

CHES: an innovative concept for a new generation of population surveillance

Momentum towards the post-2015 Sustainable Development Goals (SDGs) is encouraging, after the UN Conference on Funding for Development in Addis Ababa, Ethiopia,¹ and the UN Sustainable Development Summit.² However, one of the major difficulties in assessment of the Millennium Development Goals (MDGs) has been the absence of effective measurability. Data of better quality and greater quantity, especially at the subnational level, must underpin the SDGs.

We propose a new generation of population surveillance operations—the Comprehensive Health and Epidemiological Surveillance System (CHES)—capable of timely delivery of high-quality data for disease-specific and pathogen-specific morbidity, together with data for overall and cause-specific mortality. In addition to disease causes and morbidities, CHES will include full risk factor surveillance and address the full range of the rapidly transitioning burden of disease, including non-communicable diseases and external causes and their associated morbidities. Importantly, CHES will include monitoring health systems and policy initiatives because they affect communities and households.

In implementing CHES, we will not underplay the importance of documentation, study, and implementation of intervention studies related to inequalities in health, health-care access and use, and intervention coverage. CHES will be founded on established dynamic cohort surveillance approaches, by building on existing methods used in health and demographic surveillance systems (HDSSs).³ The HDSS platform longitudinally documents millions of person-years relating to individuals across sites in Africa, Asia, and the Pacific.² HDSSs have developed and

managed integrated field and data systems to monitor causes of death and their determinants. HDSSs, mostly close to district hospitals, provide broad research platforms for nested drug and vaccine trials, cohort studies, behavioural studies, assessments of health services effectiveness, and mortality and morbidity surveillance.

The main CHES innovation is integration across population and health facility data systems, linking demographic, epidemiological, mortality, morbidity, clinical, laboratory, household, environmental, health systems, and other contextual data, with a unique electronic individual identification system throughout. This integration will generate empirical unbiased data essential for development and assessment of interventions at the subnational level. Data from health facilities will be linked to community-level information. For example, mortality data will be collected both from health facilities (with medical certificates of cause of death) and from the community, through verbal autopsy.

Subcohorts within CHES populations will be followed up to monitor morbidity incidence and collect clinical data and laboratory specimens, through frequent scheduled household visits (active surveillance) and unscheduled visits triggered by mobile phone contacts from households. Additionally, sentinel health facility data will provide information about severe diseases and their causes, with outcomes traced back to household levels on a timely basis. CHES will provide numerators and denominators for population-based diseases with causes and mortality disaggregated by finely specified age groups (including neonates).

The HDSS foundation for CHES will be enhanced by crucial innovations needed for the morbidity and aetiological surveillance components, at both household and health facility levels. Household-based cohort studies with an electronic illness notification system, in addition to operational and

data linkages with health facilities, will be complemented by advanced quality-assured clinical and laboratory investigations and expertise.

Data collection for CHES will build on existing HDSS platforms, thereby making unique identifiers (either electronic or biometric) available for every individual. These identifiers also have the potential to be linked to national identification systems, which is necessary for integration of datasets from households, health facilities, and laboratories. CHES will use technological solutions to establish an integrated electronic surveillance system combining all relevant data sources and allowing for appropriate response. CHES will provide complementary data to national health management and information systems and link to local civil registration systems, enabling access to birth and death registration and certification for the population, and thus providing individuals and families with direct benefits.

We are aware that the enhancements we propose need substantial developments in resources, expertise, and capacity, and will have substantial opportunity costs. Robust ethical safeguards also have to be considered. However, now is the moment to firmly state that the world cannot continue to work without essential and large-scale population health information.

We declare no competing interests.

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Osman Sankoh, on behalf of the INDEPTH Network
osman.sankoh@indepth-network.org

INDEPTH Network, Accra, Ghana

- 1 UN. Outcome document of the Third International Conference on Financing for Development: Addis Ababa action agenda. July 15, 2015. http://www.un.org/ga/search/view_doc.asp?symbol=A/CONF.227/L.1 (accessed July 22, 2015).
- 2 UN. Goal 3: ensure healthy lives and promote well-being for all at all ages. New York: United Nations, 2015. <http://www.un.org/sustainabledevelopment/health/> (accessed Sept 29, 2015).
- 3 Sankoh O, Byass P. The INDEPTH Network: filling vital gaps in global epidemiology. *Int J Epidemiol* 2012; **41**: 579–88.



