What Defines a Valuable Investment in Global Health Research?

Gerald S. Bloomfield*, K. M. Venkat Narayan†, Uchechukwu K. A. Sampson‡, Jagat Narula§
Durham, NC, USA; Atlanta, GA, USA; Bethesda, MD, USA; and New York, NY, USA

At a time in history when noncommunicable diseases (NCDs) increasingly account for worldwide deaths, morbidity, and costs, it is imperative both to invest in and to demonstrate the value of investments in global health research. This issue of Global Heart does just that for an investment in NCD research and capacity building in low- and middle-income countries (LMICs). In 2008, an ambitious public-private partnership between the National Heart, Lung and Blood Institute and UnitedHealth Group was launched to create a network of research Centers of Excellence (COEs) in LMICs, partnered with institutions in high-income countries. In this issue, we highlight 19 original investigations, reviews, and editorials that represent a fraction of the concrete returns and anticipated yields of this historic investment in global health research. The scope of research results presented in this issue mirrors the multipronged approach needed to decrease the burden of NCDs worldwide and attests to the value of global health investment. From among these articles, several themes emerge.

HYPERTENSION

Worldwide, hypertension accounted for 10.4 million deaths and 208.1 million disability-adjusted life-years (DALYs) lost between 1990 and 2013 [1]. Three articles in this issue tackle hypertension explicitly. The prevalence of hypertension varies widely (age-standardized prevalence, 19% to 55%) in different communities across 7 population-based cross-sectional studies in 9 LMICs [2]. Awareness and treatment vary similarly, and the data reported by Irazola et al. [2] will undoubtedly guide regional interventions. An analysis from the Peru COE identifies that several demographic, social, and environmental factors were the strongest predictors of receiving antihypertensive therapy after 1 year [3].The Tunisia COE shows that a comprehensive community-based intervention decreased hypertension rates by 30% over 3 years, whereas in a control community, rates remained the same or were slightly higher [4]. These findings demonstrate the great gains potentially made by leveraging locally acquired data and resources.

CARDIOMETABOLIC RISK

Obesity and diabetes are increasingly prevalent worldwide, even in rural areas [5]. In an analysis of 31,118 people from LMICs, Patel et al. [6] report a high prevalence of, and variation in, general obesity (11% to 50%) across countries and an even higher prevalence of central obesity (19% to 79%). Both body mass index and waist circumference were associated with greater cardiovascular risk across populations. Interestingly, although general obesity was highest among South Asians, central obesity was highest among South Americans. In a second paper, Patel et al. [7] compare the prevalence of a phenotype, comprising dysglycemia, low high-density lipoprotein cholesterol, and high triglycerides, and found that whereas 8% to 15% of U.S. men and 1% to 2% of U.S. women from diverse ethnic groups display this phenotype, urban South Asians in India and Pakistan are 5 to 9 times more likely to do so, a finding—suggesting a unique “South Asian phenotype.” Shen et al. [8] find the prevalence of diabetes and prediabetes to be alarmingly high in urban and periurban parts of Latin America, South Asia, and South Africa and note that the South Asian populations had higher diabetes prevalence at lower body mass index and younger ages than other LMIC populations. Diabetes awareness and control rates were also disturbingly low. Rosana et al. [9] examine physical activity, an important risk factor for obesity and diabetes, and find that 58% of people in Chile engaged in insufficient physical activity, and 23% were physically inactive. Women, older people, and those with higher education were more likely to be physically inactive in this population.

HEART FAILURE

Heart failure has plagued sub-Saharan Africa for decades or longer [10]. An analysis from the Kenya COE investigated the contribution of atherosclerosis to heart failure and questioned prevailing assumptions about the paucity of atherosclerosis in this region [11]. Noninvasively assessed markers of atherosclerosis were commonly found in middle-aged persons with heart failure and contribute to 25% of all cases identified in this study. More locally obtained data to uncover the current state of the epidemiologic transition in sub-Saharan Africa are needed.

OVERALL CARDIOVASCULAR RISK

Extending a previously validated tool, the network identifies “high cardiovascular risk” in 9 LMIC areas in Africa, Asia, and South America [12]. High cardiovascular risk is uncommon before age 50 years but increases 10-fold thereafter, with significant variation among sites. Another analysis finds that the association between socioeconomic factors and cardiometabolic risk factors varies depending on, among other factors, the community of interest.

