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ARE LIVE AND STILLBIRTHS COMPARABLE  
ALL OVER EUROPE?  
Legal definitions and vital  
registration data processing

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FOREWORD

Improvement of infant and child health have been key objectives of public health and population programs in both developing and developed countries. Monitoring of such programs through the measurement of infant mortality has occupied the attention of health statisticians and demographers in many countries. Even when there are good civil registration systems in place, comparison of infant mortality rates over time and space are still problematical because legal definitions still affect the concerned vital events to be declared: stillbirths, live births and deaths.

When infant mortality rates are very low, as they are in Europe, the impact of legal definitions are greatest as infant deaths become more and more concentrated in the early days and even hours of life. This paper reports on a 1991 survey undertaken by the Institute of Demography, Catholic University of Louvain, Belgium, in order to gain a comprehensive picture of the existing vital registration situation and its consequences as to the comparability of perinatal and early neonatal mortality statistics.

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# ***Are Live and Stillbirths Comparable All Over Europe? <sup>1</sup>***

## ***Legal definitions and vital registration data processing***

Catherine Gourbin and Godelieve Masuy-Stroobant

The *infant mortality rate (risk)* is known to be one of the most widely and commonly used indicators of the social and economic development of a population, whilst the *perinatal mortality rate* is supposed to monitor the quality of perinatal care, including pregnancy. Very often used for international comparisons, or to evaluate the progress achieved over time within specific countries, these indicators are probably not as accurate as one might expect, given the quality of our vital registration systems.

Although vital statistics offer many advantages for the production of health and mortality indicators, they are still a by-product of legal obligations and therefore depend closely on the legal definitions of the (concerned) vital events to be

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declared: stillbirths (or late foetal deaths), livebirths and deaths.

Since the beginning of the XXth Century, various attempts were made to recommend international definitions in order to solve the comparability problems deriving from differences in national or local legal definitions, data processing methods and also in the declaration practices (Nations Unies, 1955). Those differences are known to have only a very limited impact on birth statistics and the related fertility figures, as they chiefly concern a small number of children dying very shortly after birth. Concerning infant mortality, their impact depends obviously on its general level, but predominantly on the age at death distribution within the first year of life. When infant mortality was high and mainly postneonatal, their incidence could not cause gross misclassification of countries in this respect. At present, the situation has changed dramatically: infant mortality is very low in Europe and concentrates more and more in the very early days or even hours of life. Simultaneously, the increasing performances of neonatal care techniques during the eighties led to a redefinition of the de facto viability criteria, which vary probably within and across countries according to the availability of adequate neonatal care (Gourbin, 1991; Fenton, et al. 1990). Obstetrical practice changed accordingly, and the decision to proceed to elective delivery of very preterm foetuses at risk of dying in utero exerts a significant impact on the overall incidence of very preterm infants. This may lead to a shift towards registration of a live birth instead of a stillbirth (or of no registration at all, if the foetal death did occur below the minimum requested gestational age for being considered as a stillbirth). Consequently it has been suggested (Working Group on the Very Low Birthweight Infant, 1990) that perinatal mortality considered as a global indicator is no more able to reflect adequately improvements occurring in perinatal care as it relies more and more on the availability of highly specialized care and mixes prenatal and neonatal factors as well as registration rules and practices. Accordingly, *the impact of differences in legal definitions, in the related declaration practices and data processing methods is presumably rising, especially when early neonatal and perinatal mortality indicators are considered.*

## A. Materials and methods

A first comprehensive study analyzing the comparability of statistics produced by the vital registration systems all over the world was conducted by the United Nations in reference to the year 1950 (Nations Unies, 1955). The study offers a very detailed overview of the history of vital event registration, the definitions in use by 1950, the declaration procedures, the information collected at registration and the data processing and publication procedures. Recommendations were also provided in order to enhance international comparability of this invaluable material and the study may be used as a reference for possible further improvements in this field.

From 1976 to 1979, the United Nations conducted a survey on the vital registration statistical methods to update the former 1950 study (Nations Unies, 1985).

The WHO Regional Office for Europe set up a Perinatal Study Group in 1979 to study and report on the issues surrounding birth and birth care. 23 European countries participated to the survey they conducted in 1981-1982. A very small part of the survey was devoted to vital registration in the participating countries and unfortunately, most of the tables and figures are published in an aggregate form, precluding any possibility to compare their results with the more detailed 1950 survey (Mugford, 1983; WHO, 1985).

The 1991 survey undertaken by the Institute of Demography (Catholic University of Louvain), was preceded by two more qualitative investigations:

- First, an in-depth comparative research undertaken in Belgium and in the Region of Nord-Pas-de-Calais (France) revealed the importance of legal definitions pertaining to vital events registration, but also of the administrative management of the registration itself: who declares, in what delay, contents and shape of the civil registration forms, coding, data processing and publication of the registered statistical information, etc (Dumoulin and Gourbin, 1991).
- A further qualitative survey conducted in a sample of maternity wards in Belgium (Gourbin, 1991) confirmed the variability of the newborn's viability concepts and definitions in use, which was previously pointed out in

other researches (Keirse, 1984; Fenton et al. 1990).

Based upon those findings, a questionnaire was designed and sent by mid-1991 to all the European National Statistical Offices in order to gain a comprehensive picture of the 1991 vital event registration situation and its consequences as to the comparability of perinatal and early neonatal mortality statistics. The existence of Medical Birth Registries often linked to vital registration systems, especially in the North European countries, was also investigated. In the meantime, researchers who specialized in the study of infant health and mortality by making use of large population-based data files (vital registration, medical birth registries, specific large-scale surveys) were identified in almost every country, in order to complete the information on nation-wide data bases and their use for research in the field of infant health and mortality. Verification of the accuracy of the information provided by the first survey questionnaire was done by sending provisional tables to all the participating countries and individuals. In many instances cross-checking using two or more informants has proved to be useful. By mid-1992, all the 27 European Countries contacted participated actively to the survey (see list of participating countries on the tables below) and 106 resource-persons were identified.

## B. Vital registration of live and stillbirths in 1991 Europe

### 1. Legal definitions

#### 1.1. The need to compare. A growing concern

The use of vital statistics for public health purposes find its roots in the late XVIIth Century with John Graunt's "Observations Made Upon the Bills of Mortality" (1662), but *the need to produce comparable statistics at an international level* appears later and dates from the First International Statistical Conference, held in Brussels (Belgium) in 1853. During the XIXth Century, the principal topic of interest was to establish an International Causes of Death Classification which was committed in 1891 to the International Statistical Institute and, in 1946, to the World Health Organisation (WHO).

*The search for comparability of vital events definitions was*

*definitely a XXth Century concern.* In 1925, the League of Nations suggested international recommendations for the registration of births (live births and stillbirths), and deaths. Death being the permanent disappearance of any sign of life following a live birth, its definition is far less controversial and closely dependent of the live birth definition.

The key-questions were in fact: how to distinguish between a non-declarable miscarriage and the to be declared "late" fetal death or stillbirth? How to define a live birth and distinguish it from the deadborn or stillborn infant?

The answers, though varying over time, refer to the presence of *vital signs* for *live births* and, if absent, to an *additional viability criteria* for registering "*late*" foetal losses or stillbirths.

In 1925, the Committee for Hygiene of the League of Nations recommended *breathing* as the requested vital sign for defining a *live birth*, whatever the gestational age or duration of life. This recommendation was not adopted by a majority of European countries, since at 1st January 1950 (Nations Unies, 1955) only 5 countries made use of the "breathing" vitality criterion, whilst 14 already used the "*any sign of life criteria*". The latter being adopted by WHO in its 1950 recommendation (OMS, Série de rapports techniques nr 25, p. 12, quoted by Nations Unies 1955 note 1 p. 56) and later again in the 1975 definition of the International Classification of Diseases 9, which is still the reference today.

For defining the *foetal loss or stillbirth, the absence of breathing* (1925) and, later, of *any sign of life* (1950, 1975) appears to be insufficient and was completed by a *viability criteria*. A Special Committee on Infantile Mortality (Report of Special Committee on Infantile Mortality, 1912) defined this physical viability criterion or the "capacity for the foetus to survive independently of its mother" as a *minimum gestation duration of seven lunar months or 28 weeks*. An alternative criteria was *body length set at 32 cm crown-heel* and both suggestions were discussed at the International Statistical Institute in 1915 (Nations Unies, 1955). The League of Nations adopted a slightly different definition in 1925, where viability of the dead product of conception was taken as a *minimum gestation duration of 28 weeks or 35 cm body length crown-heel*, the latter criterion being preferred to the former. The 1950 WHO definition restricted again the viability criterion to a minimum gestation duration of 28 weeks and made use of the gestational age to distinguish between "late" and total foetal

loss. Information on foetal deaths should be collected in such a way as to permit classification into three major categories (WHO, 1950):

- early foetal deaths occurring at less than 20 completed weeks of gestation;
- intermediate foetal deaths from 20 to less than 28 weeks;
- late foetal deaths at 28 weeks or more.

