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Characteristics of the childbearing population in Europe

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Abstract

Objective: To report the distribution and availability of the indicators describing the population of childbearing women in Europe and to assess the impact of the difference in the distribution of two of these indicators (age and multiple births) on some outcome indicators. *Methods*: The six PERISTAT indicators of population characteristics were computed using data from a survey of data providers in Europe. For maternal age and multiple births, the impact on health outcome was simulated for the extremes of the distribution using indirect standardised rates. *Results*: Data availability is good for basic demographic indicators (age, parity, multiple births), but less complete for indicators of social characteristics (education, smoking, country of birth). Further, common definitions are not used for the latter. Simulations of the impact of maternal age on health outcome found that variation in the maternal age distribution may cause trisomy 21 rates to differ by nearly 20% and maternal mortality ratios by nearly 50%. *Conclusion*: Indicators of basic population characteristics are not collected routinely in every country. The crude distribution of these indicators is essential for international comparisons. Interpretation of comparative data would be improved by collection of health outcomes and service use by maternal characteristics.

Keywords: Perinatal health indicators; Maternal age; Multiple births; Smoking in pregnancy; Socio-economic risk factors

To compare outcome indicators between countries and to understand their evolution, it is important to look at the characteristics of the population, since their differences and modifications of these characteristics may affect the outcome indicators substantially.

The objective of this paper is therefore, to report the distribution and availability of the indicators considered here to be the most important for describing the population of childbearing women. We also assess the impact of the difference in distribution of two of these population indicators (age and multiple births) on some outcome indicators.

1. Methods

The data for each indicator will be presented by country and source. Macfarlane et al., this issue, describes the data sources.

To study the possible impact of maternal age on the population prevalence of trisomy 21, we used the rates of fetuses with trisomy 21 according to maternal age as recorded in the Eurocat registries [1]. We then computed an overall rate of trisomy 21 for two data sources by applying the rates by age to the age distribution.

The relation between maternal mortality was assessed similarly: the ratios of maternal mortality according to age used for the standardisation came from the PERISTAT project (see article by Alexander et al., this issue).

Rates of pre-term births were computed to study the possible impact of differences in multiple birth rates. The standardisation used a pre-term birth rate of 5% for singletons and 50% for multiple births, based on figures observed in various data bases [2].

2. Results

Table 1, which includes data from all 15 member states, presents the distribution of maternal age by country and source. It reveals that the age distribution varied substantially between countries.

Fig. 1 reports the percentage of women aged 35 years and older in each country, listed in descending order. This percentage ranges from 10.9 in Belgium (data covering Flanders only) to 20.8% in Ireland. It also includes the

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Table 1
Distribution of maternal age (in years) at delivery for women delivering live or stillborn babies

EU members state (coverage if not national)	Source[a]	<14 (%)	15–19 (%)	20–24 (%)	25–29 (%)	30–34 (%)	35–39 (%)	40–44 (%)	45–49 (%)	50+ (%)	Unknown
Austria[b]	A1-2001	0.0	4.3	18.8	33.1	29.7	11.9	2.1	0.1	0.0	0.0
Belgium (Flanders)	B2-2000	0.0	2.2	15.4	40.3	31.2	9.5	1.3	0.1	0.0	0.0
Belgium (French community)	B3-2000	0.0	4.1	18.7	36.2	27.0	11.3	1.9	0.1	0.0	0.6
Denmark	DK1-2000	0.0	1.6	13.0	36.5	34.1	12.9	1.8	0.0	0.0	0.0
Finland	FIN1-2000	0.0	2.9	17.2	30.5	31.0	15.1	3.1	0.2	0.0	0.0
France	F2-2000	0.0	2.8	15.1	37.0	30.0	12.7	2.4	0.1	0.0	0.0
Germany (9 Bundesländer)	D1-2000	0.0	2.8	15.2	28.2	34.7	16.1	2.8	0.1	0.0	0.0
Greek (perinatal survey)[b]	EL1-1998	0.0	2.8	20.1	32.2	31.1	10.4	2.5	0.1	0.0	0.8
Ireland[b]	IR1-1999	0.0	6.2	14.3	25.6	33.0	17.5	3.1	0.2	0.0	0.2
Italy	I1-1998	0.4	1.8	12.2	32.4	35.1	15.0	2.8	0.2	0.1	0.3
Luxembourg	L3-2001	0.0	2.6	14.7	31.9	33.8	14.7	2.1	0.1	0.0	0.1
Netherlands	NL1-1999	0.0	1.3	8.4	29.4	41.4	16.9	2.4	0.1	0.0	0.1
Portugal	P1-1999	0.0	6.2	20.6	33.4	26.5	11.1	2.0	0.1	0.0	0.0
Spain	E1-1999	0.0	2.9	10.3	28.3	39.0	17.0	2.4	0.1	0.0	0.0
Sweden	S1-2000	0.0	2.0	13.5	34.5	33.1	14.3	2.4	0.1	0.0	0.1
UK	UK1,2,3-2000	0.0	7.7	17.8	28.3	29.8	14.0	2.4	0.1	0.0	0.0

