NDAU 2017 Report

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Data Description & Population Characteristics

1 Data Completeness

This section shows changes in data completeness for key data items within the National Neonatal Research Database (NNRD) between 2007 and 2017. Results are categorised based on the infant's year of final neonatal discharge. Table 1a shows the number of infants, episodes of care, and daily data records that were available for analysis in each year.

Included in 2014, 2015 and 2016 are data from neonatal units in England, Scotland and Wales. For 2017, only data from England and Wales are included due to new restrictions on processing Scottish data. For this reason some totals will appear smaller this year than previous years.

Table 1a Summary of neonatal admissions and daily data in the National Neonatal Research Database by final neonatal discharge year, including infants discharged between 1st January 2007 and 31st December 2017

Year of Final Discharge	Number of infants	Number of neonatal admissions for these infants	Number of daily care records for these infants
2007	37,235	42,451	528,697
2008	44,473	51,540	656,288
2009	52,819	61,372	764,304
2010	62,643	73,131	879,364
2011	72,409	84,063	1,002,776
2012	79,281	91,397	1,040,414
2013	82,297	94,245	1,038,471
2014*	90,253	103,800	1,114,706
2015*	96,556	110,977	1,157,091
2016*	100,762	115,462	1,185,400
2017	100,182	114,236	1,117,832
Total	**818,910**	**942,674**	**10,485,343**

* includes neonatal units in England, Scotland and Wales

Data completeness for three key episodic data items and three daily data items were compared across years. Figure 1a shows the change in completeness for episodic data items between each year and figure 1b shows the change in completeness for daily data items.

Figure 1a Changes in data completeness for key episodic variables by final neonatal discharge year for infants discharged between 1st January 2007 and 31st December 2017

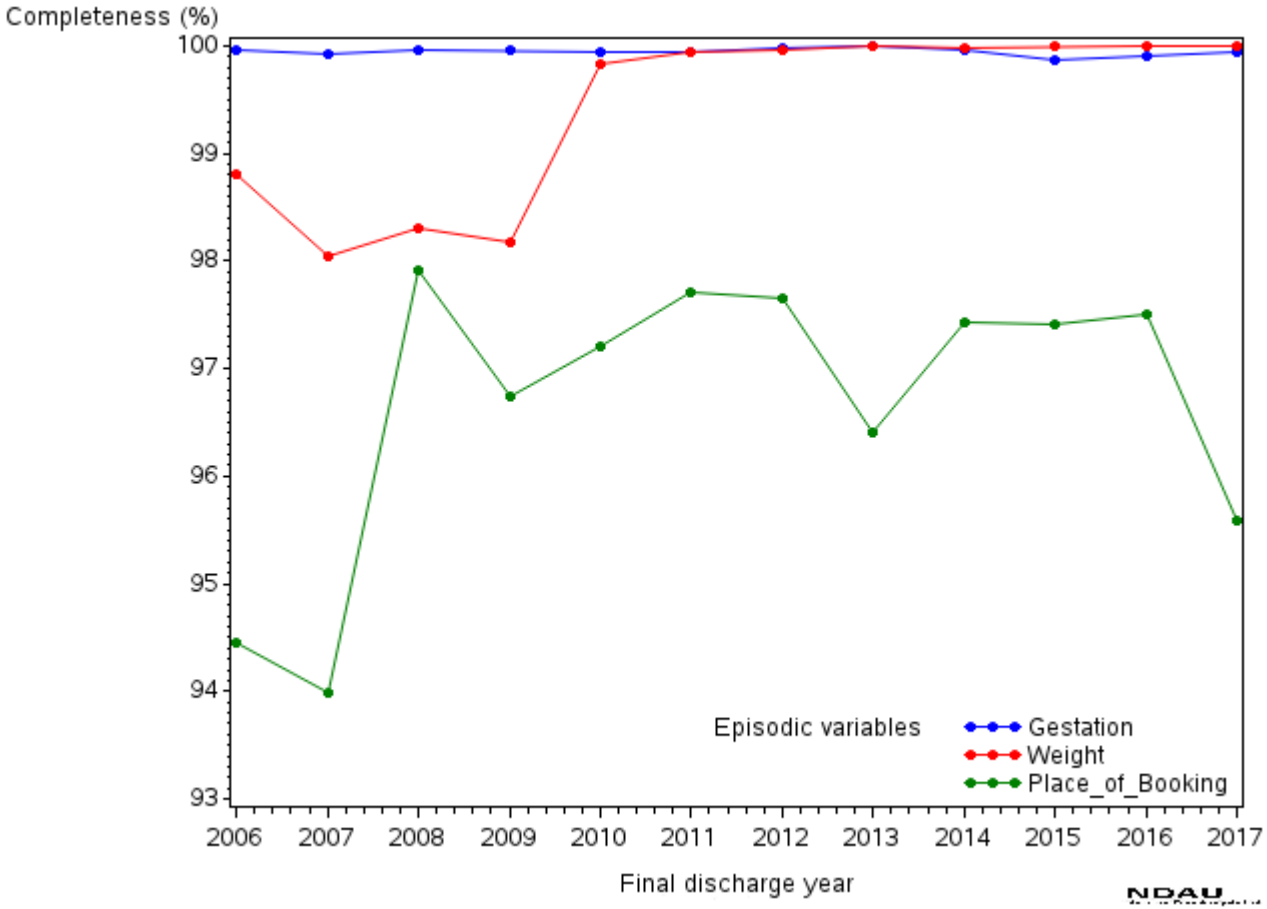
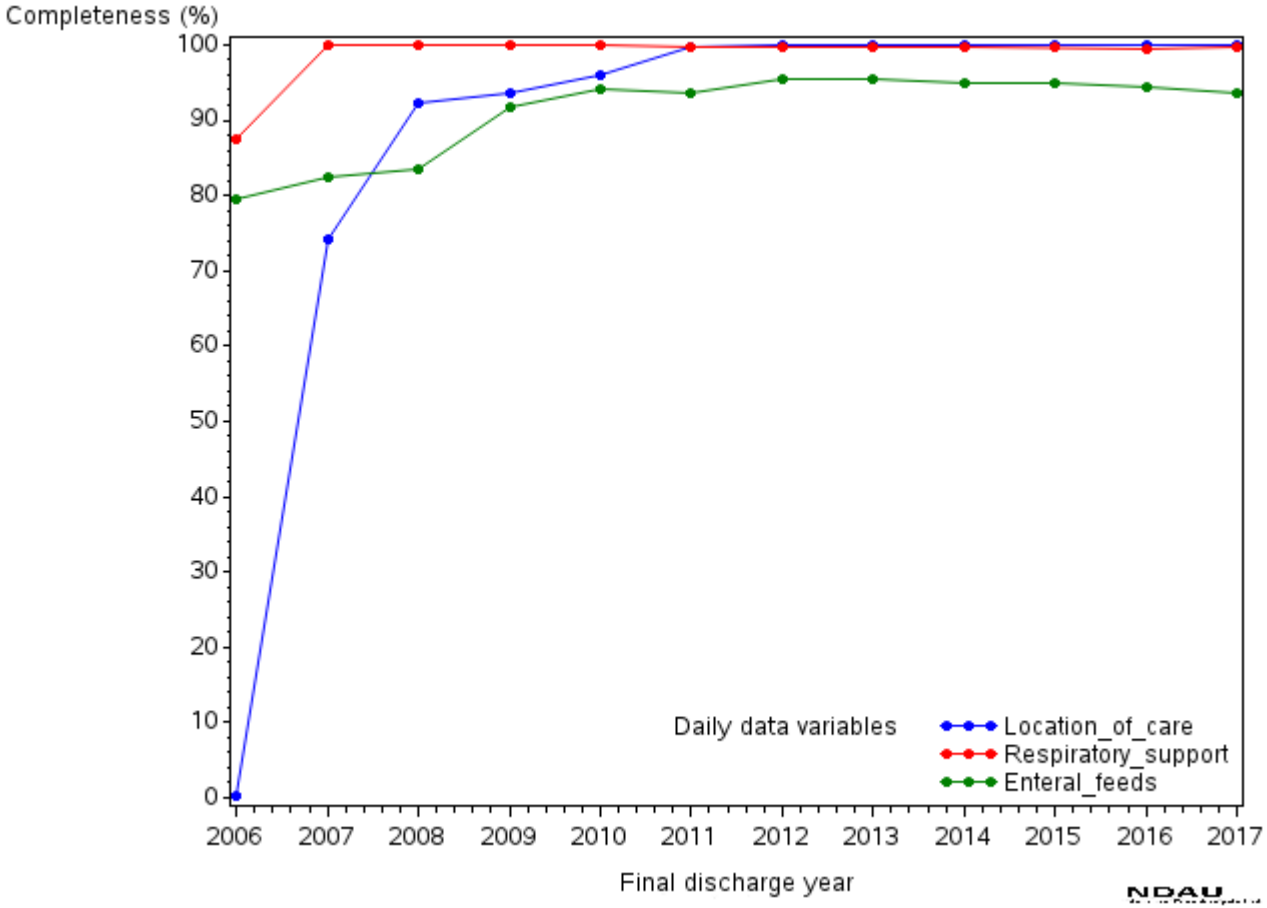


