

Data Management and Analysis Group

Fertility of Ethnic Groups in London, 2002/03

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Fertility of Ethnic Groups in London, 2002/03

Summary

This Briefing describes the derivation, at the Greater London level, of age-specific fertility rates (ASFRs) and total period fertility rates (TPFRs) for London's ethnic populations using information entirely based on the 2001 Census ethnic categories. Future development of and outputs from the GLA Ethnic Group Population Projection (EGPP) model need to reflect this ethnicity classification.

However, the EGPP model will use ten aggregated ethnic groups, derived from the sixteen ethnic categories used in the 2001 Census. This is because some of the populations, such as those for the Mixed ethnic categories, are too small to use as base populations in the model, when broken down by single year of age, for an acceptable degree of robustness to be achieved. Therefore the fertility rates described in this Briefing were derived for the ten aggregated ethnic groups to be used in the model.

Information on ethnicity of mothers was used as a proxy for ethnicity of births and was obtained from the Department of Health's Hospital Episode Statistics for 2002/03, obtainable in aggregated form through collaborative projects with the London Health Observatory. This information and ethnicity of populations of females of reproductive age were both in terms of the sixteen 2001 Census categories. Fertility rates derived from these data should therefore be more robust than in previous GLA analyses and methodologies.

For most of the aggregated ethnic groups the resulting ASFR structures are more or less of the typically symmetrical form. The exception is the Black Caribbean group which has a very skewed structure, with the peak at the young 20-24 age band of mother and then an almost linear decline with increasing age band.

For the London population the peak ASFR is 93 (births per 1000 women per year) and occurs at the 30-34 age band. Only two aggregated ethnic groups have a peak ASFR which is lower than the whole population peak. These are the White group with a peak ASFR of 76 at the 30-34 age band and the Chinese group with a peak ASFR of 79 at the same age band. The Other group has the highest peak ASFR of 246, which occurs at the 30-34 age band. In declining order the remaining groups and their ASFRs are Bangladeshi (219, at 25-29 age band), Black Other (205, at 30-34 age band), Pakistani (199, at 25-29 age band), Other Asian (140, at 30-34 age band), Black African (140, at 25-29 age band), Black Caribbean (108, at 20-24 age band) and Indian (103, at 25-29 age band).

The TPFR for the London population is 1.64 (births per woman over her lifetime, derived as an average of all women in the population being considered). Only three aggregated ethnic groups have a lower TPFR than the whole population. These are the Indian group with a TPFR of 1.54, the White group with a TPFR of 1.24 and the Chinese group with a TPFR of 1.08. The Other group has the highest TPFR of 4.52. In declining order the remaining groups and their TPFRs are Black Other (4.03), Bangladeshi (3.60), Pakistani (3.10), Black African (2.52), Other Asian (2.38), and Black Caribbean (1.83).

The ASFRs were validated by applying them to Census female populations to derive predicted births and comparing these with the number of Census under-1 year-olds. Reasonable agreement was obtained for all aggregated ethnic groups except the Other group, hence the ASFRs and TPFR for this group should be treated with caution.

Introduction

This Briefing describes the derivation, at the Greater London level, of age-specific fertility rates and total period fertility rates for London's ethnic populations using information entirely based on the 2001 Census ethnic categories. Future development of and outputs from the GLA Ethnic Group Population Projection model need to reflect this ethnicity classification. These rates are in contrast to those previously derived from information which was a mixture of ethnic groups from both the 1991 and 2001 Censuses, as described in *DMAG Briefing 2003/19 (Fertility of Ethnic Groups in London, by Ed Klodawski)*.

In the analysis described by this Briefing, information on ethnicity of mothers (obtained from the Department of Health's Hospital Episode Statistics for 2002/03) and ethnicity of female populations (based on the 2001 Census and the ONS 2002 mid-year population estimate) were both in terms of the sixteen 2001 Census categories. Fertility rates derived from these data should therefore be even more robust than in the previous exercise.

In the earlier Briefing information on ethnicity of mothers (used as a proxy for the ethnicity of births) was in terms of the 1991 Census ethnic groups, as this was all that was available at the time, whereas data on ethnicity of female populations was in terms of 2001 Census categories. However, the main objective had been to investigate the use of Hospital Episode Statistics (HES) as a source of providing better information on the ethnicity of mothers, and the outcome was successful. HES data for London was obtainable in aggregated form through collaborative projects with the London Health Observatory.

In HES a delivery and each resulting birth are recorded as separate patient episodes. This means, for example, that a mother's age and ethnicity, which are mandatory collected data items, are held as a directly linked and robust record. These data therefore provide the potential for estimating more accurate ethnic fertility rates. Previous GLA methodology had used country of birth data but this has become a weak and inaccurate predictor over the last ten years or so due to increasing numbers of successive generations of ethnic populations.

The GLA Ethnic Group Population Projection (EGPP) model will use ten aggregated ethnic groups, derived from the sixteen ethnic categories used in the 2001 Census. This is because some of the populations, such as those for the Mixed ethnic categories, are too small to use as base populations in the model, when broken down by single year of age, for an acceptable degree of robustness to be achieved. Therefore the fertility rates described in this Briefing were derived for the ten aggregated ethnic groups to be used in the model.

Data

Detailed information on the sources and data used in this analysis is given in Appendix 1.

Section A1.1 describes the Department of Health's Hospital Episode Statistics (HES) database, used as the source for information on ethnicity of mothers, including ethnicity codes and fields relevant to fertility. Sections A1.2 and A1.3 describe extraction of HES data for 2002/03. Since ethnicity coding completeness for births episodes was poor it was necessary to focus on the use of delivery episodes where ethnicity coding completeness

was much higher. It was therefore assumed that the mother's ethnicity represented the ethnicity of the baby, although this would not always be totally correct, particularly in the case of births of mixed parentage.

In assessing the HES data for completeness of ethnicity coding in subsequent analysis, the criterion 'stated ethnicity' is used to differentiate between HES codes that specify or exclude ethnicities and those that indicate an unknown status. In the coding definitions for the HES "ethnos" ethnicity field, the important leading digit can be coded A to Z for 2001 Census ethnic categories, or 0 to 9 and X for 1991 Census ethnic groups (see Appendix 1, Section A1.1). The criterion "stated ethnicity" is the sum of the count of codes A to S inclusive for 2001 codes, and codes 0 to 8 inclusive for 1991 codes.

HES Deliveries

Table 1 shows that the 2002/03 HES records for Greater London contained a total of 106,261 deliveries. A very high proportion, 99,462 (94%), were to mothers of stated London residence, 5,787 (5%) were of non-London residence, and a small number, 1,012 (1%), were of unknown residence. Of the 99,462 London codes, 89,547 (90%) were in terms of 2001 Census codes and 9,915 (10%) were in terms of 1991 Census codes. Of the 89,547 deliveries by London residence and 2001 Census codes, 69,757 (78%) were by stated ethnicity.

The high proportions of stated London residence and stated ethnicity indicate a much higher level of completeness than for births (see Appendix 1, Section A1.3). This can be largely explained by the fact that for an NHS delivery episode, which is an episode that relates to the mother but not the baby, ethnicity recording is mandatory. Therefore the deliveries data was considered to be sufficient to estimate age-specific fertility rates by ethnicity of mother.

Table 1 HES Deliveries in Greater London by Local Authority Code of Residence (April 2002 - March 2003)

Local Authority of Residence of Mother	Census Codes	Total Deliveries ¹	Deliveries by Stated Ethnicity of Mother ²	% Deliveries by Stated Ethnicity of Mother
All Codes	Total	106,261	79,615	74.9
	2001	95,769	74,691	78.0
	1991	10,492	4,924	46.9
London Codes	Total	99,462	74,409	74.8
	2001	89,547	69,757	77.9
	1991	9,915	4,652	46.9
Non-London	Total	5,787	4,401	76.0
	2001	5,275	4,168	79.0
	1991	512	233	45.5
Not Known	Total	1,012	805	79.5
	2001	947	766	80.9
	1991	65	39	60.0

Source: Department of Health, Hospital Episode Statistics.

NOTE: In HES the patient in a delivery episode is the mother.

1. 2001 Census codes: all codes (A to Z);
1991 Census codes: all codes (0 to 9, & X).
2. 2001 Census codes: codes A to S;
1991 Census codes: codes 0 to 8.

Table 2 **HES Deliveries for London Residence**
by Age of Mother (April 2002 - March 2003)

Age of Mother	Census Codes	Total Deliveries ¹	Deliveries by Stated Ethnicity of Mother ²	% Deliveries by Stated Ethnicity of Mother
All Ages	Total	99,462	74,409	74.8
	2001	89,547	69,757	77.9
	1991	9,915	4,652	46.9
15 - 49³	Total	98,908	74,095	74.9
	2001	89,097	69,445	77.9
	1991	9,811	4,650	47.4
Other Ages ⁴	Total	554	314	56.7
	2001	450	312	69.3
	1991	104	2	1.9

Source: Department of Health, Hospital Episode Statistics.

