The Global Burden of Stroke

George A. Mensah^a Bo Norrving^b Valery L. Feigin^c

^aCenter for Translation Research and Implementation Science and Division of Cardiovascular Sciences; National Heart, Lung, and Blood Institute; National Institutes of Health, Bethesda, Md., USA; ^bDepartment of Clinical Sciences, Neurology, Lund University, Lund, Sweden; ^cNational Institute for Stroke and Applied Neurosciences, School of Rehabilitation and Occupation Studies, School of Public Health and Psychosocial Studies, Faculty of Health and Environmental Studies, Auckland University of Technology, Auckland, New Zealand

Attacking global health issues requires an understanding of the current status of diseases, their risk factors and the best means for their prevention and treatment. However, global health issues are rapidly moving targets. The Global Burden of Disease (GBD) project and other studies have demonstrated a shift, in only a few decades, in the patterns of disease, from infectious and nutritional disorders to non-communicable diseases (NCDs) such as stroke, heart disease, cancer, diabetes and pulmonary disease. All the core NCDs are highly prevalent, and they are all highly preventable. In only a decade, stroke has emerged from an anonymous position embedded in the term ‘cardiovascular disease’ to recognition as a stand-alone core NCD with major implications for global health.

Global health has entered a stage where the recognition that tackling NCDs including stroke is not only a clinical and public health issue but also an important challenge for global economic development. As this special issue of Neuroepidemiology goes to press, the landmark United Nations Post-2015 High Level meeting on the sustainable development goals is taking place, and will adopt 17 new global goals, one of which concerns health and includes a target to reduce NCDs by 2030. Never before has stroke been recognized so clearly as one of the core diseases in need of prevention and management – and continual surveillance.

From its beginnings in the early 1990s, the GBD effort has championed the development, measurement and reporting of comparable, consistent and comprehensive measures of disease burden for the world. Over the past 2 decades, the effort has evolved into a major international consortium of more than 1,000 researchers, from more than 50 countries. Together with this evolution have come major improvements in the methodology of estimating disease burden. It is generally accepted that the GBD data on stroke are the most comprehensive stroke burden estimates at global, regional and national levels. However, GBD Study is a living project; it evolves along with the methodology improvements and collection of new data for data modeling. The current GBD 2013 stroke burden estimates, as well as all previous GBD estimates, are not free from limitations. One of these limitations was its inability to provide accurate country-specific incidence estimates and aggregated estimates (with uncertainty intervals) for ischemic and hemorrhagic strokes combined. At this stage, we also were not able to include in the analyses all the available publications on pediatric stroke incidence, prevalence and mortality. It is anticipated that these limitations will be addressed in future GBD analyses. Moreover, with further updates and development of the GBD Data Visualization tools available in the public domain, anyone interested in exploring

the effects of different data inputs (e.g. level of risk factors) on epidemiological estimates of stroke burden (e.g. incidence, prevalence, mortality) would be able to do this on-line interactively and with respect to various geographical locations and time.

In this issue of *Neuroepidemiology*, Roth et al. [1] share some of these improvements used in GBD 2013 to estimate stroke burden. In particular, they highlight the incorporation of large amounts of new data on stroke mortality, incidence and case fatality and novel modeling methods that better integrate these parameters into burden estimation. Truelsen et al. [2] also address the important methodological challenge of redistributing ‘unspecified stroke’, ‘ill-defined stroke’ and other unreliably defined and applied codes. They also highlight the need for further improvements in death certification for stroke and methods for estimating stroke burden.

The results of these improvements are nicely summarized by Feigin et al. [3] in the update on the global burden of ischemic and hemorrhagic stroke. The authors showed that there is still no country in the world where the burden of stroke, in terms of absolute number of people affected by or died from stroke, has declined over the last 2 decades. This finding emphasizes the urgent need for new, more effective primary stroke prevention strategies. They also called for new high quality epidemiological studies of stroke in different countries and populations, with a particular emphasis on low- and middle-income countries. In addition, an update on stroke prevalence, mortality and disability-adjusted life years (DALYs) in children and youth [4] as well as in adults aged 20–64 years is provided for ischemic and hemorrhagic stroke separately by Krishnamurthi et al. [5]. Barker-Collo et al. [6] highlight the higher incidence of ischemic stroke in men but a lack of sex differences in hemorrhagic stroke incidence or total health loss from stroke as measured by DALYs. They add that well-designed stroke intervention trials that are adequately powered for men and women separately in order to derive robust insights on the effectiveness of stroke interventions are needed. These publications confirmed that the bulk of stroke burden continues to be borne by developing countries and that the disparities in stroke burden between developing and developed countries persist. Norrving et al. [7] tackle the crucial theme of stroke prevention as a prototype of NCD prevention worldwide and highlight the importance of an inter-sectorial approach and the need for active engagement of a diverse set of stakeholders in the effort.

In order to maximize individual and population health impact, Mensah et al. [8] suggest the need to embrace rig-

orous evidence synthesis and new directions in comparative effectiveness and implementation research in stroke. The atlas by Feigin et al. [9] paints a picture of a continuing epidemic of stroke in spite of the remarkable declines seen for age-standardized incidence rates, prevalence, mortality rates, and DALYs over the period from 1990 to 2013. It also demonstrates significant geographical differences at the country and regional levels that should inform patient care, education, research and policy development for the prevention and treatment of stroke and the elimination of inequities in stroke, stroke care and health outcomes.

The papers in this issue of *Neuroepidemiology* cover GBD stroke burden estimates for the period from 1990 to 2013. Published periodically, GBD stroke burden estimates on global, regional and national levels provide evidence for healthcare decision makers to inform the healthcare organizations, resource allocation and planning (e.g. number of required beds and other hospital care facilities/needs for acute stroke patients, number of specialists and community services for caring for stroke survivors). Being the most comprehensive and up-to-date data on global, regional and national stroke burden, these data are also important for teaching medical students and defining priorities in research funding. These stroke burden estimates, when coupled with other GBD health and risk factor estimates done periodically 1–2 years apart, are also crucial for deepening our knowledge on determinants of changing stroke epidemiology worldwide, particularly in developing countries. They will also be important for the evaluation of the effectiveness of various preventative and treatment/rehabilitation strategies for stroke at national, regional and global levels.

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The authors have no conflicts of interest.

Disclaimer

The views expressed in this article are those of the authors and do not necessarily represent the views of the National Heart, Lung, and Blood Institute; National Institutes of Health; or the United States Department of Health and Human Services.

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