NCD Research in the Post-2015 Global Health Agenda
Perspectives from the NHLBI Strategic Vision

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Noncommunucable diseases (NCD) caused nearly 40 million deaths worldwide in 2015, representing 71% of global deaths and a 14% increase compared to NCD deaths in 2005 [1]. NCD are also a major contributor to disability and accounted for 18 of the 20 leading causes of age-standardized years lived with disability on a global scale in 2015 [2]. These findings on mortality and disability have tremendous implications for clinical and public health research over the next 15 years, a period covered by the post-2015 United Nations development agenda [3,4]. It is well known that population growth and aging contribute to the observed magnitude and trends in deaths from NCD [5]; however, the major NCD risk factors also play crucial roles, especially toward premature mortality and years lived with disability [6]. As a result, the post-2015 development agenda calls for specific targets for reducing these major risk factors; optimizing the prevention and treatment of heart attack, stroke, and other NCD; and improving access to technologies and essential medicines for managing NCD [6,7]. In addition, the global agenda calls for an overarching target of a 25% relative reduction in overall mortality from cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases by 2025 [6,7].

Achieving this overarching target by 2025 is not feasible without successful control of the major NCD risk factors [7]. Although much progress has been made, several research questions and challenges persist that demand innovative approaches and strategic partnerships in order to stem the tide of increasing NCD death and disability. The articles in this issue of Global Heart highlight not just the challenges but also recommendations for obtaining answers. As the leading source of public funding for health research in the world, the National Institutes of Health (NIH) takes these research questions and challenges seriously, as highlighted in the recent NIH-wide strategic plan (Fig. 1) [8]. In addition, the National Heart, Lung, and Blood Institute (NHLBI) recently completed a dynamic, iterative, and broadly inclusive strategic visioning exercise that successfully engaged diverse stakeholders from across the United States and around the globe. The resulting strategic vision identifies and prioritizes the most compelling science that can help close existing gaps in knowledge, and break down barriers to research progress (Fig. 2) [9].

There is substantial alignment in our mission-oriented goals and 8 strategic objectives of the NHLBI strategic vision and several of the recommendations identified in the articles in this issue of Global Heart. This article describes the 4 strategic goals of the NHLBI strategic vision and their related research objectives and places them within the context of NCD research as discussed in the articles in this issue of Global Heart. Although the intent of the article is to stimulate dialogue and inform the scientific community of the Institute’s strategic priorities, neither the article nor the areas it discusses should be viewed as a formal request for information or a funding opportunity announcement.

STRATEGIC GOALS FOR RESEARCH ON HEART, LUNG, BLOOD, AND SLEEP DISORDERS

Strategic goal 1: understand human biology

This goal addresses investigations that help expand knowledge of the molecular, cellular, and physiological mechanisms governing normal function of heart, lung, blood, and sleep (HLBS) systems as essential elements for sustaining human health. Fundamental discoveries from biomedical, social, and behavioral science research that lead to a greater understanding of strategies that preserve and promote health as well as confer resilience in the setting of adverse biomedical or socio-environmental exposures are an important priority. A deeper understanding of resilience can inform strategies for prudential prevention and health promotion—both of which are crucial in the prevention and control of NCD.

Several articles provide insights for addressing this research goal. Fried [10] introduces the concept of “frame of focus” and cautioned that because 70% of a population’s health is created outside of medical care and our genes, it is important for investigations on this goal to go beyond the traditional clinical setting. Additionally, it would be ideal to leverage insights from the field of gerontology to explore biological underpinnings of healthy aging [10]. Jarvis [11] addresses the “exciting new field of social networking” and the potential for related advances in digital communication and global interaction to impact health. Latina et al. [12] address the importance of investigations involving preschool children and their parents and caregivers and their potential to shed light on factors associated with persistence of healthy behaviors into adulthood.
Strategic goal 2: reduce human disease

This goal explores strategies that extend our knowledge of the pathobiology of HLBS disorders and enable clinical investigations that advance the prediction, prevention, preemption, treatment, and cures of human diseases. There is a real need to provide greater and deeper insights on the characteristics and complexities of risk exposures that lead to NCD. To successfully meet the targets set for the post-2015 developmental agenda, our research endeavors in this goal will need to address the roles of exposures from globalization, trade, urbanization, household and environmental air pollution, and the subsequent development of subclinical or overt NCD. Research studies linking cumulative risk exposures (or the “exposome”) [13] to specific pathophysiological responses could serve to improve our understanding of the “mechanistic connections between exposures and health” that can advance the potential for reducing disease and adverse health outcomes.

The concept of investigating “shared pathways” for opportunities to prevent NCD as a group could be transformative in advancing our ability to understand disease etiology and effective prevention and control strategies [10]. A natural extension of strategic goal 1 studies in healthy aging, children, and young adults is the exploration of effective behavioral and lifestyle interventions for addressing the prevention and control of NCD. Novel interventions for NCD could also be explored through studies on the emerging science of social networking and NCD risk factors [11,14]. As pointed out by Barabasi [15], networks of social influence may have just as strong an impact on the development of obesity as other strong genetic effects and may thus be valuable in the design of interventions of weight management. Novel approaches to explore social and environmental determinants as well as what Fried termed the “global vectors” [10] of NCD are also a high priority.

