



## **Variations in very preterm births rates in 30 high-income countries: are valid international comparisons possible using routine data?**

Marie Delnord, *University of Paris Descartes*

Ashna D. Hindori-Mohangoo, *TNO, the Netherlands Organisation for Applied Scientific Research*

Lucy K. Smith, *University of Leicester*

Katarzyna Szamotulska, *National Research Institute of Mother and Child*

Jennifer L. Richards, *Emory University*

Paromita Deb-Rinker, *Centre for Chronic Disease Prevention*

Jocelyn Rouleau, *Centre for Chronic Disease Prevention*

Petr Velebil, *Institute for the Care of Mother and Child*

Irisa Zile, *Centre for Disease Prevention and Control of Latvia*

Luule Sakkeus, *Tallinn University*

*Only first 10 authors above; see publication for full author list.*

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## Variations in very preterm births rates in 30 high-income countries: are valid international comparisons possible using routine data?

Marie Delnord<sup>1</sup>, Ashna D Hindori-Mohangoo<sup>2,3</sup>, Lucy K Smith<sup>4</sup>, Katarzyna Szamotulska<sup>5</sup>, Jennifer L Richards<sup>6</sup>, Paromita Deb-Rinker<sup>7</sup>, Jocelyn Rouleau<sup>7</sup>, Petr Velebil<sup>8</sup>, Irisa Zile<sup>9</sup>, Luule Sakkeus<sup>10</sup>, Mika Gissler<sup>11,12</sup>, Naho Morisaki<sup>13</sup>, Siobhan M Dolan<sup>14</sup>, Michael R Kramer<sup>6</sup>, Michael S Kramer<sup>15</sup>, Jennifer Zeitlin<sup>1</sup>, and the Euro-Peristat Scientific Committee

<sup>1</sup>Inserm UMR 1153, Obstetrical, Perinatal and Pediatric Epidemiology Research Team (Epopé), Center for Epidemiology and Statistics Sorbonne Paris Cité, DHU Risks in pregnancy, Paris Descartes University, Paris, France <sup>2</sup>Department Child Health, TNO, the Netherlands Organisation for Applied Scientific Research, Leiden, The Netherlands <sup>3</sup>Faculty of Medical Sciences, Department Public Health, Anton de Kom University of Suriname, Paramaribo, Suriname <sup>4</sup>The Infant Mortality and Morbidity Studies Group (TIMMS), Department of Health Sciences, College of Medicine, Biological Sciences and Psychology. University of Leicester, Leicester, UK <sup>5</sup>Department of Epidemiology and Biostatistics, National Research Institute of Mother and Child, Warsaw, Poland <sup>6</sup>Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA, USA <sup>7</sup>Surveillance and Epidemiology Division, Centre for Chronic Disease Prevention, Public Health Agency of Canada, Ottawa, Ontario, Canada <sup>8</sup>Institute for the Care of Mother and Child, Prague, Czech Republic <sup>9</sup>Centre for Disease Prevention and Control of Latvia, Riga, Latvia <sup>10</sup>Estonian Institute for Population Studies, Tallinn University, Tallinn, Estonia <sup>11</sup>THL National Institute for Health and Welfare, Helsinki, Finland <sup>12</sup>Karolinska Institute, Department of Neurobiology, Care Sciences and Society, Division of Family Medicine, Stockholm, Sweden <sup>13</sup>Department of Lifecourse Epidemiology, Department of Social Medicine, National Center for Child Health and Development, Setagayaku, Tokyo, Japan <sup>14</sup>Department of Obstetrics

Corresponding author: Marie Delnord, INSERM U1153, Obstetrical, Perinatal and Pediatric Epidemiology Research Team, Research Center for Epidemiology and Biostatistics Sorbonne Paris Cité (CRESS), Maternité de Port Royal, 53 Avenue de l'Observatoire, 75014, Paris, Tel : +33 1 42 34 55 86, Fax: +33 1 43 26 89 79, Marie.delnord@inserm.fr.

The Euro-Peristat Scientific Committee: Gerald Haidinger (Austria), Sophie Alexander (Belgium), Pavlos Pavlou (Cyprus), Petr Velebil (Czech Republic), Laust Mortensen (Denmark), Luule Sakkeus (Estonia), Mika Gissler (Finland), Béatrice Blondel (France), Nicholas Lack (Germany), Aris Antsaklis (Greece), István Berik (Hungary), Helga Sól Ólafsdóttir (Iceland), Sheelagh Bonham (Ireland), Marina Cuttini (Italy), Janis Misins (Latvia), Jone Jaseliuniene (Lithuania), Yolande Wagener (Luxembourg), Miriam Gatt (Malta), Jan Nijhuis (Netherlands), Kari Klungsoyr (Norway), Katarzyna Szamotulska (Poland), Henrique Barros (Portugal), Mihai Horga (Romania), Jan Cap (Slovakia), Natasa Tul Mandi (Slovenia), Francisco Bolúmar (Spain), Karin Gottvall (Sweden), Sylvie Berrut (Switzerland), Alison Macfarlane (United Kingdom). Project coordination: Jennifer Zeitlin, Marie Delnord, Ashna Hindori-Mohangoo.

