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European indicators of health care during pregnancy, delivery and the postpartum period

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Abstract

Objectives: To describe variation across Europe in PERISTAT indicators of health care in the perinatal period, and to assess the comparability of these indicators. *Study design:* The PERISTAT feasibility study provides the source for this descriptive study, covering 15 European countries. Comparative analysis includes descriptions of births following management of sub-fertility, timing of first antenatal visit, onset of labour, mode of delivery, place of birth, preterm births in units without NICU, and breast-feeding uptake. *Results:* There is broad variation in the availability to provide data on perinatal indicators, and in perinatal health care across the European Union. *Conclusions:* This paper describes the challenge of identifying indicators that are meaningful and robust for the full distribution of health care systems represented in the European Union. Further work is needed to ensure that the implementation of each indicator is comparable across member states.

Keywords: Antenatal; Perinatal; Health indicators; Health services; Mode of delivery; Onset of labour; Episiotomy; Sub-fertility; Breastfeeding

1. Introduction

Health care services are integral to health and well being in the perinatal period for women and their babies. Vast improvements over time have been documented for measures including neonatal, infant and maternal mortality in European countries. Monitoring changes in clinical practice related to evidence-based findings provides an indication of how these findings percolate through health care systems in each country. Episiotomy, for example was once considered de rigueur for all vaginal deliveries in some countries, but an increasing number of studies demonstrate that restricting use of this procedure improves maternal outcomes and reduces the incidence of more serious perineal tears [1,2]. Medical technologies associated with the perinatal period continue to advance quickly, particularly those related to the management of sub-fertility and the care of preterm infants, and describing variations in the use and success of these medical technologies is an important task of health monitoring in the European Union. Describing how clinicians support women and babies through the process of healthy pregnancy and birth enhances our understanding and comparisons of health in the perinatal period at the European level. A description of health care services must measure interventions implemented to prevent death and morbidity, but must also incorporate aspects of health care quality, as assessed by mothers themselves.

From a health monitoring perspective, indicators of care either for medical interventions or for measures of support provide a better basis for understanding the full picture of perinatal health in Europe. A key challenge is the identification of meaningful indicators that perform similarly across different health care systems. Many indicators that are useful at a national level cannot be transposed for comparisons between member states because they reflect different realities in the different models of care present in Europe.

In this paper, we present the PERISTAT health care indicators relevant to each of the following categories, listed in a chronological order from pre-conception to postpartum:

- sub-fertility management,
- antenatal care,
- labour and delivery,
- postpartum care.

The indicators presented are part of the PERISTAT list of core and recommended indicators of perinatal health [3].

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We describe each of the indicators presented in this paper, as defined by the PERISTAT scientific advisory committee, and we provide justification for its usefulness as a comparable indicator of European perinatal health. We then compare statistics on these indicators in each European country. Data come from the PERISTAT feasibility study, conducted in 2002/2003 with data providers in the 15 member states. A full description of the methodology and data sources used to compile and construct the indicators presented in this paper is provided in the paper by Macfarlane et al. in this issue [4]. We proceed to discuss issues of data quality specific to the indicator in its current form, including its availability in the member states. We conclude with a description and interpretation of the results themselves.

The final section includes indicators selected by the PERISTAT group for further development. These indicators represent goals for improving future comparisons of health services, with an emphasis on quality of care in the perinatal period. Specifically, we discuss two topics: support provided to women by clinical personnel during pregnancy, labour and delivery and the postpartum period, and maternal satisfaction with both care and support. These indicators are presented separately because the PERISTAT project did not establish clear definitions or methods of data collection for them.

Two additional indicators are not discussed in this paper because they were included in the PERISTAT list of indicators only after the feasibility study, when the committee consulted with a group of European midwives. These indicators are also key bench marks for further understanding and comparing perinatal health care services in Europe. They include a measure of births attended by midwives, and births without medical intervention.

2. Sub-fertility management

2.1. Recommended Indicator 8: percentage of women experiencing a live or stillbirth following fertility treatment

Sub-fertility management usually includes the following: induction of ovulation alone, artificial insemination alone or associated with induction of ovulation, and implantation of ovum or ova with either conventional in vitro fertilisation (IVF) or IVF techniques involving intracytoplasmic sperm injection (ICSI) or similar methods.

Births resulting from sub-fertility management are a subject of great interest in many countries. The new technologies introduced since the 1970s to address sub-fertility have provided assistance to some of the ever increasing proportion of women and couples seeking help with conception. For example in Europe in 1998 the ratio of the number of initiated treatment cycles for IVF and related procedures to women aged 15–49 years in the overall population was 3.2 per 1000 [5]. Treatments for the management of sub-fertility are responsible for between 30 and 40% of twin pregnancies and nearly 75% of triplet pregnancies in certain countries [6]. Multiple pregnancies are at particularly high risk for poor perinatal outcomes. In addition, the use of sub-fertility management is associated with increased perinatal risks for singletons. Children born following IVF treatment have higher risks for preterm delivery, low birthweight, perinatal death, congenital anomalies and neurological anomalies than children born following spontaneous conception [7–12]. Increased risk for sub-optimal outcomes is also observed for ovarian stimulation [13]. However, it is unclear whether the risks observed after sub-fertility management result from influences related to the procedure itself, from characteristics responsible for sub-fertility, or from a combination of these two factors.

