Published in final edited form as:

Glob Heart. 2015 March ; 10(1): 87–91. doi:10.1016/j.gheart.2015.02.001.

A Global Health Strategy to Capitalize on Proven-Effective Interventions for Heart, Lung, and Blood Diseases

Michael M. Engelgau, MD MS FACP¹, Emmanuel Peprah, Ph.D.¹, Uchechukwu K. A. Sampson, MD, MSc, MBA, MPH, MS, FACC¹, and George A. Mensah, MD, FACC¹

¹ Center for Translation Research and Implementation Science, National Heart, Lung, and Blood Institute, National Institutes of Health (NIH), Bethesda MD

Global health research has historically been a high priority endeavor at the National Institutes of Health (NIH) and currently represents one of the five priorities of the NIH Director.¹ Recognizing that science and disease have no national borders, NIH has encouraged its Institutes, Centers, and Offices to work with the Fogarty International Center to support biomedical research and research training across the globe.^{2, 3} In this effort, many Institutes including the National Institute of Allergy and Infectious Disease, National Cancer Institute, National Eye Institute and National Institute of Environmental Health Sciences, and others, have established or expanded their global health programs. More recently, the US Council on Foreign Relations (CFR) produced a report calling for a more robust US engagement in global health, especially for non-communicable diseases (NCDs).^{4, 5} In the report, a task force commissioned by CFR analyzed the case for increased U.S. focus on NCDs by examining countries that received significant U.S. health assistance and found that the premature burden of death and disability in many of these countries was heavily NCD-related.⁵ The CFR finds two compelling global health interests that justify increasing the US engagement with NCDs. First, NCDs undermine the effectiveness of existing U.S. global health investments. Second, NCDs represent an opportunity for the U.S. government to build on existing U.S. global health platforms that can achieve sustainable reductions in premature death and disability that disproportionately affect the poor.

In support of these calls for prioritizing global health, the National Heart, Lung, and Blood Institute (NHLBI) has championed a broad spectrum of biomedical research, training, and education programs, especially in low- and middle-income countries.⁶ These NHLBI investments span the full spectrum from basic fundamental discoveries to population health research in alignment with the three goals of the NHLBI Global Health Strategic Plan.⁶ The

Correspondence Michael M Engelgau MD MS FACP, Center for Translation Research and Implementation Science (CTRIS), National Heart, Lung, and Blood Institute, National Institutes of Health, One Rockledge Center, 6705 Rockledge Drive, Suite 6070, Bethesda, MD 20892, Office: 301-594-4279, Fax: 301-402-1051, michael.engelgau@nih.gov.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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 U.S. Department of Health and Human Services.

Conflict of Interest Disclosure: None

majority of these funded research activities focus on basic, clinical, and population science research that emphasize fundamental discoveries and early stages (T1-T3) of the translational science roadmap.⁶ Some highlights of these global health activities include (Table 1):

- NHLBI/United Health Group Collaborating Centers of Excellence in low- and middle-income countries with formation of 11 Centers of Excellence focused on heart and lung research and training;⁷
- Global Alliance for Chronic Diseases (GACD), 10 of the world's largest public funders partnered to support biomedical research which to date has invested a research portfolio for hypertension prevention and control, and diabetes and cardiovascular disease;⁸
- Global Alliance for Clean Cookstoves, a public private foundation hosted by the UN Foundation, focused on reducing chronic lung disease among vulnerable women and children exposed routinely to indoor burning of solid biomass fuels;⁹
- Medical Education Partnership Initiative (MEPI) in sub-Saharan Africa focused on medical education and building research capacity for HIV/AIDS but also included NHLBI funded linked awards focused on cardiovascular diseases in Uganda and Zimbabwe.¹⁰

These global health efforts have primarily focused on epidemiology and intervention efficacy studies. However, training and experience with T4 research – late-stage translation research – that is, research that will take proven-effective interventions and study their broad implementation across populations - has been minimal or lacking altogether. Yet, these skill sets are urgently needed in order to capitalize on the large pool of proven effective interventions that are available for uptake in the global health arena.¹¹ Specific skills that will be needed include experience in T4 research methods and metrics, partnership building for testing multilevel, multifaceted interventions, and grant writing.

The recent establishment of the Center for Translation Research and Implementation Science (CTRIS) within NHLBI, provides a unique opportunity to build on NHLBI's biomedical research investments within its global health efforts with a focus on T4 research.¹² Other leading global institutions, such as the World Bank are now calling for more T4 research within global health efforts.¹³ CTRIS is charged with providing T4 research leadership for heart, lung, and blood diseases and sleep disorders (HLBS) in the global health arena while it partners with all the NHLBI Divisions, Centers, and Offices to advance the Institute's research mission in the earlier T1-T3 stages of the translational science roadmap. In addition, CTRIS is teaming up with the Fogarty International Center¹⁴ and other key NIH partner Institutes and Centers to build on past global efforts and develop new collaborations working on T4 research.

