DATA RESOURCE PROFILE

Data Resource Profile: United Nations Children's Fund (UNICEF)

Colleen Murray* and Holly Newby

Division of Policy and Strategy/Statistics and Monitoring Section, United Nations Children's Fund, New York, NY, USA

*Corresponding author. UNICEF House, 3 United Nations Plaza, New York, NY 10017, USA. E-mail: cmurray@unicef.org

The United Nations Children's Fund (UNICEF) plays a leading role in the collection, compilation, analysis and dissemination of data to inform sound policies, legislation and programmes for promoting children's rights and well-being, and for global monitoring of progress towards the Millennium Development Goals. UNICEF maintains a set of global databases representing nearly 200 countries and covering the areas of child mortality, child health, maternal health, nutrition, immunization, water and sanitation, HIV/AIDS, education and child protection. These databases consist of internationally comparable and statistically sound data, and are updated annually through a process that draws on a wealth of data provided by UNICEF's wide network of >150 field offices. The databases are composed primarily of estimates from household surveys, with data from censuses, administrative records, vital registration systems and statistical models contributing to some key indicators as well. The data are assessed for quality based on a set of objective criteria to ensure that only the most reliable nationally representative information is included. For most indicators, data are available at the global, regional and national levels, plus sub-national disaggregation by sex, urban/rural residence and household wealth. The global databases are featured in UNICEF's flagship publications, inter-agency reports, including the Secretary General's *Millennium Development Goals Report* and *Countdown to 2015*, sector-specific reports and statistical country profiles. They are also publicly available on www.childinfo.org, together with trend data and equity analyses.

Keywords   United Nations Children's Fund, statistics, data collection, information dissemination, child welfare

Data resource basics

The United Nations Children's Fund (UNICEF) plays a leading role in the collection, compilation, analysis and dissemination of data to inform sound policies, legislation, and programmes for promoting children's rights and wellbeing, and for global monitoring of progress towards international goals and targets. To this end, UNICEF maintains a set of global databases on key topics affecting children and women covering nearly 200 countries (Table 1).

Table 1 Summary of UNICEF global databases

Countries covered	197 countries and territories in the following regions: • Eastern and Southern Africa • West and Central Africa • Middle East and North Africa • South Asia • East Asia and Pacific • Latin America and Caribbean • Central and Eastern Europe and Central Independent States • Industrialized countries
Population covered	Indicators cover a wide range of demographic groups, including primarily: • Newborns • Infants • Children under five • School-age children • Adolescents and young adults • Women of reproductive age
Data type	Global databases compiled from a broad array of sources: • Nationally representative household surveys • Censuses • Vital registration systems • Administrative records • Reports from national ministries of health/education • Estimates calculated by UN inter-agency groups • Estimates provided by other UN agencies
Frequency of data compilation	The databases are regularly updated, with a comprehensive update once per year. For the main source of data, nationally representative household surveys, we expect that many countries will have new data available every 3–5 years
Topics	• Child survival • Child health • Maternal health • Nutrition • Immunization • Water and sanitation • HIV/AIDS • Education • Child protection • Adolescents • Early childhood development
Funding sources	UNICEF is supported entirely by the voluntary contributions of individuals, foundations, corporations, non-governmental organizations and governments

Data resource area and population coverage

The UNICEF global databases cover 197 countries across the developing and industrialized world. The countries in developing regions are grouped geographically as follows: Eastern and Southern Africa, West and Central Africa, Middle East and North Africa, South Asia, East Asia and Pacific, Latin America and Caribbean, and Central and Eastern Europe and Central Independent States. Data availability varies both across countries and across indicators, but for most indicators used for global monitoring, our databases include estimates for countries covering at least 80% of the developing world. For the standard indicators included in major household surveys, there are updates from about 15–25 countries each year.

Beyond household survey data, administrative data are also included in the global databases, especially in the areas of education and maternal health. These data can often fill in the gaps in countries that do not have data from household surveys, particularly industrialized countries.