The importance of this phenomenon has led Flanders (Belgium), Finland, Germany and Sweden to collect information about sub-fertility management for the current conception as part of the medical registration of births. In Greece and France, perinatal health surveys among women following their delivery provided similar information for 1998. Table 1 presents the data provided in response to the PERISTAT questionnaire about these births. A total of 5.5% of women giving birth in France, 3.9% in Flanders, and 2.3% in Germany reported some form of sub-fertility management. Information is more widely available about IVF than other procedures, and the percentage of women giving birth

Table 1
Women experiencing live and stillbirths following fertility treatment

Member state (coverage if not national)	Source[a]	Total		Induction of ovulation alone		Artificial insemination		Implantation of ova/ovum[b,c]	
		%	95% CI	%	95% CI	%	95% CI	%	95% CI
Belgium (Flanders)	B2-2000	3.9	3.8–4.1	1.7	1.6–1.8	0.5	0.5–0.6	1.7	1.6–1.8
Finland	FIN1-2000							2.1	2.0–2.2
France (perinatal survey)[d]	F1-1998	5.4	5.1–5.8	3.4	3.0–3.7	0.7	0.6–0.9	1.4	1.2–1.6
Greece (perinatal survey)[d]	EL1-1998	4.5	4.1–4.8	1.3	1.1–1.5			3.2	2.9–3.5
Germany	D4-2000	2.3							

[a] Information on data sources including number of births, in Appendix A.
[b] Implantation in Flanders includes IVF and ICSI.
[c] Implantation in Finland includes IVF and ICSI and FET.
[d] Greece and France report live births only (data are from population surveys).

following IVF ranged from 1.4% in France to 3.2% in Greece.

There is a risk of underestimating the use of treatments for sub-fertility management, and there is often confusion about the methods employed. Data collection in each country can affect variations in the rates reported in Table 1. The French and Greek data come from interviews with women in population-based surveys. Data provided in medical registers essentially come from medical records, which may not systematically include information about sub-fertility treatment, as women may not be asked the relevant questions. Furthermore, it is possible that some women may withhold information related to fertility treatments. In Finland, a comparison between the medical birth registration and the IVF register demonstrated that an estimated 20% of IVF births were not reported in the medical birth register [14]. It is also possible that the formulation of certain questions may predispose women to think in terms of IVF and not other medications or procedures that constitute sub-fertility management.

Between-country differences in the types of sub-fertility treatment often result from variations in the availibilty of these treatments. For instance, in 1998 the use of IVF, expressed as the ratio of initiated treatment cycles reported to women aged 15–49 years, was twice as high in the Nordic countries as in France, a finding that demonstrates a much larger proportion of the population receiving this treatment for sub-fertility [5]. Furthermore, it is possible that differences in medical norms between countries, for example the relative promptness with which doctors apply more intensive treatment strategies such as IVF, play a role in the rate variation.

The feasibility study revealed that data are not currently available in the EU to adequately assess the contribution of ovarian stimulation and IVF to births or to monitor their impact on pregnancy outcomes, a finding supported in the literature [15]. For example, in many countries, including France and the UK, the data available through IVF centres are aggregated at the national level but are often insufficient or inappropriate for estimating the contribution of these procedures towards births.

3. Antenatal care

3.1. Recommended Indicator 9: distribution of timing of first antenatal visit

The PERISTAT project selected timing of the first visit as an indicator at the European level because it is widely accepted that antenatal care should begin during the first trimester, despite differences in the recommended quantity and sometimes content of care. Early antenatal care makes it possible to identify medical conditions which need careful surveillance throughout pregnancy. In countries where gestational age is estimated by ultrasound scan, this is systematically done before the end of the first trimester. A first trimester scan conducted between 11 and 13 weeks also provides an opportunity for nuchal translucency screening for Down's syndrome. Maternal serum screening, which is often conducted early in the second trimester, requires some advance information and counselling that are invariably provided during the first trimester.

Fig. 1 describes the differences across the member states with respect to the timing of women's first antenatal visit. Specifically, we present the proportion of women whose first visit occurs after the first trimester (>15 completed weeks of gestation). Seven of the 15 participating countries provided data for this indicator. Responses ranged from more than 30% in Ireland to fewer than 5% of women in France, with most clustered between 12% (Germany) and 7% (Spain). These figures compare favourably to data from the US

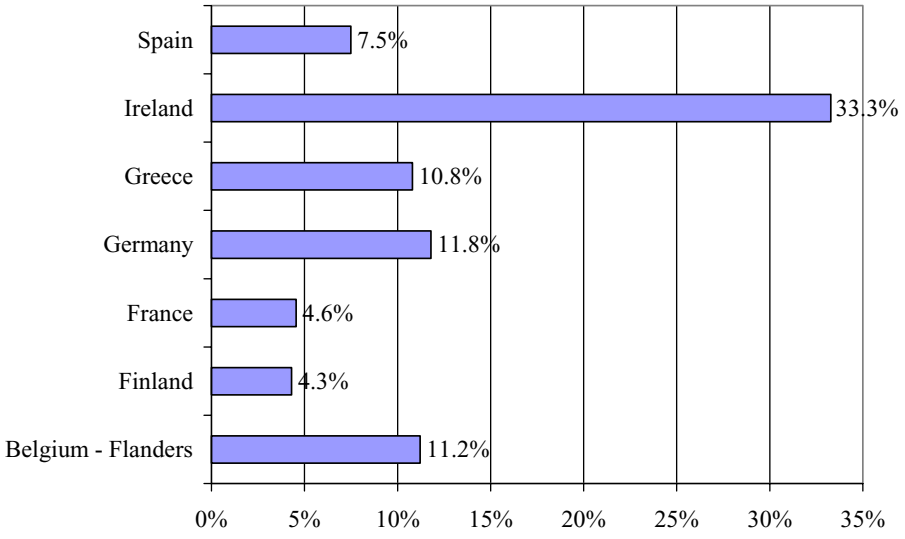

Fig. 1. Percentage of women with late antenatal care. Note: data from Flanders provided by SPE for 1999, data from Ireland reported as first visit at 20 or more weeks of gestation.

