Birmingham City Council

Information briefing

Report from: **Strategic Director for People**

Report to: **Health and Social Care Overview and Scrutiny Committee**

Date: **19th January 2016**

Title: **Infant Mortality**

1 Background

The Birmingham Health and Wellbeing Strategy identified a key action to facilitate the outcome of improving Child Health was "to review the intelligence related to infant mortality". This report to the Health Overview and Scrutiny Committee outlines some of the current intelligence.

Previous reports presented to the Health and Wellbeing Board have shown that:

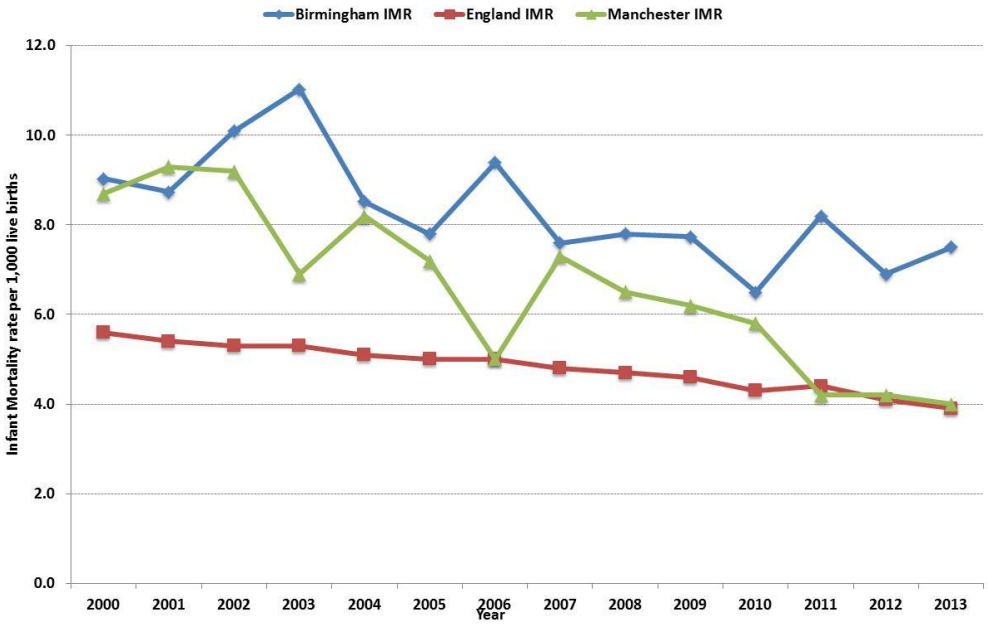
- Birmingham has one of the highest infant mortality rates in England
- Early neonatal deaths contribute most to the total infant mortality rates and early neonatal deaths account for most of the local variation
- Gestational age predicts survival and very few survive if born before 22 weeks
- Nearly a fifth of infant deaths in Birmingham occur in foetuses with a gestational age of 21 weeks or less
- Maternal ethnicity is not recorded in over a third of infant deaths
- Gestational age is not known in over 10% of infant deaths

2 Detail

Infant mortality is defined as deaths in children aged less than 12 months. It has long been accepted as one of the best indicators of the overall health of a nation. The rate in England has dropped dramatically over the last century and now the numbers of infant deaths are fortunately low. But each infant death is a tragic experience for every family.

Birmingham has one of the highest infant mortality rates in England and this is shown in Figure 1. Manchester is also shown as it has reduced significantly in the past 5 years. These facts have not changed since the last report. This has not significantly changed in 2014, if anything the gap with England is widening.

