



City Research Online

City St George's, University of London

Citation: Haidinger, G., Klimont, J., Alexander, S., Zhang, W-H., Vandervelpen, E., Delnord, M., Kolarova, R., Yordanova, E., Rodin, U., Drausnik, Z., et al (2022). Population birth data and pandemic readiness in Europe. BJOG: An International Journal of Obstetrics and Gynaecology, 129(2), pp. 179-184. doi: 10.1111/1471-0528.16946

This is the published version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/28148/>

Link to published version: <https://doi.org/10.1111/1471-0528.16946>

Copyright and Reuse: Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to [City Research Online policy](#).

Population birth data and pandemic readiness in Europe

Euro-Peristat Research Network*

*Correspondence: J Zeitlin, Obstetrical, Perinatal and Pediatric Epidemiology Research Team INSERM UMR 1153 53 avenue de l'observatoire 75014 Paris, France. Email: jennifer.zeitlin@inserm.fr

Accepted 21 September 2021. Published Online 30 November 2021.

Please cite this paper as: Euro-Peristat Research Network. Population birth data and pandemic readiness in Europe. BJOG 2022;129:179–184.

Introduction

The SARS-CoV-2 pandemic exposed multiple shortcomings in national and international capacity to respond to an outbreak of infectious disease. It is essential to learn from these deficiencies to prepare for future epidemics. One major gap is the limited availability of timely and comprehensive population-based routine data on the impact of COVID-19 on pregnant women and babies. As part of the Horizon 2020 Population Health Information Research Infrastructure (PHIRI) project on the use of population data for COVID-19 surveillance, the Euro-Peristat Research Network investigated the extent to which routine information systems could be used to assess the effects of the pandemic by constructing indicators of maternal and child health and COVID-19 infection. The Euro-Peristat network brings together researchers and statisticians from 31 countries to monitor population indicators of perinatal health in Europe, and periodically compiles data on a set of ten core and 20 recommended indicators.¹

The effect of the pandemic on the health of pregnant women and babies

At the onset of the pandemic, single-centre hospital studies and rapidly mounted population-based studies provided vital information to guide clinical care and policy by documenting the greater risks of admission to intensive care and of pregnancy complications, such as preterm delivery and pre-eclampsia, among pregnant women with COVID-19.² They also showed generally good outcomes for most infected pregnant women and babies.² Systematic reviews of this growing body of work have provided more robust guidance, but are limited in their ability to capture key

population outcomes such as stillbirth and neonatal death, which occur too infrequently to be included as outcomes in most single- and even multi-centre studies. The most recent update of a living systematic review, based on 192 studies of pregnant women with COVID-19, with 97 studies investigating perinatal outcomes, included only 72 stillbirths and 41 neonatal deaths.³

Research has also accumulated on the effects of the pandemic on the general population of pregnant women. These indirect effects may result from changes in health care access or quality, through health-system failures, policies to reorganise care, such as moving to telemedicine consultations, or women's reluctance to seek care for fear of infection, as well as from economic adversity and increased stress. A recent systematic review provides a valuable overview of 40 studies on the indirect effects of the pandemic on multiple maternal and perinatal outcomes, but also reveals the lack of research using population birth data.⁴ For example, some very small studies reported unexpected decreases in preterm birth rates during the first lockdown in March and April 2020.^{5,6} Ten further studies on preterm birth in high-income countries were identified by the review, yielding an overall pooled effect in favour of a decrease in preterm birth, but with substantial heterogeneity.⁴ However, only three studies were population-based regional or national studies. Only one of the eight studies on stillbirth included in the review was population based.