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& Gynecology and Women's Health, Albert Einstein College of Medicine / Montefiore Medical Center, Bronx, NY, USA <sup>15</sup>Departments of Pediatrics and of Epidemiology, Biostatistics and Occupational Health, McGill University Faculty of Medicine, Montreal, Quebec, Canada

## Abstract

**Objective**—Concerns about differences in registration practices across countries have limited the use of routine data for international very preterm birth (VPT) rate comparisons.

**Design**—Population-based study

**Setting**—27 European countries, the United States, Canada and Japan in 2010.

**Population**—9,376,252 singleton births.

**Method**—We requested aggregated gestational age data on live births, stillbirths and terminations of pregnancy (TOP) under 32 weeks, and information on registration practices for these births. We compared VPT rates and assessed the impact of births at 22-23 weeks GA, and different criteria for inclusion of stillbirths and TOP on country rates and rankings.

**Main outcome measures**—Singleton very preterm birth rate, defined as singleton stillbirths and live births before 32 completed weeks of gestation per 1000 total births, excluding TOP if identifiable in the data source.

**Results**—Rates varied from 5.7 to 15.7 per 1000 total births and 4.0 to 11.9 per 1000 live births. Country registration practices were related to percentage of births 22-23 weeks (between 1% and 23% of very preterm births) and stillbirths (between 6% and 40% of very preterm births). After excluding births 22 to 23 weeks, rate variations remained high and with a few exceptions, country rankings were unchanged.

**Conclusions**—International comparisons of very preterm birth rates using routine data should exclude births at 22-23 weeks GA and terminations of pregnancy. The persistent large rate variations after these exclusions warrant continued surveillance of VPT rates at 24 weeks and over in high-income countries.

## Keywords

very preterm; Euro-Peristat; stillbirths; international comparisons; preterm birth

## Introduction

Preterm birth, defined as a birth before 37 completed weeks of gestation, is a leading cause of neonatal and infant mortality globally, representing about 75% of all neonatal deaths and 60% of all infant deaths [1, 2]. Infants born very preterm (before 32 completed weeks) face the highest risks of neonatal mortality and morbidity, as well as long-term neurodevelopmental impairment [3-6]. Recent studies showed wide variations in total preterm births among countries with comparable levels of development and healthcare systems, raising questions about the population and health system factors that influence

preterm birth [1, 7-9]. However, less is known about international variation in very preterm birth, which represents the most vulnerable infants.

There are concerns about using routine statistics for international comparisons at very early gestational ages because of differences in recording practices across countries [10-15]; especially regarding regulations for stillbirths and late terminations of pregnancy (TOP) [14, 15]. Further, differences in views on viability can influence whether births with signs of life that occur at 22 and 23 weeks of GA are actually registered as live births or stillbirths [16]. Differences in recording practices have been shown to have a strong impact on international comparisons of perinatal mortality [10-15]. Thus, while the World Health Organization (WHO) defines the perinatal period as starting at 22 completed weeks (154 days) of gestation, they recommend restricting international comparisons of perinatal mortality to third-trimester births, using a 1000 gram lower threshold [17]. Others have used 28 weeks of gestation as a cut-off for comparative studies [14]. These cutoffs are not useful for comparisons of VPT rates since many births occur before 28 weeks and/or with birth weights less than 1000 grams, and the majority of these infants now survive in high-income countries [4].

Given the impact of very preterm births on the overall perinatal mortality rate, the high costs of care for these infants [18, 19, 6], and their vulnerability to long-term neurodevelopmental impairments, producing comparable and regularly reported statistics on this population is an important objective. Our study aimed to assess the feasibility of using routine statistics to make valid international comparisons of very preterm births (VPT) rates. We used routine population-based data in 2010 in 27 European countries, the United States, Canada and Japan to describe very preterm birth rates and investigate the extent to which births at very early gestations (22-23 weeks), stillbirths, and TOP affect rate variations.

## Methods

### Data

This study is part of an international collaboration between the Euro-Peristat network and the Preterm Birth International Collaborative (PREBIC) Epidemiology Working Group. Euro-Peristat is a European Union-funded network of clinicians, statisticians and researchers that aims to monitor perinatal health in Europe based on a recommended set of 30 perinatal health indicators [20]. These indicators are compiled from population-based routine data sources; routine sources are defined as those that regularly collect and report data and can include repeated surveys. European data in this study were originally collected for the *European Perinatal Health Report: the Health and care of pregnant women and babies in 2010* [1]. Data from the United States, Canada and Japan were provided specifically for this study by members of the PREBIC Epidemiology Working group. PREBIC is a multi-disciplinary network of scientific experts focused on the prevention of preterm birth through basic, epidemiologic, and applied clinical research.

