Commentary

# Perinatal health monitoring through a European lens: Eight lessons from the Euro-Peristat report on 2015 births

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## Introduction

In November 2018, the Euro-Peristat collaboration published a new European Perinatal Health Report based on national-level indicators of mothers' and babies' health in 2015 in current EU member states and Iceland, Norway, and Switzerland, a total of 31 countries with over five million births (1). Euro-Peristat's indicator set includes 10 core and 20 recommended indicators of fetal and newborn health, maternal health, characteristics of the childbearing population and healthcare services (2). Indicators are compiled from population-based routine sources, such as civil registration systems, administrative or medical birth registers, audits and surveys (3). A standardised protocol is used and integrates clinically relevant sub-groups, notably gestational age and birthweight. Each country provides aggregate data for all births at ≥ 22 completed weeks of gestation, or ≥500 grams if gestational age is missing. If this is not possible, other clearly specified national criteria are used. Euro-Peristat relies on the active involvement of national teams to compile, verify and interpret the indicators. Previous reports were produced for births in 2000, 2004 and 2010 (2, 4). The 2015 report focuses on the core indicators and two recommended indicators relevant to public health, smoking in pregnancy and pre-pregnancy body mass index (BMI).

In this commentary, over 50 graphs and tables in the 180 page report are distilled into a single table summarising the distribution of the principal Euro-Peristat indicators and risk ratios from meta-analyses comparing 2015 with 2010. These are used to support eight key messages for healthcare professionals, clinicians, policy makers and parents.

**Key messages**

1. ***Wide disparities in fetal and neonatal mortality rates between countries exist and are not explained by reporting practices***

Comparisons of fetal, neonatal and infant mortality rates between countries are often met with scepticism because of questions about the consistency and completeness of reporting of deaths at the limits of viability (5, 6). Inclusion of terminations of pregnancy can also influence stillbirth rates (7). Many studies have shown that the size of artefactual reporting differences can outweigh expected true variation in rates (5-7). Table 1 illustrates the importance of using common gestational age thresholds. The median stillbirth rate was 2.7 per 1000 when using the internationally recommended threshold of 28 weeks of gestation, but 3.4/1000, 26% higher, when using 24 weeks and 3.7/1000, 37% higher, when using 22 weeks. This comparison also highlights the contribution of early stillbirths, which are excluded when the threshold of 28 weeks is used (5). Similar conclusions emerge for neonatal mortality rates: the median rate was 29% higher with a cut-off of 22 compared to 24 weeks.

Despite this impact on stillbirth and neonatal mortality rates, using common thresholds does not eliminate heterogeneity between countries. With some exceptions, rankings are similar regardless of the threshold. Stillbirth rates ≥28 weeks' gestation per 1000 total births ranged from below 2.3 in Cyprus, Iceland, Denmark, Finland, and the Netherlands to over 3.5 in Slovakia, Romania, Hungary, and Bulgaria. Greece, France, Sweden, Belgium and UK England and Wales were between these extremes with rates around 3.0. Neonatal mortality at ≥24 weeks' gestation ranged from under 1.3 per 1000 live births in Slovenia, Iceland, Finland, Norway, the Czech Republic, Luxembourg and Estonia to around 2.0 in the Netherlands, Lithuania, France, Latvia and over 3.2 in Northern Ireland, Malta, Romania, and Bulgaria.

2. ***Mortality rates were slightly lower in 2015 than in 2010, but some countries achieved greater reductions***

The stillbirth rate ≥28 weeks' gestation in 2015 was 6% lower than in 2010 with a pooled risk ratio of 0.94 (95% CI: 0.89-0.99). This was less than the 17% reduction from 2004 to 2010 (95% CI 10%-23%) observed in our previous report.(8) Neonatal mortality rates ≥24 weeks' gestation in 2015 were 15% lower than in 2010 (95% CI: 9%-20%). This was also less marked than the 29% decrease (95% CI: 13%-36%) from 2004 to 2010. These slowdowns may reflect changing economic situations in many countries.