NOTE: In HES the patient in a delivery episode is the mother.

1. 2001 Census codes: all codes (A to Z);
1991 Census codes: all codes (0 to 9, & X).
2. 2001 Census codes: codes A to S;
1991 Census codes: codes 0 to 8.
3. 15-49 range includes 17 deliveries by stated ethnicity of mother recorded in the 10-14 age band.
4. Other Ages codings (miscodings) - deliveries by stated ethnicity of mother:

Blank:	296
0 - 9:	8
50 - 59:	10

Table 2 shows that in the 2002/03 HES records for deliveries by London residence, there was a high level of completeness of mothers' ethnicity in the age range 15-49 years. The number of deliveries with other age coding (blank, 0-9, and 50-59 years) was a low 554 (0.6% of the overall total). The total number of deliveries identifiable by reproductive age of mother was therefore 98,908, of which 89,097 (90%) were in terms of 2001 Census ethnic codes and 9,811 (10%) were in terms of 1991 Census codes.

Of the 89,097 deliveries by London residence and 2001 Census codes, 69,445 (78%) were by stated ethnicity. Furthermore, although not tabulated, when this sub-set was broken down by five-year age band of mother, the high level of completeness of mothers' ethnicity recording was maintained throughout all seven age bands, ranging from 75% to 79%. This sub-set (excluding 1991 codes) was used for the fertility rate analysis.

1991 codes could have been included to maximise sample size but were disregarded as only 4,650 of the 9,811 records in the 15-49 age range for London residence were by stated ethnicity of mother, and this was small in proportion to the 69,445 records using 2001 codes. It was also considered not desirable to mix the low number of 1991 codes with aggregated codes from the main 2001 sub-set on the grounds that aggregated 2001 groupings would not exactly reflect the 1991 codes due to possible differences in interpretation by patients according to which set of codes had been presented to them. These were also the reasons why fertility analysis using HES data for 2001/02 was not undertaken. In 2001/02 HES delivery records there were a total of 63,830 by London residence, stated ethnicity of mother, and age of mother 15-49 years, of which 38,919 (61%) were by 2001 ethnicity codes and 24,911 (39%) by 1991 codes. The number of 2001 codes was considered to be too low (compared to 69,445 in 2002/03) to represent all 100,000+ births in London on its own. The only option would have been to combine 2001 codes with 1991 codes, but this was not pursued because of the possible errors arising from combination of two dissimilar sub-sets, from the point of view of ethnic classification, of similar size. It was considered preferable to use information based on "pure" known 2001 Census codes providing a sample of sufficient size could be obtained, and this was achieved with the 2002/03 HES information.

In the current fertility analysis it was necessary to aggregate HES deliveries in the sub-set of 2001 codes from the sixteen ethnic categories into the ten ethnic groups to be used by the GLA Ethnic Group Population Projection model, as described in the Introduction. This was also directly beneficial for improving the robustness of fertility rates because at the level of breakdown by sixteen ethnicities and seven five-year age bands the number of observed deliveries in several ethnicity/age components, particularly in the Mixed ethnicities, was very low, typically in the range 0 to 100.

The breakdown of deliveries by mother's age and the ten aggregated ethnic groups for London residence is shown in Table 3. Deliveries in the 10-14 age band are included in the 15-19 age band, and the very small number of deliveries for ages 50+ have been omitted as being of either erroneous or indeterminate age. The basis of aggregation from the sixteen 2001 ethnic categories to the ten aggregated ethnic groups is shown in Table 4, the ten aggregated ethnic groups being broadly consistent with the ten 1991 Census ethnic groups. It must be emphasised that although the aggregated ethnic groups have the same names as the 1991 Census ethnic groups, their ethnic compositions are not identical.

**Table 3 HES Deliveries for London Residence by Age Band and Stated Ethnicity of Mother
- Aggregated Ethnic Groups (April 2002 - March 2003)**

Age of Mother	Stated Ethnicity of Mother (Aggregated Ethnic Groups)										
	All People	White	Black Caribbean	Black African	Black Other	Indian	Pakistani	Bangla -deshi	Chinese	Other Asian	Other
15-19	3,427	1,796	353	290	321	73	79	181	12	65	257
20-24	11,676	5,232	796	966	644	642	694	1,228	63	442	969
25-29	17,727	7,772	752	1,937	887	1,534	979	1,372	155	805	1,534
30-34	21,369	11,832	904	2,224	1,052	1,318	748	644	213	773	1,661
35-39	12,504	7,279	722	1,322	740	508	248	204	144	400	937
40-44	2,620	1,456	233	257	184	89	43	45	24	85	204
45-49	122	73	9	13	#	#	#	#	#	#	10
15-49	69,445	35,440	3,769	7,009	3835*	4165*	2795*	3680*	610*	2570*	5,572

Source: Department of Health, Hospital Episode Statistics.

indicates suppressed values (from 1 to 5 inclusive).

* indicates values rounded to the nearest 5.

Table 4**Aggregated Ethnic Groups**

2001 Census Ethnic Category	Aggregated Ethnic Group
White: British White: Irish White: Other	White
Black or Black British: Caribbean	Black Caribbean
Black or Black British: African	Black African
Black or Black British: Other Black Mixed: White & Black Caribbean Mixed: White & Black African	Black Other
Asian or Asian British: Indian	Indian
Asian or Asian British: Pakistani	Pakistani
Asian or Asian British: Bangladeshi	Bangladeshi
Chinese or Other: Chinese	Chinese
Mixed: White & Asian Asian or Asian British: Other Asian	Other Asian
Mixed: Other Mixed Chinese or Other: Other	Other

Derivation of ASFR, GFR and TPF

ONS Vital Statistics Live Births data for Greater London in Table 5 indicates that of the 105,603 live births occurring in 2002, 101,265 (96%) occurred within the confines of the NHS. The 2002/03 sample of 69,445 HES deliveries of stated mother's ethnicity by 2001 code and reproductive age in Table 2 (and age and aggregated ethnic groups in Table 3) was assumed to be taken from the 101,265 population of NHS births. It was further assumed that the HES sample was representative, in terms of mothers' ethnicity and age, of all 105,603 births in Greater London, giving an overall sample rate of 66%. This assumption may be less valid at the age band/ethnicity component level, depending on sample size, but cannot be tested.

Table 5 ONS Births in Greater London by Place of Confinement - 2002

Place of Confinement	Live Births
<i>Total</i>	<i>105,603</i>
NHS	101,265
Non-NHS	2,231
At Home	2,000
Elsewhere	107

Source: ONS, Vital Statistics 2002; Table VS1.

Vital Statistics data for maternities in London in 2002 were not made available by ONS due to disclosure control considerations. However, maternities and births data in Table 6 shows that there were 103,143 maternities and 104,162 Live Births in London in 2001, the ratio of Live Births/Maternities being 1.0099. This ratio is very close to 1.0 because additional births arising from the 1,590 multiple maternities (approximately 98% of which produced twins) were partially offset by an overall 620 stillbirths. On the basis that a Vital Statistics maternity and a HES delivery are equivalent, it was assumed that 1 HES delivery record represents 1 Live Birth, i.e. scaling to adjust from deliveries to births was not considered necessary, and that this would also apply to the year of this analysis.

Table 6 ONS Maternities and Births in Greater London - 2001

Event Type	Number
All Maternities	103,143
Live Births	104,162
(difference)	(1,019)
Ratio: Live Births / Maternities	1.0099
Multiple Maternities	1,590
Still Births	620

Source: ONS, Vital Statistics 2001; Tables VS1 and VS2.

Table 7 shows a breakdown of live births in London in 2002 by five-year age band of mother. It also shows the corresponding breakdown for the London residence 2002/03 HES sample of 69,445 deliveries of stated ethnicity by 2001 code. These data enabled a ratio between actual populations of live births and samples of HES deliveries for each age band of mother to be derived. These age band ratios were then applied to the HES delivery data for each aggregated ethnic group in Table 3 to produce a structure by age band and aggregated ethnic group of mother for all 105,603 births in London in 2002, as shown in Table 8.

