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The Best Start: Review of Caesarean Section Rates in Scotland

CHILDREN, EDUCATION AND SKILLS

social research

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Summary

Analysis of current rates and long-term trends of caesarean sections in Scotland, relative to the other two countries in Great Britain and international comparisons where appropriate.

- The overall caesarean section rate in Scotland has risen steadily over the last five decades from 9% in 1975/76 to 35% in 2019/20, the highest rate since records began.
- Caesarean section rates in 2019/20 for England (31%) and Wales (28%) 2019 follow a similar pattern to that seen in Scotland (34.5%) for 2019/20, although Scotland has seen slightly higher rates than the other two nations in recent years.
- Scotland and England have had generally similar trends in the rate of increase in caesarean sections since 1990, with steady increases of 0-1% per year since 1990 and periods of elevated increase from around 1993-2003 and 2013 to present.
- The trend of increasing caesarean section rates has been seen across the world, though to varying extents in different regions and countries. Caesarean section rates tend to be higher in more developed countries. According to data from 150 countries, the proportion of births by caesarean section ranges from 6% to 56% worldwide.
- Mode of delivery differs markedly throughout Europe, with lower levels of caesarean births of around 16% to 17% in most Nordic countries and the Netherlands, and higher caesarean rates in Cyprus, Romania, Bulgaria, Poland, and Hungary of approximately 40% or higher. Other countries with higher than average caesarean rates of around 35% are Italy and Switzerland.
- Differences in cultural and economic context, demographic structure, general healthcare structure and maternal/midwife autonomy in delivery all contribute to the wide range in caesarean section rates seen internationally. However, even in countries for which similarities can be drawn in these respects, there still appears to be wide variation in the caesarean section rate.

A year by year analysis of caesarean section rates by region and description of the variation between health boards
Rates of emergency versus elective caesarean sections – by region, by mothers age, by presentation, previous births, and other factors

- There are wide variations in overall caesarean section rates among health boards in Scotland (from 27% to 42% in 2020).
- The increase in overall caesarean section rates in Scotland is attributable to an increase in both emergency and elective caesarean sections, with both forms of delivery seeing a comparable increase in recent years.
- Mothers from less deprived backgrounds have been more likely to have a caesarean section than those from more deprived backgrounds in recent years and have also accounted for an increasing proportion of all births.

- There has been a gradual increase in the age of mothers giving birth since the 1970s. In 1975/76 the proportion of births to mothers over the age of 35 was 6% compared to 23% in 2020. Older mothers are more likely to have a caesarean section than younger mothers and the proportion of births delivered by caesarean section has increased to a greater extent for older mothers in recent years.
- The proportion of overweight or obese mothers giving birth in Scotland has increased since 2011. In Scotland in 2019/20 over half (53.3%) of pregnant women were overweight or obese. Older mothers are more likely to be recorded as overweight or obese at their antenatal booking and rates of obesity in pregnancy overall are also increasing. Obesity is an independent risk factor for adverse obstetric outcome and is significantly associated with an increased caesarean delivery rate.

Rates of caesarean section alongside maternal mortality/morbidity and stillbirth/neonatal death rates and neonatal morbidity.

- The rate of perinatal deaths and stillbirths in Scotland decreased between 1975/76 and 2019/20, however the rate of this reduction has slowed over time.
- Caesarean section rates of 10-15% are thought to be associated with decreases in maternal, neonatal and infant mortality. When they increase above 10-15%, rates of caesarean section are thought to be no longer associated with lower mortality rates.

The impact of changes to the NICE guidance in 2011 on caesarean section rates [1]

- The NICE guidelines for caesarean section were revised in 2011 with the main update relating to maternal request for a caesarean section. NICE Guideline CG132 (revised 2011, now NG192) states that women requesting a caesarean with no other indication should be offered appropriate discussion and support, but ultimately, if they are making an informed choice, a caesarean should be offered. The guideline also states that if an obstetrician is unwilling to carry out a caesarean section (CS) the woman should be referred to an obstetrician who will carry out the CS.
- There is some indication from preliminary analysis that experiences across Health Boards in Scotland have varied since the introduction of the update to the NICE guidelines. It is suggested that further exploration of the caesarean section rate at an individual board level is undertaken.
- Recent studies report low rates of caesarean section by maternal request among nulliparous women and many studies have indicated that women are most likely to follow the advice of their obstetrician. However, how embedded a practice, such as caesarean sections has become can influence the advice provided by obstetricians and in turn the rates of delivery by caesarean section.
- The fear of pain associated with labour has been found by many studies to be a contributing factor of caesarean section by maternal request. This is most common among women who have previously had a traumatic birth experience or emergency caesarean section.

Critical analysis of the available literature and evidence on the reasons for caesarean section.

- A combination of higher maternal age, increasing levels of obesity and chronic disease, such as diabetes, mean that more pregnancies are medically complex. This results in higher risk during pregnancy, labour and birth and could be associated with a higher rate of caesarean section.
- The views of obstetricians and midwives, and the role they play in influencing decision making around caesarean sections is important in helping to understand variance in caesarean section rates.
- Literature suggests that a prevalent indication for a primary caesarean section is failure to progress in labour, despite lack of association between relatively prolonged labour without indications of foetal distress and detrimental health outcomes. This coupled with the acceptable time for labour to progress growing progressively shorter over recent decades without any clear medical indication of why, is likely to have had an impact on caesarean section rates.
- Evidence also suggests that once practice has become embedded it is difficult to dislodge. Therefore if caesarean section is an embedded practice this could result in an increase in rates. Factors such as the psychological burden of the threat from clinical negligence and lack of training, skills or experience have been highlighted as barriers to change and to dislodging embedded practices among healthcare professionals.

Evidence-informed actions to address non clinically indicated caesarean sections

- The WHO published guidance focussed on non-clinical interventions for reducing non-clinically indicated caesarean sections, the recommendations are grouped according to the target of the intervention.

- Interventions include educational tools and tailored information for women, introducing a policy of second opinion for caesarean section indications, audits of indications for completed caesarean deliveries using Robson's classification, feedback to those involved in the decision-making process and collaborative working between midwifes and obstetricians.

- Interventions targeted at health organisations or systems may also be effective. Studies have also shown that alternative institutional settings can increase the likelihood of spontaneous vaginal birth, labour and birth without analgesia/ anaesthesia, satisfaction with care, and decrease the likelihood of assisted vaginal birth and caesarean birth. There is a growing body of research which has demonstrated the independent effects of physical attributes of the hospital room on caregivers' behaviour and patients' health outcomes.

Introduction

The Best Start Review Context

The Review of Maternity and Neonatal Services in Scotland was announced on 25 February 2015. The main aim was to ensure that every mother and baby continues to get the best care from Scotland's health service, giving all children the best start in life. The review examined choice, quality and safety of maternity and neonatal services, in consultation with the workforce, NHS Boards and service users.

The Best Start Review Report was published on 20 January 2017 and sets out the future vision for maternity and neonatal services in Scotland.[2] The report also sets out what this vision will mean for the delivery of high quality and safe maternity and neonatal services across Scotland; how women, babies and families will receive the type of care they want and how staff will be supported to deliver that care. The 134 page report is based around 76 recommendations that will change the way that services are organised and delivered.

The Best Start – Caesarean Section Recommendation

Recommendation 17 within the Best Start Report relates to the rising rates of caesarean delivery. This report provides information about the rising caesarean section rate in Scotland and explores the factors contributing to the rising rates of caesarean section in Scotland by exploring the published data and evidence within Scotland, across the UK and wider where applicable. There are also areas highlighted for additional analysis to further understand the trends in caesarean section rates.

> Recommendation 17 – Caesarean delivery should only be provided if clinically indicated and factors contributing to the rising caesarean section rate should be examined, from both the clinical, and women's perspective with optimal levels of intervention that balance risk and potential harm being identified.

Key Questions

The key areas for exploration set out in the project brief and covered in this report are outlined below:

1. Current rates and long-term trends in caesarean sections in Scotland, relative to the other counties of Great Britain and international comparisons where appropriate.
2. Rates of emergency vs elective caesarean sections (e.g. by board, by mothers age, by presentation, previous births etc.)
3. Rates of caesarean section alongside maternal mortality/morbidity and stillbirth/neonatal death rates and neonatal morbidity.
4. impact of changes to the NICE guidance in 2011 on c section rates.[3]
5. Critical analysis of the rationale for differences in caesarean section rates, where evidence exists.
6. Evidence-informed actions to address non clinically indicated caesarean sections if evidence supports.

Caesarean Section Rates

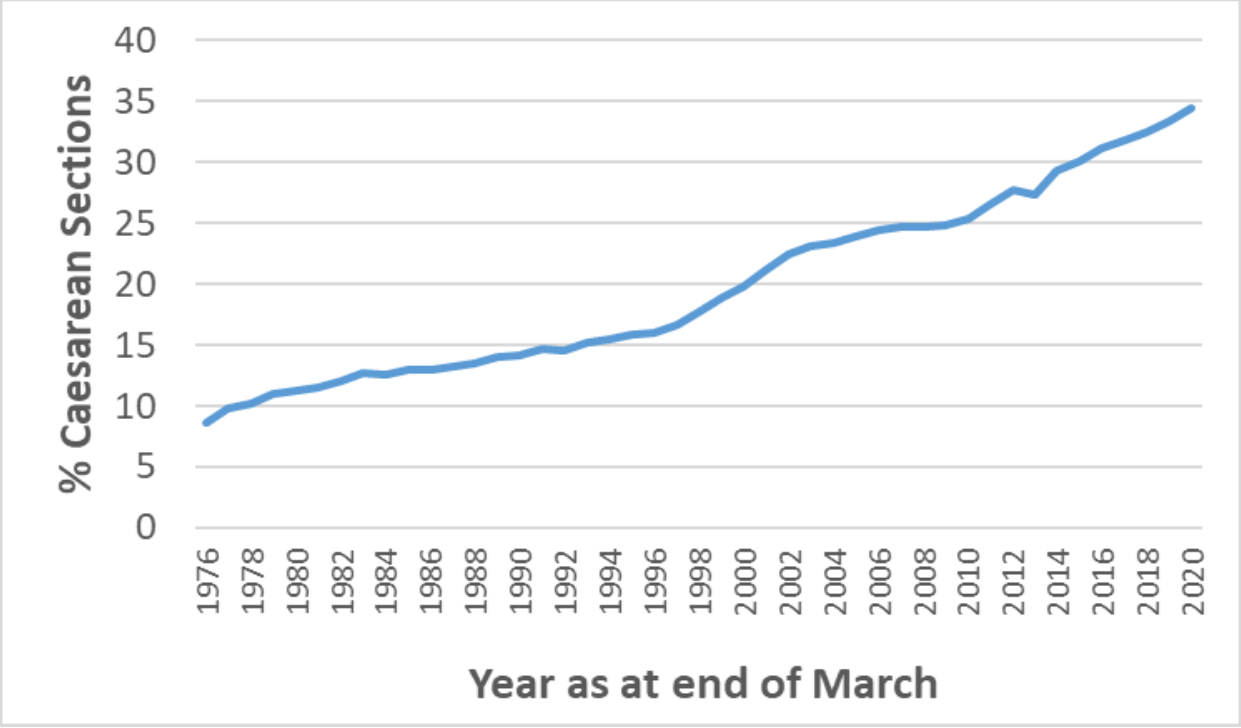
Caesarean Section rates - Long Term Trends

Current rates and long-term trends in caesarean sections in Scotland, relative to the other countries of Great Britain and international comparisons where appropriate.

