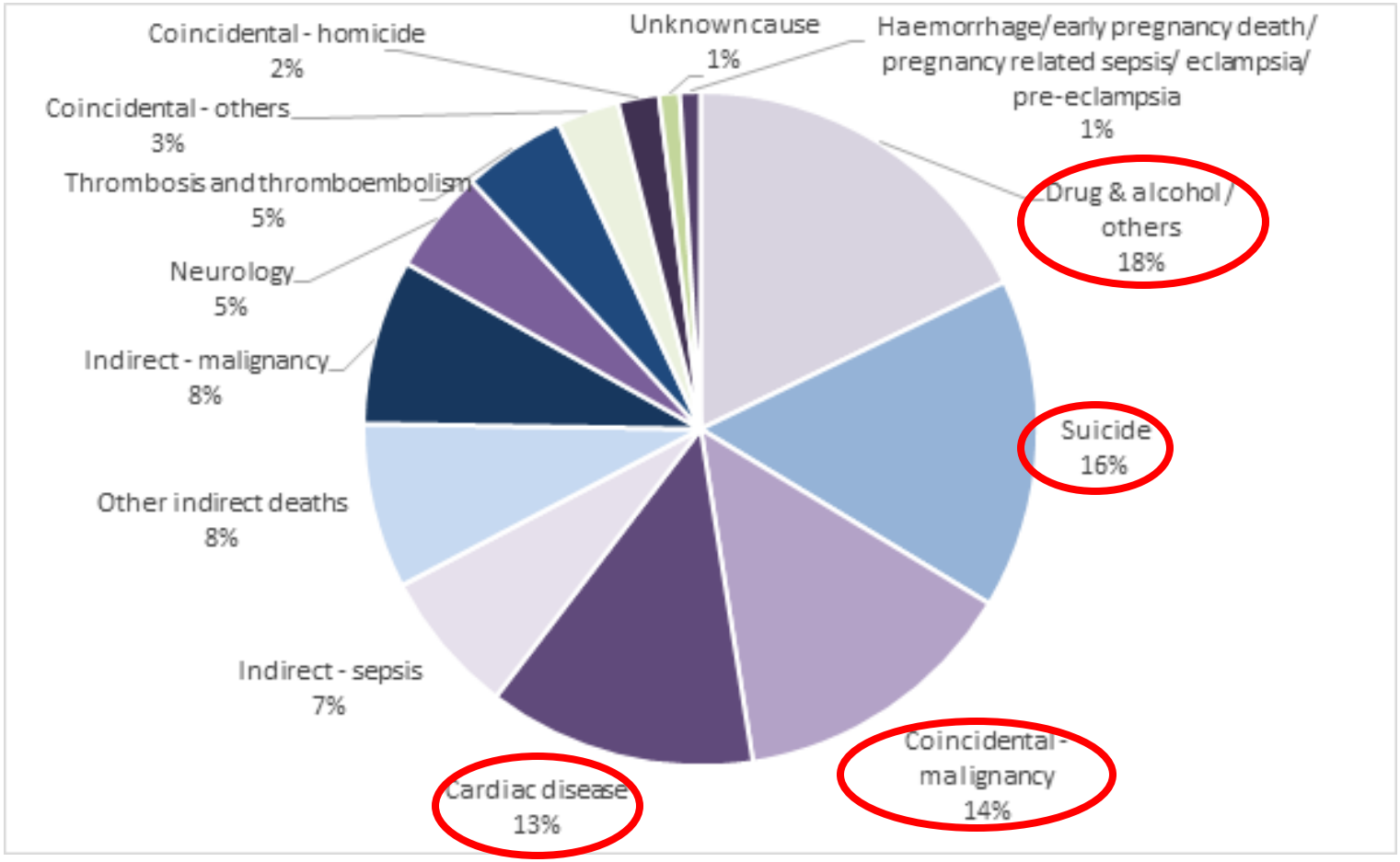

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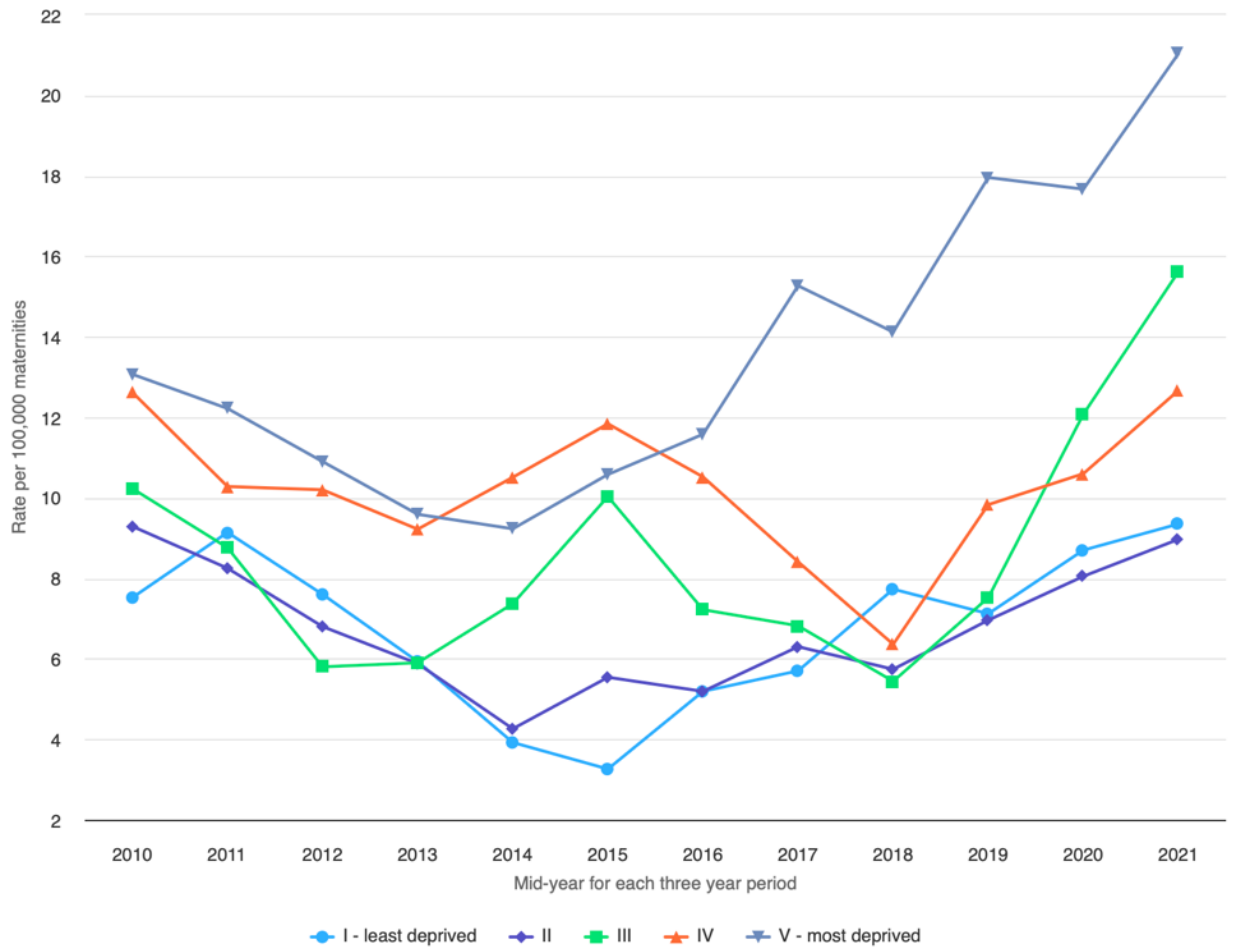
Figure 4 Maternal mortality rates 2009-22 among women from different levels of socio-economic deprivation in England*