Surveillance of perinatal health during a pandemic requires population-based data

As pregnant women and newborns are generally in good health, studies to monitor their health require large population-based samples. Further, trend data from previous years are required for reliable assessments of change because

*For a list of members of the Euro-Peristat Research Network, see the Appendix.

seasonal effects, secular trends in birth rates and pandemic-related changes in fertility, as observed during CoV-SARS-2,⁷ can impact on perinatal outcomes. A population approach is also essential because single- and multi-centre studies may not detect systemic changes that result from disruption to the organisation of healthcare services. They may also be unreliable if population movements affect their activity levels and patient case mix. For instance, 17% of residents of the Parisian region moved to other parts of France during the first lockdown.⁸ Finally, comprehensive coverage, including disadvantaged populations, is needed because perinatal outcomes are sensitive to changes in socio-economic circumstances, and social disadvantage increases vulnerability to infection and its consequences.²

Population birth data in Europe: a survey of the availability and timeliness of key indicators

To assess the availability of population birth data in Europe, the Euro-Peristat network developed an online survey for participating countries asking about the availability of preliminary and verified finalised birth data for constructing core perinatal health indicators, including stillbirth, neonatal mortality, preterm birth, low birthweight and caesarean rates for births from (i) January–April 2020 and (ii) all of 2020. We also enquired about whether codes had been routinely added to birth data to indicate COVID-19 infection. The initial survey was completed in June–July 2020 and updated in November–December 2020 to include information on linkage and disruptions to reporting systems after a discussion of preliminary results by the country teams. Twenty-seven countries and the constituent nations of the UK provided data (Table S1).

Some countries used several data sources, including birth and death certificates, birth notification systems, or stillbirth and abortion registers, to generate the full set of core indicators. In these cases, we asked for information about the availability of data to generate stillbirth, preterm birth, low birthweight and caesarean rates, as they are often available earlier than data on neonatal or infant deaths.

Timeliness of data

Figure 1 presents the estimated timing for accessing preliminary and final population data on births in 2020 and illustrates the considerable heterogeneity between countries. About half of the countries had preliminary data on the first lockdown period by November of 2020, with half having the final data by May 2021. Final data for the year 2020 started to become available in March 2021, with half of the countries having data available by September 2021. Figures distinguishing between sources that rely solely on

civil registration data and those using medical registers or hospital discharge databases show that, especially for preliminary data, medical registers provided more rapid access.

Some countries reported disruptions or changes of data procedures related to the pandemic that may impact on quality or completeness, particularly for preliminary data. These were mainly as a result of personnel being repurposed for other data or clinical duties, resulting in backlogs in processing, mentioned by eight countries. Several countries mentioned delays to birth registration. For instance, in the UK the civil registration of live births was paused for several months during the first lockdown. It was then continued in Scotland and Northern Ireland, but varied locally in England and Wales, during subsequent lockdowns. Other changes to procedures, such as in France, where the hospital budgets for 2020 and 2021 will not be determined by activity measures from hospital discharge data, may affect the coding of complications or outcomes.

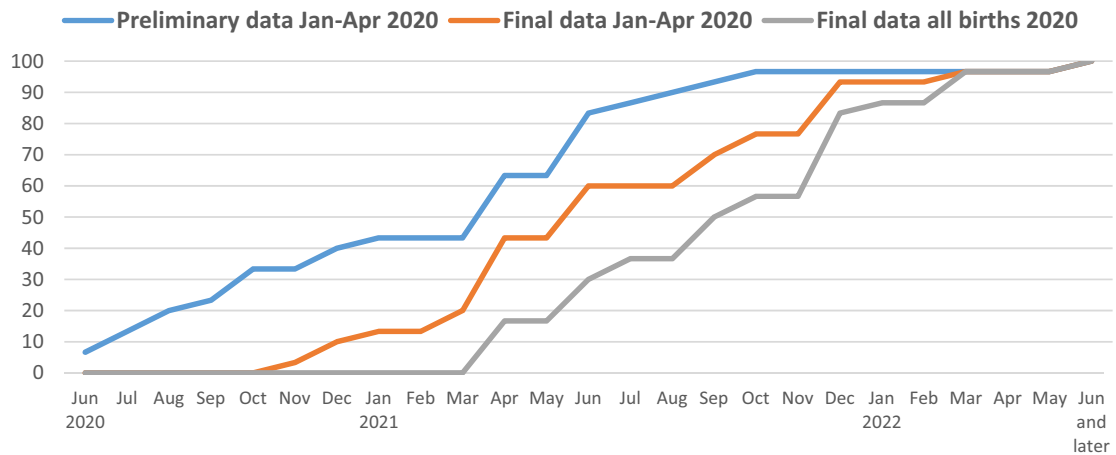
Integrating COVID-19 codes into birth sources

