



## INDICATOR ANALYSIS

INFANT MORTALITY RATE (PROBABILITY OF DYING BETWEEN BIRTH AND  
AGE 1, EXPRESSED AS RATE PER 1000 LIVE BIRTHS)

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FOR THE LANCET-SIGHT COMMISSION ON PEACEFUL SOCIETIES THROUGH HEALTH AND GENDER EQUALITY

Indicator: Infant mortality rate (Probability of dying between birth and age 1, expressed as rate per 1000 live births)

Overview	<p>According to the WHO, the infant mortality rate is “the probability that a child born in a specific year or period will die before reaching the age of 1 year, if subject to age-specific mortality rates of that period, expressed as a rate per 1000 live births. The infant mortality rate is, strictly speaking, not a rate (i.e. the number of deaths divided by the number of population at risk during a certain period of time) but a probability” (1).</p> <p>Under the third Sustainable Development Goal to “Ensure healthy lives and promote well-being for all at all ages”, there is a sub-goal to “end preventable deaths of newborns and children under 5 years of age” (2). Infant mortality goes beyond neonatal mortality rates, which is the probability of an infant dying in the first 28 days of life. As of 2018, the global average was 11 infant deaths per 1,000 live births (3).</p>
How is the indicator calculated?	Number of children who died before their first birthday / Number of live births.

<b>GLOBAL TRENDS</b>	
What are the global patterns for this indicator?	<p>The total number of deaths among children and adolescents has dropped by 56% between 1990 and 2019 (4). Further “85 per cent of deaths among children and young adolescents in 2018 occurred in the first five years of life, accounting for 5.3 million deaths”, 1.5 million (29per cent) of which occurred at age 1–11 months (4).</p> <p>As of 2018, “121 countries had already achieved an under-five mortality rate below the Sustainable Development Goal (SDG) target of 25 or fewer deaths per 1,000 live births” and 74 countries had not (4). Sub-Saharan Africa accounts for more than half of under-five child deaths (4).</p> <p>Distinguishing infant mortality rates from under- five deaths is important, given that 75% of all under-five deaths in 2018 occurred within the first year of life (5) . Additionally, data has shown that reducing infant deaths in the first four weeks of life is more difficult than reducing the overall under-five mortality rates (6).</p>

<b>RELEVANCE TO UNDERSTANDING RELATIONSHIPS AMONG GENDER, HEALTH, FRAGILITY/PEACE</b>	
How could this indicator contribute to our understanding of how gender, health and fragility and peace influence one another?	<p>Infant mortality ratio is often used to help explain the impact and significance of birthing conditions, maternal healthcare, and infant care after birth. Malnutrition, malaria, and diarrhoea are major causes of infant deaths (8). A lack of access to healthcare often due to conflict contributes to infant deaths (8). This indicator is inherently gendered, as better care for women after birth translates to better care for their infants. Access to perinatal care can provide women with essential information on how to ensure the health and wellbeing of their infants. More specifically, the WHO has collected data on mother-child pairing and their access to maternal and child health services, disaggregated by wealth quintile (8). These data was collected using indicators of care such as number of visits to a health</p>

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	<p>centre, vaccinations, access to clean water, and the presence of a skilled birth attendant. The lowest wealth quintile had the lowest access to services. These indicators can all be compromised in impoverished or fragile settings. The infant mortality rate in 2018 in the WHO African Region (52 per 1000 live births) was over seven times higher than that in the WHO European Region (7 per 1000 live births) (5). Access to birth control for women can help to reduce infant mortality, as well as access to immunizations for babies. This reinforces the connection between infant deaths and access to health services (9). These statistics highlight how weaker health systems, lower access to health services for mothers, and other factors such as poverty and conflict can create significant geographic differences in rates of infant mortality.</p>
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<b>UTILITY</b>	
<p>What does the indicator measure?</p>	<p>Infant mortality measures the number of deaths per 1000 live births that occur before the age of one.</p>
<p>What does it NOT measure - what does it miss?</p>	<p>Infant mortality rates can vary among countries due to the way they collect data and their definitions of a live birth. The WHO has identified “a wide variation in how European countries define infant mortality, due to differences in birth and death registration practices”, which often leads to underreporting of infant mortality (7). As infant mortality rates have gone down since the initiation of the MDGs, accurate data collection has become even more important to understanding the variation in infant mortality rates between countries (7). Further, this indicator is not always disaggregated by cause of death, nor by the presence of a skilled birth attendant.</p>