Most deprived 20% vs least deprived = RR **2.25**, 95% CI 1.41-3.73

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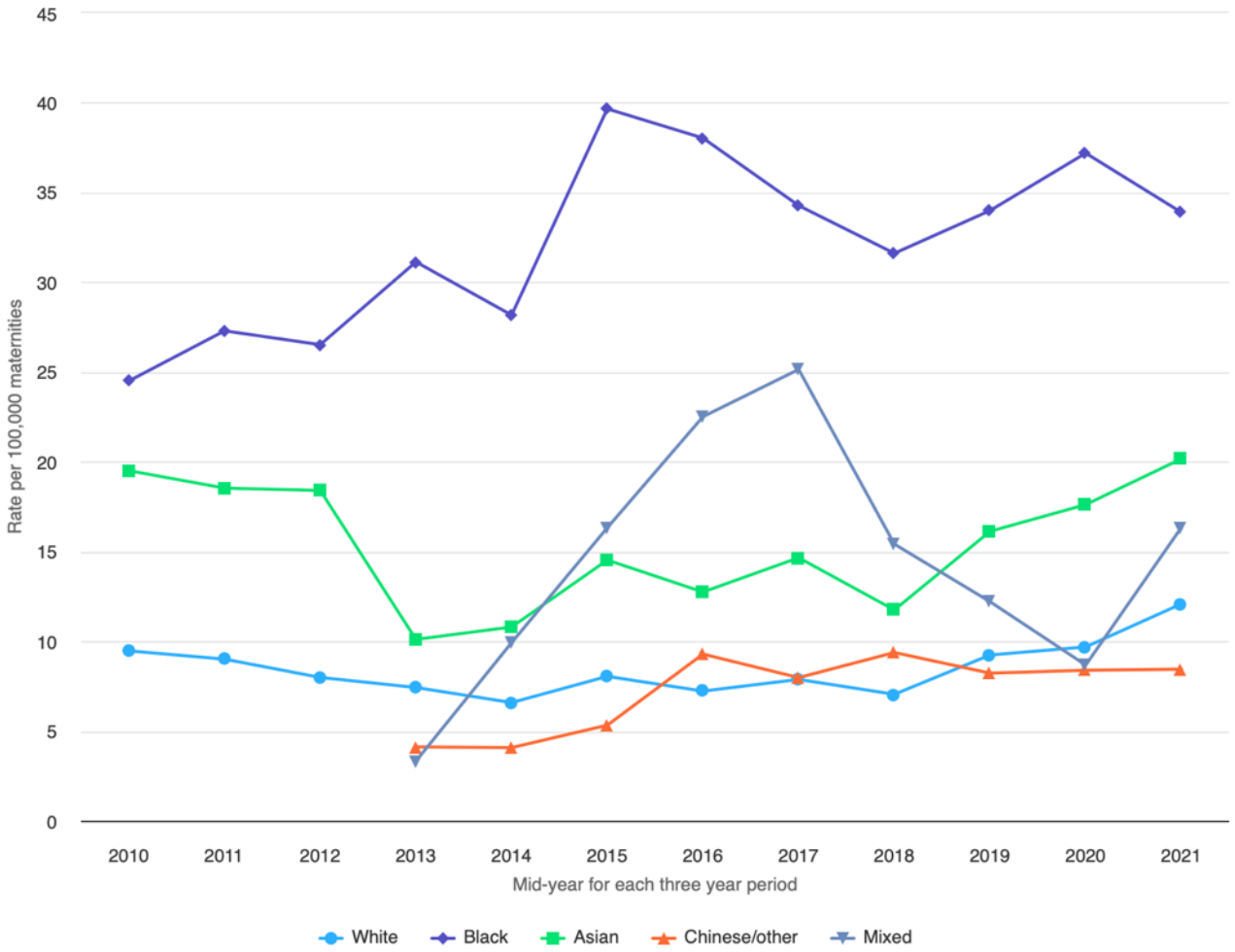
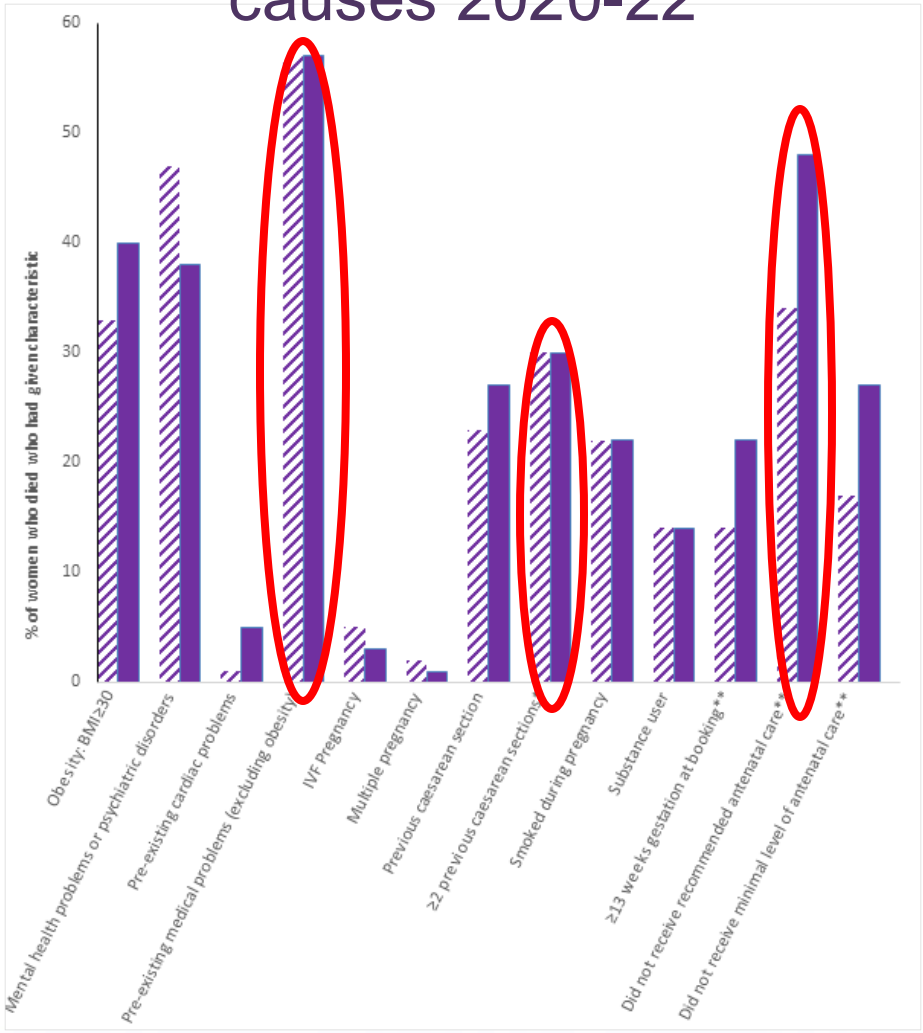
Figure 3. Maternal mortality rates 2009-22 among women from different ethnic groups in England*