We requested aggregate national-level data on the number of live births and fetal deaths at each completed week of gestation by plurality (singleton or multiple) starting at 22 weeks in 2010. We also asked for separate data on TOP, when these were included in the data sources

and could be differentiated from spontaneous stillbirths. When gestational age was missing, we asked countries to include births if birth weight was 500 grams or more. The 22-week GA threshold is recommended by Euro-Peristat for the collection of all data on births in Europe [20]. If countries could not provide data using these criteria, they were asked to provide available data using their own inclusion criteria, and to specify their inclusion thresholds for live births and stillbirths.

Data came from vital statistics, civil registers and medical birth registers in most countries and from nationally representative surveys of births in Cyprus and in France [1]. If countries could not provide national data, population-based data from geographically defined regions were accepted. Data for Belgium (BE) came from the regions of Brussels, Wallonia and Flanders; data from the United Kingdom were provided separately by the UK's constituent countries: England and Wales combined, Northern Ireland, and Scotland. Data from Cyprus were from 2007 and data from Canada were from 2008. Data from Canada included all provinces and territories except the province of Ontario. Euro-Peristat also collects information on data quality, management, and data collection procedures [15]. The sources of data used for each of the countries and their coverage are provided in Supplemental Table S1.

## Outcome

Our principal outcome was the singleton very preterm birth rate, defined as all singleton stillbirths and live births before 32 completed weeks of gestation per 1000 total births, excluding TOP if identifiable in the data source. We also computed the singleton live VPT rate (number of singleton live very preterm births per 1000 live births). We limited our comparison to singleton pregnancies, because preterm birth rates are much higher for multiple pregnancies and multiple pregnancy rates differ widely among countries [9, 21].

In the European countries, Canada and Japan, gestational age was based on the best obstetrical estimate. This estimate can be derived from ultrasound, and other prenatal assessments of gestational length (i.e. last menstrual period, fundal height). In Canada, postnatal assessments may sometimes be used if ultrasound data are missing. In the United States (US), the obstetric estimate of gestational age was used in the 35 states which had adopted the 2003 birth certificate revision; however, 15 states used the 1989 revision which relies on the clinical estimate of gestational age, and is based on postnatal assessment in addition to ultrasound and prenatal assessments [22, 23]. In the US, birth and death data are linked from separate data sources. Out of the 35 states which had adopted the 2003 revision for live birth certification only 25 had adopted the 2003 revision for fetal death certification, whilst other states reported only the 1989 revision [24]. In our study, less than 1% of gestational age data were missing, except in Spain, where 14% were missing.

## Analysis strategy

For this study, we identified countries where differences in registration practices may contribute to variability in rates. First, we assessed whether the data provided by each country met our inclusion criteria: births and deaths starting at 22 weeks of gestation for each completed week of gestation, excluding terminations. We identified countries using

different birth weight or gestational age criteria, as well as countries that included TOP in their vital statistics but could not distinguish them from spontaneous births. Next, we calculated the rates of singleton very preterm births for all births less than 32 weeks GA using a lower threshold of 22 weeks GA or national definitions. We then evaluated the influence of periviable births (defined as births at 22-23 weeks) and stillbirths on country rates and rankings by comparing VPT rates with and without these births. We also calculated percentages of periviable births, and stillbirths (for births  $\geq$  22 weeks GA vs.  $\geq$  24 weeks GA), among very preterm births, and percent of stillbirths by gestational age subgroups: at 22-23 weeks GA, 24-27 weeks GA, and 28-31 weeks GA. We studied the association between rates for total and live births overall and by gestational age subgroups using Spearman's rank test. Last, we investigated the potential impact of underreporting of stillbirths, after exclusion of births at 22 to 23 weeks, by simulating an extreme situation where a third of stillbirths 24 to 27 weeks of GA were not reported in countries with higher registration thresholds. Data were analyzed using STATA 13.0 software (StataCorp LP, College Station, TX, U SA).

## Results

Thirty countries provided data on 9,376,252 singleton births, of which 9,339,331 were live births and 36, 921 were stillbirths. All countries could provide data on singleton live births starting at 22 weeks of gestation, but several countries record stillbirths only starting at 24 weeks of GA or use a 500 gram birth weight threshold, as detailed in Table 1. Most countries could also provide data without TOP, either because they are not included in birth registers or because they can be distinguished from other deaths. However, Belgium, Cyprus, the Czech Republic, Iceland, Luxembourg, the Netherlands, Slovenia, Spain, UK: England and Wales, and UK: Northern Ireland could not exclude TOP from their statistics. The median singleton VPT rate among participating countries was 9.5 per 1000 births. Countries with the lowest rates, that is, below the 25<sup>th</sup> percentile (Q1= 8.5‰) included Iceland, Finland, Japan, Sweden, Italy, Slovakia, Norway, Malta. Countries with the highest rates, above the 75<sup>th</sup> percentile (Q3=10.8‰) included Germany, UK: England and Wales, UK: Scotland, the Netherlands, Romania, Latvia, the United States and BE: Brussels (Table 1).

