British Journal of Obstetrics and Gynaecology
December 1986, Vol. 93, pp. 1224–1232

Comparisons of data from regional perinatal mortality surveys

ALISON MACFARLANE, SUSAN COLE, EDMUND HEY

Summary. The standard format in which NHS regions are invited to submit data from their perinatal mortality surveys for comparative analysis in the *British Journal of Obstetrics and Gynaecology* is described. Some examples of the way these data can and will be used to compare regional differences in mortality patterns are given and possible future developments are discussed. Although the term perinatal mortality is used in the title, it is hoped that surveys will cover stillbirths and neonatal deaths and also, where possible, late fetal deaths of less than 28 weeks gestation.

An editorial in this Journal last year announced that the editorial board had decided to publish a supplement on perinatal mortality in 1987 and at intervals thereafter (Chalmers 1985). The purpose of this is to bring together data from the regional surveys which are now taking place (Mutch 1986). It is hoped that this will encourage greater consensus about the framework for doing these surveys so that as well as auditing their own practice, NHS regions can make valid comparisons between patterns of fetal and neonatal mortality rates in their own and other regions.

Two papers in this issue (p. 1204 and 1213) outline methods of classifying maternal, fetal and neonatal factors. These have been developed in the course of work done over the past 2 years by Scotland and in the Northern region with the aim of improving the comparability of information.

Although a more ambitious format may be appropriate for this supplement in the future, it has been decided to make a modest start in 1987.

This paper outlines the format in which those doing regional surveys are invited to send data for deaths of babies born in 1986 and, where possible, 1984 and 1985. Data from Scotland and the Northern region are used to show some possible types of comparative analyses which might be used to compare regional data in the future. The article ends by outlining current thoughts about future developments.

Correspondence: Editorial Office, British Journal of Obstetrics and Gynaecology, 27 Sussex Place, Regent's Park, London NW1 4RG.

Data collection and classification

It should be stressed that data from surveys are to be provided in tabular form rather than as individual records. For compatibility with other sources of national statistics the tabulated data should cover registered stillbirths (fetal deaths after 28 completed weeks gestation) and all neonatal deaths (deaths occurring <28 completed days after live birth) where possible, or if late neonatal deaths are not available for analysis, deaths occurring <7 days after live birth. It is preferable for surveys to include late neonatal deaths because of the extent to which these have their origins in the perinatal period. Ideally, late fetal deaths <28 completed weeks gestation but at least 500 g in weight or 22 weeks gestation) should also be included in surveys with other perinatally related events (Chiswick 1986). As these are not registrable stillbirths, however, it is unlikely that NHS regions will be able to provide data on these in the near future. Experience in Scotland has shown that only those hospitals that regularly include late fetal deaths under 28 weeks in their local perinatal mortality reviews

are able to produce reliable information about numbers and classification (Information Services Division 1986).

A second important criterion is that NHS regions should be able to provide data about all deaths of babies born to women resident in their geographical area, including women delivered in other NHS regions. The Scottish data are available on a national basis, so the problem of within country cross border flow does not arise. Details of births and neonatal deaths to the resident population can be obtained from the copies of the entry in the register sent to the District Health Authority (DHA) or Health Board (HB).

Within Scotland or within England and Wales, the local Registrar sends a copy of the register entry to the Health Board or District Health Authority in which the parent registering the birth normally lives. No such transfer of information occurs across the border between Scotland and England, and births and deaths of residents occurring in the other country are counted within the statistics of that country. In England and Wales, these are included in tabulations along with other births (or deaths) to residents outside England and Wales. In Scotland such births (or deaths) are attributed to the place of occurrence. It is recommended that births and neonatal deaths to women living outside England and Wales be included with the survey data from the NHS region (or country in the case of Wales) in which they occur.

In principle, copies of birth and death registrations are sent to District Medical Officers. Since the Griffiths reorganization, however, some districts do not have District Medical Officers or other community physicians. It would be good practice, therefore, if those responsible for co-ordinating regional surveys identified the person in each district to whom registration details are sent and arranged to receive copies of those which pertain to stillbirths and neonatal deaths. At the same time, it is important to liaise not only with community physicians, but also information officers and other relevant staff of DHAs and RHAs.