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Members of the INDEPTH Network and partner institutions are listed in the appendix

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Supplementary appendix

This appendix formed part of the original submission. We post it as supplied by the authors.

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Authors from INDEPTH member centres and partner institutions

Osman Sankoh, Martin Bangha, Jacques B O Emina, Abraham J Herbst, Stephen Tollman, Shashi Kant, Peter Aaby, Abhijit Chowdhury, Valerie Delaunay, Aldiouma Diallo, Wasif A Khan, Kim Streatfield, Nurul Alam, Abbas Bhuiya, Bui Thi Thu Ha, Mitike Molla, Yigzaw Kebede, Marriane Alberts, Tran Khanh Toan, Nguyen Thi Kim Chuc, Margaret Gyapong, Momodou Jasseh, Fasil Tessema, Rose Nathan, Abdullah Salim, Honorati Masanja, Sureeporn Punpuing, Amelia Crampin, Moffat Nyrienda, Seni Kouanda, Fred W Mangen, Tom Lutalo, Nelson Sewankambo, Thomas N Williams, J Anthony Scott, Nega Assefa, Yohannes Adama, Alemseged Areagy Gebru, Seth Owusu-Agyei, Frank Odhiambo, Walter Otieno, Peter Sifuna, Eusebio Macete, Mark Urassa, Peter Larson, Alex Ezeh, Donatien Beguy, Catherine Kyobutungi, Halidou Tinto, Oche Mansur Oche, Abraham Oduro, Ali Sie, Abdramane Soura, Siswanto Wilopo, Sodiomon Sirima, Bassirou Bonfoh, Sanjay Juvekar, Bakary Sonko, Bang Pham Nguyen, Martin Meremikwu, Gershim Asiki, Ricardo Thompson, Timothy Evans, Peter Byass, Hans-Olov Adami, Harry Campbell, Anna Mia Ekstrom, Halima Mwenesi, David Ross, Cheikh Mbacké, Cheryl Moyer, Ime Asangansi, Philippe Bocquier, Samuel J Clark, Anastasia J Gage, Barbara McPake, Jocalyn Clark, Miriam Sturkenboom, Daniel Weibel, Jan Bonhoeffer, David Dolinger, Catharina Boehme, Yazoume Ye, Fred Binka, Don de Savigny, Kurt Z Long, Michael Käser, Aliya Karim, Daniel Mäusezahl, Marcel Tanner

INDEPTH Network, Accra, Ghana (Osman Sankoh, Martin Bangha, Jacques B O Emina, Abraham J Herbst, Stephen Tollman, Shashi Kant, Peter Aaby, Abhijit Chowdhury, Valerie Delaunay, Aldiouma Diallo, Wasif A Khan, Kim Streatfield, Nurul Alam, Abbas Bhuiya, Bui Thi Thu Ha, Mitike Molla, Yigzaw Kebede, Marriane Alberts, Tran Khanh Toan, Nguyen Thi Kim Chuc, Margaret Gyapong, Momodou Jasseh, Fasil Tessema, Rose Nathan, Abdullah Salim, Honorati Masanja, Sureeporn Punpuing, Amelia Crampin, Moffat Nyrienda, Seni Kouanda, Fred W Mangen, Tom Lutalo, Nelson Sewankambo, Thomas N Williams, J Anthony Scott, Nega Assefa, Yohannes Adama, Alemseged Areagy Gebru, Seth Owusu-Agyei, Frank Odhiambo, Walter Otieno, Peter Sifuna, Eusebio Macete, Mark Urassa, Peter Larson, Alex Ezeh, Donatien Beguy, Catherine Kyobutungi, Halidou Tinto, Oche Mansur Oche, Abraham Oduro, Ali Sie, Abdramane Soura, Siswanto Wilopo, Sodiomon Sirima, Bassirou Bonfoh, Sanjay Juvekar, Bakary Sonko, Bang Pham Nguyen, Martin Meremikwu, Gershim Asiki, Ricardo Thompson, Samuel J Clark, Fred Binka); **School of Public Health, Faculty of Health Sciences, University of Witwatersrand, Johannesburg, South Africa** (Osman Sankoh); **Faculty of Public Health, Hanoi Medical School, Hanoi, Vietnam** (Osman Sankoh); **ACDIS HDSS, Africa Centre, University of KwaZulu-Natal, KwaZulu-Natal, South Africa** (Abraham J Herbst); **Agincourt HDSS, MRC/Wits Rural Public Health and Health Transitions Research Unit, University of the Witwatersrand, Johannesburg,**

