CHAPTER 1

Public Health in Africa: Theoretical Framework

This introductory chapter sets the parameters for the study and tries to define clearly the major concepts and terms contained in the volume, such as the distinction between medical practice and public health; causes and impact of health disparities; and the reason why Africa functions under several health care systems which seem to be dysfunctional. Also covered in this chapter are such topics as available resources; the degree of national integration and nationhood that impacts health; people's educational level; cultural practices that may be obstacles to healthy behavior; Africa's specific geographic location and its eco-system; the state of the infrastructure; and constructive or hostile international relations. The point made in this chapter is that health can only be understood and properly managed if all variables are considered individually and collectively, given that synergetic phenomena can make or break a system, and overwhelm or prevent people's ability to manage their health and access to quality health care wherever they might be. Therefore, the concepts that inform the whole discussion include:

1. Health, health care, and public health, global health
2. Tropical medicine
3. Health systems and culture
4. Climates and climate changes and their impact on diseases

M.J. Azevedo, *Historical Perspectives on the State of Health and Health Systems in Africa, Volume I*,
DOI 10.1007/978-3-319-32461-6_1

5. Infectious, communicable, or transmissible diseases versus chronic or non-communicable diseases
6. Disease burden and health disparities in Africa
7. Globalization
8. International Health Organizations

These are examined as parts of the health or medical systems from an historical perspective that enables the reader to link the present to the past and vice-versa.

Assessing the changes that have occurred since independence in most of the African continent, which it achieved during the 1960s–1970s, and the impact of privatization and reliance on voluntary NGOs (forced on the Africans by the neo-liberal theories imposed by international financial organizations to advance the health and health care of Africans), is a difficult task. In fact, Prince and Marsland doubt whether the continent has "public health" as we understand it, given that the recent global health focus is unable to reach all citizens of the struggling countries in Africa. It appears that Africa, as a result of the hard economic decades of the 1980s and thereafter, has hardly pursued a serious and successful path toward the improvement of the health of its people, which is embedded in the modern, scientific medical principles that hold the premise that health strategies must be linked to prevention (and treatment), with policies based on real local conditions, adequate infrastructure, clean water, proper sanitation, and the eradication of environmental pollution, among other health-related factors. Indeed, the neo-liberal health policies of the 1980s compelled post-independence African states and governments to forget Alma-Atta's emphasis on primary health care, even after the 1987 Bamako Declaration. Primary health care was designed to focus on prevention of disease rather than treatment and not leaving the individual to fend for himself, while neglecting to "tackle the broader socioeconomic and political conditions underlying ill health," out of which "health services [in Africa] have become more containment of disease," often defined simply as "health emergencies" (Prince and Marsland 2014: 1–5).

Tropical Medicine

It might be enlightening to the reader if we discuss briefly the concept of tropical medicine as used by the pioneers of public health a few centuries ago. Tropical medicine has caused unnecessary debate among African

health experts and the former colonizers, or others, who have used the two words loosely. It is important that this distraction from the real health issues be dealt with here before it causes further confusion when addressing the most important concepts of public health, medicine, and global health. This much we know on the controversy. It is agreed that the concept of tropical medicine started during the nineteenth century in British, French, and German laboratories and schools of medicine whose primary motive was to care for the health of the army and the European administration living in tropical climates, as is the case of 80% of the African continent. However, in trying to solve the problem of ill health, the pioneers of the tropical effort focused on disease without seriously thinking about the socioeconomic factors responsible for certain disease clusters and the various pathogenic agents.

In many cases, diseases were considered to be tropical even if they did not originate within the tropics or occurred only occasionally in places such as Africa. It is widely accepted today, for example, that in Africa, many of the contagious diseases, such as syphilis and smallpox, spread to the interior from the coast—the preferred place for Europeans—which allowed the newcomers to control the shipping industry, the welcoming and enhancement of the arrival of more colonizers, and the discharging of laborers from one area of the continent to another. The reasons and impact of the stigma associated with several diseases, such as leprosy and mental illness, and how to combat them received little attention then. Sadly, this neglect continued even with the emergence African universities and medical schools at the end of the colonial period. In fact, the spread of such diseases as influenza is related to population density and people's relation to disease vectors such as mosquitoes, flies, helminthes, and lice, resource allocation, social interaction, and relationships of power that influence social organization and space, and not simply to geographic characteristics, climate, and tropical location (Niang 2008: 29).

Many public health experts make a sharp distinction between the concepts and goals of public health and global health, between international health and tropical medicine, between health itself and its disciplines, and between population and individual health. For one, some maintain that "tropical medicine has connection with [an] international [domain]," which is somewhat inaccurate, because one can focus on tropical medicine [or public health] and not necessarily transcend a country's or colonial national boundaries. Due to its connection with the early years of colonialism, as noted above, tropical medicine originated among interested colonial

doctors and scientists in England who described the state of Africa's health negatively while portraying themselves as the saviors of the continent. Eddleston notes in this context that, when the organization of European Schools of Tropical Medicine (TropMed Europe) met in Addis Ababa in 1997, "we were persuaded by our African colleagues that the term 'tropical medicine' still had patronizing colonial overtones and should be replaced by 'international medicine' although this decision was never implemented" (Eddleston 2011: vi). Prominent historian Roy Porter (1997: 462) objected to the use of the concept as it created the wrong impression of "Intrepid doctors going off to the steaming jungles and overcoming some of the most lethal diseases besetting mankind," as the greatest benefactors to mankind (Eddleston et al. 2011: v). To be sure, tropical medicine was defined by Manson in 1898 as the branch of medicine that focuses on the diseases "occurring only, or which from one circumstance or another are specially prevalent, in warm climates," requiring "the necessary skills and experience needed to meet its special challenges: the zoology of vectors and reservoirs, hygiene, anthropology, economics, epidemiology and demographics as the mainstream medical sciences."