Specific codes indicating COVID-19 infection are necessary for monitoring outcomes associated with infection, but also for exploring indirect effects where and when the prevalence of infection is high. Only two of the 11 countries that use civil registration sources have the option of adding COVID-19 codes from the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) to birth data, as shown in Table 1. In contrast, 17 out of 19 countries that use sources based on clinical or medical databases reported that this code is already or will be added to birth data. In some countries, there is a potential to link COVID-19 codes to birth data, but this is not currently planned. Overall, 23% of the countries cannot add COVID-19 codes to routine birth data.

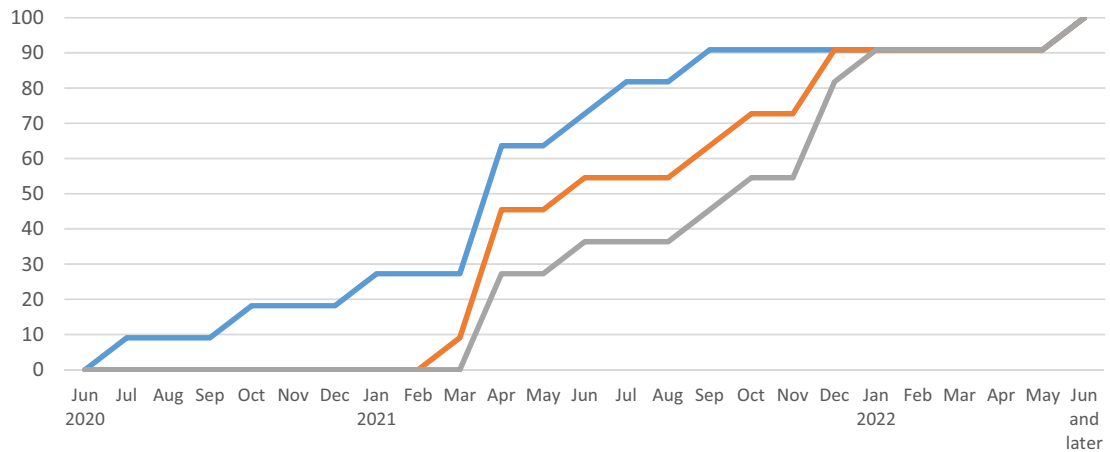
Remaining questions for European data systems

This overview focused on the availability and timeliness of key data items, but other questions remain. For instance, it is important to evaluate whether disruptions to data procedures affected the quality or completeness of the data. Verifying the coding of key variables or trends over time in numbers of births by hospital or region could reveal system dysfunctions; these quantitative assessments could be complemented by qualitative studies. Further research is also needed on the quality and reliability of COVID-19 codes. At the onset of the pandemic, the World Health Organization (WHO) issued guidelines for coding confirmed

All sources (N=30 countries)



Civil Registers (N=11 countries)



Medical Registers (N=19 countries)

