



Department
of Health &
Social Care

Sex ratios at birth in the United Kingdom, 2014-18

A report on sex ratios at birth in the United Kingdom

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Contents

Executive Summary	3
Aim	3
Key findings from 2014 to 2018 data	3
Background.....	4
The legal context	4
Trends in Birth Sex Ratios.....	5
Calculations and statistical tests used	7
Limitations of the analysis	8
2. Results	9
Coverage of this analysis	9
All Births	9
Births by Ethnicity of Child.....	10
Births by mother's country of origin.....	11
Abortions by Gestation and Ethnicity.....	12
Conclusion.....	12
Appendix A: Abortions by Gestation and Ethnicity.....	13
All abortions, by gestation	13
All abortions, by gestation and ethnic group.....	15
Repeat abortions and ethnic group.....	17
Conclusion.....	17
Further Information	18

Executive Summary

Aim

This report provides statistics on the analysis of male to female birth ratios in the United Kingdom using the most recent data for the period 2014-18. For the first time this analysis has been extended to include Northern Ireland.

The purpose of these Official Statistics is to update and inform the public and Parliament on whether or not there is evidence for sex selective abortions happening at scale within specific communities in the United Kingdom. Data are sourced from birth registration data in England, Wales, Scotland and Northern Ireland. This analysis uses a generally accepted birth sex ratio upper limit of 107 (see paragraph 1.15) i.e. we are looking for birth ratios with significantly more than 107 boys born for every 100 girls within a community.

Where the ratio of boys to girls for a particular ethnicity or country of origin of mother is significantly greater than 107 (after adjusting for multiple testing and the order of birth of the child) this may indicate that people in this community have been involved in sex selective abortions. A lower sex birth ratio limit is not used, as we are not investigating if there are many more girls born than boys born in the United Kingdom.

Key findings from 2014 to 2018 data

This report presents statistics on the analysis of male to female birth ratios in the United Kingdom for the period 2014 to 2018:

- This analysis of birth sex ratios finds no evidence for sex selective abortions occurring in the United Kingdom over the period 2014 to 2018.
- There were 3.8 million births registered in the United Kingdom in this period with a ratio of boys to girls of 105.4, below the accepted upper limit of 107. (See Table 1; Results)
- Latest analyses by ethnicity of the child and country of origin of mother for overall birth ratios, and by birth order, shows no ratio was found to be significantly higher than a boy to girl birth ratio of 107. (See Table 2 and 3 in accompanying spreadsheets).

Background

- 1.1 The Department of Health and Social Care made a [commitment to publish sex birth ratio](#) analysis annually, in line with the recommendation of the Council of Europe Parliamentary Assembly that member states should 'collect the sex ratio at birth, monitor its development and take prompt action to tackle possible imbalances' and 'encourage research on sex ratios at birth among specific communities'. If more boys than girls are being born than is expected, this could imply some pregnancies are being terminated with an abortion due to the sex of the fetus. This process is known as a sex selective abortion. However, a number of factors can influence the sex of a child including maternal and paternal age, coital rates, number of children and sex of previous children.

The legal context

- 1.2 Concern has been raised in some countries about the occurrence of sex selective abortions^{1, 2}.
- 1.3 Sex is not itself a lawful ground for abortion in England, Wales and Scotland (Abortion Act 1967). Department of Health and Social Care guidance, in May 2014, states that abortion on the grounds of sex alone is illegal.
- 1.4 However, under the Abortion Act, it is lawful to abort a fetus where two registered medical practitioners (RMPs) (i.e. doctors) are of the opinion, formed in good faith, "that there is a substantial risk that if the child were born it would suffer from such physical or mental abnormalities as to be seriously handicapped." There are some serious conditions which are known to be related to a person's sex.
- 1.5 From 31st March 2020 a [new framework for access to abortion services for Northern Ireland](#) came into force. As with England, Wales and Scotland, sex is not itself a lawful ground for abortions in Northern Ireland.
- 1.6 In early 2015 the Serious Crime Act contained a requirement that the Secretary of State should arrange for an assessment to be made, within six months of Royal Assent, of the evidence for sex-related abortions occurring. A report was subsequently laid before Parliament in August 2015, which contained the [assessment of evidence of terminations of pregnancy being undertaken on the grounds of the sex of the fetus](#), and a statement and explanation of why the

¹ Hesketh, T., & Xing, Z. W. (2006). Abnormal sex ratios in human populations: causes and consequences. Proceedings of the National Academy of Sciences, 103(36), 13271-13275.

