Numbers and proportions of women giving birth in UK midwifery units since 2016: a secondary analysis of data reported to the UK Midwifery Study System (UKMidSS)

Abstract

Background

Choice of planned place of birth for women at 'low risk' of complications is a longstanding UK policy commitment. Planned birth in a midwifery unit (MU) is safe for babies and associated with better outcomes for women. From 2010-2015 the number of MUs, and the proportion of births in MUs, increased.

Aim

We aimed to provide evidence about UK MU provision and utilisation between 2016-24.

Methods

Secondary analysis of data from six studies conducted using the UK Midwifery Study System (UKMidSS), January 2016 to January 2024. We used monthly data about the number of women admitted to and/or giving birth in each MU and monthly national birth statistics to estimate the number and proportion of births in MUs. We used modified Poisson regression to compare proportions over time in alongside midwifery units (AMUs), adjusting for calendar month and number of participating open MUs, overall and by nation of the UK.

Findings

The percentage of births in UK AMUs declined from 11.8% in Study 1 (2016) to 5.4% in Study 6 (2023). The chances of giving birth in an AMU were 47% and 56% lower during Study 5 (2021-2) and Study 6 respectively, compared with Study 1, and was not explained by changes in the number of MUs. There was some variation between nations of the UK.

Conclusion

A dramatic reduction in the number of women giving birth in MUs has occurred since 2016, and particularly since 2021, with serious implications for women's outcomes and for midwifery skills and experience.

Keywords

Birthing Centers, Midwifery, Birth Setting, Parturition

Statement of significance

Issue

For women who are healthy with straightforward pregnancies, choice of place of birth, including the option of birth in a midwifery unit, is a key UK policy commitment, but there are no published data about the number and proportion of women giving birth in midwifery units across the UK, or the number of midwifery units, since 2015-17.

What is already known

Compared with planned birth in an obstetric unit, planned birth in a midwifery unit is associated with less intervention with no difference in outcomes for babies.

What this paper adds

This paper provides robust evidence of a halving in the number of women giving birth in UK MUs since 2016, particularly since 2021, which is not explained by changes in the number of MUs, with some variation between the nations of the UK.

Background

Midwifery-led care and midwifery-led settings for birth are available in many high-resource countries, for women who are healthy with straightforward pregnancies and therefore at 'low risk' of complications, with good evidence of safety and positive outcomes.[1] In England there has been a longstanding policy supporting choice of planned place of birth for 'low risk' women.[2] In 2011 the Birthplace national prospective cohort study provided robust evidence about the relative safety of midwifery-led settings for 'low risk' women in England, compared with planned obstetric unit birth.[3, 4] National guidance for England, published in 2014, explicitly advised that 'low risk' women should have a choice about where to give birth. Midwifery units (MUs), both freestanding midwifery units (FMUs) located on a site separate from a hospital obstetric unit, and alongside midwifery units (AMUs) located in the same building as a hospital obstetric unit, were described as "particularly suitable", because of the reduced risk of intervention and comparable outcomes for babies, compared with planned birth in an obstetric unit.[5] Maternity care policy and guidance in the other three

nations of the United Kingdom (UK) is similarly aligned.[6-9] Revised guidance for England published in 2023 continued to support women to have a choice of birth settings.[10] Between 2010 and 2015 the number of AMUs in England doubled, from 53 to 97, and the percentage of births that took place in MUs almost trebled to 14%.[11] The number of AMUs in England continued to increase from 2015-2017, while the number of FMUs remained fairly static over the same period.[12]

Since 2015, a number of drivers may have had an impact on the number and proportion of births taking place in MUs in the UK. The Covid-19 pandemic led to widespread temporary closures of MUs, many of which have not re-opened.[13] Successive investigations into the circumstances surrounding deaths of mothers and babies in Morecambe Bay, Shrewsbury and Telford, and East Kent have raised concerns about team working between midwives and obstetricians in settings with MUs,[14-16] and there has been undermining of the safety of midwifery care in print and social media.[17, 18] Midwifery staff shortages have been highlighted as a safety concern[19] and are also likely to have implications for staffing and availability of MUs, with obstetric unit staffing typically prioritised in the event of staff shortages.[20] Changes in MU admission criteria,[21] the clinical characteristics of pregnant women, including increases in the prevalence of risk factors likely to have an impact on eligibility for midwifery-led care, such as obesity and maternal age,[22] and increasing rates of planned caesarean birth, from 16% in 2016-17 to 25% in 2023-24 in England,[23] may also have had an impact.

In the UK, routine data do not accurately record whether women gave birth in an MU, particularly when on the same site as a hospital obstetric unit. There are no published data about the number and proportion of women giving birth in MUs across the UK, or the number of MUs, since 2015-17.[11, 12]

The aim of this research was to provide evidence about the landscape of UK MU provision and utilisation over the period 2016-24. Specific objectives were to: (i) describe the number and proportion of women giving birth in MUs over time between 2016 and 2024 by type of unit (AMU/FMU); (ii) explore the extent to which any changes might be explained by changes in the number of MUs (including any temporary closures for intrapartum care), and/or changes in the number of admissions and transfer rates, over the same period; and

(iii) explore and describe any regional variations within England and across the four nations of the UK.