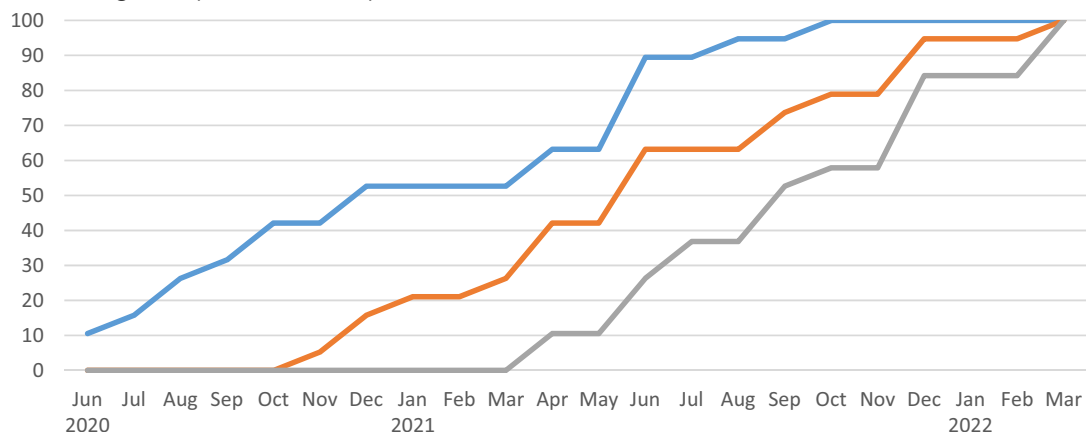


Figure 1. Availability of core perinatal health indicators in European countries overall and by source. When several sources were used to generate Euro-Peristat data, we requested information on birth data that could be used to generate stillbirth, preterm and low birthweight rates (as opposed to neonatal or infant deaths, which may become available later). See Table S1 for data by country.

Table 1. Capacity to identify confirmed or suspected COVID-19 infections using ICD codes in routine birth data

	Civil registration only	Clinical/ hospital discharge databases	Total	%
ICD codes for COVID-19 included in birth data (directly or by linking to another source)	2 ^a	14 ^b	16	53
Linkage is planned to another source with COVID-19 codes	2 ^c	3 ^d	5	17
Potential to link to other source, but not planned	2 ^e		2	7
Not possible to include COVID-19 codes	5 ^f	2 ^g	7	23
Total no. of countries responding	11	19	30	100

Refers to data on births used to compute stillbirth, preterm birth and low birthweight rates, using several data sources (using COVID-19 codes for deaths only was not counted as a 'yes').

^aCzech Republic, Romania.

^bCroatia, Denmark, England and Wales, Finland, France, Germany, Iceland, Latvia, Luxembourg (code is present, but not based on ICD codes), Malta, Norway, Sweden, Northern Ireland, Scotland.

^cBelgium, Cyprus.

^dEstonia, Lithuania, the Netherlands.

^ePoland, Portugal.

^fAustria, Bulgaria, Italy, Spain, Switzerland.

^gIreland, Slovenia.

COVID-19 infection using ICD codes; these were updated to include guidelines for suspected infection and specific guidelines were developed for mothers and babies. Studies are beginning to address the issue of coding quality as applied generally, finding good results overall,⁹ but this is likely to differ across countries and hospitals and has not been assessed for pregnant women and babies. Unique questions exist for the mother–child dyad: for instance, although it may be easy to identify babies with a symptomatic mother testing positive for COVID-19 at delivery, identifying children born to mothers with a resolved or asymptomatic COVID-19 infection during pregnancy is more challenging. The ability to link hospital testing strategies will be crucial for the interpretation of positivity rates as it is estimated that about three-quarters of infections at delivery are asymptomatic.³

A final question concerns the data in population data sources beyond the core perinatal health outcomes discussed here. The Euro-Peristat indicator set has a limited

number of health service measures, in part because of the complexity of defining comparable indicators between health systems. In line with broader WHO initiatives to develop population health indicators in the context of COVID-19,¹⁰ countries should assess whether they are able to report on population health service indicators to enable rapid feedback on problems with access or quality of care that can affect women and babies during a pandemic.

Larger lessons and strategies for change

This overview draws attention to the delays in the availability of population birth data; in general, finalised data from the first lockdown period were not available until the spring of the following year. However, there was marked heterogeneity, suggesting that workable solutions to producing more rapid data already exist. Some of the variation was linked to the types of data systems, with a generally longer lag for preliminary information when countries derive birth data from civil registration rather than from clinical databases or hospital discharge systems. This illustrates the importance of using these medical databases for reporting on perinatal indicators at a population level, if this is the case. Many countries relied on linkage to obtain information on COVID-19. Linkage of routine data, underused in many countries, emerges as a central component of a strategy to improve the pandemic readiness of population birth data. It is being exploited in some countries to make further investigations possible,¹¹ and ambitious initiatives to provide longitudinal maternal–newborn databases for routine surveillance could provide a road map for the future.¹² Finally, a future plan should include procedures for the rapid international synthesis of data. Compiling data at a European level, a central objective of the PHIRI project, permits insight into the generalisability of national trends and generates knowledge to inform European policy.