² Chahnazarian, A. (1988). Determinants of the sex ratio at birth: Review of recent literature. Social biology, 35(3-4), 214-235.

Secretary of State for Health considered a formal plan under sub-section (3) (a) of the clause was not required.

Identifying the Sex of a Fetus with Technology

- 1.7 Antenatal sexing of the fetus is not a routine part of antenatal care. Scans are undertaken to support the clinical care of the mother and unborn baby such as: the number of foetuses, the age of the fetus, and screening for fetal anomalies. It is usually only possible to identify the sex of a baby at the second ultrasound scan, which takes place at around 18-21 weeks gestation. Disclosing the sex of a fetus is a local decision, adhering to local policies, and should be based on clinical judgment about the certainty of the assessment and the individual circumstances of each case.
- 1.8 The introduction of new and emerging technologies (such as Non-Invasive Prenatal Testing which is currently available in private clinics and on the internet) provide further context from which the monitoring of birth ratios needs to be considered. Plans are underway to make the NIPT test available on the NHS.³
- 1.9 The majority of abortions take place in the first trimester of pregnancy (92% up to 12 weeks; 61% up to 7 weeks gestation, [Abortion Statistics, England and Wales, 2019](#)). The majority of abortions are therefore taking place nearly two months before most women could have been told the sex of the fetus in the antenatal screening pathway. It is acknowledged though that some people may seek information on sex using other methods such as tests available on the internet or in private clinics. However, data is not available on the extent to which other methods of sex determination may be being used. See Appendix A for further information on abortions by gestation and ethnicity.

Trends in Birth Sex Ratios

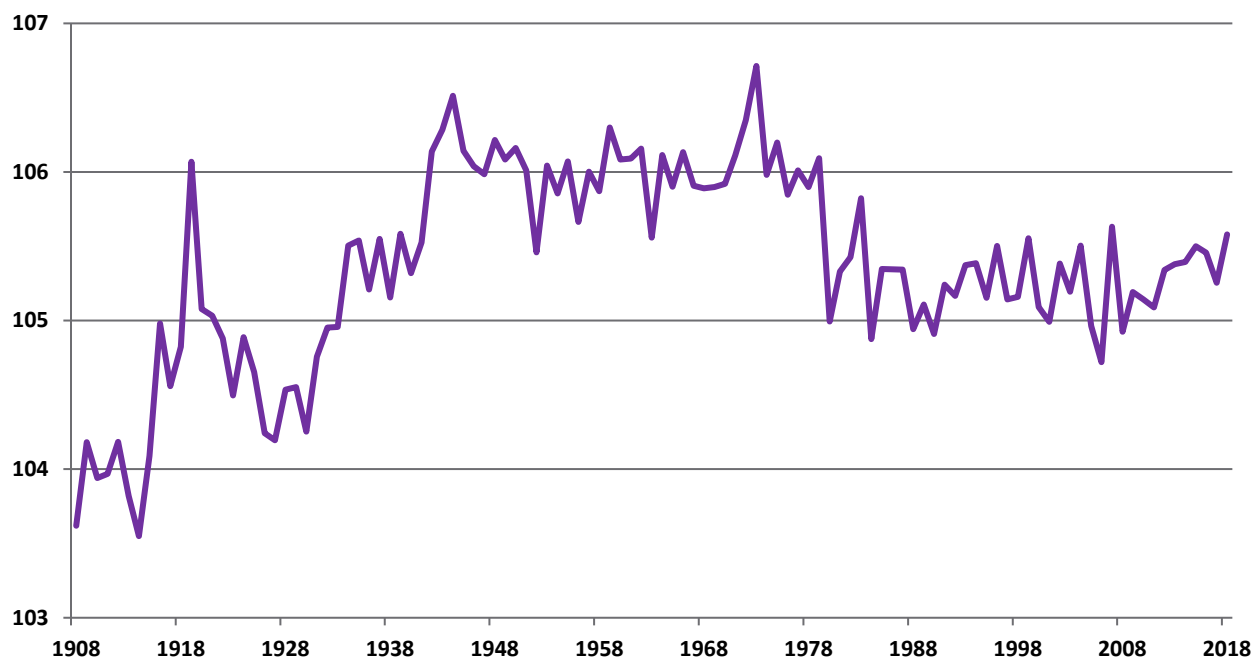
- 1.10 Within large populations, we can expect the birth ratio to vary, due to external factors⁴ including wars and economic crises. Figure 1 shows the fluctuation within the United Kingdom since 1908. The chart shows that the birth ratio has never been above 107 over that period. The minimum ratio was 103.5 in 1914 and the