The inter-agency estimates of child mortality, maternal mortality, immunization and water and sanitation generally cover all countries in both the developing and industrialized world, and are interpolated to a common reference year either annually or every few years.

Frequency of database updates

Keeping the global databases up to date is an on-going process in UNICEF's Statistics and Monitoring Section, which is punctuated by a concentrated effort once a year. Each spring, UNICEF undertakes an exercise called Country Reporting on Indicators for the Goals (CRING) in which field offices are asked to review the

existing data for a selection of 80 indicators and provide any updates for their country. Updates received by the CRING deadline can be reviewed for inclusion in the databases before the statistical tables are finalized for the next edition of UNICEF's annual flagship publication, *The State of the World's Children*, although new data submissions can be considered at any point throughout the year. In 2012, 152 country offices were invited to participate in CRING, and of those, 142 contributed to the exercise.

Although UNICEF asks field offices to review the data every year, we expect that for most countries, there will not be annual updates for many of the key indicators. A large share of the data in our databases comes from nationally representative household surveys such as the UNICEF-supported Multiple Indicator Cluster Survey (MICS) and the United States Agency for International Development-supported Demographic and Health Survey, which have a periodicity of 3–5 years. However, other household surveys focusing on a specific sector such as nutrition, malaria, reproductive health or HIV/AIDS may be available in the interim, and administrative and vital registration data may be available yearly.

Beyond the CRING exercise, UNICEF also updates the global databases with inter-agency estimates and data provided by other UN agencies. For example, inter-agency estimates of under-five mortality and immunization coverage are produced every year, and harmonized demographic estimates are provided by the UN Department of Economic and Social Affairs (UNDESA) Population Division every 2 years.

Measures (data compilation and quality assurance)

UNICEF leads the global MICS household survey programme, which supports countries to collect data on a wide range of indicators. Experience with the implementation of these surveys, and their analysis, is invaluable in evaluating measurement methods and assessing the data quality of submissions to the global database.

The greatest share of data compilation occurs during the CRING process each year. This exercise relies on the wide network of UNICEF field offices, which each draw on their knowledge of local data collection efforts to contribute the latest available data to headquarters. Data submissions undergo a rigorous data quality assurance process, whereby each data point is evaluated using a set of objective criteria before it is entered in the database. Sector specialists review source documentation for details, including sampling method, indicator definitions and the precise wording used in questionnaires. They also check for plausibility of trends and relationships with related indicators. This review includes consultations with the country and regional offices, colleagues from other UN

agencies and academic partners. Programme specialists within UNICEF often participate in the review as well by providing context to interpret the data.

Data compilation for industrialized countries differs from the CRING process because there are not field offices to contribute to CRING. For these countries, sector specialists need to seek out data from alternative sources, including administrative records, vital registration and censuses.

UNICEF also participates in a number of UN inter-agency Millennium Development Goal (MDG) monitoring groups, which contribute estimates to the global databases across a number of sectors. One purpose of these groups is to harmonize estimates across agencies, especially for use in monitoring progress towards the goals. Although each inter-agency group has a slightly different methodology, the basic procedure is to collect underlying data, make adjustments if necessary (e.g. for definitional differences, under-reporting and misclassification) and use statistical modelling to generate estimates for all countries for a common reference year.

Finally, the data for some indicators in the global databases are provided by partner UN agencies. This cooperation prevents a duplication of efforts in cases in which another agency already has the expertise and capacity to produce the estimates needed. UNAIDS provides databases with estimates of HIV incidence and prevalence, as well as some indicators related to treatment. For education, the United Nations Educational, Scientific and Cultural Organization Institute for Statistics provides databases based on administrative data, including enrolment, survival through primary school, transition to secondary school and youth literacy.

Below is an overview of the indicators included in UNICEF's global databases, sorted by compilation method and by sector (Tables 2 and 3).

The indicators named in Tables 2 and 3 are not meant to represent an exhaustive list, rather an overview of key indicators used for analysis and reporting.