**Table 7 Structure of ONS Live Births in Greater London in 2002
by Age Band of Mother**

Age of Mother	ONS Live Births ¹	HES Deliveries ²	Ratio ONS / HES
<i>All Ages</i>	<i>105,603</i>	<i>69,445</i>	<i>1.52</i>
Under 20	5,232	3,427	1.53
20-24	16,957	11,676	1.45
25-29	25,798	17,727	1.46
30-34	33,526	21,369	1.57
35-39	19,903	12,504	1.59
40-44	3,947	2,620	1.51
45 +	240	122	1.97

1. Source: ONS Births Statistics 2002 (Series FM1 no.31, Table 7.3).

2. Source: Department of Health, Hospital Episode Statistics.

Table 8 Structure of All Births in Greater London in 2002
by Age Band and Ethnicity of Mother (Aggregated Ethnic Groups)

Age of Mother	Ethnicity of Mother (Aggregated Ethnic Groups)										
	All People	White	Black Caribbean	Black African	Black Other	Indian	Pakistani	Bangla -deshi	Chinese	Other Asian	Other
15-19	5,232	2,742	539	443	490	111	121	276	18	99	392
20-24	16,957	7,598	1,156	1,403	935	932	1,008	1,783	91	642	1,407
25-29	25,798	11,311	1,094	2,819	1,291	2,232	1,425	1,997	226	1,172	2,232
30-34	33,526	18,563	1,418	3,489	1,650	2,068	1,174	1,010	334	1,213	2,606
35-39	19,903	11,586	1,149	2,104	1,178	809	395	325	229	637	1,491
40-44	3,947	2,193	351	387	277	134	65	68	36	128	307
45-49	240	144	18	26	#	#	#	#	#	#	20
15-49	105,603	54,137	5,726	10,671	5,830*	6,290*	4,190*	5,465*	935*	3,895*	8,456

indicates suppressed values (derived from suppressed values in Table 3).

* indicates values rounded to the nearest 5.

**Table 9 Population Structure of Females of Reproductive Age in Greater London in 2002
by Age Band and Ethnicity (Aggregated Ethnic Groups)**

Age Band	Ethnicity (Aggregated Ethnic Groups)										
	All People	White	Black Caribbean	Black African	Black Other	Indian	Pakistani	Bangla -deshi	Chinese	Other Asian	Other
15-19	209,320	122,244	12,341	15,819	8,471	17,879	6,678	8,908	3,336	6,941	6,703
20-24	275,514	187,110	10,709	14,595	6,638	18,825	7,249	9,305	5,493	7,378	8,211
25-29	361,403	259,627	13,032	20,073	6,616	21,611	7,149	9,133	4,816	8,725	10,620
30-34	359,083	245,227	21,047	27,627	8,048	20,781	6,913	5,963	4,233	8,633	10,609
35-39	328,936	222,177	26,139	24,041	7,912	19,433	4,979	3,727	3,895	7,951	8,681
40-44	267,797	181,964	19,883	16,329	4,779	19,360	4,673	3,040	3,776	6,744	7,248
45-49	218,456	156,052	11,981	9,106	2,241	16,667	3,701	3,263	3,778	5,325	6,342
15-49	2,020,509	1,374,402	115,133	127,591	44,705	134,556	41,342	43,339	29,328	51,698	58,414

Source: ONS 2001 Census Table ST101: Sex and Age by Ethnic Group, grossed up to 2002 Mid Year Estimate.

Table 9 shows the population structure, by five-year age band and aggregated ethnic group, of females of reproductive age in London at mid-2002. These were derived as described in Appendix 1, Section A1.8.

The Age-Specific Fertility Rates (ASFRs), by mother's five-year age band, for the whole population and each aggregated ethnic group, were then derived using the births structure in Table 8 and the female population structure in Table 9, using the following definition:

$$\text{ASFR}(x, y) = 1000 \times \frac{\text{Births based on HES 2002/03}(x, y)}{\text{Women at mid-2002}(x, y)}$$

where:

x = five-year age band of mother;

y = ethnicity (or whole population);

units of ASFR (x, y) are: *births per 1000 women per year.*

If $x = 15$ to 49 , this gives the General Fertility Rate (GFR), *births per 1000 women in the reproductive ages.*

The Total Period Fertility Rate (TPFR), for the whole population and each aggregated ethnic group, were derived using the following definition:

$$\text{TPFR}(y) = \frac{5}{1000} \times \sum \text{ASFR}(x, y)$$

where:

units of TPFR (y) are: *births per woman over her lifetime* (an average of all women in the population being considered).

The resulting ASFR, GFR and TPFR values by ethnicity are tabulated in Table 10. The ASFR structures are shown in four graphs, Figures 1 to 4. The TPFR values are shown in Figure 5. Comparisons of results between this analysis (2002/03) and the previous analysis (2000/01) are shown in Figure 6 for TPFRs and in Figures 7 and 8 for ASFRs.

Table 10 Age-Specific, General and Total Period Fertility Rates for Greater London in 2002
by Ethnicity (Aggregated Ethnic Groups)

Age Band	Ethnicity (Aggregated Ethnic Groups)										
	All People	White	Black Caribbean	Black African	Black Other	Indian	Pakistani	Bangla -deshi	Chinese	Other Asian	Other
ASFR (per 1000)											
15-19	25	22	44	28	58	6	18	31	5	14	59
20-24	62	41	108	96	141	50	139	192	17	87	171
25-29	71	44	84	140	195	103	199	219	47	134	210
30-34	93	76	67	126	205	100	170	169	79	140	246
35-39	61	52	44	88	149	42	79	87	59	80	172
40-44	15	12	18	24	58	7	14	22	10	19	42
45-49	1	1	1	3	#	#	#	#	#	#	3
GFR (per 1000)											
15-49	52	39	50	84	130	47	101	126	32	75	145
TPFR	1.64	1.24	1.83	2.52	4.03*	1.54*	3.10*	3.60*	1.08*	2.38*	4.52

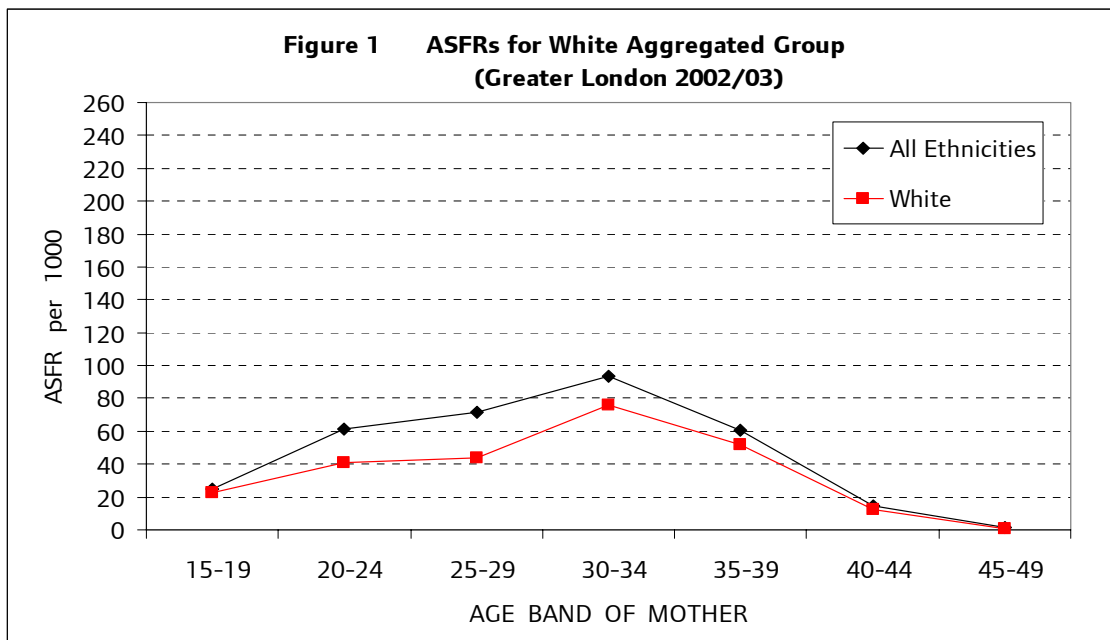
indicates suppressed ASFR values (derived from suppressed values in Table 8).

* indicates TPR values where derivation excludes suppressed ASFR values.

Results

The following discussion relates to the ten aggregated ethnic groups, which were derived from deliveries and female population observed data structured solely by the sixteen 2001 ethnic categories.

ASFRs



From Figure 1 it can be seen that, in terms of five-year age band, the ASFRs for the whole population and the White aggregated ethnic group are of a similar shape and both have a well-defined (ASFR) peak at the 30-34 year age band. For the whole population the peak value is 93 (births per 1000 women per year), and for the White group it is 19% lower at 76. The White group is lower than the whole population at all age bands, particularly in the 20s, although at the lowest and highest age bands the difference is minimal.