Nonetheless, mortality rates were significantly lower in some countries. For stillbirths ≥28 weeks, risk ratios of less than one were observed for the Netherlands (0.75, 95% CI: 0.65-0.86), Scotland (0.79, 95% CI: 0.64-0.97), Poland (0.84, 95% CI: 0.77-0.91) and England and Wales (0.85, 95% CI 0.81-0.90), while Germany had a risk ratio over one (1.08, 95% CI: 1.01-1.16). Neonatal mortality showed similar heterogeneity. Significant falls in some countries compared with stagnating rates elsewhere raise questions about whether health policies or practices played a role in mitigating the impact of socioeconomic adversity.

3. ***Variations in preterm birth rates and trends raise questions about what drives population differences in this essential indicator of child health***

Preterm birth is associated with adverse child and adult health outcomes and its prevention is a major challenge in obstetrics. Our 2015 report confirms previous Euro-Peristat findings showing marked disparities in preterm birth rates and trends in Europe (9) and stresses the need to understand these differences between countries. The median preterm live birth rate in 2015 was 7.3%, but ranged from less than 6% in Finland, Latvia, Estonia, Sweden, and Lithuania to more than 8% in Belgium, Scotland, Romania, Germany, Hungary, Greece, and Cyprus. A two-percent difference is substantial, representing over 77 000 fewer preterm children if all European countries reduced their preterm birth rates to at least 6%.

Our data suggest that change is possible. Overall, preterm birth rates in 2015 did not differ from those in 2010, but this obscures significantly lower rates in six countries (the Netherlands, Austria, the Czech Republic, Spain, Sweden and Germany) and significantly higher in eight (Italy, Portugal, England and Wales, Poland, Ireland, France, Cyprus and Scotland). Understanding what drives these changes is an important public health priority.

4. ***Limitations of public health surveillance systems impede valid comparisons of maternal mortality***

Euro-Peristat compiles data about maternal deaths over a five-year period (2011-2015) because the numbers are low. As well as data from routine systems, it draws on enhanced systems which use reinforced ascertainment methods, including data linkage and audits. Unfortunately, most countries rely solely on routine cause of death statistics even though they under-ascertain maternal deaths (10). Data from countries with both routine and enhanced systems illustrate the extent of under-ascertainment. In Italy, enhanced reporting yields a maternal mortality ratio (MMR) of 9.7 versus 3.6 per 100,000 live births for routine data, whereas in Ireland, these figures are 9.2 and 2.6, respectively. Given the feasibility of linking data about deaths and births, a minimum requirement for all countries should be to reinforce ascertainment using linkage. In addition, countries should consider implementing audits. There are excellent European models for these, such as the longstanding confidential enquiries in the UK and France (10). Meanwhile, data from routine systems should be interpreted cautiously.

### *5. Disparities in caesarean section have widened, with rates reaching very high levels in some countries*

The median caesarean birth rate in 2015 was 27.0%. It ranged from below 18% in Iceland, Finland, Norway, and the Netherlands to over 30% in Slovakia, Ireland, Malta, Germany, Scotland, Luxembourg, Portugal, Switzerland and Italy. The highest rates were in Hungary (39.0%), Poland (42.2%), Bulgaria (43.0%), Romania (46.9%) and Cyprus (56.9%). On average, rates in 2015 were 4% higher than in 2010, but this includes larger increases in Romania (36.9% to 46.9%), Poland, (34.0% to 42.2%), Hungary (32.3% to 39.0%), and Scotland (27.8% to 32.5%) and decreases in Lithuania, Latvia, Portugal, Estonia, Italy, and Norway. Euro-Peristat also compiles caesarean rates by presentation, multiplicity, parity, gestational age, and previous caesarean. Rates in sub-groups tend to reflect overall caesarean rates (11); for instance, the median caesarean rate for breech presentations was 89%, but it was under 75% in Norway, Latvia, Finland, and France where overall caesarean rates are relatively low.

### 6. Europe encompasses exemplary models for the care of pregnant women and newborns

Data from this report identify high performers with good outcomes for fetal and neonatal mortality and low preterm birth and obstetric intervention rates. These shape a framework for goal setting. At a time when caesarean section rates are rising worldwide (12), these European models are needed to counter beliefs that caesarean rates should be increased to reduce fetal and neonatal mortality. Our report shows that low mortality rates can be achieved with low caesarean rates, as in the Nordic countries, the Netherlands and Slovenia. While increasing obstetric intervention may be one way of lowering stillbirth rates, our data suggest that other options exist. For instance, stillbirth rates were lower in 2015 than in 2010 in both the Netherlands and in the countries of the UK, but in England the caesarean rate rose by 10% from 2010, reaching 27.0% in 2015, while in the Netherlands, the caesarean rate was 17.4% in 2015, only 2% higher than in 2010.