Overall the proportion of birth delivered by caesarean section (caesarean section rate) in Scotland has risen steadily over the last five decades from 9% of live singleton babies delivered by caesarean section in 1975/76 (when the national maternity dataset, SMR02, was introduced) to 35% in 2019/20, the highest rate since records began.

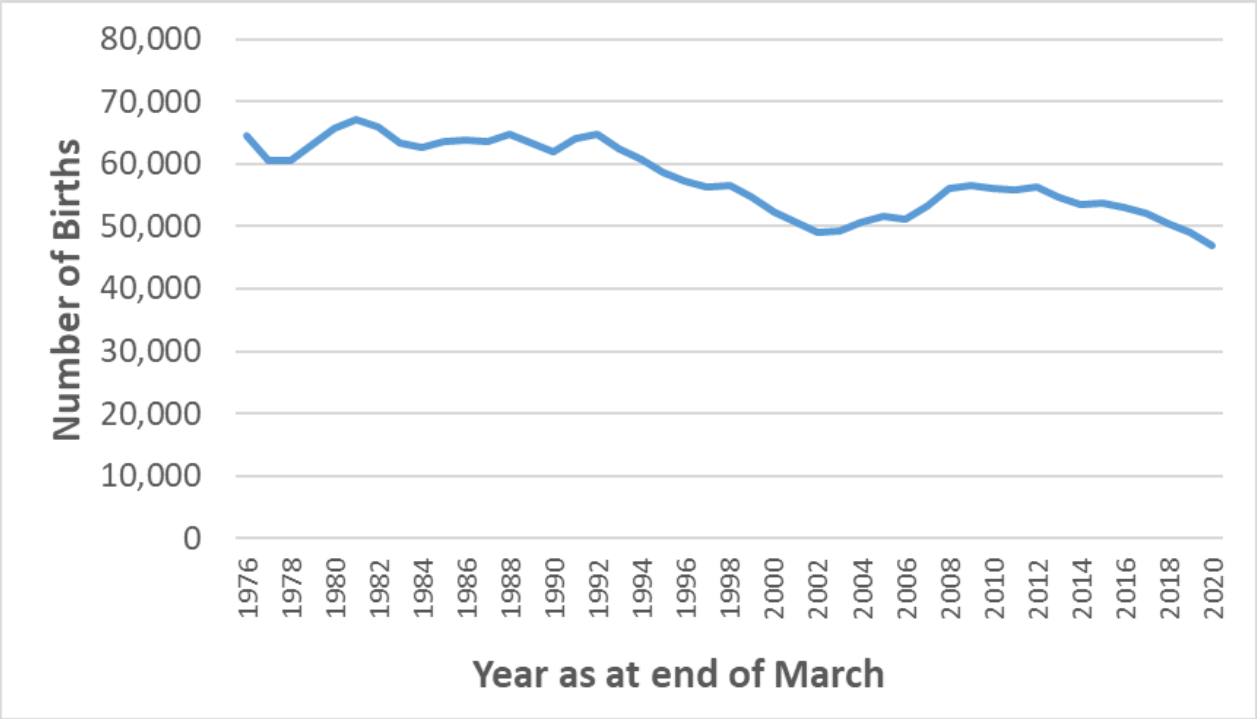
Nationally, the increase in caesarean section rates has generally been steady and constant from the 70's to the present day, from zero to one percentage points per year. However, during this time the largest year-on-year increases in caesarean section rates were between 1997/98 and 2002/03 (increase from 18% to 23%) and more recently between 2012/13 and 2019/20 (increase from 27% to 34%). (Chart 1).

Chart 1 – Proportion of live singleton births delivered by caesarean section in Scotland (1976/77 to 2019/20)[4]



Over the same period of time, the number of births per year in Scotland has gradually declined, from 64,587 in 1976/77 to 46,923 in 2019/20. (Chart 2)

Chart 2 – Total number of live singleton births per year in Scotland (1976/77 to 2019/20)[5]



The trend of increasing caesarean section rates has been seen across the world, although to varying extents in different regions and countries. Globally, the region with the highest caesarean section rate as at 2014 was Latin America and the Caribbean, with 40.5% of births delivered by caesarean section, followed by Northern America (32.3%), Oceania (31.1%), Europe (25%), and Africa (7.3%). Latin America and the Caribbean has also been the region with the largest absolute increase in caesarean section rates in recent years, with an absolute increase of 19.4% between 1990 and 2014. Asia, Oceania and Europe have had a similar absolute increases over the same time period of around 14-15%, while Northern America (10%) and Africa (4.5%) have had a more gradual increase in caesarean section rates.

As at 2014, UN-classified “more developed nations” had the highest caesarean section rates at 27.2%, followed by “less developed nations” (20.9%) and “least developed nations” (6%). Since 1990, the absolute increase in caesarean section rates has been highest in “less developed nations” at 14.6%, while “more developed nations” have seen an absolute increase of 12.7% and “least developed nations” of 4.2%.

Differences in cultural and economic context, demographic structure, general healthcare structure and maternal/midwife autonomy in delivery all contribute to the wide range in caesarean section rates seen internationally. However, even across countries for which similarities can be drawn in these respects, there still appears to be wide variation in the caesarean section rate. For example, in Australia/ New Zealand, the caesarean section rate increased from 23% to 32% between 1989 to 2012, whereas in Sweden it increased from 11% to 16% over a similar time-frame.

Mode of delivery differs markedly throughout Europe, with lower levels of caesarean births of around 16% to 17% in most Nordic countries and the Netherlands, and higher caesarean rates in Cyprus, Romania, Bulgaria, Poland, and Hungary, of around 40% or

higher. Other countries with higher than European average caesarean rates, at around 35%, are Italy and Switzerland (Table 1).

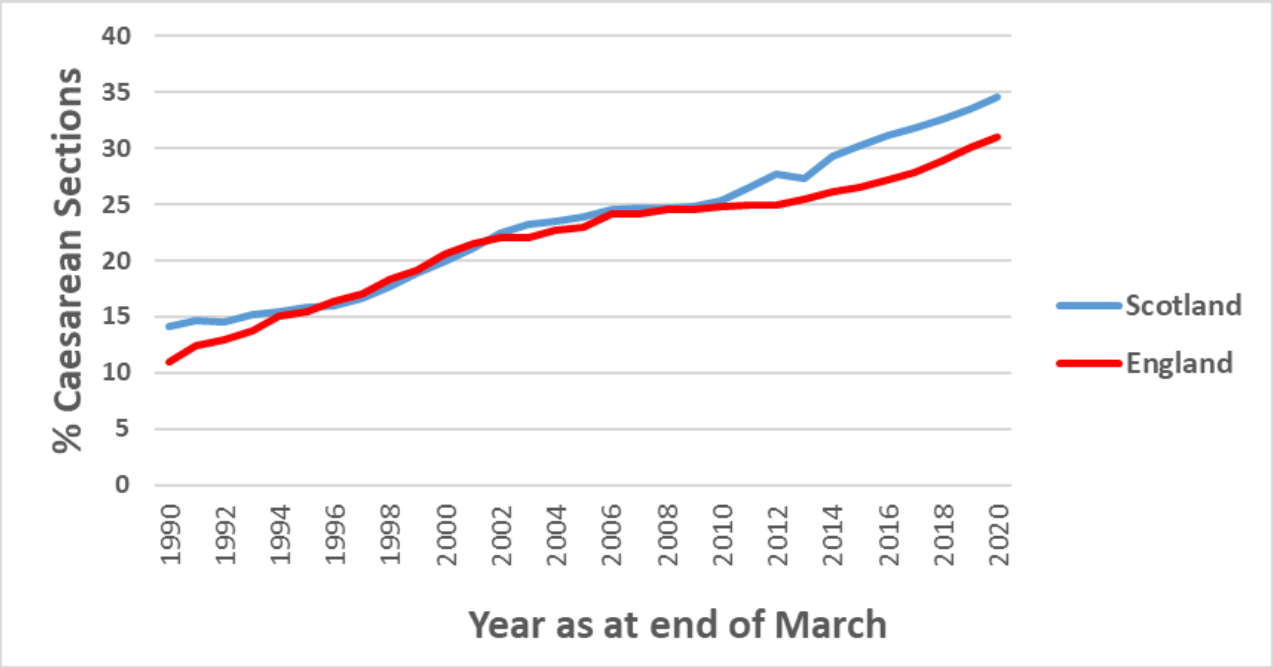
Table 1 – Caesarean section rates in select global regions (2014 and % change with 1990)[6]

Global Region	Births by C-Section in 2014 (%)	Absolute increase in proportion of births delivered by C-Section from 1990 to 2014 (%)
Eastern Europe	23.7	+15.9
Northern Europe	22.4	+11.3
Southern Europe	30.7	+14.8
Western Europe	24.5	+9.7
Australia/New Zealand	32.3	+14.1

When comparing caesarean section rates in Britain with the rest of Europe and other more developed nations, Britain has relatively high caesarean section rates. For the time period reported in the global comparison above (2014), caesarean sections accounted for 29.3% of births in Scotland, 26.5% in England and 26.3% in Wales (Data not available for Northern Ireland). The rate of absolute increase seen in Scotland (15.1%) and England (14.1%) between 1990 and 2014 has also exceeded that seen in Europe (13.8%) and the more developed nations of the world (12.7%) (Data not available for Wales and Northern Ireland). Caesarean sections rates have continued to increase in the UK since 2014, with 2019/20 data showing 34.5% of deliveries by caesarean section in Scotland (up 5.2% from 2014) and 2019/20 data showing rates of 31% in England (up 4.7% from 2014) and 28% in Wales (up 1.7% from 2014).