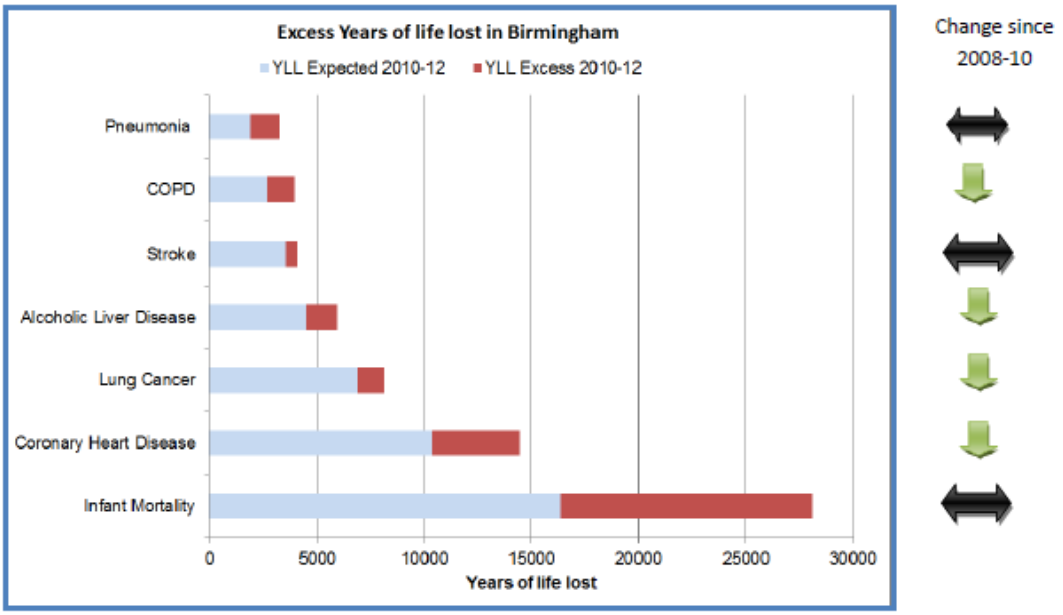
Figure 1 Trend in Infant Mortality Rates (IMR) between 2000 and 2013



Source: ONS

Infant mortality is a key driver of life expectancy as every early death has a dramatic effect on the calculation. It is most starkly seen in “years of lost life” where a death at aged one loses 74 years (with 75 years as the bench mark) whilst a death at 74 only loses one life year. Infant mortality is the top cause of our life expectancy gap. This is seen in Figure 2 which shows the key causes of the life expectancy gap with England.

Figure 2 Conditions in Birmingham Accounting for 70% of the Excess Years of Life Lost with England (2010-2012)



Source: ONS

Infant mortality is not only a significant outlier by itself in the NHS Outcome Frameworks; it causes adverse effects upon life expectancy in both the Public Health and NHS Outcomes Frameworks

This local information suggests that an extra 50 infants in Birmingham don't survive beyond 1 year compared to that expected from the national rate. This has not changed recently.

Whilst we are an outlier for Infant Mortality Rates (under 1), we are not for Child Mortality Rates which is defined as deaths in children aged 1-17 (Source CHIMAT – child health profiles). The underlying associations for deaths in infancy also affect deaths in childhood (deprivation etc.). The big discrepancy in the two rates cannot easily be explained.

3. Definitions

An understanding of the definitions is vital to comprehend some of the issues in Birmingham. These have been defined in legislation and reported by the Office for National Statistics (ONS). These are shown below:

Miscarriage - born before 24 weeks completed gestation and which did not, at any time, breathe or show signs of life
Stillbirth – born after 24 or more weeks completed gestation and which did not, at any time, breathe or show signs of life
Early neonatal deaths – deaths under 7 days
Late neonatal deaths – deaths between 7 and 28 days
Post neonatal deaths – deaths between 28 days and 1 year