Black vs white RR 2.81 (95% CI 1.81-4.22)

Asian vs white RR 1.67 (95% CI 1.00-2.88)

Selected characteristics of women who died from direct or indirect causes 2020-22



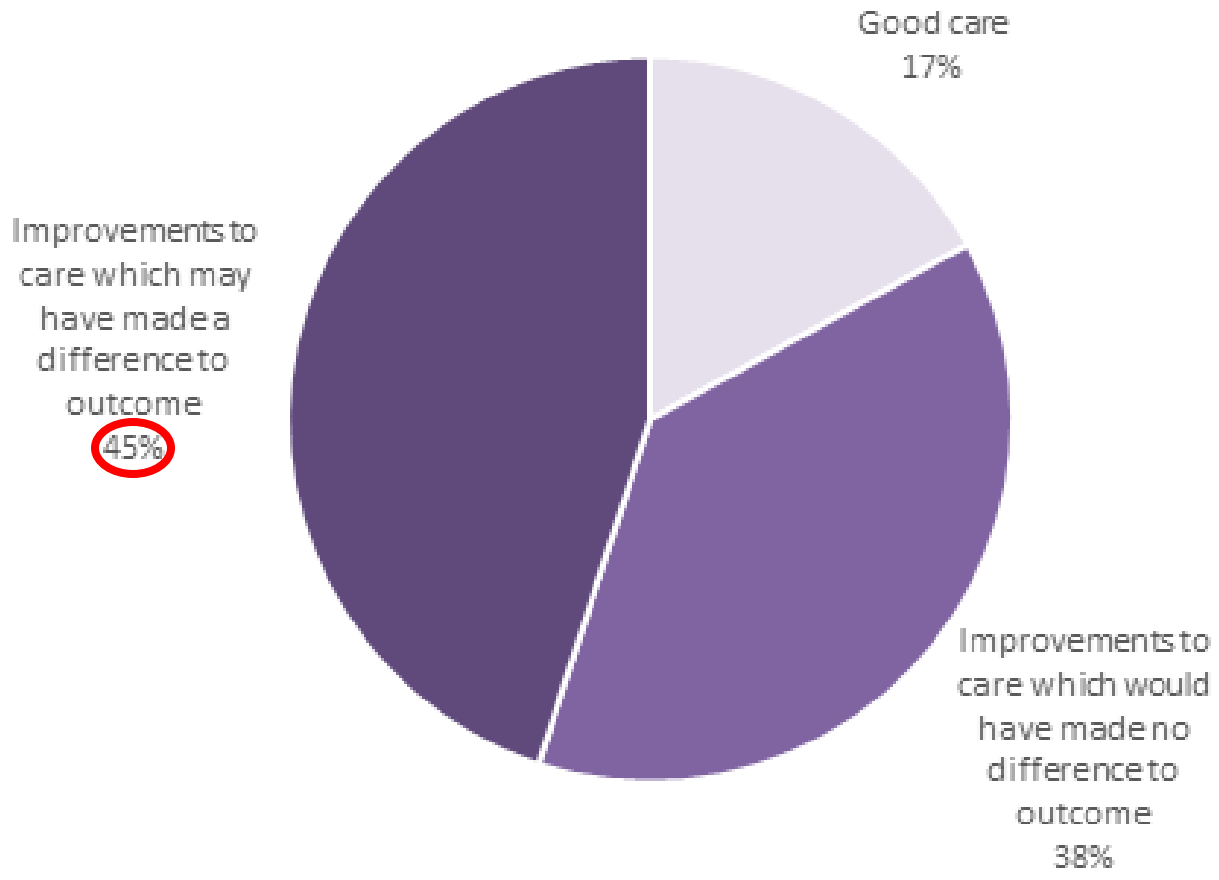
- Pre-existing medical problems and obesity
- ≥ previous CS
- Did not receive recommended antenatal care