Data resource use

The UNICEF global databases are used extensively for monitoring the situation of children and women at both national and global levels. The data are used in situation analyses at the country level to track progress towards development targets and identify potential areas for intervention. Monitoring trends is also done at the global level, and UNICEF's data are heavily relied on in trend analysis, including MDG monitoring,[1] and the 'Countdown to 2015'[2] initiative. In tracking MDG 4 (reduce child mortality), UNICEF leads the UN Inter-agency Group for Child Mortality Estimation (IGME), which reported that the annual number of under-five deaths dropped from 12 million in 1990 to 6.9 million in 2011. Although the average annual rate of reduction has accelerated (from

Table 2 Overview of indicators: data from primary sources included directly in database

For the following indicators, estimates from surveys, administrative sources, vital registration or censuses are identified and included directly in the database:	
Child health	• Household ownership of insecticide-treated nets • Under-fives sleeping under insecticide-treated nets • Anti-malarial treatment of fever • Care seeking for suspected pneumonia • Antibiotic treatment of suspected pneumonia • Treatment with oral rehydration solution for diarrhoea • Treatment with oral rehydration therapy or increased fluids and continued feeding for diarrhoea
Maternal health	• Contraceptive prevalence rate • Antenatal care (1+ visits and 4+ visits) • Skilled attendance at birth • Institutional deliveries • Caesarean section rate • Births by age 18 years • Intermittent preventive treatment during pregnancy (malaria)
Nutrition	• Anthropometry (underweight, stunting, wasting and overweight) • Low birthweight • Early initiation of breastfeeding • Exclusive breastfeeding • Introduction to solid, semi-solid or soft foods • Continued breastfeeding (12–15 months and 20–23 months) • Households consuming iodized salt
Education	• Primary net attendance ratio • Survival to last grade of primary school • Youth literacy rate • Secondary net attendance ratio
HIV/AIDS	• Comprehensive knowledge of HIV • Sex before age 15 years • Sex with multiple partners • Condom use at last sex among those with multiple partners • Condom use at last higher-risk sex • Orphan school attendance ratio
Child protection	• Birth registration • Child labour • Child marriage • Female genital mutilation/cutting • Child disability • Child discipline • Domestic violence • Attitudes towards domestic violence
Early childhood development	• Attendance in early childhood education • Adult support for learning • Father's support for learning • Learning materials at home (books and playthings) • Children left in inadequate care

1.8% a year from 1990–2000 to 3.2% a year from 2000–2011), the progress is insufficient to meet the MDG target of reducing the under-five mortality rate by two-thirds by 2015.[3,4]

UNICEF's databases are also frequently used as the basis for data-driven policy advocacy reports, like the recently published *Pneumonia and Diarrhoea: Tackling the Deadliest Diseases for the World's Poorest Children*.[5] The report featured extensive data analysis on these leading causes of child deaths, including trends in intervention coverage and disparity analysis by residence, household wealth and sex. A key finding was

that prevention and treatment of these illnesses remain low, particularly among children in rural areas and from poorer households. For example, in sub-Saharan Africa and South Asia—the two regions with the most diarrhoea deaths—children with diarrhoea are unlikely to receive solutions made from oral rehydration salts (ORS) (coverage of 30 and 33%, respectively); the children in the poorest households in the poorest countries are much less likely to receive ORS than children in the richest households. This report made the case that preventable child deaths from pneumonia and diarrhoea are concentrated

Table 3 Overview of indicators: estimates from statistical modelling exercises included in databases

For the following indicators, primary data sources are identified and used in statistical modelling exercises by inter-agency estimation groups:

Child survival (IGME)	• Under-five mortality rate • Infant mortality rate • Neonatal mortality rate
Water and sanitation (Joint Monitoring Programme for Water Supply and Sanitation)	• Use of improved drinking water sources • Use of improved sanitation facilities
Immunization (WHO and UNICEF Estimates of National Immunization Coverage)	• Tuberculosis • Diphtheria, pertussis and tetanus • Polio • Measles • Hepatitis B • *Haemophilus influenzae* type b • Tetanus
Maternal health (Maternal Mortality Estimation Inter-agency Group)	• Maternal mortality ratio • Lifetime risk of maternal death

among the most disadvantaged children, and that many lives could be saved with an equity-focused approach.

