



Non-communicable diseases surveillance: overview of magnitude and determinants in Kenya from STEPwise approach survey of 2015

Richard G Wamai^{1*}, Andre Pascal Kengne² and Naomi Levitt^{3,4}

Background

Disease surveillance is a scientifically and legally established hallmark of population health whose goal is systematically collecting, interpreting and disseminating data to target and monitor interventions to reduce disease morbidity and mortality [1–5]. However, data is often either lacking or of low quality especially in low- and- middle-income countries (LMICs). For example, more than half of global deaths for 2015 did not have an established cause [6]. The Global Burden of Disease (GBD), the largest descriptive epidemiological study, show low rates of data quality for most LMICs during 1980–2016 [777

factors shared among the major NCDs – tobacco use, harmful consumption of alcohol, unhealthy diet, and physical inactivity – are all highly modifiable to prevent nearly half of premature NCD deaths [30–33].

Among LMIC regions, sub-Saharan Africa (SSA) faces the greatest challenge from NCDs that could pose the next ‘poverty trap’ [34]. While carrying the largest burden of major communicable diseases such as malaria, HIV/AIDS, tuberculosis, and neglected tropical diseases (NTDs) [35–38], the subcontinent is also undergoing critical epidemiological, demographic and socio-economic transformations including nutrition transitions that are resulting in a rise in NCDs such as cancer, hypertension, obesity and diabetes as earlier predicted [29, 39–44]. An ageing and increasing population with

factors for NCDs based on national household expenditure and health utilization data [70]. Key risk factors to NCDs were socio-economic (income, education levels), health systems (e.g., distance to health facilities, cost of care), adverse social interactions in area of residence (e.g., availability and consumption of alcohol and smoking and influencing behavioural factors), and biological factors (e.g., age and gender) [70]. The STEPS has allowed a deeper and more comprehensive understanding of the national NCDs risk-factor profile.

Overview of methods for the Kenya STEPS

The STEPS Kenya 2015 survey was a national cross-sectional household survey conducted between April and June 2015. It was designed to provide estimates for indicators on risk factors for NCDs for persons aged 18–69 years with a sample size of 6,000 individuals to allow national estimates by sex (male and female) and residence (urban and rural areas). Using a three-stage sampling, 200 clusters (100 urban and 100 rural) were selected in stage one, followed by a uniform selection of 30 households in each cluster in stage two, and in stage three one adult aged 18–69 years was randomly selected from each household, with a household defined as people who eat and live together, and approached for the survey. The survey used the fifth National Sample Surveys and Evaluation Programme (NASSEP V) master sample frame that is developed and maintained by Kenya National Bureau of Statistics. The stratified probability proportional to size sampling methodology was developed using 96,251 Enumeration Areas (EAs) generated from the 2009 Kenya Population and Housing Census to form 5,360 clusters split into four equal sub-samples [62]. National sampling frames are necessary for disease surveillance at the household level and evolve over time to reflect population and administrative changes [71]. The Kenya STEPS thus uses the most recent frame (NASSEP V) which was also used in the latest DHS.

The survey used the modular expanded STEPS collecting demographic and behavioural information (step 1), physical measurements (step 2) and biochemical measures (step 3) [60]. After providing informed consent, the participants were interviewed on the four main behavioural risk factors of NCDs (tobacco use, harmful use of alcohol, unhealthy diets, and physical inactivity), and measurements for key biological risk factors for NCDs (overweight and obesity derived from height and weight and central obesity derived from waist and hip circumference, blood pressure and fasting blood glucose, triglyceride, and cholesterol levels) were also taken. The survey was administered using a Personal Digital Assistant (PDA) loaded with the WHO eSTEPS software. Data collection took place during a two-month period (April–

June) in 2015. Complete details of the sample design, methodology and questionnaire are provided in the formal report published by the Ministry of Health [72].

distribution and economic activity. For example, physical inactivity in the STEPS was only 7.7% compared with that in other higher income-level countries like South Africa (44.7%) and Swaziland (49.1%) and the global prevalence of 31% [75]. Without strong culturally miti-

countries over time are able to generate surveillance data for major established and emerging NCDs in their population. Kenya could use a similar approach in future STEPS or similar surveys, to expand the scope of traditional NCD risk factors to lipid disorders including expanding the assessment of diabetes beyond a fasting glucose level that is likely to underestimate the prevalence, to collect data on neglected NCDs like epilepsy and mental health, and on emerging and novel risk factors. This should ideally go in parallel with efforts to develop and maintain complementary data sources, which in the long term, will equip the country with a comprehensive surveillance system for NCDs. With such a pragmatic policy prescription for NCD surveillance, the country also need to step up provision of services for prevention and treatment of NCDs in and outside the health system in line with national and global goals. Ultimately, for Kenya and countries across Africa the path to longer and healthier lives to 2030 [99], and beyond, requires understanding disease profiles matched by the right interventions.