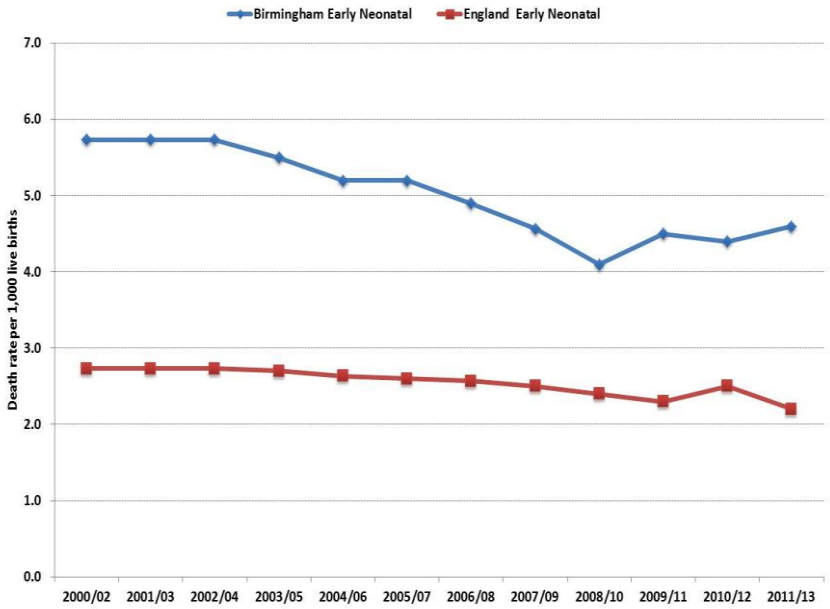
Neonatal mortality rates include all deaths between 0 - 28 days (both early and late neonatal deaths) with all live births being the denominator. Infant deaths are defined as all deaths under 1 year of age and include neonatal and post-neonatal deaths.

Perinatal mortality relates to all stillbirths and early neonatal deaths and if described as a rate, uses all stillbirths and live births as a denominator.

4 Trend analysis

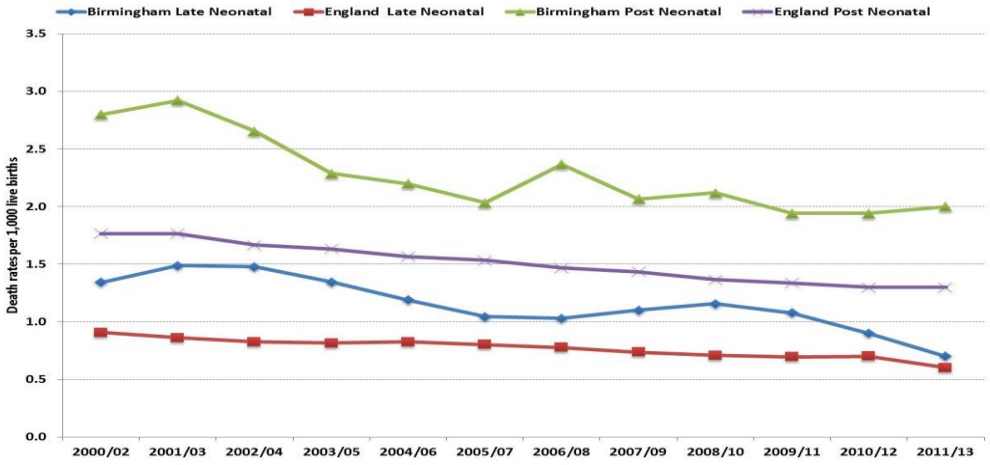
Infant mortality rates can be broken down to look at early and late and post neonatal periods.
The updated trends in Birmingham are shown in Figure 3 and Figure 4

Figure 3 Three Year Rolling Early Neonatal Death Rates (2000/2 – 2011/13)



Source: ONS Deaths/Births

Figure 4 Three Year Rolling Late and Post Neonatal Death Rates (2000/2 – 2011/13)

