

## FOCUS: GLOBAL HEALTH AND DEVELOPMENT

# Understanding the Development and Perception of Global Health for More Effective Student Education

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The concept of “global health” that led to the establishment of the World Health Organization in the 1940s is still promoting a global health movement 70 years later. Today’s global health acts first as a guiding principle for our effort to improve people’s health across the globe. Furthermore, global health has become a branch of science, “global health science,” supporting institutionalized education. Lastly, as a discipline, global health should focus on medical and health issues that: 1) are determined primarily by factors with a cross-cultural, cross-national, cross-regional, or global scope; 2) are local but have global significance if not appropriately managed; and 3) can only be efficiently managed through international or global efforts. Therefore, effective global health education must train students 1) to understand global health status; 2) to investigate both global and local health issues with a global perspective; and 3) to devise interventions to deal with these issues.

## BACKGROUND

### *Global Health Movement*

A noticeable and influential evolution in the field of medicine in the 21st century is the emergence of the global health movement. This movement has built on the ex-

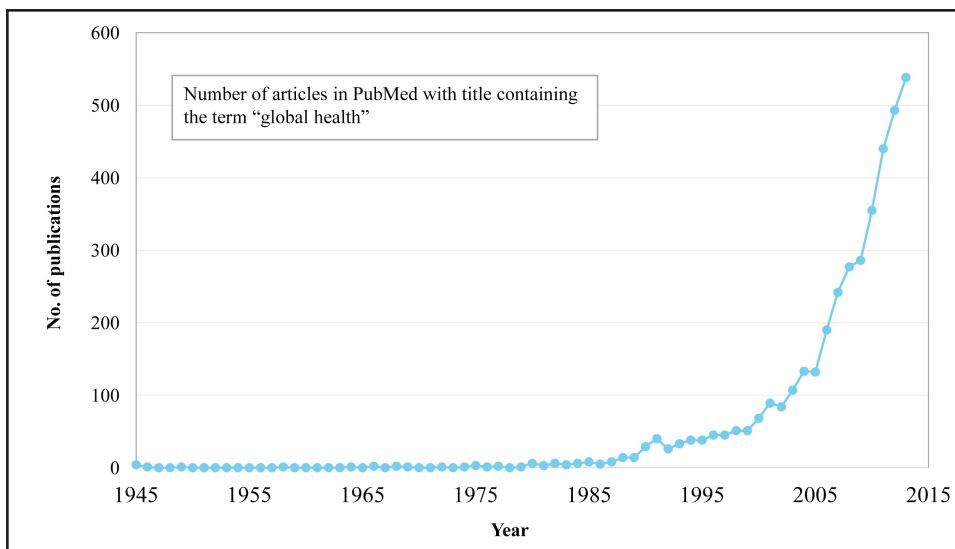
perience and achievement of the World Health Organization that was established in 1948 [1-3] and includes the current economic globalization and challenges confronted by medicine, public health, and international health [4,5]. The global health movement has the potential to reshape medical and health sciences, including re-

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†Abbreviations: CUGH, Consortium of Universities for Global Health; PEPFAR, President’s Emergency Plan for AIDS Relief; WHO, World Health Organization; HIV, human immunodeficiency virus; AIDS, acquired immunodeficiency syndrome; SARS, severe acute respiratory syndrome; GHIC, Global Health & Innovation Conferences.

Keywords: global health, medical education, public health



**Figure 1.** Explosive growth in publications in PubMed with “Global Health” as the phrase in the title.

search and education, as well as medical and public health practice. The concept of global health first appeared in the literature after World War II in the 1940s, when there was an urgent need for cross-national organizations to mobilize resources and coordinate activities to fight against life-threatening infectious diseases [6-9]. A search of paper titles from PubMed up to 2014, using the key words “global health,” indicated that few studies were published on global health from 1945 to 1995; however, since 1995, the number of publications has grown exponentially (Figure 1).