The difficulty to assess without ambiguity the exact gestation duration was discussed by the same Sub-Committee, but birthweight appeared still to be even less accurate owing to its dependence on race and the mother's nutritional status.

Nevertheless, *birthweight became the key criterion* since the WHO 1975 (ICD-9) international recommendations for the elaboration of national and international perinatal mortality statistics (OMS, 1977). The correspondences between the quantitative criteria were fixed at 500 g (birthweight) - 22 weeks (gestation duration) - 25 cm (body length) for the elaboration of *national perinatal mortality statistics*, the criteria being applied to live births and foetal losses; for *international comparisons, standardized perinatal mortality statistics* should be calculated on the basis of a minimum of 1 000 g or 28 weeks or 35 cm.

The forthcoming ICD-10 definitions and standards related to foetal, perinatal, neonatal and infant mortality (WHO, 1990), reinforce the birthweight criterion for producing standard statistics for the perinatal period. They give however more detailed rules regarding the denominator of the related ratios and rates and define explicitly standard measures for foetal death rate, early neonatal, neonatal, perinatal and infant mortality rates, whilst ICD-9 only mentioned standard perinatal mortality measures.

When suggesting rules for the elaboration of perinatal mortality statistics at the national and international levels, WHO in fact tried to dodge the still puzzling problems linked to legal definitions by distinguishing, in their recommendations, legal criteria from the production of comparable statistics.

## 1.2. The 1991 situation in Europe

In spite of a general tendency towards the adoption of common definitions for civil registration of live and stillbirths all over Europe (WHO, 1985), the 1991 situation still shows significant differences between the 27 participating countries (Table 1).

Table 1: Legal criteria for registration of a Live Birth (LB), Europe 1/1/1991  
Critères légaux d'enregistrement d'une naissance vivante à l'Etat civil, Europe 1/1/1991

Countries	Any signs of life	Signs of life			Lower limits
		Breath	Heart Beat	Pul. umb. cord	
Austria	.....	..+..	..+..	..+..	Minimum of lifetime
Belgium	WHO	.....	.....	.....	.....
Czechoslovakia	WHO	.....	.....	.....	.....
Denmark	WHO	.....	.....	.....	if BW** < 500g : + 24 hours of life
England-Wales	WHO	.....	.....	.....	.....
Finland	WHO	.....	.....	.....	.....
France	.....	..+..*	..+..*	..+..*	if GD*** < 28 w. : alive at registration
GDR (ex)	.....	..+..	..+..	..+..	.....
GFR (ex)	.....	..+..	..+..	..+..	.....
Greece	WHO	.....	.....	.....	.....
Hungary	WHO	.....	.....	.....	.....
Iceland	WHO	.....	.....	.....	?
Ireland (Rep.)	WHO	.....	.....	.....	.....
Italy	WHO	.....	.....	.....	.....
Luxembourg	WHO	.....	.....	.....	.....
Netherlands	WHO	.....	.....	.....	.....
Northern Ireland	WHO	.....	.....	.....	.....
Norway	WHO	.....	.....	.....	.....
Poland	WHO	.....	.....	.....	if 601 g ≤ BW ≤ 1000 g : + 24 h of life
Portugal	WHO	.....	.....	.....	.....
Romania	WHO	.....	.....	.....	if BW < 1000 g alive at Registration
Scotland	WHO	.....	.....	.....	.....
Spain	WHO	.....	.....	.....	.....
Sweden	WHO	.....	.....	.....	.....
Switzerland	.....	..+..	..+..	.....	if GD < 28 w or BW < 1000 g : + 168 hours of life
USSR	.....	.....	.....	.....	.....
Yugoslavia	WHO	.....	.....	.....	.....

\* or other signs of life

\*\* BW = Birthweight

\*\*\* GD = Gestation Duration

Source: Survey conducted by the Institute of Demography, Catholic University of Louvain (Belgium)

Table 2. Legal criteria for registration of a Stillbirth. Europe 1/1/1991  
Critères légaux d'enregistrement d'un mort-né à l'Etat civil. Europe 1/1/1991

Countries	Gestation Duration				Weight			Length	
	22 w.	24 w.	26 w.	28 w.	500 g	1000 g	30 cm	35 cm	
Austria	.....	.....	.....	.....	.....	.....	.....	.....	
Belgium	.....	.....	.....	.....	.....	.....	.....	.....	
Czechoslovakia	.....	.....	.....	.....	.....	.....	.....	.....	
Denmark	.....	.....	.....	.....	.....	.....	.....	.....	
England-Wales	.....	.....	.....	.....	.....	.....	.....	.....	
Finland	.....	.....	.....	.....	.....	.....	.....	.....	
France	.....	.....	.....	.....	.....	.....	.....	.....	
GDR (ex)	.....	.....	.....	.....	.....	.....	.....	.....	
GFR (ex)	.....	.....	.....	.....	.....	.....	.....	.....	
Greece	.....	.....	.....	.....	.....	.....	.....	.....	
Hungary (1)	.....	.....	.....	.....	.....	.....	.....	.....	
Iceland	.....	.....	.....	.....	.....	.....	.....	.....	
Ireland (Rep.)	.....	.....	.....	.....	.....	.....	.....	.....	
Italy	.....	.....	.....	.....	.....	.....	.....	.....	
Luxembourg	.....	.....	.....	.....	.....	.....	.....	.....	
Netherlands	.....	.....	.....	.....	.....	.....	.....	.....	
Northern Ireland	.....	.....	.....	.....	.....	.....	.....	.....	
Norway	.....	.....	.....	.....	.....	.....	.....	.....	
Poland	.....	.....	.....	.....	.....	.....	.....	.....	
Portugal	.....	.....	.....	.....	.....	.....	.....	.....	
Romania	.....	.....	.....	.....	.....	.....	.....	.....	
Scotland	.....	.....	.....	.....	.....	.....	.....	.....	
Spain	.....	.....	.....	.....	.....	.....	.....	.....	
Sweden	.....	.....	.....	.....	.....	.....	.....	.....	
Switzerland	.....	.....	.....	.....	.....	.....	.....	.....	
USSR	.....	.....	.....	.....	.....	.....	.....	.....	
Yugoslavia	.....	.....	.....	.....	.....	.....	.....	.....	

\* 180 days from presumed date of conception \*\*\* 1 001 g

(1) Registration of stillbirth is not compulsory in Hungary  
Source: Survey conducted by the Institute of Demography, Catholic University of Louvain (Belgium)

Although a majority of countries (20 out of the 27 participating countries) make use of WHO signs of life criteria required for defining a live birth, some of them still restrict vitality to the presence of a set of explicitly defined signs of life. Furthermore, there are still countries which impose additional viability criteria if the newborn's weight or gestational age is below legal defined limits. If this is the case, a minimum life duration, varying from 24 (ex-Czechoslovakia, Poland) to 168 hours (the former U.S.S.R.), is required for official registration of the birth (Table 1).

Vital registration of foetal deaths is mainly restricted to *late foetal deaths or stillbirths*, according to the WHO definition. They are defined by the absence of the necessary signs of life for being a live birth, but an additional viability criteria of a minimum of 28 weeks gestation, or the corresponding weight (1 000 g) or length (35 cm) is also required. Few countries register intermediate foetal deaths, but some of them register foetal deaths from 22 weeks gestation duration (Portugal, Finland) (Table 2). The preference given in almost every country to the gestation duration instead of birthweight is still in disagreement with WHO recommendations, the more so as the correspondence between 28 weeks gestation and 1 000 g birthweight is far from being a systematic one (Dubois et al., 1984; Hellier and Goldstein, 1979).

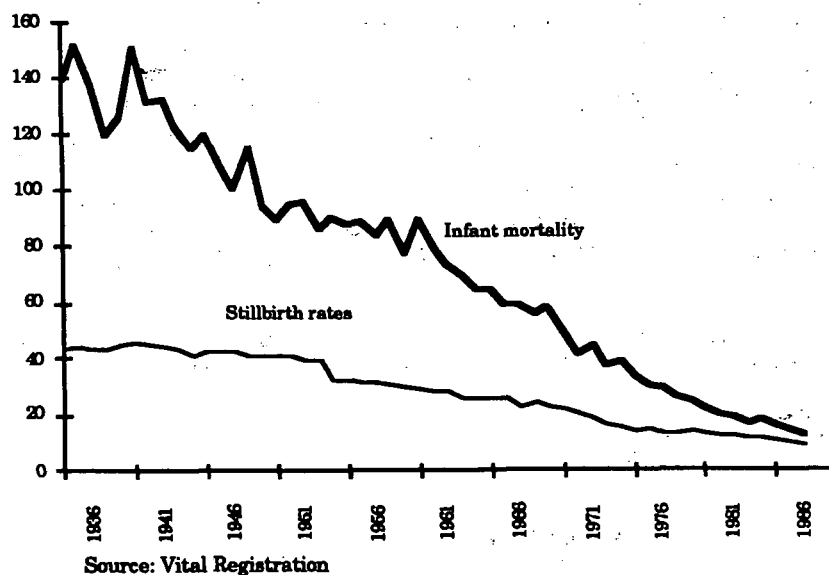
As far as we know in a limited number of European countries (WHO, 1985) vital registration of stillbirths is not (no more) required by law. In Hungary late foetal deaths are recorded since 1984 in the hospital where the delivery has occurred. Vital registration of stillbirths is only necessary when the parents want to bury the deadborn child.