Figure 1b Changes in data completeness for key daily data variables by final neonatal discharge year for infants discharged between 1st January 2007 and 31st December 2017



2 Birth weight by gestational age

There were 100,182 infants discharged from neonatal care for 167 neonatal units in England, and Wales. A breakdown of these infants is available in table 2a by birth weight and gestational age.

Table 2a Number of infants by birth weight category and gestational age category in the National Neonatal Research Database by final neonatal discharge year, including infants discharged between 1st January 2017 and 31st December 2017

Birth weight category (in grams)	Number of infants (% of all infants)	Gestational age category (in completed weeks)	Number of infants (% of all infants)
≤ 999 g	2,664		
1000 – 1499 g	4,563	**≤ 25 weeks**	1,154
1500 – 1999 g	9,116	**26-32 weeks**	9,547
2000 – 2999 g	32,674	**33-36 weeks**	25,430
≥3000 g	51,161	**≥ 37 weeks**	63,989
Missing	4	**Missing**	62
Total	**100,182**	**Total**	**100,182**

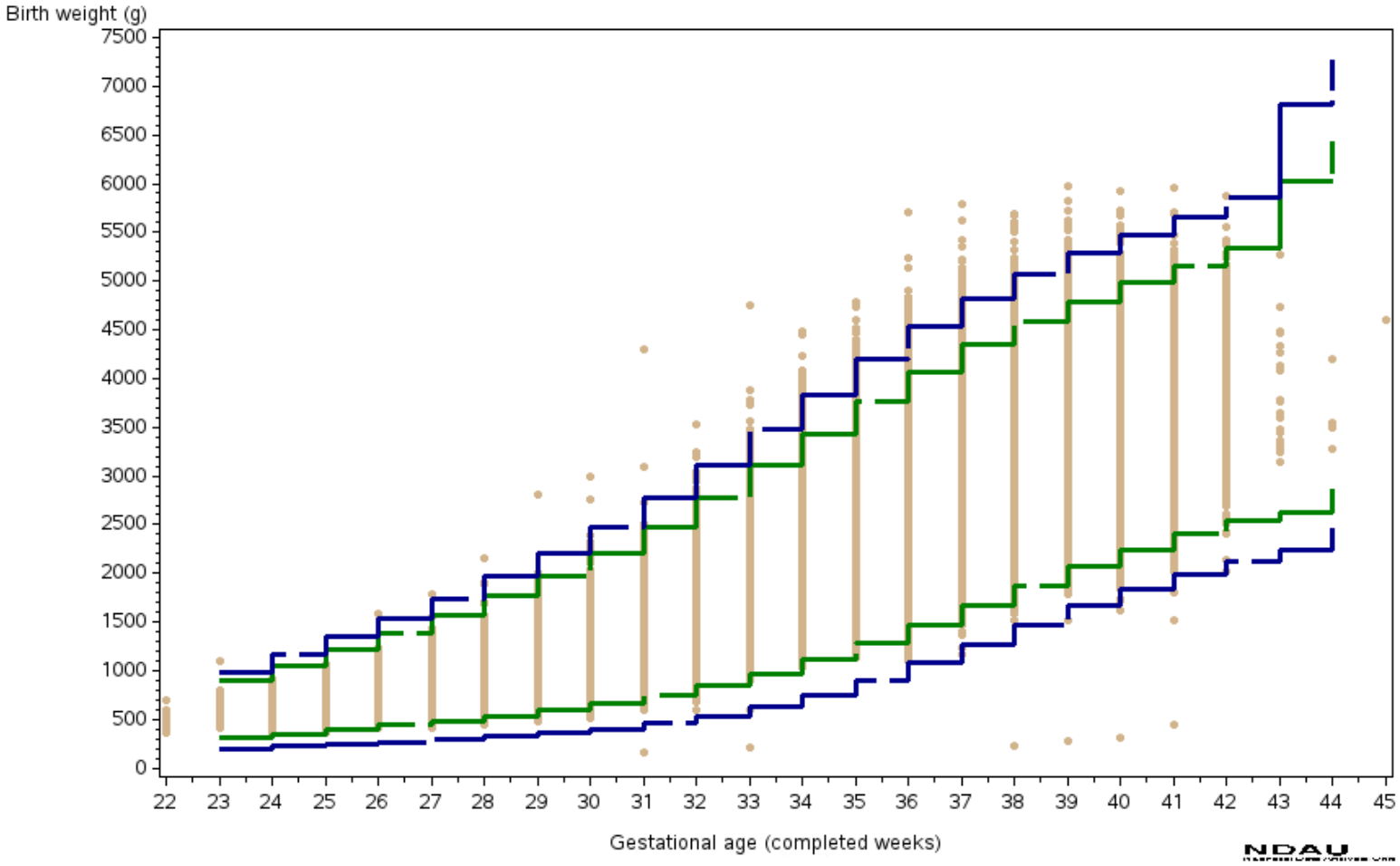
Figure 2a demonstrates the distribution of birth weights for each gestational age week for infants with a final discharge between 01 January and 31 December 2017. The limits on this graph are calculated using the UK-WHO growth charts and represent 3 standard deviations (green) and 4 standard deviations (blue) from the gestational age-specific mean[1]. The purpose of these lines is to show records which are potential birth weight outliers or erroneous entries. However, the birth weight distribution of infants admitted to neonatal units may differ from this reference population, particularly as the UK-WHO growth charts represent standards, not averages.