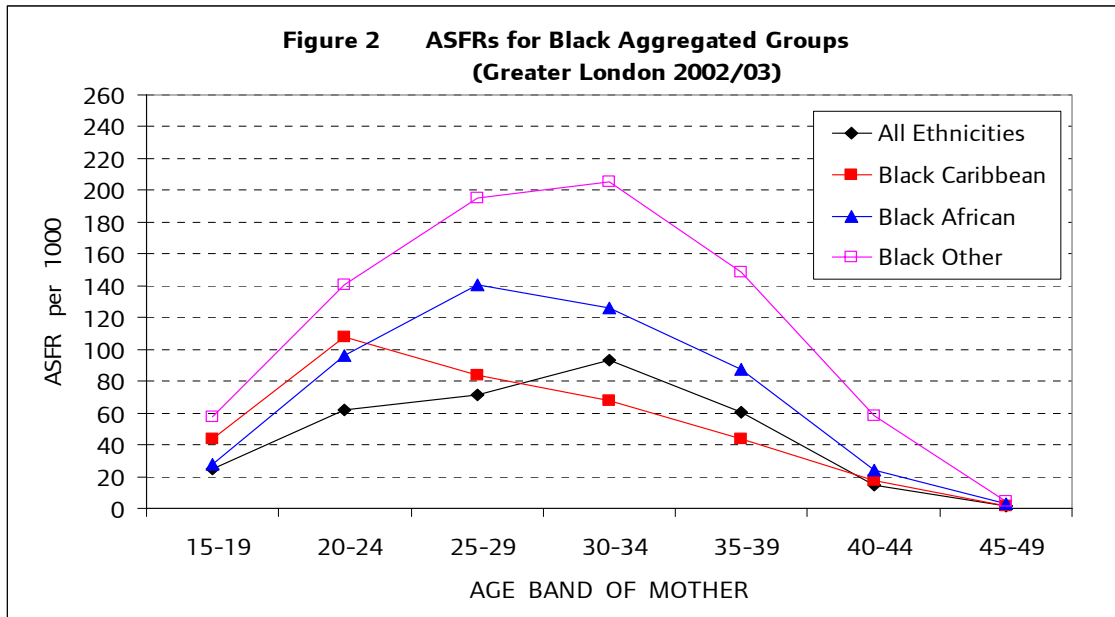


Figure 2 shows ASFRs for the three Black aggregated ethnic groups. For the Black Caribbean group the structure is very skewed with a distinctive peak at the 20-24 year age band. The peak ASFR is 108, which is 16% higher than the whole population peak. The structure then declines almost linearly with increasing age. The skewness of this structure is not repeated in any of the other aggregated ethnic groups.

For the Black African group the structure is noticeably higher than that for the whole population at ages 20-24 through to 35-39 years. The peak ASFR is 140, which is 50% higher than the whole population peak and occurs at the younger 25-29 year age band.

For the Black Other group the structure is much higher than that for the whole population, except at the oldest age band 45-49 years. The peak ASFR is 205, which is 120% higher than the whole population peak and occurs at the same 30-34 year age band.

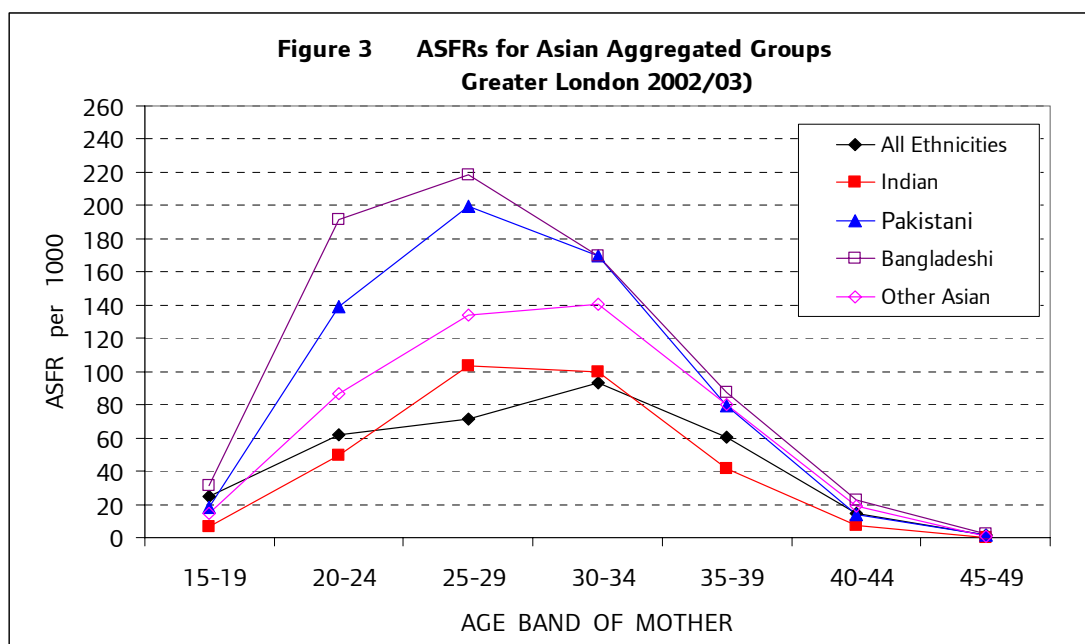


Figure 3 shows ASFRs for the four Asian aggregated ethnic groups. For the Indian group the structure is broadly similar to that for the whole population. The peak ASFR for the Indian group is 103, which is 11% above the whole population peak, and occurs one age band earlier at 25-29 years. At the 30-34 age band the ASFR is 100, therefore the peak of the structure is flat across the two age bands.

For the Pakistani and Bangladeshi groups the structures are of a similar shape and both are generally much higher than for the whole population, except at the lowest and high age bands. ASFRs of similar value to the whole population peak or above occur over the four consecutive age bands between 20 to 39 years. For the Pakistani group the peak ASFR is 199, which is 113% higher than the whole population peak and occurs at the next youngest age band, 25-29 years. For the Bangladeshi group the peak ASFR is 219, which is 134% higher than the whole population peak and occurs at the next youngest age band, 25-29 years. The Bangladeshi group has the highest peak ASFR of all the ethnic groups, apart from the Other group, see later.

For the Other Asian aggregated group the structure is higher than for the whole population and the Indian group, and lower than for the Pakistani and Bangladeshi groups, about mid-way between the two pairs of curves. The peak ASFR for the Other Asian group is 140, which is 50% higher than the whole population peak and occurs at the same age band, 30-34 years. At the 25-29 age band the ASFR is 134, therefore the peak of the structure is flat across the two age bands, as for the Indian group.

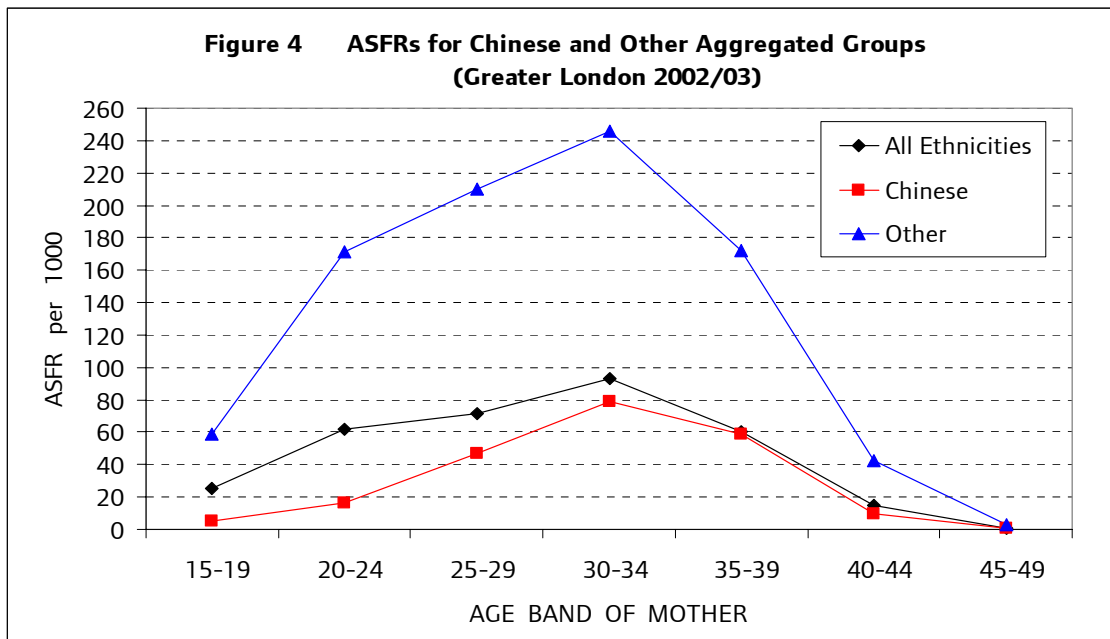


Figure 4 shows ASFRs for the Chinese and Other aggregated ethnic groups. The structure for the Chinese group is lower than the whole population at all age bands, although the two are similar over the four highest age bands, ages 30 to 49 years. Its' peak ASFR is 79, which is 15% below the whole population peak and occurs at the same 30-34 year age band. The Chinese structure is similar to that of the White group, except at the two youngest age bands, from 15 to 24 years, where it is noticeably lower. This is probably due to a relatively large proportion of the Chinese population of these ages being students.