### 1.3 Facts and figures

The first observation is that differences and changes in legal criteria definitely have an impact on the usual infant mortality indicators and their comparability over time and space.

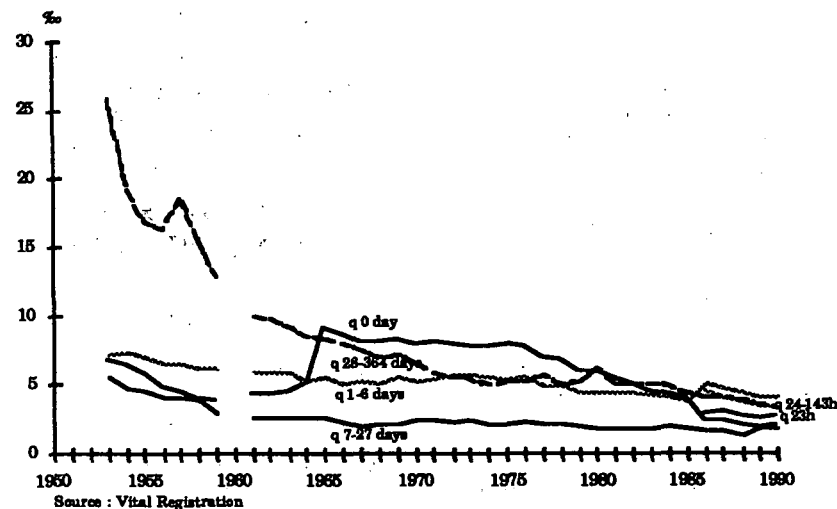
When Portugal proceeded in 1955 from a registration of every foetal death to the adoption of a more restrictive definition of the stillbirth to be declared (28 weeks gestation duration), their stillbirth rates decreased accordingly (Fig 1). However, the more recent shift (1980) towards compulsory registration of foetal deaths after 22 weeks (gestational age) did not affect the figures as might have been expected.

Fig. 1: Portugal 1936-1989



As a consequence of the adoption (1965) of the WHO definition of a live birth, one observes a sudden upward trend of the first day infant mortality risk in Czechoslovakia (Fig 2). Furthermore, first day mortality was calculated by difference in calendar days up till 1985 leading to an important underestimation of the real first 24 hours mortality, the remainder of the early neonatal mortality being overestimated.

Fig. 2: Czechoslovakia 1950-1990. Infant mortality risks by age  
Tchécoslovaquie 1950-1990. Quotients de mortalité infantile  
par âge au décès

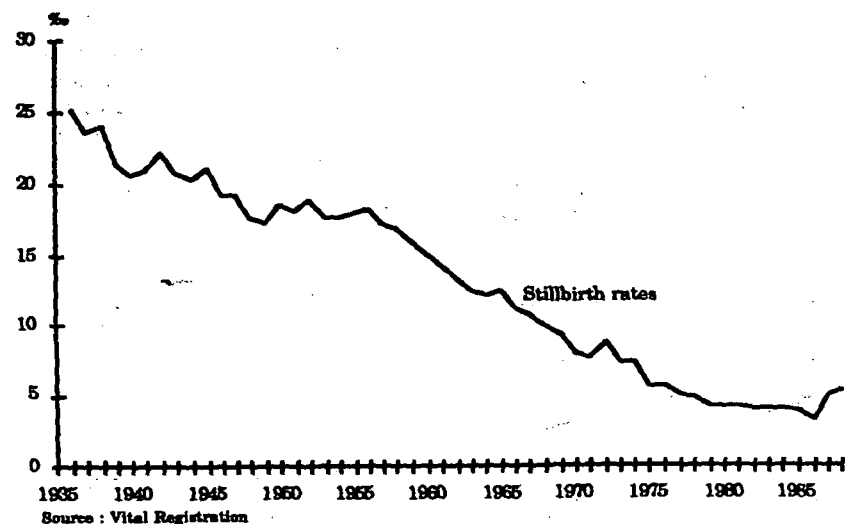


The very recent upward trend shown by the stillbirth rates in Finland (Fig. 3) is a direct consequence of the adoption in 1987 of the WHO recommendations for the elaboration of national perinatal statistics. But the last revision occurred after a long history of periodical changes in legal criteria for stillbirth registration, each of them having an impact on the published figures (with a time-lag of one year):

- from 1938 to 1954, all the stillbirths declared in the local registers were considered without explicit lower threshold;
- from 1955 to 1963, a death certificate for stillbirths was introduced and body length of at least 25 cm was used for determining declaration;
- from 1964 to 1986, a stillbirth was declared if it had a minimum of 185 days gestation duration (26 weeks and 3 days);
- from 1987 onwards, the WHO recommendations for national perinatal statistics were adopted: all births with a minimum gestational age of 22 weeks or a birthweight of at least 500 g are eligible for registration.



Fig. 3: Finland 1936-1988. Finlande 1936-1988



Besides their historical interest, similar situations will probably last for a long time, since changes in legal definitions are planned or already implemented since our reference period (1/1/1991) in some countries and they still do not always meet the WHO recommendations (Table 3).

The cases of The Netherlands and the United Kingdom are of special interest in this matter. Concerning The Netherlands, it was decided to fix the minimum gestation duration at 24 weeks for registration of live and stillbirths (since 1st July 1991). If a child having a lower gestation duration survives 24 hours, it should be declared as a live birth. It means that some very preterm babies born alive (according to the WHO definitions) but dying shortly after birth will legally and statistically be ignored and the early neonatal mortality figures underestimated ... For the United Kingdom the legal criterion for registration of a stillbirth will be reduced from 28 weeks to 24 weeks gestation duration from the 1st October 1992 onwards.

Table 3. Future changes in legal or administrative definitions.  
Europe 1/1/1991  
Changements prévus dans les définitions légales et administratives.  
Europe 1/1/1991

		Stillbirth	Live Birth
Belgium	in discussion	≥ 500 g	≥ 500 g
Czechoslovakia	planned	?	?
England-Wales	1/10/92	24 wks	/
Netherlands	1/07/91	24 wks	24 wks
Northern Ireland	1/10/92	24 wks	/
Poland	1/01/92	≥ 500 g	≥ 500 g
Scotland	1/10/92	24 wks	/
USSR*	planned	≥ 500 g	≥ 500 g

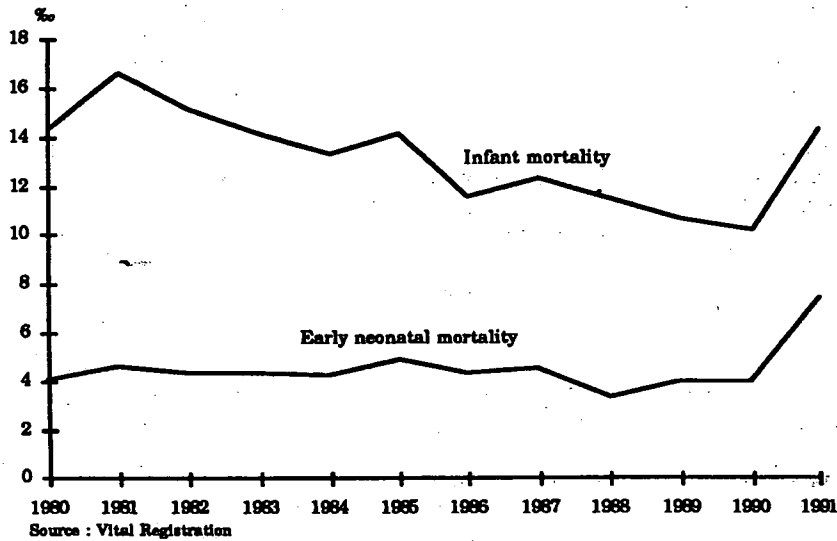
\* For Latvia and Lithuania WHO recommendations for national statistics were to be adopted in 1991, for Estonia in 1992.  
Source: Survey conducted by the Institute of Demography. Catholic University of Louvain (Belgium)

The new political situation in the Baltic Republics has allowed the adoption of the WHO recommendations for elaboration of national statistics. Consequently stillbirths have to be registered from 500 g of weight or from 22 weeks gestation duration since 1991 in Lithuania and Latvia, 1992 in Estonia. Concerning livebirths, Latvia imposes a minimum life span of seven complete days of life if a live birth take place below the limits of weight or gestation indicated in its legislation (less than 500 g of weight or 22 weeks gestational age).

The influence of these modifications on infant mortality figures was immediate, and the sudden and important rise of the various infant mortality rates in Lithuania in 1991 (Lithuanian Health Information Centre, 1992), is a direct consequence of the change in declaration of live birth<sup>2</sup> and stillbirth (Fig. 4).

<sup>2</sup> With the former USSR legislation, a live birth weighing less than 1 000 g was declared only if the child could survive 7 days.