[1] Wright CM, Williams AF, Elliman D, et al. Using the new UK–WHO growth charts. BMJ 2010;340:c1140.

Figure 2a

Birth weight distribution by gestational age (completed weeks)

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)



3 Deprivation

The index of multiple deprivation (IMD) 2015 is an overall measure of deprivation in England for a defined geographical area or Lower Super Output Area (LSOA)[2]. Similar indices of deprivation exist for Wales (2014 WIMD). These measures are defined by the following key dimensions of deprivation: (i) income, (ii) employment, (iii) health and disability, (iv) education, skills and training, (v) barriers to housing and services, (vi) living environment, and (vii) crime. The higher the IMD score the greater the deprivation.

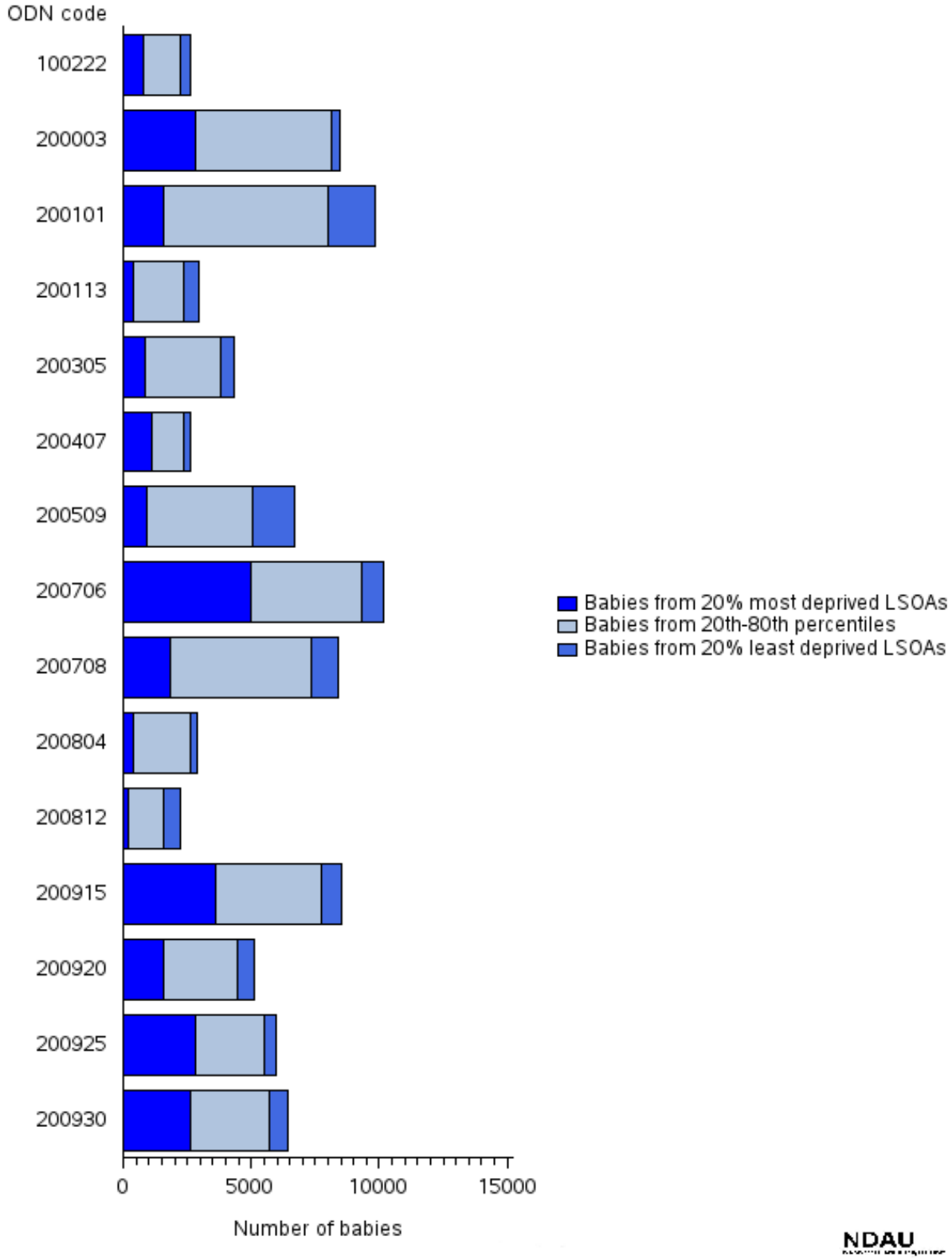
Each infant was assigned the IMD score of the LSOA matching the mother's home post code as recorded at an infant's admission for units in England and Wales. A score was available for 87% (87,182/100,182) of all infants. Due to the asymmetry of the IMD score, the rank of the score is often used instead. The scores are ranked within the overall population to determine the 20% most and least deprived LSOAs. Shown by neonatal operational delivery network in figure 3a, 12.6% (10,962/87,182) of infants are of mothers living in the top quintile, 30.3% (26,399/87,182) are from the bottom quintile, and 57.2% (49,821/87,182) are from the middle three quintiles for deprivation.