As seen above there is wide variability in caesarean section rates internationally, and also some variation in caesarean section rates within Europe and the UK, with Scotland typically having slightly higher levels of caesarean sections than England and Wales. However, Scotland and England have had generally similar trends in the rate of increase in caesarean sections since 1990 (Chart 3).

Chart 3 – Proportion of live births delivered by caesarean section in Scotland* and England (1989/90 to 2019/20)7,[8]



***Live singleton births**

Caesarean Section Rates by type, regions of Scotland and maternal characteristics

A year-by-year analysis of caesarean section rates by region and description of the variation between regions.
Rates of emergency versus elective caesarean sections - by board, by mothers age, by presentation, previous births, and other factors.

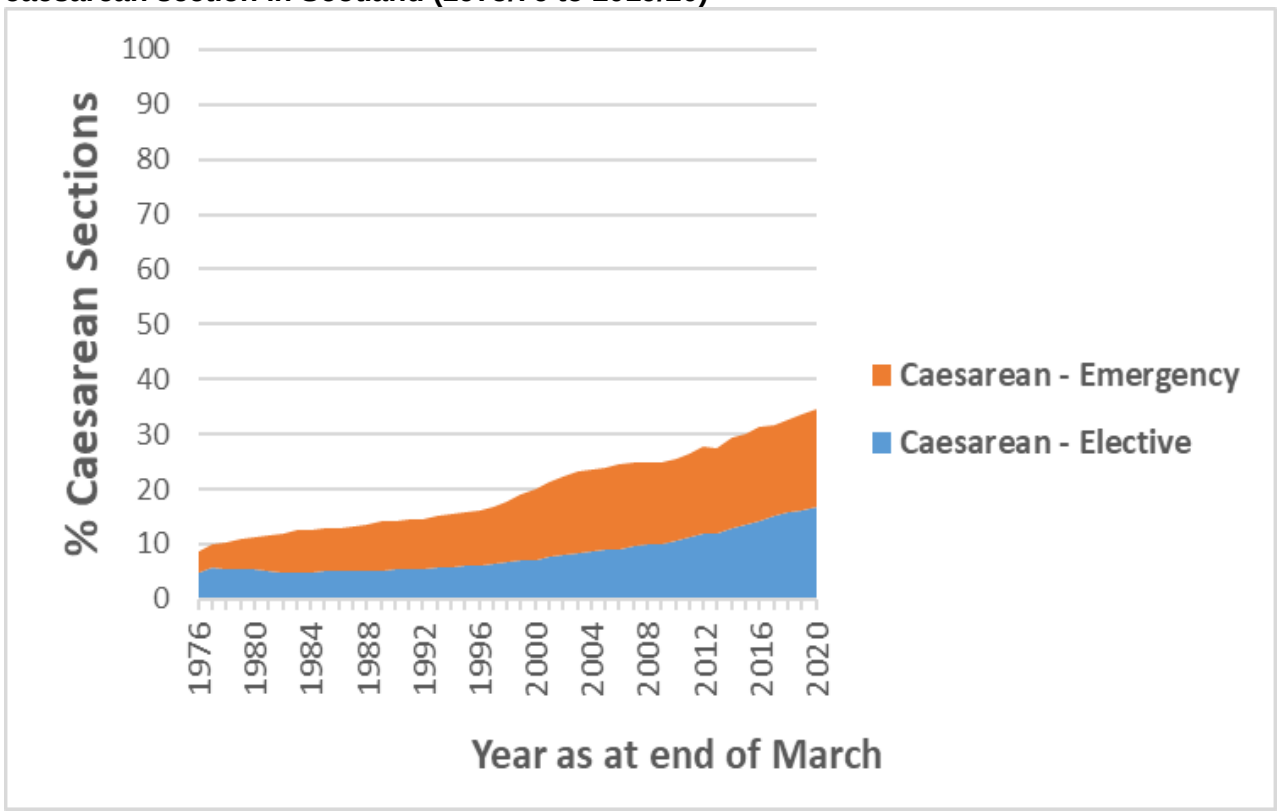
Rates of emergency versus elective caesarean sections

In Scotland in 2019/20 the percentage of live singleton babies delivered by caesarean section was 34.5% overall (16.7% elective, 17.8% emergency).

For singleton births in Scotland, the percentage of normal vaginal (spontaneous cephalic) deliveries has fallen steadily from 76% in 1975/76 to 53% in 2019/20. Other births in 2019/20 are accounted for as follows – 9% forceps, 3% vacuum, 0.1% vaginal breech.

The increasing rate in caesarean sections overall is accounted for by an increase in both elective and emergency caesarean sections, with elective sections increasing from 4% to 17% of all live singleton births and emergency increasing from 4% to 18% between 1975/76 and 2019/20 (Chart 4).

Chart 4 – Proportion of all live singleton births delivered by elective and emergency caesarean section in Scotland (1975/76 to 2019/20)[9]

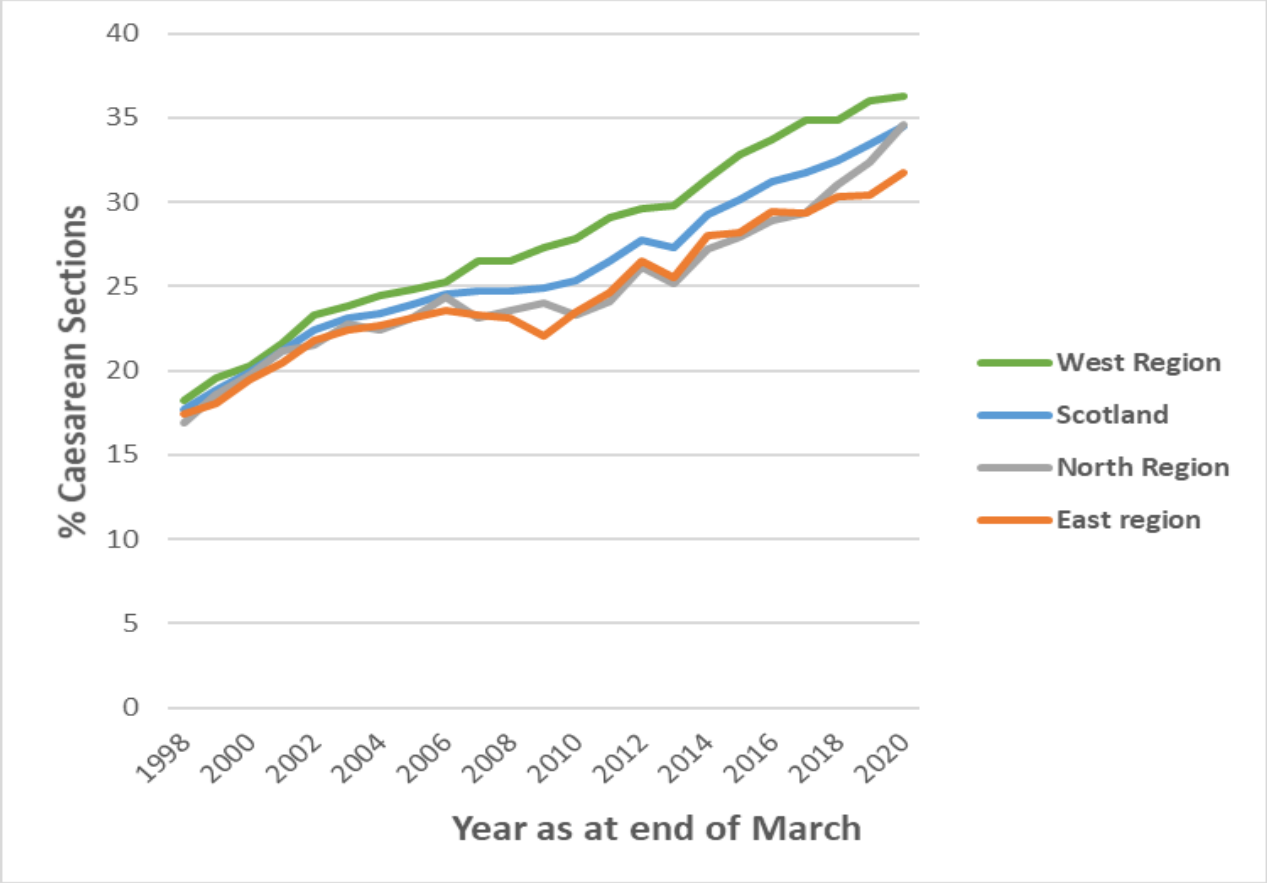


The data on rates of emergency versus elective caesarean sections, by mother's age, presentation, previous births, co-morbidity and other important factors are not currently

published. Further analysis to understand if and how these factors have contributed to an increase in elective versus emergency caesarean section rates is therefore recommended.

While all health boards in Scotland have seen an increase in the number of caesarean sections taking place since 1990, some health boards have seen a more rapid increase than others. Different regions[a] of Scotland have seen broadly similar trends. Historically, caesarean section rates were similar in each region of Scotland, with the overall rate in 1997/98 at 18%, 17% and 17% in the West, North, and East respectively. Since then, the overall caesarean section rate has increased in each of these regions, but to a slightly larger extent initially in the West – and more recently in the North - and to a smaller extent in the East. In 2019/20 the overall caesarean section rate was 36%, 35% and 32% in the West, North, and East respectively (Chart 5).

Chart 5 – Proportion of all live singleton births delivered by caesarean section in regions of Scotland, 1997/98 to 2019/20[10]



[a] For the purposes of this report, North Scotland includes NHS Western Isles, NHS Shetland, NHS Orkney, NHS Highland, NHS Grampian and NHS Tayside. West Scotland includes NHS Greater Glasgow & Clyde, NHS Lanarkshire, NHS Ayrshire & Arran and NHS Dumfries & Galloway. East Scotland includes NHS Lothian, NHS Borders, NHS Forth Valley and NHS Fife.