Fig. 4: Lithuania 1980-1991. Lithuanie 1980-1991



## 2. Administrative limitations

Besides differences in vital event definitions, registration modalities and data processing methods, including publication of the collected information data, may further distort comparability between countries.

### 2.1. The delay for notification and registration

Delays for registration of births and deaths are usually fixed by law. They vary widely across countries ranging from 24 hours for the registration of a *live birth* (ex-Czechoslovakia, Hungary) to three months (former U.S.S.R.) with one country, Sweden, where no delay is fixed at all (Table 4). The length of such registration delays was formerly dependent on the distance between the place of birth (mainly home births before World War II) and the Vital Registrar's Office. More recently, a number of countries decided to lengthen their delay to allow the

Table 4: Delay for registration at Civil Administration. Europe 1/1/1991  
Délais pour les déclarations des événements vitaux à l'Etat civil. Europe 1/1/1991

Countries	Notific. in Hours	Live Birth			Stillbirth			Death		
		≤1	S7	≤16	≤1	S7	≤16	≤1	S7	≤16
Austria	+ 48 h.	+	+	+	+	+	+	+	+	+
Belgium	+ 24 h.	+	+	+	+	+	+	+	+	+
Czechoslovakia	+ 24 h.	+	+	+	+	+	+	+	+	+
Denmark	-	+	+	+	+	+	+	+	+	+
England-Wales	+ 36 h.	+	+	+	+	+	+	+	+	+
Finland	-	+	+	+	+	+	+	+	+	+
France	-	+	+	+	+	+	+	+	+	+
GDR (ex)	-	+	+	+	+	+	+	+	+	+
GFR (ex)	-	+	+	+	+	+	+	+	+	+
Greece	-	+	+	+	+	+	+	+	+	+
Hungary	-	+	+	+	+	+	+	+	+	+
Iceland	?	+	+	+	+	+	+	+	+	+
Ireland (Rep.)	-	+	+	+	+	+	+	+	+	+
Italy	-	+	+	+	+	+	+	+	+	+
Luxembourg	-	+	+	+	+	+	+	+	+	+
Netherlands	-	+	+	+	+	+	+	+	+	+
Northern Ireland	+ 168 h.	+	+	+	+	+	+	+	+	+
Norway	-	+	+	+	+	+	+	+	+	+
Poland	-	+	+	+	+	+	+	+	+	+
Portugal	-	+	+	+	+	+	+	+	+	+
Romania	-	+	+	+	+	+	+	+	+	+
Scotland	+ no delay	+	+	+	+	+	+	+	+	+
Spain	-	+	+	+	+	+	+	+	+	+
Sweden	-	+	+	+	+	+	+	+	+	+
Switzerland	-	+	+	+	+	+	+	+	+	+
USSR	-	+	+	+	+	+	+	+	+	+
Yugoslavia	-	+	+	+	+	+	+	+	+	+

\* Notification: Vital events are notified by the maternity Hospital before the declaration at the Civil Registrar.  
\*\* For live birth only  
1 But after 24 hours of life

Source: Survey conducted by the Institute of Demography, Catholic University of Louvain (Belgium)

mother to do the birth registration by herself: this was the case for Belgium where the registration delay changed in 1985 from 3 to 15 days and in Spain where it was lengthened to 30 days in 1991 (former 16 days).

Very long delays may bring about an underregistration of very early neonatal deaths (both birth and death are then not registered at all). Amongst the 18 countries where the registration delay lasts at least 7 days, only 5 (Austria, Belgium, England and Wales, Northern Ireland and Scotland) impose a notification of births (i.e. total births, live births and stillbirths), by the maternity where the delivery occurred, within a shorter delay (24 to 168 hours); in Czechoslovakia, both notification and registration are supposed to be done within the first 24 hours. Compulsory notification of births by maternity wards occurs usually independently of their vital registration and offers thereby the possibility to crosscheck the number of events to be registered and hence may help to overcome some underregistration.

No delay is fixed in some countries for registration of *stillbirths* (France, Hungary, Sweden) or *deaths* of liveborn children (Belgium, Luxemburg, Sweden), whilst in most of the countries, stillbirths and deaths are supposed to be registered within shorter delays, which seldom exceed 7 days. Since registration is usually requested for burial, one may assume that when a live birth is registered, death may not escape registration.

## 2.2. Control for the adequacy to legal definitions

De facto registration may differ from legal requirements in two ways: births are actually registered even if they do not match the minimum legal criteria, or births escape for some reasons any registration even when they are "declarable" from a legal point of view. Causes of underregistration are well known: stillbirths or very early neonatal deaths of teenage unwedded mothers are not declared in some cases, the decision to declare very preterm births depends on the availability of adequate neonatal care and hence on their estimated survival chances (Gourbin, 1991), a birth is declared as stillbirth instead of live birth (Keirse, 1984) or conversely (Lindsay, 1985). When underregistration is still difficult to evaluate without ad hoc in-depth surveys, some clues may be investigated as to the possibility to control overregistration. One of them is the

capacity at registration to control compliance to legal rules and related criteria. At another stage, control may occur during data processing leading to either a revision of the concerned birth registry and related rights and advantages for the parents or to a simple suppression of the out-of-range events from officially published tables and figures.

The first condition for control is the *availability* of the legal criteria on the corresponding registration forms. If they are available, a control may occur at registration if the information is *accessible* to the Registrar, i.e. if they are not concealed in a confidential part of the document and if the Registrar has the right to refuse registration (as in the case of France for stillbirths and children dying before registration). The administration in charge of data processing (usually the National Statistical Institute) has also in some cases the capacity to control and correct for actually registered but not declarable events.

### 2.2.1. Live births

Twenty-two countries do not fix any quantitative threshold below which a live birth should not be registered, precluding the necessity of any control (Table 1).

For the five countries having minimum requirements for registration, control for compliance is not always possible.

In Romania and ex-U.S.S.R., birthweight or gestation duration are not available from the live birth registration forms, whilst the three countries prescribing a minimum life duration before registration have actually the capacity to control, the information being accessible to the Registrar (ex-Czechoslovakia, France, Poland)

Table 5. Possibility to control for adequacy to legal criteria.  
Stillbirths. Europe 1/1/1991.

Possibilité de contrôle du respect des critères légaux  
d'enregistrement des mort-nés. Europe 1/1/199

	Legal criterion on vital registration form	CONTROL	
		by Vital Registrar or National Statistical Institute	by linkage with Medical Registration System
Austria	x	x	
Belgium	x	-	
Czechoslovakia ° *	x	x	-
Denmark °	-	-	x
England-Wales	x	x	
Finland °	x	x	x
France	x	x	
GDR (ex)	x	x	
GFR (ex)	x	x	
Greece	x	x	
Hungary	x	x	
Iceland °	x	x	x
Ireland (Rep.) °	x	x	-
Italy	x	x	
Luxemburg	-	-	
Netherlands	-	x	
Northern Ireland	x	x	
Norway °	-	-	x
Poland	x	x	
Portugal	x	x	
Romania °	-	-	-
Scotland	x	x	x
Spain	x	x	
Sweden °	-	-	x
Switzerland	x	x	
USSR °	-	-	?
Yugoslavia	-	-	

\* Since 1991

° Countries with a Medical Registration System on compulsory basis

Source: Survey conducted by the Institute of Demography, Catholic  
University of Louvain (Belgium)

### 2.2.2. Stillbirths

The requested information is available on the registration form for 19 countries and accessible to the Registrar in 18 of them (Table 5). In **Belgium** (medical information is concealed from the Registrar) and **The Netherlands** (information notified on a confidential death certificate), the information is forwarded directly to the National Statistical Institute.

With the exception of **Belgium**, where all the registered stillbirths are included in the published tables, 19 countries apparently comply with the legal criteria for officially published tables. But, in **Scotland** and **Spain** stillbirths having a gestational age below the legal criteria are considered to have met them and are published accordingly.

In **Austria** and **Switzerland**, however, when stillbirth forms show a body length below the fixed minimum, an invalidation procedure is undertaken at the legal level.

It is still difficult to evaluate the respective importance of the interventions made by either the Registrars or the National Statistical Institutes in this matter. It seems however that compliance to legal rules will be reinforced at registration if the Registrar is directly involved in the invalidation procedure. This is namely the case in **France**, where the Registrar has to pay, at least partly, for the expenses incurred by this procedure.

### 3. Practices

The decision to declare (or not to declare) is a necessary condition for registration. This decision relies mainly on the birth attendant, his knowledge of the definitions and, for very preterm births, on his trust in their survival chances. Furthermore, the legal aspects (rights and obligations) linked to the birth registration may in some cases induce the birth attendant to depart from the rules. The comparative social advantages (birth and child allowances) attached to the declaration of a live birth versus a stillbirth constitutes for some doubtful cases another possible cause of distortion. Cultural factors, like religion, were sometimes argued to explain shifts in declaration from stillbirth to a live birth (for baptism). Finally, the political importance given today to the infant mortality figures could have been responsible for selective declaration of the healthiest infants, hence lowering artefactually overall infant mortality and more specifically early neonatal mortality.