Figure 1 illustrates the variations in births (live births and stillbirths) at 22-23 weeks as a proportion of all very preterm singleton births; the associated registration practices for births and deaths in each country are also shown. The unweighted mean for the 30 countries (9.6%) is presented here with 95% upper and lower confidence limits. The percentage of periviable births among very preterm births, varied between 0.7% and 23.4% across countries, and 18 out of 30 countries/regions displayed proportions outside the 95% confidence limits. Countries with a 24-week GA threshold for registration of stillbirths, voluntary reporting of stillbirths at certain gestational ages, or those using a 500 grams threshold for stillbirth reporting, had lower proportions of these very early births: Romania (0.7%), Portugal (1.5%), Spain (3.5%), Italy(4.3%), UK: England and Wales (5.0%), Ireland (6.3%), UK: Scotland (6.9%), and Germany (8.3%). However other countries with a 22-week threshold also had low rates, notably, Slovakia (2.2%), and Latvia (4.0%). Countries that were unable to remove TOP had higher proportions of births at 22-23 weeks GA, including BE: Brussels (15.7%), the Czech Republic (23.3%), and the Netherlands (23.4%).

Nonetheless, others where data included only spontaneous stillbirths also had high rates such as Japan (11.5%), Denmark (12.4%), the United States (13.7%), Switzerland (14.0%), and Canada (14.4%).

Stillbirths constituted an average 20.6% of all very preterm births for the 30 countries, with a range between 5.9% and 39.9%, as shown in Figure 2A. Some of the countries with the lowest rates had other inclusion criteria, and those with the highest could not exclude terminations. There was substantially less variation around the mean after excluding births at 22-23 weeks GA, although percentages ranged from 6.0% to 29.6% even in countries with similar registration criteria (Figure 2B). For example, Estonia (11.3%), US (11.6%), Norway (12.1%), Denmark (12.7%), Canada (14.7%), Sweden (14.8%), Switzerland (14.9%) and Finland (15.4%) had proportions below the average in 30 countries, whereas Lithuania (17.5%), Japan (17.7%), Latvia (19.0%), Malta (21.4%), France (29.6%), and Luxembourg (29.6%) displayed high percentages.

The median percentage of stillbirths was 58.8% at 22-23 weeks GA, 24.8% at 24-27 weeks and 10.6% at 28-31 weeks. Variation was particularly high at 22-23 weeks ranging from 10.4% in Italy to 100% in Iceland and Cyprus; Iceland and France stood out as outliers based on the overall distribution of stillbirths at 28-31 weeks GA (Supplemental Figure S1). Median rates of births at 22-23 weeks were 0.9 per 1000 for all births versus 0.3 per 1000 for live births; at 24-27 weeks GA, 2.8 per 1000 for all births versus 2.1 per 1000 for live births and at 28-31 weeks GA, 5.5 per 1000 for all births versus 4.9 per 1000 for live births (Supplemental Figure S2).

In general, countries with high rates in one gestational age category were more likely to have higher rates in the others, with the exception of the 22-23-weeks category. For live birth rates at 22-23 weeks GA, and 24-27 weeks GA, the rank correlation coefficient was 0.37 ( $p=0.02$ ), and with live births at 28-31 weeks it was 0.1 ( $p=0.77$ ). The correlation was strongest (0.53) for live birth rates at 24-27 weeks GA and 28-31 weeks GA ( $p<0.01$ ). The correlation between total birth and live birth rates was 0.43 ( $p=0.01$ ) at 22-23 weeks GA, 0.82 ( $p<0.01$ ) at 24-27 weeks GA, and 0.94 ( $p<0.01$ ) for births at 28-31 weeks GA.

In Table 2, we compare countries' very preterm birth rates and rankings using different gestational age criteria (22+ versus 24+ weeks GA) for all births and live births. Rates of all births from 24 to 31 weeks ranged from lower values of 5 to upper values of 13 per 1000, whereas for live births the range was from 4 to 11 per 1000. In general, countries with high rates for all births remained high when births at 22-23 weeks GA and stillbirths were excluded, and those with lower rates remained low. Rates were strongly correlated: the correlation coefficient for rates based on total very preterm births 22+ weeks GA and live births 24+ weeks was 0.78 ( $p<0.01$ ), and for live and total births at 24-31 weeks GA, the correlation coefficient was 0.92 ( $p<0.01$ ). Countries in the higher and lower quartiles of the distribution regardless of the definition remained the same, with a few exceptions (Italy is ranked lower while France had a better ranking when stillbirths were removed). Furthermore, our sensitivity analysis based on an extreme situation (one-third underreporting of stillbirths at 24-27 weeks) in countries that don't record stillbirths starting

at 22 weeks, showed that differences in rates and rankings were robust to potential residual underreporting (Supplemental Table S2).