Analyses based on the global databases are also often featured in peer-reviewed journal articles. In the area of child protection, the UNICEF database on child discipline was drawn on for an analysis published in *Child Abuse and Neglect*[6] focusing on caregivers' attitudes towards physical punishment. The analysis of household survey data from 34 countries found that although the majority of caregivers did not think physical punishment was necessary to raise a child, acceptance of physical punishment was common in many countries, and was often associated with background characteristics including rural residence and less household wealth. Across most countries, attitudes were correlated with practices: children whose primary caregivers had accepting attitudes towards physical punishment were more likely to experience such discipline.

Some recent publications have focused on health issues affecting the world's 1.2 billion adolescents,[7,8,9] which is an area garnering increasing attention and data collection efforts. Analysis of the UNICEF databases revealed that child marriage (before age 18 years) is common in South Asia and sub-Saharan Africa, with the highest worldwide rate found in Niger, where three of four young women were married before age 18 years. Rates of early childbearing tend to be higher in these countries where early marriage is common. Further, adolescents—particularly adolescent girls—in HIV-endemic countries are not likely to have a comprehensive knowledge of HIV transmission and are unlikely to use condoms, putting their reproductive health at risk.

Strengths and weaknesses

UNICEF's global databases include nationally representative data on a broad selection of indicators related to the well-being of children and women. Disaggregated data are available by sex, residence and wealth quintile, allowing for easy disparity analysis. The indicators are standardized and aligned with MDG goals and targets; therefore, trend analysis can be relied on as an indication of progress towards these internationally agreed-on goals.

Although coverage is improving, there are still some gaps in the databases. Not all countries collect the data used for global monitoring, and in some cases, submissions cannot be included, e.g. if the indicator definitions are not aligned with the standard, or if the survey sample is not nationally representative. There are also, increasingly, demands for sub-national data analysis. Although UNICEF's databases include disaggregation by sex, residence and wealth quintile, geographical sub-regions for each country are not yet part of the databases. Data coverage for high-income countries also tends to be less complete for many indicators, especially those for which standardized household survey data are the primary source.

The compilation of the global databases draws on the strength of UNICEF's wide network of field offices, where those closest to the local situation can provide context and keep informed about data collection efforts. At headquarters, the Statistics and Monitoring Section also benefits from the vast knowledge of household survey methodology among the staff in the MICS survey programme. This expertise is invaluable in assessing data quality of submissions from around the world.