No wonder the replacement of the concept of tropical medicine with that of "international medicine" was never adopted. Indeed, talking about international medicine makes little sense because, as the preceding authors noted, tropical medicine asks several questions whose answers are extremely relevant to such continents as Africa, including those that are not in the tropics: issues of medicine chain; impact of the heat on medication; drying a blood film or staining a malaria film; stabilizing airways obstruction by using a "a bloody tracheotomy"; weighing patients quickly in a humid temperature; operating a hospital without electricity and clean water; sanitizing and sterilizing hospital needles and similar equipment; applying the technique of weighing patients and monitoring their fluid balance "at the most peripheral levels of the health service"; avoiding contamination in situations where water is scarce; and improving the methods that might offset the impact of mosquitoes, flies, rodents, germs, and parasites that thrive in humid climates and wet areas. These and myriad other health-related issues are important or less critical where geography presents advantages or disadvantages for managing health care more efficiently and more effectively. Thus, even though tropical medicine has local, international, and even global implications, it need not be international: it may be simply national or regional depending on its specific focus. This means that in dealing with diseases health experts must go

beyond the concept because it is narrow in approach and confuses those who see health as determined by more factors than climate. In short, one must be careful when using the concept of tropical disease or diseases, which should mean that certain diseases are common in certain geographical locations and not that all found in such locations are tropical, as is the case with HIV/AIDS and SARS. Additionally, diseases appearing in cooler climates are not necessarily non-tropical, as many can adapt to any climate. As the world continues to shrink, the distinction between tropical and non-tropical becomes less accurate. Finally, one must consider genetic predisposition of an individual born in a tropical or cooler climate when trying to classify the disease.

Defining Public Health and Its Disciplines in Africa

The terms "public health" involve a set of critical concepts, a number of important actors, the various disciplines it evolved from and into, the constant changing or expanding foci it takes, and the misgivings that cynics have spread among the consumers of health care when presumably scientific studies continue to contradict one another, thus creating confusion and doubts about its significance for both populations and individuals. In the US, the resistance to imposing or promoting certain behaviors that public health professionals, practitioners, and advocates request is heightened when politicians and policy-makers claim that the field should be the domain of states rather than the federal government. This ideology has, for a long time, hurt the government's ability to act as the most important agent for the protection of people's health. In the US, such type of thinking is clearly underscored by the continued controversy over President Barack Obama's Affordable Care Act passed by Congress in March 2010 and declared constitutional by the Supreme Court in 2012.

The attempt by the opponents to repeal this law without suggesting any alternative comes from nothing else but an ideological framework that is based on the premise that health and access to (quality) care is not a right of all people, and that the poor and the unhealthy must be held responsible for their condition, for which they are to blame in a social environment that asks each citizen to fend for himself—an echo of sociologist Herbert' and anthropologist Darwin's theory of the "survival of the fittest." If this is the basis of social behavior and assessment of how

suffering fellow global citizens should be handled, the federal government has no legitimate authority over legislation on health. However, if one were to follow this logic to the extreme, as is the case among certain US politicians and pharmaceutical conglomerates, then one could simply posit that no state, federal, locality, or community has the right to regulate people's lives in so far as health is concerned and that only the individual can determine by himself his own conduct, even if this may result in an epidemic or a pandemic outbreak that affects everyone else. Such thinking demonstrates how absurd or unwise it is to reject the tenets and the sociopolitical requisites of public health. It is fortunate, at least for now, that this debate has not permeated discussions over the power of the African governments to legislate, survey, monitor, evaluate, fund, and advocate for certain types of policies designed to protect the health of the community and, consequently, that of the individual. This non-combative attitude in Africa has its roots in the colonial authoritarian regimes Africans inherited, the family and community-based traditions prevalent on the continent prior to the imposition of a system that focused on individualist capitalism interested only in the accumulation of material goods regardless of the methods used, one that sought instant or visible gratification brought about by the public health system. In the long run, however, a population-based approach is less expensive than a focus on individual disease cases and individual well-being.

Even though the definition of health was suggested as early as 1948 by the World Health Organization (WHO), few experts ever took it seriously until two decades ago. Yet, even today, some still consider it to be too utopian and, therefore, unattainable. The WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of diseases." In the context of such a definition, health is a positive concept that makes its opposite, ill health, undesirable, even if the ill person does not suffer from a disease. A person with a broken arm or a slight injury from a car crash does not have a disease but he is not healthy either. In the same vein, an individual who has an infection that does not develop into a disease is not in "health;" he or she is, instead, unhealthy.

The WHO's definition seems utopian but it is accurate as long as it stands as a long-range goal, an ideal that humanity should always strive for. One reason why this definition was introduced by the experts was to make the point that mental disorders are also diseases that should merit as much attention as physical illnesses. For a long time, in fact, mental disease remained neglected by the medical profession and even public health

practitioners and scholars, and policy-makers globally, including the West. As a positive concept, the United Nations (UN) definition emphasizes the point that "social and personal resources as well as physical capabilities" are all important elements for the health of the community (Lloyd and Morrow 2010). Public health is precisely what the two words mean, that is, "the state of complete physical, mental, and social well-being" of the public "and not merely the absence of disease" in its midst. This can be expressed in so many ways making the debate among experts unnecessary.