## Discussion

### Main findings

Very preterm birth rates varied widely across Europe, North America and Japan. Our analyses by gestational age subgroups and vital status suggest that rates are influenced by differences in lower gestational age and birthweight thresholds for recording births and deaths, and the capacity for identifying TOP. These differences have a strong impact on the reporting of births at 22 and 23 weeks GA. However, after excluding these births, we noted large variability between countries; rates and rankings were robust to the potential effects of stillbirth under-reporting at 24 to 27 weeks suggesting true differences beyond measurement or registration artefacts. Given the impact of very preterm births on newborn and child health, routine data on these births should be monitored to understand variation across countries and over time. Two indicators: births at 22-23 weeks and stillbirths as percentages of all very preterm births, made it possible to flag countries where recording practices may require further assessment.

### Strengths and limitations

We had access to population-based data by completed week of gestation and plurality compiled using a common protocol [1]. Countries with varying gestational age or birth weight thresholds for recording stillbirth were identified. We also excluded TOP in countries where they are included in birth registries and identifiable, and flagged countries where TOP could not be removed. However, there were several limitations. We requested data using the best obstetric estimate of gestational age, but did not have further information on how this estimate was derived. While ultrasound dating is the norm, various methods of gestational age assignment are likely used and may impact the preterm birth rate [25, 26]. We also only had data from one year, which leads to random variation in countries with a small number of annual births. Finally since our data were aggregated, we were unable to stratify by other factors that may affect the preterm birth rates such as maternal age, parity, and socioeconomic status.

### Interpretation

Our results suggest an association between registration practices and VPT rates and rankings. Many countries with very low proportions of births 22-23 weeks were also those that used a registration criterion for stillbirths other than 22 weeks GA. Most countries register live births based on any sign of life, although practical and ethical difficulties can arise when assessing signs of life at the earliest gestational ages [27-29]. Regulations for stillbirths can vary between countries (i.e. parental leave allowance), and reporting may also differ based on the intent of sparing parents the burden of having to report the death, or alternatively, feeling that parents would benefit from acknowledging that they had a baby which lived. These difficulties contribute to the wide variability in the proportion of periviable births registered as live versus stillbirth; the underreporting of stillbirths also has an impact, since a large fraction of births at 22-23 weeks are stillbirths.

More generally, variations in the registration of stillbirths influence VPT rates, owing to the high proportion of stillbirths before 32 weeks GA. Antenatal screening practices and termination policies vary widely among countries [30-32], and the prevalence of late TOP depends on those policies; some of the countries with high proportions of very preterm stillbirths were unable to remove TOP inflating overall figures. Terminations are not legal everywhere meaning that births for lethal anomalies can be registered as stillbirths or neonatal deaths. TOP reporting can affect some countries more than others. In England and Wales, terminations cannot be distinguished from routine stillbirth statistics although a previous English study showed that late TOP for congenital anomalies represent a relatively large proportion (17.1%) of births 22-26 weeks GA [33]. In Canada, there is some ambiguity between coding of TOP or congenital anomalies as the cause of death, which means that terminations are only excluded if recorded as the cause.

Our analyses show the importance of excluding periviable births and TOP from very preterm birth rate comparisons. However, our results also suggest that comparing rates starting at 24 weeks makes it possible to capture true variation between countries. Most countries can provide data on stillbirths starting at 24 weeks and this threshold is less sensitive to differences in the declaration of early neonatal deaths as stillbirths than a 22-week threshold [14, 11, 16, 34, 35]. As about 90% of live births will be at least 500 g at 24 weeks GA [36], the criteria of 24 weeks enables comparisons with countries using a 500-g inclusion threshold for stillbirths. We also showed that even if there were underreporting of stillbirths between 24 and 27 weeks of gestation in countries that do not record stillbirths starting at 22 weeks, this was unlikely to affect rates or rankings. Finally, including spontaneous stillbirths in these comparisons is important to reflect the global burden of morbidity and mortality associated with very preterm birth; total and live VPT rates starting at 24 weeks correlated very strongly, and the associations between gestational-age specific subgroup rates were strong.

We observed wide rate variations in countries like France and the US where we do not suspect there would be registration issues given their lower registration thresholds at 22 weeks GA, capacity to exclude TOP and data coverage above 99%. Based on the rate least susceptible to reporting differences, live VPT rates at 24 weeks and over, two-fold differences were observed among countries with low (Iceland, Finland) versus high (the US, Romania) rates. Differences in maternal risk profiles could explain true differences in underlying very preterm birth risks. The latest European Perinatal Health Report showed cross-country variations in maternal characteristics typically associated with preterm delivery rates, including age, smoking, pre-pregnancy body mass index and education [1, 37]. However, studies comparing the US with Canada, and France have shown that variations in risk of preterm delivery persisted even after adjustment for these socio-demographic characteristics [38, 39]. Differences in health systems factors may be another explanation for the observed heterogeneity; up to 46% of very preterm singletons result from a provider-initiated delivery [40].