Concurrently, there has been a marked growth in the establishment of programs, centers, institutes, and departments under the name of global health in colleges and universities (particularly those in industrialized countries) [4,10]. A recent website review of medical schools in the United States indicated that 32 out of the 133 surveyed schools offered structured global health programs to students [10]. In the recent past, academic conferences, societies, consortiums, and associations have also been established in order to coordinate the effort of global health education, research, and practice. A notable example is the Consortium of Universities for Global Health (CUGH†), which was co-funded by the Bill and Melinda

Gates Foundation and the Rockefeller Foundation (<http://cugh.org>). After merging with the Global Health Education Consortium in 2011, the CUGH now has more than 200 member universities from across the world. The 2013 Global Health Conference of CUGH held in Washington, D.C., attracted more than 1,500 leaders, researchers, and innovators (<http://2013globalhealth.org/>). Another example is the Global Health and Innovation Conference (GHIC) initiated by Yale University in 2011. It is recognized as “the world’s leading and largest global health conference” and “the largest social entrepreneurship” conference, attracting more than 2,000 participants from all 50 states in the United States and more than 55 countries (<http://www.uniteforsight.org/conference/>).

In addition to academia, governments have also joined the efforts. A typical example is the President’s Emergency Plan for AIDS Relief (PEPFAR), created in 2003 by U.S. President George W. Bush. In 2009, President Obama released the Global Health Initiative to strengthen the PEPFAR for HIV/AIDS, tuberculosis, and malaria and expanded the PEPFAR to cover maternal and child health and neglected tropic diseases [11]. In 2010, with governmental support, Canada established the funding

program Grand Challenges Canada to support “Bold Ideas with Big Impact” in global health (<http://www.grandchallenges.ca/>). A total of 314 grants were funded in the 2012-13 fiscal year alone. Although functioning in many ways as national diplomatic strategies [12-14], these governmental initiatives stimulated the development of global health in the United States, Canada, and many countries across the globe.

### *Driving Force for Global Health Movement*

Few reported studies have investigated why global health is so prominent today, particularly given that the idea of global health appeared more than 70 years ago. A better understanding of what drives the current global health movement could inform higher education decision-makers on how to better direct the development of medical and health sciences. Such information is also needed for medical and public health education programs to adjust their teaching curricula to meet the current needs of the society. Furthermore, such information will better inform faculty and students in the medical and health science fields during the pursuit of their career goals. Lastly, a better understanding of the driving force for the global health movement may inform the governmental, non-governmental, and philanthropic organizations on how to better invest in health.

Several forces may be fueling the current global health movement, including the uneven development of health globally, the rapid growth and development of information and communication technologies, the infusion of large sums of money into global health, and the economic globalization. Like the unevenly paced economic development that drives the economic globalization, the *unevenly paced health development* is the fundamental driving force for the global health movement. Through the lens of Omran’s epidemiological transition theory [15,16], substantial differences can be observed in the patterns of morbidity, mortality, life expectancy, and quality of life among people living in different countries

across the globe. In many developing countries, people may only live up to 50 years, and infectious diseases (e.g., pneumonia, malaria, tuberculosis) are the primary causes of death [17-19]. While in developed countries, people can live to be well over 80 years old, and non-infectious diseases (e.g., cardiovascular diseases and cancers) are the main causes of death [20-22]. These differences imply great potential for improvement in the health of people across the globe. Furthermore, the glaring inequities are compelling to philanthropists and segments of the industrialized world, resulting in some substantial investment in global health in recent years.

Since differences in the level of population health have long existed, why have these inequities emerged as critical to address today? At least three influential factors are likely to be contributing to this timing. The first one is the *rapid development of information technology* in the past 1 to 2 decades, including the Internet, wireless technologies, and social media. Previously, health disparities across countries were acknowledged, but this information was circulated primarily among researchers through peer-reviewed journals and academic conferences or was made apparent by leaders from governmental organizations in charge of human and health services (e.g., health department, centers for disease control and prevention, etc.). With the development of information technology, health disparities across countries became the general public’s knowledge. Likewise, through the Internet and cellular technology, individuals in developing countries were able to gain access to information about health and development in the industrialized nations. Increased awareness of health disparities fueled the drive of people in the less developed nations to improve their health conditions. Therefore, the *awareness of differences in unevenly paced health development by the general public* becomes a second driving force.