Methods

Study design

This was a secondary analysis of data collected in six national cohort and case control studies conducted using the UK Midwifery Study System (UKMidSS) between January 2016 and January 2024.[24-30]

Data and data sources

The UKMidSS is a research infrastructure for conducting national cohort and case-control studies in MUs across all four nations of the UK. It comprises a network of midwife reporters (at least one in each UK MU), and a research team and web-based administrative system at the National Perinatal Epidemiology Unit at the University of Oxford. UKMidSS was set up in 2015,[24] covering all UK AMUs for the first three studies conducted in 2016, 2017-18 and 2018-19 ,[25-27] and in 2019 was expanded to also include all UK FMUs for subsequent studies.[28-30] Data about the name and location of AMUs in 2015 (and FMUs in 2019) was shared with UKMidSS under licence by Rod Gibson Associates and BirthChoiceUK.[31] Since then the UKMidSS team have conducted regular internet searches and used midwifery networks and word of mouth to identify new units. UKMidSS data collection processes have been described in detail elsewhere.[24-29] Briefly, for each UKMidSS study, midwife reporters submit data every month about the overall number of admissions and births in their MU in the previous month, along with the number of women meeting the specific eligibility criteria for the study. Data are requested every month, including where there are zero admissions to report. Since 2021, reporters have also been asked to indicate each month whether their unit was closed to admissions for the whole of the previous month. Prior to this, unit closures were relatively uncommon and reporters typically informed the UKMidSS team directly. The duration of data collection for each study is typically 12 months, but some studies were shorter.

For the analyses reported here, data about the number of units and number of women admitted to and/or who gave birth in each unit each month were extracted from the UKMidSS administrative system for each of the six national cohort and case-control studies

carried out between January 2016 and January 2024 (Table 1).[25-30] Admissions data were collected in all but two studies. Births data were collected in all studies. All six studies collected data from AMUs, with the most recent three studies also collecting data from FMUs. The proportion of UK MUs participating in UKMidSS studies ranged from 87% in Study 6 to 97% in Study 1.

Table 1: Characteristics of studies from which data were drawn

Study number	Study duration (Dates study conducted)	Data available		Type of MU		Total number of participating MUs	Total number of participating AMUs
		Admissions	Births	AMU	FMU	n (%[1])	n (%[1])
1[25]	12 months (1st Jan-31st Dec 2016)	✓	✓	✓	✕	121 (97%)	121 (97%)
2[26]	12 months (1st Mar 2017-28th Feb 2018)	✕	✓	✓	✕	123 (95%)	123 (95%)
3[27]	9 months (1st Aug 2018-30th Apr 2019)	✓	✓	✓	✕	123 (95%)	123 (95%)
4[28]	6 months (1st Sep 2019-29th Feb 2020)[2]	✕	✓	✓	✓	200 (95%)	122 (95%)
5[29]	12 months (1st Oct 2021-30th Sep 2022)	✓	✓	✓	✓	183 (88%)	114 (88%)
6[30]	12 months (1st Feb 2023-31st Jan 2024)	✓	✓	✓	✓	177 (89%)	110 (87%)

[1] As a proportion of all MUs known to the UKMidSS team.
[2] Note that data collection for Study 4 ended earlier than planned, in March 2020, because of the Covid-19 pandemic. Because of pandemic-associated pressures on maternity services, no studies were conducted until several months after the last national lockdown (March 2020 to July 2021)

Data about the overall number of births in each month for which UKMidSS data were available, were drawn from national routine birth statistics for England and Wales,[32, 33]

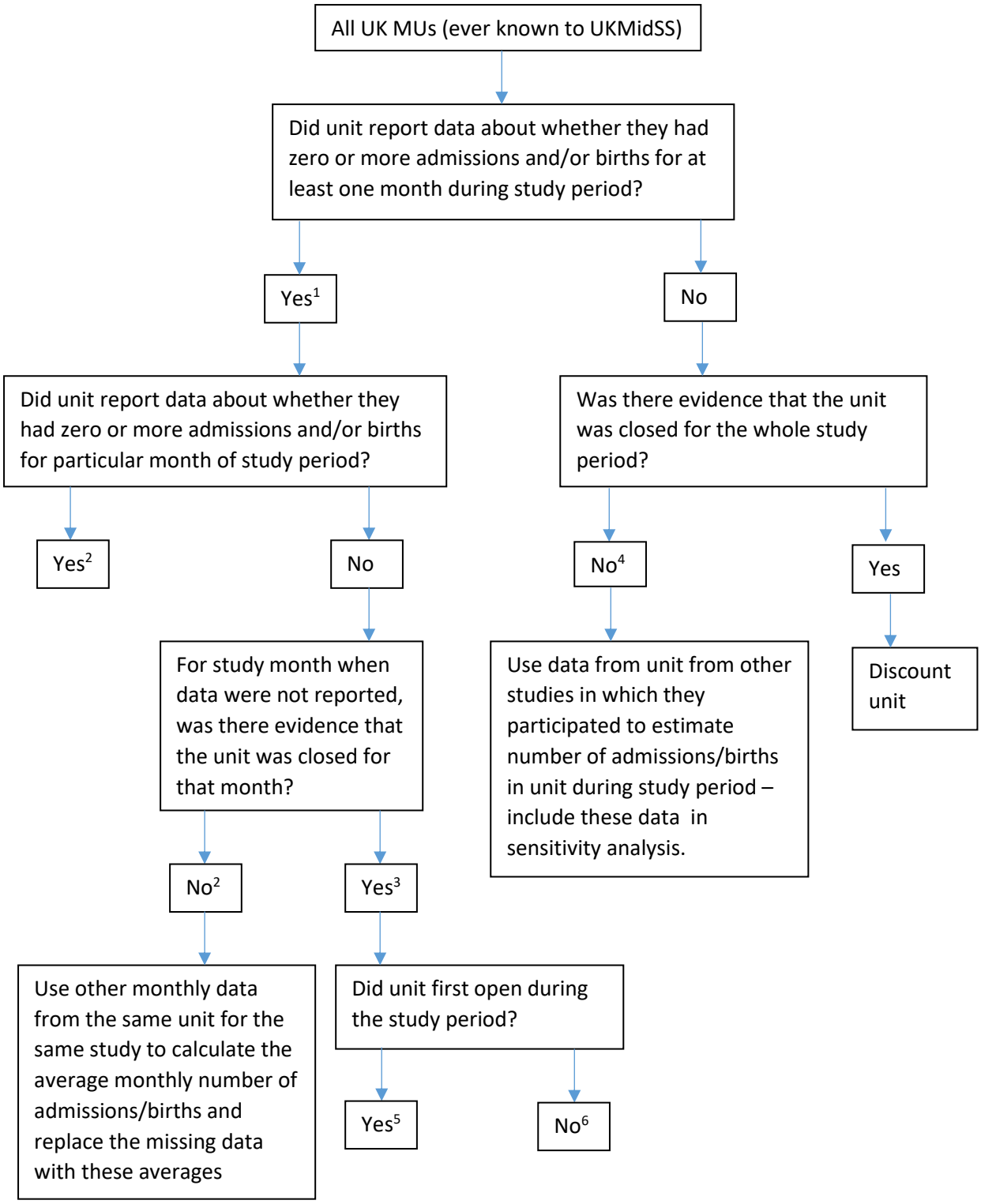
Scotland,[34] and Northern Ireland.[35] Data about annual births in each of the nine NHS regions of England were drawn from national routine birth statistics for England and Wales.[32, 33]