This overview of information systems in Europe, highlighting the limits of routine birth data, calls for urgent attention to population monitoring capacity to improve preparedness for a future pandemic. The SARS-CoV-2 virus has been most deadly for older people and adults with respiratory and other comorbidities. In contrast, a future pandemic could be more dangerous for pregnant women and newborns who remain uniquely vulnerable to major adverse effects from viral infections and are at risk when health systems are disrupted because of their non-deferrable need for health services during pregnancy, child-birth and the postpartum period.

Disclosure of interests

None declared. Completed disclosure of interests form available to view online as supporting information.

Contribution to authorship

All members of the Euro-Peristat network, listed as a group author, participated in the design of the study, provided data for their country, assisted with interpretation of the data and revision of the article and approved the final version. Several online meetings were held to discuss this study. From the Institut national de la santé et de la recherche médicale (Inserm) team, MD and MP designed the data collection instrument and carried out the data analyses. JZ drafted the article.

Details of ethics approval

Not required.

Funding

The research leading to these results received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101018317, the Population Health Information Research Infrastructure (PHIRI).

Data availability statement

Data are provided in Table S1.

Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Data sources, type, data available and new ICD codes for COVID-19. ■

References

- Zeitlin J, Alexander S, Barros H, Blondel B, Delnord M, Durox M, et al. Perinatal health monitoring through a European lens: eight lessons from the Euro-Peristat report on 2015 births. *BJOG* 2019;126:1518–22.
- Knight M, Bunch K, Vousden N, Morris E, Simpson N, Gale C, et al. Characteristics and outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 infection in UK: national population based cohort study. *BMJ* 2020;369:m2107.
- Allotey J, Stallings E, Bonet M, Yap M, Chatterjee S, Kew T, et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ* 2020;370:m3320.
- Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, Gurrol-Urganci I, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. *Lancet Glob Health* 2021;9:e759–72.
- Hedermann G, Hedley PL, Bækvad-Hansen M, Hjalgrim H, Rostgaard K, Poorisrisak P, et al. Danish premature birth rates during the COVID-19 lockdown. *Arch Dis Child Fetal Neonatal Ed* 2021;106:93–5.
- Philip RK, Purtill H, Reidy E, Daly M, Imcha M, McGrath D, et al. Unprecedented reduction in births of very low birthweight (VLBW) and extremely low birthweight (ELBW) infants during the COVID-19 lockdown in Ireland: a 'natural experiment' allowing analysis of data from the prior two decades. *BMJ Glob Health* 2020;5:e003075.
- Aassve A, Cavalli N, Mencarini L, Plach S, Sanders S. Early assessment of the relationship between the COVID-19 pandemic and births in high-income countries. *Proceedings of the National Academy of Sciences of the United States of America* 2021 preprint 2021; 118. this version posted March 25, 2021.
- Pullano G, Valdano E, Scarpa N, Rubrichi S, Colizza V. Evaluating the effect of demographic factors, socioeconomic factors, and risk aversion on mobility during the COVID-19 epidemic in France under lockdown: a population-based study. *Lancet Digit Health* 2020;2:e638–49.
- Kadri SS, Gundrum J, Warner S, Cao Z, Babiker A, Klompas M, et al. Uptake and accuracy of the diagnosis code for COVID-19 among US hospitalizations. *JAMA* 2020;324:2553–4.
- World Health Organization. Strengthening monitoring of population health to signal and address the wider effects of the COVID-19 pandemic. 2020.
- Stock SJ, McAllister D, Vasileiou E, Simpson CR, Stagg HR, Agrawal U, et al. COVID-19 in Pregnancy in Scotland (COPS): protocol for an observational study using linked Scottish national data. *BMJ Open* 2020;10:e042813.
- Woodworth KR, Reynolds MR, Burkel V, Gates C, Eckert V, McDermott C, et al. A preparedness model for mother-baby linked longitudinal surveillance for emerging threats. *Matern Child Health J* 2021;25:198–206.