The structure for the Other group is much higher than the whole population and broadly similar to the Pakistani and Bangladeshi groups (and also to the Black Other group). Its' peak ASFR is 246, which is 163% above the whole population peak, and is in fact the highest peak of all the ten aggregated groups. It occurs at the 30-34 year age band, which is the same age band as the whole population peak and the Black Other peak but the next older age band than the Pakistani and Bangladeshi peaks. It is suspected that the high fertility rates for the Other group are due to numerator inflation caused by this group being used as a "sink" group or default "not stated" group in HES recording of deliveries.

TPFRs

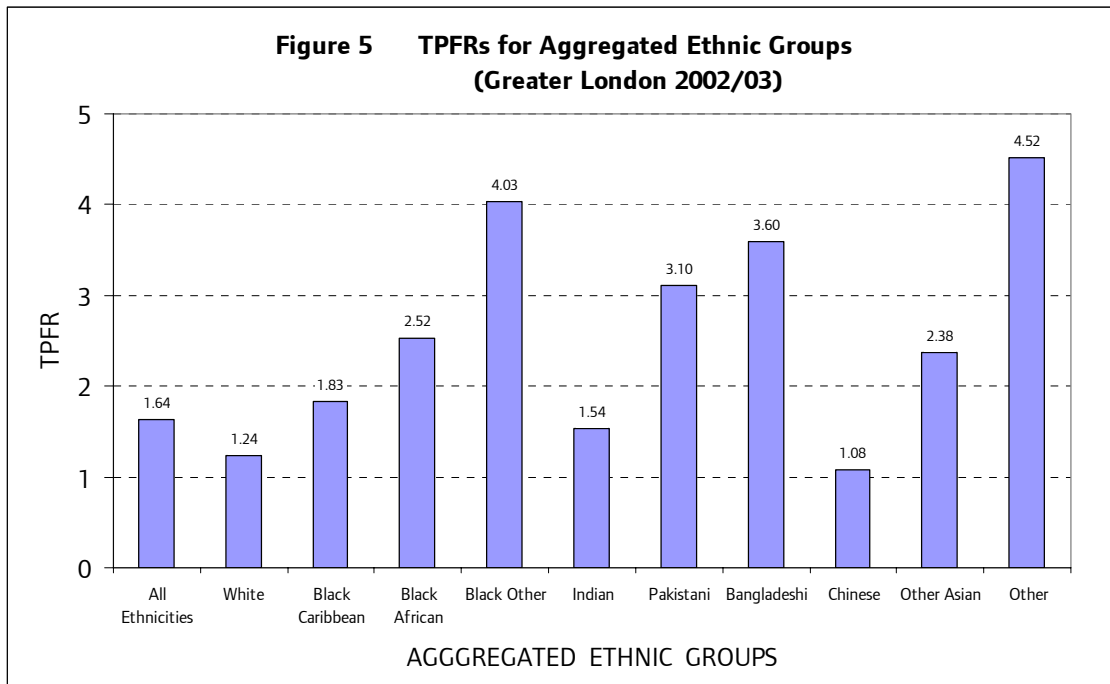


Figure 5 shows the TPFR for each aggregated ethnic group. For the whole population of Greater London the TPFR is 1.64 (births over a woman's lifetime, an average of all women in the population being considered). Three aggregated ethnic groups, White, Indian, and Chinese have a TPFR that is lower than for the whole population. The TPFR of the White group is 24% lower than for the whole population. The TPFR of the Indian group is 6% lower than for the whole population. The Chinese group has the lowest TPFR of 1.08, which is 34% below the whole population.

The remaining seven aggregated ethnic groups all have TPFRs that are higher than for the whole population. The highest TPFR of 4.52 is that for the Other group, which is 176% higher than the whole population. The Black Other (4.03, 146% higher), Bangladeshi (3.60, 120% higher), and Pakistani (3.10, 89% higher) groups all have much higher TPFRs than the whole population. The Black African TPFR of 2.52 is 54% higher, the Other Asian TPFR of 2.38 is 45% higher, and the Black Caribbean TPFR of 1.83 is 12% higher.

Comparison with 2000/01 analysis

In *DMAG Briefing 2003/19* fertility rate analysis was undertaken using HES deliveries data for 2000/01 in terms of HES 1991 Census ethnicity codes, and female populations from the 2001 Census. The analysis in the current report uses HES deliveries data for 2002/03 in terms of HES 2001 Census ethnicity codes, and female populations from the 2002 MYE distributed by 2001 Census ethnicity figures. Figure 6 therefore compares TPFRs from both analyses, and Figures 7 and 8 compare ASFR structures.

TPFRs

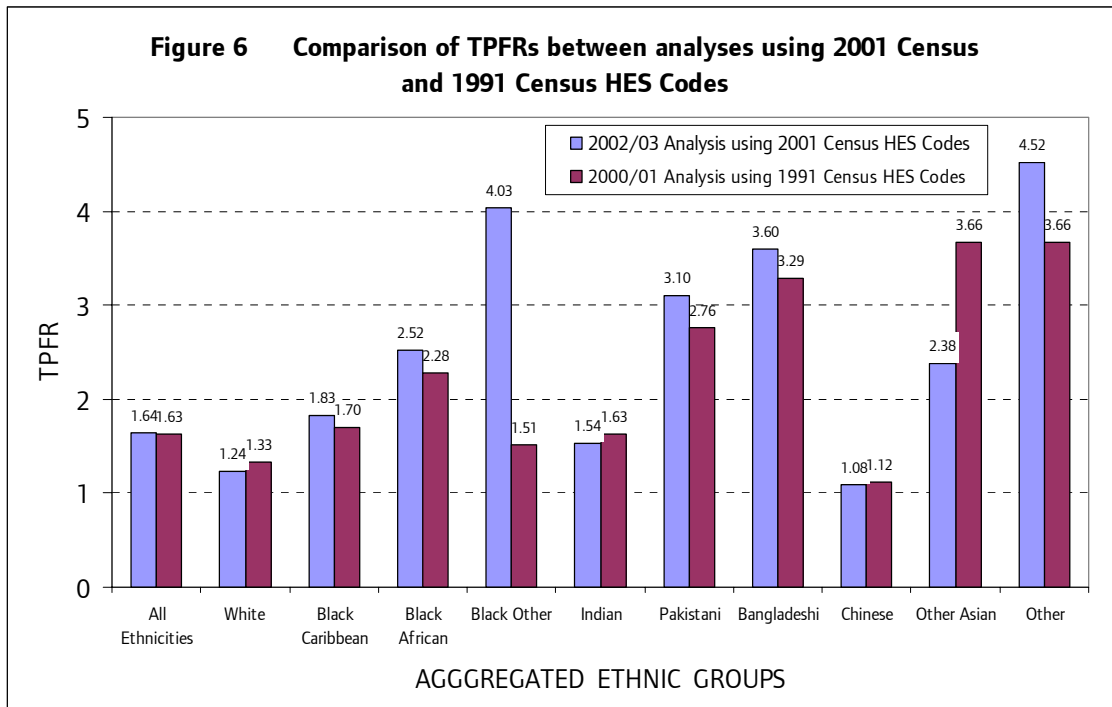


Figure 6 shows that for most individual aggregated ethnic groups there is good agreement. For the White, Indian, and Chinese groups the TPFRs from the current analysis using 2001 HES codes are slightly lower, and for the Black Caribbean, Black African, Pakistani and Bangladeshi groups they are somewhat higher.

In the case of the Black Other group the current analysis using 2001 HES codes has produced a TPFR which is 167% higher.

In the earlier Briefing there was no separate Other Asian group because the HES 1991 coding classification did not have a code for Other Asian. It was thought likely that the HES Other group may have contained records of deliveries to Other Asian mothers. Hence Figure 8 shows the 2000/01 HES Other value of 3.66 for comparison with both the Other Asian and Other groups of 2002/03 analysis. The Other Asian TPFR is noticeably lower than the HES Other group of previous analysis, whereas the Other TPFR is significantly higher.

