International Journal of Epidemiology, 2017, 4–7
doi: 10.1093/ije/dyx010
Advance Access Publication Date: 15 February 2017
Editorial

Editorial

Why population-based data are crucial to achieving the Sustainable Development Goals

Osman Sankoh[1,2,3]* on behalf of the INDEPTH Network and partners[¥]

[1]INDEPTH Network, Accra, Ghana, [2]School of Public Health, University of Witwatersrand, Johannesburg, South Africa and [3]Department of Mathematics and Statistics, Njala University, Njala, Sierra Leone

*Corresponding author. Department of Mathematics and Statistics, Njala University, Njala, Sierra Leone. E-mail: osman.sankoh@indepth-network.org

[¥]A full list of representatives from INDEPTH Network member centres and partner institutions is available in the supplementary file at *IJE* online.

Accepted 8 January 2017

In September 2015, the member countries of the United Nations signed up to 17 Sustainable Development Goals (SDGs). The goals contain a total of 169 specific targets which governments have committed to meeting by 2030. With their aim of eliminating poverty, protecting the planet and ensuring prosperity for all, the SDGs lay out the agenda for international development over the next 15 years.[1]

Reliable data are crucial to the achievement of the goals. Without data, it will be difficult not only to know whether the world is on track to achieve its targets, but also to design, implement and fine-tune the policies and programmes that will be needed. Data generation in the low- and middle-income countries (LMICs) that are the primary focus of the goals has been notoriously uneven.[2,3] Many poorer countries lack the requisite human and financial resources to gather robust and accurate data. Others lack the will, failing to realise the benefits of evidence-based policy making. In others, data (for example, census or poverty data) are manipulated for political purposes. Many international donors have also neglected data collection. They often rely instead on estimates; but although the latter are interesting at a global level, empirical data are required at country level and for tracking subnational trends.

A notable exception to this general rule are the empirical data collected in 20 LMICs by the 49 health and demographic surveillance systems (HDSSs) that make up the International Network for the Demographic Evaluation of Populations and Their Health. (INDEPTH) Network [www.indepth-network.org]. These HDSSs have amassed a vast array of longitudinal health, socioeconomic and demographic data on hard-to-reach rural and urban communities, covering periods of many years. The HDSS sites monitor births and deaths; observe population changes through fertility rates, mortality rates and migration; track changes in household wealth; and trace the evolution of health threats and other social determinants of health. Bringing together the cream of international health and demography scientists from LMICs and high-income countries, HDSS researchers also conduct studies in their communities to assess the impact of health systems, policies and interventions. A fuller description of the HDSS platform, its data quality and standardization processes, what's being measured and how the databases are constructed, has been provided.[2–4]

The HDSS sites in the INDEPTH Network currently observe the life events of over 3.8 million individuals in Africa, Asia and Oceania. Their data, which are made publicly available through the INDEPTH open data platform,[5] are collected through regular visits to every household in a geographically defined area. They will be important for assessing progress towards several of the SDGs, and in

particular the third goal—to 'ensure healthy lives and promote well-being for all at all ages'. This goal contains nine targets, and INDEPTH and its members already produce robust, detailed data on each of them. Here, we briefly present INDEPTH's work on each of these nine targets.

The first two targets aim to reduce the global maternal mortality ratio and to end preventable deaths of newborns and children under 5 years of age. All INDEPTH member centres track pregnancies, newborn births and deaths, and infant and child morbidity and mortality on a longitudinal basis. Many sites have already begun to measure progress towards the SDGs and publish the data collected. Chakaria HDSS in Bangladesh, for example, found a neonatal mortality rate in its surveillance area—a rural community in Bangladesh—of 34.1 per 1000 live births in 2015; higher than both the national rate of 28 and the 2014 rate of 31.5 per 1000. It found that infant mortality was 44.4 per 1000 live births, compared with a national rate of 38, and that under-5 mortality was 58.9 per 1000 (the national rate was 46 per 1000). The centre also tracks the proportion of births that take place in health facilities (23.4% in 2015) and that are assisted by a skilled birth attendant (35.3%).[6]