Appendix

Euro-Peristat Research Network

Austria - Gerald Haidinger (The Medical University of Vienna, Department of Epidemiology, Centre of Public Health, Vienna), Jeannette Klimont (Statistics Austria, Vienna); **Belgium** - Sophie Alexander, Wei-Hong Zhang (Perinatal Epidemiology and Reproductive Health Unit, CR2, School of Public Health, ULB, Brussels), Gisèle Vandervelpen (Statbel, Brussels), Marie Delnord (Sciensano, Belgian Institute for Health, Brussels); **Bulgaria** - Romyana Kolarova (Directorate Budget and Finance, Ministry of Health, Sofia), Evelin Yordanova (Statistics of health and justice. National Statistical Institute, Sofia); **Croatia** - Urelija Rodin, Željka Draušnik (Croatian National Institute of Public Health, Zagreb), Boris Filipovic-Grcic (Clinical Hospital Center Zagreb, School of Medicine University of Zagreb, Zagreb); **Cyprus** - Theopisti Kyprianou, Vasos Scoutellas (Health Monitoring Unit, Ministry of Health, Nicosia); **Czech Republic** - Petr Velebil (Institute for the Care of Mother and Child, Prague); **Denmark** - Laust Hvas Mortensen (Department of Public Health, University of Copenhagen, Copenhagen and Denmark Statistics, Copenhagen); **Estonia** - Luule Sakkeus, Liili Abuladze (Estonian Institute for Population Studies, Tallinn University, Tallinn); **Finland** - Mika Gissler (THL Finnish Institute for Health and Welfare, Information Services Department,

Helsinki and Karolinska Institute, Department of Neurobiology, Care Sciences and Society, Stockholm); **France** - Béatrice Blondel, Catherine Deneux-Tharaux, Mélanie Durox, Marianne Philibert, Jennifer Zeitlin (Université de Paris, CRESS, Obstetrical Perinatal and Pediatric Epidemiology Research Team, EPOPé, INSERM, INREA, Paris), Jeanne Fresson (Population Health Office, Directorate of Research, Study, Evaluation and Statistics (DREES), Health Ministry, Paris); **Germany** - Guenther Heller (Institute for Quality Assurance and Transparency in Healthcare IQTIG, Berlin), Bjoern Misselwitz (Institute of Quality Assurance Hesse, Eschborn); **Greece** - Aris Antsaklis (IASO Maternity Hospital, Department of Fetal Maternal and Perinatal Medicine, University of Athens, Athens); **Hungary** - István Berbik (MedCongress Ltd., Budapest); **Iceland** - Helga Sól Ólafsdóttir (Department of Obstetrics and Gynaecology, Landspítali University Hospital, Reykjavik); **Ireland** - Karen Kearns (Healthcare Pricing Office, National Finance Division, HSE, Dublin), Izabela Sikora (The National Perinatal Reporting System, Health Pricing Office, Dublin); **Italy** - Marina Cuttini (Clinical Care and Management Innovation Research Area, Bambino Gesù Pediatric Hospital, Rome), Marzia Loghi (Directorate for Social Statistics and Welfare, Italian Statistical Institute (ISTAT), Rome), Serena Donati (National Centre for Epidemiology, Surveillance, and Health Promotion, National Institute of Health, Rome), Rosalia Boldrini (General Directorate for the Health Information and Statistical System, Italian Ministry of Health, Rome); **Latvia** - Janis Misins, Iriša Zile (The Centre for Disease Prevention and Control of Latvia, Riga); **Lithuania** - Jelena Isakova (Institute of Hygiene, Health Information Centre, Health Statistics Department, Vilnius); **Luxembourg** - Aline Touvrey-Lecomte, Audrey Billy, Sophie Couffignal (Department of Population Health, Luxembourg Institute of Health, Luxembourg), Guy Weber (Department of Epidemiology and Statistics, Directorate of Health, Luxembourg); **Malta** - Miriam Gatt (Directorate for Health Information and Research, National Obstetric Information Systems (NOIS) Register, Tal-Pietà); **Netherlands** - Jan Nijhuis (Department of Obstetrics & Gynaecology, Maastricht University Medical Centre, MUMC+, Maastricht), Lisa Broeders (The Netherlands Perinatal Registry (Perined), Utrecht), PW Achterberg (National Institute for Public Health and the Environment, Bilthoven), Ashna Hindori-Mohangoo (Foundation for Perinatal Interventions and Research in Suriname (PeriSur), Paramaribo, Suriname, Tulane University School of Public Health and Tropical Medicine, New Orleans, USA); **Norway** - Kari Klungsoyr (Division of Mental and Physical Health, Norwegian Institute of Public Health, Bergen, Norway and Department of Global Public Health and Primary Care,