Today, a vast array of proven-effective HLBS disease interventions is available. A recent World Economic Forum and WHO collaboration developed a report addressing current information gaps in our understanding of how to mitigate the social costs of NCDs and the resource needs for managing these conditions.¹¹ Targeted at decision makers, civil society,

and the private sector, this report provides assessments of the economic impact of NCDs and costs of scaling up a core of proven-effective interventions within low- and middle income countries. These interventions, referred to as “best buys” should be feasible within the current country context. However, successfully delivering “best buys” within a country's context requires locally developed knowledge bases for effective and sustainable dissemination and implementation that is context specific. The specificity of local knowledge needed to understand how adoption, acceptability, appropriateness, cost, feasibility, fidelity, penetration and sustainability are critical for implementing intervention strategies in low resources settings provide - a compelling reason to prioritize efforts on T4 translation research. In crafting a strategic way forward and to operationalize NHLBI's Global Health Strategic Plan,⁶ we held a Global Health Think Tank in September, 2014, to obtain input from experts in global health. A panel made up of invited members of the Institute's National Advisory Council and its Board of External Experts along with global health experts and key stakeholder partners was tasked with providing expert and ongoing advice on compelling scientific questions for T4 research that could inform and guide NHLBI global health research priorities including:

- Catalyzing T4 translation research in HLBS diseases and disorders in low- and lower-middle and upper-middle income countries
- Developing T4 translation research infrastructure for global health research that leverages previous NHLBI global investments
- Training and mentoring for the next generation of global health researchers for rigorous T4 translation

Globally, a huge variation in country level resources and capacity is evident. The World Bank, using established methods,¹⁵ categorizes counties into strata by their gross national income per capita.¹⁶ (Table 2) These strata are then used to tailor World Bank development efforts and loan packages best suited to each country's current context. Moving from low-income (<US\$1,045 per capita) to lower middle income->US\$1,045 to \$4,125 per capita), and to upper middle-income countries (US\$4,126 to US\$12,745 per capita), finds a huge range from low income countries with only minimal resources and capacity, to well established health care delivery systems and research infrastructure within some upper-middle income countries. Overall, many panelists from the Global Health Think Tank supported strategically supporting focused global health research efforts using tailored support strategies that align with the country's infrastructure, capacity, and context. This approach will assure that goals are feasible and achievable.

Furthermore, paced and tailored strategies across low-income, lower-middle-income, and upper-middle-income countries for engaging country-driven T4 research for local priority health issues are needed. Where capacity is very limited (low and lower-middle income countries), larger upfront efforts for planning, organizing, and training will be the need. While in upper-middle income countries, where capacity for non-T4 research is already established, less intensive efforts will be needed to support T4 research capacity.

Strategic partnerships are a critical success factor with global health T4 research efforts. Panel membership for the NHLBI Global Health Think Tank included heart, lung, and blood

disease global health experts, NIH Institute experts with global health portfolios from National Cancer Institute, National Institute for Neurologic Diseases and Stroke, National Institute for Mental Health, and the Fogarty International Center, US federal agency experts from Health and Human Services Office of Global Affairs, US Agency of International Development, the Agency for Healthcare Research and Quality, and the Centers for Disease Control and Prevention, and finally, less traditional partners for NIH—WHO and World Bank experts.

The time is ripe for NHLBI supported strategic efforts in research for global health. As the Institute of Medicine recently affirmed, reducing the burden of cardiovascular and other chronic diseases worldwide - especially in low- and middle-income countries - is an achievable goal.¹⁷ However, it will require identifying strategies to link-up specifically with the Fogarty International Center, other key NIH Institutes and Centers, along with other key stakeholders working on heart, lung, and blood diseases and sleep disorder research within global health settings. In addition to expanding our global health knowledge base, efforts in T4 research, which NHLBI has made high priority, should lead to increased adoption, adaptation, dissemination, and scaling-up of the National Economic Forum's and World Health Organization's "best buys" - effective, affordable interventions for specific real world settings guided by country-driven health priorities.¹⁷⁻¹⁹ NHLBI's current global health strategic plan and now the ongoing Strategic Visioning process are providing a sound direction for this future research agenda.²⁰