<b>AVAILABILITY</b>
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<p>Sources for indicator (CRVS, DHS etc.);</p>	<p>Data are collected through civil registration and vital statistics system, censuses, specified research projects, and household surveys (1). If the data are collected using a registration system, it is annual. Otherwise, data on infant mortality are collected every 3-5 years (1).</p> <p>Indicator data are available from the following source:</p> <ol style="list-style-type: none"> <li>1. UNICEF's Data Warehouse (country level from 1970-2019): <a href="https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&amp;df=GLOBAL_DATAFLOW&amp;ver=1.0&amp;dq=.CME_MRY0..&amp;startPeriod=1970&amp;endPeriod=2019">https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&amp;df=GLOBAL_DATAFLOW&amp;ver=1.0&amp;dq=.CME_MRY0..&amp;startPeriod=1970&amp;endPeriod=2019</a></li> <li>2. WHO's Global Health Observatory (country level from 1950-2018) <a href="https://www.who.int/data/gho/data/indicators/indicator-details/GHO/infant-mortality-rate-(probability-of-dying-between-birth-and-age-1-per-1000-live-births)">https://www.who.int/data/gho/data/indicators/indicator-details/GHO/infant-mortality-rate-(probability-of-dying-between-birth-and-age-1-per-1000-live-births)</a></li> <li>3. World population prospects (country level and regional 1950-2020 in 5-year intervals): <a href="https://population.un.org/wpp/">https://population.un.org/wpp/</a></li> </ol>
<p>Most recent date available;</p>	<p>Data can be found on infant mortality rate as recently as 2018 from UNICEF for global statistics, but some countries have calculated their national average in 2019 as well (10).</p>
<p>Availability across geographic areas;</p>	<p>Yes. UNICEF has several reports that breakdown infant mortality regionally, at the country level, and over time (particularly from 1990-2018). Country-specific data has been made available because it is necessary to measure the progress of each country in meeting the SDG.</p>
<p>Availability in conflict affected settings;</p>	<p>Yes, available in most conflict affected settings. It should be noted that data collection is more difficult in fragile states, as is the implementation of health interventions. Countries without adequate data from civil registration have values imputed through modelling. These differences in data availability and in estimation methods can significantly expand the indicator's confidence interval. For example, in 2019 the indicator value and confidence interval for Senegal were IMR=29.0 [CI: 24.1, 34.8] while in South Sudan they were IMR=57.2 [CI: 25.7, 105.7] (10).</p> <p>Data are widely available for most conflict-affected settings on the GHO: Afghanistan (1962-2019); DRC (1969-2019); Libya (1959-2019); Somalia (1982-2019); South Sudan (1980-2019); Yemen (1962-2019). Data is also available in these countries from 1950-2020 from the World Population Prospects.</p>

<b>GRANULARITY</b>	
<i>Disaggregation at national level</i>	
Data disaggregated by sex;	No, these data are not made available for many countries, as it is more common to use an overall measure of infant mortality for cross-country comparisons.
Data disaggregated by identity group (race, ethnicity);	No. However, some developed countries like the United States have race-disaggregated data that shows that Native American and African American infants have a mortality rate two to three times higher that of Caucasian infants (11).
Data disaggregated by income	No.
Data disaggregated by citizenship	No.
Data disaggregated by migration background	No.
<i>Disaggregation at sub-national level</i>	
Data disaggregated by geographic region;	Yes (rural/urban). WHO data shows that infant mortality in rural areas was on average 8 deaths more per 1000 live births than in urban areas (9).
Data disaggregated by identity group (race, ethnicity);	No.
Data disaggregated by income.	No, but data on infant mortality is occasionally disaggregated into wealth quintiles.
Data disaggregated by age	N/A

<b>SOURCES OF BIAS</b>	
What bias can exist with these data?	Sources of bias could be associated with a differential risk of misreporting across settings and population groups.

<b>VALIDITY</b>	
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Clear and accepted international standards for indicator;	The standards and definition of infant mortality are not internationally agreed upon among countries, although institutions such as the WHO and UN use the established metric detailed above.
Validity of measurement of indicator generally accepted;	The literature indicates that this indicator is accepted as valid and is often used as a measure of population health. Further disaggregation of data would strengthen the interpretation of results for future health interventions, especially in conflict zones and countries that have seen a slow decrease in their infant mortality rates.

<b>RELIABILITY</b>	
Reliability of indicator generally accepted;	Yes. However, in countries that do not have fully fledged CRVS systems deaths and births may not be logged.

<b>COMPLEXITY</b>	
Enables analysis across time and location.	Yes, this indicator does enable for analysis across time and location as there is no geographic or time-related limitation explicitly identified within its definition.

<b>OTHER REFLECTIONS</b>	
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<p>Are indicator values imputed/modelled?</p>	<p>For UNICEF’s Data Warehouse and the WHO’s GHO:  The UN IGME derives infant mortality rates from the projection of under-five mortality rates converted into infant mortality rates using the Bayesian B-splines bias-adjusted model (12). This method is used for all values to ensure consistency across estimates and can be described as a curve fitting method which extrapolates estimates based on data availability. Estimates are based on underlying data and are not derived from covariates (13).  <i>Uncertainty bounds are included with modelled estimates and should be considered during analysis.</i></p> <p>Details regarding the Bayesian B-splines bias-adjusted model and its validation applied to estimate the Under-five mortality rate are provided by L. Alkema (2015) (14).</p> <p>For the World Population Prospects estimates:  The United Nations World Population Prospects include modelled and extrapolated values and offer a description of country specific methods and data sources used to derive estimates in their metadata documentation (15).  <i>Uncertainty bounds are not provided with estimates. As such, the United Nations World Population Prospects' metadata documentation (15) should be consulted to see methods and data used to derive country specific estimates prior to analysis. Caution should be exercised when utilizing model derived values based on limited data.</i></p> <p><i>Note: In the metadata documentation, indirect estimation refers to "any estimation method that depends upon models or uses consistency checks, or indeed uses conventional data in an unconventional way" (16).</i></p>
<p>Other reflections and debates</p>	<p>Greater research should be done on infant mortality, citizenship status and the role of migration status of the mother/family. Due to the recent increase of refugees, forced migrants, and climate refugees, it is essential to examine the ways in which infant mortality can be reduced in these types of fragile situations.</p>

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