Data management and analysis

Midwifery unit classification for analysis

UK MUs known to the UKMidSS team were classified as 'participating' in UKMidSS for any given study if they reported data about admissions and/or births (zero or more) for at least one month during the study period (Figure 1). For any given month within a study, participating units were classified as 'open' for that month if they reported data about admissions and/or births, and 'closed' if the UKMidSS team had evidence that the unit was not open (either in the form of communication from the reporter or, from 2021, in a monthly report of temporary closure or from other sources).

Units that did not participate in any given study, but where the UKMidSS team knew the unit to be open to admissions for at least part of the study period, were classified as 'missing'.



[1]Unit classified as participating
[2]Unit classified as participating and open for month in question
[3]Unit classified as participating but closed for month in question
[4]Unit classified as missing unit
[5]For months where unit was classified as 'closed', this was because the unit did not exist yet
[6]For months where unit was classified as 'closed', this was a true closure

Figure 1: Process for classifying midwifery units for analysis

Analysis

Data were imported into Microsoft Excel for cleaning, and analysis was performed using Excel and STATA version 18.[36] Given that data were available from AMUs from all six UKMidSS studies, and because most MU births in the UK occur in AMUs, all analyses were conducted for AMUs. Where analyses were also conducted for FMUs, this is described below.

For objective (i) we summarised the number of admissions and births taking place in each type of MU per month of each study across the UK. We calculated the mean number of admissions and births per month of each study by type of MU, with standard deviations (SD). We calculated the proportion of births taking place in AMUs across the UK for each month for which data were available, using the total number of births reported to UKMidSS from AMUs each month as the numerator and the total number of UK births recorded in routine statistics for the same month as the denominator.

We calculated the proportion of births taking place in UK AMUs during each of the six UKMidSS studies along with 95% confidence intervals (CIs), using the total number of births reported to UKMidSS from AMUs in each study as the numerator and the total number of UK births recorded in routine statistics during the study period in question as the denominator. We used modified Poisson regression to estimate the relative risk (RR), with 95% CIs, of giving birth in UK AMUs by study, using the first UKMidSS study as the reference category. We adjusted for month to account for potential monthly variation in the likelihood of giving birth.

To address objective (ii), for each month of each study we summarised the number of participating open MUs by type of unit. The RR (with 95% CIs) of giving birth in UK AMUs by study was estimated, additionally adjusting for the number of participating open AMUs each month during the study periods. For studies where we had data about admissions and births we calculated the proportion of women transferred from each type of MU to obstetric care during labour for each month of each study. For example, for AMUs we used the total number of admissions to AMUs reported to UKMidSS for each month as the denominator and the total number of births in AMUs reported for the same month as the numerator, subtracted this value from one and presented this as a percentage. We also

calculated the mean number of admissions and births per unit for each month of each study, by type of unit.

To address objective (iii), we calculated the number and proportion of births in AMUs for each month for which data were available and during each of the six UKMidSS studies, for England and Wales combined (because the monthly routine birth statistics that were used as the denominator to calculate the proportions are not reported separately for England and Wales), for Scotland, and for Northern Ireland.

We also estimated the proportion of births occuring in AMUs each month separately for Wales and for England. For each month for which data were available from UKMidSS studies, we multiplied the monthly number of births in England and Wales combined, by the proportion of births occurring in Wales annually. We used a similar process to estimate the number of births in AMUs for regions of England (London, Midlands and East, South and North).

The RR of giving birth in AMUs for each region of England and for the nations of the UK by study was estimated using modified Poisson regression, again using the first UKMidSS study as the reference category and sequentially adjusting initially for month and then additionally for the number of participating open AMUs in the area in question each month during the study periods.

Management of missing monthly data

Reporting completeness (i.e. the proportion of monthly report requests that were responded to by participating units) was relatively high, but not all participating units reported for every month of each study. To manage this missing monthly data, units that reported data for at least one month in the study period, but did not report data for *all* months in the study period, were identified (Figure 1). Where we had no evidence that the unit was closed, we used other monthly data from the same unit for the same study to calculate the average monthly number of admissions and births and replaced the missing data with these averages. The proportion of missing data for each month of each study was calculated separately for AMUs and FMUs (Supplementary File Figures S1 and S2). The proportion of monthly data that was missing ranged from an average of 0.2% (range 0-1%) in Study 2 to an average of 8.3% (range 1-14%) for AMUs in Study 6.

