

National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis



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Summary

Background Previous estimates have highlighted a large global burden of stillbirths, with an absence of reliable data from regions where most stillbirths occur. The Every Newborn Action Plan (ENAP) targets national stillbirth rates (SBRs) of 12 or fewer stillbirths per 1000 births by 2030. We estimate SBRs and numbers for 195 countries, including trends from 2000 to 2015.

Methods We collated SBR data meeting prespecified inclusion criteria from national routine or registration systems, nationally representative surveys, and other data sources identified through a systematic review, web-based searches, and consultation with stillbirth experts. We modelled SBR (≥ 28 weeks' gestation) for 195 countries with restricted maximum likelihood estimation with country-level random effects. Uncertainty ranges were obtained through a bootstrap approach.

Findings Data from 157 countries (2207 datapoints) met the inclusion criteria, a 90% increase from 2009 estimates. The estimated average global SBR in 2015 was 18.4 per 1000 births, down from 24.7 in 2000 (25.5% reduction). In 2015, an estimated 2.6 million (uncertainty range 2.4–3.0 million) babies were stillborn, giving a 19% decline in numbers since 2000 with the slowest progress in sub-Saharan Africa. 98% of all stillbirths occur in low-income and middle-income countries; 77% in south Asia and sub-Saharan Africa.

Interpretation Progress in reducing the large worldwide stillbirth burden remains slow and insufficient to meet national targets such as for ENAP. Stillbirths are increasingly being counted at a local level, but countries and the global community must further improve the quality and comparability of data, and ensure that this is more clearly linked to accountability processes including the Sustainable Development Goals.

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Introduction

WHO first published national, regional, and worldwide estimates of stillbirths in 2011, highlighting the large global burden of stillbirths, with an estimated 2.6 million women and families affected in 2009.¹ This process also showed the dearth of reliable data in the regions where most stillbirths occur. In 2014, the Every Newborn Action Plan, a global multipartner movement to end preventable maternal and newborn deaths and stillbirths, set a target for national stillbirth rates (SBRs) of 12 or fewer stillbirths per 1000 births in all countries by 2030, accompanied by action in countries to address disparities.² This stillbirth target was included in response to the requests of many countries during the consultation process.³ To achieve this target, countries will need to act to reduce preventable stillbirths and improve monitoring of SBRs.^{4,5}

In this study, our objective was to estimate national, regional, and worldwide stillbirth rates and absolute numbers for 195 countries in both 2000 and 2015, to enable an assessment to be made of the extent to which SBRs have changed over time.

We sought to improve on the 2011 WHO exercise and our work previous to that⁶ in terms of both the quantity of SBR data, by undertaking more extensive searches, and the quality of the data, by applying more stringent inclusion and exclusion criteria. Variation in definitions used for stillbirths affects comparability. For this exercise, we examined the effect of different definitions, and sought to adjust all input SBR data to correspond to a standard definition (≥ 28 weeks' gestation) before modelling.

We present our methods and results using the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) checklist. This is a new reporting checklist for worldwide health estimates that promotes transparency, including the sharing of input data and modelling code.⁷

Methods

Data inputs

For the purposes of these estimates, we defined a stillbirth as a baby born with no signs of life at 28 weeks' gestation or more (third trimester; panel). When

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For the study input data modelling codes see <http://dx.doi.org/10.17037/DATA.25>

Research in context

Evidence before this study

Previous global estimates for stillbirths have been undertaken, of which the most recent was for 2009 by WHO.¹ Stillbirths were not tracked under the Millennium Development Goals, and progress in reducing stillbirths is slower than that for maternal or neonatal deaths. In 2014, the Every Newborn Action Plan set a target of a national stillbirth rate of 12 or fewer stillbirths per 1000 births by 2030 and to address within-country disparities in all countries. However, stillbirths are still not included in global burden estimates or global goals.