PRAMS study, which estimates that between 15 and 30% of US women do not begin antenatal care in the first trimester of pregnancy [16]. McQuide et al. reported in 1998 that all European countries provide some form of incentive to reduce barriers to and improve participation in antenatal care. In France and Finland these incentives are financial, while in other countries they are primarily non-financial [17].

Several interpretations may explain the apparent high proportion of late attenders to antenatal care in the Republic of Ireland. A similarly high rate of late care was published in 1999 by Delvaux and Buekens [18]. It is likely that many women receive most of their antenatal care from a general practitioner or midwife before officially booking at a maternity unit, and that the national statistics may be capturing only the first hospital visit rather than first antenatal contact with a clinician. The United Kingdom has a similar system, and for this reason did not contribute to data on first antenatal visit.

The majority of women in the reporting member states receive antenatal care in the first trimester, though 4% of women in Germany, 3% in Greece and 2% in Spain did not receive care until the third trimester compared to fewer than 1% in Flanders, Finland, and France. Approximately 2.5% of women in Greece received no antenatal care, while this figure was less than 1% for other countries that provided data for this indicator.

Countries vary in terms of what happens at the first antenatal visit: in some places the first visit is purely administrative, in others it includes a pregnancy test and scheduling a subsequent visit, and in many cases it is a medical visit with clinical personnel [17,18]. Regardless of its content, this visit marks the first point of contact between the pregnant woman and the medical system that will provide care, information and support throughout her pregnancy, labour and delivery, and in the postpartum period.

4. Labour and delivery

4.1. Recommended Indicator 11: distribution of place of birth

The distribution of place of birth provides an example of the heterogeneity of maternity care organisation in European countries, in terms both of the size of maternity units, defined by annual births, and the proportion of births occurring at home. Place of birth reflects differences in the organisation of maternity care, and can provide information about trends in the constellation of maternity units in the member states. Many papers have identified the importance of regionalisation of obstetric and neonatal care in improving outcomes for high-risk deliveries [19–21], but the debate continues for pregnancies not identified as high risk. Is it safer to give birth in a large referral centre where intensive care services are immediately available on site? Or do women with low-risk pregnancies face unnecessarily high levels of medical interventions in these settings? One recent study from Hesse, Germany, suggested improved survival in the neonatal period among 'low-risk' babies born in high-volume compared to smaller maternity units [22]. In contrast reviews of studies in the United Kingdom and The Netherlands found no evidence that the safest policy was for all women to delivery in high-volume facilities [23]. The question of over-medicalisation of low-risk deliveries in large facilities has not been sufficiently examined in the literature, and not all results support the high-volume thesis [24]. The policy and health system implications of regionalisation for these low-risk deliveries are extensive, particularly in more rural areas where access to high-volume facilities is limited.

Most of the 15 member states provided data on the distribution of place of birth, and among those, 10 could distinguish size of maternity unit by the number of annual

Table 2
Distribution of hospital births as a proportion of all births (size of maternity hospital by number of annual births)

Member state (coverage if not national)	Source[a]	<300 (%)	300–499 (%)	500–999 (%)	1000–1499 (%)	1500–1999 (%)	2000–3999 (%)	4000+ (%)	home/other (%)
Austria	A1-2001	4.3	11.1	39.0	17.4	9.5	17.5	0.0	1.3
Belgium (Flanders)[b]	B2-2000	0.3	8.1	52.4	19.0	8.3	11.2	0.0	0.8
Denmark	DK1-2000	1.4	2.3	3.9	23.4	12.8	40.7	13.7	1.5
Finland[c]	FIN1-2000	1.7	5.6	11.6	12.6	11.9	30.4	24.8	0.2
France (perinatal survey)	F1-1998	2.4	7.9	29.0	22.7	17.0	20.4	0.7	0.0
Germany (nine Bundesländer)	D1-2000	4.2	13.3	38.6	27.0	11.1	5.7	0.0	0.0
Luxembourg	L2-2000	3.7	12.2	22.9	61.1	0.0	0.0	0.0	0.1
Spain (Valencia)	E5-2000	0.7	1.3	7.2	21.3	31.9	22.5	15.0	0.0
Sweden[d]	S1-2000	–	2.2	9.6	14.1	14.7	59.0	–	0.0
UK (Scotland)	UK6-2000	2.4	0.0	7.1	7.4	9.5	44.3	28.4	1.0
UK (Northern Ireland)	UK7-2000	0.0	0.0	13.2	16.0	7.1	43.7	19.6	0.2
UK (Wales)	UK18-2000	2.1	0.0	0.0	16.0	23.0	56.4	0.0	2.1

[a] Information on data sources including number of births, in Appendix A.
[b] Flanders data are reported for deliveries, not births.
[c] 692 births where size of maternity hospital is unknown have been excluded.
[d] Sweden smallest category reported is 100–499, and last category combines 2000–3999 with 4000+.

births. Table 2 shows the full range of variation between countries with respect to size of maternity units.

The debate about the relatively safety of smaller maternity units for neonatal health outcomes makes the variations between member states presented in Table 2 particularly interesting. In three countries (Austria, Germany, and Luxembourg), nearly 15% of births occur in maternity units with fewer than 500 annual births, and nearly 10% of French births. In other member states (UK, Sweden, Finland, and Spain) small maternity hospitals (<500 annual births) account for less than 3% of all births.

At the other end of the spectrum, some member states rely on very large maternity units with more than 4000 annual births for a significant proportion of births. This ranges from nearly 25% of births in Finland to 28% in Scotland and 20% in Northern Ireland, and England and Wales. In contrast Austria, Belgium, France, Germany, and Luxembourg report no maternity units of this size at all. These variations reflect real differences in health care systems and philosophies of care for mothers and neonates.