Table 2 – Caesarean section rates by region in Scotland (2019/20 and % change compared to 1997/98)[11]

Scottish Region	Births by caesarean section in 2019/20 (%)	Absolute increase in proportion of births delivered by caesarean section from 1997/98 to 2019/20 (%)
North Region	35%	18%
West Region	36%	18%
East Region	32%	14%
Scotland	34%	17%

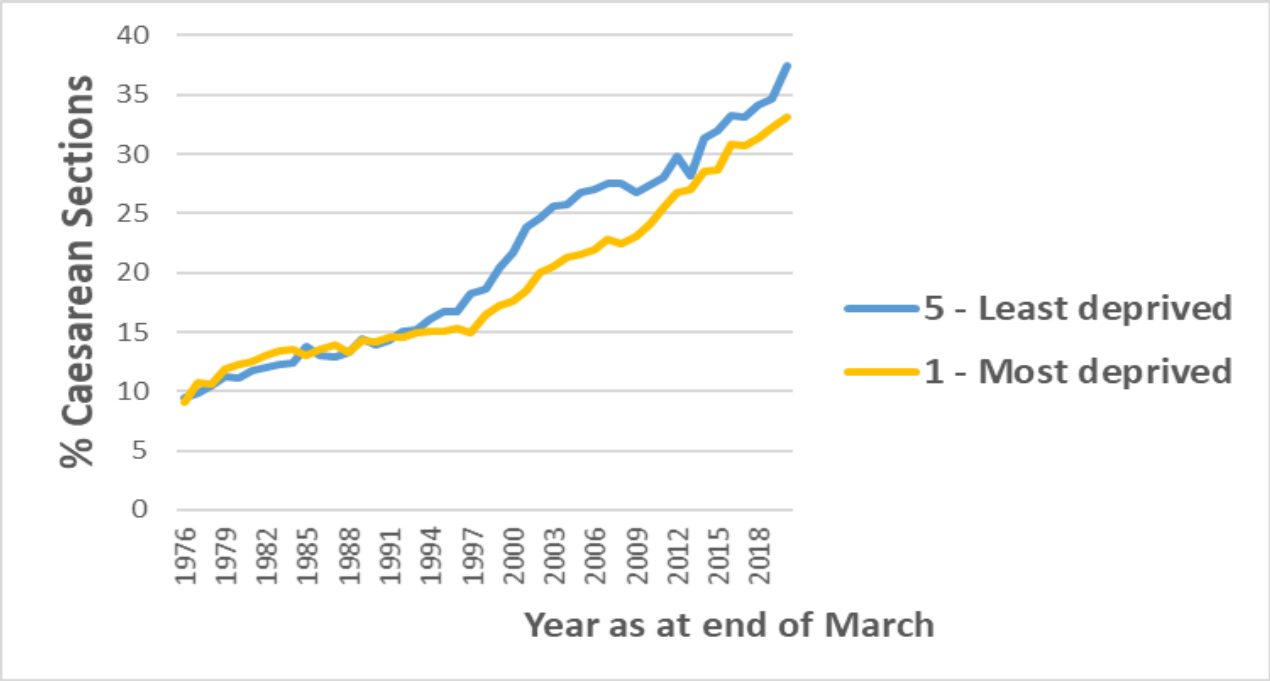
While regionally the caesarean section rates do not vary substantially, this is not the case when observing the rates across health board areas. All health boards in Scotland have seen an increase in caesarean sections between 1997/98 and 2019/20. There has, however, been wide variability in the extent of this increase between health boards. This has caused a further divergence in rates among boards. In 1997/98 all health boards had a caesarean section rate of between 12% and 20%, while in 2019/20 rates ranged from 27% to 42%.

It has previously been stated that these variations cannot be explained by case mix[12] (the characteristics of women giving birth) in each of the health board areas, however, given the increases seen in relevant risk factors such as rising maternal age and higher maternal BMI in the most recent years it is suggested that the case mix within each health board is examined further in future work using relevant unpublished data from SMR02 and other relevant sources of data.

Deprivation

The increasing rate of caesarean sections between 1975/76 and 2019/20 has been seen across all deprivation quintiles at a similar rate, however there has been some divergence in the rates between the most deprived areas and least deprived areas. Mothers from the least deprived areas are now slightly more likely to have a caesarean section than those from the most deprived areas. In 1975/76 almost one in ten (9%) births from the most deprived areas (SIMD 1) were delivered by caesarean section, increasing to 33% in 2019/20. While the increase in the least deprived areas (SIMD 5) was from 10% to 38% over the same time period (Chart 6).

Chart 6 – Proportion of all live singleton births delivered by caesarean section in Scotland in SIMD quintile 1 (most deprived) and 5 (least deprived) (1975/76 to 2019/20)[13]



There was a larger/faster increase in caesarean section rates for those in the least deprived areas as compared to the most deprived between 1993 and 2003. Over the same period there was a drop in the number of births per year across all deprivation quintiles, however this drop was greater for the most deprived areas. Between 1993 and 2003 the births per year in the least deprived areas dropped from 10,209 to 9,314. Meanwhile in the most deprived areas the number of births per year dropped from 16,690 to 11,855. However as at 2019/20, SIMD 1 still accounts for the largest proportion of total births per year, and accounts for the highest share of caesarean sections in absolute terms (3812 in SIMD 1 in 2019/20 compared with 2907 in SIMD 5) (Chart 7)(Chart 8).

Chart 7 – Total number of live singleton births in Scotland by SIMD (1975/76 to 2019/20)[14]

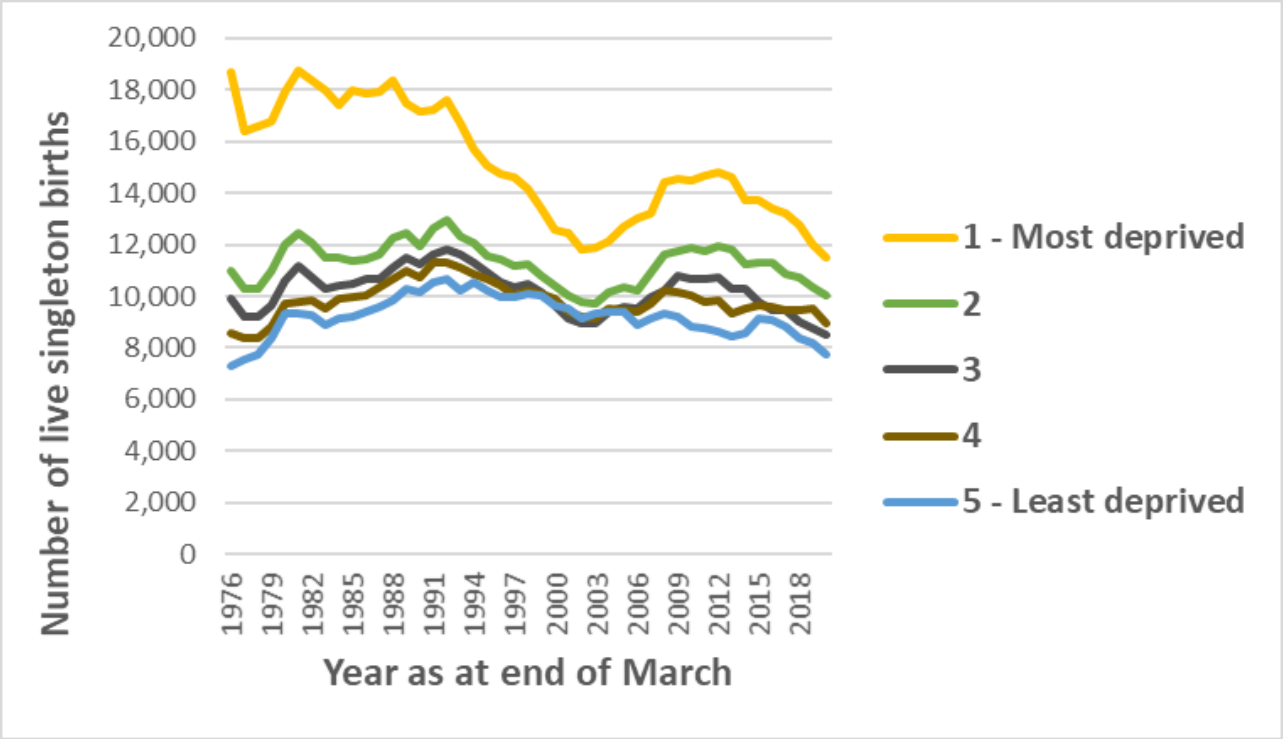
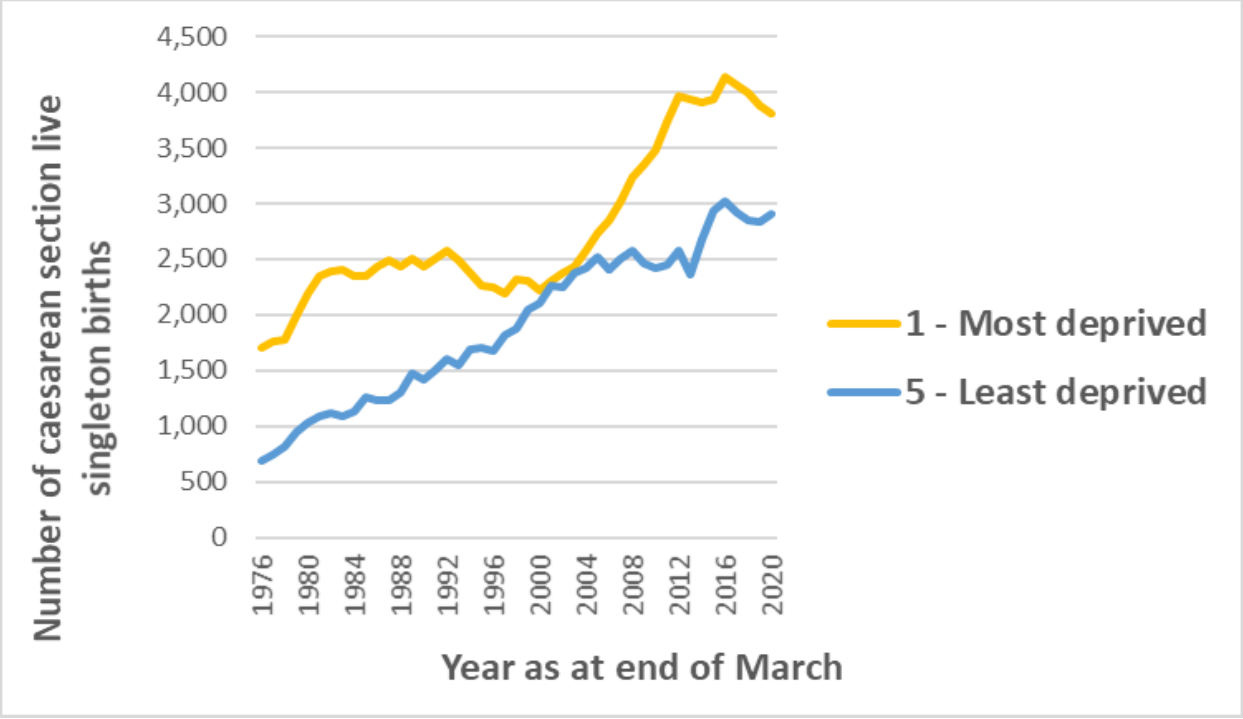


Chart 8 – Number of live singleton births delivered by caesarean section in Scotland in SIMD quintile 1 (most deprived) and 5 (least deprived) (1975/76 to 2019/20)[15]



Previous studies from England have suggest that women from the least deprived areas were more likely to have an elective caesarean section than those from the most deprived areas.