Data resource access

The UNICEF global databases are publicly available through a number of outlets. The UNICEF statistical website, www.childinfo.org, serves as a repository of data and additional resources. On Childinfo, users can view country-, regional- and global-level data in
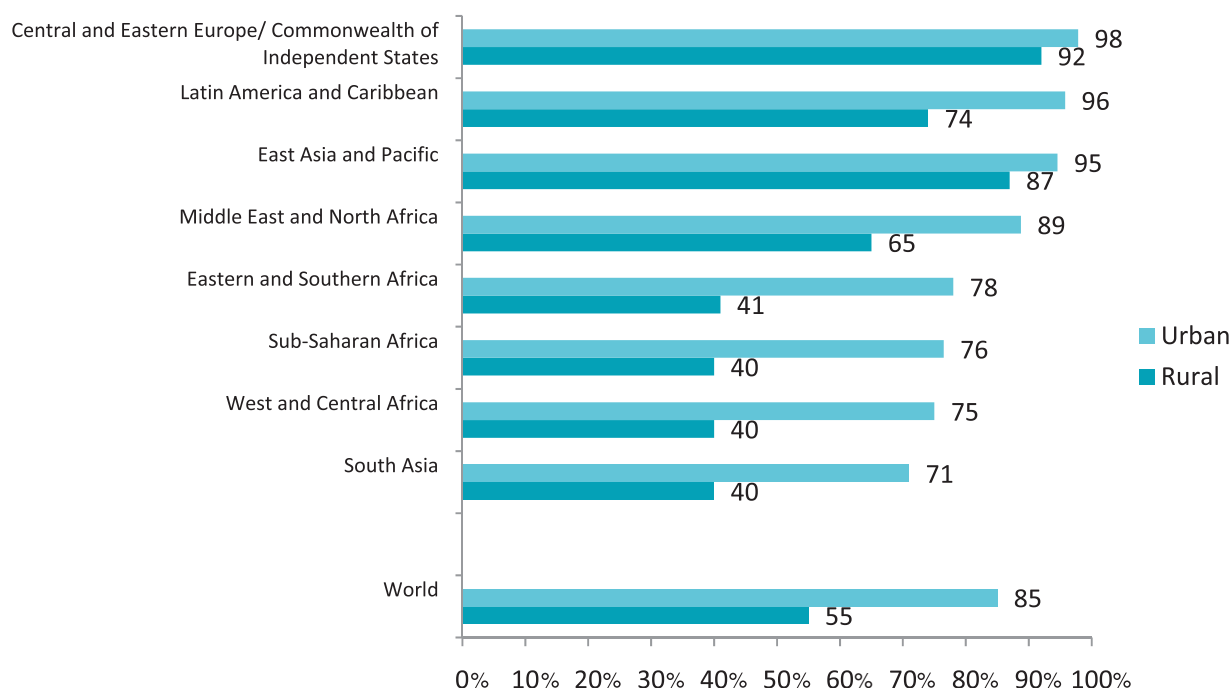
Figure 1 Women who live in urban areas are more likely than women in rural areas to be assisted during delivery by a skilled birth attendant. *Source*: UNICEF global databases 2011, from Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS), and other nationally representative sources. *Note*: Global estimates are based on a subset of 96 countries, covering 80% of births in the world. Regional estimates represent data from countries covering at least 50% of regional births
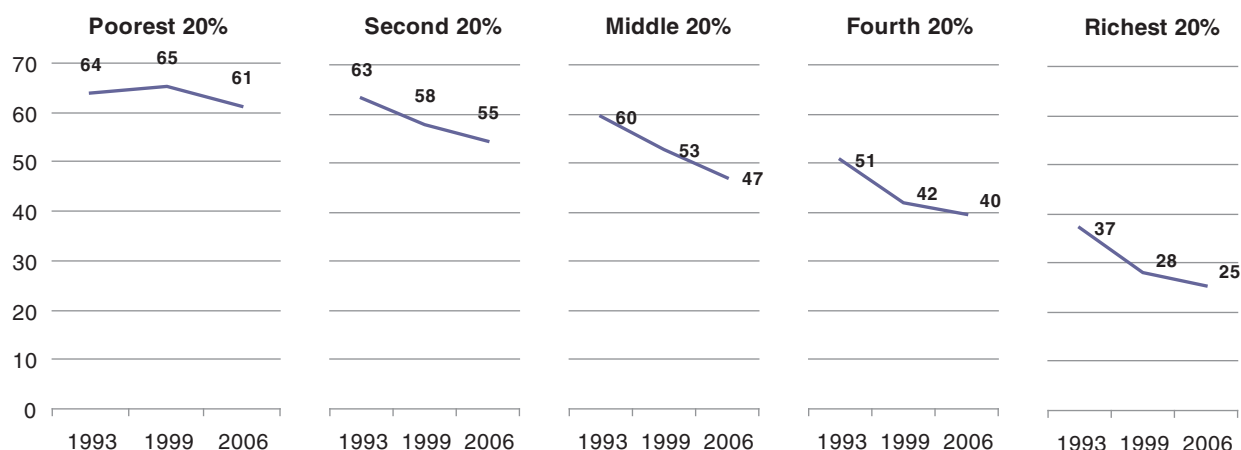

Figure 2 In India, a greater reduction in underweight prevalence occurred in the richest 20% of households than in the poorest 20%. *Source*: National Family Health Surveys, 1992–1993, 1998–1999 and 2005–2006. *Note*: Prevalence estimates are calculated according to the National Center for Health Statistics reference population, as there were insufficient data to calculate trend estimates by household wealth according to World Health Organization Child Growth Standards. Estimates are age-adjusted to represent children 0–59 months in each survey

statistical tables either directly on the web page or by downloading the tables in an Excel file. Trend and disparity data are available for most indicators.