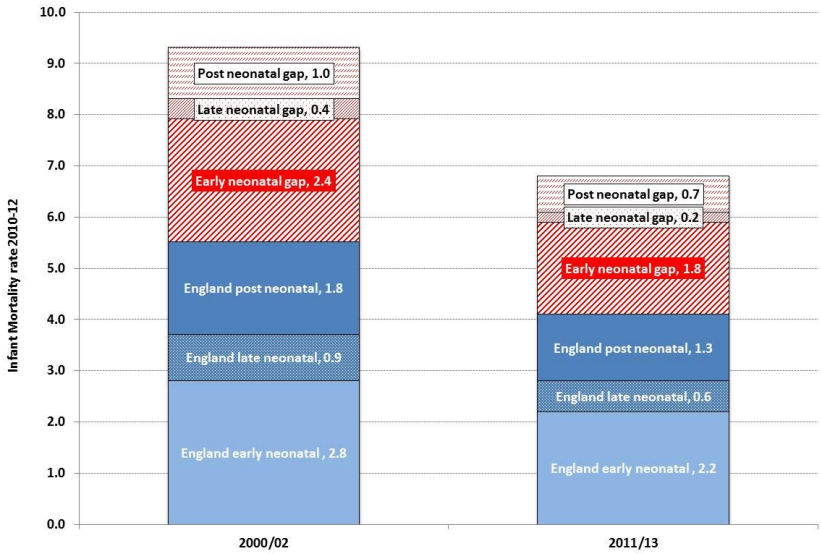


Early neonatal deaths contribute most to the total infant mortality rates and early neonatal deaths account for most of our local variation. The gap with England has not closed. We still have 75% more early neonatal deaths than the national average.

This is shown more clearly in Figure 5. It shows the excess in Birmingham for the three main periods in infancy compared to the national average and the change over the past decade. Birmingham has closed some of the gap with England but the biggest excess, both numerically and proportionally is in the early neonatal period.

The excess of deaths in this early period accounts for 70% of the total gap with the national average. The increases seen in the other two categories are small, even the increase in the post neonatal period only accounts for a fifth of the overall excess compared to England.

Figure 5 English Infant Mortality and the Birmingham Excess by Neonatal Time Period, 2000/2 and 2011/13

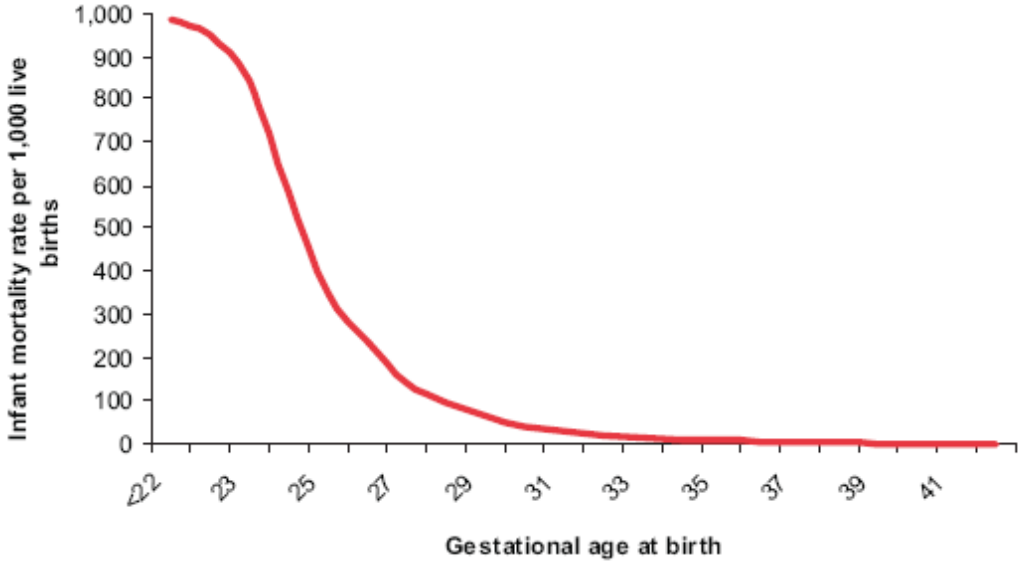


5 Gestation at Birth

A pregnancy which lasts the full 40 week term results in optimal growth and development. The gestational age at birth is the biggest influence on survival. Babies with a very low gestational age are much more likely to die of immaturity; whilst more mature babies are more likely to die from other causes especially congenital causes. There is now considerable research in this field, both in this country and internationally.

