Institution: University of Oxford

Unit of Assessment: 2 – Public Health, Health Services and Primary Care

Title of case study: Driving policy change to improve safety and outcomes in maternity services

Period when the underpinning research was undertaken: 2008-2018

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Marian Knight	Professor of Maternal and Child Population Health	2006 to present
Jennifer J Kurinczuk	Professor of Perinatal Epidemiology	2003 to present
Rachel Rowe	Senior Health Services Researcher	1998 to present
Peter Brocklehurst	Professor of Perinatal Epidemiology	1998 to 2010

Period when the claimed impact occurred: Jan 2014 – December 2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact

Several programmes of research conducted by the University of Oxford have led to major changes to improve the safety of maternal services in the UK and internationally:

- The 'Birthplace in England' national cohort study showed that expanding the number of midwife-led births is one of the most effective ways to reduce rising intervention rates, whilst maintaining low levels of adverse outcomes for mother and baby. This led to a new focus on midwifery-led care in the maternity strategies for all UK nations, as well as internationally.
- The MBRRACE-UK and UKOSS national programmes showed that two thirds of the population attributable risk of maternal death is associated with medical co-morbidities. This led to the introduction of new maternal medicine networks in England and international initiatives to improve access to specialist care for high-risk pregnant women.
- Rapid research into the impact of COVID-19 on pregnant women (conducted through MBRRACE-UK and UKOSS) found that black and ethnic minority women were significantly more likely to be hospitalised with SARS-CoV-2 infection, and that disruption to wider maternity support services resulted in avoidable deaths, including from suicide. These results were rapidly incorporated into NHS and other clinical guidelines leading to specific actions to increase support for ethnic minority women and safeguard perinatal mental health services.

2. Underpinning research

A. Childbirth safety in different settings for low-risk pregnant women

National policy has supported choice of birth setting for low-risk pregnant women since the 1990s. However, until recently it was unclear whether outcomes for mothers and babies differed in births planned in different settings.. The Birthplace in England cohort study, led by Professor Peter Brocklehurst at the University of Oxford, collected information about the outcomes of pregnancy among 64,540 low-risk women planning birth in different settings, both midwife-led and obstetrician-led [1].

The study found that for low-risk women, there were no significant differences in adverse perinatal outcomes (including stillbirth, neonatal brain damage and respiratory distress) for planned births in freestanding midwifery units (FMUs) and alongside midwifery units (AMUs) compared with planned birth in an obstetric unit. In addition, women who planned birth at home or in FMUS or AMUs were significantly less likely than those who planned birth in obstetric units to have an instrumental or operative birth or to receive medical interventions. An associated study of the cost effectiveness of alternative planned places of birth in England for low-risk women [2] found that the overall cost of intrapartum and postnatal care for low-risk women, and

associated related complications, was significantly lower for births planned at home, in a FMU or an AMU compared with planned birth in an obstetric unit.

B. Safer and improved care for high-risk pregnant women

The Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE UK) maternal mortality surveillance and confidential enquiry programme, established in 2012 and led by Professors Marian Knight and Jennifer Kurinczuk at the University of Oxford has consistently shown that most women who die during or after pregnancy in the UK die from indirect causes, i.e. medical and mental health comorbidities. In 2009-12, 7.2 per 100,000 women died during or in the six weeks after pregnancy from indirect causes compared with 3.5 women per 100,000 from direct (obstetric) causes [3-4]. A comparison of women who died with those who survived from the same complications, identified through the UK Obstetric Surveillance System (UKOSS), also led by Professor Knight, showed that 66% of the population attributable risk fraction of maternal death can be attributed to medical co-morbidities [3].

C. Protecting vulnerable pregnant women during the COVID-19 pandemic

When the COVID-19 outbreak was declared as a pandemic in March 2020, it was not known whether pregnant women were more susceptible to the disease. To generate conclusive evidence on this, University of Oxford researchers conducted a rapid national observational study using the UKOSS which assessed the outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 throughout the UK [5]. Compared with pregnant White women, pregnant Black women were eight times more likely to be admitted to hospital with COVID-19, while pregnant Asian women were four times as likely. In addition, the MBRRACE UK team at the University of Oxford instituted a rapid responsive review of the impact of the pandemic on wider maternity services, including mental health support and community visits [6]. The report concluded that '*It was evident that changes to service provision as a direct consequence of the pandemic meant that women were not able to access appropriate mental health care'*. This led to the new recommendation that triage processes be used *'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'* even in the context of services disrupted by COVID-19. The report also highlighted the increased risk to BAME women, since seven of the eight pregnant women who died from SARS-CoV-2 infection were of BAME background.