In England and Wales a second opportunity to obtain data occurs after the Office of Population Censuses and Surveys (OPCS) sends to Regional Health Authorities (RHAs) and the Welsh Office computer tapes containing coded information about the previous year's births and deaths of people living in their area. This information is derived from the 'draft entries' sent to OPCS by Local Registrars. In addition to the details provided by the person registering the birth, the Registrars obtain information about birthweight from the DHA. This is derived from birth notifications. Because it is considered to be clinical information, Registrars are not instructed to ask parents for birthweights.

Of course, even in the Thames regions, a high proportion of women are delivered in the region in which they live and any resulting stillbirths and neonatal deaths will be known to local clinicians without waiting for registration details. Cross checks are still useful, however, for monitoring the completeness and accuracy of both survey and registration data.

It should be noted that while a study in Northern Ireland identified considerable underregistration, particularly of stillbirths (Scott *et al.* 1981), this is not the case in the rest of the United Kingdom. Cross checks between registration data and survey data in the Northern and North East Thames regions found very little incompatibility.

In order to be able to derive the tables specified later, NHS regions should ensure that the following data items are recorded locally for each stillbirth and neonatal death.

(1) Cause of death classified by maternal factors as described by Cole *et al.* in this issue (p. 1204).

(2) Cause of death classified by fetal and neonatal factors as described by Hey *et al.* in this issue (p. 1213).

(3) Multiplicity, in order to be able to analyse singleton and multiple births separately. It would be useful, for local purposes, to distinguish between twins, triplets, quadruplets, quintuplets and sextuplets, but these details are not needed for regional comparisons.

(4) Birthweight in grams. The article by Chiswick in this issue (p. 1236) stresses that this should be the initial measurement made after birth, to the nearest gram, preferably on an electronic weighing balance.

(5) Timing of death. This should be subdivided into: late fetal death after at least 22 weeks but under 28 weeks gestation (if possible), antepartum stillbirths, intrapartum stillbirths, deaths occurring <7 completed days after live births and deaths occuring from 7 to 27 days after live birth.

This is not, of course, an exhaustive list of data

which could be collected within NHS regions in perinatal surveys. Data items which would be recorded for local use include district of residence, place of delivery and socio-economic information about parents.

Regional tabulations

Regions are invited to submit three tabulations, containing numbers of fetal and neonatal deaths.

(1) *Maternal factors by birthweight.* Birthweight should be in 250 g groups under 1500 g (<500 g, 500–749 g, 750–999 g, 1000–1249 g and 1250–1499 g) and in 500 g groups from 1500 g on (1500–1999 g, 2000–2499 g, 2500–2999 g, 3000–3499 g, 3500–3999 g, 4000–4499 g, ≥4500 g). Births with unknown birthweight should be identified separately. The tabulation should be done for singleton and multiple births separately, showing age at death. An example of part of the layout for the tabulated data is shown in Fig. 1.

(2) *Fetal and neonatal factors by birthweight.* The data should be tabulated as above, showing age at death and singleton and multiple births separately.

(3) *Maternal factors by fetal and neonatal factors.* The data are tabulated to show singleton and multiple births separately and time of death.

These tables are, of course, too detailed to be of interest as they stand but the reason for asking for more detailed data is the need for sufficient flexibility in analysing and combining the data and calculating rates as has been done in Tables 1–5. If NHS regions wish to participate in this, it would be almost essential that a regional contact is appointed to facilitate the exchange of information, particularly about women who are delivered outside their home NHS region. Such a contact might also wish to receive copies of the layout for the proposed tabulations above, in order to clarify the way data should be submitted, either on paper or in computer readable form.