The prevalence of home births reported in these data ranges from one-tenth of 1% in Luxembourg to 1% of all births in Austria and Denmark to 2.1% in England and Wales. The impossibility of distinguishing planned from emergency home births represents a significant limitation in these data. It is also likely that home births are underreported in countries where the medical system is geared towards hospital-based perinatal care.

Data were not provided from The Netherlands, where it is estimated that nearly one third of all deliveries are planned home births (TNO unpublished data).

5. Care for high-risk infants

5.1. Recommended Indicator 13: percentage of very preterm deliveries in units without NICU

Access to intensive care for very preterm infants determines their survival and future quality of life. Medical advances over the past 25 years have decreased the mortality and morbidity of the very preterm infants who have access to new therapies. Many studies have concluded that the risk of neonatal death is lower when a very preterm birth occurs in a maternity unit with an on-site neonatal intensive care unit, called a 'level-III perinatal unit' [25–28] and attribute this result to differences in the quality of care at birth as well as to the deleterious effects of transporting these newborns after birth to an intensive care unit in another hospital. The percentage of very preterm babies born in units that give

Table 3
Place of birth for very preterm babies (<32 weeks gestational age)

Member state (coverage if not national)	Source	*N* (births <32 weeks)	Type of unit (number of units, when available)	Place of birth, units defined in column 4			
				1	2	3	4
Belgium (Flanders)	B2-2000		1 = units with NICU 2 = other units	62.7[a] 76.5[b]	37.3[a] 23.5[b]		
Denmark	DK1-2000	685	1 = units routinely using assisted ventilation (4) 2 = other units (∼60)	50.0	50.0		
Finland	FIN1-2000	597	1 = university hospital (5) 2 = central hospital (17) 3 = regional or local hospital (20) 4 = home/other	71.5	23.3	4.4	0.8
France (Burgundy)	F5-2000	162	1 = unit with a NICU 2 = units without NICU	78.2	21.8		
Germany (nine Bundesländer)	D1-2000	7312	1 = NICU on site (233) 2 = other units (652)	83.0	17.0		
Greece (perinatal survey)	EL1-1998		1 = university clinics 2 = non-university hospitals 3 = large private clinics 4 = small private clinics	33.5	21.1	33.0	12.4
Portugal	P3-2000	979[b,c]	1 = hospital with NICU (22) 2 = hospital with neonatal units (28) 3 = home	88.3[b,c]	9.5[b,c]	2.2[b,c]	
Spain (Valencia)	E5-2000	3240[b]	1 = level III, GA < 32 & <1500 g (5) 2 = level II, minor/moderate pathology (10) 3 = level I, term and normal birthweight infants (6)	97.7[b]	2.3[b]	0.1[b]	

[a] All births.
[b] Live births.
[c] <1500 g, 22 homebirths excluded.

them the greatest chance of survival without impairment is a one measurement of the quality of the organisation of health services.

Table 3 presents available data from the feasibility study on the place of birth of very preterm babies. Respondents were asked to provide data on the place of birth of very preterm births by levels of obstetrical and/or neonatal care and to describe the classification system used in the country. Relatively few countries could provide this information: the ability to evaluate the care of high-risk babies requires official or unofficial guidelines for classifying units (not available in all EU countries [19], as well as birth statistics that include gestational age.

The data in Table 3 show that the countries in Europe have different ways of organising care for very preterm babies. In Portugal, the Valencia region of Spain, and Germany, care is concentrated in level III units, whereas in Denmark, units that do not routinely use assisted ventilation nonetheless care for a large number of very preterm infants. These statistics should be interpreted with caution as there is variation in the level of services accompanying the term NICU. Greater clarification on the capacity of intermediate care units would be helpful in interpreting these data.

While data were requested for all births, some countries only provided information on live births (Portugal and Spain). This point is important because women experiencing a fetal death before labour are often not transferred to a maternity hospital with a NICU. In Belgium, where information about live and stillbirths are separately available, fewer live than stillborn very preterm babies were born in units without an NICU. Data from Portugal cover births less than 1500 g but only from 32 weeks of gestational age onward. For these figures to be comparable, the population covered must be clearly specified.

This indicator provides important information about the way that European countries organise care for the population of high-risk babies (and, indirectly, on their ability to evaluate the organisation of care). The ability to monitor changes in organisation and care over time will be enormously useful for health planners and clinicians in Europe.

5.2. Recommended Indicator 10: distribution of births by mode of labour onset

For most women, pregnancy and childbirth are a natural process requiring little medical intervention. The challenge in obstetrics is to exploit new medical technology and take into account scientific evidence on beneficial effects of interventions, without concomitantly over-medicalising pregnancy and childbirth. Medical intervention during delivery can be in some circumstances, an indicator of the medicalisation of childbirth. Rates of labour induction and planned caesarean sections are on the rise across Europe, and they represent an area of diversity in obstetric practice between the member states. This indicator was computed according to gestational age and plurality to improve our understanding of the management of indicated term and preterm deliveries.

Seven member states provided data on the distribution of labour onset, as Table 4 shows. Seven were able to provide the data by gestational age and to distinguish interventions for multiple gestation pregnancies, thus providing a more robust picture of indicated interventions pre- and post-term for singletons and twins/triplets. The proportion of spontaneous onset of labour among the reporting member states ranged from fewer than half of all births in Greece (47%) to 81% of all births in Sweden.