Figures 1 and 2 show sample data resources available on www.childinfo.org.

The website provides a number of additional resources, including methodological information, as well as links to download data-driven publications and statistical country profiles. It also includes links to all of the online resources powered by

DevInfo, a database management system that facilitates the organization, storage and display of data. These include CMEInfo (child mortality) and MMEInfo (maternal mortality), which are tools for the dissemination of the UN inter-agency estimates of child and maternal mortality.

UNICEF data are also available in a number of publications, the most comprehensive of which is *The State of the World's Children*, which includes a set of data-rich statistical tables. This annual compendium presents the most recent key statistics on children for the world's countries, territories and regions. The number of topics covered has grown over the years, and as of 2012, there were 13 tables, each covering key indicators related to a different theme: basic indicators, nutrition, health, HIV/AIDS, education, demographics, economic indicators, women, child protection, rate of progress, adolescents and equity by both residence and wealth. The tables provide some disaggregated data by sex, residence and wealth quintile, as well as selected trends. Each table is accompanied by indicator definitions and main data sources, and there is an extensive section of data notes with methodological information and guidance on data interpretation.

The full report, including statistical tables of *The State of the World's Children*, is available for download at http://www.unicef.org/sowc2012/. The tables are also available individually in both pdf and Excel formats. Further, the website includes a link to SOWCInfo, which is a DevInfo application featuring the data from the publication. With SOWCInfo (www. devinfo.info/sowc), users can create tables, graphs and maps using selected data from the statistical tables.

Acknowledgements

KEY MESSAGES

- Analyses based on UNICEF's databases provide important insights into the well-being of children and women. Key findings from recent reports include the following:
  - The UN IGME reported that the annual number of under-five deaths dropped from 12 million in 1990 to 6.9 million in 2011. Although the average annual rate of reduction has accelerated, progress is insufficient to meet the MDG target by 2015.
  - A UNICEF analysis of data on pneumonia and diarrhoea concluded that prevention and treatment of these illnesses, which are two of the leading causes of under-five deaths, remain low, particularly among children in rural areas and from poorer households.
  - Recent UNICEF publications, including *The State of the World's Children*, have highlighted data that make the case for investing in adolescents, who now number 1.2 billion worldwide. Among the most marginalized are the adolescent girls who are married or in union, which jeopardizes their chances of completing school and puts them at risk for early childbearing, domestic violence and exposure to HIV.

References

[1] United Nations Secretariat, Department of Economic and Social Affairs, Inter-agency and Expert Group on MDG Indicators (IAEG). *The Millennium Development Goals Report* 2012.

[2] Countdown to 2015. *Building a Future for Women and Children: The 2012 Report* 2012.

[3] UN Inter-agency Group for Child Mortality Estimation (IGME). *Levels and Trends in Child Mortality* 2012.

[4] UNICEF. *Committing to Child Survival: A Promise Renewed* 2012.

[5] UNICEF. *Pneumonia and Diarrhoea: Tackling the Deadliest Diseases for the World's Poorest Children* 2012.

[6] Cappa C, Khan SM. Understanding caregivers' attitudes towards physical punishment of children: evidence from 34 low- and middle-income countries. *Child Abuse Negl* 2011;**35**:1009–21.

[7] Patton GC, Coffey C, Cappa C *et al*. Health of the world's adolescents: a synthesis of internationally comparable data. *Lancet* 2012;**379**:1665–75.

[8] UNICEF. *The State of the World's Children: Adolescence, an Age of Opportunity* 2011.

[9] UNICEF. *Progress for Children: A Report Card on Adolescents* 2012.