In this article, mortality rates for the Northern region have been calculated by dividing the numbers of fetal and neonatal deaths by the relevant numbers of births to residents of the Northern region. These were derived from OPCS data. NHS regions who want to do this for their own data can produce the relevant tabulations using the computer tapes of birth data provided to the RHA annually by OPCS. It will be necessary to tabulate the numbers of singleton and multiple live and stillbirths separately by birthweight. Those who are unable to do so may be able to request data from the OPCS unpublished reference tabulations. OPCS will, however, have to make a charge to cover the clerical costs of extracting the data required from more detailed tabulations.

In addition, from 1986 onwards, OPCS will include birthweight distributions for each district on its VS2 tabulations. These will supersede the SD52 tabulations which are currently circulated to RHAs and DHAs. Our understanding is that these will not be subdivided into singleton and multiple births and that they will use 500 g groupings throughout. OPCS has been informed of the interest among obstetricians and paediatrians in using 250 g groupings below 1500 g and subdivisions into singleton and multiple births, but discussions have yet to take place about whether it would be feasible to publish them routinely and, if so, what level of aggregation would be appropriate. Even for singletons such data would be of limited use at district level for single years because of the small numbers involved. For singleton births it might therefore be more appropriate to ask for regional data for single years and district data aggregated over 3-year periods, while broader

	Birthweight			
	Under 500 g		500–749 g . . . etc	
	Single	Multiple	Single	Multiple
Congenital anomaly				
Late fetal deaths under 28 weeks				
Antepartum stillbirths				
Intrapartum stillbirths				
Early neonatal deaths				
Late neonatal deaths				
etc. with totals at bottom of table				

Fig. 1. The top left-hand corner of the tabulation recording maternal factors by birthweight.

Table 1. Comparison of crude stillbirth and neonatal mortality rates, Scotland and Northern region 1985

	Singleton				Multiple				Total			
	Scotland		Northern region		Scotland		Northern region		Scotland		Northern region	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Antepartum stillbirths	275	4·19	165	4·11	18	12·94	21	23·76	293	4·37	186	4·52
Intrapartum stillbirths	59	0·90	42	1·04	10	7.19	3	3.39	69	1.03	45	1·10
Early neonatal deaths	250	3·83	157	3·92	41	30·08	21	24·42	291	4·36	176	4·58
Late neonatal deaths	65	0·99	38	0·95	8	5·87	6	6·98	73	1·10	44	1·08
Live births	65 308		40 018		1363		860		66 671		40 878	

Stillbirths are expressed as the rate per 1000 total births and neonatal deaths as the rate per 1000 live births.

aggregation will be needed for analysing multiple births.

In Scotland, clinical data have been available on over 98% of births since 1976 (Cole 1980). Birthweight distributions are calculated by applying the percentage distributions from the SMR2 form to the numbers of registered live and stillbirths.

It may seem strange that no tabulations by gestational age have been proposed. This is because this information is not recorded when live births are registered in England and Wales and, therefore, no denominators are available. These data were collected for a 10% sample of births through the Maternity Hospital In-Patient Enquiry, but this data collection system ceased at the end of 1985. In Scotland the data are collected through the SMR2 system and are available as both a 'best clinical estimate of gestation' and as a calculated gestational age derived by subtracting the date of last menstrual period from the date of delivery.

How the data can be used

In what follows, examples are given of how the data submitted in the three tabulations described above could be analysed and aggregated to enable comparisons to be made between NHS regions. The analysis is by no means exhaustive, so what is eventually published in 1987 may differ from what is given here.

Table 2. Stillbirth, perinatal mortality and neonatal mortality rates, Scotland and Northern region 1985

	Birthweight (g)					
	<1000		≥1000		Total	
	Scotland	Northern region	Scotland	Northern region	Scotland	Northern region
Stillbirths/1000 total births						
Congenital anomaly	19·5	32·7	0·4	0·3	0·5	0·5
Other causes	239·0	235·3	4·2	4·3	5·0	5·2
All causes	258·5	268·0	4·7	4·6	5·4	5.6
Perinatal deaths/1000 total births						
Congenital anomaly	29·3	58·8	1·7	1·5	1·8	1·8
Other causes	692·7	666·7	5·8	5·8	8·0	8·2
All causes	722·0	725·5	7·6	7·3	9·8	10.0
Neonatal deaths/1000 live births						
Congenital anomaly	13·2	25·0	1·7	3·7	1·7	1·7
Other causes	717·1	641·7	2·1	1·8	3·7	3·7
All causes	730·3	666·7	3·8	3·5	5·4	5·4