South Africa (Stephen Tollman); **Ballabgarh HDSS, All India Institute of Medical Sciences, New Delhi, India** (Shashi Kant); **Bandim HDSS, Bandim Health Project, Bandim, Guinea Bissau** (Peter Aaby); **Birbhum HDSS, School of Digestive and Liver Diseases, Institute of Post Graduate Medical Education & Research, Kolkata, India** (Abhijit Chowdhury); **Bandafassi, Mlomp and Niakhar HDSSs, Institut de Recherche pour le Développement (IRD), Dakar, Senegal** (Valerie Delaunay, Aldiouma Diallo); **Bandarban HDSS, International Centre for Diarrhoeal Diseases Research, Dhaka, Bangladesh** (Wasif A Khan); **Matlab HDSS, International Centre for Diarrhoeal Diseases Research, Dhaka, Bangladesh** (Kim Streatfield, Nurul Alam); **Chakaria HDSS, International Centre for Diarrhoeal Diseases Research, Dhaka, Bangladesh** (Abbas Bhuiya); **Chililab HDSS, Hanoi School of Public Health, Hanoi, Vietnam** (Bui Thi Thu Ha); **Butajira HDSS, Addis Ababa University, Addis Ababa, Ethiopia** (Mitike Molla); **Dabat HDSS, University of Gondar, Gondar, Ethiopia** (Yigzaw Kebede); **Dikgale HDSS, University of Limpopo, Limpopo, South Africa** (Marriane Alberts); **Dodalab HDSS, Hanoi Medical School, Hanoi, Vietnam** (Tran Khanh Toan); **Filabavi HDSS, Hanoi Medical School, Hanoi, Vietnam** (Nguyen Thi Kim Chuc); **Dodowa HDSS, Dodowa research Centre, Ghana Health Service Dodowa, Ghana** (Margaret Gyapong); **Farafenni HDSS, Medical Research Council, Banjul, The Gambia** (Momodou Jasseh); **Gilgel Gibe HDSS, Jimma University, Jimma, Ethiopia** (Fasil Tessema); **Ifakara HDSS, Ifakara Health Institute, Dar es Salaam, Tanzania** (Rose Nathan, Abdullah Salim); **Rufiji HDSS, Ifakara Health Institute, Dar es Salaam, Tanzania** (Honorati Masanja); **Kanchanaburi HDSS, Institute for Population and Social Research, Mahidol University, Bangkok, Thailand** (Sureeporn Punpuing); **Karonga HDSS, Malawi, School of Hygiene and Tropical Medicine, London, UK** (Amelia Crampin, Moffat Nyrienda); **Kaya HDSS, Institut de recherche en Sciences de la Santé/Centre National de la recherche Scientifique et technologique (IRSS/CNRST), Ouagadougou, Burkina Faso** (Seni Kouanda); **Iganga/Mayuge HDSS, Institute of Public Health, Makerere University, Kampala, Uganda** (Fred W Mangen); **Rakai HDSS, Rakai Health Project, Makerere University, Kampala, Uganda** (Tom Lutalo, Nelson Sewankambo); **Kilifi HDSS, KEMRI-Wellcome Trust Research Programme, Kilifi, Kenya** (Thomas N Williams, J Anthony Scott); **Kersa HDSS, Haramaya University, Dire Dawa, Ethiopia** (Nega Assefa); **Kilite Awlaelo HDSS, Mekelle University, Mekelle Ethiopia** (Yohannes Adama, Alemseged Areagy Gebru); **Kintampo HDSS, Kintampo Research Centre, Ghana Health Service, Kintampo, Ghana** (Seth Owusu-Agyei); **Kisumu HDSS, KEMRI/CDC, Kisumu, Kenya** (Frank Odhiambo); **Kombewa HDSS, KEMRI/Walter Reed Project, Kisumu, Kenya** (Walter Otieno, Peter Sifuna); **Manhica HDSS, Centro de Investigação em Saúde de Manhiça, Maputo, Mozambique** (Eusebio Macete); **Magu HDSS, Mwanza Research Centre of the National Institute for Medical Research, Tanzania** (Mark Urassa); **Mbita HDSS, Nagasaki University Institute of Tropical Medicine-Kenya Medical Research Institute Project, Nairobi, Kenya** (Peter Larson); **Nairobi HDSS, African Population and Health Research Center, Nairobi, Kenya** (Alex Ezeh, Donatien Beguy, Catherine Kyobutungi); **Nanoro HDSS, National institutes of medical**