Sensitivity analysis

Participation of MUs in UKMidSS studies was high, but for each study there was a small number of units that did not participate, but that were known to the UKMidSS team not to have been closed (identified as group 4 in Figure 1). This could occur, for example, if the unit was unable to accurately identify women fitting the inclusion criteria for that study, or if they were unable to support data collection for the study because of staff shortages. To estimate the impact of the non-participation of these 'missing' units we calculated the average number of monthly births for each missing unit using data from the previous available study or, if this was not possible, from the following available study. We included these estimated monthly births data in sensitivity analyses, repeating the analysis to estimate the number and proportion of women giving birth in AMUs including the missing units, and calculating the RR of giving birth in UK AMUs by study including the missing units, and sequentially adjusting for month and then the number of UK AMUs including the missing units.

Patient and public involvement

The UKMidSS Steering Group includes two lay members who have represented the views of pregnant women and families throughout all UKMidSS studies and during the conduct and interpretation of this secondary analysis.

Results

Births in midwifery units

The number of women admitted to AMUs in the UK declined over time from a mean of 10,530 (SD 514) per month in Study 1 in 2016, to a mean of 4,225 (SD 214) per month in Study 6 (February 2023-January 2024) . The number of women giving birth in AMUs in the UK also declined in this period from a mean of 7,619 (SD 393) per month in Study 1 to a mean of 2,952 (SD 167) per month in Study 6 (Figure 2). Data about the number of women giving birth in FMUs were only available from 2019, and showed a decline from a mean of 645 (SD 45) per month in Study 4 to 213 (SD 29) per month in Study 6 (Supplementary File Figure S3).

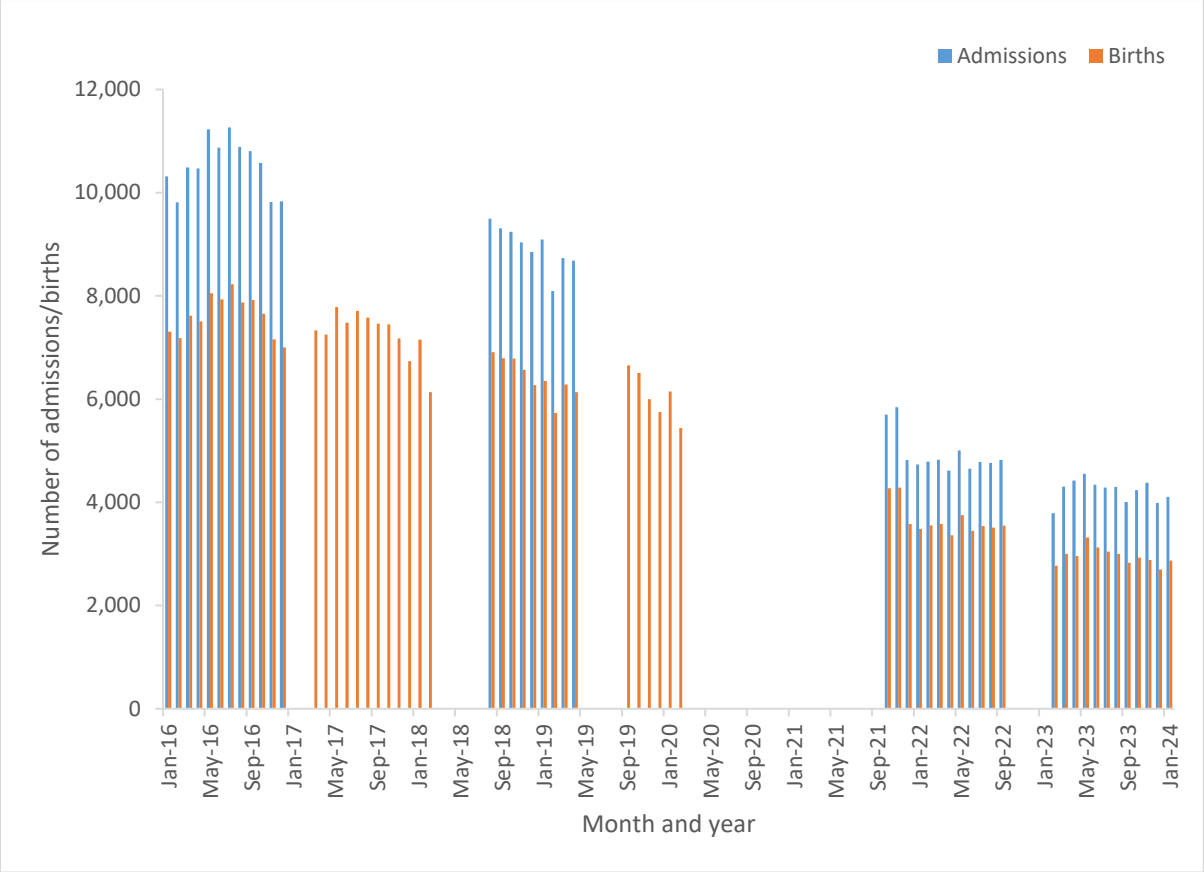


Figure 2 Number of admissions to and births in participating UK AMUs for each month for which data were available

In Study 1, 11.80% (95% CI 11.73-11.87) of UK births took place in AMUs (Table 2 and Supplementary File Figure S4). In all subsequent studies, the percentage of births in participating AMUs was lower than in Study 1, with the decline particularly evident in the last two studies (Study 5, 6.45%; Study 6, 5.4%). After adjusting for month of the study, the chances of giving birth in an AMU were 47% and 56% lower in the periods covered by Study 5 and Study 6 respectively, compared with in Study 1 (Table 2).