## Conclusions and recommendations

Our study answers the question – whether valid international comparisons are possible using routine data – with a qualified yes. We demonstrated the importance of adopting a standardised approach to these comparisons by excluding births at 22 and 23 weeks GA and TOP, and provided indicators to flag countries with less reliable data at early gestational ages. However, we also found wide differences in rates among countries with similar inclusion criteria and complete coverage of all births. Differences in these rates have wide-reaching implications for public health. Besides their impact on national perinatal mortality rates [34, 41, 42], the health and financial burden of neurodevelopmental impairment is very high among very preterm survivors [18, 19, 3, 6]. Medical advances have improved outcomes for these infants but, preterm birth prevention, defined as effective medical interventions supported by policy initiatives still constitutes a challenge [43, 44]. The wide range of rates observed in countries with similar levels of development suggests that potentially modifiable population or health care factors and practices, such as induced preterm birth, merit further study. Regularly reported international data on very preterm births are needed to provide country-specific benchmarks for preterm birth prevention initiatives, to inform decision-making and to target future investments in health care and research [45, 46].

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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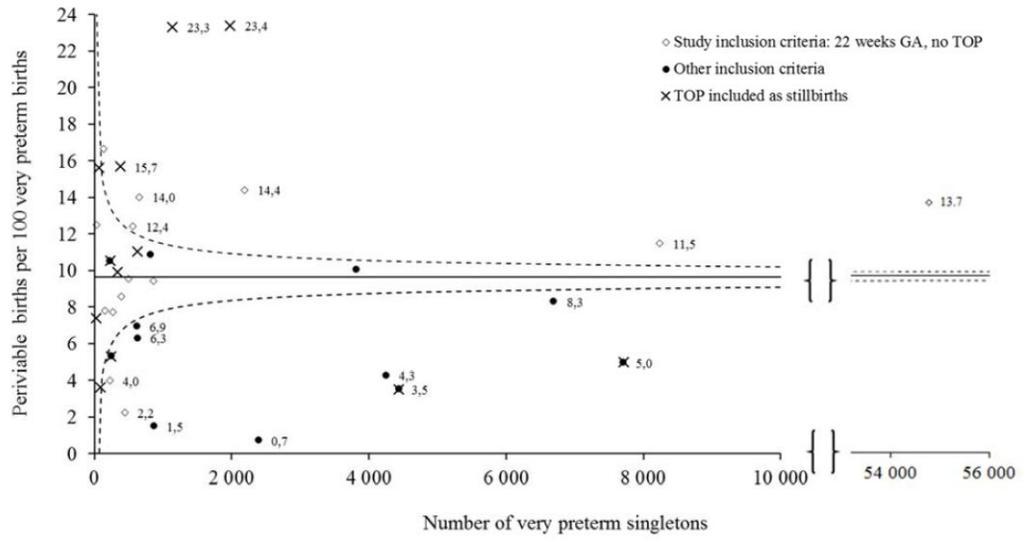
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**Figure 1.** Births at 22 and 23 weeks as a percent of singleton very preterm births in 30 countries in 2010 according to registration practices for births and deaths

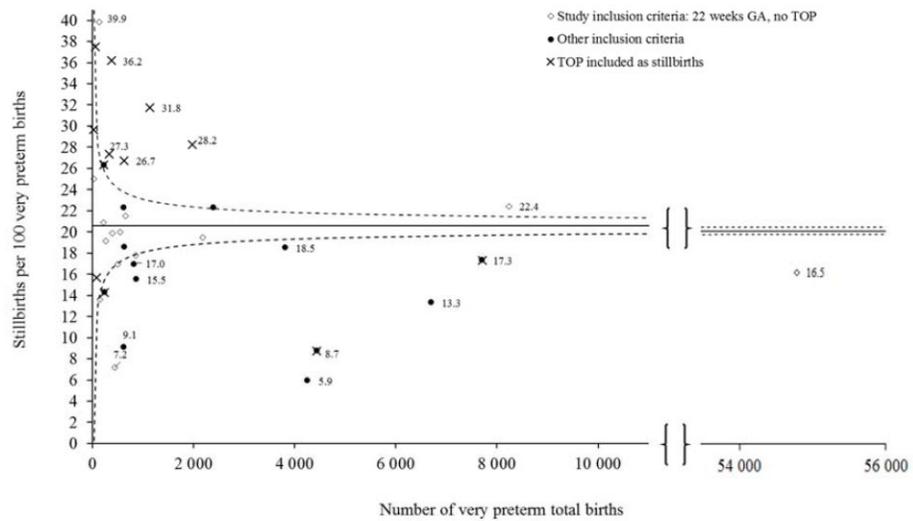
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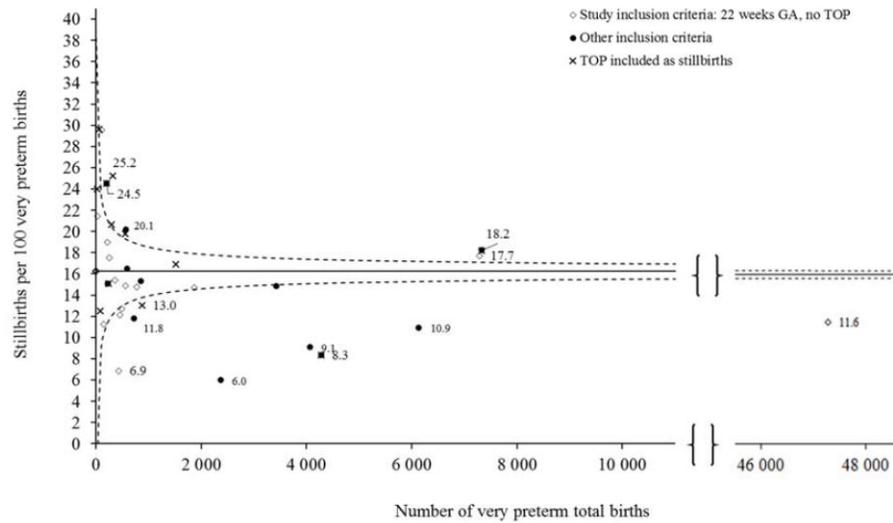
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**A. Stillbirths  $\geq 22$  weeks GA**