Two particularly vexing challenges related to this goal are 1) the huge chasm between what we know to be effective in reducing disease burden and what we do in routine clinical and public health practice [16], and 2) the intractable pervasive nature of disparities in access to care and quality of care in the United States [17,18] and abroad.
Regarding the former, Hassell and Hennis [22] provide evidence of the implementation gaps that need to be addressed for us to succeed in the prevention and control of NCD. For example, they point out that although 13 countries are parties to the Framework Convention on Tobacco Control, only 4 have adopted at least 1 of the 4 proven-effective tobacco demand reduction measures at their highest level of implementation [22]. Additionally, only 3 countries have fully implemented at least 1 of the 3 best buys to reduce harmful use of alcohol [22].

**Strategic goal 3: advance translational research**

This goal facilitates innovation and accelerates research translation across the entire research spectrum, bridging basic to clinical, clinical to practice, and population to health impact. Both early and late phases of translational research are important. In the early phase of translational research, fundamental discoveries about molecular, cellular, and tissue-based mechanisms of HLBS and other NCD are translated into novel and ideally improved diagnostic and therapeutic interventions, devices, and drugs. For these outcomes to have significant health impact, they have to be affordable, acceptable, and used with high fidelity as demonstrated in efficacy and effectiveness studies. This last requirement necessitates investments in dissemination and implementation research—an important part of late-stage translational research [23].

Several articles in this issue of *Global Heart* address this goal. Palma et al. [24] reported a case study from Swaziland’s National NCD program as an example of successful integration of NCD services for people living with human immunodeficiency virus (HIV) and receiving healthcare in HIV programs. They also demonstrate the adoption of resources and tools initially designed for HIV-specific settings now adapted for screening, monitoring, and management of NCD [24]. The novel ways in which social networks can stimulate research to improve the prevention and control of NCD and risk factors are presented by Jarvis et al. [11]. Legal frameworks have been used to expand the spectrum of effective public health strategies for addressing NCD and risk factors in community settings [25,26]. Peer and Kengne highlight the role that laws, regulations, taxation, and price interventions can be used to support NCD prevention and control [27]. Research on strategies that help simplify NCD treatment algorithms and improve medication affordability, acceptability, ease of use [28], and also advance adherence science is needed [29].

Regardless of the strategy used to address this goal, research to identify ways in which the “best buy” interventions can be adopted, scaled-up, and sustained long-term is always a high priority [10,30,31]. The articles addressing the challenges in chronic disease prevention and control in the Gulf Cooperation Countries [2] and in the Caribbean [22] provide opportunities especially for implementation research. As pointed out by Yach [32], there many important lessons from progress made in the global control of tobacco that can inform strategic priorities in the prevention and control of NCD. In addition to these lessons and insights, research is needed to explore strategic cross-sector collaborations that leverage new approaches, innovations, and emerging technologies to advance the prevention and control of NCD [33].

**Strategic goal 4: develop workforce and resources**

This goal enables the development of a diverse biomedical workforce equipped with the essential research resources.
to pursue emerging opportunities in science. It is essential to all of our work. Without a rich pipeline of committed and well-trained investigators, the compelling research questions and critical challenges of the future might go unanswered. Creating the opportunity and environment for effective preparation of a diverse scientific workforce is crucial [10] for the United States and abroad and remains a high priority at the NIH [34] and NHLBI [35–37].

Recognizing the dearth of skilled health professional workforces in most low- and middle-income countries [38], Jarvis et al. [39] address one potential solution using community health workers in task-shifting. They also highlight the need to foster an appropriately supportive policy environment, standardize incentive schemes across countries, and provide professional recognition for task-shifting to succeed [39]. Harold [40] also addresses the role that professional organizations such as the American College of Cardiology can play in mitigating the global shortage of health care workers.

**CROSS-CUTTING THEMES**

Several articles in this issue of *Global Heart* address themes considered cross-cutting in the NHLBI strategic vision and thus have relevance for all 4 mission-relevant strategic goals. These themes include research across the lifespan, from children [12] to the elderly [10], systems science, predictive modeling, and big data; research funding; monitoring and evaluation of research output for impact [41,42]; and strategic partnerships necessary to advance research and turn discovery science to health impact [40,42–44]. The magnitude and trends in global funding for NCD discussed by Nugent [45], although an important cross-cutting theme, are outside the scope of the NHLBI strategic research goals. Another cross-cutting theme important in the prevention and control of NCD is health inequities—a challenge that has proven very difficult to solve in the United States and elsewhere and remains a high priority for research at the NHLBI [46].

**CONCLUSIONS**

The NHLBI remains committed to supporting meritorious high-quality research in HLBS diseases and disorders that contribute to addressing the national and global challenge of NCD. We believe that research funding agencies can play an important role in elevating strategic research priorities that can inform the prevention, detection, evaluation, treatment, and control of NCD nationally and globally. The research implications of articles in this issue of *Global Heart* have direct relevance to this mission and to our strategic vision for Institute-solicited research, but they can also inform investigator-initiated research globally. In this endeavor, Greenberg’s advice for public health to expand its horizons by tearing down the walls or “silos” that inhibit the emergence of relevant global public health” deserves serious consideration and contemplation [47]. We need multi-sectoral and interdisciplinary team science approaches to address these mission-driven strategic research goals to better inform research in the decade ahead.

**REFERENCES**


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