Some variance by deprivation may be explained by increasing maternal age and rising BMI levels of pregnant women in Scotland. Studies have found that pregnant women in the most deprived areas were more likely to be overweight or obese, while advanced maternal age was more likely in the least deprived areas.

Maternal Age

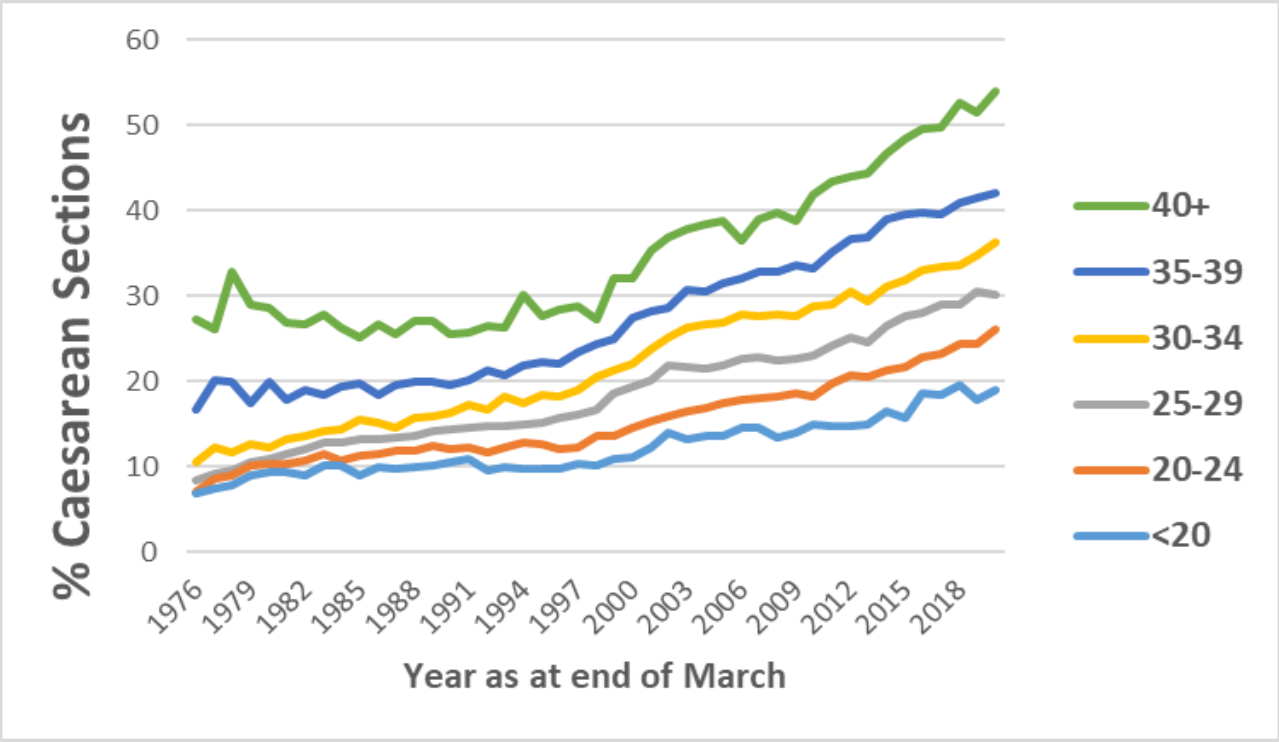
There has been a steady increase in the average age of women giving birth in Scotland between 1975/76 and 2019/20, with a majority of women giving birth now over 30 years old. As shown in the table below.

Table 3: Proportion of live singleton births in Scotland per maternal age group (1975/76 and 2019/20)[16]

Age of Mother	1975/76	2019/2020
Under 20 years	12.2%	2.9%
20-24 years	33.6%	13.4%
25-29 years	34.8%	27.3%
30-34 years	13.5%	33.3%
35-39 years	4.8%	9%
Over 40 years	1.2%	4.1%

As shown in the chart below, older women giving birth in Scotland are more likely to have a caesarean section than younger women – in 2019/20 12.3% of women under the age of 20 gave birth by caesarean section, compared with 26.7% of women aged over 40. Although the caesarean section rate has increased for all age groups between 1975/76 and 2019/20, this trend is more pronounced in older age groups. The gap in caesarean section rates between under 20s and over 40s has increased from 19.9% to 35% between 1975/76 and 2019/20. (Chart 9).

Chart 9 – Proportion of live singleton births delivered by caesarean section in Scotland by maternal age group (1975/76 to 2019/20)[17]



The age of women having their first baby in Scotland has also been gradually increasing over the last three decades. In 2019/20 the proportion of first births to women aged 35 and over was 15% compared with 3.5% in 1990/91, 9% in 2000/01 and 13% in 2010/11.[18] This trend is also evident in Britain overall: 22% of first births in the year 2016/17 were to women aged 35 and over. Of all births for the year 2016/17 53% of all women giving birth were aged 30 or over.[19]

There is a range of risk factors and adverse outcomes for both mother and baby with increased maternal age, including placental abruption, placenta praevia, malpresentation, low birthweight, preterm and post–term delivery, and postpartum haemorrhage.[20] There is also an increased risk of still birth with rising maternal age and induction of labour is widely practiced as an intervention to reduce this risk.

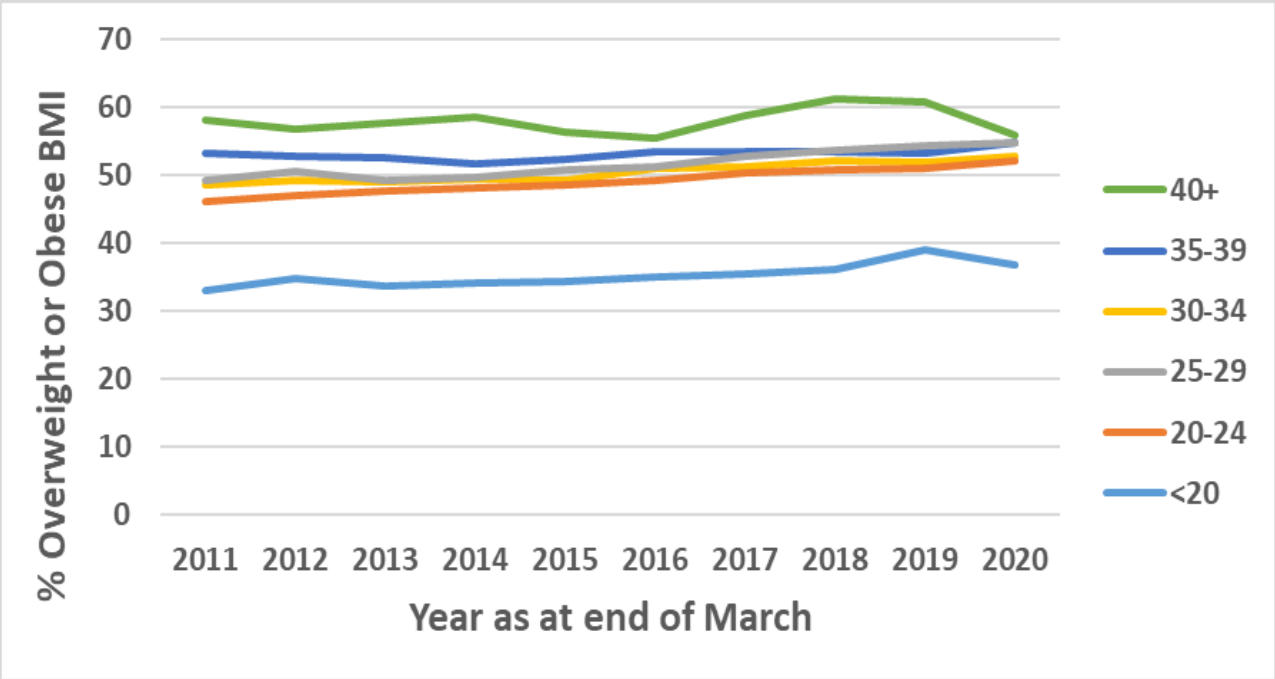
A survey of UK obstetricians found that 37% of obstetricians offer induction of labour at term to women aged 40–44 years of age and 55% to those ≥ 45 years old.[21] Incidence of elective caesarean section are higher among women older than 40 years and some studies suggest that there is a lower tolerance of acceptance of elective caesarean without medical indication among this age group.[22]

Body Mass Index

The Body Mass Index (BMI) of women giving birth in Scotland has generally increased between 2010/11 and 2019/20, with the proportion of women giving birth who are overweight or obese increasing from 48.5% to 53.3%. This increase appears to be greater in younger mothers, however older mothers are still slightly more likely to be obese or overweight than a normal weight. In 2010/11 46% of mothers giving birth under 30 years old were overweight or obese, increasing to 53% in 2019/20. Over the same time period the proportion of overweight or obese mothers aged 30 or older increased from 51% to 54%. (Chart 10).