Solid bars indicate indirect cause of death, hatched bars indicate direct causes of death

*Amongst women who had a previous caesarean birth

**NICE recommended antenatal care: booked at 10 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 care received by women who died and are included in the confidential enquiry chapters, UK and Ireland (2020-22)*



*Only the women who died in 2021 and 2022 are included in this year's confidential enquiry into deaths due to ectopic pregnancy

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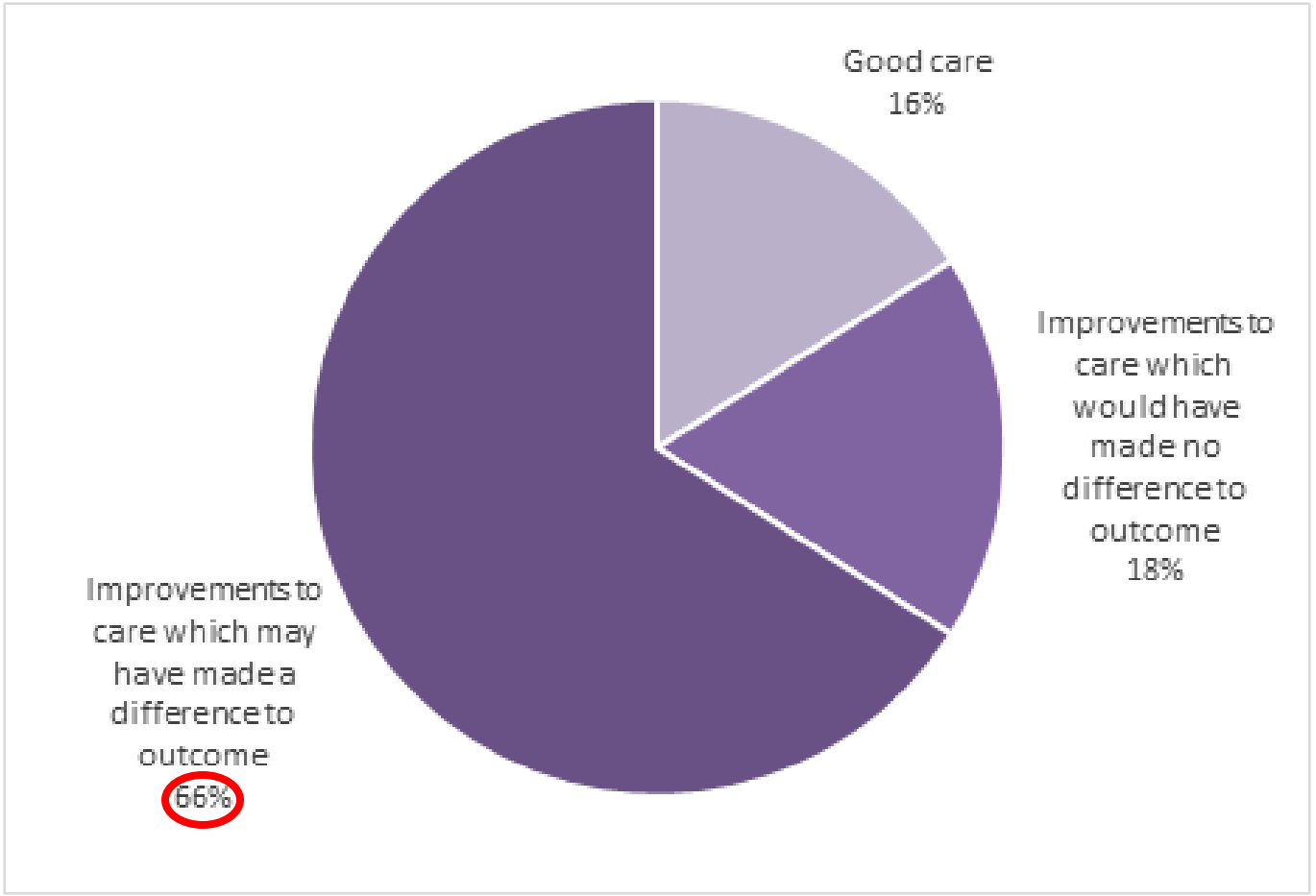
Classification of care received by the women who are included in the morbidity confidential enquiry into the care of migrant women with language needs, 2022



Vignette

An older ethnic minority woman, a long-term UK resident and English speaker, was admitted with COVID-19 pneumonitis in the third trimester of pregnancy four months after she became eligible for SARS-CoV-2 vaccination. She had received an influenza vaccination during pregnancy, but there was no record of SARS-CoV-2 vaccination ever having been discussed. She had an emergency caesarean birth but died a few weeks later.

A pregnant woman with known respiratory disease was eligible for SARS-CoV-2 vaccination early in the vaccination programme. Her respiratory physician advised her to contact her GP. SARS-CoV-2 vaccination was not discussed with her again until five months later, when she accepted it. She contracted COVID-19 and died shortly afterwards.

An extremely high-risk pregnant woman became eligible for SARS-CoV-2 vaccination very early in the vaccination programme. SARS-CoV-2 vaccination was discussed but she was undecided at this time. She died from COVID-19 pneumonitis three months later.