³ In this test a small blood sample is taken from the mother's arm. The UK National Screening Committee made a recommendation to use NIPT, a contingent test in the NHS Fetal Anomaly Screening Programme only for Trisomy 13,18 and 21 and not for any other genetic marker, including sex. (A trisomy is a disorder characterised by an additional chromosome).

⁴ Helle, S., Helama, S., & Lertola, K. (2009). Evolutionary ecology of human birth sex ratio under the compound influence of climate change, famine, economic crises and wars. *Journal of Animal Ecology*, 78(6), 1226-1233.

maximum ratio was 106.7 in 1973. The male to female birth ratio has been consistently around 105 since 1980.

Figure 1: Live male births per 100 live female births, England, Wales, Scotland and Northern Ireland



Source: Office for National Statistics, National Records of Scotland and Northern Ireland Statistics and Research Agency.

1.11 The issue of sex ratios of new-born babies is the subject of numerous academic articles, where there is a range of evidence. A 2011 World Health Organisation report stated a biologically normal sex ratio at birth ranges from 102 to 106 male births, per 100 female births,⁵ although other studies have stated that 105 or lower is a more “normal” ratio of boys to girls⁶. Evidence suggests that a number of factors can influence the sex of a child, including maternal and paternal age, coital rates, number of children and sex of previous children⁷. It is important to note that the interaction between factors that could influence the sex of the child has not been controlled for or taken into account in this analysis.

⁵ World Health Organization. (2011). Preventing gender-biased sex selection: an interagency statement-OHCHR, UNFPA, UNICEF, UN Women and WHO.

⁶ Hesketh, T., & Xing, Z. W. (2006). Abnormal sex ratios in human populations: causes and consequences. *Proceedings of the National Academy of Sciences*, 103(36), 13271-13275.

⁷ Jacobsen, R., Møller, H., & Mouritsen, A. (1999). Natural variation in the human sex ratio. *Human reproduction*, 14(12), 3120-3125.

- 1.12 For this publication a birth ratio upper limit of 107 boys to 100 girls is used as a threshold for comparisons. This is based on a review of available literature^{6, 8} advice from academic experts and on examination of data on birth ratios in more developed countries.

Calculations and statistical tests used

- 1.13 The aim of this analysis is to investigate if any of the birth ratios considered are statistically significantly higher than 107, i.e. if any group or community has statistically significantly more than 107 boys born for every 100 girls.
- 1.14 Birth ratios above the 107 threshold do occur, but could be due to chance, rather than due to a real difference. Statistical significance testing is carried out to determine whether any differences observed between the birth ratios and the 107 threshold are likely to be "real" or whether they are consistent with chance fluctuations.
- 1.15 This publication uses a number of techniques to test whether ratios over 107 are statistically significant. The first stage of the process is to calculate the probability ('p values') that the differences observed could arise by chance as opposed to there being a real difference. We have used the common acceptable level of 5% significance level in this analysis, which means that a statistically significant result is found for any p values less than 0.05 (5%).
- 1.16 However, this methodology presents some difficulties when there are many tests involved. For example, the 'country of mother's origin' analysis involved testing the significance level for 174 countries and five birth orders, equivalent to 870 statistical tests. (825 tests were carried out as 45 countries in the unknown birth order category had no data available). With so many tests, it would be expected that some results appear statistically significant due to chance alone. Even when there was no real difference from a ratio of 107, on average, a 5% significance level means that 1 in 20 results would be found to be significant. When applying this across these country of birth tests there is a high chance of a "false positive" result, therefore inferring evidence about sex selective abortions incorrectly.
- 1.17 In order to address this issue known as the 'multiple testing problem', a statistical technique called the Benjamini-Hochberg procedure was applied using p values already calculated as part of our method to assess statistical significance. In addition to this procedure, the Storey technique is also used to estimate false

⁸ Chahnazarian, A. (1988). Determinants of the sex ratio at birth: Review of recent literature. *Social biology*, 35(3-4), 214-235.

positive discovery rate as a form of sensitivity analysis. The application of these techniques is discussed in detail in the technical guidance.