Over four decades, the global rate of obesity has doubled to become one of the largest global public health challenges. The Euro-Perisat Perinatal Health Report found that in 2015 30-50% of women in contributing countries were overweight or obese.[23] For the year 2019/20 in Scotland, over half (53.3%) of pregnant women were overweight or obese at antenatal booking.[24] Several studies have reported that maternal obesity is associated with an increased risk of a number of serious adverse outcomes, including miscarriage, birth defects, thromboembolism, gestational diabetes, pre-eclampsia, dysfunctional labour, postpartum haemorrhage, wound infections, stillbirth and neonatal death.[25] Obesity is an independent risk factor for adverse obstetric outcome and is significantly associated with an increased caesarean delivery rate.[26]

Chart 10 – Maternal BMI at antenatal booking, overweight and obese by maternal age, Scotland (2010/11 to 2019/20)[27]

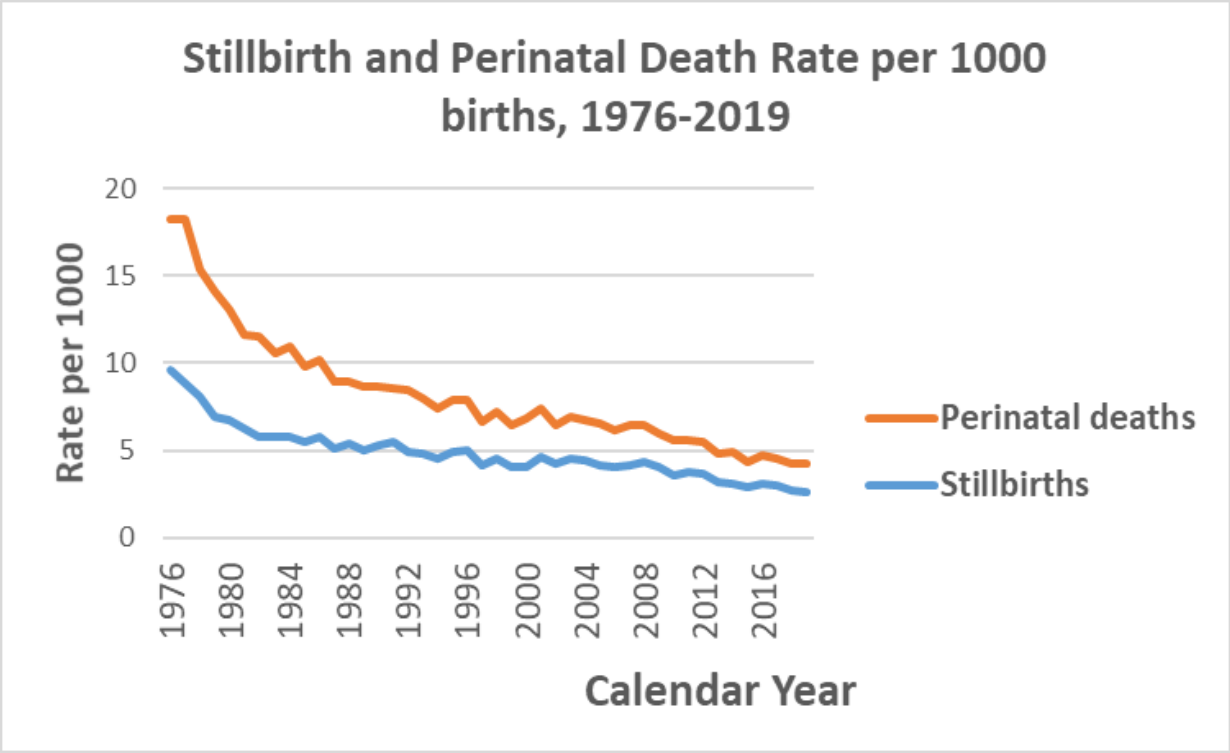


Maternal mortality, stillbirth rates and neonatal morbidity

Rates of caesarean section alongside maternal mortality/morbidity and stillbirth/neonatal death rates and neonatal morbidity.

As shown in Chart 11, both stillbirth and perinatal death rates have fallen in Scotland between 1976 and 2019. In 1976, there were 9.6 stillbirths and 18.3 perinatal deaths per 1000 births respectively. These rates rapidly declined in the following decade and have more steadily declined in recent years to 2.6 stillbirths and 4.2 perinatal deaths per 1000 births in 2019. Although the rate of stillbirths and perinatal deaths continues to decline, the pace of decline has decreased. In the 10 years between 1976 and 1986 the rate of perinatal deaths per 1000 decreased from 18.3 to 10.2, whereas in the 10 years between 2009 and 2019, it decreased from 6.0 to 4.2. The rate of decrease of stillbirths and perinatal deaths in Scotland do not appear to correlate directly with the caesarean section rate in Scotland – during periods of accelerated increase in caesarean sections there does not appear to be a corresponding accelerated reduction in mortality (although this has not been subject to significance testing).

Chart 11 – Number of stillbirths and perinatal deaths per 1000 births in Scotland (1976 to 2019)[28]



The World Health Organisation has concluded that caesarean section rates of 10-15% are associated with decreases in maternal, neonatal and infant mortality.[29] However, when they increase above 10-15%, rates of caesarean section are no longer associated with lower mortality rates.

Studies into maternal and pregnancy outcomes have continued to report a range of inequalities in the UK. Women from deprived areas are at higher risk of dying compared with women from less deprived areas.[30] Mortality rates also remain high for babies born to Black or Black British and Asian or Asian British women. Findings reported in the recent

perinatal MBRRACE-UK report show that the perinatal mortality rate remains disproportionately high for these groups although the stillbirth rate for these groups has decreased. The report also indicated an over-representation of maternal deaths in women over the age of 35.[31]

The Word Health Organisation stated that, although caesarean sections are effective in saving maternal and infant lives, they increase the likelihood of long-term and short-term maternal and infant complication, such as neonatal respiratory distress, infection, asthma and obesity in children.[32] [33] Medically unnecessary caesarean section is a public health concern because of the excess morbidity compared to vaginal childbirth[34] such as greater complications in subsequent pregnancies[35,36] and greater maternal mortality.[37] Evidence suggests that in the UK there was increased risk for admission to intensive care if pregnant women were of black ethnicity, of BMI >35 and had advanced maternal age.[38]

That said, it is important to note the recent findings of the Ockenden Report which found that caesarean section rates, at the NHS Trusts in England subject to the Ockenden review[c], were between 8 and 12%, consistently below the English average of 24%. The review found a culture of trying to keep caesarean section rates low because of a belief that this demonstrated good maternity care. But the review found that earlier decisions to use caesarean delivery would have avoided death and injury in many cases[39].

[c] On 10 December 2020 the Ockenden Review was published which set out its findings further to an independent review of maternity services at Shrewsbury and Telford Hospitals NHS Trust. The review was formally authorised in 2017 to assess “the quality of investigations relating to new-born, infant and maternal harm at the Trust”.

NICE Guidelines

Impact of changes to the NICE guidance in 2011 on caesarean section rates[40]

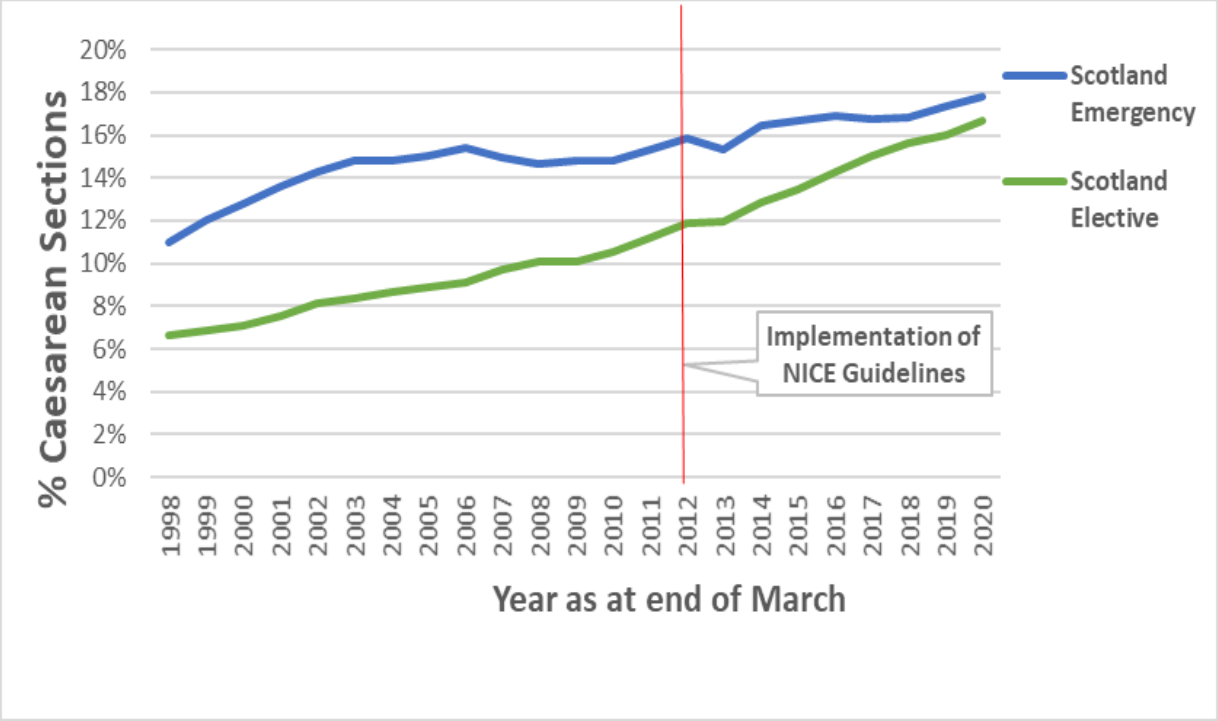
The NICE guidelines for caesarean section were updated on 23rd November 2011.

The following recommendations were added to the guidance:

- When a woman requests a caesarean section because she has anxiety about childbirth, offer referral to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner.
- For women requesting a caesarean section, if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option, offer a planned caesarean section.
- An obstetrician unwilling to perform a caesarean section should refer the woman to an obstetrician who will carry out the caesarean section.

Since the update of NICE guidelines in 2011, the rates of both emergency and elective caesarean sections have continued to increase across Scotland. The gap between emergency and elective caesarean section rates has narrowed somewhat in this time, reflecting a continuing faster rate of increase of elective caesarean sections than for emergency sections. The rate of emergency caesarean sections has increased by 1.9 percentage points since 2011/2, whereas the rate of elective caesarean sections has increased by 4.8 percentage points. (Chart 12).