Table 2: Percentage of births occurring in participating AMUs in the UK during each study, as a proportion of all births in the UK during the study period in question, and risk ratio (RR) of giving birth in UK AMUs by study

Study number (Dates study conducted)	% of births occurring in UK AMUs (95% CI)	RR (95% CI, p-value)	Adjusted RR[1] (95% CI, p-value)	Fully adjusted RR[2] (95% CI, p-value)
1 (1st Jan-31st - Dec 2016)	11.80 (11.73-11.87)	Ref	Ref	Ref
2 (1st Mar 2017 - 28th Feb 2018)	11.60 (11.52-11.67)	0.98 (0.97-0.99, p<0.001)	0.98 (0.97-0.99, p<0.001)	0.98 (0.97-0.99, p<0.001)
3 (1st Aug 2018 - 30th April 2019)	10.75 (10.67-10.83)	0.91 (0.90-0.92, p<0.001)	0.92 (0.91-0.93, p<0.001)	0.91 (0.89-0.93, p<0.001)
4 (1st Sep 2019 - 29th Feb 2020)	10.41 (10.31-10.51)	0.88 (0.87-0.89, p<0.001)	0.89 (0.88-0.91, p<0.001)	0.89 (0.87-0.90, p<0.001)
5 (1st Oct 2021 - 30th Sep 2022)	6.45 (6.39-6.51)	0.55 (0.54-0.55, p<0.001)	0.55 (0.54-0.55, p<0.001)	0.53 (0.49-0.57, p<0.001)
6 (1st Feb 2023 - 31st Jan 2024)[3]	5.41 (5.35-5.47)	0.46 (0.45-0.46, p<0.001)	0.46 (0.45-0.46, p<0.001)	0.44 (0.41-0.47, p<0.001)

[1] Adjusted for month
[2] Adjusted for month and number of participating open AMUs each month
[3] Total number of births in the UK not available for January 2024, so analysis conducted on data up to and including December 2023 only

Other changes over time

Number of midwifery units

The number of participating open AMUs remained fairly constant during the first four UKMidSS studies, at around 120, but decreased to around 100 in the last two studies (Supplementary File Figure S5). A decrease in the number of participating open FMUs was also seen, from around 75 in Study 4 (the first to collect data from FMUs) to around 50 in Studies 5 and 6 (Supplementary File Figure S6). Adjusting for the number of participating open AMUs in the UK each month during the study periods had little material effect on the RR estimates of giving birth in UK AMUs by study (Table 2).

In the first four UKMidSS studies, the number of participating AMUs that were closed to admissions in any one month was very small (Supplementary File Figure S7). During Studies 5 and 6, around 7% of AMUs and around 20% of FMUs each month reported that they were closed to admissions for the whole of that month (Supplementary File Figures S7 and S8).

Transfers

The proportion of women transferred during labour from AMUs to obstetric care changed little (around 28% in Studies 1 and 3, and around 26% and 30% respectively in Studies 5 and 6) (Supplementary File Figure S9). The proportion of women transferred during labour from FMUs to obstetric care for Studies 5 and 6 was around 18% (the only studies for which FMU data were available) (Supplementary File Figure S10).

Admissions and births per unit

The average number of admissions and births per participating open AMU more than halved between Study 1 and Study 6, from around 85 admissions per month to 40, and from around 65 births per month to 30 (Figure 2). The average number of births per participating open FMU reduced from around 8 births per month in Study 4 (when FMU data were first collected) to around 4 births per month in Study 6 (Supplementary File Figure S11). The average number of admissions per participating open FMU could only be calculated for Studies 5 and 6, where a small decrease was also noted (Supplementary File Figure S11).