Abbreviations

APHRC: African Population and Health Research Centre; ART: antiretroviral treatment; BMI: Body mass index; CDIA: Chronic Disease Initiative for Africa; CHANCES: Consortium on Health and Ageing Network of Cohorts in Europe and the United States; CMNN: communicable, maternal, neonatal, and nutritional conditions; CVD: Cardiovascular diseases; DALYs: disability-adjusted life-years; DHS: Demographic and Health Survey; EAs: Enumeration Areas; FCTC: Framework Convention for Tobacco Control; GATHER: Guidelines for Accurate and Transparent Health Estimates Reporting; GATS: Global Adult Tobacco Survey; GBD: Global Burden of Disease; GSHS: Global school-based student health survey; GTS: Global Tobacco Survey; HALE: healthy life expectancy; HDL: High-density lipoproteins; HDSS: Health and Demographic Surveillance System; HED: heavy episodic drinking; IDSR: Integrated Disease Surveillance and Response; KDHS: Kenya Demographic and Health Survey; KEPH: Kenya Essential Package of Health; KNBS: Kenya National Bureau of Statistics; LICs: low-income countries; LMICS: Low- and middle-income countries; NAS-SEP V: National Sample Surveys and Evaluation Programme; NCDs: Non-communicable diseases; NTDs: neglected tropical diseases; PCA: principal component analysis; PDA: Personal digital assistant; SARAM: Kenya Service Availability and Readiness Assessment Mapping; SDGs: Sustainable Development Goals; SSA: Sub-Saharan Africa; STEPS: WHO STEPwise approach to Surveillance (of NCD risk factors); WHO: World Health Organization

Acknowledgements

The editors would like to acknowledge all the authors and reviewers of the articles in this special issue of the Kenya STEPS. We acknowledge Kenya's Ministry of Health Unit for NCDs for conducting the STEPS and initiating this special issue. We also acknowledge the APHRC for their role in coordinating this special issue. Acknowledgments are also due to Gandham N.V. Ramana (Lead Health Specialist & Program Leader, Kenya, Rwanda, Uganda and Eritrea Country Department, Africa Region, The World Bank Group) and Miriam Schneidman (Lead Health Specialist, Eastern and Southern Africa, Health, Nutrition and Population Global Practice, The World Bank Group) for the financial support for conducting the Kenya STEPS. The editors have received no financial or other rewards for their role.

Funding

Publication of this supplement has been funded by International Development Research Centre (IDRC) grant number 107209-001, through the African Population and Health Research Center (APHRC). The articles have undergone the journal's standard peer review process for supplements. NL declares to have received funding to attend international conferences from Sanofi and Novo nordisk and whose Unit has received contributions

to the salary of a diabetes educator from Roche Diagnostics and Lilly Laboratories. The other Supplement Editors declare that they have no competing interests.

About this supplement

This article has been published as part of

The full contents of the supplement are available online at <https://bmcpublichealth.biomedcentral.com/articles/supplements/volume-18-supplement-3>.

Authors' contributions

RGW conceived the paper and wrote the content outline. APK and NL provided critical comments and guidance on the content outline. RGW wrote the first draft. APK and NL reviewed the draft and provided input. RGW, APK and NL reviewed and approved the final draft for submission.

Ethics approval and consent to participate

Ethical approval for this overall paper is not applicable as we are not using primary data.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Author details

¹Integrated Initiative for Global Health, Department of Cultures, Societies and Global Studies, Northeastern University, Boston, MA, USA. ²Non Communicable Diseases Research Unit, South African Medical Research Council, Francie van Zijl Drive, Parow Valley, Cape Town, Western Cape, South Africa. ³Diabetic Medicine and Endocrinology, University of Cape Town, J47/86 Old Main Building, Grootte Schuur Hospital, Observatory, Cape

UT03(E307(2.101 Tf))JTJ 9 -1sent)-34tTarg

2.101 Tf

10. World Health Organization. World Health Statistics 2018: Monitoring health for the SDGs. Available at: http://www.who.int/gho/publications/world_health_statistics/2018/en/. Accessed 10 May 2018.
11. Kassebaum NJ, Lopez AD, Murray CJL, Lozano R. A comparison of maternal mortality estimates from GBD 2013 and WHO. *Lancet*. 2014;384:2209–10.
12. Kovacs SD, Mullholland K, Bosch J, et al. Deconstructing the differences: a comparison of GBD 2010 and CHERG's approach to estimating the mortality burden of diarrhea, pneumonia, and their etiologies. *BMC Infect Dis*. 2015;15:16.
13. Supervie V, Costagliola D. Time for a revolution in tracking the HIV epidemic. *Lancet HIV*. 2016;3(8):e337–9.
14. Deribew A, Ojal J, Karia B, Bauni E, Oteinde M. Under-five mortality rate

59. Alwan A, MacLean DR, Riley LM, d'Espaignet ET, Mathers CD, Stevens GA, et al. Monitoring and surveillance of chronic non-communicable diseases: progress and capacity in high-burden countries. *Lancet*. 2010;376:1861–8.
60. WHO. WHO STEPS Surveillance Manual: The WHO STEPwise Approach to