ASFRs

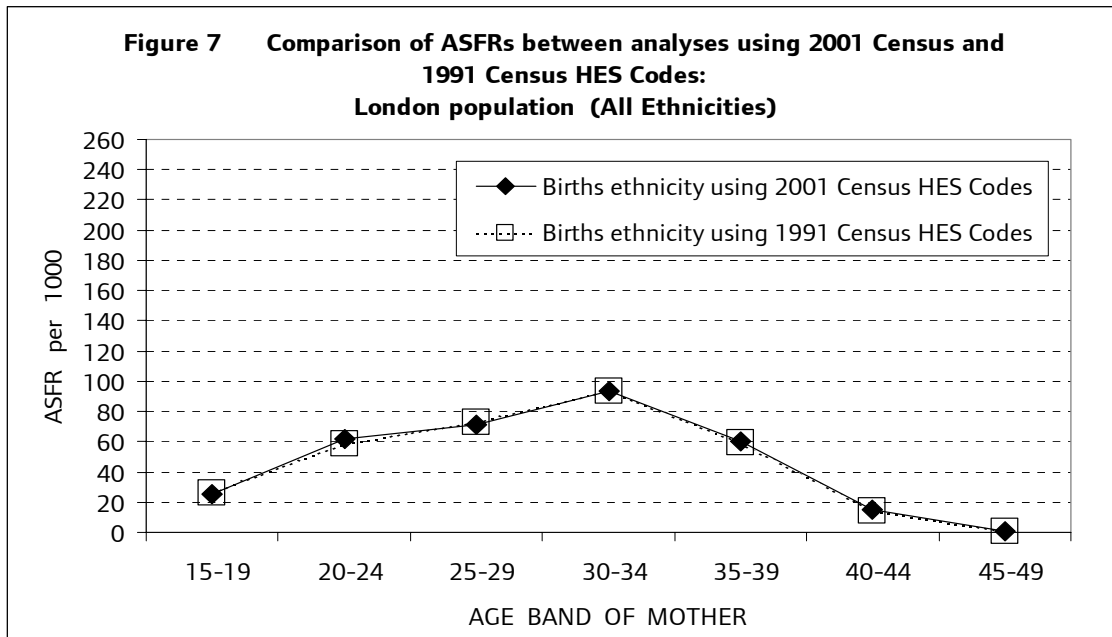


Figure 7 shows that for the whole London population the ASFR structures in the two analyses are practically the same. This is a consistent result that validates the scaling process of deliveries to ONS live births by age band.

Figure 8 Comparison of ASFRs between analyses using 2001 Census and 1991 Census HES Codes: Individual aggregated ethnic groups

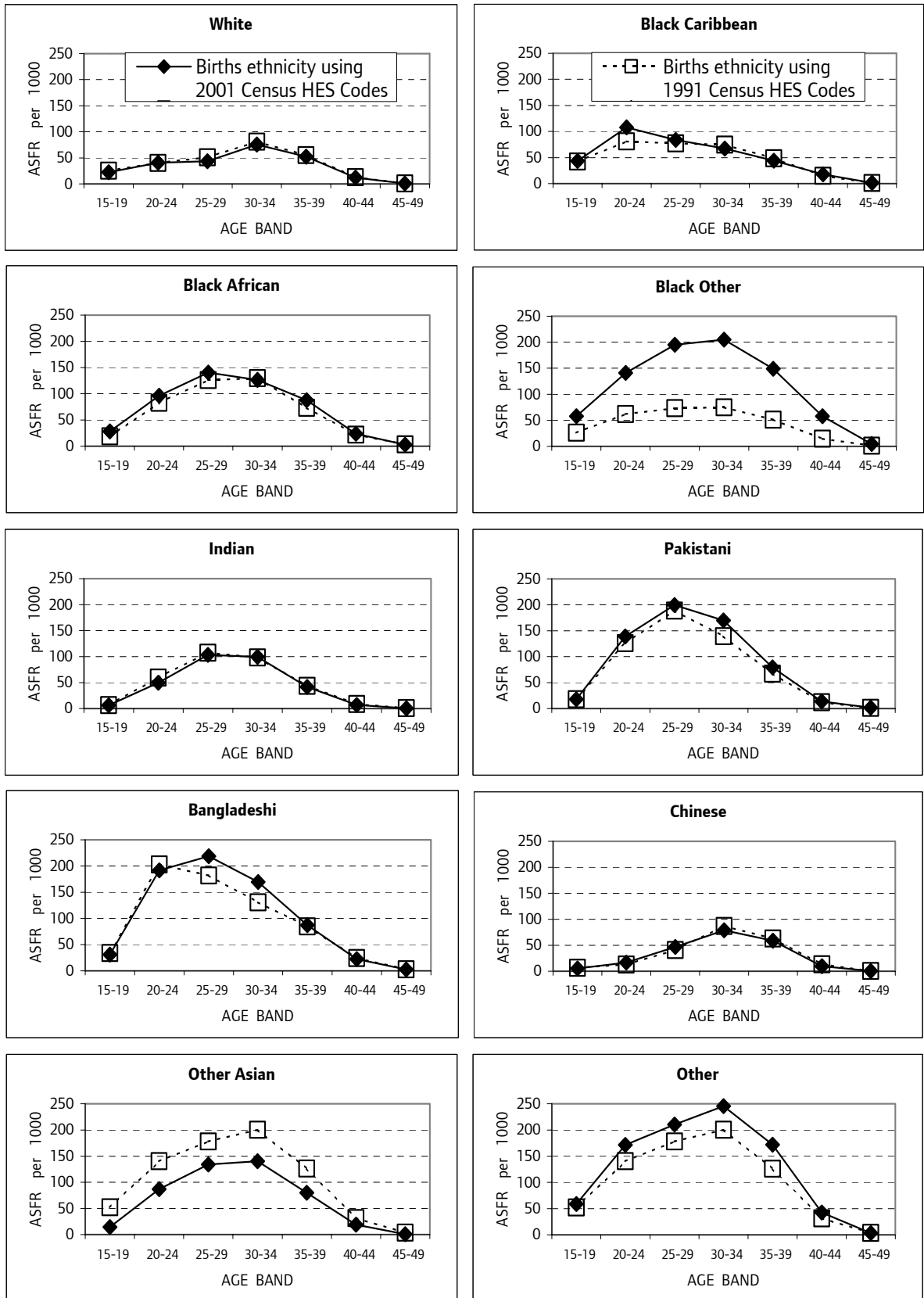


Figure 8 compares ASFRs for each individual aggregated ethnic group. For most groups there is good agreement between the two analyses, particularly for the White, Black Caribbean, Black African, Indian and Chinese groups. For the Pakistani and Bangladeshi groups the structure is slightly higher from the current analysis using 2001 Census HES codes, but the agreement is still very good.

The main group where ASFRs differs greatly between the analyses is Black Other. Structures for the Other Asian and Other groups are again compared with the HES Other grouping from previous analysis, and show the same relative differences implied by the TPFrs in Figure 6.

For most groups the structures are typically reasonably symmetrical. The one exception is the Black Caribbean group, which has a skewed structure with a peak at the young age band of 20-24, and this is accentuated by the current analysis using 2001 Census HES codes, which also confirms the development of this structure over a period of at least three years.

Hence, for most of the aggregated ethnic groups, fertility structures have been confirmed by both analyses. The results from the current analysis using 2001 Census HES codes are considered to be the most representative and robust because data based on the 2001 Census ethnic classification was used in both numerators and denominators.

The only aggregated ethnic group where the two analyses have produced ASFRs and TPFrs that differ greatly is the Black Other group. This difference is not due to denominator populations. From the 2000/01 analysis to the 2002/03 analysis the increase in the London population of females of reproductive age was from 1,992,246 to 2,020,509, an increase of 1.42%, and the increase in the corresponding Black Other population was similar at 1.40%.

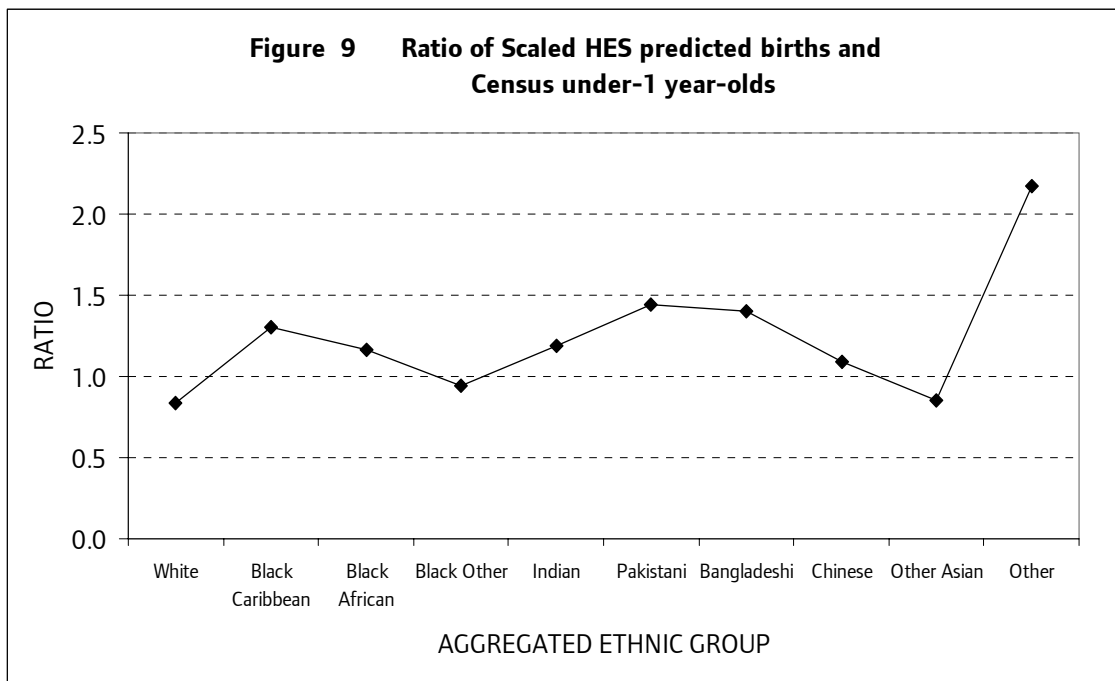
From the 2000/01 analysis to the 2002/03 analysis the increase in HES observed deliveries to London resident mothers by stated ethnicity was from 63,026 to 69,445, an increase of 10.18%. However, the increase in deliveries in the Black Other group was much greater at 190.16%. In the 2002/03 analysis deliveries in the aggregated Black Other group were comprised of 3,055 in the Other Black 2001 category, 389 in the White & Black Caribbean 2001 category, and 389 in the White & Black African 2001 category, a total of 3,833. Whereas in the 2000/01 analysis deliveries in the Black Other group were comprised only of 1,321 in the 1991 group. Hence there was a large increase in Black Other deliveries of 2,512, implying that there was, for whatever reason, a significant increase in hospital coding of deliveries by this ethnic grouping. The validation process described in the following section suggests that the ASFRs and TPFr obtained for the Black Other aggregated group by the current analysis are representative.