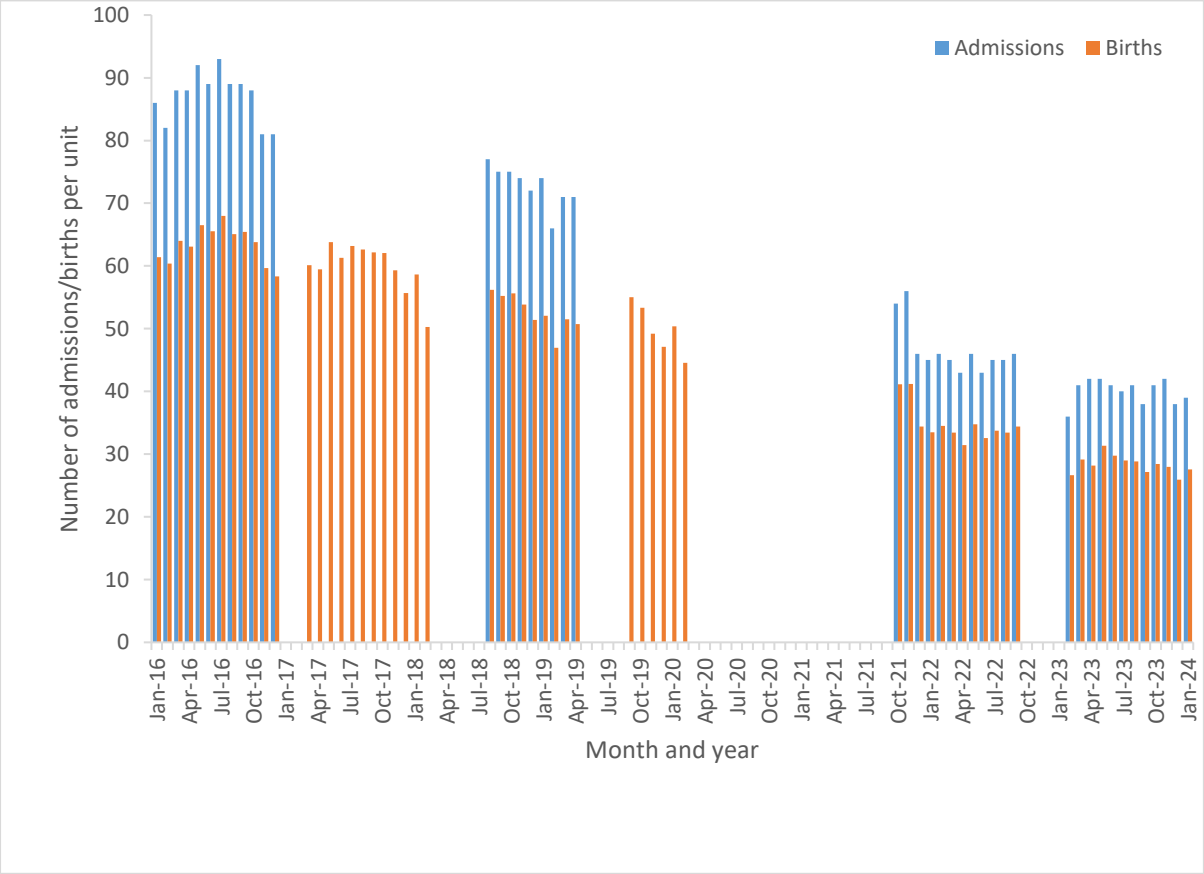


Figure 2: Average number of admissions and births per participating open AMU in the UK for each month for which data were available

National and regional variation

There was some variation in the proportion of births occurring in participating AMUs between the nations of the UK (Figure 4 and Supplementary File Table S1). The pattern for England and Wales combined closely followed that for the whole of the UK, because most births occur in England. In Scotland, the percentage of births in participating AMUs was significantly lower in Studies 2 (7.02%) and 3 (7.05%) compared with in Study 1 (8.97%), with some recovery for Study 4 (8.75%), followed by a decline for Studies 5 (7.05%) and 6 (4.78%). After adjusting for month of the study and the number of AMUs, the chances of giving birth in an AMU in Scotland were 22% and 47% lower in the periods covered by Study 5 and Study 6 respectively, compared with in Study 1 (Supplementary File Table S1). In Northern Ireland there was little evidence of a decline in Studies 2 (10.83%), 3 (12.97%), 4 (12.16%) and 5 (10.70%), compared with Study 1 (10.78%), but a more noticeable change during Study 6 (6.59%). After adjusting for month of the study and the number of AMUs, the chances of giving birth in an AMU in Northern Ireland were similar during Studies 2, 3, 4 and 5, and 39% lower during Study 6, compared with in Study 1. Although the number of AMUs in each of the devolved nations is much lower than in England, there was little evidence that a reduction in the number of AMUs occurred in the devolved nations (Supplementary File Figure S12).

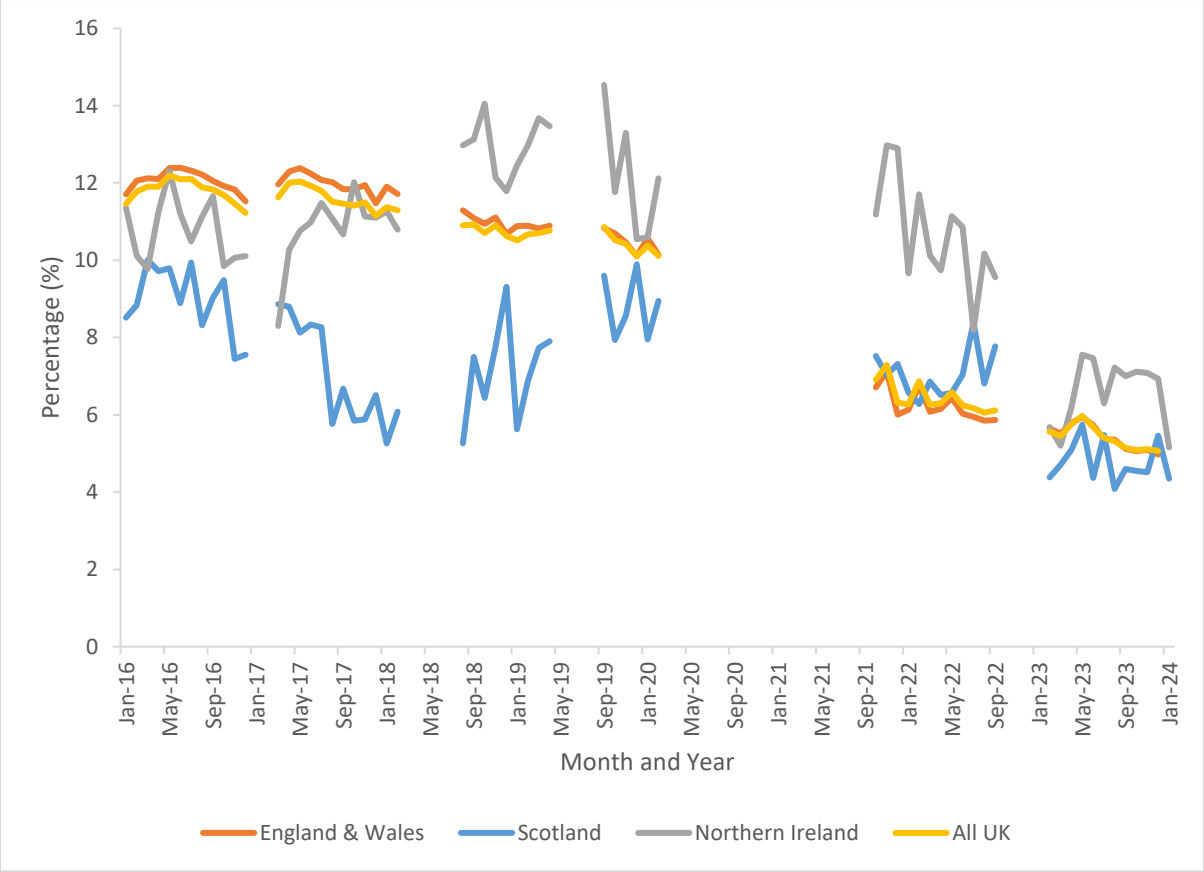


Figure 3 Percentage of births occurring nationally in participating AMUs as a proportion of overall national births for each month for which data were available