[a] Information on data sources in Appendix A.
[b] Data provided for births not mothers delivering a live or stillbirth.

percentage of women aged 19 years and younger, which ranges from 1.6 in Denmark to 7.7% in the UK.

When we applied standardised trisomy 21 rates by age to the distributions observed in Belgium (Flanders data) and Ireland, the two extremes, we obtained standardised trisomy 21 rates of 19.5 per 10,000 and 26.3, respectively. Using the same procedure, we applied the maternal mortality ratios by age observed in Europe to the age distributions in these two

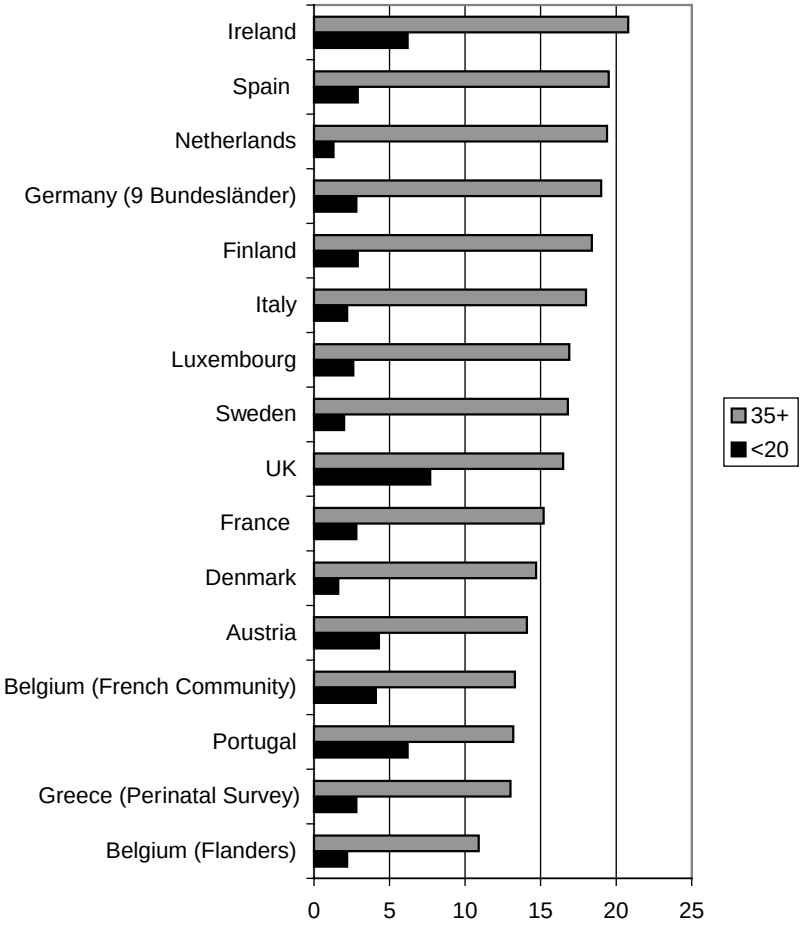

Fig. 1. Mother's younger than 20 years and older than 34 years.