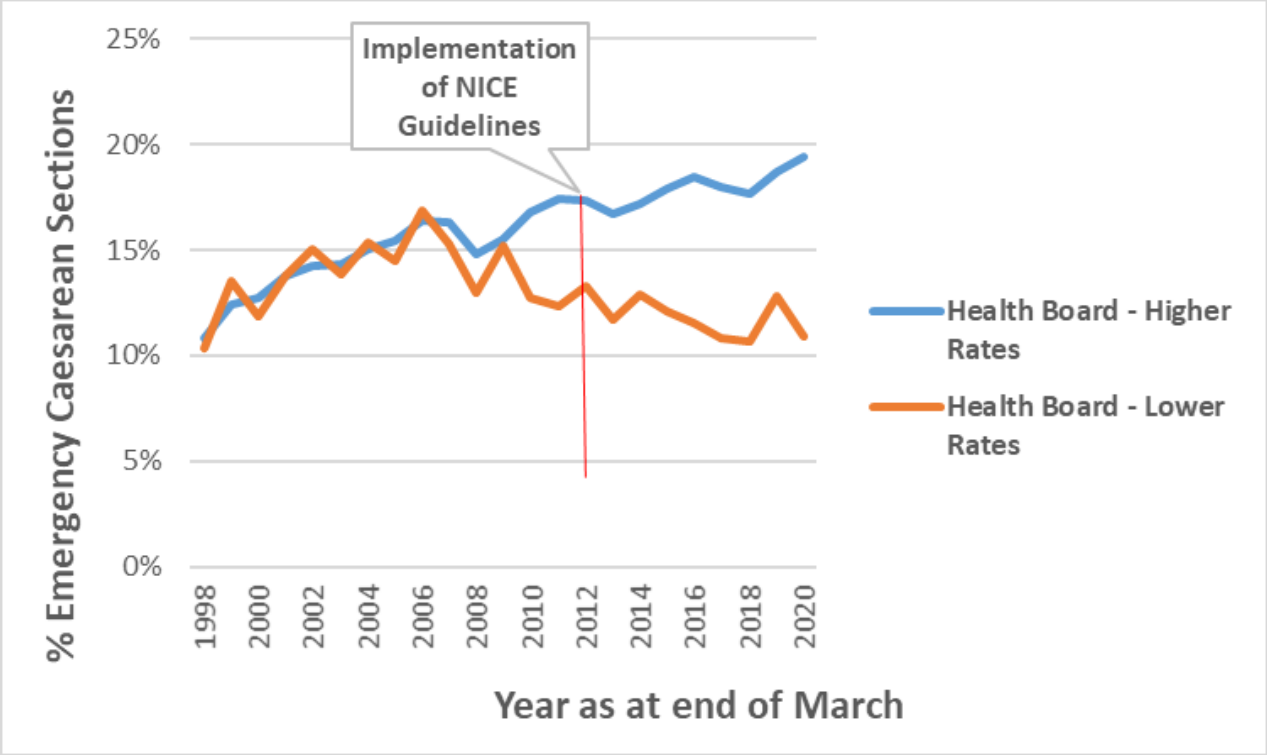
Chart 12 – Proportion of live singleton births delivered by emergency and elective Caesarean Section in Scotland, 1997/98 to 2019/20[41]



When comparing emergency and elective caesarean section rates in two health boards within mainland Scotland with the highest and lowest rates of caesarean section immediately prior to the introduction of the NICE guidelines they have shown different trends in emergency rates but similar trends in elective rates since the time of the update.

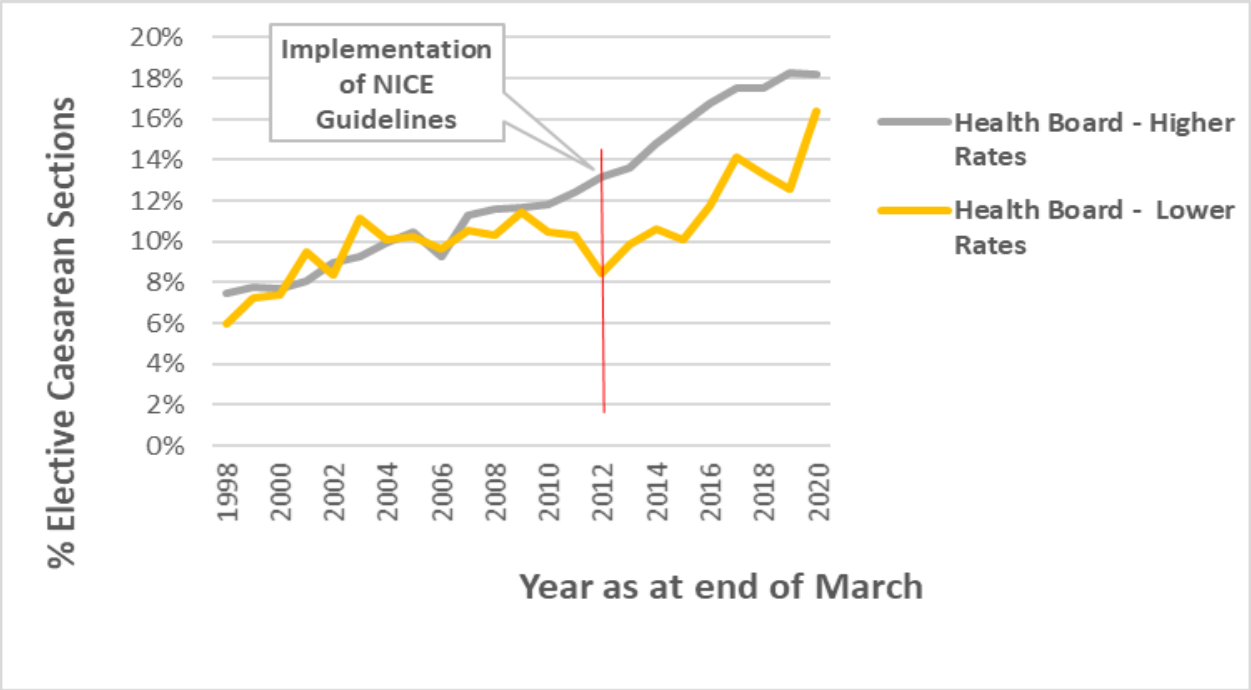
The health board with higher initial rates has seen a moderate increase in emergency caesarean section rates of 2.1 percentage points since 2011/12, while the health board with initially lower rates has seen a reduction of 2.4 percentage points (Chart 13).

Chart 13 – Proportion of live singleton births delivered by emergency caesarean section in two health boards (1997/98 to 2019/20)[42]



For elective caesarean sections, the health board with initially higher rates has seen a large increase of 5.1 percentage points since 2011/12 while the health board with initially lower rates has also had a larger increase of 8 percentage points. (Chart 14). For the health board with initially higher rates, this increase continues a trend of increasing elective caesarean section rates since before the guidance was updated. Whereas, for the health board with initially lower rates it reverses the trend of declining elective caesarean section rates in the years immediately preceding the update.

Chart 14 – Proportion of live singleton births delivered by elective caesarean section in two health boards (1997/98 to 2019/20)[43]



There is some indication from preliminary analysis that experiences across Health Boards in Scotland have varied since the introduction of the update to the NICE guidelines. It is suggested that further exploration of the caesarean section rate at an individual board level is undertaken.

Studies internationally and in Scotland and the UK have explored the perceptions of various stakeholders, including maternity care providers (obstetricians and midwives), pregnant women, and the general public, on the involvement of women in making decisions on caesarean section as the mode of birth in uncomplicated pregnancies.

They have found the following:

- Gender differences were noted between male and female obstetricians in their support for caesarean section by maternal request (CSMRs).[44,45] In Canada, male obstetricians (34%) were more likely than female obstetricians (16%) to agree to perform a caesarean section by maternal request (CSMR).[46] A similar difference was found in Italy, where 48.3% of male and 33.3% of female obstetricians would agree to perform a caesarean section upon request.[47]
- Experience also had a bearing on whether obstetricians were willing to perform a CSMR. Three studies reported that trainee obstetricians and obstetricians who had been qualified for less than 10 years were more likely to agree to a CSMR.[48,49,50]
- The majority of the studies reported that women wanted to have the freedom to choose their mode of birth, however 50–70% of pregnant women in the UK considered it the responsibility of obstetricians to decide whether a caesarean section was necessary for the safety of the mother or baby.[51]

- Four qualitative studies conducted in Scotland, the UK, Australia, and Argentina reported that pregnant women sought to make the decision together with their obstetricians, rather than on their own.[52,53,54,55]
- In these studies women described themselves as being autonomous in their decision on mode of birth.[56,57] Women who perceived that they had made an autonomous decision indicated higher levels of satisfaction with their birth.[58] However, statements made by women about the process of making a decision on their mode of birth, showed that the women had followed the advice of their obstetrician.[59] These women said that, based on the advice of their obstetrician, they had chosen to undergo a caesarean section because of the predictability and safety of the procedure for their baby and themselves, and that a vaginal birth involved unknown risks and unexpected outcomes. This indicated that even when women thought that they had made an autonomous decision, they had in fact followed the advice of their obstetrician. It was unclear whether the mode of birth was reflective of the women's preference prior to the consultation with their obstetrician or was more of a reflection of the preference and opinion of their obstetrician.

To better understand the rates of caesarean section in Scotland it will also be important to understand the staff mix within individual maternity units to understand if any of the factors indicated above are having an influence on the caesarean section rates.

Alongside this, it is important to consider other factors that have also changed both before and after the implementation of the (2011) NICE guidelines, including increases in obesity and maternal age. Furthermore, given that recent studies report low rates of section by maternal request among nulliparous women it is important that a holistic approach is taken to try to understand all factors that are contributing to the rise in caesarean sections.

- A survey conducted in the UK and Ireland found that 77% of obstetricians believed that maternal request was an important contributing factor to the national increase in caesarean sections. However, the same study found that most obstetricians reported receiving only a few requests.[60]
- A survey of 166 pregnant women, 31 midwives and 52 doctors within maternity units at two hospitals in the North East region of England found that the views of pregnant women and health professionals differ regarding requests for caesarean section. When asked if women should always be allowed to choose caesarean section in an uncomplicated pregnancy 2% of health professionals agreed compared with 20% of pregnant women. Further, when asked for the reasons women might request a caesarean section in an uncomplicated pregnancy, pregnant women were more likely than health professionals to feel that 'safer for the baby' was a reason (19% vs 3%). Health professionals were more likely than pregnant women to cite fear of injury as a reason for women requesting a caesarean section (30% vs 14%).[61]
- Evidence from Canada, the UK, Sweden and Australia indicates that 6–15% of women indicate a preference for caesarean section. [62,63] Maternal requests for caesarean section highlight the role of risk narratives in shaping women's experiences during pregnancy and throughout the birth decision making process. Some studies suggest

that perceived risks of urinary incontinence, vaginal prolapse and/or sexual dysfunction, are a factor for seeking a caesarean section, despite the fact that these are not clearly linked outcomes.[64,65]

- The fear of pain associated with labour has been found by many studies to be a contributing factor of caesarean section by maternal request. Researchers in Norway conducted interviews and focus groups with women who had requested a caesarean section and found that fear of labour most commonly emerged as a result of a previous traumatic birth experience.[66] In 2001, repeat elective caesarean section was considered as the most significant factor influencing Scottish caesarean section rates.[67]
- The process of decision making regarding mode of birth can be complex as the process can be influenced by different and competing factors in a woman's life. A qualitative study of women in Scotland that aimed to explore the decision-making process regarding mode of delivery for women who had previously given birth by caesarean section found that the decision evolved and changed throughout pregnancy. The women were mostly influenced by their past experience, their decision was strongly influenced by the possibility of an emergency caesarean if they opted for a vaginal birth after caesarean (VBAC), and were more likely to request a planned caesarean. Women who were unsure about their mode of delivery wished for more information from their consultant and midwife that was tailored to their personal situation.[68] Similar studies have found that women who have previously had a caesarean section valued the safety of their baby over their own but also wished to avoid a repeat emergency caesarean.[69]

Reasons for caesarean section rates

Critical analysis of the available literature and evidence on the reasons for caesarean section.