**B. Stillbirths  $\geq 24$  weeks GA**



**Figure 2.** Stillbirths as a percent of singleton very preterm births in 30 countries in 2010 according to registration practices for births and deaths

Singleton very preterm birth rates in 30 countries in 2010 and associated reporting criteria for births and deaths

Table 1

Reporting criteria for stillbirths <sup>2</sup>	Country	Total births N	Very preterm births N	Rate per 1000 Total births <sup>1</sup>	[95% CI]
22 weeks, no TOP	Canada <sup>3</sup>	229 700	2185	9.5	[9.1;9.9]
	Denmark	60 896	556	9.1	[8.4;9.9]
	Estonia	15 412	154	10.0	[8.4;11.6]
	Finland	59 484	397	6.7	[6.0;7.3]
	France	14 402	138	9.6	[8.0;11.2]
	Japan	1 083 473	8236	7.6	[7.4;7.8]
	Latvia	18 764	225	12.0	[10.4;13.6]
	Lithuania	30 167	272	9.0	[7.9;10.1]
	Malta	3872	32	8.3	[5.4;11.1]
	Norway	60 836	502	8.3	[7.5;9.0]
	Slovakia	54 204	447	8.2	[7.5;9.0]
	Sweden	111 705	860	7.7	[7.2;8.2]
	Switzerland	77 266	656	8.5	[7.8;9.1]
	United States	3 873 943	54 779	14.1	[14.0;14.3]
22 weeks, with TOP	BE: Brussels	23 933	376	15.7	[14.1;17.3]
	BE: Flanders	67 330	625	9.3	[8.6;10.0]
	BE: Wallonia	37 133	333	9.0	[8.0;9.9]
	Cyprus <sup>3</sup>	8133	83	10.2	[8;12.4]
	Czech Republic	112 116	1140	10.2	[9.6;10.8]
	Iceland	4765	27	5.7	[3.5;7.8]
	Luxembourg	6321	64	10.1	[7.6;12.6]
	Netherlands	172 707	1978	11.5	[10.9;12.0]
24 weeks, no TOP	Romania	209 120	2397	11.5	[11.0;11.9]
	Portugal	98 690	870	8.8	[8.2;9.4]
	Sweden	111 705	860	7.7	[7.2;8.2]
	UK: Scotland <sup>4</sup>	55 654	619	11.1	[10.2;12.0]
24 weeks, with TOP	UK: England and Wales <sup>2</sup>	699 494	7710	11.0	[10.8;11.3]
	UK: Northern Ireland	24 900	245	9.8	[8.6;11.1]

Reporting criteria for stillbirths <sup>2</sup>	Country	Total births N	Very preterm births N	Rate per 1000 Total births <sup>1</sup>	[95% CI]
180 days, no TOP	Italy <sup>4</sup>	529 182	4254	8.0	[7.8;8.3]
180 days, with TOP	Spain <sup>4</sup>	444 217	4438	10.0	[9.7;10.3]
+500g or 24 weeks, no TOP	Ireland	73 041	635	8.7	[8.0;9.4]
+500g, no TOP	Austria	76 226	820	10.8	[10.0;11.5]
	Germany	613 796	6696	10.9	[10.6;11.2]
	Poland	403 781	3816	9.5	[9.2;9.8]
+500g, with TOP	Slovenia	21 589	228	10.6	[9.2;11.9]
Total births (N)		9 376 252	106 793		
Median rate (%)				9.5	[8.9;10.2]
[IQR]				8.5;10.8	
Range				5.7;15.7	

NOTE:

(1) Using lower threshold of 22 weeks GA for births and deaths without TOP, or national definitions as specified.