Table 3. Stillbirth and neonatal death rates by maternal factors and fetal and neonatal factors, singletons only, Scotland and Northern region 1985

	Fetal and neonatal factors									
	Congenital anomaly		Asphyxia and trauma		Pulmonary immaturity and hyaline membrane disease		Other and not known†		Total	
Maternal factors	Scotland	Northern region	Scotland	Nothern region	Scotland	Northern region	Scotland	Northern region	Scotland	Northern region
Stillbirths/1000 total births										
Congenital anomaly	0·46	0·45							0·46	0·45
Pre-eclampsia			0·47	0·40					0·47	0·40
Antepartum haemorrhage			0·99	1·00					0·99	1·00
Other and not known*			0·40	0·32			0·21	0·12	0·61	0·45
Unexplained			2·56	2·84				0·02	2·56	2·86
Total	0·46	0·45	4·42	4·55			0·21	0·15	5·09	5·15
Neonatal deaths/1000 live births										
Congenital anomaly	1·67	1·70							1·67	1·70
Pre-eclampsia			0·03		0·18	0·08	0·03	0·03	0·24	0·10
Antepartum haemorrhage			0·21	0·25	0·28	0·28	0·05	0·10	0·54	0·62
Other and not known*			0·15	0·18	0·08	0·10	0·52	0·58	0·75	0·85
Unexplained			0·48	0·32	0·80	1·03	0·35	0·25	1·62	1·60
Total	1·67	1·70	0·87	0·75	1·33	1·47	0·95	0·95	4·82	4·88

* Includes: Isoimmunization; Mechanical; Maternal disorder; Miscellaneous; Unclassifiable; No information.

† Includes: Isoimmunization; Intracranial haemorrhage; Infection; Miscellaneous; Unclassified or unknown.

Table 4. Stillbirths and neonatal deaths by maternal factors and fetal and neonatal factors, multiple births only, Scotland and Northern region 1985

	Scotland		Northern region	
	No.	Rate/1000 total births	No.	Rate/1000 total births
Maternal factors				
Congenital anomaly	10	7·19	3	3·41
Pre-eclampsia	3	2·16	5	5·68
Antepartum haemorrhage	3	2·16	1	1·14
Other and not known*	6	4·31	9	10·23
Unexplained	55	39·54	33	37·50
Total	77	55·36	51	57·96
Fetal and neonatal factors				
Congenital anomaly	10	7·19	3	3·42
Asphyxia and trauma	27	19·41	23	26·14
Pulmonary immaturity and hyaline membrane disease	34	24·44	16	18·18
Other and not known†	6	4·31	9	10·23
Total	77	55·36	51	57·96

* Footnote as Table 3.
† Footnote as Table 3.

Table 1 shows crude mortality rates for Scotland and the Northern region, with stillbirths subdivided into antepartum and intrapartum deaths. Before 1986 when the new stillbirth certificate was introduced, this distinction was not made in registration data for England and Wales. For singleton births, rates for England and Scotland are very similar while larger differences are seen in rates for the small numbers of multiple births.

In rates for the Northern region in these and subsequent tables, there are slight discrepancies between numerators derived from the Northern region's survey and denominators based on OPCS birth statistics. The Northern region's survey is based on deaths of babies born in 1985. The OPCS birth file mainly consists of details of births which occurred in 1985, but also includes those which occurred in 1984 which were registered after January 1985 and excludes 1985 births registered after January 1986. Similar principles apply to birth data for other years.

Most of the OPCS published mortality statistics are derived from death files based on the year of registration. In addition, OPCS produces 'birth cohort infant mortality linked files' based on the year of birth, but this happens some time after its basic data files are compiled. This is because many postneonatal deaths take place in the calendar year after the baby was born. In Scotland, it has been decided to base the perinatal mortality survey on the year in which stillbirths and neonatal deaths are registered, to ensure consistency, and it is suggested that English regions may choose to do likewise, treating January birth registrations in the way described above.