Added value of this study

Through systematic searches (national statistical office, ministry of health and nationally representative household survey websites, and published literature) and consultation with a group of stillbirth investigators to identify further unpublished stillbirth data, we compiled the largest stillbirth rate dataset so far. The final dataset included 2207 datapoints from 157 countries, almost doubled from 1149 datapoints from 135 countries in the previous estimation exercise. This increase was predominantly due to increased data availability

from national routine data sources in middle-income countries. We also improved the consistency of the stillbirth definitions, and strengthened the criteria for quality of data. These national stillbirth rates estimates are for 195 countries for 2015 with time-trends from 2000.

Implications of all the available evidence

We estimate that 2.6 million (uncertainty range 2.4–3.0 million) babies were stillborn in 2015, affecting women and their families in all settings. 98% were in low-income and middle-income countries, of which over two-thirds were in sub-Saharan Africa and southern Asia. Data from 39 countries with complete time series shows slow progress in reducing this burden. Nearly half (45%) of the data available is for the 2% of stillbirths from developed regions, and more must be done to close this data gap and improve data quality and comparability in all settings. Stillbirths are increasingly being counted at a local level; however, absence of global goals and reporting mechanisms continues to restrict their visibility, especially in the countries with the greatest disease burden. Unless this changes, stillbirths are likely to remain invisible beyond 2015.

presenting results by region, we used the Millennium Development Goal (MDG) regions (appendix pp 3–4).

The database for the previous WHO stillbirth estimates¹ included 1149 datapoints covering the period 1995–2009, and this was updated with data covering the whole period from 1990 to 2015. SBR data were identified from multiple sources (figure 1) including national routine data defined as data from national systems such as civil registration and vital statistics (CRVS) systems, national health management information systems (HMIS), and birth registries; nationally representative surveys including demographic and health surveys (DHS) and reproductive health surveys (RHS); and subnational data sources including population-based studies (eg, from demographic surveillance sites or research studies), and facility-based data.

To identify routine national data, we searched the websites of the national statistical office and ministry of health of all countries. For countries where routine CRVS systems are less well developed (those outside the MDG Developed region), we identified additional sources of data for SBRs. These included compiling all DHS and RHS reports from the DHS programme website, and undertaking a systematic search of the published literature (appendix pp 5–7). Searches included terms relating to the following key concepts: “stillbirth”, “stillbirth timing”, “rate/prevalence”, and “low and middle income (LMIC) countries”. MESH headings were used where available. Because SBR data can be collected in other programme and study settings, but not reported via the above mechanisms, a Stillbirth Epidemiology Investigator Group was convened to identify further unpublished stillbirth rate data, with calls for data distributed via relevant groups and list serves, and investigators from individual studies

approached (appendix p 8). An effort was made to include HMIS data from the District Health Information Systems 2 platform, with emails sent to national contact persons.

WHO’s country consultation process was used to confirm, for every country, the validity of the data from that country included as inputs in the estimation process, and to ask for any additional data. Preliminary estimates were also circulated to WHO member states for review. New or updated country-year observations (282 from 25 countries) were added through the consultation process in July and August, 2015—mainly more recent data, or resubmitted data using the 28 week or more definition.

We assessed all reports that included more than 50 total births with a midpoint of data collection of 1990 or later and in which an SBR was given or could be calculated. Although we aimed to estimate SBRs using the 28 week or more definition, in the input database, we included SBR data using other definitions. Data reports from specialised services such as diabetes, hypertension, or growth restriction clinics or on specific subpopulations or ethnic groups were excluded as non-generalisable. We classified health facility data as likely to have minimum bias, where the facility covered more than 90% of births in the population. We excluded population-based prospective studies with rates of loss to follow-up of more than 20% of pregnant women. Similar to the approach taken for the previous stillbirth estimates, data from health facilities with potential for greater bias were included and identified using a dummy variable.¹

Premodelling adjustments

Before applying exclusion (implausibility) criteria and modelling, data inputs with a non-standard stillbirth

See Online for appendix

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