### 7. *The childbearing population is diverse in Europe, but countries face common trends*

The percentages of births to women aged 35 years or more exceeded 29% in Portugal, Greece, Ireland, Italy, and Spain, twice as high as in Bulgaria, Romania, and Poland. Smoking during pregnancy also varied; in a quarter of the 20 countries with data, more than 12.5% of women smoked, reaching 18.3% in the Valencia region in Spain, 17.3% in Wales, 16.3% in France and 14.3% in Northern Ireland compared with under 5% in Norway, Sweden, and Lithuania. In the smaller number of countries reporting maternal pre-pregnancy BMI, obesity (BMI ≥ 30) ranged from 7.8% in Croatia to over 22% in Scotland and Wales. Nonetheless, there were common trends, with significant increases in maternal age in 25 countries, along with less smoking and more obesity. Understanding the population impact of changing risk factors among childbearing women is essential for developing prevention policies and all countries should collect these data.

### 8. **High quality reporting of perinatal health indicators is possible, but lack of sustainability constrains its full potential**

Euro-Peristat's reports illustrate the feasibility of compiling comparable perinatal data, but also the limitations of the current system of relying on a project network of researchers and data providers. As rates fluctuate from year to year, continuous time series data are needed to fully monitor trends. Comprehensive reporting should also include all Euro-Peristat recommended indicators; these cover a wider set of health, healthcare and social factors, including mothers' level education and countries of birth.  A sustainable infrastructure for data collection and analysis is needed to compile this fuller range of data. This challenge is addressed by the European Joint Action on Health Information (InfAct) which is seeking to improve the use of routine data for surveillance, research and policy in Europe.

**Conclusion**

European countries provide a rich terrain for comparing perinatal health indicators, given high standards of living, universal access to health care and widespread access to clinical knowledge, combined with diverse approaches to the care of pregnant woman and their babies. Euro-Peristat's comparisons challenge health professionals and policy makers to confront shortcomings in their own countries and raise broader questions about the differences in health and health practices which this cross-country context makes visible.

**Contributions to Authorship section**

As members of the Euro-Peristat Executive board, all authors JZ, SA, HB, BB, MD, MéD, MG, ADHM, AH, AM, KS contributed to the analysis of key messages of the report. JZ drafted the first version with AM and BB. MD, MéD, AH compiled the data provided by members of the Euro-Peristat group. All authors commented on drafts of the paper and approved the final version of the manuscript. JZ had overall scientific responsibility for the project. The collaborators listed as the Euro-Peristat Scientific Committee group author provided data and interpretation of data for the report.

**Conflicts of interest**

The authors have no conflicts of interest to declare.

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**Table 1: Summary of perinatal health indicators in Europe in 2015 and changes since 2010**