In Table 2, all births and deaths are tabulated so that babies weighing under 1000 g and those whose cause of death was attributed to congenital anomaly are shown separately. Death rates attributed to congenital anomaly among babies

Table 5. Estimated death rates in 250-g groups, Scotland and Northern region 1985

	Total stillbirths and neonatal deaths			
	Scotland		Northen region	
Birthweight (g)	No.	Rate*	No.	Rate*
<500	14	1000	13	1000
500–749	66	1000	39	696
750–999	84	667	60	682
1000–1249	76	352	25	253
1250–1499	56	210	41	151

*Per 1000 total births.

Table 6. Perinatal mortality rates by birthweight and country and Regional Health Authority of usual residence of mother, England and Wales 1984, Scotland 1983

Area of usual residence of mother	Total	Birthweight (g)			
		<1500	1500–2499	≥2500	Not stated
England	10·0	363·2	44·7	3·5	238·9
Regional Health Authorities					
Northern	11·0	396·5	42·5	4·3	326·1
Yorkshire	11·6	383·3	55·3	3·9	333·3
Trent	9·7	334·5	50·0	3·2	310·3
East Anglia	8·9	327·0	46·0	3·6	133·3
North West Thames	9·0	311·1	35·8	3·2	206·3
North East Thames	9·7	320·4	43·4	3·5	175·8
South East Thames	10·5	358·4	43·3	3·5	201·7
South West Thames	8·5	342·0	42·8	3·2	333·3
Wessex	8·6	360·5	39·8	3·2	371·4
Oxford	8·7	336·5	46·6	2·6	131·1
South Western	9·3	333·3	53·5	3·5	234·0
West Midlands	12·3	446·0	46·0	3·9	218·3
Mersey	9·0	372·2	35·3	3·0	319·1
North Western	10·3	376·4	40·9	3·3	290·3
Wales	10·5	405·0	50·8	3·8	279·4
Scotland	10·7	421·5	46·8	3·7	226·2

Source: OPCS Mortality statistics (England and Wales) available in *Hansard* 10/6/86, cols 106 and 149 (w). SMR2 (Scotland) available in *Hansard* 10/6/86 Col 113 (w).

weighing under 1000 g were lower in Scotland than the Northern region. It may be that the screening policy in Scotland is more effective in detecting malformations leading to fetal death or preterm labour in this weight group, or may also reflect differences in incidence. Otherwise, however, the stillbirth and death rates were very similar.

A fuller use is made of the classification in Table 3 in which stillbirths and neonatal deaths among singleton births are tabulated by maternal and by fetal and neonatal factors. Stillbirth rates in Scotland and the Northern region are very similar and show consistent use of the two classifications. Amongst neonatal deaths the Northern region apparently had a higher mortality attributed to hyaline membrane disease and immaturity while Scotland had higher rates for asphyxia and trauma. It is likely that this difference, which also affected the rates for multiple births shown in Table 4, arises from problems in definition which, it is hoped, can be resolved by use of the flow chart described by Hey *et al.* in this issue (p. 1213).

Multiple births are too few in number for it to be worth using the two-way classification on a regional level, so in Table 4 stillbirths and neonatal deaths combined are tabulated according to each classification separately. Although the overall rates are very similar, it is not surprising, given the small numbers involved, that there are larger differences in cause specific rates.

Death rates among babies born weighing less than 1500 g in Scotland and the Northern region are shown in Table 5. These have been tabulated in the 250 g groups recommended earlier. The Scottish data should be interpreted with caution as they were calculated using denominators derived from an estimated birthweight distribution based on 1984 data. It is thought that a very small number of babies in the 500–749 g group born in Scotland did, in fact, survive. They do illustrate, however, the marked differences in mortality within the 500 g groups under 1500 g.