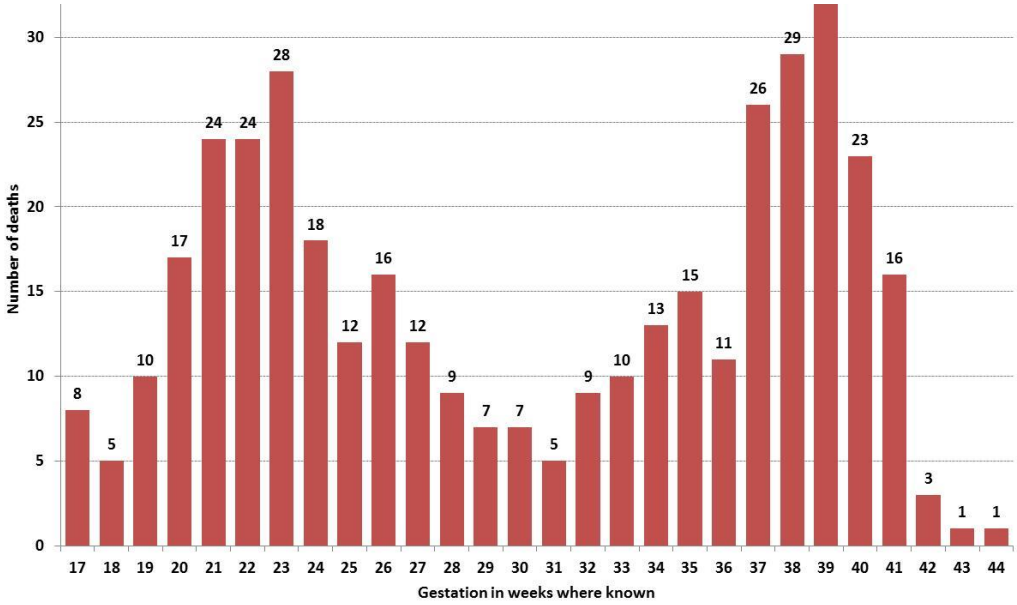
The National Perinatal Epidemiology Unit based in Oxford is an authority in this area. It has shown that there is a real increased risk of infant death with decreased gestational age. This is shown using national data in Figure 6. This has been mirrored by other centres outside England. This research indicates that very few of those born at less than 22 weeks gestation survive. This position has not changed in the intervening 10 years despite advances in medical technology.

Figure 6 Infant Mortality Rate by Gestational Age for England and Wales, 2005



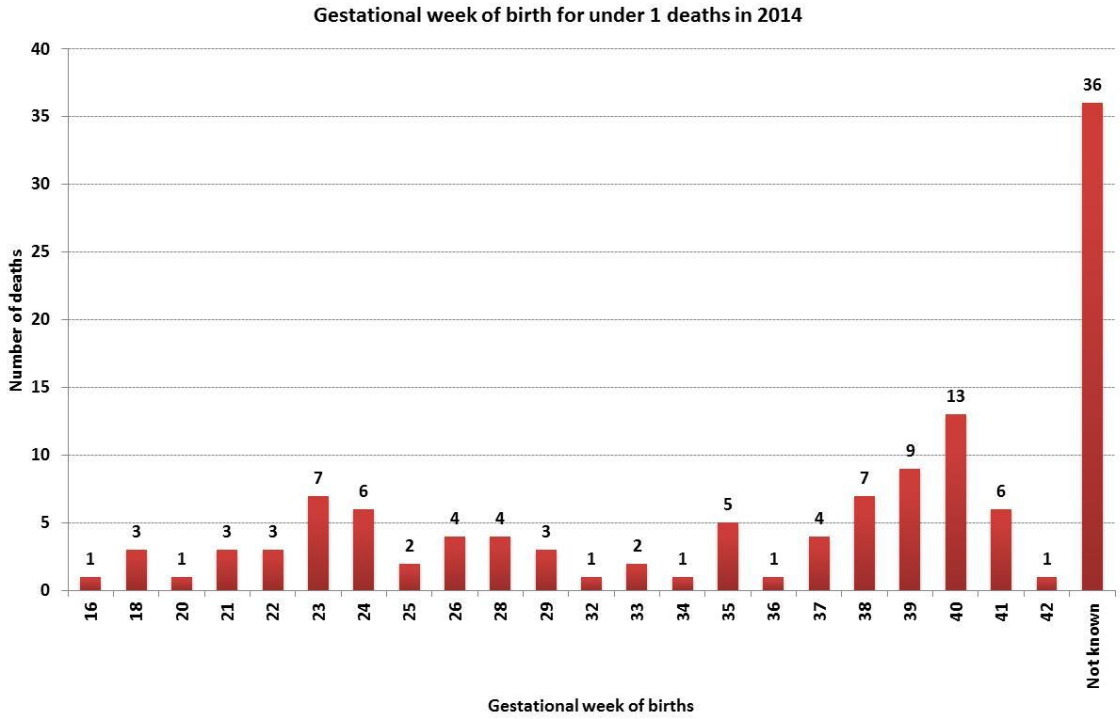
Statistics relating to gestational age stopped routinely being reported nationally over 8 years ago. Thus there is less certain local intelligence on this important parameter. We have used hospital data to look at the local picture. It is unfortunate that a considerable minority (at least 25%) of births have no gestational data. Figure 7 shows the local picture over the past 4 years.