A number of centres have also tested health interventions in these areas, such as vitamin A supplementation[7] and micronutrient supplementation for anaemia.[8] Moreover, INDEPTH's Working Group on Maternal, Newborn and Child Health brings together scientists from across the network to study maternal, newborn, infant and child health epidemiology and the impact on it of health interventions. The group is already part of the Every Newborn Action Plan (ENAP), working with other groups to validate the SDG indicators related to mothers and newborns.[9]

The third health target is to end the epidemics of AIDS, tuberculosis, malaria and other neglected tropical diseases and to combat other communicable diseases. INDEPTH members in Africa and Asia have conducted hundreds of studies of morbidity and mortality from communicable diseases and have tested a wide range of interventions to control them. The Africa Health Research Institute in South Africa showed how antiretroviral therapy for HIV/AIDS increased adult life expectancy by 11.3 years in a rural South African community, and that the benefits far outweighed the costs of providing treatment.[10] Several INDEPTH sites contribute to the Analysis Longitudinal Population-based HIV/AIDS data on Africa (ALPHA) network, which contributes detailed statistical estimates of HIV incidence, mortality patterns and fertility impacts to the UNAIDS Reference Group on Estimates, Modelling and Projections. This reference group oversees the data and methods used for producing HIV epidemic updates and projections in African countries. A study examining the rate of infection with *Mycobacterium tuberculosis* in children under 5 years of age in the Karonga DHSS showed that the majority of infected children had acquired the infection through casual contact or undiagnosed cases.[11] A study by the Navrongo HDSS in Ghana, which found that bed nets soaked in permethrine reduced child deaths by 17%, led to the adoption of bed net provision in health policies across Africa.[12] The Manhiça HDSS site in Mozambique developed a nationwide malaria risk map for the National Malaria Control Programme, and conducted drug trials which persuaded the national government to replace chloroquine with amodiaquine and sulphadoxine-pyrimethamine as its principal malaria treatment.[13] The oral cholera vaccine tested by Matlab HDSS in Bangladesh, meanwhile, is now recommended by the World Health Organization.[14]

The fourth target is to reduce premature mortality from non-communicable diseases (NCDs) and to promote mental health. INDEPTH member centres' verbal autopsy data track mortality from NCDs and other diseases. For example, a multisite study of more than 80 000 deaths over 15 years in African and Asian demographic surveillance areas found that NCDs accounted for 36% of deaths.[15] The Network's working group on Adult Health and Aging monitors the evolution of NCDs and their risk factors at HDSS sites in South Africa, Tanzania and Ghana, as Africa goes through the health transition. INDEPTH member centres in five countries collaborated on the largest study to date of epilepsy in Africa, which found significantly higher rates of epilepsy among adults who had suffered parasitic diseases and among those who as infants had complications during birth.[16] To examine the rise in obesity and associated NCDs in Africa, INDEPTH has embarked on a study to identify genomic and environmental contributions to cardiometabolic diseases in Africans.[17] This six-site population cross-sectional study in Burkina Faso, Ghana, Kenya and South Africa, including about 12 000 adults mainly between the ages of 40 and 60 years, will provide baseline data on the prevalence of obesity, hypertension, diabetes, chronic kidney diseases and risk factors for NCDs. The participants will be tracked for mortality and progression to NCD status.

Data on targets five and six—preventing and treating substance abuse, and halving deaths and injuries from road traffic accidents—are hard to come by in many LMICs. INDEPTH sites' verbal autopsy data, which monitor morbidity and mortality from road traffic accidents and diseases caused by substance abuse, are a rare and important exception, and are helping to improve burden of disease data across Africa and Asia.[18] In addition, INDEPTH is developing a 5-year research project on adolescent health, including intervention studies assessing how to reduce

addictive behaviours through marketing campaigns, conditional cash transfers and training of health workers.