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Ensure that pregnant and breastfeeding women are not excluded inappropriately from research, including new vaccine and treatment research, and ensure that messaging about benefits and risks of medication and vaccine use is clear and well informed with involvement of key opinion leaders and representatives of communities at risk from an early stage. Prepare a route to enable rapid dissemination of updated advice and data concerning new vaccines and treatments to both women and their clinicians in the future

New recommendation

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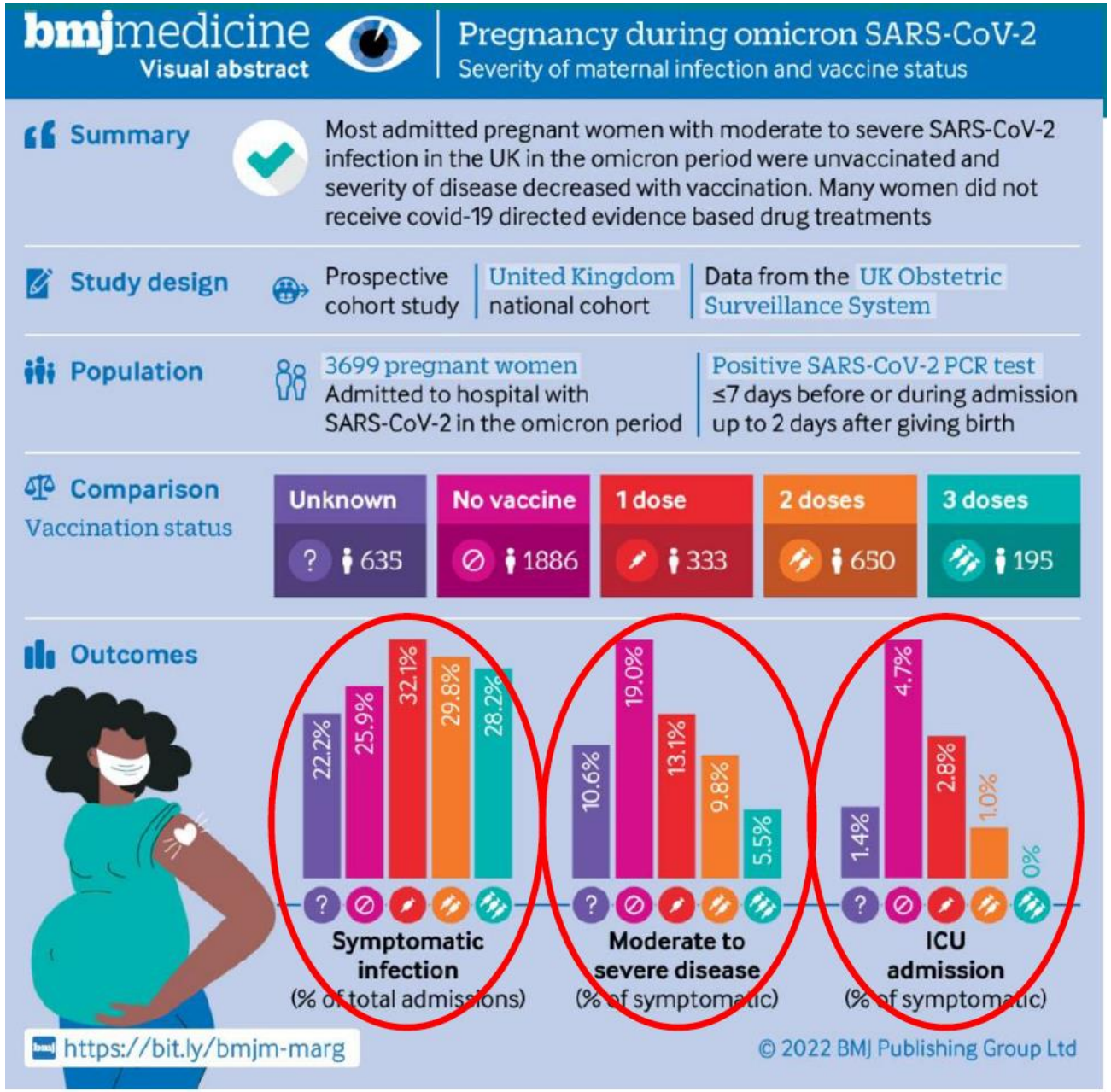
Recommendation

At the first antenatal appointment discuss and give information on immunisation for flu, pertussis, and other infections (including COVID-19) during pregnancy (National Institute for Health and Care Excellence 2021)

Women who are pregnant, who are planning pregnancy or in the immediate postpartum should be recommended to receive COVID-19 immunisation (Public Health England 2020)

Inactivated influenza vaccine should be offered to pregnant women at any stage of pregnancy (Public Health England 2020)

RSV added from Sept 2024 in UK



COVID vaccine in pregnancy benefits

- A systematic review and meta-analysis of 81,000 women vaccinated in pregnancy and 255,000 unvaccinated pregnant women found COVID-19 vaccination during pregnancy was associated with
  - A lower risk of NICU admission (OR, 0.88; 95% CI, 0.80-0.97) and
  - Lower risk of intrauterine fetal death (OR, 0.73; 95% CI, 0.57-0.94)
  - And a lower risk of maternal SARS-CoV-2 infection (OR, 0.46; 95% CI, 0.22-0.93)

Watanabe et al Peripartum Outcomes Associated With COVID-19 Vaccination During Pregnancy: A Systematic Review and Meta-analysis JAMA Pediatr. doi:10.1001/jamapediatrics.2022.3456 Published online October 3, 2022.

Engjom HM, Ramakrishnan R, Vousden N, et al,
Severity of maternal SARS-CoV-2 infection and perinatal outcomes of women admitted to hospital during the omicron variant dominant period using UK Obstetric Surveillance System data: prospective, national cohort study
BMJ Medicine 2022;1:e000190. doi: 10.1136/bmjmed-2022-000190

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Vignette

A woman who had conceived following assisted reproduction had premature rupture of membranes at 22 weeks gestation. After a delay in review, she was transferred to a tertiary unit with a neonatal intensive care facility. Upon arrival, the risks to the baby of premature birth were discussed extensively with her but the risks to her of serious infection were not discussed. She opted to delay birth. More than two days after her membranes ruptured, she developed signs of sepsis. The consultant was informed, but it was three hours before she was reviewed. Her white cell count was raised, which was attributed to steroids. Minutes later she had a temperature of 39°C and MEOWS of 5; she was transferred to the labour ward where the sepsis pathway was started but delivery was not expedited. A few hours later she had a spontaneous vaginal birth. Her condition continued to deteriorate and she died less than 12 hours after her symptoms of infection started. A placental swab grew E. coli.