Table 2
Distribution of parity for women delivering live or stillborn babies

EU members state (coverage if not national)	Source[a]	0 (%)	1 (%)	2 (%)	3 (%)	4+ (%)	Unknown (%)	Total (%)
Austria[b]	A1-2001	45.8	35.4	13.1	3.9	1.8	0.0	100
Belgium (Flanders)	B2-2000	46.7	34.2	12.7	4.0	2.5	0.0	100
Belgium (French community)	B3-2000	43.9	32.1	14.4	5.4	3.3	0.9	100
Denmark	DK1-2000	40.3	36.3	13.9	3.6	1.6	4.3	100
Finland	FIN1-2000	40.9	33.1	15.9	5.5	4.4	0.3	100
France (perinatal survey)	F1-2000	42.5	33.1	15.2	5.0	3.4	0.7	100
Greece (perinatal survey)[b]	EL1-1998	40.1	12.3	33.1	9.6	4.0	0.8	100
Ireland[b]	IR1-1999	41.0	29.7	17.0	7.2	5.0	0.0	100
Italy	I1-1998	51.1	36.6	9.6	2.0	0.8	0.0	100
Luxembourg	L3-2000	42.9	37.1	14.1	4.3	1.4	0.2	100
Netherlands	NL1-1999	45.3	35.4	12.7	3.7	2.2	0.8	100
Portugal	P1-1999	55.0	33.1	8.2	2.3	1.4	0.0	100
Spain	E1-1999	52.0	36.8	8.7	1.7	0.8	0.0	100
Sweden	S1-2000	43.6	34.9	14.6	4.4	2.5	0.0	100
UK (Northern Ireland)	UK7-2000	39.7	31.2	17.1	7.2	4.7	0.0	100
UK (Scotland)	UK6-2000	45.5	34.7	13.2	4.3	2.2	0.1	100

[a] Information on data source provided in Appendix A.
[b] Data provided for births not mothers delivering a live or stillbirth.

countries and obtained a maternal mortality ratio of 6.07 per 100,000 for Belgium (Flanders) and 8.97 per 100,000 for Ireland.

These findings demonstrate the importance of taking age into account in comparing outcomes, since the difference in age distribution may cause trisomy 21 rates to differ by nearly 20% and maternal mortality ratios by nearly 50%.

Table 2 summarises the data about parity, obtained for 13 countries. The percentage of first births ranged from 39.7 to 55.0% whereas the percentage of fourth or later births ranged from 1.4 to 5.0%.

Table 3 reports the multiple birth rates, which are available for all member states. The twin birth rates ranged from 11 to 20 per 1000. Fig. 2 shows the multiple birth data in descending order by country. When a 5% pre-term birth rate is applied to singleton births and 50% to multiple births with the lowest multiple birth rates observed (Luxembourg, Portugal) and the highest rates (Denmark, The Netherlands, Greece) the resulting percentages of women delivering before term are 5.5% for countries with a low multiple birth rate and 5.9% for those with a high rate. This translates into pre-term birth rates, defined as the percentage of all babies born pre-term, of 6.0% versus 6.8%.

Table 3
Multiple birth rate by number of fetuses per 1000 births (Number of women with a multiple gestation pregnancy at delivery per 1000 women delivering live or stillborn babies)

EU member state (coverage if not national)	Source[a]	Rate of twin births	Rate of triplet + births	Total multiple birth rate
Austria	A1-2001	14.95	0.42	15.37
Belgium (Flanders)	B2-2000	18.04	0.30	18.33
Belgium (French community)	B3-2000	13.31	0.55	13.86
Denmark	DK1-2000	19.68	0.32	20.00
Finland	FIN1-2000	15.88	0.16	16.04
France	F2-2000	14.98	0.28	15.26
Germany (9 Bundesländer)	D1-2000	15.82	0.62	16.44
Greece (perinatal survey)	EL1-1998	20.05	0.21	20.26
Ireland	IR1-1999	13.00	0.52	13.52
Italy	I1-1998	11.73	0.52	12.25
Luxembourg	L3-2000	10.55	0.18	10.72
Netherlands	NL1-1999	18.98	0.38	19.37
Portugal	P1-1999	11.07	0.32	11.38
Spain	E1-1999	15.22	0.70	15.92
Sweden	S1-2000	15.99	0.20	16.19
UK	UK1,2,3-2000	14.24	0.44	14.69

[a] Information on data sources in Appendix A.