3. References to the research (authors in bold employed at Oxford at time of research)

1. Birthplace in England Collaborative Group, **Brocklehurst P**, **Hardy P**, **Hollowell J**, **Linsell L**, Macfarlane A, McCourt C, Marlow N, Miller A, Newburn M, **Petrou S**, **Puddicombe D**, **Redshaw M**, **Rowe R**, Sandall J, Silverton L, **Stewart M**. (2011). Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. *BMJ* 343:d7400. doi:10.1136/bmj.d7400. [Journal article, cited by 453].
2. **Schroeder E, Petrou S, Patel N, Hollowell J, Puddicombe D, Redshaw M, Brocklehurst P**; Birthplace in England Collaborative Group (2012). Cost effectiveness of alternative planned places of birth in woman at low risk of complications: evidence from the Birthplace in England national prospective cohort study. *BMJ* 344:e2292. doi: 10.1136/bmj.e2292. [Journal article, Cited by 133].
3. **Nair M, Knight M, Kurinczuk JJ** (2016). Risk factors and newborn outcomes associated with maternal deaths in the UK from 2009 to 2013: a national case-control study. *BJOG*. 23(10):1654-62. doi: 10.1111/1471-0528.13978. [Journal article, Cited by 34].
4. **Knight M,** Nair M, Tuffnell D, Kenyon S, Shakespeare J, Brocklehurst P, **Kurinczuk JJ** (Eds.) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care - Surveillance of maternal deaths in the UK 2012-14 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-14. Oxford: *National Perinatal Epidemiology Unit, University of Oxford, 2016*. https://www.npeu.ox.ac.uk/assets/downloads/mbrrace-uk/reports/MBRRACE-UK%20Maternal%20Report%202016%20-%20website.pdf [Public report, Cited by 427].

5. **Knight M, Bunch K,** Vousden N, Morris E, Simpson N, Gale C, O'Brien P, **Quigley M,** Brocklehurst P and **Kurinczuk JJ** (2020). Characteristics and outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 infection in UK: national population-based cohort study *BMJ*. 369:m2107. doi:10.1136/bmj.m2107. [Journal article, Cited by 162].
6. **Knight M,** et al. on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care Rapid Report: Learning from SARS-CoV-2-related and associated maternal deaths in the UK March – May 2020 Oxford: *National Perinatal Epidemiology Unit, University of Oxford 2020.* [Public report] https://www.npeu.ox.ac.uk/assets/downloads/mbrrace-uk/reports/MBRRACE-UK_Maternal_Report_2020_v10_FINAL.pdf

4. Details of the impact

A. Childbirth safety in different settings for low-risk pregnant women:

i) Facilitating national policy change towards community-focused care

The Birthplace in England study [1] has been a key driver towards a stronger focus on midwife-led birthing services across the UK. The National Institute of Health and Care Excellence's 2014 Guidelines 'Intrapartum care for healthy women and babies.' direct practitioners to use the data presented from [1] to *'advise low-risk multiparous women that planning to give birth at home or in a midwifery-led unit (freestanding or alongside) is particularly suitable for them because the rate of interventions is lower and the outcome for the baby is no different compared with an obstetric unit'* [A]. Additional analyses by the University of Oxford researchers who led the Birthplace study [1] provided key evidence to the policy document 'Better Births', a five-year forward view for maternity care in England published in February 2016 [Bi]. The evidence from the Birthplace study was integral to the conclusions of 'Better Births', which included the recommendation that '*The [University of Oxford] evidence reports commissioned for this review show that midwifery care results in fewer interventions. If we can increase the proportion of births supported by midwifery care, we will be able to reduce the cost of medical interventions*' [Bi]. The Birthplace study [1] was also cited by the maternity strategies for Scotland [Bii] (January 2017), Wales [Biii] (July 2019) and Northern Ireland [Biv] (July 2012), as evidence to support increase in provision of midwifery units for low-risk women.

ii) Health and wellbeing outcomes

Approximately 750,000 women give birth in the UK each year, 70% of whom are considered 'low risk', and 45% are eligible for midwifery-led birth at the end of pregnancy. The Birthplace study [1] has led to substantial improvements in women's birth experiences and access to midwifery-led settings for birth. Between 2010 and 2016, the number of midwifery-led units in England rose by 42% from 111 to 158; during this period, the proportion of births in midwifery-led settings almost trebled from 5% to 14% [C]. Women who plan birth in a midwifery-led setting have between a two- and five-fold increase in the odds of having a normal birth compared with women planning birth in an obstetric unit. In addition, the proportion of women offered birth in a midwife-led unit/birth centre in England increased from 35% in 2013 to 45% in 2018. Similarly, in Northern Ireland, the number of midwifery-led units has increased from five in 2012 to nine in 2020. By 2018, over half (59%) of UK NHS organisations with alongside maternity units operated an opt-out policy whereby the midwifery unit is the default planned place of birth for low-risk women [D].