Variation among member states was more marked for induction of labour than for caesarean sections performed before labour. Labour induction ranges from a third of all births in Northern Ireland and 28% in Greece, to 10% in Sweden. While some of this variation may result from differences in which clinical procedures constitute 'labour induction', it is likely that they reflect real differences in the

Table 4
Distribution of births by labour onset

Member state (coverage if not national)	Source[a]	Spontaneous (%)	Induction (%)	CS before labour (%)
Belgium (Flanders)[b]	B2-2000	58.8	31.9	9.2
Denmark	DK1-2000	83.4	9.8	6.8
Finland[c]	FIN1-2000	78.3	14.3	7.3
France (perinatal survey)	F1-1998	69.0	19.9	9.0
Germany (nine Bundesländer)	D1-2000	74.4	15.8	9.8
Greece (perinatal survey)[d]	EL1-1998	47.2	27.9	15.4
Sweden	S1-2000	81.0	10.2	6.8
UK—England[e]	UK4-00/01	68.7	21.5	9.8
UK—Scotland[e]	UK6-2000	65.4	26.9	7.7
UK—Northern Ireland[e]	UK7-2000	52.9	32.6	13.7

[a] Information on data sources including number of births, in Appendix A.
[b] Data are based on women delivering live or stillborn babies.
[c] Finland: data for caesarean section are termed 'planned caesarean section'.
[d] 10% data missing from Greek perinatal survey.
[e] UK data for caesarean section are termed 'elective caesarean section' meaning that the caesarean took place before labour or immediately after its onset, following a decision made before labour.

philosophy of care as it translates into obstetric practices, such as the management of labour for medical indications, and even the organisation of the clinical team in the maternity unit.

The proportion of caesarean section before labour is more stable across the countries providing data. Flanders, Finland, France, Germany, and Sweden each report an overall rate of caesarean section before labour under 10%, while in Greece and Northern Ireland the rate is approximately 15 and 14% of all deliveries, respectively.

5.3. Core Indicator 10: distribution of births by mode of delivery

Data to construct this indicator are widely available in Europe; those reported here came from 13 of the 15 member states. All 13 were also able to provide some information on analytic subgroups, including parity, fetal presentation, and previous caesarean sections among multiparas. Measurements of differences in mode of delivery under different key circumstances including breech presentation, previous C-section, parity and multiple gestation pregnancies would offer insight into obstetric practices in which the balance of benefits and risks to women and their babies must be weighed on a case by case basis. In most cases these data came from the medical birth registration, but in some countries, they resulted from national surveys.

In view of the on-going debates about the safest path to delivery, surveillance of mode of delivery provides a window to view how the evidence from clinical trials, which can provide guidance to clinicans, is diffused into practice in different European countries. And because there is not yet clear consensus on the safest path to delivery, this indicator may point the way to new studies examining the results of clinical practices in labour and delivery.

Spontaneous deliveries represented the majority of births in all reporting countries, accounting for a low of 60% in Greece to highs of 77% in The Netherlands and 81% in Sweden. The trend in vaginal instrumental deliveries was clearly towards greater use of ventouse than forceps, except in Scotland where the percentage of forceps-assisted births are marginally higher than ventouse. Austria, Denmark, France, Italy, Netherlands and UK-Wales did not distinguish between the instruments used but rather reported the total for all instrument-assisted deliveries (Table 5). Overall, instruments were used in fewer than 15% of all deliveries, at levels ranging from 5% in Austria to 12% in Flanders, France, Scotland and Northern Ireland to 15% in the Republic of Ireland.

The overall caesarean delivery rates ranged from 12% in The Netherlands to 31% in Greece and Italy, respectively. Six other countries had caesarean rates of 20% or below. Germany (21%) and three countries of the United Kingdom (England and Wales 22%, Scotland 22%, and Northern Ireland 24%) reported that caesareans accounted for between one-fifth and one-quarter of all deliveries. These figures reveal important aspects of obstetric practice in the member states. As early as the 1980s there was already a noticeable distinction between The Netherlands and other countries with respect to the use caesarean section [29]. By the 1990s, the levels of caesarean had already increased significantly in Greece, the UK and The Netherlands, and

Table 5
Distribution of births by mode of delivery[a]

Member state (coverage if not national)	Vaginal deliveries					Caesarean deliveries		
	Source	Spontaneous (%)	Forceps (%)	Ventouse (%)	Total instrumental (%)	Labour (%)	No labour (%)	Total CS (%)
Austria	A1-2001	76.2	0.6	4.3	4.9	–	–	18.9
Belgium (Flanders)	B2-2000	70.7	1.3	11.0	12.3	7.0	10.0	17.0
Denmark	DK1-2000	76.0	–	–	8.0	8.3	7.7	16.0
Finland[b]	FIN1-2000	77.6	0.1	5.9	6.1	8.8	7.3	16.0
France (perinatal survey)	F1-1998	69.6	–	–	12.4	7.9	9.6	17.5
Germany (nine Bundesländer)	D1-2000	71.2	1.6	4.8	6.7	11.1	9.8	20.9
Greece (perinatal survey)	EL1-1998	59.6	0.7	8.4	9.1	15.1	15.4	30.5
Ireland	IR1-1999	64.5	5.1	9.9	15.0	–	–	20.4
Italy	I1-1998	62.8	–	–	6.0	–	–	30.8
Luxembourg	L2-2000	68.1	4.6	5.9	10.0	–	–	20.3
Netherlands	NL1-2000	77.0	–	–	11.0	7.0	4.6	11.7
Sweden	S1-2000	81.0	0.6	7.2	7.7	8.1	6.8	15.4
UK (England)[c,d]	UK4-00/01	66.6	3.8	7.2	11.1	12.7	8.8	21.5
UK (Scotland)[c,d]	UK6-2000	65.2	6.9	5.4	12.0	7.7	14.0	21.9
UK (N Ireland)[c,d]	UK7-2000	63.7	5.5	6.6	12.0	12.5	11.2	23.7
UK (Wales)[c,d]	UK18-00/01	65.3	2.7	7.8	10.3	14.0	9.8	23.8

[a] Information on data sources including number of births, in Appendix A.
[b] Finland: data for caesarean section are termed 'planned caesarean' and 'other caesarean section'.
[c] Instrumental vaginal deliveries in England and Scotland include a category for vaginal breech extraction.
[d] United Kingdom: caesareans are subdivided into 'elective' meaning that it took place either before the onset of labour or directly after, following a decision made before labour, and 'emergency' meaning that the decision was made during labour.