Obviously most of the invoked causes of under- or wrong registration are mostly concerned with very preterm births (either stillborn or born alive) or children dying very shortly after birth, hence stillbirth and early neonatal rates are more directly affected by different practices than death rates at older ages. The decision to declare may vary from no declaration at all (the child whether born alive or not is considered as a miscarriage) to a move in both directions from a declaration of a stillbirth instead of a live birth (followed by a neonatal death) and conversely .... Quantitative exact evaluation of the effects of practices are scarce, if any. Qualitative surveys, or crosschecking by comparing vital registration records with independently collected medical records, testimonies of well-informed key-witnesses (gynecologists, pediatricians, ....), or evidence gained from data analysis may at most give some clues to understand surprising figures.

### 3.1. *The knowledge of the legal definitions*

Further to the well-known survey (Keirse, 1984) conducted among the Dutch (**The Netherlands**) and Flemish (northern part of **Belgium**) members of the respective Societies of Obstetrics and Gynecology, it appears that only 6% of the 499 respondents would correctly apply the current regulations for registration of perinatal mortality for the three described cases of perinatal deaths. Faultily underreporting was far more frequent (69%) than overreporting (13%). Accordingly, other surveys report a lack of precise knowledge of the legal requirements for vital registration in several European countries (Höhn, 1981; Gourbin, 1991).

### 3.2. *Crosschecking with hospital records*

More frequent are the attempts made to estimate underregistration of births by comparing births (or deaths) recorded in hospital files with those declared at the vital registration system. To our knowledge, such validation studies are usually conducted on a local basis in collaboration with a variable number of hospitals or maternities. Underregistration of stillbirths and early neonatal deaths appears to be the rule. The magnitude of this underreporting is variable and even difficult to assess within each study because of inconsistencies between medical records and status of birth at vital

registration. The inconsistencies being obviously linked to differences in medical and legal definitions of live birth, late foetal death and other outcomes of pregnancies.

A study in Hainaut (**Belgium**) shows that 5% to 14% perinatal deaths were not registered during the year 1983 (Herthoghe et al., 1987). The wide range of this estimation depends on the interpretation given to the legal minimum gestation duration for being a declarable stillbirth: at that time some confusion still persisted concerning the exact period covered by the legal required 180 days, whilst the Belgian Civil Code (1848) mentioned that it should be calculated from the *date of conception*, resulting in roughly 28 weeks calculated from the *date of the last menses* (Masuy-Stroobant et al., 1993).

In France, the legal restrictions for declaration of stillbirths *apply also to liveborn children dying before their birth registration*. This means that a minimum gestation duration of 28 weeks is required for those early neonatal deaths also, but not for neonatal deaths occurring after the time birth was declared. A survey conducted in the Nord-Pas de Calais region (France) showed that it brings about an underregistration of 12% of total early neonatal deaths (Dumoulin and Gourbin, 1991).

Similar studies were found for the U.S.A. (McCarthy et al., 1980; Greb et al., 1987). They conclude to significant underregistration either of stillbirths or of neonatal deaths, depending on their field of investigation.

### 3.3. *Attitudes to viability of preterm infants*

Quantifying the effects of attitudes to viability on perinatal mortality figures is a difficult exercise. However, evidence from two local in-depth studies show that viability and hence registration decision is influenced by differences in delivery management of very preterm infants (Fenton et al., 1990 for the Trent region, **United Kingdom**) and by differences in the proximity or accessibility of Intensive Neonatal Care Units (Gourbin, 1991 for Brussels and Wallonia, **Belgium**). When a liveborn infant is considered non-viable he is usually not registered unless he meets the minimum gestation duration required to be considered as a declarable stillbirth.

### 3.4. Legal, social and psychological factors

Attitudes to viability may also be influenced by other factors than accessibility to adequate care. When a pregnancy outcome is considered as a not to be declared miscarriage, all the rights linked to a legal recognized birth are refused to the parents: maternity leave, birth allowances, burial of the child etc. Psychological, social, economic and even cultural factors are to some extent involved (Lindsay, 1985) in the decision to declare and how to declare (live- or stillbirth) for very preterm births and deaths occurring shortly after birth.

Psychological considerations to facilitate the normal mourning process for the parents (Lewis and Page, 1978; Moreau and Rousseau, 1986) may bring the birth attendant to overestimate gestation duration in order to declare the birth. On the contrary, parents may choose to spare the costs of funerals in some borderline circumstances (Keirse, 1987).

Social considerations may also lead to either over- or underregistration: in the case of an adverse outcome to an unmarried teenager, birth may remain unregistered at the official level, whilst the possibility to have better social advantages for a live- than for a stillbirth may lead to an overregistration of early neonatal deaths.

Finally, the legal rights and obligations linked to the declaration of a birth have further consequences on inheritance, filiation, etc. and are to be considered specifically for each country.

### 3.5. And at the political level ....

The importance given to infant mortality indicators at both international and national levels as one of the key-measures of the country's health and social development may induce some adverse practices leading to an artefactual lowering of the official figures.

The most extreme example known to us is the case of Romania. The delay for declaration of a live birth lasts fifteen days (Table 4). If a liveborn child weighed less than 1 000 g at birth its birth was declared only if it survived the legal delay and its declared weight did refer to the registration day. If it died within that period it was considered as a miscarriage and this event was only mentioned in medical files. Furthermore, during the last ten years of the Ceaucescu regime, medical

salaries were partly linked to the perinatal and infant mortality figures produced by the hospitals, no doubt that some "miscarriages" weighed more than the 1 000 g known threshold .... Those measures were abolished after the end of the Ceaucescu period, but did the medical practices change at the same time in a country where, obviously, adequate neonatal care is seriously lacking? Similar situations existed probably in the former U.S.S.R. where overall infant mortality is known to be underestimated (Anderson and Silver, 1986) and where early neonatal figures are abnormally low (Fig. 4).

In Poland a separate category of unviable births was defined: those born alive, but weighing 601 g to 1 000 g and who did not survive the first 24 hours. Figures relating to these early neonatal deaths were published separately and not included in the overall perinatal and infant mortality rates.

Generally speaking, the use of perinatal or infant mortality rates to assess quality of care provided at the hospital or regional level in order to adjust the related health politics or the selective financing of the specialized care units according to their performances, bring about the temptation to produce "good results".

### 4. Ambiguity and inaccuracy of the perinatal mortality rate

The summing up of stillbirths and early neonatal deaths into a unique global indicator, may further bias comparisons over time and space in different ways.

When *late foetal deaths, or stillbirths*, are considered for vital registration, one observes (Table 2) a general tendency to adopt similar definitions across Europe. In 22 countries, foetal losses occurring at a minimum gestational age of 28 weeks, or the corresponding birthweight (1 000 g) or body length (35 cm) are eligible for vital registration and included in national statistics. In doing so, and with the sole exceptions of Finland and Portugal, they do not follow WHO's recommendations for establishing *national perinatal statistics*. Firstly, the traditional criterion of gestation duration is still preferred by an overwhelming majority of legislations, whilst WHO recommends to rely first on birthweight, which seems to be a more reliable and available criteria, although less accurate than gestation duration for measuring prematurity.

The legal minimum 180 days gestation duration in use in Belgium,

France, Italy and Luxemburg and its operational definition in the different countries is a good illustration of the problems linked to the use of the gestation duration criterion. From an historical point of view, the Civil Codes of those countries rely all on the Napoleon Civil Code<sup>3</sup>, where the 180 days criterion was adopted according to the medical knowledge and observations made in .... 1806. They considered that an independent life was possible after a minimum gestation duration of 180 days counted from the presumed date of conception (Code Civil, 1805). France and Belgium followed this rule at the legal level and 180 days lasting from date of conception correspond roughly to 28 weeks from date of last menses<sup>4</sup> (the WHO definition for late foetal death). Italy and Luxemburg interpreted the old rules differently and count the 180 days from date of the last menses, which correspond to a 26 weeks gestation duration (in fact 25.7 weeks). But even in France and Belgium where the legal rules are in accordance with the international definitions for a late foetal death, some confusion persist on the interpretation of those rules in France between the medical profession and the National Statistical Institute (Blondel et al., 1991) and in Belgium amongst the birth attendants (Gourbin, 1991).

Furthermore, there seems to be some reluctance in giving legal or administrative rights, if any, to foetal losses occurring before the traditional viability criteria of 28 weeks. The occurrence of late abortions, or legal restriction to the access to abortion are probably part of the explanation.

The case of Finland is a good example of the ethical and statistical problems involved with therapeutic abortions. In this country, registration of stillbirths follows the WHO recommendations for elaboration of national statistics since 1987, including all births from a gestational age of 22 weeks or a birthweight of 500 g, whilst therapeutic abortions are authorized up to 24 weeks gestation duration. These fetuses are thus not declared<sup>5</sup> at the Vital Register, leading to an underregistration of stillbirths and early neonatal mortality according to the current legal definitions.

3 The reference to the Napoleon 1806 Civil Code is made explicitly in Belgium, France and Luxemburg. It is not mentioned in the Italian Civil Code, but given that Italy was under French domination from 1800 to 1815, it is not impossible that their 180 days viability criterion has to be considered a remains of their past history.