Knowledge of the differences may not be adequate enough to trigger a global health movement without the influence of the *eco-*

*conomic globalization* — the third driving force. Along with the rapid economic globalization, the rapid development in technologies for long distance commuting and transportation has greatly facilitated cross-country movement of persons across the globe. People from both developed and developing nations can now directly observe the differences they have learned from media and directly experience different health conditions, lifestyles, medical education, health systems, and medical, pharmaceutical, and health technologies. In addition, many less developed countries have also experienced rapid economic growth, such as China and India, enabling the importation of medical and health technologies to improve the health of people in these countries.

The fourth factor is the *influence of non-governmental organizations*, particularly philanthropic organizations that are fueling the global health movement. The massive investment from philanthropists is substantial in attracting medical and public health institutions and their faculty and students, such as Bill and Melinda Gates [23,24] and the Rockefeller Foundation (<http://www.rockefellerfoundation.org/our-focus/our-focus/global-health>). There have been major advances and innovations made in research and interventions aimed at managing the HIV/AIDS, malaria, tuberculosis, pneumonia, and malnutrition epidemics and promoting maternal and child health across the globe [25-27]. The massive philanthropic investment has also created opportunities in academia to create new career tracks for faculty development and new programs for formal medical and public health training with a specific focus on global health [26,27].

The currently growing global health movement has the potential to lead to substantial change in medical and health sciences. It will reshape our values on health and economic development, reshape the role of governmental and non-governmental organizations in dealing with medical and health issues, and reshape the medical and health field, including research, education,

and practice. It is our hypothesis that just like in economic globalization, the global health movement will ultimately lead to a time of *health globalization*, when limited health resources are optimally allocated, people's health is maximized, and health inequalities are minimized across the globe. We as a medical and health profession must be ready for such a change and actively participate in and lead the global health movement.

## UNDERSTANDING OF GLOBAL HEALTH

A clear understanding of the concept of global health is needed 1) to help form the academic identity of global health in the larger field of medical and health sciences; 2) to mobilize resources supporting the development of global health; 3) to attract and train medical and health professionals in global health; 4) to actively carry out global health research; and 5) to effectively put global health into practice. Establishment of *a global perspective* is a prerequisite toward the understanding of global health. Different from the commonly accepted health perspective that focuses on local areas, individual persons, groups, or nations separately, global health considers health of a locality, an individual, a group or a nation as an integral part of the whole globe. Consequently, resources (e.g., personnel, monetary, material, scientific, and technical) available anywhere by anyone in the globe can be mobilized for any health issue regardless of its location and scope. The ultimate purpose is to optimize resource allocation so that health disparities will be minimized and people's health will be maximized.

Although the concept of global health appeared in the literature in the mid-1940s, and the term "global health" frequently appears in today's media and literature, there is no consensus on the definition of global health to date [2,4,5,12,28,29]. Although many existing global health institutions and programs are within or associated with public health, global health conceptually en-

compasses both prevention and treatment, which is broader in scope than public health that has its traditional emphasis on prevention [4,5].

How to scientifically conceptualize global health remains a challenge to many theorists and other scientists interested in global health [5,30]. With the global health perspective outlined at the beginning of this section and the subsequent discussion, I proposed a hierarchical conceptual framework: Global health can be understood at three levels from most general to most specific: 1) global health as a guiding principle; 2) global health as a branch of medical and health sciences; and 3) global health as a scientific discipline.

#### *Global Health as a Guiding Principle*

Global health can first be considered a guiding principle. Any effort to improve people's health, either locally or across national borders with a global perspective, can be considered as global health. This broad definition will enable us to understand retrospectively all of the significant events associated with the development of the global health movement. In addition to the growing number of peer-reviewed publications that are guided by global health, other examples include the establishment of programs, divisions, centers, institutes, and departments in the name of global health, organization of academic associations (e.g., CUGH), and academic conferences (e.g., GHIC). Although initiated and/or supported by different agencies such as governments (e.g., President Bush's PEPFAR and President Obama's Global Health Initiative), non-governmental philanthropic organizations (e.g., the Bill and Melinda Gates Foundation and the Rockefeller Foundation), and higher education and research institutions, all these efforts and activities share one point in common: They are guided by a focus on people's health either globally or locally with a global perspective.