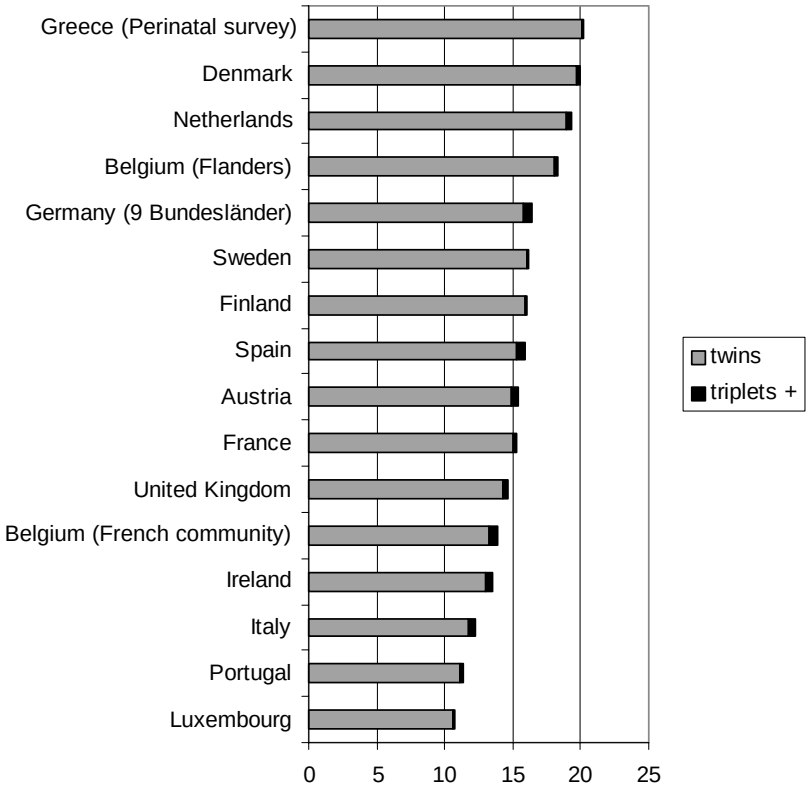

Fig. 2. Twin and triplet birth rates (per 1000 women delivering a live or stillbirth).

Table 4 shows the percentage of women who smoked during pregnancy. This information was available for seven countries. The percentage of women smoking during the third trimester was high, ranging from 6.0 to 23.7%.

Table 5 reports the distribution of mother's educational levels in the eight countries for which data are available. As the table notes, however, the definition of each level varies between countries. The percentage of women with post-secondary level education varied from 14 to 79%.

Table 4
Percentage of women smoking during pregnancy

Members state (coverage if not national)	Source[a]	Period 1 (first trimester) (%)	Period 2 (third trimester) (%)
Denmark	DK1-2000	20.9	20.5
Finland[b]	FIN1-2000	14.4	12.7
France (perinatal survey)	F1-1998	N/A	23.7
Germany (9 Bundesländer)	D1-2000	N/A	18.0
Greece (perinatal survey)	EL1-1998	N/A	17.1
Spain	E6-2000	N/A	23.4
Sweden	S1-2000	11.1	6.0
UK (Scotland)	UK6-2000	26.8	N/A
UK (infant feeding survey)[c]	UK15-2000	N/A	20.0

N/A: not available.

[a] Information on data sources provided in Appendix A.

[b] Finland, Period 2: smoked after first trimester.

[c] 11% gave up smoking on confirmation of pregnancy, 2% gave up later in pregnancy and 20% smoked throughout pregnancy.

Table 6 describes the data currently available in different countries about maternal country of origin, ethnicity, and nationality. While the availability and type of information vary substantially, the table nonetheless shows that approximately one woman in six giving birth in the EU is not a citizen of the country where her child is born. The variation in the collection of these data may reflect not only difficulties in defining ethnicity or origin, but also a reluctance to do so.