[2] Department for Communities and Local Government. The English Indices of Deprivation 2015.

Figure 3a

Number of infants whose mothers are in 20% least deprived, 20% most deprived, and 20-80th deprivation percentiles of LSOAs by neonatal operational delivery network of first admission in England (IMD 2015) and Wales (WIMD 2014)

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)



4 Maternal ethnicity

Maternal ethnicity data was entered for 67.9% (68,072/100,182) of all infants admitted to neonatal care in England and Wales. Maternal ethnicity data was missing (32.1%) for the remaining 32,110 infants. The overall summary can be found in table 4a, including detail on the ethnicities in each category, while information by neonatal operational delivery network of first admission can be seen in figure 4a.

Table 4a First admissions to neonatal care by maternal ethnicity

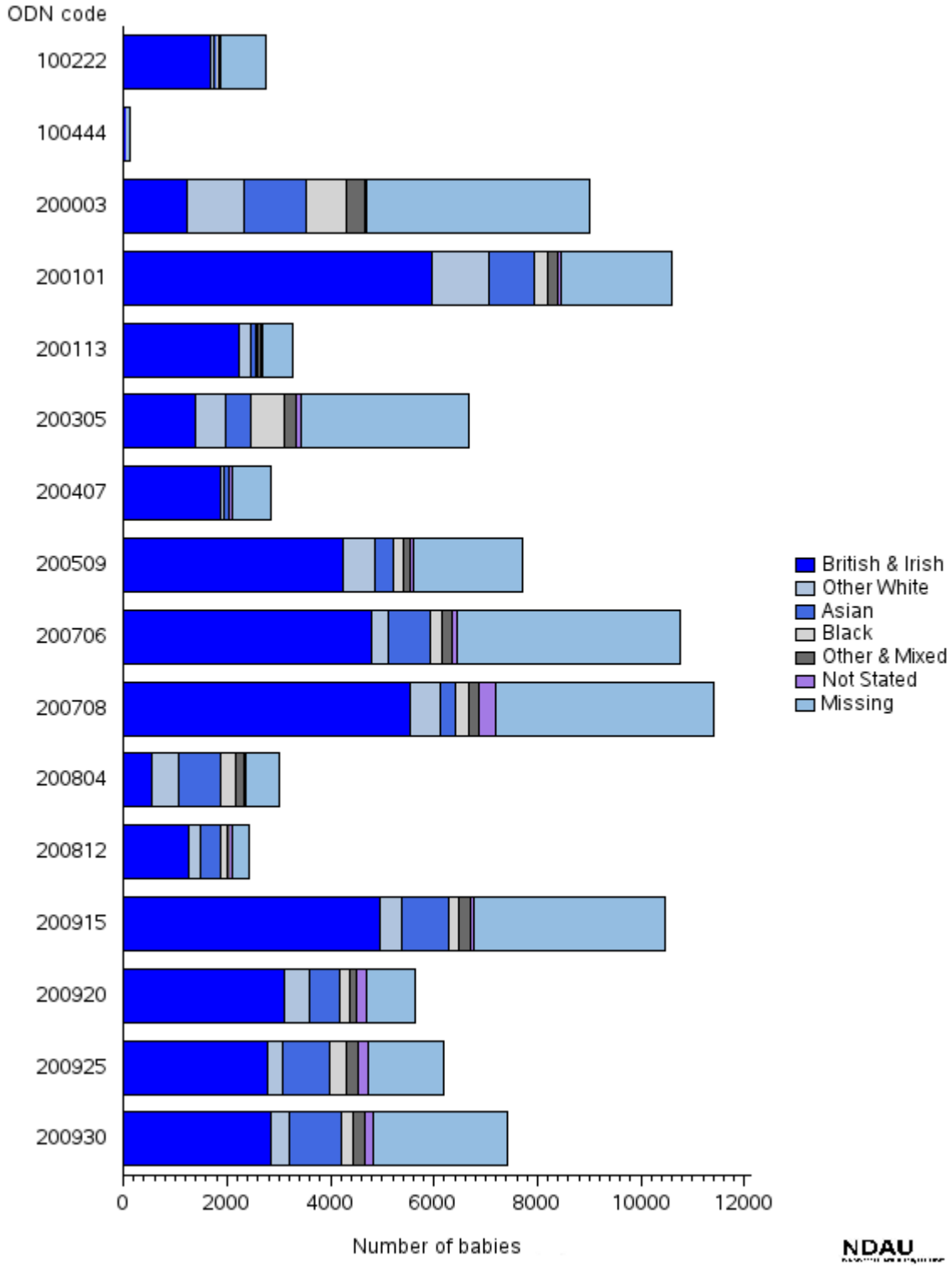
(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)