Novick and Brown defined public health as "organized efforts to improve the health of communities rather than individuals," combining science and social approaches, with the central goal of "reducing disease" and improving the health of the community (Lloyd and Brown 2010). However, it is agreed that definitions must be concise, precise, and relatively brief, while containing the essential elements that make something what it is, presenting a form of existence and operation that are unique to the subject been defined. In this light, Novick and Brown's definition seems to be too general to the extent that it needs some elaboration. Some definitions note, for example, that public health relies on a combination of science and art. Suppose there is no science, does one still have public health? What is science and who defines it? Can a community have public health without the element of art? What is art and who defines art? Aristotle gave us a simple principle for defining something: showing the specific genus and its unique species. By defining public health the way we have done over the past three decades or so, Africa and the less developed world may not have public health, which is only acceptable as long as we maintain the Eurocentric definition of science and art.

The Institute of Medicine, in its *The Future of Public Health* (1988), defined the concept(s) as "an organized community effort to address the public interest in health by applying scientific and technical knowledge to prevent disease and promote health." Though this definition has received much praise and acceptance from researchers and health practitioners, it must still answer this question: What is scientific and what is technology, so that it may be applicable to all health systems of the world no matter how underdeveloped? Indeed, did Hippocrates, the so-called father of modern (Western) medicine, or Thucydides, who wrote about epidemics in his part of the world of the time, have the scientific and technical knowledge expected to prevent disease and promote health? In a word, did the Greek and other ancient civilizations have public health?

C.E.A. Winslow, one of the best known promoters of public health since he began his work during the 1920s until his death in 1958, tried to define public health as:

> The science and art of preventing disease, prolonging life, and promoting physical health and mental health and efficiency through organized community efforts toward a sanitary environment; the control of community infections; the education of the individual in principles of personal hygiene; the organization of medical and nursing services for the early diagnosis and treatment of disease; and the development of social machinery to ensure every individual in the community a standard of living adequate for the maintenance of health. (Winslow 1920)

Winslow caused more confusion than was needed when presenting a definition that seems to cause more problems than it clarifies the essence of the field of public health with its many functions, means, strategies, goals, disciplines, and desired outcomes, interjecting the word individual, which takes the essence of public health away, namely, from its primary focus on the community and populations, or the public. Winslow's definition has received such negative criticism that renowned sociologist Paul Starr called it a downright subversive "—a conception [that is, if taken seriously, is an invitation to conflict." Starr continues his criticism: "Public health cannot make all these activities its own, without, someone, sooner or later, violating private beliefs or private property or the prerogative of other institutions…Much of the history of public health is a record of struggles over the limits of its mandate" (Starr 1982: 180). Starr further adds that, in the past, religious organizations opposed public health because it was perceived as officially introducing its own concepts of health and hygiene, while businessmen and merchants did not welcome the emerging field as they perceived it as encroaching upon their domain. At the end of the nineteenth century, physicians also vehemently objected to the impression that public health was infringing on the core of their medical profession.

This writer found an interesting definition that seems to present fewer problems and little confusion. Samantha Battams defined the "new" public health as "the sum of activities undertaken by societies, occurring both within in and beyond the health system and health sector, to promote health and prevent disease" (Battams 2014). Thus defined, public health may be applicable to even ancient societies, including those found in Africa, because it does not make essential the subjective Western understanding

of science, technology, and medical practices, as the identifying elements of the concept. The WHO makes two points in its discussion of the evolution of the field of public health and its belated acceptance as a one that the public needed, making a major contrast with the medical field and the unchallenged role of physicians. Battams notes that, for a long time, particularly in the aftermath of the Second World War,

> The nature of health issues became increasingly more medical and professional. The discovery of new drugs and other irrefutable medical progress laid the foundations for a strong belief in the ability of doctors and the health services to solve all the major health problems. Health policy became increasingly synonymous with medical care policy, with the debates centering on how we should finance and recruit personnel to an ever-swelling hospital sector. (WHO, Commission on Social Determinants 2000)

However, during the 1980s, public health began to have a stronger hand in tackling health problems that endangered the health of people, and it thus turned out to be a more respected field. In fact, several institutions and medical schools began offering degrees in the field. First, communities were disillusioned by the medical profession because diseases they expected to be contained or eradicated were still around, causing a heavy death toll, disability, and misery. This appeared to show both the impotency of physicians and the weakness of their clinical treatment of patients faced with infectious and non-communicable diseases. This understanding was highlighted and sharpened by the HIV/AIDS pandemic outbreak. Second was the fact that, for treatment and cure, enormous amounts of personal and governmental funds were being spent for years indefinitely, always escalating to such an extent that many people were unable to pay for the services they wished to receive. Third, while it was clear that the rich had a better chance of surviving disease and illness, the poor continued to lag behind no matter how often some of the socioeconomic barriers might be arrested.

The credibility of public health suddenly grew exponentially when it convincingly demonstrated that there was something called "socioeconomic determinants" of disease, implying that health is impacted by almost everything and every sector of life. Therefore, an understanding emerged that being in good health required the containment or eradication of risk factors, which included social inequities, disparities, and poverty. As the WHO has hastened to add, "Using health determinants as the basic means,

the vast majority of public health must take place outside the medical care service," or "outside the spheres of medical competence and knowledge" (see Krieger 2011: 291). In an effort to rebut those who claimed that using the stick of inequity or disparity was interfering with the scientific requisites of ideological neutrality, the WHO's Commission on the Social Determinants of Health (2008) added this strong statement: "Our core concerns with health equity must be part of the global community, health equity, and the urgency of dealing with climate change…When it comes to influencing unemployment figures, social security, housing segregation and alcohol habits, decisions taken in municipal assemblies and other democratic bodies play a much more important role than efforts made in the medical sector…The overarching aim is to create the conditions for good health on equal terms for the entire population."