4 Given that the date of conception can only be presumed, the date of the last menses was used by the medical profession as early as the mid XIXth Century to date the gestation duration.

5 Death registration is made to obtain the authorization for burial, the death certificate being primarily used as burial license. When aborted fetuses are not buried, death registration is not necessary.

When examining the consequences of a change in the legal criteria for vital registration of stillbirths in the United Kingdom, the commissioned Committee<sup>6</sup> considered gestational age as a better viability criterion than birthweight and determined a minimum gestation duration for registration this way: "... The gestational age to be selected is not one that should include every baby that is potentially salvagable but one that can be regarded that a limit below which survival is unlikely and above which it is probable." (Report on fetal viability and clinical practice, 1985 p. 12). Hence the adopted lower limit of 24 weeks was considered to be in accordance with the above definition, more especially as it allows to overcome the still striking problem of late medical abortions. Furthermore this threshold complies to reasonable survival chances at least during the neonatal period (28 days) given present medical criteria (Milner and Greenough, 1988).

On the other hand, civil registration of *very preterm liveborn infants* with gestation durations as low as 26 to 24 weeks, is no longer an exception (Tables 6 and 7) even though their mortality risks still remain at very high levels. *Perinatal mortality figures thus often mix adverse pregnancy outcomes with different gestation durations.* The notion of viability of the newborn, in fact closely linked to a minimum gestation duration is expanding for live births but not for stillbirths, due to more rigid legal definition constraints. Since vital registration statistics usually do not standardize their perinatal mortality figures for birthweight or gestation duration, the concerned events (stillbirths and early neonatal deaths) belong thus to increasingly divergent viability criteria.

Even though a majority of European countries (21) share the WHO definition for the registration of a live birth, six countries impose legal or administrative restrictions for liveborn children who do not meet a given minimum gestation duration or birthweight.

The usual additional requirement for those out-of-range liveborn children was (Spain up till 1978) and still is (France, The Netherlands, the former U.S.S.R., ex-Czechoslovakia, Poland, and Romania in 1991) their survival during a defined life span, often fixed at 24 hours. It is extended to the time of registration in France (and since 1st July 1991 also in the Netherlands), and before 1991, to fifteen days in Romania and to a whole week in the former U.S.S.R.

6 This Committee comprises various associations: Royal College of Obstetricians and Gynaecologists, British Paediatric Association, Royal College of General Practitioners, Royal College of Midwives, British Medical Association, Department of Health and Social Security observers.

Table 6: Frequency of extremely low birthweight infants (less than 1 000 g) and their early neonatal mortality risks.  
 Available data for 1981 -1990  
 Fréquence d'enfants de très petit poids de naissance (moins de 1 000 g) et leur quotient de mortalité néonatale précoce.  
 Données disponibles 1981 - 1990

Years	Austria		Belgium <sup>1</sup>		Czechoslovakia <sup>2</sup>		England and Wales <sup>3</sup>		GFR (ex) <sup>4</sup>	
	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %
1981 - 82	484 0.26	/	326 0.13	222 680.98	917 0.19	.../	2826 0.22	1507 533.26	3 083 0.25	1 945 630.88
1983 - 84	454 0.25	/	297 0.13	162 545.45	736 0.16	.../	1874 0.29	901 480.79	1 624 0.28	889 547.41
1985 - 86	457 0.26	283 619.26	407 0.18	182 447.17	691 0.15	238 0.684	1922 0.29	896 467.74	3 211 0.26	1 523 474.31
1987 - 88	464 0.27	234 504.31	221 0.19	98 441.44	601 0.14	407 0.677	.../	.../	3 625 0.27	1 491 411.31
1989 - 90	464 0.26	208 448.28			694 0.17	436 0.628	.../	.../	1 970 0.29	715 362.94

Table 6 (Contd.)

Years	Hungary		Italy <sup>5</sup>		Poland <sup>6</sup>		Switzerland <sup>7</sup>	
	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %
1981 - 82	1 137 0.41	868 763.41	1 355 0.22	1 194 881.18	9 052 0.65	7 658 846.00	314 0.14	632.2
1983 - 84	1 185 0.47	903 762.02	1 289 0.21	981 761.05	8 732 0.61	/	531 0.18	347 653.5
1985 - 86	1 325 0.51	1 058 798.49	1 182 0.20	929 785.96	8 043 0.61	6 551 8 14.50		
1987 - 88	1 134 0.45	876 772.49			7 454 0.62	5 908 792.28	279 0.18	
1989 - 90	1 041 0.42	746 716.62			6 515 0.59	5 212 800.00	367 0.23	

Source: Vital Registration

1 Data available till the year 1987

3 Data non available for the years 1983 and 1986

5 Data available only for the years 1981, 1983 and 1985

7 Data available for the years 1979-1981, 1982-1985

2 Data non available for the year 1986

4 Data not available for the years 1983 and 1990

6 Including "Non viable births with signs of life"  
(Weight ≤ 1 000g)



Frequency of extremely low birthweight infants and their early neonatal mortality risks  
 Available data from Medical Birth Registries  
 Fréquence d'enfants de très petit poids de naissance et leur quotient de mortalité néonatale précoce  
 Données provenant des Registres Médicaux

Years	Ireland(Rep.)		Norway		Sweden	
	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %	Incid. Nb & %	7 q 0 Nb & %
1981 - 82	/	/	176 0.17	96 545.45	155 0.17	63 406.45
1983 - 84	/	/	240 0.24	128 533.33	340 0.18	99 291.18
1985 - 86	242 0.20	157 648.76	253 0.24	123 486.17	404 0.21	165 408.42
1987 - 88	241 0.21	133 551.87	342 0.31	146 426.90	493 0.23	164 332.67
1989 - 90	/	/	401 0.33	164 408.98	.../	.../

\* Data not available for 1981

Source: Medical Birth Registries

Table 7: Frequency of extremely preterm infants (less than 28 weeks of gestation) and their early neonatal mortality risks.  
 Available data for 1981 -1990  
 Fréquence d'enfants extrêmement prématurés (< 28 semaines de durée de gestation) et leur quotient de mortalité néonatale précoce. Données disponibles 1981 - 1990

Years	Austria		Belgium <sup>1</sup>		Czechoslovakia <sup>2</sup>		Hungary		Italy <sup>3</sup>	
	Incid. Nb and %	7 q 0 Nb and %	Incid. Nb and %	7 q 0 Nb and %	Incid. Nb and %	7 q 0 Nb and %	Incid. Nb and %	7 q 0 Nb and %	Incid. Nb and %	7 q 0 Nb and %
1981 - 82	/	/	293 0.12	183 624.57	/	/	1 235 0.45	825 668.02	1 609 0.26	1 314 816.66
1983 - 84	/	/	286 0.12	152 531.47	/	/	1 230 0.49	835 678.86	1 312 0.22	1 065 811.74
1985 - 86	602 0.35	334 554.82	328 0.14	154 469.51	284 0.13	/	1 444 0.56	1 092 756.23	1 237 0.21	940 759.90
1987 - 88	535 0.31	263 491.59	207 0.18	94 454.11	463 0.11	/	1 196 0.48	874 730.77	/	/
1989 - 90	562 0.32	226 402.13	/	/	594 0.14	/	1 095 0.44	722 659.36	/	/

<sup>1</sup> Data available till 1987  
 Source: Vital Registration

<sup>2</sup> Data not available for 1985

<sup>3</sup> Data available only for 1981, 1983, 1985

Frequency of extremely preterm infants and their early neonatal mortality risks  
 Data available from Medical Birth Registries  
 Fréquence d'enfants extrêmement prématurés et leur quotient  
 Données provenant des Registres médicaux

Years	Ireland(Rep.)		Sweden*	
	Incid. Nb and %	7 q 0 Nb and %	Incid. Nb and %	7 q 0 Nb and %
1981 - 82	/	/	240 0.26	66 275.00
1983 - 84	/	/	521 0.28	125 239.92
1985 - 86	247 0.20	159 643.72	582 0.29	163 280.07
1987 - 88	262 0.23	147 561.07	658 0.31	172 261.40
1989 - 90			/	/