The seventh target—ensuring universal access to sexual and reproductive health care services—has been a focus of HDSS sites for decades. INDEPTH is an LMIC institutional partner on the Population Council's EVIDENCE project, which seeks to use evidence strategically to expand access to family planning and reproductive health services worldwide. INDEPTH's working group on Fertility and Family Planning is leveraging existing fertility data from HDSSs to produce a set of comparative studies across the network. It also plans to use longitudinal demographic data to understand and quantify the fertility transition in the poorest countries, and to conduct impact evaluations to discover which policies and interventions are most effective.

Finally, the eighth target aims to achieve universal health coverage (UHC) and access to quality services, medicines and vaccines, and the ninth aims to reduce mortality and morbidity from environmental pollution and contamination. INDEPTH and its members collect data and test interventions in both areas. For example, an INDEPTH project on UHC developed a tool for use by HDSSs to capture information on need, access to health care and usage patterns of health care at the district level. The INDEPTH Effectiveness and Safety Studies of Antimalarials in Africa have brought together African researchers to conduct effectiveness studies of three antimalarial drugs among 30 000 individuals, producing the largest available database on antimalarial drug impact. Over the next 5 years, INDEPTH, using its new Comprehensive Health and Epidemiological Surveillance System (CHESS),[19] will take a leading role in safety surveillance of medicines, vaccines, biological products and other medical interventions in LMICs. With regard to environmental pollution, INDEPTH's working group on Environment and Health is using longitudinal data from multiple HDSS sites to monitor the impacts of environmental changes on health and migration, as well as testing interventions to strengthen climate change mitigation and adaptation in sub-Saharan Africa.

The INDEPTH platform, which is often the only source of community-level health data in the countries where its members operate, is therefore uniquely placed to assist LMICs to track progress against and hasten the achievement of the SDGs. HDSS sites' longitudinal tracking of births, migrations, deaths and morbidities, as well as studies to test interventions, are important to the SDGs relating to areas such as eliminating poverty, ending hunger and promoting gender equality, and they are vital to the health SDG.

INDEPTH is working to strengthen its contribution to measuring and achieving the SDGs. Like other organizations, such as UNICEF and DHS, the Network plans to map each SDG to develop and publish baseline metrics so that progress across its current 20 LMICs can be assessed. It will publish regular updates of progress towards the health and other SDGs, and work with local and national officials to integrate the data to improve their own monitoring efforts, and to use them to design effective, evidence-based policies and programmes. Most countries that host INDEPTH HDSS sites lack civil registration and vital statistics (CRVS) systems, for example. Where such systems are in place, they register only a small proportion of births and deaths. As major international donors have become interested in CRVS, INDEPTH has developed links with health systems to improve their collection of such data, both assisting with capacity strengthening and making its own data available as a comparative tool for monitoring CRVS effectiveness.

Finally, the last of the relevant SDGs pledges is to promote capacity development for implementing the goals and to 'increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts'. Through its own longstanding programmes to build the capacity of LMIC health, biomedical and demographic researchers, INDEPTH has helped create several generations of demographic and epidemiological expertise that will be of central importance for attaining, as well as monitoring, the SDGs.

In conclusion, population-based data are crucial for assessing progress towards the SDGs. Without these data, it will be difficult to hold to account the governments that signed up to the goals, and to help governments identify areas where more concerted action is needed. INDEPTH member HDSS sites are often the only source of community-level health and demographic data in the countries where they operate, and greater support for organizations that produce such data in challenging settings is vital if databases are to be improved, uncertainty reduced and achievement of the SDGs moved from pledge to reality.

Supplementary Data

Supplementary data are available at IJE online.

Funding

O.S., M.K., S.U. and M.W. are funded through core support grants from Hewlett Foundation, Sida/Research Cooperation and Wellcome Trust.

References

1. United Nations. Sustainable Development Goals. 2016. http://www.un.org/sustainabledevelopment/sustainable-development-goals/# (1 December 2016, date last accessed).