References

1. Collins FS. Research agenda. Opportunities for research and NIH. *Science*. 2010; 327(5961):36–7. [PubMed: 20044560]
2. Breman JG, Bridbord K, Kupfer LE, Glass RI. Global health: the Fogarty International Center, National Institutes of Health: vision and mission, programs, and accomplishments. *InfectDisClinNorth Am*. 2011; 25(3):511–36, vii.
3. Glass RI. What the United States has to gain from global health research. *JAMA*. 2013; 310(9):903–4. [PubMed: 24002270]
4. Bollyky TJ, Emanuel EJ, Goosby EP, Satcher D, Shalala DE, Thompson TG. NCDs and an outcome-based approach to global health. *Lancet*. 2014; 384(9959):2003–4. [PubMed: 25483157]
5. Council on Foreign Relations. The emerging global health crisis: Noncommunicable diseases in low- and middle-income countries. USA. 2014
6. National Heart Lung and Blood Institute. [Feb 15 2015] <http://www.nhlbi.nih.gov/about/org/globalhealth/resources/OGHStrategicPlan%2007022012%20-%20FINAL.pdf>
7. National Heart Lung and Blood Institute and United Health Group. [Feb 15 2015] <http://www.nhlbi.nih.gov/about/org/globalhealth/centers/>
8. [Feb 15 2015] Global Alliance for Chronic Diseases. <http://www.gacd.org/>
9. [Feb 15 2015] Global Alliance for Clean Cookstoves. <http://cleancookstoves.org/>
10. [Feb 15 2015] Medical Education Partnership Initiative. <http://www.fic.nih.gov/programs/Pages/medical-education-africa.aspx>
11. World Economic Forum and World Health Organization. [Feb 15 2015] http://www3.weforum.org/docs/WEF_WHO_HE_ReducingNonCommunicableDiseases_2011.pdf
12. National Heart Lung and Blood Institute. Center for Translation Research and Implementation Science (CTRIS). [Feb 15 2015] <http://www.nhlbi.nih.gov/about/org/ctris/>
13. World Bank. [Feb 15 2015] <http://www.worldbank.org/en/news/speech/2012/10/12/remarks-world-bank-group-president-jim-yong-kim-annual-meeting-plenary-session>.

14. National Institutes of Health, Fogarty International Center. [Feb 15 2015] <http://www.fic.nih.gov/researchtopics/pages/implementationscience.aspx>
15. World Bank. [Feb 15 2015] <https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method>
16. World Bank Group. [Feb 15 2015] <http://data.worldbank.org/news/2015-country-classifications>
17. Institute of Medicine. Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health. National Academies Press; Washington, DC: 2010.
18. Mayosi BM. The 10 'Best Buys' to combat heart disease, diabetes and stroke in Africa. *Heart*. 2013; 99(14):973–4. [PubMed: 23680892]
19. Vedanthan R. Global health delivery and implementation research: a new frontier for global health. *MtSinai JMed*. 2011; 78(3):303–5.
20. Mensah GA, Kiley J, Mockrin S, Lauer M, Hoots K. NHLBI Strategic Visioning: Setting an Agenda Together for the NHLBI of 2025. *Am J Pub Hlth*. 2015; 105 (published on line) URL pending.

Table 1

Examples of global health projects, their funding partners, and participating countries by World Bank country income per capita categories.*