It stands to reason, therefore, that public health should be defined in a way that fits all societies, all races, and all ethnicities, regardless of their status of development or social evolution, because, where there is an ultimate and implicit commitment to human beings, the effort and activities to promote health and prevent disease are always present, even though some practices may be more effective in some populations than in others. Public health will necessarily involve, as Battams elaborates,

> Health public legislation and policy [or binding guidelines handed down by a ccepted authorities, such as a king, traditional medical practitioners, and specially experienced and trained healers as is the case in Africa]; intersectoral action [as conduct safeguards imposed by merchants and rulers when caravans encountered an epidemic outbreak during their journeys]; community participation [as happened when the village chief in Africa would ask people to limit contact with an infected person or attend meetingsto stamp out disease, invariably focusing on the safety of the community rather than the individual, which, at times, even proscribed sexual intercourse]; and promotion of a physical, economic, and social environment conducive to health [such as an ordinance from the king asking the populace to move to an area not infested with mosquitoes carrying disease parasites, to quarantine cattle, and to pray for the eradication of pestilence and disease].

In his essay in the *Encyclopedia Britannica* (2014), John Bryant described public health as the "art and science of preventing disease, prolonging life, and promoting physical and mental health, sanitation, personal hygiene, control of infection, and organization of health sciences, recognizing the importance of community action in the promotion of health and prevention and treatment of disease" (Bryant 2014).

Ruth Prince and Rebecca Marsland (2014: 3) go further and are of the opinion that,

> The term public health conventionally refers to the duties of the modern state concerning the protection and care of the health of its citizens, through the application of modern, scientific medicine and rational administration—providing health-care services, preventive medicine, and environmental sanitation, as well as protective legislation concerning exposure to industrial, agricultural, or environmental hazards.

Even though this is not a definition, it encapsulates, nevertheless, what most health experts believe public health should be in our times. First, it places the state at center stage, implying that, with no state, there is no public health. It further stresses the role of the "modern state" rather than simply any state or any society that functions at the margins of society. Furthermore, the two authors restrict the term to the application of "modern, scientific medicine, and its administration through the use of rational principles." The problem, however, is that this conception of public health rules out any system in Africa or elsewhere prior to colonialism, especially among societies that had an egalitarian character or were stateless, such as the Ibo of Nigeria, given its emphasis on the modern state, the adoption of Eurocentric principles of science, and a "rational" type of administration that refers to the way the Western world has organized the conduct of health care through structures that are often too bureaucratic, unaccountable, voracious, and universalistic, allowing for no exceptions for population segments, and culturally unsound. This description of public health and its role is problematic also in so far as pre-colonial and pre-modern African medical practices are concerned. Indeed, concerted initiatives aimed at preserving, promoting, and treating disease in populations were common and intricate parcels of health practices on the African continent prior to the Atlantic slave trade during the fifteenth to nineteenth centuries and the scramble for Africa during the latter part of the nineteenth century and the beginning of the twentieth century (1884–1905).

Public Health and Medicine

The preceding discussion leads us to consider the distinction between public health and medicine. Both fields deal with disease and health but their focus is different: Public health, as emphasized here, deals primarily with the health of the community and not the individual, though the

two may at times overlap, and aims at preventing disease and promoting healthy behaviors and practices that lead to the improvement of the health of the public and of populations. Medicine or clinical practice, on the contrary, focuses primarily on the health of the individual and treatment of disease in clinical settings, to the extent that caring or curing one individual may not necessarily improve the health of the community. Medicine is, in a sense, a private, confidential, and individual practice, whereas public health is a communal act intended to prevent and control or eradicate all risks harmful to health—now commonly called the social and environmental determinants of health following official endorsement of the concept by the WHO in 2008. Public health is, therefore, uniquely suited to highlight the interplay between all factors and sectors of life that are related to the health or ill health of populations. Public health clearly calls for an integrated approach of activity to one of the most important aspects of life, health.

The Bloomberg School of Health at Johns Hopkins thus distinguishes the two fields—public health and medicine—their methods, and focus: "In the medical field, clinicians treat diseases and injuries one patient at a time. But in public health, we prevent disease and injury. Public health researchers, practitioners, and educators with countries and populations implement large scale practices solutions" (*Johns Hopkins School of Public Health Magazine* 2014: 1). In an effort to make the distinction sharper, the School further notes:

> Instead of treating a gunshot wound, we work to identify the causes of gun violence and develop interventions. Instead of treating premature low-birth babies, we investigate the factors at work and we develop programs to keep babies healthy. And instead of prescribing medication for high blood pressure, we examine the links among obesity, diabetes, and heart disease—and we use our data to influence policy aimed at reducing all three conditions. (*Johns Hopkins Magazine* 2014: 2)

To accomplish these tasks and ensure community and population well-being, public health uses several now established disciplines: epidemiology, biostatistics, behavioral health promotion and education, environmental health, mental health, health policy and management, nutrition, maternal and child health, and now *global health,* focusing on such topics and themes as epigenetics, food processing, contamination, and safety, old age, chronic and infectious diseases, disaster and disease outbreak preparedness, health

policy analysis, safe housing, hazardous driving, safety measures, better sanitation and hygiene, and assessment of population health outcomes, while searching for associations, or the "web of causation," and effective interventions for the major illnesses that affect populations, as well as prevention of infant mortality and problems associated with tobacco and drug use addiction.