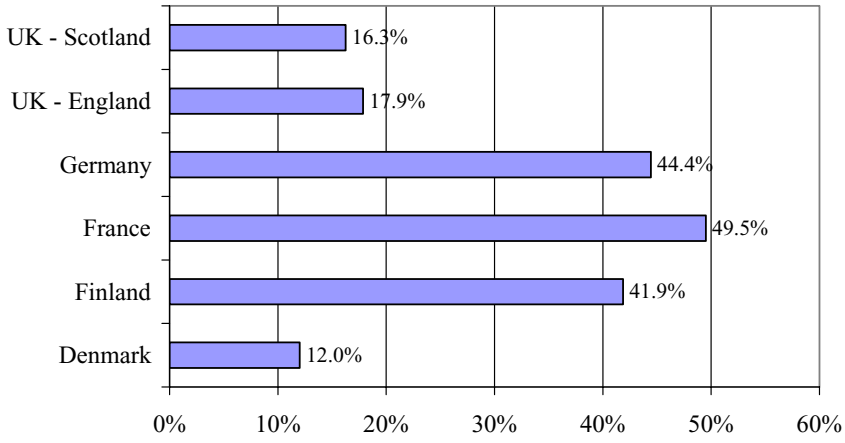

Fig. 2. Proportion of vaginal deliveries with episiotomies.

less markedly in Finland [30]. Caesarean sections performed before labour account for between 40 to 60 percent of all Caesareans in the countries providing data, demonstrating a general trend towards a 50–50 division between caesareans performed before labour and those undertaken during labour in Europe.

5.4. Recommended Indicator 5: prevalence of trauma to the perineum

Prevalence of perineal trauma was selected as a measure of both clinical practice and of morbidity with potential long-term implications for women's health. In the context of ongoing debates about indications for and benefits of certain obstetric interventions, episiotomy rates reflect differing approaches to care during labour and delivery. Considering these rates together with information on the rate and level of perineal tears, we can better describe a common morbidity associated with vaginal delivery. As new recommendations emerge from multicentre clinical trials, it is important to monitor how these reach clinicians in the member states and affect clinical practice.

The Argentine randomised controlled trial, concluding that anything over 20% could not be medically justifiable, established a ''ceiling'' for episiotomy rates [2]. A 1999 Cochrane review found evidence to support 'restrictive use' of episiotomy to lower the risk of perineal and posterior trauma, but stopped short of advocating an appropriate rate [1].

The proportion of women who experience episiotomy as a part of vaginal birth is often a more accessible measure than perineal tearing in existing European data. Episiotomies are typically reported in medical registers, while tears are more likely to be ascertained from ICD codes in hospital records and thus to be under-reported, particularly if they are less severe. Because of the association established by many studies between episiotomy and additional perineal trauma [31–33], the most useful statistics would cover the state of the perineum after vaginal delivery and include both tears and surgical procedures. Six of the 15 member states provided information on the episiotomy rate, while four could furnish data on the rate and degree of tearing.

The episiotomy rates reported for this study show that European countries vary widely in their approaches to vaginal birth. As shown in Fig. 2, episiotomy rates range from nearly half of all vaginal births in France to 18% in England, 16% in Scotland, and 12% in Denmark. Although data from Sweden were unavailable for this report, a 1999 paper reported a rate of 3.4% at a large University hospital in Sweden between 1992 and 1994 [34]. Increased episiotomy rates have been associated with vaginal instrumental deliveries, particularly forceps delivery [35], but the data we present in this paper for instrument-assisted vaginal delivery rates do not account for the variation in episiotomy rates. While France had high rates for both, with 49% episiotomies and 12% instrumental assistance, the level of instrumental assistance in England was similar (11%) while its episiotomy rate was much lower—fewer than 20% of all births.

6. Postpartum care

6.1. Recommended Indicator 12: percentage of babies breast-feeding at birth

The PERISTAT group selected breast-feeding in the first 48 hours after birth as an indicator because it represents a health boost to infants and because it is often dependent on the support, information and assistance of health care professionals during pregnancy and the immediate postpartum period. Breast-feeding provides babies not only with an important nutritional advantage over artificial milk substitutes, but also improves resistance to infections [36]. While recommendations differ about the length of time breast-feeding should continue, there is general agreement about its benefits for babies and thus about the importance of

Table 6
Breastfeeding at birth (within 48 hours)

Member state (coverage if not national)	Source[a]	Infants breastfed		Infants not breastfed (%)	Unknown (%)
		exclusive (%)	mixed (%)		
Belgium (French community)[b]	B3-2000	71.3	0.9	25.2	2.7
France (perinatal survey)	F1-1998	40.4	6.8	42.7	10.2
Ireland	IR1-1999	35.9	0.8	63.0	0.3
Luxembourg (infant feeding survey)[c]	L4-2000	72.0	25.8	1.2	1.0
Spain (infant feeding survey)[d]	E4-1997	84.2	–	15.8	–
Sweden	S1-2000	91.2	5.6	1.7	1.6
UK (infant feeding survey)[e]	UK15-2000	29.0	16.0	31.0	–
UK—Northern Ireland[f]	UK7-2000	34.3	1.7	62.7	1.3

[a] Information on data sources including number of births, in Appendix A.
[b] French community in Belgium includes infants breastfed anytime during the 5-day hospital stay following birth.
[c] 95% confidence intervals for Luxembourg survey, calculated because survey included 600 respondents only: exclusive 0.64–0.75, mixed 0.22–0.29, not breastfed 0.003–0.02, unknown 0.002–0.02.
[d] Data from Spain include exclusive and mixed breastfeeding in a single category.
[e] An estimated 69% of babies were breastfed initially. At 3–6 weeks, an estimated 29% were exclusively breast-fed and 16% had a mixture of breast and other milk.
[f] Feeding method at hospital discharge.

the initial postpartum uptake. This indicator provides one measure in the perinatal period and is complemented by recommended indicators from the EURODIET and CHILD projects of the European Commission's Health Monitoring Programme.