Treating global health as a guiding principle also helps us understand the rapid growth in the number of people who are interested in global health and eventually par-

ticipate in global health activities in the past decade. For example, the CUGH began as a conference on global health issues in 2007 and has now attracted more than 200 member universities across the globe with thousands of students, faculty, research staff, and other health professionals participating in global health (<http://cugh.org>). The GHIC, initiated by Yale in 2011, has attracted more than 2,000 attendees every year, including leaders, students, faculties, and other professionals from all fields of health, international development, and social entrepreneurship with hundreds of plenary sessions for exchange of global health thoughts, innovations, and achievements (<http://www.uniteforsight.org/conference/>). Although these participants differ from each other in many ways, they are all guided by one common thought — global health — and have one common goal — promoting people's health across the globe.

Prospectively, defining global health as a guiding principle will be ideal to promote global health development. This definition has the least boundary and the broadest inclusiveness. With this definition, the door to global health will be widely open. Any individuals, groups, and organizations can contribute to global health if they believe in health for all across the globe, use a global perspective to investigate a medical or health issue, and take actions to improve people's health across the globe. With global health as a guiding principle, it is our anticipation that more and more people, including students, faculty, and medical and health professionals from all walks of life across the globe, will join the global health movement. More and more schools, research institutions, and national and international organizations will devote time and effort to global health teaching, research, and services, and more and more governmental, non-governmental, and philanthropic groups and organizations will invest resources to support global health development.

#### *Global Health as a Branch of Science*

Although global health as defined above may be a useful guiding principle, this definition is too broad for the development

of global health as a branch of medical and health science. In general, any field of medicine must deal with three fundamental tasks to achieve its goal: 1) describing a medical and/or a health condition; 2) investigating the etiology or the understanding of the causes, risk factors, and mechanisms of a medical and health condition; and 3) developing and implementing intervention measures to treat or to prevent a medical condition and to promote health. Following the general pattern of medical sciences, global health science can be defined as a new branch in medical and health sciences, and it will achieve its goal of health for all through global descriptive, etiological, and intervention research.

*Global descriptive epidemiology* is needed to depict, understand, and comprehend the global health status, including morbidity and mortality of all medical and health conditions and the corresponding socioeconomic and health care systems across the globe. Descriptive information is also needed to prioritize medical and health issues across the globe, supporting decision-making for optimal intervention strategies. *Global etiological research* must be carried out to examine medical and health conditions that are determined primarily by factors with a cross-cultural, cross-national, cross-regional, or even global scope, including medical and health conditions related to global warming, air pollution, social media, international travel, etc. Evidence obtained through global etiological research is the foundation supporting the development of intervention strategies to deal with medical and health issues. *Global intervention strategies*, including therapeutic, preventive, and promotion strategies, are to be developed, tested, and implemented to tackle a) any local health issues that will be of global significance if not appropriately managed (e.g., new infectious diseases such as SARS) and b) medical and health issues that can only be efficiently managed through international or global efforts (e.g., the pandemic of severe infectious diseases, prevention, and treatment of AIDS, cancers; prevention of travel, and migration-related

issues, such as acculturative stress and depression). One challenge for global health intervention research will be the emphasis of optimization of health resources allocation to maximize intervention effect and minimize health inequalities across countries and regions in the globe.

### *Global Health as a Discipline*

Given that global health is a branch of medical science, it is logical to establish global health as an academic discipline in the field of medicine. The establishment of the global health discipline is necessary for institutionalized education to recruit and train faculty and students, to conduct global health research, and to promote global health practice. Along with the development of the global health movement, a number of colleges and universities in the developed countries have established various global health programs, centers, departments, and institutes. As described earlier, the establishment of the CUGH in 2007 and further development of the organization in the subsequent years has facilitated the development of global health as a medical discipline. Many schools in developed countries now offer graduate degree programs in global health. A number of global health academic journals have been established, including *Global Health Action*, *Global Public Health*, *Journal of Epidemiology and Global Health*, and *Global Health Promotion*, to name a few.