\* Data not available for 1981.  
 Source: Medical Birth Registries

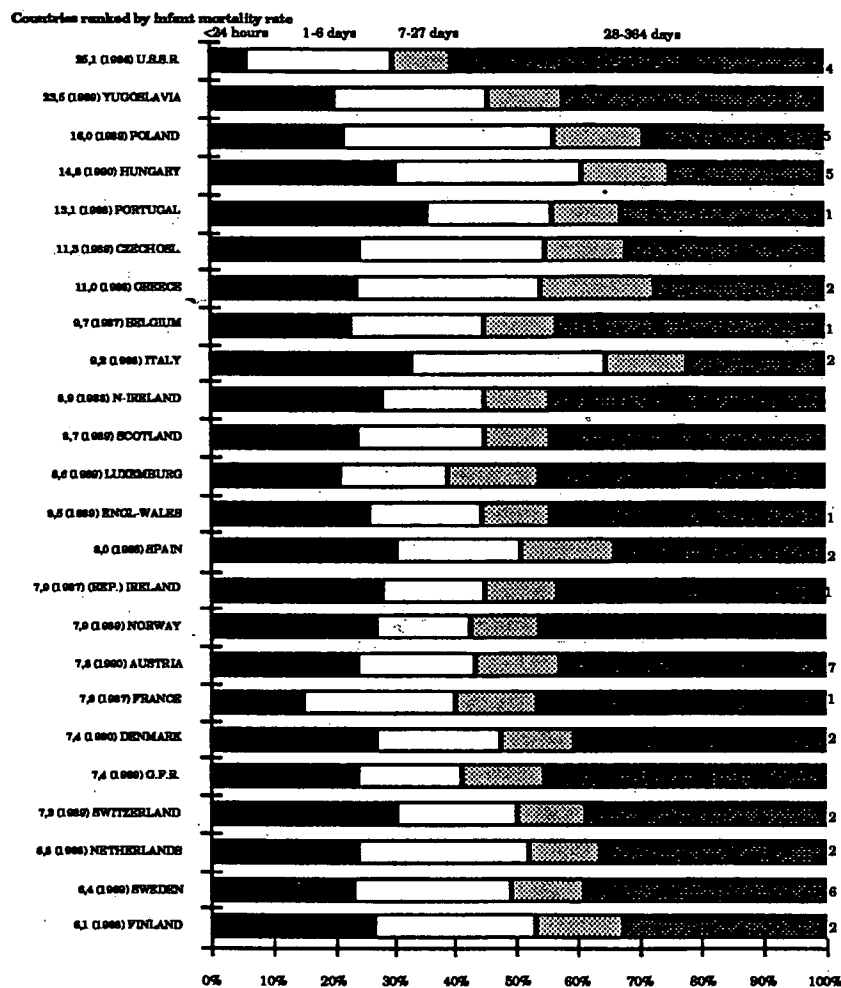
However, besides those legal or administrative rules, the 24 hours survival criterion is presumably far more common in every-day practice than is supposed by the existing rules. Obviously, vital registration of very preterm liveborn children who die shortly after birth is to be discussed in relation to the access to specialized neonatal care, legal and social consequences linked to the vital registration, inheritance, funeral costs, psychological factors, etc. Concerning the accuracy and comparability of neonatal or global perinatal mortality figures, the most worrying fact is that, when those very preterm infants are not registered as live births, they usually also fail to meet the minimum requirements to be considered as stillbirths, and are thus not registered at all. *In this case, thinking of a global perinatal mortality measure is still misleading: in several cases moving from one category to the other, from early neonatal death to stillbirth is impossible.*

As a matter of consequence, very early deaths need to be considered separately from those occurring later. It is suggested (Masuy-Stroobant, 1993) to take as a cutpoint survival at 24 hours of age, deaths occurring during the first day of life being the most subject to underreporting. Comparable early neonatal figures could then be obtained in reference to the remaining days of the first week of life (denominator of the risks should then be survivors at 24 hours).

When considering the age at death structure for total infant (liveborn) deaths (Fig. 5), one observes a general pattern towards a near 50% concentration of total infant deaths within the first week, of which a further 50% (25% of total deaths) occur during the first 24 hours. Obviously, several countries may be considered as "outliers" in the general picture we just describe. For some of them, the causes of their (apparently) very low first-day mortality are easy to identify:

France, where gestation duration of babies dying before registration is taken into account for the decision to register or not. Moreover, for all births (still and live births) registered after death, a distinction is made between children who breathe (considered thus as live births and included in the early neonatal death statistics), children who have never breathed (counted as stillbirths) and children for which no information was available for breathing (also counted as stillbirths). The latter category represented about 13% of the total stillbirths in 1987 (Blondel et al., 1991) and this specific way of establishing stillbirth statistics, contributes probably to a further significant underestimation of the very early neonatal mortality.

Fig. 5: Infant death structure by age. Europe 1985-1989  
Structure de la mortalité infantile suivant l'âge au décès. Europe 1985-1989



Source: Vital Registration

**ex-Czechoslovakia**, where first day of life is calculated by differences in calendar days, not in completed days of 24 hours, which usually leads to an underestimation of the first day mortality. However since 1985 both figures are available: deaths occurring during the first 24 hours and the

former duration which was calculated by differences in calendar days.

**ex-U.S.S.R.**, where survival during a whole week was requested for infants weighing less than 1000 g at birth. But besides this very specific administrative rule, infant mortality in general and early neonatal mortality in particular is known to be seriously underreported in the country. Underreporting is more severe in some Republics, but the data are still to be evaluated (Anderson and Silver, 1986).

**Poland** expects an increase of about 20% of its total infant mortality rate when it will adopt the WHO definition for a live birth. The change will specifically affect first-day mortality, as one must presently wait 24 hours before considering that infants weighing more than 600 g but less than 1 001 g are to be declared.

**Italy** shows, on the contrary, a very high early neonatal mortality given its general infant mortality level, and **Portugal** a rather high first-day mortality. Outside the fact that both countries register *stillbirths* at an earlier stage (26 weeks in Italy and 22 weeks in Portugal), which can bring about an overall earlier registration of *live births*, their registration practices obviously need an in depth investigation before discussing their figures further.

## 5. Beyond published data, the potentiality of vital registration data to produce standardized perinatal mortality figures

Besides the relative inconsistency of the published perinatal statistics, a closer examination of the *contents of the concerned civil registration forms* (live birth, stillbirth and death records) and of the *data processing methods (record linkages)* routinely or occasionally performed by the National Statistical Institutes, gave some indications as to the feasibility of producing adequate and comparable perinatal statistics. We consider here that, given the observed heterogeneity of birth definitions across countries, comparability depends on the possibility to standardize mortality figures by birthweight or gestation duration. For doing so, at least one out of the two following requirements must be fulfilled:

- if birthweight or gestation duration are recorded on the birth registration form, then individual record linkages should be performed between birth and death records, automatic procedures being preferred to manual linkages (Pinnelli, 1984),
- if record linkage is impossible (legal or technical reasons),

then the availability of birthweight or gestation duration on all the concerned registration forms is required.

Only 5 countries (Table 8) (Austria, England and Wales, Hungary, Poland and Switzerland) are able to standardize their mortality figures through record linkage, which permit better quality in the published data. Eight countries encounter the second requirement (situation where birthweight or gestation duration are available on all the concerned registration records), Belgium, Czechoslovakia (ex), G.D.R. (ex), G.F.R. (ex), Ireland, Italy, Poland and Portugal. Poland being the sole country where both requirements are met.

To sum up, 12 countries out of the 27 involved in the survey, have the capacity to produce standardized perinatal mortality figures further to the WHO recommendations for international comparisons, given the general constraints on the registration of stillbirths. But in doing so, should they adequately monitor the most recent progresses achieved in perinatal and neonatal care? Obviously, they are not: resuscitation and keeping children weighing less than 1 000 g alive is possible now. The viability limit fixed at 28 weeks gestation in 1925 by the "Organisation d'Hygiène de la Société des Nations" and adopted in 1950 by WHO for the definition of the late foetal deaths or stillbirths is no longer acceptable and need to be adapted by WHO and the civil laws to a still changing reality.

It is important to note here that the restriction of the analysis on the vital registration forms give a somewhat pessimistic view of the capacity to produce comparable perinatal statistics. The Nordic countries developed Medical Birth Registries since many years, which are routinely linked with vital registration records. When installed for a certain period and organized on a compulsory basis, these Birth Registries cover near to 100% of births, but usually fail to obtain a similar coverage of the perinatal deaths. Starting in the North in the late sixties (Norway, Denmark) - early seventies (Sweden, Iceland), Medical birth registration systems spread in the next decade to other European countries (Ireland, Scotland, Luxemburg, Flanders (Belgium), Finland, Czechoslovakia (ex) ...). In some cases they compensate, through record linkage, for the deficiencies of vital registration concerning birthweight or gestation duration, but there are still some differences in the coverage, objectives, event definition, contents, access, data processing systems and publication between the two systems, where they coexist. Clearly, Medical Birth Registries need to be further investigated in order to gain a more precise description of

Table 8: Vital Registration. Availability of birthweight and gestation duration for specific infant mortality rates. Europe 1/1/1991  
Disponibilité des informations "poids, durées de gestation" pour le calcul de quotients différentiels de mortalité infantile. Europe 1/1/1991