Maternal ethnicity category	NHS classification[1]	Number of infants with ethnicity data entered	Percentage of infants with ethnicity data entered
British & Irish	British	44,108	64.8
	Irish	385	0.6
Other White	White other	6,927	10.2
Asian	Asian other	1,640	2.4
	Bangladeshi	1,151	1.7
	Chinese	383	0.6
	Indian	2,531	3.7
	Pakistani	3,252	4.8
Black	Black African	2,563	3.8
	Black Caribbean	798	1.2
	Black other	459	0.7
Other & Mixed	Any other ethnic group	1,362	2.0
	Mixed other	334	0.5
	White & Asian	206	0.3
	White & Black African	183	0.3
	White & Black Caribbean	391	0.6
Not Stated	Not stated	1,399	2.1
	Total	**68,072**	**100**

Figure 4a

Maternal ethnicity distribution by neonatal operational delivery network of first admission

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)



5 Multiple Births

The type of pregnancy was known for 99.9% (100,115/100,182) of infants admitted for neonatal care in England and Wales. Of these infants admitted for neonatal care 10.3% (10,266/100,115) were from a multiple pregnancy and 89.7% (89,849/100,115) were from a singleton pregnancy.

The proportion of single and multiple births by neonatal operational delivery network of first admission for all infants are in figure 5a.The number of infants from multiple pregnancies, as a proportion of all infants admitted to a neonatal operational delivery network, is detailed by neonatal operational delivery network of first admission in figure 5b.

Figure 5a Single and multiple births by neonatal operational delivery network of first admission for all infants

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)