Note: total number of births in England and Wales not available for January 2024, so only used data up to December 2023 for these nations and 'all UK'

Analysis using estimated separate monthly data for England and Wales showed a different pattern for Wales compared with the other nations of the UK. There was little evidence of change in the percentage of births taking place in AMUs in Studies 2 (13.48%), 3 (12.79%) and 4 (13.00%), compared with Study 1 (12.51%). This was followed by a decline in the period covered by Study 5 (8.60%) and a return to a level closer to that seen in Study 1, during Study 6 (11.39%). After adjusting for month of the study and the number of AMUs, the chances of giving birth in an AMU in Wales were similar during Studies 2, 3 and 4, 30% lower during Study 5, and just 6% lower during Study 6, compared with in Study 1 (Supplementary File Figure S13 and Supplementary File Table S2).

Within England, all four regions studied showed a reduction in the percentage of births taking place in AMUs. The Midlands and East region, and the North region showing the biggest reduction in the chances of giving birth in an AMU in the period covered in Study 6 compared with Study 1 (66% lower and 63% lower respectively, after adjusting for month of

the study and the number of AMUs. The South region and London had smaller reductions comparing the same two study periods (47% lower and 37% lower respectively) (Supplementary File Figure S14 and Supplementary File Table S3). The London region had a consistently higher proportion of births in AMUs compared with other regions, across all study periods.

Sensitivity analysis

For each study the UKMidSS team knew of a small number of MUs that were not closed to admissions, but which did not participate in that study. The proportion of these 'missing' AMUs ranged from 3% in Study 1 to 13% in Study 6 (Table 1). In our sensitivity analysis, in which we included the estimated number of births in these 'missing' AMUs, the estimated proportion of births occurring in UK AMUs was still observed to have declined over time (from 12.06% during Study 1 to 6.72% in Study 6), with the decline still particularly evident during the last two UKMidSS studies (Supplementary File Table S4).

Discussion

Our analyses show that the proportion of UK births occurring in MUs in 2023 was around 50% lower than in 2016. While a decline was seen in studies carried out in 2017-18 and 2018-19, it was particularly evident in studies carried out in 2021-22 and 2023, and was independent of changes in the number of open MUs. The most important driver of this reduction in births in MUs was a change in admissions to MUs, with the number of admssions per unit per month reducing by at least 50%. There was some evidence of different patterns in the different nations of the UK and in the different regions of England. With limited data available to us, we were unable to explore or empirically test potential reasons behind these changes. We therefore consider a number of plausible explanatory or contributory factors.

National policy and guidance in the four nations of the UK in relation to choice of place of birth has not changed over this period, apart from in Northern Ireland where national guidance about admission to MUs, and associated information for women, was withdrawn in November 2022 following an inquest into the death of a baby that raised questions about care in FMUs.[37 38] An update to NICE guidance in 2023 was consistent with previous guidance and was, if anything, more inclusive in relation to some potential risk factors (e.g. Body Mass Index and Gestational Diabetes) and choice of birth in a midwifery unit.[10] Other

changes in guidance, for example the lowering of thresholds for the offer of induction of labour in 2021,[39] and the introduction of the Saving Babies Lives Care Bundle in 2016,[40] with an increased focus on monitoring fetal growth in pregnancy, may have contributed to a higher proportion of women identified as being at 'higher risk' of complications and therefore being advised to plan birth in an obstetric setting.

The most noticeable decline in admissions and births in MUs occurred in studies conducted since the Covid-19 pandemic. Although we lack the data to make a definitive causal link, in the context of a maternity service in which the obstetric unit or hospital is considered the default core service and MU birth an 'alternative' that is outside the norm,[41 42, 43] changes that occurred during the pandemic may have had implications for MUs. Midwifery staffing levels were reduced by 20% on average, and staff were increasingly centralised to larger obstetric units.[20, 44, 45] Closure of MUs during the pandemic was common,[13, 46] and some did not re-open again. Our data show that temporary closures of MUs have become more common, with around 7% of AMUs and around 20% of FMUs each month reporting that they were closed to admissions for the whole of that month in studies conducted in 2021-22 and 2023 (compared with very low levels of closure in studies before 2020). This will underestimate the true level of closures as other temporary closures, for anything less than a full month, are not required to be reported to UKMidSS. In our analyses, the dramatic fall in the number of women giving birth in MUs was independent of permanent and temporary closures of units. We speculate that in a system that has been argued to work against birth in an MU,[41, 43] persistent or frequent unit closures may lead to a situation where uncertainty about MU availability means that midwives are less likely to offer birth in these settings as an option and women may be less likely to plan birth in a setting which is often closed and therefore not reliably available.[47]

The context in which decisions about place of birth are made is complex. Women are exposed to and actively access information about pregnancy and birth from a range of informal sources, including online information and communities, social media, television and other mass media,[48] many of which present birth as risky and medicalised.[49-51] During the period covered by our analyses there was a succession of high-profile investigations, reports and reviews looking at the safety of maternity services. Some were national,[52-54] while others focused on local NHS services.[14-16, 55] Media reporting of these enquiries

typically centred the stories of women and families who had experienced poor outcomes, including death or severe injury of their babies, and often focused on midwives, midwifery and MUs as contributing to these outcomes.[17, 18, 56] There is a lack of research on the impact of media representations of birth, maternity services and midwifery on women, and on midwives, but one possible outcome is increased fear and a loss of confidence in midwifery-led services. One small-scale exploratory qualitative study has highlighted a 'culture of fear' around midwifery-led care, with perceptions that women are being offered and/or choosing a more medicalised birth because of anxiety and fear, but there is little empirical evidence.[57]