Figure 7 Deaths by Gestation at Birth (April 2009 to December2013)



Whilst the numbers are smaller, Figure 8 shows the picture for 2014. They have some similarities, especially in the number of deaths coded where the gestational age is under 22 weeks and even at 17 weeks – when there is no international evidence for survival.

Figure 8 Gestational Age at Birth of Infant Deaths in 2014



Source: ONS Deaths/Birth & SUS

The other feature of note is that nearly 50% have no coded gestational age. We have good evidence that most of these births die within 24 hours and are very likely to be early gestational ages.

Thus approximately a fifth of all infant deaths in Birmingham (where the gestational age is known) occur in foetuses where the best evidence has shown that the chance of survival is negligible. This has not recently altered.

This would account for at least a fifth of our overall infant mortality rate or approximately a third of our excess.

The definitions related to infant mortality have been stated. There is individual interpretation of "shows signs of life". The professional body for Obstetricians has guidance on this as well as death certification (a duty of either a doctor or the coroner). These facts would suggest that there is a need for more consistent local interpretation which is in line with national and international practices.

A useful development would be an audit of a sample of deaths with a gestational age under 22 weeks. This is being proposed in the Staffordshire/Shropshire/Black Country Maternity Network.

Inclusion of foetuses under 22 weeks severely hampers our analysis of the causation of avoidable infant deaths in the City. A consistent approach to these unfortunate events is urgently needed.

5 Ethnicity

Unfortunately ethnicity is not recorded on death certificates. However it is possible to match maternal data with infant data and this is now published at a national level. Thus ethnicity is usually of the mother, and not necessarily the infant. Table 1 shows that there is variation in infant mortality by maternal ethnicity. It should be noted that there is an increased infant mortality rate in all ethnic groups in Birmingham compared to that seen in England and that the greatest difference is in the White group.

Table 1 Infant Mortality by Maternal Ethnicity (per 1000 live births

Ethnicity	Birmingham 2012	England (2010)
White	5.3	3.6
Asian	4.4	7.0
Black	7.1	6.7
Other	4.3	4.4
Not Stated	7.9	4.3
All	6.9	4.1

Source: ONS Deaths & SUS

The technique has been replicated locally although there are a number of data constraints. Small numbers are excluded from the published information and are shown in Table 2.