3. Discussion

The information we collected through various sources demonstrates that data on age distribution and multiple birth rates were available for every country included in the project. Information for the other indicators was more difficult to come by. Neither smoking during pregnancy nor maternal educational level is recorded often. For the latter, moreover, the definitions vary from one country to another.

Substantial differences were observed for all of the indicators. They cannot all be attributed to differences in definition. Age at delivery and multiple birth are easy to define. In contrast, parity can be defined as covering all previous births or previous live births only. Variations in definition or registration may explain some of the differences in the other indicators. For instance, the percentage of

Table 5
Distribution of mothers' education

Member state (coverage if not national)	Source[a]	I None (%)	II Primary-6 years (%)	III Secondary-end of compulsory (%)	IV Post-secondary. non-tertiary (%)	V Tertiary (%)	Unknown
Austria[b]	A1-2001			19 (I + II + III)	68	11	2
Belgium (Flanders)[b,c]	B2-2000		4 (I + II)	50		39 (IV + V)	7
France (perinatal survey)[d]	F1-1998	1	3	55		37 (IV + V)	4
Greece (perinatal survey)	EL1-1998	1	13	51	9	25	1
Italy	I1-1998	0	7	47	36	8	2
Luxembourg (survey)[e]	L4-2001		15 (I + II)	44	12	13	16
Spain (Valencia)[f]	E6-2000	3	30	50		14 (IV + V)	4
UK (Infant feeding survey)[g]	UK15-2000			36 (I + II + III)	35	28	–

N/A: not available.
[a] Data sources in Appendix A.
[b] As a proportion of births, not number of women delivering a live or stillborn baby.
[c] Primary: none + primary combined; secondary: sum of 3 years + secondary 6 years.
[d] Secondary: sixth-general baccalaureate + fifth technical baccalaureate; tertiary: all post-secondary.
[e] Source is breastfeeding survey. N: 600 women.
[f] Valencia, none: illiterate, no schooling.
[g] Age at completion of full time education, 36%: 16 years or under; 35%: 17 or 18; 28%: over 18 years.

women smoking will depend on when the question is asked during pregnancy, since a significant proportion of women stop during pregnancy. This information may also be more reliable if it is obtained by interview than if it is extracted from medical records or birth registration data [3].

This paper also reveals the importance of variations in age distribution. The role of age as a risk factor for maternal and neonatal mortality and morbidity is well known [4–6]. Rates between countries and trends should, therefore, be compared only after adjustment for age. This adjustment requires

Table 6
Data available to describe mother's nationality, ethnicity or country of origin

Member state (source)	Source[a]	Information available	Data as currently reported
Austria	A1-2001	Current nationality	Austrian: 87.1%. 11 categories provided
Belgium (civil registration)	B1-1995	Current nationality	Belgium (in 1995): 84.8. Two categories provided (Belgian nationality, foreign nationality)
Denmark	DK1-2000	Country of birth	Denmark: 86.3%. Nine categories provided (Africa, Asia, Australia, Denmark, EU countries, North America, Other European countries, South America, Unspecified)
Finland	FIN5-2000	Country of origin Current nationality	Data on country of origin, Finland: 94.6% Each country provided (57 countries in 2000)
France	F2-2000	Current nationality	French: 93.5%. 12 categories provided
Germany	D1-2000	Country of origin (ethnicity)	Germany: 79.5%. Seven categories provided (Germany, Europe/America, Mediterranean, Eastern Europe, Orient/Africa, Asia, Other)
Ireland	IR1-1999	Nationality; for the birth notification form is defined as country of birth	A pilot programme to collect these data is currently underway.
Italy	I1-1998	Country of origin	Italy: 95.0%. Each country provided (>150 countries in 1998)
Luxembourg (Fimena 2000)	L2-2000	Current nationality	Luxembourg: 41%. Seven categories provided (Portugal, Yugoslavia, Belgium, France, Italy, Africa, Others)
Portugal	P1-1999	Current nationality	Portuguese: (not provided) categories (every EU country, Other European, African countries (specifically Portuguese speaking), American countries (by country))
Spain	E1-2001	Country of birth	Two categories provided (Spanish nationality, foreign nationality). Year 2001 Spanish: 91.8%
United Kingdom, England and Wales	UK1-2000	Country of birth of mother	Born in UK: 84.5%. 17 categories provided
United Kingdom, Scotland	UK2-2000	Country of birth of mother	Born in UK: 94.2%. 11 categories
United Kingdom, England	UK4-00/01	Self-reported ethnic origin of mother	Ten census categories grouped into four because of under-recording
United Kingdom (infant feeding survey)	UK15-2000	Self-reported ethnic origin of mother	Same questions asked as in population census. Differed slightly from country to country, as in census. Grouped into four categories for analysis