iii) Impacts on international policy

The Birthplace programme evidence [1] helped to drive changes in maternity services in Europe, Australia, New Zealand, Canada and the USA. For instance, the New Zealand Government's 2014 Report on Maternity states '*Primary birthing units and home births are recommended for well, healthy women likely to experience normal birth'* (citing [1] and [A]) [E]. Similarly, the 2017 American College of Obstetricians and Gynaecologists (ACOG) guidance on planned home birth specifically notes that the low rates of perinatal mortality reported by the Birthplace study [1] reflect '*provision of care by uniformly highly educated and trained certified midwives'* and on this basis *'supports the provision of care by midwives who are certified by the American Midwifery Certification Board'* for planned home birth [Fi]. Prior to this, ACOG had a negative position towards home births, described by the American College of Nurse-Midwives [Fii].

B. Safer and improved care for high-risk pregnant women:

i) Changes to national policy and service provision

The MBRRACE-UK and UKOSS national programmes of maternal mortality and morbidity surveillance and confidential enquiries showed that two thirds of the population attributable risk of maternal death is associated with medical co-morbidities, and highlighted maternal suicide as an important cause of death in the year postpartum. This led to the introduction of new maternal medicine networks in England, announced in November 2017 [G]. Previously, networked maternal medicine was only available in one of 12 regions of the UK (8%) despite the fact that 30% of women who give birth are 'higher risk'. Networked maternal medicine is now available in the remaining 92% of areas and therefore this model of care is accessible to over 160,000 women for whom it was not previously available.

MBRRACE-UK and UKOSS national programmes were cited as evidence underlying the national maternity strategy, including expanding access to specialist perinatal mental health services in the NHS England Long Term Plan published in January 2019 [H], and new funding of GBP50,000,000 for perinatal mental health services in Scotland, announced in March 2019. The work also underpins many of the recommendations in recent NICE guidance on intrapartum care for high-risk women [I]. The MBRRACE-UK evidence has been used to develop a new Medical Emergencies in Obstetrics (MEmO) course which to date has been run over 40 times with 400 total participants. The evidence also helped develop a new Acute Care Toolkit for Obstetric Medicine by the Royal College of Physicians which has been downloaded over 1,400 times.

ii) Health benefits

The measures to prevent maternal deaths in association with medical and mental health co-morbidities is already having an effect. There was a decrease in the maternal mortality rate from indirect (medical and mental health-related) causes from 7.2 per 100,000 women giving birth in 2009-11 to 6.0 per 100,000 women giving birth in 2015-17. This is in spite of an increasing average age at which women give birth and increasing medical complexity of the maternity population overall.

iii) International policy change in care for high risk pregnant women

The work led to new legislation in the United States (the US Congress Preventing Maternal Deaths Act of 2018 [Ji]) regarding maternal mortality surveillance and review, and in 2019 Knight contributed insights to a workshop that led to recommendations for quality, availability and consistency of surveillance data and review in the United States [Jii, Jiii]. The work was cited as evidence driving World Health Organisation initiatives on sepsis and maternal mental health, as well as the health care of pregnant refugee and migrant women and their newborn children [K].

iv) Cultural impact and contribution to public debate

Zena Forster, a local independent playwright, became aware of the research findings on maternal mental health, and, working with the researchers, developed a play, 'Stitch Up'. Steeped in emotion and drama, 'Stitch Up' draws directly on key public health messages arising from the research, and women's lived experience of mental illness both during pregnancy and postnatally, to raise awareness, reduce stigma and encourage discussion about maternal mental health. An evaluation on behalf of the Arts Council including feedback from audience members noted that it was a '*brilliant way to initiate discussion on a controversial topic - approachable and open dialogue'*.