(2) All countries could provide data on live births starting at 22 weeks GA

(3) Data from Cyprus are from 2007, data from Canada are from 2008.

(4) Incomplete registration for stillbirths before 180 days in Spain and Italy, and before 24+ weeks in UK; Scotland.

**Table 2** Country rankings of singleton very preterm birth rates in 2010 using different gestational age and vital status criteria

Total 22-31 weeks GA*		Total 24-31 weeks GA reference group		Live 24-31 weeks GA	
Country	Rate	Country	Rate	Country	Rate
Iceland	5.7	Iceland	5.2	Iceland	4.0
Finland	6.7	Finland	6.1	Finland	5.2
Japan	7.6	Japan	6.7	Japan	5.6
Sweden	7.7	Sweden	7.0	France	5.7
Italy	8.0 <sup>***</sup>	Malta	7.2	Malta	5.7
Slovakia	8.2	Switzerland	7.3	Sweden	6.0
Norway	8.3	Norway	7.5	Luxembourg	6.0
Malta	8.3	Italy	7.7 <sup>***</sup>	Switzerland	6.2
Switzerland	8.5	Czech Republic	7.8	BE: Wallonia	6.4 <sup>**</sup>
Ireland	8.7	Denmark	8.0	Norway	6.6
Portugal	8.8	France	8.0	BE: Flanders	6.7 <sup>**</sup>
BE: Wallonia	9.0 <sup>**</sup>	Slovakia	8.1	Czech Republic	6.8
Lithuania	9.0	BE: Wallonia	8.1 <sup>**</sup>	Ireland	6.8
Denmark	9.1	Ireland	8.2	Lithuania	6.9
BE: Flanders	9.3 <sup>**</sup>	Canada (2008)	8.2	Canada (2008)	7.0
Poland	9.5	BE: Flanders	8.3 <sup>**</sup>	Denmark	7.0
Canada (2008)	9.5	Lithuania	8.3	Italy	7.0 <sup>***</sup>
France	9.6	Poland	8.5	Slovenia	7.2
UK: Northern Ireland	9.8 <sup>**</sup>	Luxembourg	8.6	Poland	7.3
Spain	10.0 <sup>***</sup>	Portugal	8.7	Netherlands	7.3
Estonia	10.0	Netherlands	8.8	Portugal	7.4
Luxembourg	10.1	Estonia	9.2	Slovakia	7.5
Czech Republic	10.2	UK: Northern Ireland	9.3 <sup>**</sup>	UK: Northern Ireland	7.9 <sup>2</sup>

Total 22-31 weeks GA <sup>*</sup>		Total 24-31 weeks GA reference group		Live 24-31 weeks GA	
Country	Rate	Country	Rate	Country	Rate
<i>Cyprus (2007)</i>	<b>10.2</b>	Slovenia	9.5	Estonia	8.2
Slovenia	10.6	Austria	9.6	<i>UK: Scotland</i>	<b>8.3<sup>2</sup></b>
Austria	10.8	Spain	9.6 <sup>***</sup>	Austria	8.5
<i>Germany</i>	<b>10.9</b>	<i>Cyprus (2007)</i>	<b>9.8</b>	<i>UK: England and Wales</i>	<b>8.6<sup>**</sup></b>
<i>UK: England and Wales</i>	<b>11.0<sup>**</sup></b>	<i>Germany</i>	<b>10.0</b>	<i>Cyprus (2007)</i>	<b>8.3<sup>**</sup></b>
<i>UK: Scotland</i>	<b>11.1<sup>**</sup></b>	<i>UK: Scotland</i>	<b>10.4<sup>**</sup></b>	Spain	8.9 <sup>***</sup>
Netherlands	11.5	<i>UK: England and Wales</i>	<b>10.5<sup>**</sup></b>	<i>Germany</i>	<b>8.9</b>
<i>Romania</i>	<b>11.5</b>	<i>Romania</i>	<b>11.4</b>	<i>Latvia</i>	<b>9.4</b>
<i>Latvia</i>	<b>12.0</b>	<i>Latvia</i>	<b>11.5</b>	<i>BE: Brussels</i>	<b>10.0<sup>**</sup></b>
<i>United States</i>	<b>14.1</b>	<i>United States</i>	<b>12.2</b>	<i>Romania</i>	<b>10.7</b>
<i>BE: Brussels</i>	<b>15.7<sup>**</sup></b>	<i>BE: Brussels</i>	<b>13.3<sup>**</sup></b>	<i>United States</i>	<b>10.8</b>

Data are given as Rates per 1000 births; Bold indicates countries with the lowest rates; Italic indicates countries with the highest rate for the reference group.

\* Using lower threshold of 22 weeks of gestation, no TOP or national definitions.

\*\* Data for Belgium and the UK provided by the region/constituent country.

\*\*\* Incomplete registration before 180 days in Spain and Italy.