[a] Data sources in Appendix A.

knowing not only the overall mortality and morbidity rates and age distributions but also the rates by maternal age.

We also simulated the effect that variations in the rates of multiple birth will have on preterm birth rates. Further, exploration of the causes of these differences in multiple birth rates would be interesting. Are they due to age, sterility treatment or in vitro fertilisation? The data presented are consistent with those analysed by Blondel and Macfarlande [7].

Parity is known to be associated with such maternal and neonatal conditions as hypertension and pre-eclampsia [8], as well as with use of services and intervention during pregnancy, labour and delivery [9]. Accordingly, the best approach to reducing the rate of unnecessary caesarean deliveries is probably to reduce the rate among women giving birth for the first time. The cesarean rate in this population would thus be an indicator to follow for monitoring overall trends in caesareans.

Numerous reports have demonstrated the harmful effects of smoking on maternal and neonatal condition [10]. These effects concern not only the perinatal period but also the infant's long-term development. Failure to collect these data at a national level in many countries may prevent the generalisation of smoking cessation programmes for pregnant women and will certainly preclude the measurement of their effects. The absence of these data is thus highly regrettable, for smoking cessation may be the most effective intervention to improve both short- and long-term outcome for mothers and children.

It is well documented that socio-cultural differences in access to care lead to differences in outcome [11]. These inequities should be considered to be unethical and their reduction should be a major goal for health policies. The difficulty in defining socio-cultural indicators creates an obstacle to comparisons. Nonetheless, the paucity of information collected at a national level in many countries may reflect a lack of interest in this aspect of care.

4. Conclusion

This chapter shows that indicators of basic population characteristics are not collected routinely in every country. International comparisons would be greatly facilitated by collection of the crude distribution of these indicators as well as of indicators of health outcomes and service use by maternal characteristics. If this cannot be routinely recorded for every birth, countries should consider collecting it for a representative sample of births [12].

Appendix A

Member state	Coverage (if not national)	Data source[a]	Year(s) provided	Abbreviation	Total births where relevant
Austria		Statistics Austria	2001	A1-2001	75707
Belgium		National Institute of Statistics and Scientific Institute of Public Health	1995	B1-1995	116122
Belgium	Flanders	SPE (Studiecentrum voor Pernatale Epidemiologie)	2000	B2-2000	62122
Belgium	French community	ONE (Office de la Naissance et de l'Enfance)	2000	B3-2000	44328
Denmark		Danish perinatal database	2000	DK1-2000	67337
Finland		Medical birth registry—TAKES	2000	FIN1-2000	56768
Finland		Population statistics—tatistics Finland	2000	FIN5-2000	
France	Representative sample	National perinatal survey	1998	F1-1998	13718
France		INSEE	2000	F2-2000	778341
Germany	9 Bundesländer[b] representing 72.6% of all births	BAQ—perinatal survey	2000	D1-2000	558079
Germany		Federal bureau of statistics Wiesbaden	1999	D2-1999	770744
Ireland		National perinatal reporting system	1999	IR1-1999	54302
Italy		ISTAT, Civil birth and death registration. Discontinued in 1998	1998	I-1998	533808
Luxembourg		FIMENA 2000	2000	L2-2000	5430
Luxembourg		Annuaire Statistique 2001	2001	L3-2001	5723
Luxembourg		Breast-feeding survey	2001	L4-2001	600

Appendix A. (*Continued*)