2. Bangha M, Diagne A, Bawah A, Sankoh O. Monitoring the Millennium Development Goals: the potential role of the INDEPTH Network. *Glob Health Action* 2010;**3:**5517
3. Sankoh O. Global health estimates: stronger collaboration needed with low- and middle-income countries. *PLoS Med* 2010;**7:**e1001005.
4. Sankoh O, Byass P. INDEPTH Network: filling vital gaps in global epidemiology. *Int J Epidemiol* 2012;**41:**579-88
5. Sankoh O, Herbst AJ, Juvekar S, Tollman S, Byass P, Tanner M. INDEPTH launches a data repository and INDEPTHStats. *Lancet Glob Health* 2013;**1:**e69.
6. Hanifi SMA, Sultana A, Mia MN *et al*. *Chakaria Health and Demographic Surveillance System Report – 2015: Focusing on the Sustainable Development Goals*. Scientific Report No. 134. Dhaka: Health Systems and Population Studies Division, ICDDR, B, 2016.
7. Ghana Vitamin A Supplementation Trials (VAST) Study Team. Vitamin A supplementation in northern Ghana: effects on clinical attendance, hospital admissions, and child mortality. *Lancet* 1993;**342**:7-12.
8. Hirve S, Bhave S, Bavdekar A *et al*. Low dose 'Sprinkles' – an innovative approach to treat iron deficiency anemia in infants and young children. *Indian Pediatr* 2013;**44:**91-100.
9. Lawn JE, Blencowe H, Waiswa P *et al*. Stillbirths: Rates, risk factors, and acceleration towards 2030. *Lancet* 2016;**387:**587-603.
10. Bor J, Herbst AJ, Newell ML, Bärnighausen T. Increases in adult life expectancy in rural South Africa: valuing the scale-up of HIV treatment. *Science* 2013;**339:**961-65.
11. Khan PK, Glynn JR, Fielding K *et al*. Risk factors for Mycobacterium tuberculosis infection in 2 to 4 year olds in a rural HIV-prevalent setting. *Int J Tuberc Lung Dis* 2016;**20:**342-49.
12. Binka FN, Adazu FK, Adjuik M *et al*. Impact of permethrin-impregnated bed nets on child mortality in the Kasena Nankana district, Ghana: a randomized controlled trial. *Trop Med Int Health* 1996;**1:**147-54.
13. Abacassamo F, Enosse S, Aponte JJ *et al*. Efficacy of chloroquine, amodiaquine, sulphadoxine-pyrimethamine and combination therapy with artesunate in Mozambican children with non-complicated malaria. *Trop Med Int Health* 2004;**9:**200-08.
14. Clemens JD, Sack DA, Harris JR *et al*. Field trial of oral cholera vaccines in Bangladesh: results from three-year follow-up. *Lancet* 1990;**335:**270-73.
15. Streatfield PK, Khan WA, Bhuiya A *et al*. Adult non-communicable disease mortality in Africa and Asia: evidence from INDEPTH Health and Demographic Surveillance System sites. *Glob Health Action* 2014;**7:**25365.
16. Ngugi A, Bottomley C, Kleinschmidt I *et al*. Prevalence of active convulsive epilepsy in sub-Saharan Africa and associated risk factors: cross-sectional and case–control studies. *Lancet Neurol.* 2013;**12:**253–63.
17. Ramsay M, Crowther N, Tambo E *et al*: H3Africa AWI-Gen Collaborative Centre: a resource to study the interplay between genomic and environmental risk factors for cardiometabolic diseases in four sub-Saharan African countries. *Glob Health Epidemiol Genom* 2016;**1:**e20.
18. Streatfield PK, Khan WA, Bhuiya A *et al*. Mortality from external causes in Africa and Asia: evidence from INDEPTH Health and Demographic Surveillance System Sites. *Glob Health Action* 2014;**7:**25366.
19. Sankoh O; INDEPTH Network. CHESS: an innovative concept for a new generation of population surveillance. *Lancet Glob Health* 2015;**3**:e742.