Assessment of HES results against Census

The ethnic fertility structures obtained by this analysis were validated against 2001 Census data. The fertility rates were applied to Census ethnic female populations of reproductive age in order to predict the number of births by aggregated ethnic group. The total number of predicted births was 104,610.

The actual number of Census births by aggregated ethnic group was estimated by assuming them to be the same as the number of Census under-1 year-olds available from commissioned single-year-of-age data (the total number of these was 95,970). Hence, the total HES predicted births were higher by 8,640. HES predicted births were also higher than Census under-1 year-olds at individual aggregated ethnic group level for all groups except the White and Other Asian. Most of the difference at London level is due to net out-migration, the 95,970 Census under-1 year-olds being the surviving London residents from the live births recorded in London in the 12 months preceding the Census (about 104,000). Although the number of Census under-1 year-olds is not the same as the typical annual number of live births in London, it is the only source of information by ethnic breakdown suitable for this assessment purpose (London's net out-migration is not known by ethnic breakdown).

The HES predicted births for each aggregated ethnic group were then scaled to control the overall HES predicted births to the Census under-1 year-olds total. Finally, the ratio of the scaled HES predicted births to Census under-1 year-olds was derived for each aggregated ethnic group. These controlled birth ratios give an indication of the validity of the HES fertility structures, and are shown in Figure 9. It is seen that these ratios are reasonably close to 1.0 for the White, Black African, Black Other, Indian, Chinese and Other Asian groups, and acceptably close to 1.0 for the Black Caribbean, Pakistani and Bangladeshi groups.



The ratio for the Other group shows a much greater variation from 1.0, indicating that the fertility structure for this group should be treated with caution, and supports the suspicion that this group may have been used as a “sink” group for recording of HES deliveries, as mentioned in the Results section.

Another two potential sink groups are Black Other and Other Asian, due to their fertility structures being much higher than for the London population (see sections on Results and Comparison with 2000/01 analysis). However, in Figure 9 the ratios for these groups are both very close to 1.0 and this suggests that these structures are valid and much more representative than for the Other group.

Application of HES results to EGPP model

The objectives of deriving ethnic fertility rates based on 2001 Census categories were to fulfil the need to align fertility structures, as much as possible, with the base populations used in the GLA Ethnic Group Population Projection (EGPP) model.

For most of the aggregated ethnic groups the fertility rates show good agreement between analyses using 2001 Census HES codes and 1991 Census HES codes, as previously discussed and shown in Figure 8. The results from the current analysis using 2001 Census HES codes are considered to be the most representative and robust because data based on the 2001 Census ethnic classification was used in both numerators and denominators. For some groups such as Black Other, Other Asian and Other the fertility rates are liable to be more variable because they are likely to be used as “sink” groups in recording of HES deliveries.

These aggregated “sink” groups are made up from four of the underlying “sink” 2001 Census categories (Other Black, Other Asian, Other Mixed and Other) and three of the Mixed categories (White & Black Caribbean, White & Black African, and White & Asian). The composition of a “sink” category in HES data may be less consistent with the composition of the corresponding female population group based on the Census, compared to the consistency for each of the main ethnic groups. This is because ethnicity of the mother was assumed to represent ethnicity of the newborn. There is therefore some uncertainty in cases where the mother’s ethnicity is that of a “sink” category, or where the mother is of any Mixed ethnicity, or in cases of cross-generational ethnic change where parents may not assign their own ethnicity to their newborn. This will affect the consistency between births numerators and female population denominators in ASFRs. Commissioned 2001 Census data on ethnicities of mothers, fathers and infants in households has recently been received and will be used to investigate these relationships and establish parameters for refining the EGPP model.

A separate consideration, applicable to all ethnic categories, is that all London births may not have the same ethnicity distribution as the sample of HES deliveries by known 2001 ethnicity. This could arise if there is variation in ethnicity coding completion between hospitals.

A final consideration is that when the derived fertility structures generate ethnic births in the EGPP model the figures are unlikely to match the ethnic base populations of Census under-1 year-olds, as in the assessment exercise described in the preceding section.

Because of these factors and constraints it will be necessary to adjust the fertility structures obtained from this analysis when they are applied to the EGPP model.

Appendix 1 - Data

A1.1 The Hospital Episode Statistics (HES) Database

www.dh.gov.uk/PublicationsAndStatistics/Statistics/HospitalEpisodeStatistics/fs/en

The Department of Health's Hospital Episode Statistics (HES) database has existed since the late 1980s. It is a secure record-level database of hospital admissions and treatments, originally being restricted to admitted patients but will include outpatient activity from 2004. It consists of data submitted by NHS Trusts to the NHS-Wide Clearing Service (NWCS). The NWCS is a transactional database continuously updated, whereas HES takes a subset of the NWCS data at regular points in time (quarterly and annually), and cleans up the data to improve quality.

HES covers all NHS Trusts in England only (there are separate databases for Northern Ireland, Scotland and Wales). Private hospitals are not included, although private patients treated in NHS hospitals are.

Information from HES on patient care is used to provide wide-ranging analysis for the NHS, Government and many other organisations and individuals who have an interest in health and healthcare administration.

The type of information collected by NHS Trusts for each episode of care and submitted to the NWCS database includes facts about the patient treated (eg age), the NHS Trust (or PCT) who provided the care, administrative details (including admission and discharge date), and clinical details of diagnoses and treatments. Currently, HES contains approximately 262 fields of collected information and derived data, although not all fields are applicable to each episode.

Each HES annual extract for England contains around 12 million admitted patient records, but because these relate to individual patients direct access to them is restricted, in order to comply with data protection legislation. Data at record level is usually made available in anonymised form. Furthermore, not all fields are permitted to all users at anonymised record level, but some of these restricted fields may be accessible at aggregated level.

Typically, users of anonymised HES data may include medical researchers, statistical analysts (eg Department of Health), public health specialists (eg epidemiologists), and disease registers (eg regional cancer registry).

Analysts at the London Health Observatory (LHO) are permitted access to anonymised record-level extract data for Greater London. LHO have a HES extract for Greater London for each data year, 1st April – 31st March, from 1995/96 to 2002/03. The 2002/03 HES extract for Greater London contains 1.84 million records and approximately 60 fields of information.

From the point of view of ethnic demography, there are several fields of information in the LHO HES extracts, which are accessible to the GLA in aggregated form through collaborative projects, that can improve modelling of ethnic fertility, the main ones being:

- ethnicity of mother in relation to delivery episode (collection mandatory);
- age of mother in relation to delivery episode (automatically derived from mandatory collected date of birth and admission date);

- ethnicity of baby in relation to birth episode (although collection of ethnicity at birth is optional rather than mandatory);
- local authority of residence of mother in relation to delivery episode (automatically derived from mandatory collected home address/postcode);
- local authority of residence of baby in relation to birth episode (automatically derived from mandatory collected home address/postcode of mother);
- gender of baby (collection mandatory).

Although births and deliveries outside the NHS are not included, these are relatively small in number. If of sufficient coverage and quality, HES data may enable improved and updated understanding of ethnic group ASFR structure and male/female birth ratio. Insight into trends over the last five or six years may also be possible.

A wider range of HES fields (as designated and defined in the Hospital Episode Statistics Data Dictionary) that may be of relevance to demographic fertility analysis is listed below, although not all are present or permitted in the LHO 2002/03 extract. Note that delivery (mother's episode) and birth (baby's episode) are entered as separate episodes.