C. Protecting vulnerable pregnant women during the COVID-19 pandemic

The rapid response research studies prompted by the COVID-19 pandemic [5,6] identified key lessons to guide ongoing service provision during the pandemic, including planning for winter and future lockdown scenarios. The increased risk to pregnant women from BAME communities highlighted in [5] generated significant media interest including all major UK outlets (e.g. BBC News, The Times, The Telegraph) and international distributors (e.g. CNN). In response the Chief Midwife in England wrote to all the maternity units in the country calling on them to take specific actions to minimise the additional risk of COVID-19 for BAME women and their babies [L(i)]. Both the UKOSS and MBRRACE-UK studies [5,6] were the basis of the joint statement from the Royal College of Midwives and RCOG: 'Planning for Winter 2020/21: reducing the impact of COVID-19 on maternity services in the UK' [L(ii)]. A key principle of this is that services

should show *'particular attention to those from BAME communities or those living with medical, social or psychological conditions that make them higher risk.'* The report recommends '*Services should review the following evidence and recommendations as a matter of priority, and encompass them into their planning: 1. The findings and recommendations of the MBRRACE rapid report',* citing reference [6]. The MBRRACE-UK report was also cited in the Royal College of Psychiatrists' guidance: 'COVID-19: Working with vulnerable people', which listed a number of '*key red flags identified from the MBRRACE reports which still need to be acted upon promptly'* [L(iii)]. Even in non-pandemic situations, approximately 10% of pregnant women have a mental health problem. Safeguarding mental health provision therefore protects an estimated 75,000 vulnerable women per year from avoidable harm during pregnancy.

5. Sources to corroborate the impact

A. NICE Guideline CG190: Intrapartum care for healthy women and babies. December 2014.

B. National maternity strategies. (i) Better Births' five-year forward view for maternity care. NHS England 2016. (ii) The best start: five-year plan for maternity and neonatal care. Scottish Government Jan 2017. (iii) Maternity care in Wales: A Five Year Vision for the Future (2019-2024). Welsh Government 2019. (iv) A strategy for maternity care in Northern Ireland 2012-2018. Department of Health, Social Services and Public Safety 2012.

C. Walsh D, et al. (2018) Mapping midwifery and obstetric units in England. *Midwifery.* 56:9-16. Journal article, doi:10.1016/j.midw.2017.09.009.

D. Glenister C, Burns E, Rowe R. (2020). Local guidelines for admission to UK midwifery units compared with national guidance: results of a national survey using the UK Midwifery Study System (UKMidSS). *PLOS ONE* 15(10): e0239311. Journal article, doi:10.1371/journal.pone.0239311.

E. Report on Maternity 2017. New Zealand Ministry of Health, April 2019. https://www.health.govt.nz/publication/report-maternity-2017

F. American College of Obstetricians and Gynecologists: home birth guidance. (i) ACOG 2017. Planned Home Birth. (ii) American College of Nurse Midwives, Issue Brief: ACOG Committee Opinion on Planned Home Birth: Opening the Door to Collaborative Care.

G. (i) Safer Maternity Care: Progress and next steps. November 2017. UK Department of Health, Public document. https://www.gov.uk/government/publications/safer-maternity-care-progress-and-next-steps (ii) Corroborator 1: National Clinical Director, NHS England.

H. NHS Long Term Plan, January 2019. https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf

I. NICE Guideline NG121: Intrapartum care for women with existing medical conditions or obstetric complications and their babies and associated evidence reviews. March 2019.

J. (i) U.S Congress Preventing Maternal Deaths Act of 2018. (ii) Certificate of contribution, and (iii) Technical report: HRSA Maternal Mortality Summit: Promising Global Practices to Improve Maternal Health Outcomes, U.S. Health Resources and Services Administration, February 2019, recommendations 5 and 6. https://www.hrsa.gov/sites/default/files/hrsa/maternal-mortality/Maternal-Mortality-Technical-Report.pdf

K. Technical guidance: Improving the health care of pregnant refugee and migrant women and newborn children. Copenhagen: WHO Regional Office for Europe; 2018 https://www.euro.who.int/__data/assets/pdf_file/0003/388362/tc-mother-eng.pdf

L. (i) NHS boosts support for pregnant black and ethnic minority women. NHS News. 27 June 2020. https://www.england.nhs.uk/2020/06/nhs-boosts-support-for-pregnant-black-and-ethnic-minority-women/, (ii) Joint RCOG & RCM Statement - Planning for Winter 2020/21: reducing the impact of COVID-19 on maternity services in the UK. October 2020. https://www.rcog.org.uk/globalassets/documents/guidelines/2020-10-08-rcog_rcm_winter_secondwave_statement.pdf, (iii) COVID-19: Working with vulnerable people. Royal College of Psychiatrists. https://www.rcpsych.ac.uk/about-us/responding-to-covid-19/responding-to-covid-19-guidance-for-clinicians/community-and-inpatient-services/covid-19-working-with-vulnerable-patients (accessed 24 March 2021)