Limitations of the analysis

- 1.18 Using birth registration data to calculate birth ratios is an indirect method for investigating evidence for sex selective abortions.
- 1.19 The relatively small number of births within many of the groups in this analysis are such that large differences between birth ratios and the expected upper limit of 107 would need to be observed for the ratio to be identified as statistically significantly higher than the expected upper limit of 107. Therefore, evidence would only be identified through this means if sex selection were taking place on a significant scale.
- 1.20 Any differences in the birth ratios seen could be due to a number of factors, not just sex selective abortions. There is evidence that paternal and maternal age, coital rates and the number and sex of previous children can influence the sex of a child.

2. Results

Coverage of this analysis

- 2.1 This report presents statistics on the analysis of male to female birth ratios in the United Kingdom for the period 2014-2018. For the first time this analysis has been extended to include Northern Ireland.
- 2.2 Sex ratios are examined overall and by birth order (first born, second born etc) for:
- All mothers for 2014-2018 for the United Kingdom
 - The country of birth of the mother of the baby born in 2014-2018 for the United Kingdom
 - Ethnicity of child for 2014-2018 for England and Wales

All Births

- 2.3 In the period 2014-2018, there were 3.8 million live births in the United Kingdom and an overall ratio of boys to girls of 105.4 which is below the upper limit of 107. (Analysis covered countries where the total number of births for 2014-18 was 100 or more to ensure adequate sample sizes, so excluding some countries).
- 2.4 The sex birth ratio did not vary significantly across the different birth orders with a ratio between 105 and 106 boys to girls (see Table 1 below).

Table 1: Sex birth ratios by birth order, United Kingdom, 2014-2018

Birth Order	Number of Births	Birth ratio
All births	3,812,182	105.4
1st born	1,554,767	105.8
2nd born	1,347,750	105.3
3rd born or more	895,042	105.1
Unknown	14,623	105.7

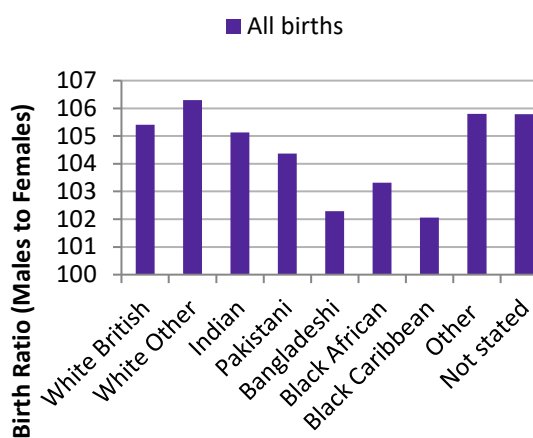
(Unknown birth order represents those babies whose birth order was unknown).

Births by Ethnicity of Child

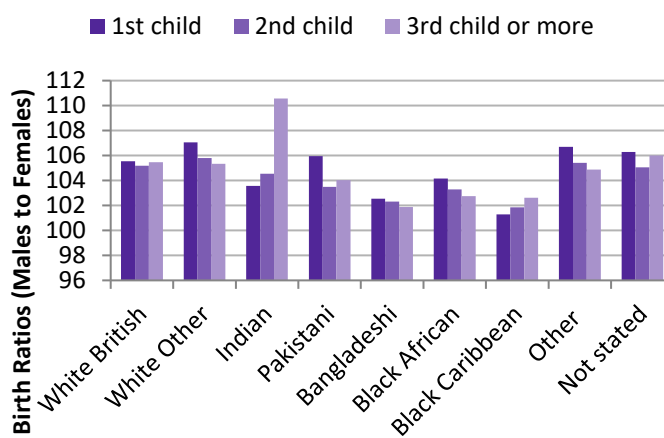
- 2.5 Data on ethnicity of the child is not available for Scotland and Northern Ireland, therefore this component of the analysis is limited to England and Wales.
- 2.6 There were 3.4 million births included in the analysis of birth ratios by ethnicity of the child and birth order, for England and Wales. The majority of births in England and Wales were for children in the White British ethnic group (61%).
- 2.7 An analysis of birth sex ratios by the ethnicity of the child for England and Wales both for overall birth ratio and by birth order, showed no ratio to be significantly higher than 107. (See Table 3 in accompanying spreadsheets).
- 2.8 Although some birth ratios were higher than 107, such as third born or later babies of Indian ethnicity, following the statistical testing, no ethnicity and birth order were found to be statistically significant.