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Recommendation

Ensure risk assessment and counselling in relation to extremely premature prelabour rupture of membranes includes consideration that there is a risk of maternal mortality and serious morbidity with impact on future pregnancies (Knight, Bunch et al. 2020)

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Recommendation

Take into account that women who are pregnant, have given birth or had a termination of pregnancy or miscarriage in the past six weeks are in a high-risk group for sepsis. In particular, women who had prolonged rupture of membranes.

NICE NG51 Sepsis: recognition, diagnosis and early management (National Institute for Health and Care Excellence 2016)

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Vignette

A primiparous woman was known to have adrenal insufficiency prior to pregnancy. She had admissions with adrenal crises before pregnancy and several documented episodes in pregnancy. She saw her endocrinologist regularly who increased her medication and ensured a supply of emergency hydrocortisone. The endocrinologist documented repeatedly that she had severe nausea and vomiting from early in the first trimester. No plan was made for comprehensive antiemetic therapy despite the fact she was unable to keep her oral medication down on multiple occasions. There was minimal communication between the obstetric and endocrine teams. She had an uneventful labour and birth and was discharged the following day despite low sodium levels, a marker of poorly-controlled Addison's disease. She had various concerning symptoms postnatally, including further episodes of nausea and vomiting. She died from an adrenal crisis shortly after being discharged to community midwifery care.

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Ensure that staff working within maternal medicine networks are equipped with the skills to care for the complex and multiple medical, surgical, mental health and social care needs of the current maternity population

New recommendation

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Recommendation

Inpatient care [for nausea and vomiting in pregnancy and hyperemesis gravidarum] should be considered if there is at least one of the following:

- **Continued nausea and vomiting and inability to keep down oral antiemetics**
- **Continued nausea and vomiting associated with clinical dehydration or weight loss (greater than 5% of body weight), despite oral antiemetics**
- **Confirmed or suspected comorbidity (such as urinary tract infection and inability to tolerate oral antibiotics)**
- **Co-morbidities such as epilepsy, diabetes, or HIV, where symptoms and inability to tolerate oral intake and medication could present further complications**

For women with persistent or severe hyperemesis gravidarum, the parenteral, transdermal, or rectal route may be necessary and more effective than an oral regimen.

RCOG Green-top guideline 69 (Royal College of Obstetricians and Gynaecologists 2016, Royal College of Obstetricians and Gynaecologists 2023)

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Key messages

from the themed mortality enquiry report 2023

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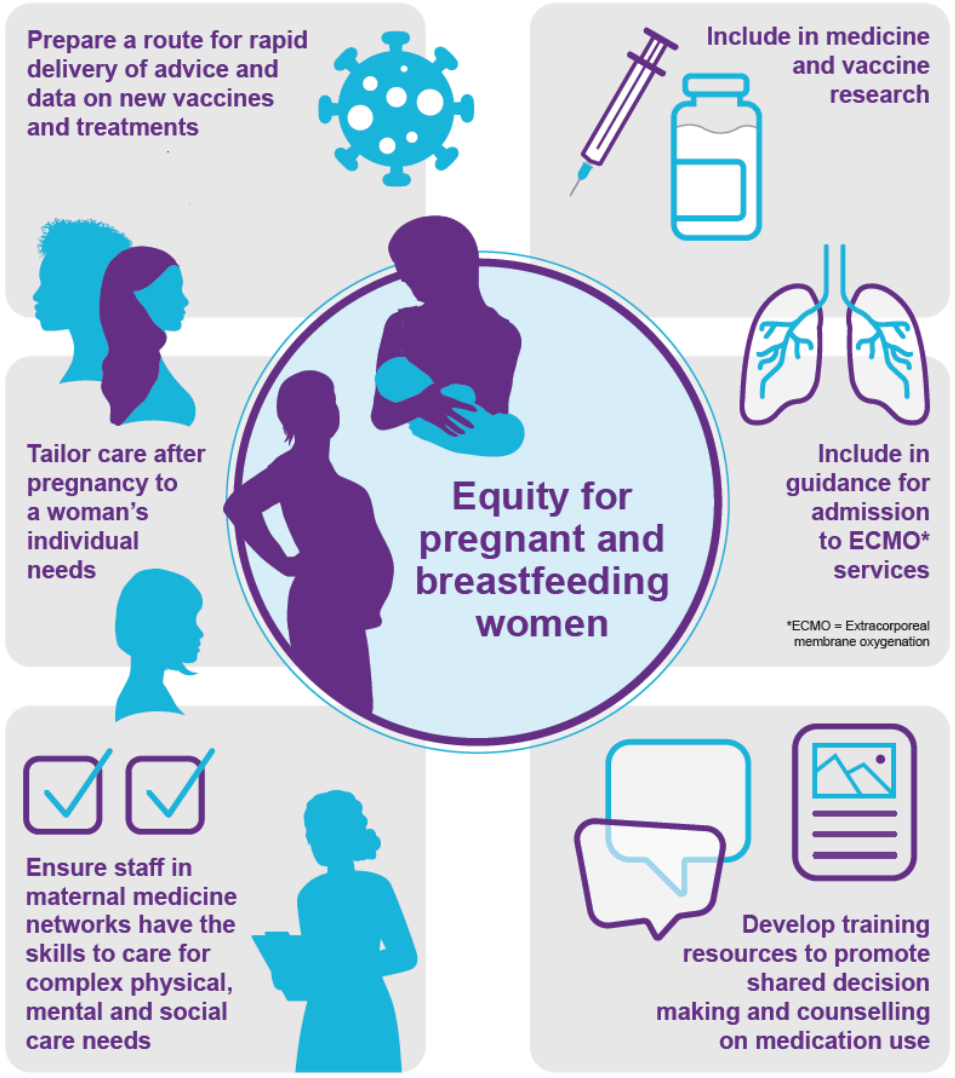
Treat pregnant, recently pregnant, and breastfeeding women the same as a non-pregnant person unless there is a very clear reason not to.