On the differences between the two fields, public health and medicine, there is a saying that an aspiring physician was asked by Dr. Guy Hayes, a public health practitioner and fellow at the time with the Rockefeller Foundation, whether he would prefer to fish with a line or with a net. Dr. Hayes gave his own answer: "If you practice medicine, you are fishing with a line. But if you want to help more people you fish with a net. That's public health." This statement cannot be more illustrative of the differences between the two fields. However, because communities are made up of individuals, the two, at times, overlap, and tension may flare up from time to time. It would seem ideal to include more medicine in public health but the suggestion has been opposed by the medical profession. As Starr once reminded us: "Doctors fought against public health treatment of the sick, requirements for reporting cases of tuberculosis, and venereal disease, and attempts by public health authorities to establish health centers to coordinate preventive and curative medical services" (Starr 1982: 181).

Regrettable is the fact that most definitions fail to mention an important aspect that this author thinks should be a part of the definition of public health: agency, which is discussed later in the work, as it relates to health during the colonial period. How does a movement towards prevention of disease and promotion of health originate? Most often than not, it is not the community or the physician that initiates it. Including this element as a part of the definition would eliminate passive definitions that, leaving the agency out, would appear as coming out of the blue. Agency often comes from one health-focused individual, professional, researcher, or a small group of individuals. This needs prominence in the discussion of both medicine and public health. After noting that the public health profession differs from the clinical health professions in that the former encompasses many professional disciplines such as medicine, dentistry, nursing, optometry, nutrition, social work, environmental health sciences, health education, health services administration and the behavioral sciences, *Medicine Network* notes that its activities focus on entire populations rather than on individual patients (*Medicine Network* 2014). Another way of expressing the most effective way of improving the health of all is targeting "geographic or otherwise

defined populations, as an organizing principle." In fact, physicians have of late implicitly and explicitly acknowledged the importance of public health by enrolling in public health programs where they upgrade their knowledge and skills regarding, for example, the measurements of disease and its impact on populations, better understanding of the etiology of illness, and familiarity with the most recent best practices in the evolution of medicine itself and its application to the needs of the community at large. Public health practitioners are also avid researchers and gear their work towards translating their findings to concrete health situations or move their trade "from bench to bedside," as some would say.

Despite the acceptance of the role of public health now, Fayoyin lists a numbers of controversial issues it has had to contend with over the years, namely: the various, at times, contradicting interpretations of research findings; "claims and counter-claims" by experts and practitioners from various disciplines and walks of life that certain diseases can be cured or that we know all the answers to health problems; interference of politicians and institutions through policies, cultural norms, religious beliefs, ideological propensities, or economic interests, that result in "disinformation," as is the case with circumcision and HIV transmission in Africa (discussed elsewhere in this volume), vaccines, and condoms; errors in the implementation of medical treatment, and unethical practices; the proper and improper use of statistical data and interpretation; and "media gaffes," misreporting, or misinterpretation of health issues. This problem has been clearly highlighted by the dispute between some American doctors who deal with the Ebola virus treatment and European companies that have tried to discover drugs or vaccines against the deadly disease that erupted in Liberia, Sierra Leone, and Guinea recently as to the ethical process to prove the effectiveness and safety of a recommended intervention. Some experts, such as Dr. Kalil of the University of Nebraska Medical Center, argue that double-blind randomized trials that use drugs and placebos in a case-control study of diseases, such as Ebola, are the only ethical studies acceptable, of which Africa is being short-changed. As Nicole Lurie, US Health and Human Services Assistant Secretary for Preparedness and Response put it, "We recognize the need for compassion and quick access to effective drugs for those in need,…but history has taught that the best approach is to conduct rigorous controlled trials to determine both safety and effectiveness" (*The Wall Street Journal*, May 13 2015: A7). This means that patients are to be selected through a randomized process, i.e., one in which everyone has the same chance to participate in a clinical trial

that administers an experimental drug and placebo, with neither the doctors nor the participants knowing in advance or before the study who did or did not receive what.

The list of controversies in public health should also include: the contentions between the claims of superiority and infallibility of Western biomedicine, which do not take into account cultural factors and its clashes with traditional medical practices worldwide; absence or lack of rigorous medical training at several institutions in many parts of the world, including Africa, making public health a field in which anyone, even without any training, can claim to be an expert; introduction of racial attitudes and biases that taint research and findings; misinterpretation of the role of persistent inequalities and inequities in health; the tendency for public health disciplines to work in isolation from one another and from others outside the field; the absence of rigorous evaluation of accepted processes or protocols; and lack of consistent and robust research methods that often rely on scanty and poorly designed protocols. The most important caveat for anyone studying, reading, and applying public health is that this field has elements of natural and social science and the arts, the latter including the ability to assemble and integrate components of health to make results plausible or reasonable enough when weighed against science, strengthened by common sense and deeply embedded knowledge of people's behavior and culture. This can only be achieved through the use of the best interdisciplinary evidence-based practices. The next section discusses briefly the role played by the various public health disciplines referred to in the preceding paragraphs for the prevention of disease and promotion of health behavior globally, but with specific focus on Africa, the subject of this work. The first discipline that comes to mind is epidemiology.