Figure 2: Birth ratios by ethnicity: England and Wales, 2014-2018

a) All births



b) 1st, 2nd and 3rd child or more

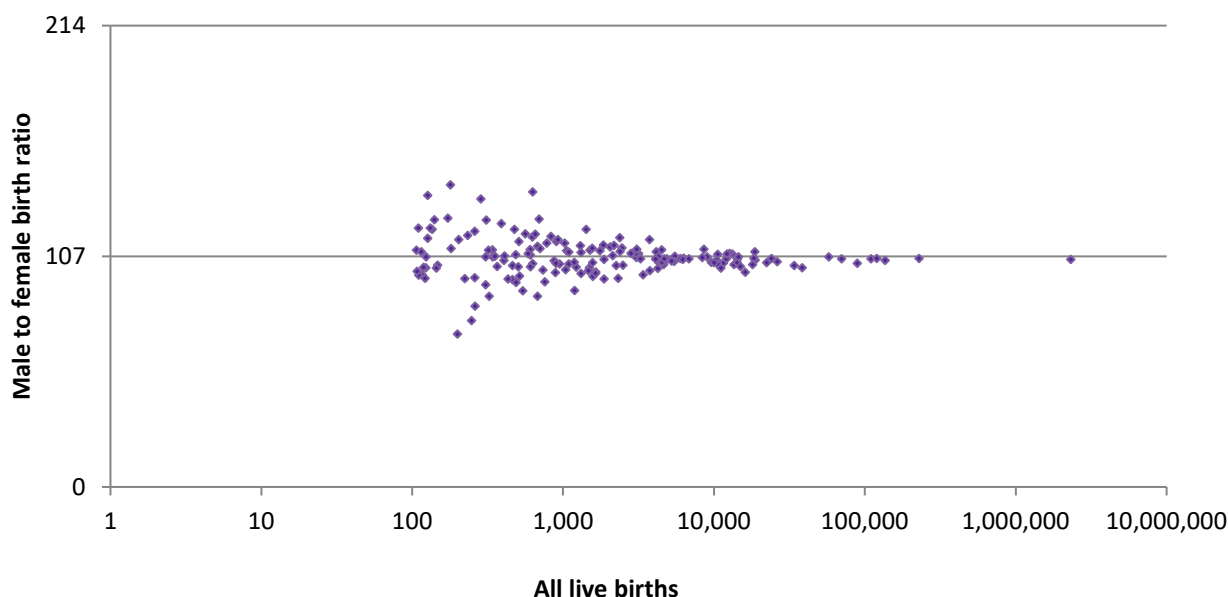


- 2.9 When interpreting the birth ratios (Table 3), it is important to keep in mind that this analysis covers 9 ethnic groups, in line with the ethnic groupings used by the Office For National Statistics, for 5 categories of birth order (all, first born, second born, third born or later, and unknown birth order). We would therefore expect to see high birth ratios for some groups simply as a result of random variation and small sample sizes.