Fear and anxiety may be one factor behind the rising pre-labour (elective) caesarean birth rate which, over the period covered by our analyses, rose in England and Wales from 16% in 2016 to 25% in 2023 (with a rapid rise from 18% in 2020).[23] This in itself may be a partial explanation for the reduction in MU admissions, as women planning a caesarean birth cannot plan birth in an MU. Increasing complexity of the birthing population is another potential independent factor contributing to declining numbers of MU admissions and births. Maternal age, obesity and diabetes all increased over the period covered by our analyses, but changes in the prevalence of these and other conditions that complicate pregnancy, and which may impact on planned and actual place of birth, are unlikely to be sufficient to explain the changes seen in MU admissions over this period. Maternal age has been steadily increasing since the 1970s, but over the period covered by our analyses, the average maternal age was consistently between 30 and 31 years.[58] A similar pattern is seen for obesity, with a longstanding increase over time, but among women aged 25-34, the proportion of women who are obese in England has been around 30% since 2017.[59]

Whatever the reasons for the changes we have evidenced, the implications for maternity services are significant. Midwives support all women in pregnancy and childbirth, with a particular role in optimising normal physiological processes of labour and birth and in recognising and acting on complications should they occur.[60] Midwives can be supported to have evidence-based discussions with women about place of birth,[61] but they also need confidence in their skills to support women, and experience working in midwifery-led settings, to confidently offer women the option of birth in a midwifery-led setting and support women in labour in these settings.[41, 47, 62, 63] Student midwives also need opportunities to develop these skills and experience.[64] If fewer women are admitted to

MUs, there are fewer opportunities for midwives to develop their skills and confidence, with the potential to lead to a negative spiral in terms of admissions. Ongoing research aiming to improve the quality and safety of intermittent auscultation has identified similar issues in relation to the offer of fetal monitoring options.[65]

For women who are at low risk of complications, planned birth in a midwifery unit is strongly associated with beneficial outcomes for women, in terms of reduced risk of intervention in labour and birth, with no associated adverse impact on outcomes for babies.[3] Interventions such as caesarean birth can be life-saving, but unnecessary intervention can be harmful.[66] The use of the caesarean birth rate as a quality metric was stopped in England in 2022,[67] but this does not negate the fact that caesarean birth is associated with a range of short- and longer-term adverse outcomes for women and babies.[68] Although there is no agreed optimum caesarean birth rate, the World Health Organization advises that country-level caesarean birth rates higher than 10% are not associated with reductions in maternal and neonatal mortality.[69] In the context of an overall caesarean birth rate in England and Wales of 42% (with a 17% intrapartum caesarean birth rate),[23] planning birth in an MU is protective. In 2008-10 around 4-5% of women admitted to MUs had a caesarean;[3] recent studies carried out using UKMidSS have shown similar proportions of women having caesarean birth following admission to an MU.[29]

Continuing decreasing numbers of women giving birth in MUs is likely to have implications on perceptions of the financial and practical viability of MUs. This has been a perennial issue,[41, 47, 62] which is likely to be made worse if it is perceived that space is being underused. While current numbers of MU admissions raise questions about whether eligible women are having a genuine choice about planned place of birth, women's choice is likely to be eroded further if more MUs close as a result of perceptions of underuse. FMUs appear to have been particularly affected by closures, both permanent and temporary. With fewer women giving birth in FMUs and data only available us for three studies conducted since 2019, there is less certainty about our estimates of changes in births in FMUs, but the patterns we saw were broadly similar. FMUs offer women the option of maternity care in a local setting, often for antenatal and postnatal care in addition to intrapartum,[47] and are a potential resource in support of the new NHS Ten Year Plan's goal to move care in England "from hospital to community",[70] so the decline in their numbers is of particular concern.

Policy and practice action to address the changes we have reported should be guided by evidence about the causes. This evidence is limited, but the variation we have shown between the four nations of the UK may shed some light, potentially pointing to the value of strong and consistent guidance and support for midwifery-led care. In both Northern Ireland and Wales, before 2020, there was little evidence of a change in births in MUs. In Northern Ireland, following the withdrawal of national guidelines about admission to MUs in 2022,[37] and the closure of all FMUs, there was an accelerated decline in the number of MU births. In contrast, in Wales, where there has been an all-Wales care pathway for midwifery-led care in place since 2002-4, now in its sixth edition (2022),[71] there was a 'bounce-back' in Study 6 (2023) to levels of birth in MUs close to those in Study 1 (2016). It is possible that the consistent and evidence-based active support for midwifery-led care provided by this pathway may be a factor in Wales bucking the trend seen in other nations of the UK.

Strengths and Limitations

The data on which these analyses are based were all collected in the same way, with good coverage of MUs and high response to monthly requests for data across a long period of time. Where data were missing because of monthly report requests that were not responded to, we used averages from other months from the same MU to replace these missing data. For some of these months for which a monthly report was missing, it is possible that MUs were in fact closed to admissions, so our approach to managing missing data may have overestimated the number of admissions/births. In the two most recent UKMidSS studies a higher proportion of MUs were not involved in UKMidSS. We used estimates and sensitivity analyses to mitigate the impact of this. The data available to us for these analyses did not include any individual level maternal or clinical data, nor data about staffing or service reconfiguration, which might have helped us explain some of the reasons behind the patterns we have seen.

Conclusions

A dramatic reduction in the number of women giving birth in midwifery units has occurred, despite a national policy commitment to choice of planned place of birth. The causes of the reduction are likely to be multifactorial, and may be in part an unintended consequence of other maternity policy drivers, but we lacked the data to explore these. The reduction in the

number of (open) MUs negatively affects women's choices, and the reduction in MU births has serious implications for women's outcomes and for midwifery skills and experience. Further research in this area is urgently needed to understand the reasons for this trend, with a view to reversing it.

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