Health care professionals transmit their attitudes towards the importance of breast-feeding through the support and assistance (or lack thereof) that they provide [37]. A recent randomised controlled cluster trial demonstrated the effect of intervention by hospital staff in the immediate postpartum on both the uptake and continuation of breast-feeding [38]. It also found reduced risks of gastrointestinal infections and eczema among infants in the intervention clusters at the 12-month follow-up.

As Table 6 shows, seven member states provided data on uptake of breast-feeding, mostly from population-based surveys of new mothers. Definitions differed significantly between countries. Spanish data, for example, do not differentiate between exclusive and mixed breast-feeding, while the Belgian data reported the percentage of women who breast-fed at any time during the 5-day postpartum hospital stay, and in Northern Ireland data represent the feeding method at the time of hospital discharge. The feeding choice is reported to be unknown in 10% of the births in the French data, most of these are cases where the babies were transferred out of the maternity units where they were born. The highest percentage of exclusive breast-feeding uptake is reported in Sweden (91%), compared with approximately 70% in both Luxembourg and Belgium. France (40%), Ireland (36%), and Northern Ireland (34%) report fewer than half their babies exclusively breast-fed in the first 48 hours.

In addition to exclusive breast-feeding uptake, we note key differences in the level of mixed feeding, that is, those infants who receive both breast milk and formula. This percentage ranged from below 1% in Wallonia to as much as 26% in Luxembourg; it was 7% in France and 6% in Sweden. There is no clear relation between the percentages of mixed feeding and exclusive breast-feeding in these data. These differences between countries related to mixed and exclusive breast-feeding could result from different definitions of what constitutes mixed feeding. According to breast-feeding advocates, mixed feeding can hinder the augmentation of breast milk supply and thereby limit the ability to breast-feed.

7. Indicators for further development

Facets of health care provision other than care and medical interventions need to be measured. The PERISTAT scientific advisory committee, which worked to define the list of indicators presented in this report, highlighted the importance of indicators to address certain 'qualitative' aspects of care from the perspective of women and their babies during the perinatal period. The indicators that received the highest ratings from this expert group were consistently those geared towards improving health outcomes for women and their babies. In this context, it is important to remember that the vast majority of pregnancies progress as a normal and indeed healthy physiological event and culminate in the birth of a healthy child. Therefore, while it is necessary to examine such negative outcomes as morbidity and mortality, these do not provide a sufficient picture of perinatal health in Europe. Additional indicators are crucial to understand the quality of care provided to all pregnant women, most of whom experience pregnancy and childbirth without medical complications. To better address the quality of care in the perinatal period, two indicators were selected: support provided to women by health personnel and women's satisfaction with the care they receive.

7.1. Support to women in the perinatal period

The definitions employed to measure social support vary widely [39], but three key aspects are broadly accepted: (1) emotional support, including intimacy, reassurance and the ability to confide in or rely on another, (2) informational support, that is, providing information and advice, and (3) instrumental support, involving aid and services that can include gifts, financial assistance, household help. It is reasonable to posit that the support offered to women by different medical systems during the perinatal period respond explicitly to their needs and so provide some indication of the quality of the social environment for these women. Indicators of social support provided by medical personnel also help us to understand the relevant social policies in each member state better. Finally, social support can be considered from a health perspective, inasmuch as it may improve health outcomes. Some observational studies have demonstrated that women provided with additional social support experience more positive birth outcomes [40]. Randomised controlled trials provide little evidence that interventions intended to provide social support during pregnancy have benefits on either gestational age or birthweight [41]. Nonetheless, support by lay people or midwives during labour has been associated with reduction in caesarean and operative vaginal deliveries and time elapsed in second stage labour [42]. Furthermore, support during the postpartum may help protect against postpartum depression.

As part of the DELPHI process to select perinatal indicators [3], the expert group considered a number of indicators related to the measurement of social support. Each came from previous recommendations by groups including WHO and the European Association of Perinatal Medicine. In addition, the PERISTAT project recruited a cohort of European midwives to participate in a similar DELPHI process, part of which focused specifically on measures of support. The indicators selected include various aspects of support:

- *Perceived support*: mother's satisfaction with medical care.
- *Description of the network*: marital status or cohabitation with partner, support by partner or friend during labour.
- *Specific interventions intended to provide support*: attendance of antenatal classes.
- *Medical care intended to provide support as well as other objectives*: planned home birth, birth attended by midwife, duration of hospital stay after delivery, home visits during postpartum period, continuity of care throughout the antenatal, intrapartum and early postpartum periods.
- *Support to the mother and the newborn*: breast-feeding, rooming-in from birth.