Births by mother's country of origin

- 2.10 The majority of births in the United Kingdom were to mothers born in England, Wales, Scotland and Northern Ireland (73%). This analysis focuses on the mother's country of origin for the 27% (representing 1,014,949 births) of babies born to mothers from countries outside of England, Wales, Scotland or Northern Ireland.
- 2.11 The analysis of birth sex ratios by the mother's country of origin for the United Kingdom for the overall birth sex ratio and by birth order, showed only one result to be significantly higher than 107. This was for Asia (except middle east, not otherwise stated (NOS)) for the third born or later children. However, further consideration did not find this result to be valid in terms of checking for sex selective abortions.
- 2.12 Asia (except Middle East) (NOS), consists of a number of countries within Asia which have not been accounted for elsewhere due to lack of precise information on the country of origin of the mother. Due to the uncertain and disparate nature of this grouping, along with the relatively small sample size of 57 births for the third born or later children, we cannot consider this as a meaningful result. Most of the third born or later births from countries in Asia were properly attributed to specific countries and none of these countries showed significant results.
- 2.13 Table 2 (in accompanying spreadsheets) shows the sex birth ratios for all of the countries included in the analysis. When interpreting the birth ratios in Table 2, it is important to keep in mind that this analysis covers 174 country of origin groups for 5 categories of birth order (all, 1st born, 2nd born, 3rd born or later, and unknown birth order). We would therefore expect to see high birth sex ratios for some groups simply as a result of random variation and small sample sizes. To illustrate, during 2014-2018 for women born in Djibouti, there were 22 babies who were the first born with a sex birth ratio of 69.2 whilst 30 babies were the second born with a sex birth ratio of 130.8. However, this has not produced a statistically significant result. This wide variation exists, particularly where sample sizes are smaller (see Figure 3 below).

Figure 3: Plot of Male to Female birth ratio by country of origin of the mother: All births, United Kingdom, 2014-2018



2.14 The greater variation in countries with lower numbers of live births is shown in Figure 3 in relation to the unadjusted birth ratios and compared to the 107 boys to 100 girls ratio used as the threshold for comparisons. Over half the countries (61 per cent) are below the 107 ratio threshold, with most of those that are higher having low sample sizes, for example Cambodia and Iceland where the ratio is 135 and 125 boys to 100 girls respectively. Similar variation is seen below the 107 line, with Barbados where there were 77 boys born for every 100 girls. As noted above, when testing using the Benjamini-Hochberg technique, there were no countries found to be significantly higher than the 107 ratio.

Abortions by Gestation and Ethnicity

2.15 To supplement the sex birth ratio analysis, further analysis has been done to investigate the relationship between gestation (and thus when sex can be identified) and abortion rates, by ethnic group of the woman. See Annex A.

Conclusion

2.16 Following extensive statistical testing, this analysis of sex birth ratios finds **no evidence** for sex selective abortions occurring in the United Kingdom over the period 2014-2018.

Appendix A: Abortions by Gestation and Ethnicity

Data on the sex of the fetus at an abortion is not available, which is why birth registrations data are used in this analysis. We can however analyse abortions data by ethnicity of the mother and gestation to provide wider context around the birth sex ratio analysis. Any evidence for unusual sex birth ratios might imply sex selective abortions were taking place in the population.

This section adds some additional context on abortions by gestation and ethnicity from the annual abortion statistics publication:

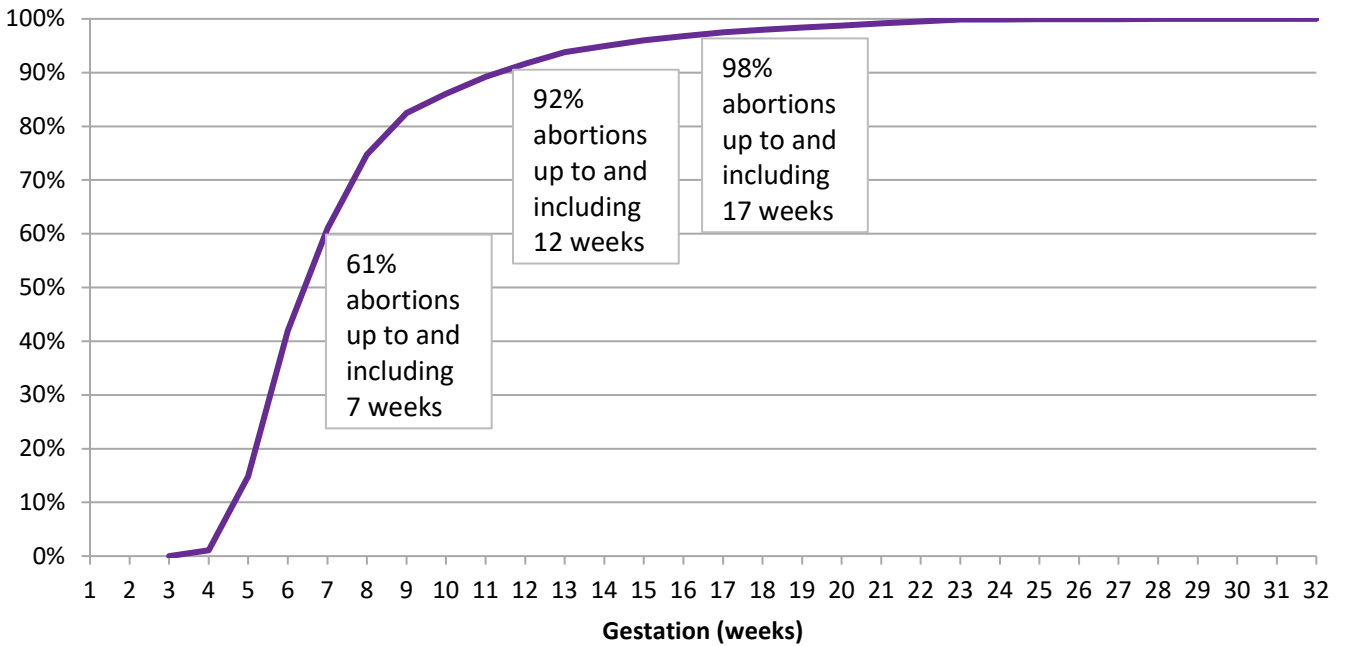
[Abortion statistics for England and Wales, 2019](#)

This covers residents of England and Wales in 2019.

All abortions, by gestation

The total number of abortions for residents of England and Wales in 2019 was 207,384. This was an increase of 3% from 2018, and the highest number recorded since the Abortion Act was introduced. The majority of abortions took place in the early stages of pregnancy: 92% up to and including 12 weeks; 61% up to and including 7 weeks gestation, whilst NHS antenatal sexing of a fetus typically takes place much later in the pregnancy at 18-21 weeks gestation. The majority of abortions are therefore taking place nearly two months before most women could have been told the sex of the fetus in the antenatal screening pathway. It is acknowledged though that some people may seek information on sex using other methods such as tests available on the internet or in private clinics. However, data is not available on the extent to which other methods of sex determination may be being used.

Chart 1: Proportion of abortions by gestation week, England and Wales, 2019

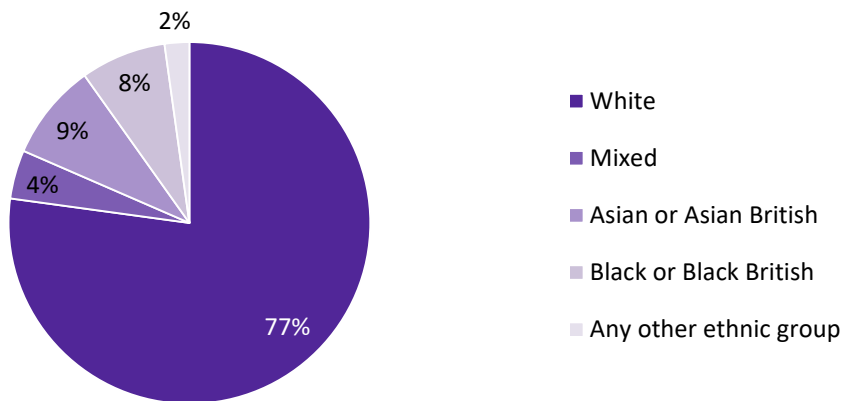


All abortions by ethnic group

Ethnicity was recorded on 97% of the forms received for 2019. Of all ethnicities recorded in the Abortions National Statistics breakdowns; 77% were reported as White, 9% as Asian or Asian British and 8% as Black or Black British.

Chart 2: Abortion statistics split by ethnic group, England and Wales, 2019

2019 Abortion Statistics - Abortions by Ethnicity, England & Wales



All abortions, by gestation and ethnic group

There are variations between the gestation period of an abortion when comparing different ethnicities. The proportion of abortions before 17 weeks range from 96 to 98 per cent depending on the ethnic group of the woman. For abortions carried out before 12 weeks the range between different ethnic groups is from 88 to 92 per cent, with a wider range for abortions carried out before 7 weeks from 39 to 49 per cent depending on the ethnic group of the woman.