University of Bergen), Rupali Akerkar, Hilde Engjom (Health Registry Research and Development, Norwegian Institute of Public Health, Bergen); **Poland** - Katarzyna Szamotulska, Ewa Mierzejewska (Department of Epidemiology and Biostatistics, National Research Institute of Mother and Child, Warsaw); **Portugal** - Henrique Barros (University of Porto Medical School, Department of Public Health, Forensic Sciences and Medical Education, Porto), Carina Rodrigues (Institute of Public Health of the University of Porto, Porto); **Romania** - Mihai Horga (East European Institute for Reproductive Health, Târgu Mureş), Vlad Tica (East European Institute for Reproductive Health, Faculty of Medicine, University "Ovidius", Constanța), Lucian Puscasu (East European Institute for Reproductive Health, University of Medicine, Pharmacy, Science and Technology "George Emil Palade", Târgu Mureş), Mihaela-Alexandra Budianu (Obstetrics and Gynaecology Clinic, University of Medicine and Pharmacy, Târgu Mureş), Alexandra Cucu (National Centre for Health Promotion and Evaluation, National Institute of Public Health, Târgu Mureş), Cristian Calomfirescu (National Center for Statistics and Informatics in Public Health, National Institute of Public Health, Târgu Mureş); **Slovakia** - Jan Cap (National Health Information Center, Bratislava); **Slovenia** - Natasa Tul Mandic (Gynaecological and Maternity Hospital Postojna, Postojna), Ivan Verdenik (University Medical Centre, Department of Obstetrics & Gynecology, Ljubljana); **Spain** - Oscar Zurriaga (Public Health General Directorate, Valencia Regional Public Health Authority and Public Health and Preventive Medicine Department, University of Valencia and Centre for Network Biomedical Research in Epidemiology and Public Health (CIBERESP), Madrid), Adela Recio Alcaide (National Institute for Statistics (INE), Madrid), Mireia Jané (Public Health Surveillance Direction, Catalan Public Health Agency Generalitat de Catalunya, Barcelona), Maria José Vidal (Public Health Surveillance Direction, Catalan Public Health Agency Generalitat de Catalunya, Barcelona); **Sweden** - Karin Källén, Anastasia Nyman (The National Board of Health and Welfare, Department of Evaluation and Analysis, Epidemiology and Methodological Support Unit, Stockholm); **Switzerland** - Tonia Rihs (Federal Statistical Office FSO, Neuchâtel); **United Kingdom** - Alison Macfarlane (Centre for Maternal and Child Health Research, School of Health Sciences, City University of London, London), Rachael Wood, Kirsten Monteath (Public Health Scotland, Edinburgh and University of Edinburgh, Edinburgh), Lucy Smith (Department of Health Sciences, College of Life Sciences, University of Leicester, Leicester), Siobhán Morgan, Jennifer Hillen (Hospital Information Branch, Department of Health, Stormont Estate, Belfast).