Given the breadth of the project, we needed to reduce this list to one or two indicators that might best represent the notion of support to women and that were most likely to be available at the national level among the member states. The consensus regarding any one of these indicators was not strong: although 80% of the expert panel selected all of the core indicators as essential, only half considered the percentage of home births a necessary measure, and agreement dropped to 30% for the inclusion of duration of hospital stay, birth attended by a midwife and marital status. Among the other measures of support, 19% of experts selected rooming-in from birth, 15% attendance in antenatal classes, and 12% home visits in the postpartum period. Concerns were voiced about the feasibility of measuring and comparing support cross-nationally, as the meaning of results will be influenced by the health care system in each member state. Duration of hospital stay following delivery provides an example, as it is typically dictated by national policy and must be considered in the context of other relevant practices, including postpartum home visits following hospital discharge. Another example of how an objective measure of support depends on structural variation between countries is the percentage of births attended by midwives. In some countries, a birth requires the presence of an obstetrician, while in others the midwife may operate as an independent caregiver from the beginning of the pregnancy to the birth and the postpartum period.

7.2. Measuring women's satisfaction with perinatal health care

Satisfaction is an important indicator of perceived quality of care. It is essential to ensure that medical services are patient-centred and respond to the needs of women. Satisfaction also has repercussions for health service utilisation, as women will seek to avoid clinicians or services which they perceive unsatisfactory. Finally, satisfaction with care received in the perinatal period may reinforce a positive attitude among women toward their pregnancy and ultimately their child.

Studies measuring clinical services and health outcomes particularly for low-risk pregnancies are more frequently including measures of satisfaction and perceived quality [43–46]. Instruments employed to measure satisfaction are well developed in the literature and also quite varied. Measurement scales to address general satisfaction or satisfaction with a specific type of service do not always include the same dimensions; some of the most common are perceived competence, quality of the caregiver–client relationship, organisation of care, and control. These indicators are themselves sometimes characteristics of certain procedures for which a priori judgements are made about quality. In addition to the choice of instrument, there are difficulties in selecting the appropriate time frame to collect data, as the response to the same questions may vary over time. It is also critical to temper international comparisons of satisfaction with the understanding that population-level knowledge and cultural biases will affect individual perceptions of care [47]. For example, one randomised controlled trial found that women who received a reduced number of antenatal care visits were less satisfied than those who received standard

care, even though the health outcomes were similar in both groups [48]. Methodological work is required before indicators to measure women's satisfaction with care can be used appropriately at the European level.

8. Conclusions

In this paper, we have presented a wide range of indicators that measure the provision of health care services to women and their babies in the perinatal period. These indicators are crucial for monitoring and comparing perinatal services across the European Union. We have noted the challenge of identifying indicators that are meaningful and robust for the full distribution of health care systems represented in the European Union. Further work is needed to develop clear definitions and to ensure that the implementation of each indicator is comparable across member states. The results presented here make it clear that the PERISTAT indicators of health care services capture a great deal of variability in perinatal care across the EU. At the same time, we recognise the differences in the data sources and definitions, and the roles that they play for certain indicators.

Further, there are large differences in data availability for many of the indicators we have discussed. While information about mode of delivery is widely available in the member states, there is a relative paucity of information about breastfeeding, perineal trauma and management of sub-fertility.

Finally, much work lies ahead to develop indicators of support to women in the perinatal period and to measure maternal satisfaction with the care and support they receive. Consideration of these more qualitative aspects of health care should provide a more comprehensive understanding of how perinatal care works for the majority of women in Europe who experience healthy pregnancies and births, in addition to measuring the problems that arise. This adds complexity and challenges for defining appropriate measures and for the collection of data to address these issues.

Appendix A. Data sources used for constructing tables

Member state	Coverage (if not national)	Data source[a]	Year(s) provided	Abbreviation	Total births
Austria		Statistics Austria	2001	A1-2001	75707
Belgium	Flanders	Studiecentrum voor Pernatale Epidemiologie (SPE)	2000	B2-2000	62122
Denmark		Danish perinatal database	2000	DK1-2000	67337
Finland		Medical birth registry—STAKES	2000	FIN1-2000	56768
Finland		Hospital discharge register—STAKES	2000	FIN3-2000	
Finland		Population statistics—Statistics Finland	2000	FIN5-2000	
France	Representative sample	National perinatal survey	1998	F1-1998	13718
France	Burgundy	Perinatal network of Burgundy	2000	F5-2000	17,226
Germany	Nine Bundesländer[b] representing 72.6% of all births	BAQ—perinatal survey	2000[a]	D1-2000	558079
Germany		DIR-IVF registry	2000	D4-2000	
Greece	Representative sample	Population based perinatal survey undertaken in 1998	1998	EL1-1998	14659
Ireland		National Perinatal Reporting System	1999	IR1-1999	54302
Ireland		Birth registration system	1999	IR2-1999	54242
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	L3-2000	5723
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

Appendix A. (*Continued*)

Member state	Coverage (if not national)	Data source[a]	Year(s) provided	Abbreviation	Total births
Portugal	Voluntary register (almost complete)	Register of the perinatal society	2000	P3-2000	979
Spain		National Institute for Statistics (INE)	1999	E1-1999	397632 (live births)
Spain		Infant feeding survey	1997	E4-1997	?
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	
United Kingdom	England	Department of Health, Maternity Hospital Episode Statistics	2000/2001	UK4-00/01	
United Kingdom	Wales	National Assembly for Wales, Child Health System	2000	UK5-2000	
United Kingdom	Scotland	Information and Statistics Division, SMR2 Maternity Discharge Sheet	2000	UK6-2000	52413
United Kingdom	Northern Ireland	Perinatal information, Northern Ireland, aggregated data from child health systems	2000	UK7-2000	21794
United Kingdom	Wales	All Wales perinatal survey	2000	UK9-2000	
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
United Kingdom	England	Hospital Episode Statistics	2000/001	UK17-00/01	
United Kingdom	Wales	Patient Episode Database Wales	2000/2001	UK18-00/01	

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

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

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