Table 1: Abortions by gestation period and ethnic group, residents of England and Wales, 2019

Ethnic group	Total number of abortions	Less than 7 weeks gestation	7-11 weeks gestation	12-16 weeks gestation	17-21 weeks gestation	22 weeks and over gestation
All ethnic groups	207,384	42%	47%	8%	2%	1%
White - British	135,024	41%	48%	8%	2%	1%
White - Irish	1,159	43%	47%	7%	2%	1%
White - Any other white background	18,886	42%	46%	8%	3%	1%
Mixed - White and Black Caribbean	3,634	40%	49%	8%	2%	1%
Mixed - White and Asian	1,217	47%	45%	6%	2%	1%
Mixed - White and Black African	1,265	41%	49%	7%	3%	1%
Mixed - Any Other	2,635	42%	48%	7%	2%	1%
Asian or Asian British - Indian	6,480	46%	43%	7%	3%	1%
Asian or Asian British - Pakistani	4,546	49%	41%	6%	3%	1%

Ethnic group	Total number of abortions	Less than 7 weeks gestation	7-11 weeks gestation	12-16 weeks gestation	17-21 weeks gestation	22 weeks and over gestation
Asian or Asian British - Bangladeshi	1,759	42%	50%	6%	2%	1%
Asian - Any other Asian background	4,581	47%	43%	7%	3%	1%
Black or Black British - African	9,406	44%	45%	7%	3%	1%
Black or Black British - Caribbean	4,403	43%	47%	7%	2%	1%
Black or Black British - Any other	1,529	39%	50%	8%	2%	1%
Chinese	1,394	46%	45%	6%	2%	1%
Any other ethnic group	3,038	44%	46%	7%	3%	1%
Not known/not stated	6,428	40%	51%	7%	2%	0%

For abortions under 7 weeks, 'Asian or Asian British – Pakistani' women have the highest proportion (49 per cent). The Ethnic Group with the lowest proportion having an abortion under 7 weeks gestation was: 'Black or Black British – Other' (39 per cent)

Abortions over 17 weeks account for 3 per cent of all abortions. There is a variation across ethnicities for this gestation. Women of 'Mixed - White and Black African' and 'White - Any other white background' ethnicities, and all Asian ethnicities apart from Bangladeshi all have over 4 per cent of abortions over 17 weeks. Women whose ethnicity is either unknown or not stated have 2 per cent of abortions over this period.

Repeat abortions and ethnic group

Of all women who had an abortion in 2019, 40 per cent had already had one or more previous abortions. Again, amongst women who have had a previous abortion, there was variation across ethnic groups.

47% of Black or Mixed women having abortions in 2019 had previously had at least one abortion, compared with 33% of Chinese or other ethnic group.

Table 2: Percentage of women who had one, two and three or more previous abortions, by ethnic group, England and Wales, 2019

Ethnic group	No previous abortions	1 previous abortion	2 previous abortions	3 or more previous abortions	Total
All ethnicities	60%	29%	8%	3%	100%
White	60%	29%	8%	3%	100%
Mixed	53%	31%	11%	5%	100%
Asian	66%	25%	6%	3%	100%
Black	53%	32%	11%	5%	100%
Chinese or other	67%	24%	6%	3%	100%
Not known/not stated	64%	26%	7%	3%	100%

Conclusion

This section shows that abortions vary by ethnicity of the mother, gestation period and whether the mother has had previous abortions.

Further Information

Enquiries

Enquiries about the data or requests for further information should be addressed to:

Birth Ratio Statistics
Department of Health and Social Care
39 Victoria Street
Westminster
London
SW1H 0EU

e-mail: birthratios@dhsc.gov.uk

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Links

This bulletin for birth ratio analysis for 2014-2018, and previous reports, can be found on GOV.UK:

<https://www.gov.uk/government/collections/gender-birth-ratios-for-the-uk>

Related links

See abortion statistics, 2019:

<https://www.gov.uk/government/statistics/abortion-statistics-for-england-and-wales-2019>

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