	Birthweight		Deaths < 1 yr		Gestation duration			Record linkage	
	Live birth	Stillbirth	1970-83	1979	1984	1979	1984	1984	1984
Austria	1985	1985	1970-83	1979	1984	1979	1984	1984	1984 →
Belgium	1979	1979	1979	1979	1979	1979	1979	1979	1974/75
Czechoslovakia	1960	1960	1960	1960	1965	1965	1965	1965	1973 3 →
Denmark	•	•	•	•	•	•	1927	•	1975 →
England-Wales	1975	1970	•	•	•	•	1965	•	1975 3 →
Finland	•	1955	1955 2	•	•	•	1907	•	•
France	•	•	•	•	•	•	•	•	•
GDR (ex)	•	yes	yes	1979	•	•	•	•	1973
GFR (ex)	1979	1979	1979	•	•	•	•	•	•
Greece	1968	1968	•	•	1968	•	1968	•	•
Hungary	1960	1960	•	•	1960	•	1960	•	1980 →
Iceland	yes	yes	•	•	•	•	•	•	1972 3 →
Ireland (Rep.)	1984	1984	1984 1	•	1984	•	1984	•	•
Italy	1964	1964	1974	•	1964	•	1964	•	1975
Luxemburg	•	•	•	•	•	•	•	•	•
Netherlands	•	•	yes 1	•	•	•	yes	•	1963 →
Northern Ireland	•	•	•	•	•	•	1961	•	•
Norway	•	1961	•	•	•	•	•	•	1966 3 →
Poland	1974	1974	1971	•	•	•	•	•	1980 →
Portugal	1980	1980	1980 1	•	1980	•	1980	•	•
Romania	•	•	•	•	•	•	•	•	•
Scotland	•	•	•	•	•	•	•	•	1980 3 →
Spain	1980	1980	•	•	•	•	1968	•	•
Sweden	•	•	•	•	•	•	1960	•	1973 3 →
Switzerland	1979	1979	•	•	•	•	•	•	1979 →
USSR	•	•	•	•	•	•	•	•	•
Yugoslavia	•	•	•	•	•	•	•	•	•

1 For early neonatal deaths only

2 For neonatal deaths only

3 Linkage with Medical Birth Registry

Source: Survey conducted by the Institute of Demography, Catholic University of Louvain (Belgium)

their complementarity or specificity besides the existing vital registration systems.

### C. Discussion

Deaths in early infancy tend to concentrate more and more in the very early days of life, hence the importance given today to early neonatal mortality which accounts for about 50% of total infant mortality all over Europe. Moreover, of these early neonatal deaths more than one out of two are produced by low birthweight and preterm infants, whose expected viability is improving further to elective delivery of at risk diagnosed infants and to the still growing efficacy of neonatal intensive care techniques.

Extremely low birth weight (less than 1 000 g) and extremely preterm (less than 28 weeks gestation) were and are still subject to discussion concerning their viability and their official recognition through vital registration. Outside the various possible arguments, whether social, economic, cultural, medical or even political, that may be raised in some borderline situations, the analysis of legal criteria and the related infant mortality figures thus produced did show that even small differences in legal rules defining the 'registrability' of a birth has in fact a still growing impact on their comparability over time and across countries.

The World Health Organization tried to overcome the problem by recommending the production of standardized perinatal mortality figures. But the examination of the countries' capacity to produce these figures was disappointing: only 12 out of the 27 surveyed have actually this capacity but a closer analysis of the available or published national data brought this frequency to an even lower level (Tables 6 and 7 for early neonatal mortality figures).

The overwhelming majority of the stillbirth legal definitions used in Europe by 1991 gave their preference to the gestational age criterion which is completely in disagreement with the international recommendations where birthweight is chosen as the key criteria. The later already effective revisions occurring in The Netherlands and in the United Kingdom do not even comply to the international recommendations. Furthermore, there seems to be some reluctance in giving a legal recognition

Table 9: Treatment and Publication of vital statistics in National Publications, Europe 1/1/1991  
Exploitation et publication des statistiques vitales dans les publications nationales, Europe 1/1/1991

Countries	Events included in the calculations of the rates		Lower limit
	LIVE BIRTH	STILLBIRTH	
	All declar- ed events	All declar- ed events	
Austria	+	+	35 cm*
Belgium	+	+	1000 g
Czechoslovakia	+	+	28 w
Denmark	+	+	28 w
England-Wales	+	+	22 w 0
Finland	+	+	28 w
France	+	+	1000 g
GDR (ex)	+	+	1000 g
GFR (ex)	+	+	28 w
Greece	+	+	28 w
Hungary	+	+	28 w
Iceland	+	+	28 w
Ireland (Rep.)	+	+	28 w
Italy	+	+	28 w 0
Luxemburg	+	+	28 w
Netherlands	+	+	28 w
Northern Ireland	+	+	28 w
Norway	+	+	1001 g
Poland	+	+	500 g
Portugal	+	+	1000 g
Romania	?	?	28 w*
Scotland	+	+	28 w*
Spain	+	+	28 w
Sweden	+	+	30 cm**
Switzerland	+	+	28 w
USSR	+	+	28 w
Yugoslavia	+	+	28 w

0 For national statistics, 28 w. for international comparisons

\* Stillbirths registered before the lower limit of the legal criterion are classified as fetal deaths having reached this limit

• If registered before the lower limit, inscription of the wrong stillbirth is cancelled in the death register

Source: Survey conducted by the Institute of Demography, Catholic University of Louvain (Belgium)

to foetal losses occurring below a well-defined viability criteria as conflictual situations may arise at the legal level: late abortions occurring well beyond 22 weeks (i.e. the case of Finland) or increasing risks of legal action (infanticide) taken against the birth attendant in case of death during delivery of these very preterm and at high risk infants.

Obviously, the summing up of stillbirths and early neonatal deaths into a unique perinatal mortality indicator may further bias comparisons over time and across countries in different ways:

*If standardization procedures are impossible to apply, the perinatal mortality rate often mix adverse pregnancy outcomes with different gestation durations, stillbirths being often declared at a higher gestational age than live births (Table 9);*

*In practice however another viability criteria (the legal or the facto 24 hours survival) is applied to live births of very preterm or very low birthweight infants, leading to an underestimation of the first day mortality and of the early neonatal mortality figures.*

Finally from a psychological point of view (the mourning process), the very rigid cutpoint defining the declarability of a deadborn infant, whether 28, 24 or 22 weeks gestation is viewed as having too extreme consequences: below the cutpoint it is considered as a miscarriage with no existence, no burial etc.; from the cutpoint onwards, the reverse is true with (in some countries) additional advantages such as birth allowances, etc. It is felt that some flexibility should be given to the sometimes extreme rigidity of the administrative and legal procedures involved.

#### D. Recommendations

1. A first recommendation (already included in the forthcoming ICD-10) is that published figures, whether reported in international or national publications, should be fully documented with the current definitions of birth (live birth and foetal death), the way controls were made, if figures are standardized or not, etc.
2. Since problems regarding registration of very immature infants are very common, more attention should be given to information and training of the birth attendants in order to enhance their compliance to legal definitions. More emphasis should also be given to reporting of complete and accurate

information at the vital registry in order to produce more reliable coverage of births and infant deaths and their related characteristics, the quality of vital registration data depending closely on the quality of the observations.

3. Stillbirth figures should be published separately from early neonatal deaths and deaths within the first week should be disaggregated by distinguishing deaths occurring during the first 24 hours from the remainder. It is noteworthy that the first-day mortality is still not calculated the right way in every country.
4. Beyond the international recommendations for enhancing worldwide comparability of infant and perinatal mortality figures, more precise recommendations are to be determined for the low-mortality regions like Europe, to produce true comparable figures. Data should be suited for monitoring of care and for a correct evaluation of inequalities between and within the European countries. These recommendations should involve data collection and processing. Birthweight and gestational age are to be collected for all the concerned events: live births, stillbirths and infant deaths. Detailed tabulations of births and deaths should be produced and published according to standard disaggregation of birthweight and gestational age.

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#### Summary

*The international comparability of the perinatal mortality figures derived from vital registration statistics is assessed at different levels. Legal and administrative definitions of vital events (live birth, stillbirth) are examined for the 27 European countries participating in an in-depth survey conducted in 1991 by the Institute of Demography (University of Louvain, Belgium).*

*Their impact on comparability over time and space is illustrated by discussing some of the most obvious anomalies shown by published data (age at death structure across European countries; trends in infant mortality or stillbirth rate for selected countries).*

*The potentiality of vital registration systems to produce standardized perinatal mortality figures according to WHO recommendations for international comparisons is discussed, taking into account the contents of the vital registration forms and the data processing (record linkage) methods in use in the different countries.*

#### Résumé

#### Comparabilité des naissances vivantes et des mort-nés en Europe. Définition des événements et traitement des données d'état civil

*La comparabilité internationale des indicateurs et mesures de mortalité périnatale calculés à partir des statistiques d'état civil a été évaluée à différents niveaux.*

*Les définitions légales et administratives des événements concernés (naissance vivante, mort-né) ont été analysées à partir d'une enquête approfondie menée par l'Institut de démographie (Université Catholique de Louvain, Louvain-la-Neuve, Belgique) en 1991 auprès de 27 pays d'Europe.*

*Leurs incidences sur la comparabilité des indicateurs ont été illustrées à partir de données publiées (structure par âge des décès infantiles en Europe; évolutions de la mortalité infantile et de la mortinatalité dans certains pays).*

*Les possibilités de production de mesures standardisées de mortalité périnatale (selon les recommandations de l'OMS) ont été évaluées pour les différents pays, par une analyse du contenu des bulletins d'état civil et des méthodes de traitement de l'information (appariements) en usage.*