Recently, a number of schools in industrialized countries also started to establish global health institutions for research and education through collaboration with schools in low- and middle-income countries around the Asia-Pacific region, including China, Malaysia, and Thailand. An example is the Global Health Institute at Wuhan University China. This institute was established in 2011 through a collaborative effort with Duke University and expanded to involve faculty members from the University of Pittsburgh, the University of Hawaii, Saint Louis University, the University of Tennessee, and Wayne State Univer-

sity in the United States. The Wuhan University Global Health Institute has three research directions, including population and health, environment and health, and behavior and health. The institute is now offering both an undergraduate program and a graduate program (Master of Science) in global health. In addition to formal education, Wuhan University Global Health Institute launched the *Journal of Global Health Science* and published the first issue in February 2014.

### RE-THINKING THE TEACHING SYLLABI FOR GLOBAL HEALTH

Based on existing university websites and the work by CUGH and others, there appears to be a lack of consensus in the definition of global health [4,5,30]. Consequently, few schools across the globe share similar global health curricula [10,30]. While the current work by CUGH on a competency model to improve global health education is an important effort toward curricula consensus, additional efforts are needed to test the proposed education model. Although the phenomenon of lack of consensus is natural in the development of a new discipline, efforts are needed to build a more consistent framework for future global health teaching. This is also one of the motivations of this manuscript, because consensus can better be reached through free and broad exchange and discussion.

#### *Teaching to Enhance Global Health Perspective*

To develop global health, medical and health education must first emphasize training to enhance global health perspectives among faculty and students. The approach to achieve this goal would be to provide adequate information regarding the medical and health status at the population level across the globe. Such information may include but is not limited to 1) health status, including morbidities, mortalities, life expectancies, major causes of diseases and deaths; 2) health care systems; 3) health expenditures from govern-

ment and individuals; and 4) health care resources, including total number of physicians and total hospital beds. Such information would serve as the fundamental materials supporting the development of a global health perspective. Exposure to such information will 1) broaden individual knowledge about medical and health issues globally; 2) enable researchers and practitioners to evaluate local and global medical and health issues in the global background; and 3) to conceive and devise intervention strategies accordingly.

#### *Teaching for Descriptive Global Health Research*

In addition to exposing faculty and students to published information regarding the medical and health status of populations across the globe, the teaching curricula need to cover methods and skills to describe the global health status, to compare differences in health status with a global perspective, to prioritize medical and health issues, to effectively obtain relevant and objective evidence supporting global health decision-making. Local and global data on populations, birthrates, death rates, GDP, health care expenditure, health care resources, etc. can often be found in existing sources, such as various types of yearbooks published by governments (e.g., yearbooks of population and health, yearbooks of economics and development), and datasets from the World Health Organization and the World Bank. Most of this data can be retrieved through the Internet from the corresponding websites. With data at hand, the next teaching task will be to train students on mapping health globally, tabulating health globally, and graphing health globally. Many traditional descriptive and comparative statistical methods can also be taught, including rates, ratios, line charts, bar charts and histograms; simple comparisons analyses such as chi-square tests, t-tests, and trend tests can also be included. In addition to the traditional descriptive and comparative methodologies and skills, global epidemiology must cover GIS technology — the most efficient method for global spatial and geographic mapping.

### Teaching for Global Health Etiology

A fundamental task of global health science is to understand the etiology of medical and health conditions with a global perspective and to obtain concrete data supporting intervention strategies to improve health. Therefore, we need to teach students principles and methodologies to investigate cross-cultural, cross-national, cross-regional, or even global factors that may affect medical or health conditions. Typical examples include but are not limited to global warming, large-scale environmental pollution, social media, cross-country transportation, international labor, immigration, and acculturative stress. In addition, we need to teach students how to investigate mechanisms by which various risk factors affect people's health at different ecological levels (e.g., from individual to family, social groups, further to local community to the globe). Global health teaching for etiological research should therefore emphasize 1) systems science; 2) computer simulation; and 3) system modeling techniques. Systems theory will guide us in our investigation of the complex global medical and health issues, aided by a global perspective [31,32]. Computer simulation and modeling techniques will help us overcome the barriers to collecting and processing huge amount of data and still allow us to gain an understanding of the complex etiological relationships between a risk factor and a medical/health condition at the group level [33].