Although confidence intervals have not been shown for Tables 1–5, it should be borne in mind that many of the rates are based on small numbers of events. For some analyses, it would be preferable to combine several years' data where they are available. Readers' comments on the usefulness or otherwise of this selection of

tables and suggestions for further tabulations would be very welcome in planning the analyses which it is intended to publish next year.

Future developments in England and Wales

Gestational age is one of the items specified by the Steering Group on Health Services Information for collection in England from 1 April 1988 onwards. The data will be collected through District Maternity Systems, aggregated regionally and then submitted to OPCS for analysis nationally as part of the Hospital Episode System (HES). The Welsh Office plans to set up a similar system once Patient Administration Systems have been installed in each district.

When the Maternity HES system and its Welsh counterpart are under way it will be possible to use them to produce gestational age distributions for geographically defined populations, while local systems produce similar data by district of treatment. The same considerations apply to data about women's actual parity. At birth registration, only married women are asked about parity and the information collected is confined to previous births by her current or any other husband.

Meanwhile developments have taken place in the civil registration system. Birthweight is now recorded for most births registered in England and Wales. It was missing for only 0·13% of live births and 1·65% of stillbirths registered in 1985 (OPCS 1986*a*). It is essential that the relevant staff make efforts to reduce these percentages to zero by ensuring that all babies are weighed (Wilkinson & Howat 1980) and all birthweights are recorded on birth notifications so that they can be passed to OPCS, and also that birthweights are on all stillbirth certificates. Meanwhile, using existing data, the OPCS is able to provide denominators for tables specified here and use its infant mortality linked files to produce birthweight specific mortality rates.

One example of what is possible is shown in Table 6, which gives perinatal mortality in broad birthweight groups in each NHS region. It is, of course, possible to use smaller subdivisions. OPCS also subdivides tabulations by other items collected at birth registration, including multiplicity, parents' ages, mother's country of birth, father's social class, registered cause of death and place of delivery (OPCS 1986*b*).

The new forms introduced in 1986 for certifying stillbirths and neonatal deaths in England and Wales ask certifiers to identify separately maternal, fetal and other conditions leading to death. It may, therefore, be possible to use these attributed conditions to derive approximately the same categories of maternal factors and fetal and neonatal factors described in this issue of the Journal. This may eventually enable those NHS regions who do not conduct their own perinatal mortality surveys to contribute data. It would also mean that the classifications can be used in conjunction with the data which OPCS collects from parents at birth registration.

This will be of little value unless those certifying stillbirths and neonatal deaths improve the quality of the clinical information on the two certificates and update it by ensuring that revised information, including that from post mortems, is forwarded to OPCS. It is also hoped that the insights gained from using the classification described in this issue of the Journal will help in the provision of better data on death certificates.

Up to the present, the clinical information given on many stillbirth and death certificates has been unreliable and innacurate. When information recorded in case notes was compared with that recorded when certifying stillbirths during 1973 and 1977 in eight maternity units in the North West Thames region, many discrepancies were found (Edouard 1982). A study of stillbirths and neonatal deaths in the North East Thames region in 1983 (Duley 1986) reported in this issue (p. 1233) shows that this situation has not changed. An analysis of mortality among multiple births in England and Wales since 1975 (B. Botting, I. Macdonald Davies & A. J. Macfarlane, unpublished observations) found that a disturbingly high proportion of deaths was attributed simply to 'multiple pregnancy' rather than to any specific condition.

In an article describing the pilot study of the new forms of stillbirth and neonatal death certificates (Gedalla & Alderson 1984) the OPCS mentioned the suggestion that the introduction of the new certificates would be accompanied by an increase in the numbers of 'medical enquiries' addressed to the consultant responsible for the mother or the baby. This would ensure that fuller information from post mortems and perinatal meetings reached the OPCS in these instances.

It should be noted that when the OPCS receives such information, it amends its computer records but not its paper records, such as those sent to health authorities. NHS regions

who wish to compare the clinical information on OPCS records with the relevant case notes should, therefore, use the annual computer tapes rather than the copies of death registrations sent to DHAs. Such comparisons would be useful in auditing the quality both of data sent to the OPCS and the NHS region's own survey data.