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Vignette

A woman in her fourth pregnancy collapsed early in the third trimester with abdominal pain and was taken to the emergency department. She was hypotensive with an elevated respiratory rate and was found to be profoundly anaemic. Placental abruption and an aortic dissection were considered and plans were made for a diagnostic CT scan that did not occur. An ultrasound showed an intrauterine death and she was transferred for an emergency caesarean section. Upon opening her abdomen there was fresh blood in the peritoneal cavity the source of which could not be immediately identified. A vascular surgeon was called to identify the source of the bleeding but was unable to. A ruptured splenic aneurysm was identified post-mortem.

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Recommendation

Women of reproductive age presenting to the emergency department collapsed…should have a Focused Assessment with Sonography in Trauma (FAST) scan to exclude intra-abdominal bleeding…especially in the presence of anaemia (Knight, Nair et al. 2016).

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Vignette

A multiparous woman known to have epilepsy with tonic-clonic seizures and intermittent focal seizures presented with increasing seizures at four weeks of gestation. Following discussion with a neurologist, levetiracetam was added to her lamotrigine. The woman was unable to tolerate this and reduced the dose. She was not referred to the obstetric medicine clinic after booking. The woman's medication was increased again late in the first trimester at a nurse-led clinic where the associate specialist also joined the consultation. When seen in antenatal clinic she reported ongoing seizures and was advised to contact her epilepsy specialist nurse. No direct contact was made between obstetric and neurology services. Her medication was gradually escalated by the epilepsy team throughout pregnancy, but serum levels were not measured. She continued to experience seizures and died from SUDEP in the third trimester. Serum levels of lamotrigine were low at post-mortem. Levetiracetam was not detected.

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Develop training resources concerning shared decision making and counselling regarding medication use in pregnancy and breastfeeding, including specific information on the benefits and risks of different medications and non-adherence

New recommendation

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Recommendation

Refer women and girls with epilepsy who are planning pregnancy or are pregnant to an epilepsy specialist team for a review of their anti-seizure medication options.

Ensure information about the care of women and girls during pregnancy is shared between the epilepsy specialist team, a specialist obstetric team and primary care.

NICE NG217 Epilepsies in children, young people and adults (National Institute for Health and Care Excellence 2022)

Pregnant women with epilepsy should have regular planned antenatal care with a designated epilepsy care team.

In the antenatal period, women with epilepsy should be regularly assessed for the following: risk factors for seizures, such as sleep deprivation and stress; adherence to anti-seizure drugs; and seizure type and frequency.

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Recommendation

Postpartum safety advice and strategies should be part of the antenatal and postnatal discussions with the mother alongside breastfeeding, seizure deterioration and anti-seizure medication intake.

RCOG Green-top Guideline 68 (Royal College of Obstetricians and Gynaecologists 2016)

Ensure each regional maternal medicine network has a pathway to enable women to access their designated epilepsy care team within a maximum of two weeks (Knight, Bunch et al. 2020)

Regard nocturnal seizures as a 'red flag' indicating women with epilepsy need urgent referral to an epilepsy service or obstetric physician (Knight, Bunch et al. 2020)

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Recommendation

Obstetric teams should take urgent action when pregnant women with a current or past diagnosis of epilepsy have discontinued anti-seizure medication without specialist advice. Urgent attempts should be made by all clinicians involved in care to offer the woman immediate access to an appropriately trained professional (e.g. neurologist/epilepsy specialist nurse or midwife) to review her medication and prescribe anti-seizure medication if appropriate. All women with epilepsy should be provided with the information they need prior to conception (Knight, Nair et al. 2017)

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Recommendation

Ensure SUDEP awareness, risk assessment and risk minimisation is standard care for women with epilepsy before, during and after pregnancy and ensure this is embedded in pathways of care (Knight, Bunch et al. 2020)

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Sudden Unexplained Death in Epilepsy

We need to talk about SUDEP

Act on:

Night-time seizures

Uncontrolled seizures

Ineffective treatment

to prevent **Sudden Unexpected Death in EPilepsy**

Epilepsy and stroke 13%

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Vignette

An older woman had an elevated BP immediately postpartum. After discharge, she was seen by a community midwife but no concerns or BP recordings were documented during any home visits. For two weeks postnatally, she complained to her partner of severe headaches requiring regular paracetamol and ibuprofen. She collapsed with a severe headache and vomiting. A CT scan showed massive intracranial haemorrhage with features consistent with raised intracranial pressure. She died shortly afterwards.

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Recommendation

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**

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

At the first postnatal midwife contact, inform the woman that persistent or severe headache, which could indicate hypertension, pre-eclampsia, post-dural puncture headache, migraine, intracranial pathology or infection, are symptoms or signs of potentially serious conditions, and she should seek medical advice without delay (National Institute for Health and Care Excellence 2021).

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Vignette - Delays in treatment and investigations due to pregnancy

A woman of mixed ethnic background presented in primary care with a breast lump when she was in the first trimester of pregnancy. She was referred for further examination at a breast clinic on the 'two week' waiting list but was not seen until six weeks after her initial presentation. Clinical examination indicated breast cancer with axillary lymph node spread and biopsy confirmed a high grade triple-negative breast cancer. A mammogram was not undertaken due to pregnancy and staging included abdominal ultrasound and chest and spine x-rays. There was limited multidisciplinary team discussion and care was divided across hospitals. She was recommended to start chemotherapy during pregnancy and received five cycles. She had a vaginal birth at term following induction of labour and surgical treatment with mastectomy and axillary gland removal was performed two weeks later. A CT scan at six weeks postpartum revealed extensive disease, including liver and lung metastases. Palliative chemotherapy and radiation was planned, but she had rapid disease progression and died from her breast cancer a few weeks later.

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Clinical message

Clinical message: Imaging and interventions, including chemotherapy, mammography and mastectomy should be used in pregnancy unless there is a clear contraindication.

Consulting with the maternity medicine team on what imaging is appropriate may help ensure that pregnant women are not wrongly denied treatment.

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New recommendation

Revise and implement guidance for cancer diagnosis and management in pregnant women to include clear recommendations on the use and safety of diagnostic imaging modalities in pregnant women with a history of or with newly diagnosed cancer.