Project Name and URL	Funding partners (country location)	Countries participating by World Bank income/capita categories level	Comments
NHLBI/United Health Group Collaborating Centers of Excellence ¹	United States – NHLBI and United Health Group	<i>Low income:</i> Bangladesh, Kenya <i>Lower middle income:</i> Guatemala, India (2 sites) <i>Upper middle income:</i> Argentina, China, Mexico, Peru, South Africa, Tunisia	2010-2014 11 countries Focused on heart and lung disease research and training. Project completion and evaluation is underway.
Global Alliance for Chronic Diseases ²	Australia, Canada, China, European Union, India, Mexico, South Africa, Thailand, United Kingdom, United States (NHLBI)	<i>Low Income:</i> Kenya, Nigeria, Rwanda, Tanzania, Uganda <i>Lower middle income:</i> Ghana, India (4 sites), Samoa <i>Upper middle income:</i> Argentina, China, Fiji, Malaysia, Peru, South Africa (2 sites) <i>High income:</i> Canada (aboriginal population)	2007 - ongoing 15 countries Focused on prevention and control of blood pressure for first proposal call, diabetes on second call, and household air pollution on third call.
Global Alliance for Clean Cookstoves ^{3**}	Canada, Denmark, Germany, Ireland, Malta, Netherlands, Norway, Spain, Sweden, United Kingdom, United States Supported by grants and investments from governments, corporations, foundations, civil society, investors, and individuals	<i>Low income:</i> Bangladesh, Kenya, Uganda <i>Lower middle income:</i> Ghana, Guatemala, India, Nigeria <i>Upper middle income:</i> China	Public-private partnership with UN Foundation: goals are to save lives, empower women, and creating global market for clean household cooking solutions 8 focus countries. <i>Phase I (2010-14)</i> - focused on enhancing demand for clean cookstoves and fuels; strengthening the supply of clean cookstoves and fuels; and fostering the enabling environment for a thriving market for clean cooking solutions. <i>Phase II (2015-2017)</i> - focused on adoption of clean cookstoves and fuels
Medical Education Partnership Initiative ⁴	Office of the U.S. Global AIDS Coordinator, using largely U.S. President's Emergency Plan for AIDS Relief (PEPFAR) funds; jointly administered by the Fogarty International Center of the National Institutes of Health and the HIV/AIDS Bureau of the U.S. Health Resources and Services Administration along with funds from 8 NIH Office/Centers/Institutes (including NHLBI)	<i>Low income:</i> Botswana, Ethiopia Kenya, Malawi, Mozambique, Tanzania Uganda, Zimbabwe <i>Lower middle income:</i> Ghana, Nigeria, Zambia <i>Upper middle income:</i> South Africa	<i>Phase I:</i> 2010-15 - focused on medical education and capacity building for HIV/AIDS with linked awards for other disease areas - NHLBI supported 2 linked awards for CVD research (Uganda and Zimbabwe). <i>Phase 2:</i> 2015-2020 - focused on mentored research and will again have linked awards.

* see <http://data.worldbank.org/news/2015-country-classifications>; <http://data.worldbank.org/about/country-and-lending-groups>

** GACC has 48 partner countries total, countries participating are focus countries

¹ <http://www.nhlbi.nih.gov/about/org/globalhealth/centers/>

² <http://www.gacd.org/>

³ <http://cleancookstoves.org/>

<http://www.fic.nih.gov/programs/Pages/medical-education-africa.aspx>

4

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

2015 World Bank country classification to low-, lower middle-, and upper-middle- income by gross national income per capita using the atlas method.*

Low-income countries (US\$1,045 or less)		
Afghanistan	Gambia, The	Nepal
Bangladesh	Guinea	Niger
Benin	Guinea-Bissau	Rwanda
Burkina Faso	Haiti	Sierra Leone
Burundi	Kenya	Somalia
Cambodia	Korea, Dem Rep.	Tajikistan
Central African Republic	Liberia	Tanzania
Chad	Madagascar	Togo
Comoros	Malawi	Uganda
Congo, Dem. Rep	Mali	Zimbabwe
Eritrea	Mozambique	
Ethiopia	Myanmar	
50		
Lower-middle-income countries (US\$1,046 to \$4,125)		
Armenia	Kiribati	São Tomé and Príncipe
Bhutan	Kosovo	Senegal
Bolivia	Kyrgyz Republic	Solomon Islands
Cameroon	Lao PDR	South Sudan
Cabo Verde	Lesotho	Sri Lanka
Congo, Rep.	Mauritania	Sudan
Côte d'Ivoire	Micronesia, Fed. States.	Swaziland
Djibouti	Moldova	Syrian Arab Republic
Egypt, Arab Rep.	Mongolia	Timor-Leste
El Salvador	Morocco	Ukraine
Georgia	Nicaragua	Uzbekistan
Ghana	Nigeria	Vanuatu
Guatemala	Pakistan	Vietnam
Guyana	Papua New Guinea	West Bank and Gaza
Honduras	Paraguay	Yemen, Rep.
Indonesia	Philippines	Zambia
India	Samoa	
55		
Upper-middle-income countries (US\$4,126 to \$12,745)		
Angola	Fiji	Palau
Albania	Gabon	Panama
Algeria	Grenada	Peru
American Samoa	Hungary	Romania
Argentina	Iran, Islamic Rep.	Serbia

Azerbaijan	Iraq	Seychelles
Belarus	Jamaica	South Africa
Belize	Jordan	St. Lucia
Bosnia and Herzegovina	Kazakhstan	St. Vincent and the Grenadines
Botswana	Lebanon	Suriname
Brazil	Libya	Thailand
Bulgaria	Macedonia, FYR	Tonga
China	Malaysia	Tunisia
Colombia	Maldives	Turkey
Costa Rica	Marshall Islands	Turkmenistan
Cuba	Mauritius	Tuvalu
Dominica	Mexico	Venezuela, RB
Dominican Republic	Montenegro	
Ecuador	Namibia	

* <https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method>