Member state	Coverage (if not national)	Data source[a]	Year(s) provided	Abbreviation	Total births where relevant
The Netherlands		Merged database from professional registers. LVR: data on course of pregnancy and delivery. LNR: diagnoses of the child, duration of hospital stay, treatments	1999	NL-1999	201600
Portugal		Estatisticas Demograficas Estatisticas de Saude INE, Instituto Nacional de Estatistica	1999	P1-1999	120871
Spain		National Institute for Statistics (INE)	1999	E1-1999	397632 (live births)
Spain	Valencia	GEN (Valencian group for neonatal studies	2000	E5-2000	33467
Spain	Valencia	General direction of public health	2000	E6-2000	33467
Sweden		Medical birth register	2000	S1-2000	89722
United Kingdom	England and Wales	Office for National Statistics; Civil registration	2000	UK1-2000	607644 (604441 live births
United Kingdom	Scotland	General Register Office, Scotland; Civil registration	2000	UK2-2000	53076 (live births)
United Kingdom	Northern Ireland	General Register Office, Northern Ireland. Civil registration	2000	UK3-2000	21512 (live births)
United Kingdom	England	Department of Health, Maternity Hospital Episode Statistics	2000/01	UK4-00/01	
United Kingdom	Scotland	Information and Statistics Division, SMR2 Maternity Discharge Sheet	2000	UK6-2000	53076
United Kingdom	Northern Ireland	Perinatal Information, Northern Ireland, aggregated data from child health systems	2000	UK7-2000	21794
United Kingdom	Survey	Infant feeding 2000. Department of Health, the Scottish Executive, The National Assembly for Wales and the Department of Health, Social Services and Public Safety in Northern Ireland	2000	UK15-2000	21709

[a] More detail on data sources provided in Macfarlane et al. (this issue).

[b] Bayern, Baden-Württemberg, Berlin, Hessen (data from 2001), Niedersachsen and Bremen, Nordrhein, Sachsen, Thüringen, Westfalen-Lippe.

References

[1] EUROCAT Working Group, Report 8. Surveillance of congenital anomalies in Europe 1980–1999. University of Ulster, 2002, p. 217.

[2] Blondel B, Kaminski M. Trends in the occurrence, determinants, and consequences of multiple birth. Semin Perinatol 2002;26:239–49.

[3] Dietz PM, Adams M, et al. Completeness of ascertainment of prenatal smoking using birth certificates and confidential questionnaires: variations by maternal attributes and infant birth weight. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. Am J Epidemiol 1998;148(11):1054–8.

[4] Salanave B, Bouvier-Colle MH. The likely increase in maternal mortality rates in the United Kingdom and in France until 2005. Paediatr Perinat Epidemiol 1996;10:418–22.

[5] Haelterman E, Breart G, Paris-Llado J, Dramaix M, Tchobroutsky C. Effect of uncomplicated chronic hypertension on the risk of small-for-gestational age birth. Am J Epidemiol 1997;15:689–95.

[6] Astolfi P, Zonta LA. Delayed maternity and risk at delivery. Paediatr Perinat Epidemiol 2002;16:67–72.

[7] Blondel B, Macfarlande A. Rising multiple maternity rates and medical management of subfertility: better information is needed. Eur J Public Health 2003;13:83–6.

[8] Greer JA. Pregnancy-induced hypertension in Turnbull's obstetrics. In: Chamberlain G, Steer P, editors. London: Churchill Linvingstone; 2001.
[9] Simini F, Maillard F, Breart G. Cesarean section odds ratio. Eur J Obstet Gynecol Reprod Biol 1990;34:1–13.
[10] Stillman RJ, Rosenberg MJ, Sachs BP. Smoking and reproduction. Fertil Steril 1986;46:545–66.
[11] Blondel B, Marshall B. Poor antenatal care in 20 French districts: risk factors and pregnancy outcome. J Epidemiol Community Health 1998;52:501–6.
[12] Blondel B, Norton J, du Mazaubrun C, Breart G. Pour la Coordination nationale des enquêtes nationales périnatales. Evolution des principaux indicateurs de santé périnatale en France métropolitaine entre 1995 et 1998. J Gynecol Obstet Biol Reprod 2001;30:552–64.