Field Category: Patient

"startage" = Age on admission (automatically derived from date of birth and admission date).

"ethnos" = Ethnic origin (collection mandatory from 1995-96).
 Maternity (mother's episode) and birth (baby's episode) are entered as separate episodes. Mother's ethnicity is usually OK. Baby's ethnicity depends on mother and father – may be missing or unstated.
 From April 2001 the codes were changed to conform to the 2001 Census classification. However, HES continued to accept the old codes as well as the new codes for the 2001/02 and 2002/03 data years.

From 1995-96 to 2000-01:

- 0n White
- 1n Black Caribbean
- 2n Black African
- 3n Black Other
- 4n Indian
- 5n Pakistani
- 6n Bangladeshi
- 7n Chinese
- 8n Any other ethnic group
- 9n Not given
- Xn Not known

Note: n = coding option for local use, usually n = 0

From 2001-02:

- An British (White)
- Bn Irish (White)
- Cn Any other White background
- Dn White and Black Caribbean (Mixed)
- En White and Black African (Mixed)
- Fn White and Asian (Mixed)
- Gn Any other Mixed background

Hn Indian (Asian or Asian British)
Jn Pakistani (Asian or Asian British)
Kn Bangladeshi (Asian or Asian British)
Ln Any other Asian background
Mn Caribbean (Black or Black British)
Nn African (Black or Black British)
Pn Any other Black background
Rn Chinese (other ethnic group)
Sn Any other ethnic group
Zn Not stated

Note: n = coding option for local use, usually n = 0

"newnhsno" = NHS number of patient (from 1997-98). Note that the new NHS number is a unique identifier, whereas the old NHS number is non-unique.

"postdist" = Postcode district (outcode) of patient's residence (from 2002-03) (automatically derived).

"homeadd" = Postcode of patient (mother's postcode is used for birth episodes).

"sex" = Sex of patient.

Field Category: Admission and Discharge

"admimeth" = Method of admission to hospital.

"admidate" = Date of Admission.

"disdate" = Date of Discharge.

Field Category: Episodes and Spells

"epidur" = episode duration (automatically derived).

"epitype" = Type of episode (eg delivery or birth, hospital or non-hospital birth).

Field Category: Diagnoses

"diag_n" = Up to 7 diagnosis fields may be recorded during an episode, using ICD coding definitions in International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (WHO), eg:
ICD 10 Code: O80-O84 = Delivery, where O80-O83 = single delivery, O84 = multiple delivery;
ICD 10 Code: Z37* = Outcome of Delivery, identifying single, twin and other multiple births, and whether liveborn or stillborn).

Field Category: Geographical (derived)

"currward" = Current electoral ward of patient (automatically derived).

"resladst" = Local authority district of residence of patient (automatically derived).

Field Category: Maternity

"birordr" = Birth order (multiple births).

"birstat" = Live or still birth.

"matage" = Mother's age at delivery (automatically derived).

"numbaby" = Number of babies (live + still).

"sexbaby" = Sex of baby.

A1.2 Extraction of HES Data

Information relating to births and deliveries was obtained from the Access database of 1.84 million HES records for London for 2002/03 held by the London Health Observatory. The following HES information fields were used to perform Access Queries to extract births and deliveries data sub-sets:

Field name	Data Item	Description
startage:	Age at start of episode.	Age in whole years on admission, automatically derived from admission date and date of birth fields. For patients under 1 year old, special codes in the range 7001 to 7007 apply (7001 = less than one day).
epitype:	Episode Type.	Type of episode, eg birth, delivery, general.
ethnos:	Ethnic Group.	Ethnicity.
resladst:	Local Authority District.	County (first two characters) and Local Authority (last two characters), automatically derived from the patient's postcode in the home address field.
agegrp:	Age Group.	Age group by five-year age band, derived from field startage .

A1.3 Extraction of HES Births Data

Births data was extracted from the Access database by specifying a Query with the following parameters:

epitype = 3 or 6 (where 3 = birth episode and 6 = other birth event).

ethnos = field of required data (to obtain ethnicity of baby).

The results of this Query are not tabulated. Only 8,124 records (7% of the sample) were by stated ethnicity (of the baby). This was even less than in 2000/01, where 20,201 records (20% of that sample) were by stated ethnicity. The reason for this poor recording of ethnicity at birth is that it is not mandatory, whereas collection of most other HES information is.

The objective of investigating HES births records was to assess the possibility of linking the ethnicity of the baby to the ethnicity of the mother. Had the completeness of ethnicity coding of the births data been sufficient, it would have enabled analysis of births of mixed ethnicity in relation to the ethnicity of the mothers to be studied. A further barrier exists in this respect, whereby the anonymised HES records exclude fields that would be necessary to establish family linkage. Due to these constraints the HES births data was not used further and attention was focused on HES deliveries data.

A1.4 Extraction of HES Deliveries Data

For an initial overview, deliveries data was extracted from the Access database by specifying a Query with the following parameters:

epitype = 2 or 5 (where 2 = delivery episode and 5 = other delivery event).

ethnos = field of required data (to obtain ethnicity of mother).

The resulting deliveries data, indicating completeness of mothers' ethnicity recording, is summarised in Table 1.

As London hospitals also deal with maternities of non-London residents, deliveries data for London Residence of mother, and also age of mother, was extracted from the Access database by specifying a Query with the following parameters:

epitype = 2 or 5 (where 2 = delivery episode and 5 = other delivery event).

resladst = between 00AA and 00BK (to select Greater London residents only).

agegrp = field of required data (to obtain structure of age of mother).

ethnos = field of required data (to obtain ethnicity of mother).

The resulting deliveries data for London Residence, by five-year age band of mother, and indicating completeness of mothers' ethnicity recording, is summarised in Table 2.

A1.5 ONS Births Data

Table 5 is a breakdown of live births for residence in Greater London by place of confinement, taken from ONS Vital Statistics for 2002 (Table VS1).

A1.6 ONS Maternities and Births Data

Table 6 is a summary of maternities and births for residence in Greater London, taken from ONS Vital Statistics for 2001 (Tables VS1 and VS2). Data for 2001 is presented because detailed data on maternities for 2002 (VS2) was not made available by ONS.

A1.7 ONS Birth Structure by Age of Mother

Table 7 includes a breakdown of live births by age of mother for residence in Greater London, taken from ONS Births Statistics 2002 (Series FM1 no.31, Table 7.3).

A1.8 Populations of Females of Reproductive Age

Table 9 lists populations of females of reproductive age in Greater London at mid-2002. These were derived by applying the sixteen 2001 Census ethnic category distributions for the relevant sex-age bands in ONS Table ST101 to the corresponding ONS 2002 MYE sex-age figures. The outputs were in the form of five-year age bands (from 15-19 years through to 45-49 years) and the ten aggregated ethnic groups defined in Table 4.

Appendix 2 - Summary of Assumptions

1. HES data is for financial year 2002/03 and ONS live births and deliveries data is for calendar year 2002. ONS live births for London in calendar 2003 are unavailable as yet, but were 105,603 in calendar 2002 and 104,162 in calendar 2001, a difference of 1441 or 1.4%. Actual live births in London between mid-2002 and mid-2003 were a little higher at 108,500 therefore the HES 2002/03 period can be considered reasonably representative of calendar year 2002.
2. Populations of females of reproductive age (15–49 years) by ethnicity in London for 2002 were derived by applying the 2001 Census sex-age-ethnicity distributions to the ONS 2002 MYE sex-age figures.
3. The sample of 69,445 HES deliveries of stated mother's ethnicity and age (Tables 2 and 3) is in relation to the 101,265 NHS births. It was assumed that the HES sample was representative of all 105,603 ONS live births in London in 2002 (Table 5), giving an overall sample rate of 65.8%. When broken down by age band and ethnicity, some sample sizes may be small, so this assumption may not be so valid at the lower levels, but this cannot be tested.
4. Maternity > Delivery > Birth. Assume that 1 Delivery record represents 1 Birth. ONS Vital Statistics detailed data on maternities in London has not been made available for 2002. However, this data was available for 2001 (Table 6). There were 103,143 maternities and 104,162 Live Births in London in 2001, the ratio of Live Births / Maternities being 1.0099. This ratio is very close to 1.0 because additional births arising from 1590 multiple maternities (98% of which were twin births) were partially offset by an overall 620 stillbirths. On the basis that a VS maternity and a HES delivery are equivalent, it was thus assumed that 1 HES Delivery = 1 Live Birth, on an aggregate basis ie scaling to adjust from deliveries to births was not considered necessary. It was assumed that this argument remained applicable for 2002.
5. Ethnicity of the newborn was assumed to be the same as the ethnicity of the mother, as recorded in HES delivery episodes.

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