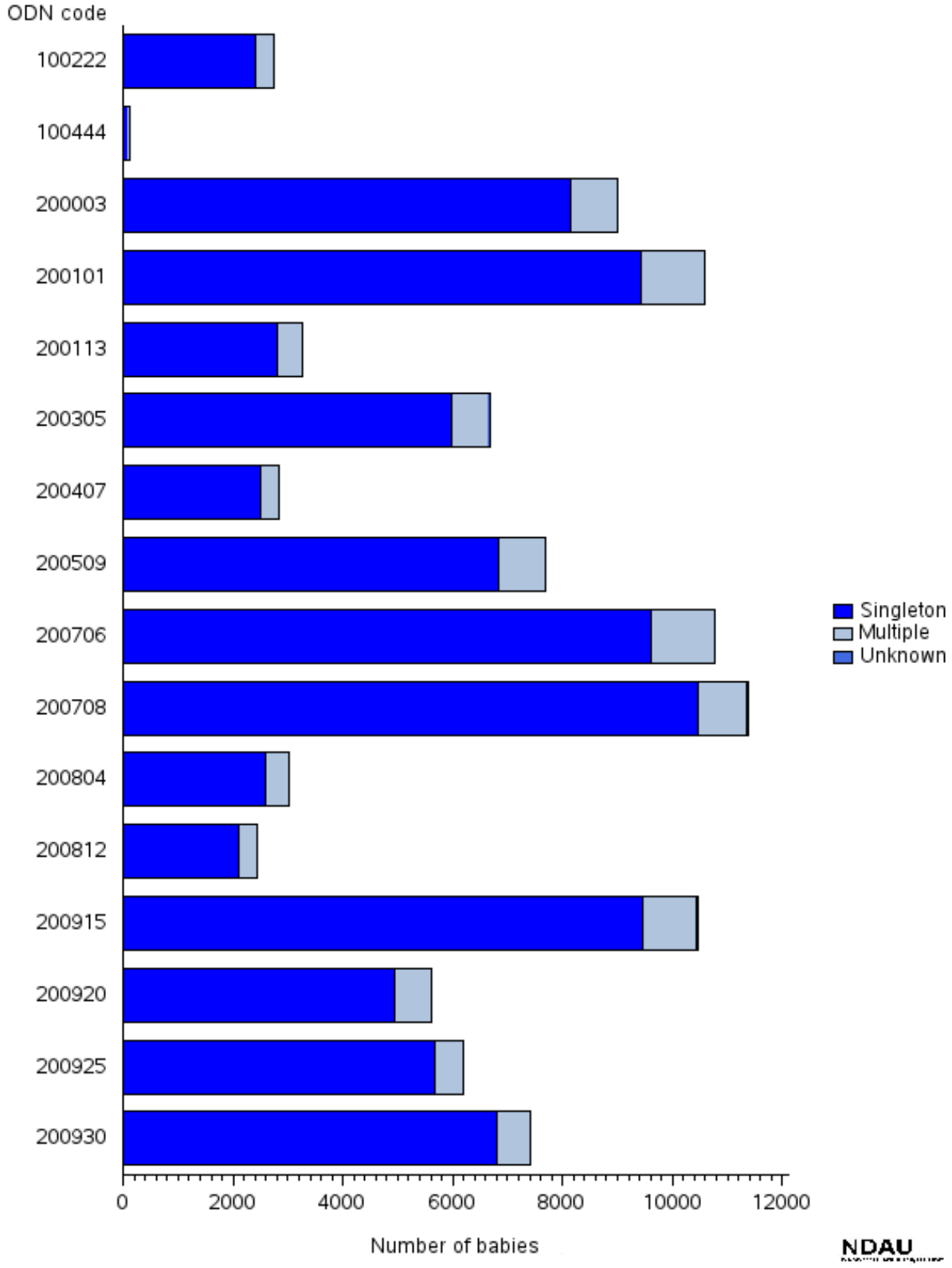
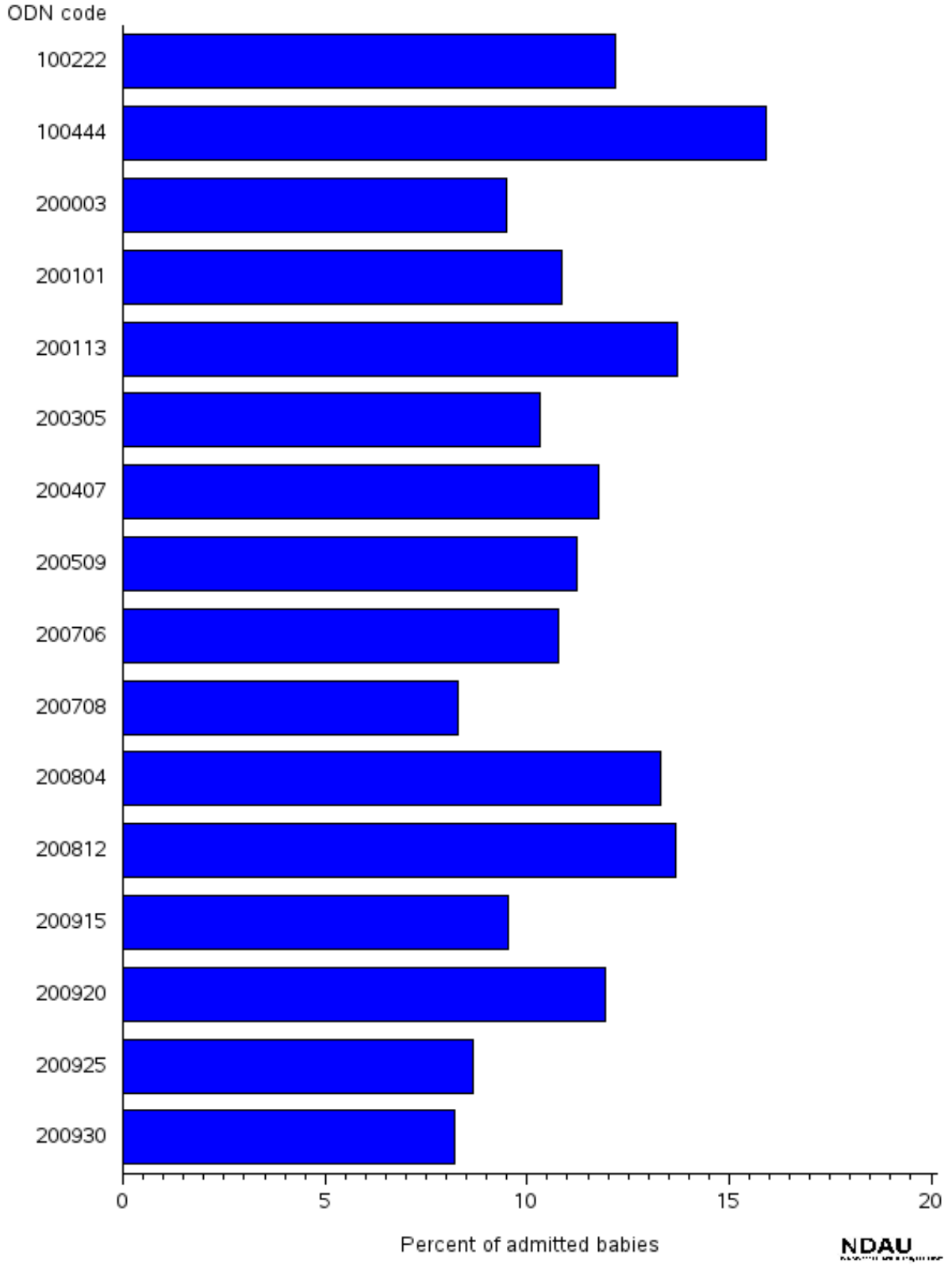


Figure 5b Multiple births as a percentage of total births, by neonatal operational delivery network of first admission

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)



Service Provision

6 Care days

Level of care was calculated for each day of an infant's stay and was defined in 2011 by British Association of Perinatal Medicine (BAPM). All care days in the 2017 calendar year were included in the analysis regardless of when the infant was discharged. This is in contrast with other analyses in this report that only include infants with a final discharge in 2017.

Information for the daily level of care was available for 99.9% (1,116,628/1,117,018) of care days for neonatal units in England and Wales. The remaining 390 days did not have daily level of care entered.

Of the 1,116,628 care days where the level of care was available, 13.7% of care days provided were classified as intensive care, 20.1% as high dependency care, 64.8% as special care and 1.4% as normal care. Care days recorded as taking place in transitional care or outside of the neonatal unit have been included in this analysis. A summary of the total number of care days at all levels can be seen in table 6a.

In total, 10.1% of all recorded days of neonatal care were provided by Special Care Units (SCUs), 39.3% were provided by Local Neonatal Units (LNUs) and 50.6% were provided at Neonatal Intensive Care Units (NICUs). The majority of care at higher levels were provided in NICU environments, with approximately 80% of intensive care days and approximately 59% of high dependency care days taking place in these units. Table 6b shows the number of care days provided by each level of neonatal unit nationally.

Table 6a Total number of care days, by level of care received, between 1st January 2017 and 31st December 2017

Level of care	Number of recorded days of care	Percent
Intensive care	152,782	13.7
High dependency care	224,617	20.1
Special care	723,179	64.8
Normal care	16,050	1.4
Total	**1,116,628**	**100**

Table 6b Total number of care days provided in neonatal units, by designation, between 1st January 2017 and 31st December 2017

Unit type	Intensive Care	High Dependency Care	Special Care	Normal Care	Proportion of care days provided in these units
SCU(n=)	2,400	11,533	96,727	2,663	10.1
LNU(n=)	27,963	80,876	322,473	7,009	39.3
NICU(n=)	122,419	132,208	303,979	6,378	50.6
Total	**152,782**	**224,617**	**723,179**	**16,050**	**100**

7 Care provision by neonatal operational delivery network of maternal booking

In England and Wales, neonatal services are structured into managed clinical networks, designed so that all care for at least 95% of their booking population can be delivered within the hospitals that constitute the network.