| | | | | Distribution (percentiles) | | | | Comparison with 2010 | | | N of countries | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N[1] | Median | Min | 25th | 75th | Max | N[1] | Risk ratio[2] | 95% CI | Higher[3] | Lower[3] |
| C1 | Fetal mortality rate (per 1000 total births)[4] | | | | | | | | | | | |
| | ≥22 weeks | 33 | 3.7 | 2.4 | 3.4 | 4.4 | 7.3 | 29 | 0.93 | 0.89 - 0.96 | 0 | 6 |
| | ≥24 weeks | 33 | 3.4 | 1.8 | 3.0 | 3.8 | 6.9 | 27 | 0.93 | 0.89 - 0.98 | 0 | 5 |
| | ≥28 weeks | 33 | 2.7 | 1.4 | 2.4 | 3.1 | 5.7 | 30 | 0.94 | 0.89 - 0.99 | 1 | 4 |
| C2 | Neonatal mortality rate (per 1000 live births)[5] | | | | | | | | | | | |
| | ≥22 weeks | 33 | 2.2 | 0.7 | 1.8 | 2.7 | 4.4 | 30 | 0.90 | 0.85 - 0.94 | 1 | 9 |
| | ≥24 weeks | 26 | 1.7 | 0.4 | 1.2 | 2.2 | 4.3 | 22 | 0.85 | 0.80 - 0.91 | 0 | 7 |
| C3 | Infant mortality rate (per 1000 live births) | | | | | | | | | | | |
| | ≥22 weeks | 33 | 3.1 | 1.5 | 2.3 | 3.8 | 7.6 | 28 | 0.88 | 0.84 - 0.93 | 0 | 8 |
| | ≥24 weeks | 22 | 2.3 | 0.7 | 1.8 | 3.2 | 7.5 | 16 | 0.84 | 0.78 - 0.90 | 0 | 5 |
| C4 | Percentage of low birthweight (<2500 g) births[6] | 33 | 6.5 | 4.2 | 5.1 | 7.7 | 10.6 | 31 | 1.00 | 0.99 - 1.02 | 9 | 5 |
| C5 | Percentage of preterm (<37 weeks GA) births[7] | 33 | 7.3 | 5.4 | 6.5 | 7.8 | 12.0 | 31 | 1.02 | 0.99 - 1.04 | 8 | 6 |
| C6 | Maternal mortality ratio (per 100,000 live births) | | | | | | | | | | | |
| | from routine statistical systems | 23 | 4.9 | 0.0 | 3.6 | 6.3 | 24.7 | | | | | |
| | from enhanced systems | 7 | 8.9 | 5.1 | 8.1 | 9.5 | 12.9 | | | | | |
| C7 | Multiple birth rate (per 1000 women delivering a live or still birth) | 33 | 16.7 | 10.4 | 14.7 | 17.6 | 26.8 | 29 | 0.99 | 0.95 - 1.03 | 6 | 7 |
| C8 | Distribution of maternal age | | | | | | | | | | | |
| | Percentage of women aged <20 years | 33 | 2.1 | 0.8 | 1.4 | 3.5 | 10.2 | 31 | 0.78 | 0.72 - 0.83 | 2 | 25 |
| | Percentage of women aged ≥ 35 years | 33 | 20.8 | 13.6 | 18.9 | 23.3 | 37.3 | 31 | 1.16 | 1.11 - 1.20 | 25 | 3 |
| C9 | Percentage of primiparous mothers | 33 | 47.4 | 38.2 | 42.5 | 49 | 54.5 | 29 | 0.98 | 0.97 - 0.99 | 4 | 10 |
| C10 | Distribution of mode of delivery[8] | | | | | | | | | | | |
| | Percentage of caesarean deliveries | 33 | 27.0 | 16.1 | 21.3 | 32.7 | 56.9 | 31 | 1.04 | 1.00 - 1.08 | 17 | 7 |
| | Percentage of instrumental delivery | 29 | 7.2 | 0.5 | 3.5 | 10.9 | 15.1 | 27 | 1.03 | 0.99 - 1.07 | 8 | 8 |
| R8 | Percent of women smoking during pregnancy | 22 | 8.4 | 3.6 | 6.5 | 12.5 | 18.3 | 19 | 0.87 | 0.80 - 0.95 | 2 | 10 |
| R12 | Percent of women with BMI ≥ 30[9] | 15 | 13.2 | 7.8 | 11.7 | 17.6 | 25.6 | 9 | 1.15 | 1.08 - 1.22 | 7 | 1 |

Notes: (1) The UK provided some data separately for England and Wales, Scotland and Northern Ireland. Not all countries provided data in the 2010 report, explaining lower numbers of countries (2) Random effects pooled risk ratio, calculated with the method of DerSimonian and Laird; These analyses generate a pooled estimate which can be interpreted as the risk ratio in an average country in Europe (3) Risk ratio for 2015 compared to 2010 is significantly different from 1, see forest plots in report (4) Without termination of pregnancy, when possible, however, for trends over time data on terminations are included because they were not removed in 2010 data. (5) Cohort data are used in 2015, when possible (6) The full indicator is the distribution of birthweight in 500 gram intervals, please see the report for further details (7) The full indicator is the distribution of gestational age in completed weeks, please see the report for further details; (8) Data are collected by key risk sub-groups: parity, presentation, multiplicity, gestational age, previous caesarean (9) The full indicator is the distribution of maternal BMI using the WHO classification.