Dr. Narayan acknowledges support from the National Heart, Lung, and Blood Institute of the National Institutes of Health, Department of Health and Human Services (contract no. HHSN268200900026C) and the UnitedHealth Group (Minneapolis, MN). All other authors report no relationships that could be construed as a conflict of interest.

From the *Department of Medicine, Duke University Medical Center, Duke Clinical Research Institute, and Duke Global Health Institute, Duke University, Durham, NC, USA; †Emory Global Diabetes Research Center, Rollins School of Public Health, Emory University, Atlanta, GA, USA; ‡Center for Translation Research and Implementation Science, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, MD, USA; §Department of Medicine, Mount Sinai Hospital, New York, NY, USA. Correspondence: J. Narula. (jagat.narula@mountsinai.org).

GLOBAL HEART © 2016 Published by Elsevier Ltd. on behalf of World Heart Federation (Geneva). VOL. 11, NO. 1, 2016 ISSN 2211-8160/$36.00. http://dx.doi.org/10.1016/j.ghheart.2015.12.007
on the socioeconomic indicator used, a finding implying a benefit to contextualizing risk factors by socioeconomic groups in Latin American settings [13]. Building on past experience, Gaziano et al. [14] show that a non-laboratory-based cardiovascular risk score similarly ranks persons compared with 4 commonly used risk scores throughout the world. Assessing cardiovascular risk in the general populations of resource-limited settings without the inconvenience of measuring cholesterol could prove a cost-effective approach to risk prediction around the globe. Although validation against clinically meaningful endpoints is the logical next step for these studies, the findings support efforts by the World Health Organization to streamline cardiovascular risk assessment in LMICs [15].

**TRAINING AND CAPACITY BUILDING**

The yields from the network most likely to reap future benefit are the structure and cohesion of the collaborative network itself and the persons who receive mentored research training. Diamis et al. [16] quantify the interconnectedness of the COEs using social network analysis demonstrating a yield in terms of ongoing collaboration beyond the initial funding period. Furthermore, an analysis profiles the methodology used to create and sustain a research training program across the COEs and frames what is needed to sustain this type of program to create future opportunities [17].

Gains in NCD control have been observed in many high-income countries [18]. Yet, many LMICs are juxtaposed between increasing rates of NCDs [19] and insufficient locally actionable information on which to act. Translating these gains to LMICs requires a multipronged strategy that includes an investment in research to understand the unique, as well as and common, attributes (e.g., epidemiology, phenotypes, environment, genetics, social context) that affect global health in disparate settings. In this context, an important strategy will be to recognize, and tap into, the extraordinary resilience and resourcefulness of people who work to improve health in disparate settings, thereby creating a more robust global community that will share the collective future of promoting health by using emerging population health systems [20].

Lessons from the COE network are instructive for the next phase of global health research investment. Effective programs will focus on capacity building and training early-stage investigators while investing in mentors as well. Effective networks will consist of partners from high-income countries and from LMICs with equitable leadership and scientific opportunities. Future networks should also be good stewards of existing global health infrastructure (e.g., GRANDSouth collaborators, Red de Instituciones de Investigación en Enfermedades Crónicas, United States Agency for International Development [USAID], Global human immunodeficiency virus [HIV]/acquired immunodeficiency syndrome [AIDS] networks) and leverage local expertise. An inclusive but innovative research agenda is warranted to attract a breadth of expertise across the basic, clinical, biomedical, behavioral, prevention, population, health services, operations, and implementation sciences. In deploying future research agendas, paced and tailored approaches will be critical for achieving success. For instance, countries or regions with limited capacity or research infrastructure may require longer lead time as well as larger initial efforts for planning, training, and execution [21].

Although >70% of CVD deaths occur in LMICs [22], <20% of the cardiovascular research emanates from these countries [23], with the lowest proportion coming from sub-Saharan Africa [24]. Reversing this trend is not only possible, but also imperative. With the vital experience of the COE network, we have the tools to do so. At a time when globalization is creating an interconnected world, and when science and its fruits should be borderless, we call on the global health community to demonstrate the will to invest in global NCD research. All countries, both rich and poor, will benefit from it. Above all, we stand at the threshold of making huge progress in controlling NCDs, just as we have managed to affect HIV/AIDS and child mortality through global collaboration and collective investment in research and action.

**Postscript.** The categorization of country income levels (low, middle) in several of the papers reflects the situation at the start of the Global Health Centers of Excellence Program, and the editors and authors are aware that some countries that were low-income have progressed into the middle-income category.

**REFERENCES**