Overall, 93.7% (93,892/100,182) of infants had information available on maternal booking networks within England and Wales. Of these 93,892 infants, 99.3% (93,270/93,892) had a known location of booking and a known place of birth whilst the remaining 622 infants were born in unknown locations.

For 98.5% (91,825/93,270) of infants (with a known booking and place of birth network within England and Wales) place of birth was in the same neonatal operational delivery network of their mother's booking hospital, 1.5% (1,445/93,270) were born outside of their mother's neonatal operational delivery network at booking. Table 7a shows the number of infants born in and outside of their mothers neonatal operational delivery network of booking in England and Wales, and Figure 7a shows these results for each neonatal operational delivery network in England and Wales.

Table 7a Place of birth by neonatal operational delivery network of maternal booking for all infants booked for delivery in hospitals in England and Wales, for infants discharged from neonatal care between January 1st 2017 and 31st December 2017

Location	Number of infants	Percent
Born inside of booked network	91,825	98.5
Born outside of booked network	1445	1.5
Total	**93,270**	**100**

Of known locations of booking, 97.9% (91,879/93,892) of infants received all of their care inside the mother's network of booking while 2.1% (2,013/93,892) of infants received some of their care outside the mother's network of booking. Table 7b shows the number of infants receiving all or some of care inside or outside of network of booking, and figure 7b shows these results for each neonatal operational delivery network in England and Wales.

Table 7b Neonatal care received by infants based on neonatal operational delivery network of maternal booking for infants discharged from neonatal care between January 1st 2017 and 31st December 2017

Location	Number of infants	Percent
All care inside of booked network	91,879	97.9
Some care outside of booked network	2013	2.1
Total	**93,892**	**100**

Figure 7a

Infants born outside neonatal operational delivery network by network of maternal booking

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)