In Scotland, the Scottish Perinatal Mortality Survey has now become part of the country's system of routine data collection, and compares stillbirths and neonatal deaths with information collected about all births. The question therefore arises as to whether this principle could be extended to NHS regions of England and to Wales.

Some surveys carried out in England have only collected information about deaths while others have used controls. Selecting controls is not easy, yet without them there are dangers in drawing unsubstantiated conclusions about 'avoidable' factors. On the other hand, Chalmers (1984) has suggested that when what is now called the Maternity HES System is fully working, it would enable comparisons to be made with the whole population, thus making the question of controls redundant.

To enable this to happen it would be necessary to link data from HES and from the parallel system in Wales with data collected at birth registration and hence with the OPCS infant mortality linked files. The question of the HES linkage has been raised, but to our knowledge a decision has yet to be taken about it. We are not aware of whether discussions have taken place about the Welsh system. Because of cross boundary flows between England and Wales some co-ordination would be highly desirable. In any case, the timing of any further developments depends on financial resources and on how soon the Maternity HES System is working fully and smoothly.

It is, however, worth raising these questions now in order to discourage long-term duplication of effort and to encourage discussions about future developments. These discussions should involve not only those doing perinatal surveys, but also statisticians at OPCS and DHSS and information officers and community physicians in NHS districts and regions.

Acknowledgments

We should like to thank Myrna Holmes and Lesley Mierh for typing the manuscript and all our various colleagues who gave helpful comments. Alison Macfarlane is funded by the Department of Health and Social Security.

References

Chalmers, I. (1984) *Enquiry into Perinatal Death. A Report on National Perinatal Surveillance prepared for the Department of Health and Social Security.* National Perinatal Epidemiology Unit, Oxford.

Chalmers, I. (1985) Commentary. Enquiry into perinatal death. *Br J Obstet Gynaecol* **92,** 545-549.

Chiswick, M. (1986) Commentary on current World Health Organization definitions used in perinatal statistics. *Br J Obstet Gynaecol* **93,** 1236-1238.

Cole, S. (1980) Scottish maternity and neonatal records. In *Perinatal Audit and Surveillance* (Chalmers, I. & McIlwaine, G., eds), RCOG, London.

Cole, S. K., Hey, E. N. & Thomson, A. M. (1986) Classifying perinatal death: an obstetric approach. *Br J Obstet Gynaecol* **93,** 1204-1212.

Duley, L. M. M. (1986) A validation of underlying cause of death as recorded by clinicians on stillbirth and neonatal death certificates. *Br J Obstet Gynaecol* **93,** 1233-1235.

Edouard, L. (1982) Validation of the registered underlying causes of stillbirth. *J Epidemiol Community Health* **36,** 231-234.

Gedalla, B. & Alderson, M. R. (1984) Pilot study of revised stillbirth and neonatal death certificates. *Arch Dis Child* **59,** 976-982.

Hey, E. N., Lloyd, D. J. & Wigglesworth, J. S. (1986) Classifying perinatal death: fetal and neonatal factors. *Br J Obstet Gynaecol* **93,** 1213-1223.

Information Services Division (1986) *Scottish Stillbirth and Neonatal Death Report 1985.* Information Services Division, Edinburgh.

Mutch, L. (1986) *Archive of Locally Based Perinatal Surveys.* National Perinatal Epidemiology Unit, Oxford.

OPCS (1986*a*) *Birthweight Statistics 1985.* OPCS Monitor DH3 86/2. OPCS, London.

OPCS (1986*b*) *Mortality Statistics 1984, Perinatal and Infant: Social and Biological Factors.* Series DH3, No 17. HMSO, London.

Scott, M. J., Ritchie, J. W. K., McClure, B. G., Reid, M. Mc. C. & Halliday, H. L. (1981) Perinatal death recording; a time for a change? *Br Med J* **282,** 707-710.

Wilkinson, A. R. & Howat, P. (1980) One kilogram babies. *Lancet* **i,** 655.