New recommendation

Imaging for diagnosis and staging in cancer

USS:
- 1st line imaging modality for evaluation of a breast mass during pregnancy as lacks ionizing radiation

Mammography:
- Can be used safely and effectively in pregnancy
- Minimal risk to developing fetus if appropriate lead shielding is used

Computed Tomography (CT):
- CT brain and thorax may be used as relative fetal radiation dose is low

Magnetic Resonance Imagine (MRI):
- MRI abdomen and pelvis preferable to CT and is not associated with increased risk of harm to fetus
- Gadolinium-based contrast should be avoided as they are associated with adverse neonatal outcomes including rheumatological, inflammatory and infiltrative skin conditions.

Sentinel lymph node biopsy:
- Can be performed throughout gestation, preferably using Technetium-99m colloid solution injection (fetal dose <0.05 mGy)
- A 1-day protocol (solution injected on the morning of the surgery) reduces fetal exposure to radiation
- Blue dye and isosulfan blue should be avoided due to risk of inducing an allergic/ anaphylactic reaction
- Methylene blue is contraindicated in 1st trimester as it is teratogenic

Table 3. Risk of Adverse Outcomes From Birth to a Maximum Age of 4 Years in the Offspring of Women Exposed to Gadolinium-Enhanced Magnetic Resonance Imaging During Pregnancy vs Women Not Exposed to Any Magnetic Resonance Imaging During Pregnancy[a]

	Magnetic Resonance Imaging Exposure						
	Cohort 2: Gadolinium-Enhanced at Any Time During Pregnancy (n = 397)		None During Pregnancy (n = 1 418 451)		Hazard Ratio (95% CI)		
Outcome	No. (%)	Incidence per 1000 Person-Years (95% CI)	No. (%)	Incidence per 1000 Person-Years (95% CI)	Crude	Inverse Probability Weight-Adjusted[c]	Inverse Probability Weight-Adjusted Risk Difference (95% CI)[c]
Stillbirth or neonatal death[b]	7 (2)	17.6 (7.1 to 36.0)	9844 (1)	6.9 (6.8 to 7.1)	2.60 (1.26 to 5.37)	3.70 (1.55 to 8.85)	47.5 (9.7 to 138.2)
Connective tissue or skin disease resembling nephrogenic systemic fibrosis	≤5 (<1)[d]	3.3 (1.3 to 8.9)	8705 (1)	1.8 (1.8 to 1.8)	1.76 (0.66 to 4.68)	1.00 (0.33 to 3.02)	0.0 (−2.2 to 6.7)
Broad rheumatological or inflammatory or infiltrative skin condition	123 (31)	125.8 (105.3 to 149.9)	384 180 (27)	93.7 (93.4 to 94.0)	1.33 (1.11 to 1.58)	1.36 (1.09 to 1.69)	45.3 (11.3 to 86.8)
Congenital anomaly	39 (10)	34.8 (25.4 to 47.6)	109 053 (8)	24.0 (23.9 to 24.2)	1.33 (0.98 to 1.82)	1.25 (0.84 to 1.86)	8.7 (−5.6 to 29.9)

Abbreviation: MRI, magnetic resonance imaging.

[a] For all outcomes, we excluded pregnancies with first-trimester exposure to MRI, in which a congenital anomaly was diagnosed prior to the MRI. For the outcomes of connective tissue or skin disease resembling nephrogenic systemic fibrosis, broad rheumatological or inflammatory or infiltrative skin condition, and congenital anomaly, we further excluded 7542 pregnancies resulting in a stillbirth.

[b] For stillbirth or neonatal death the incidence rate is per 1000 pregnancies, the hazard ratio is a relative risk, and the adjusted risk difference is per 1000 pregnancies.

[c] Stabilized inverse probability weights were used to adjust for differences between exposure groups.

[d] Data are suppressed for counts of 5 or less.

- Exposure to MRI at any trimester not associated with increased harm to the fetus
- Gadolinium MRI at any gestation associated with increased risk of rheumatological, inflammatory, infiltrative skin conditions, stillbirth and neonatal death

With thanks to Melanie Nana

Medical complications in pregnancy course 2025

Wednesday 12th – Friday 14th February 2025

A comprehensive 3-day course on Medical Disorders of Pregnancy, organised by Professors Catherine Nelson-Piercy, David Williams and Catherine Williamson. This well-established successful course has been running for over 28 years.

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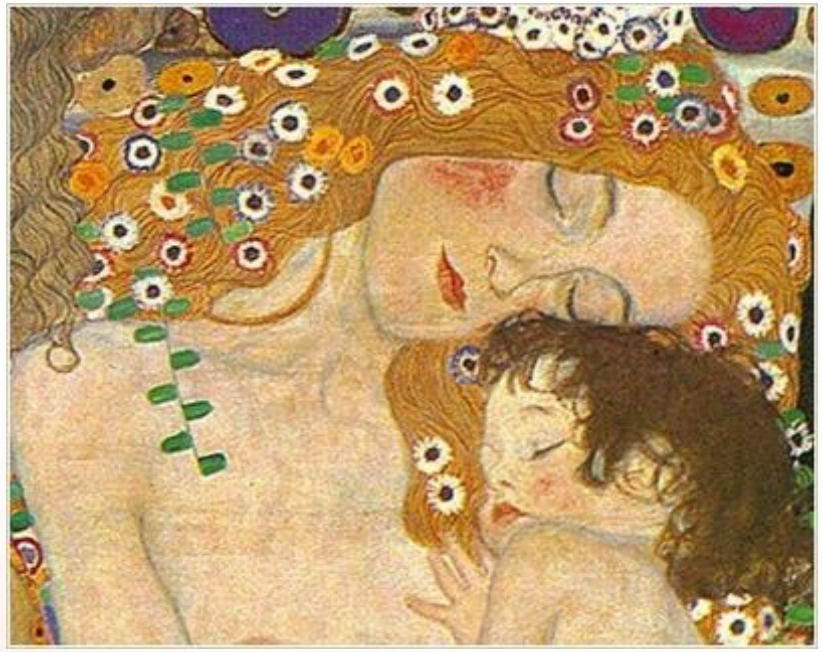
Thank you for your attention!



@nelson_piercy