Epidemiological Studies and Research in Africa

Given its focus and its ultimate goal, epidemiology has done more than any other discipline in public health to enlighten the world about the etiology of disease and its virulence and ill-health distribution in populations when it occurs, and establishing more acceptable methods of measuring risk factors and disease outcomes. In its very name, epidemiology, lie the Greek words disease, people, and study (*epi*: upon; *demos*: people; *logos*: study), which are translated as the study of "what falls on the population," understood to be death, disease outbreak, possibly in endemic, epidemic, or pandemic form. Jennifer L. Kelsie et al. (1996: 3) define epidemiology

as "the study of the occurrence and distribution of diseases and other health related conditions in populations." Others usually define it as the study of the determinants of disease and its distribution within a population at a specified period of time. The ultimate aim of epidemiology is to prevent disease, creating reliable measures of health outcomes, identifying health risks, and recommending interventions to protect people's health.

The discipline of epidemiology as we know it today began to take its final shape during the nineteenth century spurred by the impact of the industrial revolution, especially in England, where the cities grew rapidly out of the lure of the working opportunities in the cities, accelerated by the use of mass manufacture or production of goods, mechanization of agriculture, the advance of the transportation systems through the railroad, telegraph, and radio, and improved nutrition. These changes resulted in unprecedented population growth and consequently overcrowding in the cities, the appearance of slums, increased poverty among those who could not make it in the urban enclaves, the rapid spread of infectious diseases, and, therefore, in more deaths than expected. The result of the industrial revolution prompted Thomas Malthus to posit that, even though the population of England was growing too rapidly, death would be a natural balancing factor and that therefore there was no need of trying to slow down its impact. This thinking was disputed by many, including the emerging epidemiologists such as John Graunt, through his 1662 *Bills of Mortality* (his observations on mortality statistics from a plague outbreak in the City of London captured in government registries), and, later, William Farr, at times also known as one of the founders of modern epidemiology. Equally important is mentioning the British epidemiologist John Snow, who changed our perception of disease and suggested the ways to combat it. Thus, up until the 1980s, the consensus has been that epidemiology was born in England and "exported" to the New World, especially the US, as most of the first public health professionals including physicians were British and American.

These epidemiologists in embryo introduced the numerical approach to the study of disease and mortality, systematically analyzed the data they collected both from government and civil registries, and focused their attention on populations rather than on individuals. Consequently, epidemiologists are known for having developed and spread the perception of the role of their discipline in reference to the measurement of disease and disease impact, risk factors, and exposure, which are accomplished through especially designed approaches, such as cohort and case-control studies,

clinical trials, observational and cross-sectional surveys to determine what they call the relative risk and the odds ratio, rate, frequency, percentage, incidence, prevalence, life expectancy at birth, disease incubation period, morbidity, mortality, disability, secular (long-term) trends, seasonality, and disability-adjusted life years (DALYs). As a result, there are many types of studies that epidemiologists conduct to find health risks, sources of contagion and infection, types of diseases and their virulence, and their likely frequency and side effects, the nature of the disease environment, the appropriately administered and recommended remedies, interventions, or treatment. On one hand, stand the important epidemiological observational studies which are based on events or episodes that might trigger a response in people's immune system and impact their health status. In observational studies, the search is for the observable variables or data to understand or explain the likely outcome—that is, good health, infection, infectivity, disability, disease, or death. Descriptive studies, on the other hand, simply describe or narrate what has been observed, searching for answers to the research questions posed, namely, who, when, and where, regarding a specific disease that manifests itself in a given population or in a series of undesirable or unexpected individual cases.

Descriptive studies are distinguished from analytical in that the latter take data from the observable or cross-sectional studies and their outcomes and try to answer the questions "why" and "how," in a more intellectual and reflective manner. Cross-sectional surveys, at times, called snapshot studies, examine a population at a specific time interval and attempt to find the probable causes of a health episode affecting people or the disease conditions in order to provide answers to specific questions. This is done using an individual or focus group interview instrument, phone calls, written questionnaires, or through an examination of health registries detailing the conditions of patients admitted at the health facility that showed similar or dissimilar symptoms and outcomes during a certain period of time. Notwithstanding the fact that, at times, some of the aforementioned studies tend to be easier or more difficult to conduct and analyze, all involve a good deal of scientific knowledge and some art, common sense, and intelligent guessing—the reason why epidemiologists are often accused of not being analytical enough and rather relying on descriptive methods any educated person is able to apply.

A good example of this controversy is Cassel and colleagues' criticism of earlier epidemiologists when noting that "too may current epidemiological studies content themselves with describing incidence and prevalence

data by selected demographic variables and drawing few if any inferences," which implies that epidemiologists are not as relevant as perhaps clinical and laboratory scientists, who are considered to produce more credible explanations of etiologies of disease and population's ill health (See Cassel 1974: 1040–1043; Patrick and Jenkins 1960: 938–949). This criticism may have been justified some time ago but not currently because of peer review requirements and the level of improved and sophisticated methodologies in the field of public health. Critics must also remember that it is easier to study inanimate objects and non-humans than humans and societies, because of the latter's ability to manipulate data and information, conceal facts, hide feelings, and harbor preconceived or biased ideas. One might agree that it is much more difficult to be absolutely sure of one's "scientific" conclusions when dealing with people. Indeed, the inherent and potential problems apply to all sociobehavioral sciences, which have prompted Sharma Rausch, a Ph.D. psychologist at the US Homeland Security, heading the Human Factors/Behavioral Analysis Division at the Science & Technology Directorate, to affirm that it is the social sciences that are the harder sciences and not the natural sciences, which, more accurately, according to her, should be called the "softer sciences" and not the other way around. Summing up, as FAO says, "Inherent in the epidemiological approach is the belief that the frequency of occurrence of a disease in a population is governed by the interaction of a large number of different factors or determinants. Epidemiologists believe that by studying these interactions it may become possible to manipulate some of the determinants involved and so reduce the frequency with which the disease in question occurs in a population" (FAO 2015: 1). As John Last wrote in 2002, epidemiology is an "indispensable basic science of public health. It provides the logical framework for the facts that enable public health officials to identify important public health problems and to delineate their dimensions. Epidemiologic methods are used to define these health problems; to classify, identify, and elucidate their causes; and to plan and evaluate rational control measures" (Last 2002: 1).