In addition to systems science and computer simulation and modeling approaches, training on other empirical research is also needed. As has been described in the previous section on Descriptive Global Health, existing data from various sources are available also for global health etiological research. Typical examples are the World Health Survey, the Global Survey on Maternal and Perinatal Health, the Global School-Based Student Health Survey, the Global Youth Tobacco Survey sponsored by World Health Organization, and the General Social Survey carried out by NORC at the University of Chicago that has been extended from the United States to multi-countries. These

datasets have already been used in empirical research to address global health issues [34-37]. Another emerging source with great potential for global health research is social media, including Facebook, Twitter, WeChat, and QQ [38,39]. Data from these mega sources have been used in addressing large-scale significant issues in political sciences and economics [40,41].

### Training for Global Health Intervention

The ultimate goal of global health is to prevent and treat diseases and promote better health through global strategies. Many international and global intervention programs developed by WHO and individual countries across the globe provide enriched experiences and data supporting the development of global intervention sciences. Typical examples include the WHO Framework Convention on Tobacco Control, which is a global strategy for tobacco control across the globe, and the USAID's Global Health Initiative, which is a comprehensive program for disease prevention and control across the globe that focuses on infectious (including Malaria and AIDS) and non-infectious diseases (including obesity and malnutrition), as well as maternal and child health. In addition, a number of programs for diffusion and dissemination of evidence based interventions are also models for global health interventions, such as CDC's Dissemination of Evidence-Based Behavioral HIV Prevention Intervention [42] and Diffusion and Dissemination of Evidence-based Cancer Control Interventions by the US Agency for Health Care Research and Quality [43].

Similar to the economic globalization, one key part to global health intervention research is to teach students how to *optimize* the health resource allocation with a global perspective to *maximize* the effect of an intervention strategy and to *minimize* health inequality across countries/regions and the globe. One of the most appealing and most promising goals for global health is to promote health equality across the globe [4,34]. To reach the goal, it could also be one of the biggest challenges for global health researchers to establish techniques and



methodologies to devise intervention strategies capable of optimizing resource allocation to promote health globalization.

### *Training for Cross-Cultural Competence*

One challenging area that is unique to the success of global health science and discipline is the training of cross-cultural competence. This aspect has been addressed by all global health programs that have been established [5,30]. Inspired by programs for economic globalization, a number of related subject areas are included in the global health training curricula, including geography, foreign languages, communication, diplomacy, sociology, cross-cultural psychology, and international health systems [30]. Along with the rapid development of global health, more research is needed to evaluate the effect of such training for further improvement.

### **CONCLUDING REMARKS**

In this manuscript, we discussed the driving forces of the global health movement and the definition of global health as a guiding principle, a branch of science, and a discipline in the broad field of medicine. Based on our understanding of global health, we present our recommendations regarding the conceptual framework for devising global health education with a focus on descriptive global health, global health etiology, and global health intervention. We anticipate that the development of the global health movement may lead to an era of health globalization, when the allocation of limited sources will be optimized and the health of people across the globe maximized. We as a medical and health profession must actively participate in and shape the global health movement. Like any new branch of science, it will take time for global health science to develop. The purpose of this manuscript is to share our thoughts with the global health community in order to accelerate the development of global health science.

**Acknowledgments:** This manuscript would not be in its current status without Dr. Bonita Stanton's input, suggestions, critiques and English editing. Dr. Stanton, Associate Dean

of School of Medicine, Wayne State University, graduate from Yale Medical School, is a long-term colleague of the author and a global health activist. In addition, another scholar, Ms. Rhiana Wegner, a PhD candidate in Psychology, has assisted in the development of this manuscript through careful English editing, feedback, and proof reading.

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