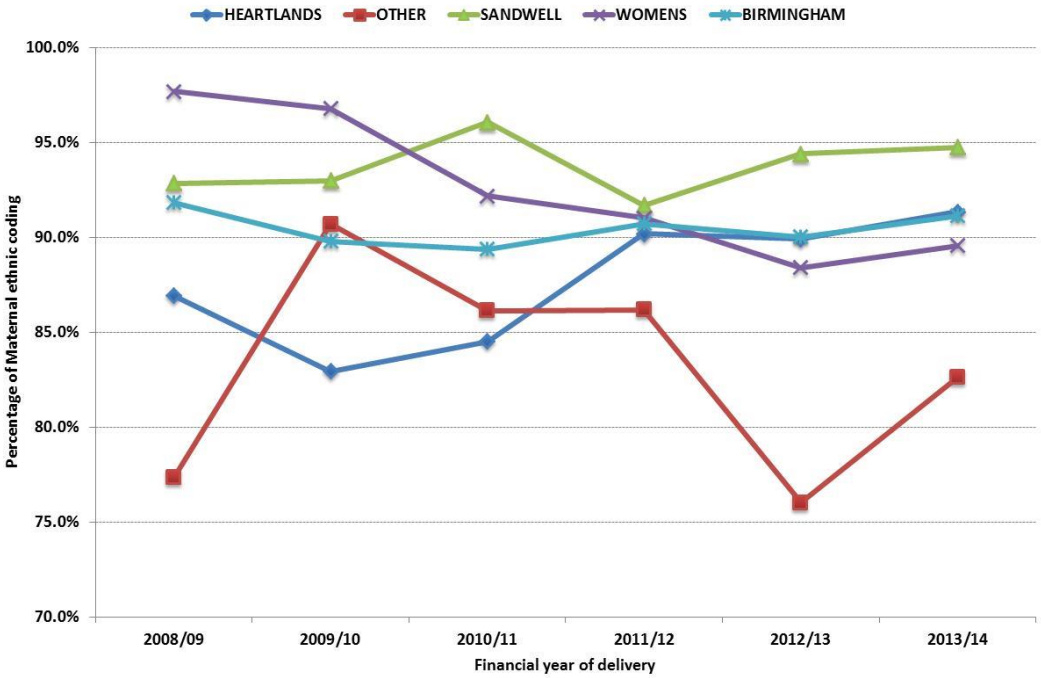
Table 2 Infant Deaths by Gestational Age and Maternal Ethnicity (April 2009–December 2013)

Ethnic breakdown	22 weeks and under	23 -29 weeks	30-34 weeks	35-39 weeks	40+ weeks	Gestation unknown	Total
White	32.5%	40.0%	21.4%	19.5%	32.6%	11.3%	22.2%
Mixed	5.0%	4.0%	0.0%	4.4%	9.3%	1.6%	3.4%
Asian	26.3%	24.0%	35.7%	39.8%	37.2%	17.8%	26.4%
Black	17.5%	5.0%	4.8%	11.5%	2.3%	4.9%	7.5%
Any other ethnic group	10.0%	1.0%	0.0%	2.7%	7.0%	4.0%	4.0%
Ethnic group not known	8.8%	26.0%	38.1%	22.1%	11.6%	60.3%	**36.5%**

The table shows that the number of infant deaths to White mothers is just over 22%, as opposed to over 26% for Asian mothers However the pattern is quite different with many more infant deaths to British women occurring under 29 weeks gestation whereas many more of the deaths to Asian mothers occurs between 30 and 39 weeks.

A major problem in this analysis is the poor coding of both ethnicity and gestation. This is seen in the table where maternal ethnicity is not recorded in over a third of infant deaths and gestation is not known in over 10% of infant deaths. This is a major obstacle in any further analysis or comparison with national data. Where national comparators of coding are available, the Birmingham picture is worse. Ethnic information is over 95% complete at a national level. Table 3 shows the variation in ethnicity coding at delivery by major provider in Birmingham.

Table 3 Data Completeness of Maternal Ethnicity at Delivery by Provider Unit



6 Summary

This report has shown the following:

1. Birmingham has one of the highest infant mortality rates in England
2. Early neonatal deaths contribute most to the total infant mortality rates and early neonatal deaths account for most of the local variation
3. Gestational age predicts survival and very few born at less than 22 weeks gestation survive
4. Nearly a fifth of infant deaths in Birmingham occur in foetuses with a gestational age of 21 weeks or less
5. Maternal ethnicity is not recorded in over a third of infant deaths
6. Gestational age is not known in over 10% of infant deaths and in 2014 nearly 30%
7 The inclusion of this group of “infant death” hampers meaningful analysis of the remainder of the deaths in infants under 1 year.

The following people have been involved in the preparation of this board paper:

Contact details: Adrian Phillips – Director of Public Health
Email: adrian.x.phillips@birmingham.gov.uk
Tel: 0121 303 2360