Analytical studies are designed to test "hypotheses of associations of suspected risk factor exposures with health outcomes" that might be based on experimental testing or clinical trials. In such studies "measures of risk [at times expressed as relative risk or RR, odds ratio, or OR, from exposure and non-exposure] and measures of association, interaction/effect modification and quality assurance/control are also relevant" (Szklo and Nieto 2007). As expected, in the course of its long evolution since the mid-eighteenth

century but particularly the nineteenth century and thereafter, following the firm entrenchment of the germ theory of disease (Kunitz 2007: 12), epidemiology has accumulated its own theoretical base derived from the series of studies it has conducted, many of which have resulted in the discovery and announcements of irrefutable or probable causes or association among risk exposure, infection, disease, disability, or death. One thing is clear at this juncture, namely, that true epidemiology is based on rigorous methods or protocols set for collecting data and information, selecting the subjects for studies, analyzing, interpreting, or synthesizing the results or findings. As Nancy Krieger notes, "scientific observation [in epidemiology] is not a passive phenomenon of what we 'see' and our technical capacity to do so… In one sense, this means that meaningful observation is, at some level, theory-laden: what we 'see' depends in part on what our ideas are about what we expect to see and what assumptions underlie the methods used to 'observe' the data" (Krieger 2011: 24). What constitutes the wrong or unethical approach in epidemiological studies is the manipulation of the results or the research process itself to suit preconceived ideas or ideologies, as some social and even natural scientists have been accused of doing, reflected, for example, in the vehement attacks from some conservative circles on those scientists that claim that climate change is a hoax designed to advance their liberal theories.

Epidemiologists are known in particular for the careful and methodical use of their various study designs, specific to the nature of the studies at hand, with in-depth review as to whether or not they are cost effective, time consuming, and likely to produce significant results. Some of these studies are called retrospective, prospective, longitudinal, ecological, case-control, cohort, and clinical trials. Retrospective studies are historical in nature, while prospective are forward looking, as is the case with the cohort studies, in which prevalence baseline gives place to the events, such as exposure to risk, infection, death, or disease that occur during follow-up. Ecologic studies focus on populations and not individuals, which may span diverse countries and geographic locations and are often comparative in nature. However, the applicability of ecological studies must be handled with much care.

Observational cohort studies follow in time a group of individuals who have been exposed to the same risk factor or factors, have similar genetic predisposition (if known), and who perhaps live in the same environment, but are not yet ill, to find out who is more susceptible to an exposure. However, cohort studies tend to be more expensive than others and must

therefore be crafted very carefully because they may require a long follow-up and a large sample. This is where the concept of relative risk (RR) is used. In contrast, a case-control study is simply a cross-sectional observational retrospective study that uses subjects who have already suffered the impact of an exposure, weighed against healthy individuals—the control group—which is suspected of having been exposed to the same risk. The goal is to find the causes or the associations that might have resulted in disease or death. The major group of interest here is actually the case and not the control group, in an attempt to find out why they turned sick or died. A case-control study may not need a large sample, and therefore tends to be cheaper, and does not require follow-up like the cohort study, and the determination of risk is done through the odds ratio (OR) that provides the ratio of likelihood that a non-exposed person in the control group versus one exposed individual in the case group may end up contracting the disease. In contrast, a valid clinical trial, which is designed to answer the questions what, where, when, how, why, who, and which, requires a randomized selection of individuals who share the same exposures and risks and who have other similar characteristics that make them equally qualified to be participants in the study. Most often, a clinical trial requires some type of blinding of the subjects, the investigators, and often the analysts, a process called triple blinding, to ensure that the results are not biased. Blinded individuals will not know in advance who was subjected to an intervention, such as a drug or a vaccine, and who was administered a placebo (Bhuyan et al. 2015: 254).

It is hopefully clear from this discussion that an epidemiologist is "an investigator who studies the occurrence of disease or health-related conditions or events in defined populations" (Last 2002), just as a detective tries to find the origin, nature, and cause of a crime. In other words, the epidemiologist's ultimate goal before divulging his or her findings is to find what is called the "web of causation," even though often the relationship between the event and outcome is more of an association than of causality or cause and effect. The minimum requirement of his or her research or detective activity is to at least find scientific probability. Thus, as a detective, the epidemiologist protects the lives of a population through consistent disease surveillance and by being the first source of information and analysis when an unexpected disease outbreak occurs in a locality. Most of the epidemiologists are also part of the other public health disciplines and serve as physicians, as is the case in Africa. However, this unwise or necessary imposition of responsibilities overworks them, often resulting in little time for research.

The preceding discussion makes it clear that rigorous training in epidemiology and public health, collection of accurate and sufficient data, following a well-crafted protocol, and attainment of permission from an institutional review board (IRB) to conduct research when human subjects are involved, are the requisites. Many of the studies require considerable funding, particularly if they are cohort studies or clinical trials, and involve fieldwork. Therefore, the rigor of the research techniques, study relevance, and ability to acquire funding are major hurdles in the conduct of most studies. These are constraints that all developing countries, including those in Africa, face daily. Funding shortages, the dearth of trained personnel, slow turn-around permission from the authorities to conduct research, unnecessary bureaucracy, poor and decaying, dilapidated infrastructure, and obstacles generated by ethnic preferences, make it very difficult for African scholars to undertake and complete meaningful and externally valid studies. Sheba Gate et al. note that, among others, one of the many shortcomings of epidemiological endeavors in Africa "…is the weakness of the public health (and clinical) laboratory networks which are critical for effective public health surveillance especially for communicable diseases" (Gate et al. 2011: 1).