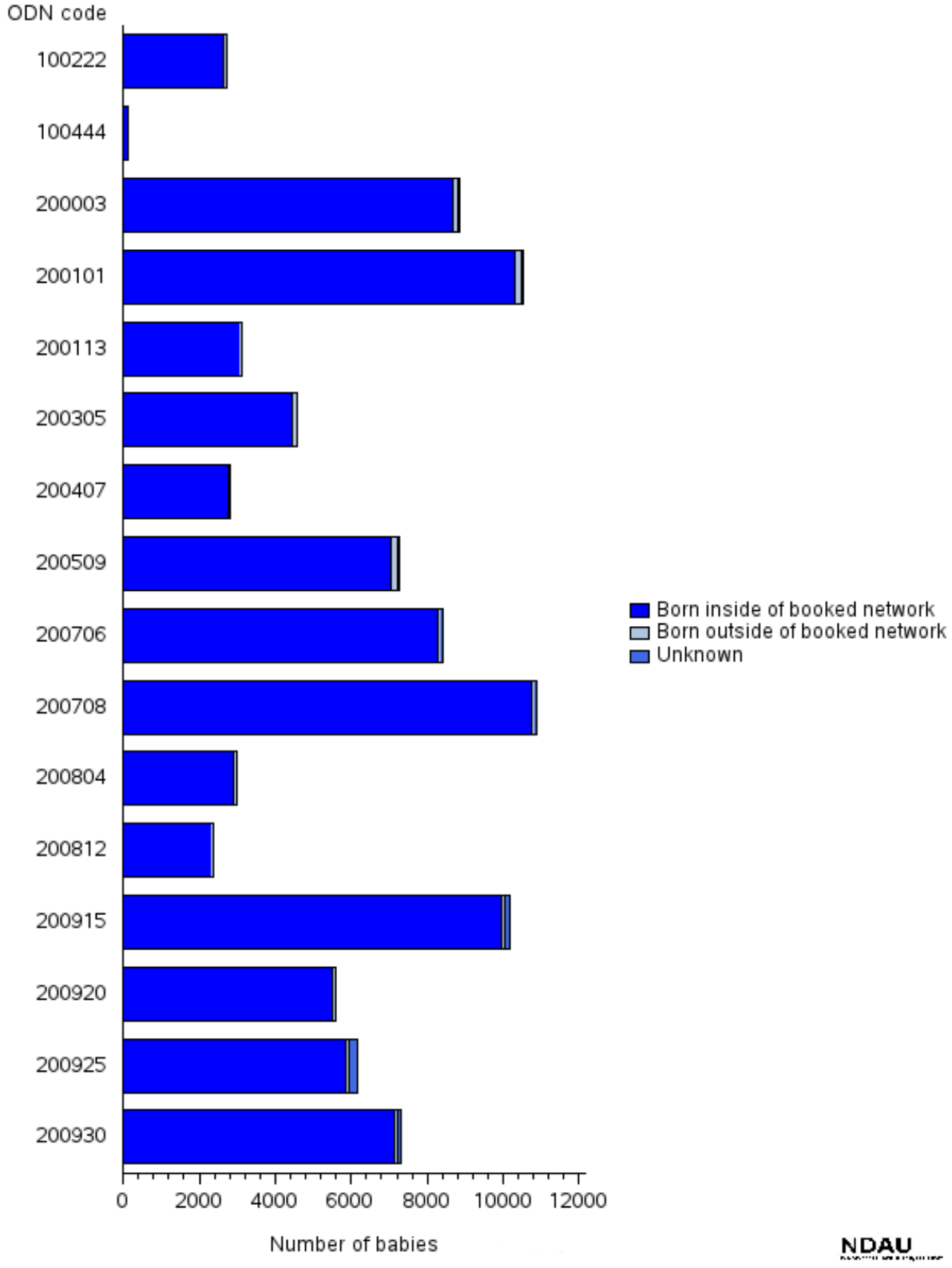
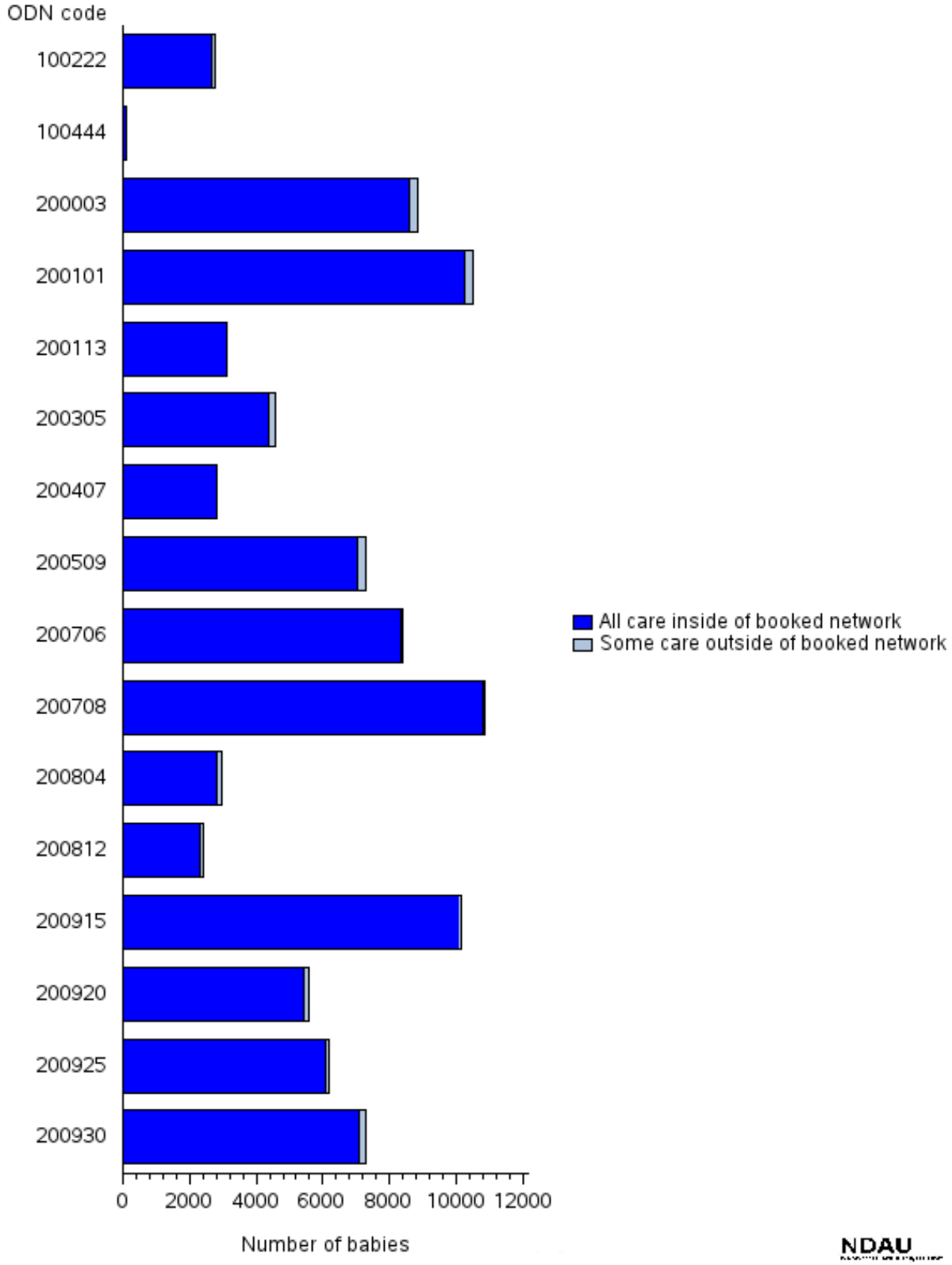


Figure 7b

Infants receiving care outside neonatal operational delivery network of booking, by network of maternal booking

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)



8 Length of stay

This section details the length of stay for infants admitted to neonatal care by gestational age group, summarized for neonatal operational delivery networks in England and Wales.

Infants were included in the analysis if they had a final discharge to home or foster care in 2017, had a known gestational age (completed weeks) and were assigned to neonatal operational delivery network of first admission. Length of stay was calculated as the time from first admission to last discharge, rounded up to the day. Postmenstrual age at discharge was calculated as gestational age at birth plus postnatal age at discharge.

Table 8 shows the median and interquartile range (IQR) for length of stay and postmenstrual age at discharge by gestational age group (≤27 weeks, 28 to 31 weeks, 32 to 36 weeks, ≥37 weeks). Figure 8 shows the median and IQR for length of stay by gestational age group for each neonatal operational delivery network, with the national medians drawn for reference.

Table 8 Length of stay and postmenstrual age at discharge by gestational age, infants discharged to home or foster care in 2017

Gestational age at birth	N	Length of stay Median (IQR)	Postmenstrual age at discharge Median (IQR)
≤27 weeks	1,810	92 (76-112)	39.3 (37.6-41.5)
28 to 31 weeks	5,156	43 (34-57)	36.4 (35.5-37.8)
32 to 36 weeks	21,552	12 (7-18)	36.6 (35.9-37.2)
≥37 weeks	37,565	3 (2-6)	40.2 (39.0-41.4)
Total	**66,083**	**6 (3-15)**	**38.7 (36.8-40.6)**

Figure 8a

Length of stay by gestational age for neonatal operational delivery networks, infants discharged to home or foster care in 2017. Reference lines show national median length of stay for each gestational age group.

(All infants with a final neonatal unit discharge between 01 January and 31 December 2017)