research, IRSS, Nanoro, Burkina Faso (Halidou Tinto); Nahuche HDSS, Ministry of Health, Zamfara State, Nigeria (Oche Mansur Oche); Navrongo HDSS, Navrongo Research Centre, Ghana Health Service, Navrongo, Ghana (Abraham Oduro); Nouna HDSS, Nouna Health Research Centre, Nouna, Burkina Faso (Ali Sie); Ouagadougou HDSS, Institut Supérieur des Sciences de la Population, Université de Ouagadougou, Burkina Faso (Abdramane Soura); Purworejo HDSS, Gadjah Mada University, Yogyakarta, Indonesia (Siswanto Wilopo); Sapone HDSS, Centre National de Recherche et de Formation Sur le Paludisme, Ouagadougou, Burkina Faso (Sodiomon Sirima); Taabo HDSS, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire (Bassirou Bonfoh); Vadu HDSS, Vadu Rural Health Program, KEM Hospital Research Centre, Pune, India (Sanjay Juvekar); West Kiang HDSS, Medical Research Council, Banjul, The Gambia (Bakary Sonko); Wosera HDSS, The Papua New Guinea Institute of Medical Research (IMR), Goroka, Papua New Guinea (Bang Pham Nguyen); Cross River HDSS, University of Calabar, Calabar, Cross River State, Nigeria (Martin Meremikwu); Kyamulibwa HDSS, Uganda Virus Research Institute, Entebbe, Uganda (Gershim Asiki); Chókwe HDSS, Chókwe Health Research and Training Centre (CITSC), Chókwe, Mozambique (Ricardo Thompson); World Bank, Washington DC, USA (Timothy Evans); Umeå University, Umeå, Sweden (Peter Byass); Harvard School of Public Health, Massachusetts, USA (Hans-Olov Adami); University of Edinburgh, Edinburgh, UK (Harry Campbell); Karolinska University, Stockholm, Sweden (Anna Mia Ekstrom); African Leaders Malaria Alliance (ALMA), Dar es Salaam, Tanzania (Halima Mwenesi); WHO, Basel, Switzerland (David Ross); Dakar, Senegal (Cheikh Mbacké); University of Michigan, Michigan, USA (Cheryl Moyer); eHealth4everyone, Abuja, Nigeria (Ime Asangansi); Université Catholique de Louvain, Brussels, Belgium (Philippe Bocquier); University of Washington, Washington DC, USA (Samuel J Clark); Tulane University, New Orleans, USA (Anastasia J Gage); Queen Margaret University, Edinburgh, UK (Barbara McPake); ICDDR,B, Dhaka, Bangladesh (Jocalyn Clark); University Medical Center Rotterdam, Rotterdam, Netherlands (Miriam Sturkenboom, Daniel Weibel); University Children's Hospital Basel, Basel, Switzerland (Jan Bonhoeffer); FIND, Geneva, Switzerland (David Dolinger, Catharina Boehme); ICF International, Rockville, USA (Yazoume Ye); University of Health and Applied Sciences, Ho, Ghana (Fred Binka); Swiss Tropical and Public Health Institute, Basel, Switzerland (Don de Savigny, Kurt Z Long, Michael Käser, Aliya Karim, Daniel Mäusezahl, Marcel Tanner); and University of Basel, Basel, Switzerland (Don de Savigny, Kurt Z Long, Michael Käser, Aliya Karim, Daniel Mäusezahl, Marcel Tanner)