Caesarean sections rates have steadily increased throughout the world over the last three decades. The rates of caesarean section vary considerably internationally. According to data from 150 countries, the proportion of births by caesarean section ranges from 6% to 56%.[70] In 1985, the WHO stated that the optimal caesarean section rate for a country was 10-15%.[71]

Although some ecological studies have suggested that socioeconomic factors may influence the variance in both caesarean section rates and maternal and infant mortality rates to an extent,[72] there is currently no standardised internationally accepted classification system to monitor and meaningfully compare caesarean section rates across different countries, facilities, cities or regions in an effective way to understand what factors are influencing this variance.

In 2011, the WHO conducted a systematic review of available systems to classify the use of caesarean section and concluded that the Robson classification is the most suitable to fulfil international and local needs. [73] The system classifies women into 10 groups based on their obstetric characteristics (parity, previous caesarean section, gestational age, onset of labour, fetal presentation and the number of fetuses). This classification is simple, prospective, clinically relevant and is based on basic obstetric characteristics that are routinely collected – meaning all women can be immediately classified upon being admitted for delivery.[74]

In literature on clinicians' views on mode of birth, the most cited clinical factors which influence clinicians' decision to perform a caesarean section were maternal BMI above 35, advanced maternal age and previous caesarean section.[75,76] Observational studies have shown that there is a higher incidence of intrapartum complications among women with obesity compared to women with a healthy weight. There is also an increased risk of slow labour progression, shoulder dystocia and emergency caesarean section within this group.[77,78]

Over four decades, the global rate of obesity has doubled to become one of the largest global public health challenges. Several studies have reported that maternal obesity is associated with an increased risk of a number of serious adverse outcomes, including miscarriage, birth defects, thromboembolism, gestational diabetes, pre-eclampsia, dysfunctional labour, postpartum haemorrhage, wound infections, stillbirth and neonatal death[79].

A combination of higher maternal age, rising caesarean rates and increasing levels of obesity and chronic disease, such as diabetes, mean that more pregnancies are medically complex.[80] Increasing maternal age and deprivation are both known to be risk factors for a higher maternal BMI. Increased maternal age is associated with a range of risks and adverse outcomes including placental abruption, placenta praevia, malpresentation, low birthweight, preterm and post–term delivery, and postpartum haemorrhage and still birth.[81] Due to these risks induction of labour is widely practiced as an intervention to reduce these risks. Talaulikar and Arulkumaran (2011) suggest that high rates of induction,

coupled with emerging evidence that upward of 20% of these inductions of labour fail, contribute to increasing rates of caesarean section. WHO guidance (2011) advises, however, that failed induction of labour does not necessarily indicate caesarean section.

Some of the literature suggests that a prevalent indication for primary caesarean section is 'non-progressive labour' or failure to progress in labour, despite lack of association between relatively prolonged labour without indications of foetal distress and detrimental health outcomes.[82,83] The acceptable time for labour to progress has grown progressively shorter over recent decades without any clear medical indication of why. [84] Arrest of labour 'disorders' are a common indication of primary caesarean section and some health professionals may have an overly narrow view of what healthy labour progression constitutes.[85]

The views of obstetricians and midwives, and the role they play in influencing decision making around caesarean sections is important in helping to understand the variance in caesarean section rates. Studies which aim to offer insight into obstetricians' and midwives' views on caesarean sections and the factors that influence the decision mainly focus on clinicians' personal beliefs, perceptions of risk and safety and clinician characteristics.[86] A study of Australian obstetricians and midwives found that elective caesarean section was often perceived as a 'safe' option by obstetricians.[87]

The perception of risk of mode of birth was subjective among obstetricians and midwives, depending on their personal and medical experience. Clinicians' confidence and skill in communicating risk is an important factor in women's decision making on mode of birth; regarding supporting women considering vaginal birth after caesarean section (VBAC) midwives in an Australian study believed that a woman's decision on mode of birth was often dependant on the doctor they get and how the information is given to them.[88] Several studies have attempted to understand clinicians' views on caesarean section by maternal request. When questioned on women's rights to request a caesarean section and their willingness to agree to perform one, over half of the obstetricians in a US study (54.6%),[89] and over one-third in studies in Turkey (40.8%)[90] and Denmark (37.6%)[91] believed women should have the right to choose and would agree to perform a caesarean section following discussion of the risks and consequences.

In 2015 the Montgomery *v* Lanarkshire case drew fresh attention to the communication of risk and informed consent in the UK. The Montgomery ruling makes it clear that any intervention must be based on a shared decision-making process. To deliver the shared-decision making process mandated by the ruling, women and their healthcare provider should both have access to the same standardised information at all points in the care pathway. This means healthcare providers should take time to clearly explain the risks and benefits of a recommended course of action and the alternatives available. Women should be given the time to reflect on the information they are given before deciding what is best for them.[92]

The Royal College of Obstetricians and Gynaecologists acknowledged in 2016 that obstetrics deals with a unique set of circumstances concerning two individuals, both the mother and baby, where the course of action and urgency of care can change quickly and dramatically, and obstetrics also covers both elective and emergency scenarios and will require a different approach.[93]

Evidence also suggests that once practice has become embedded it is difficult to dislodge. A qualitative study of midwives' views looked as the routine use of study of intrapartum electronic fetal monitoring (EFM), which has resulted in an increase of operative and instrumental deliveries. The study of two NHS trusts in north England found that midwives' routinely used EFM, regardless of clinical need in an attempt to manage the psychological burden of the threat from clinical negligence. The midwives interviewed lacked confidence in the ability of EFM to accurately detect fetal compromise but were aware that the visual monitoring record is recognised as a valuable piece of legal evidence.[94] The embedded use of EFM, fear of clinical negligence and the Montgomery ruling may all play a role in the current rate of caesarean sections in the UK. Lack of training, skills or experience have been highlighted as barriers to change among healthcare professionals.[95]

Evidence-informed actions to address non clinically indicated caesarean section

The World Health Organisation published guidance, in 2018 focussed on non-clinical interventions for reducing unnecessary caesarean sections.[96] The recommendations are grouped according to the target of the intervention:

- Interventions targeted at women
- Interventions targeted at healthcare professionals
- Interventions targeted at health organisations or systems.

Interventions targeted at women

Evidence on non-clinical interventions targeted at women mostly comprises of educational interventions and support programmes. Findings of a systematic review of qualitative studies recommend that women want educational tools such as childbirth training workshops, booklets and decision aids. The content of educational materials should not provoke anxiety and needs to be consistent with advice from health-care professionals.[97] Women also found that information from their consultant and midwife that was tailored to their personal situation would be more helpful when making a decision about their mode of birth.[98] This recommendation from the WHO echoes many of the findings highlighted in the studies references above, particularly to tailored information provision.

Interventions targeted at healthcare professionals

Evidence on non-clinical interventions targeted at health care professionals is focussed on the effect of a policy of a second opinion for caesarean section indications. Evidence suggests that health care professionals can have differing beliefs on what constitutes a definite clinical indication for caesarean across time[99] and often have differing methods and confidence levels of communicating information to women.[100] Evidence from a randomised trial suggests that women who received a second opinion felt better about their decision, the findings also found that 91% of obstetricians would recommend that second opinion should be used.[101]

Evidence also suggests that audits of indications for caesarean delivery and the provision of feedback to healthcare professionals involved in the decision making process were effective interventions. Studies have suggested that using the Robson classification system and applying this to historical data can help in analysing, screening, auditing, and comparing caesarean rates across different hospitals, countries, or regions and can help to create and implement effective strategies to address specific areas of concern or anomaly[102,103].

Interventions targeted at health organisations or systems

Evidence on interventions targeted at health organisations or systems is focused on collaborative midwifery-obstetrician model of care and midwife led models of care. Evidence suggests that women allocated to primarily midwife-led care (with collaborative and supportive access to obstetricians where required) throughout pregnancy were less likely to experience a caesarean section.[104]

Evidence suggests that organisational factors such as inter-professional conflicts, dominant medical models of birth, time pressures and a culture of 'busyness' are perceived barriers to delivering midwife-led care.[105] Studies have also shown that alternative institutional settings such as bedroom-like rooms and ambient rooms increase the likelihood of spontaneous vaginal birth, labour and birth without analgesia/anaesthesia, satisfaction with care, and decreased likelihood of assisted vaginal birth and caesarean birth.[106] There is a growing body of research which has demonstrated the independent effects of physical attributes of the hospital room on caregivers' behaviour and patients' health outcomes.

A recent data linkage study from Australia which aimed to quantify the hospital resource savings that could occur if all low-risk women in Australia gave birth at home or in birth centres found that caesarean section rates would have reduced from 13.4% to 3.7% if all low-risk women gave birth at home and to 2.3% if they gave birth in a free-standing birth centre in 2017 in Australia.[107] However, further research would be required to understand women's preferences on place of birth and also to relate these findings to births in Scotland and the UK.

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This document is also available from our website at www.gov.scot.
ISBN: 978-1-80201-264-4

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Produced for
the Scottish Government
by APS Group Scotland
PPDAS914826 (09/21)
Published by
the Scottish Government,
September 2021

GSR
GOVERNMENT SOCIAL RESEARCH
Social Science in Government

Social Research series
ISSN 2045-6964
ISBN 978-1-80201-264-4

Web Publication
www.gov.scot/socialresearch

PPDAS914826 (09/21)