Furthermore, as noted, studies may be excessively delayed due to unnecessary bureaucracy, lack of time on the part the principal investigator (PI) and the critical personnel leading the study, who are often compelled to rely on students to conduct the study and are unable to live with them in the study's often remote location or area, and lack of meaningful partnerships with other African public health colleagues. For instance, the Association of Schools of Public Health in Africa (ASPHA), now officially registered in Accra, Ghana, is composed of a few epidemiologists and public health practitioners who also live so far away from each other that distance and lack of funds prevent them from gathering more often and forging research partnerships that would allow them to share research goals and successes and discuss strategies to withstand the frustrations. As of 2014, nine African countries with a total of 26 institutions offering a public health program/school sent 37 representative members to ASPHA's annual conference. ASPHA was founded on October 2010 in Nairobi, Kenya, and the following were the few founding members:

1. Kinshasa School of Public Health, Democratic Republic of Congo
2. Jimma University, College of Public Health and Medical Sciences, Ethiopia

3. School of Public Health, College of Health Sciences, University of Ghana
4. Moi University, School of Public Health, Kenya
5. The School of Public Health at Great Lakes, University of Kisumu, Kenya
6. School of Public Health, University of Nairobi, Kenya
7. School of Public Health, College of Medicine, Malawi
8. Department of Community Medicine, University of Nigeria, Enugu
9. Faculty of Public Health, University of Ibadan, Nigeria
10. School of Public Health, University of Cape Town, South Africa
11. School of Public Health, University of Witwatersrand, South Africa
12. School of Health Systems & Public Health, University of Pretoria, South Africa
13. Department of Health Studies, UNISA, South Africa
14. School of Public Health, University of the Western Cape, South Africa

In its third summit in 2012, ASPHA agreed that its objectives were to:

1. Evaluate the programs, curricula, research projects and faculty specialties of all participating institutions
2. Document the educational resources and identify available resources that can be shared immediately
3. Support an annual general meeting to review educational research projects to be undertaken by members and promote the agenda of the association
4. Initiate faculty exchange including external examiners within the region
5. Develop training workshops for the strengthening of information technology development in teaching/learning in member schools of Ph.D. programmers, supervision, external examinations and research, and
6. Produce a regular newsletter publishing the association's activities and other pertinent public health issues in the region.

It is certainly curious to know how the very few delegates attending the summit, under the first presidency of Dr. Fred Banka, Dean of the College of Public Health at the University of Ghana at Legion, will make a difference in

the conduct of research in public health, particularly in epidemiology. Since funds are simply not easily available to conduct meaningful epidemiological work in Africa, epidemiologists find that they are severely handicapped.

A 2012 study supported by the *International Journal of Epidemiology* reported that, recently, epidemiological work in Africa has improved but that much more is needed to make its work relevant. The journal found out, for example, that from 1991 to 2010, epidemiologic research as a part of public health research in the WHO/AFRO region increased from 172 to 1086. At first glance, the increased number seems impressive but it amounts to only 50 articles per year for the whole continent during a period of 19 years. Moreover, most of the epidemiological studies or research projects are done within the context of public health and not epidemiology per se, and focus almost exclusively on infectious diseases, designed only to "control health problems." Researchers very rarely join hands with researchers from the other sociobehavioral sciences, which would increase and sharpen their work output. Another weakness comes from the fact that most of the research and the training of epidemiologists in Africa are overwhelmingly sponsored by the international organizations, invariably originating from the US, the European Community, and Australia.

In addition, most of the faculty or professionals who have had an opportunity to be trained in epidemiology have studied in South Africa, particularly at the Stellenbosch University's South African Centre for Epidemiological Modeling and Analysis (SACEMA), and in a few other countries, most notably, Nigeria, Kenya, Uganda, Zimbabwe, Ethiopia, Ghana, and Zambia. Unfortunately, the training has focused only on the Master's degree level and virtually none on the Ph.D. or Dr.P.H. To acquire one of these advanced two degrees in epidemiology, the candidate must go abroad. Even more frustrating is that, in Africa itself, there are only a few funding organizations for the epidemiologists' work, and include the WHO and The Research and Training in Tropical Diseases (TDR), the Ifakara Health Institute in Tanzania, Kintampo Health Research Center in Kintampo, Ghana, KEMRI-Wellcome Trust Research Program in Kilifi, Kenya, the Manhica Health Research Center in Maputo, Mozambique, the Infectious Diseases Institute of Makerere University in Kampala, Uganda, the Rakai Health Sciences Program in Rakai, Uganda, the Malaria Research and Training Center, the University of Bamako, Mali, the Research Support Center of the College of Medicine in Malawi, and the Center for the AIDS Program of Research in South Africa. How large, on the average, the assistance to each research is not possible to

determine because it is miniscule and not quite competitive and fair, as it depends on who you are.

The international Council on Health Research and Development (COHRED) network focuses on "strengthening national and instructional governance of research and innovation for health, equity, and development in low-middle and middle-income countries worldwide and has a strong presence in Sub-Saharan Africa," stressing advocacy, ethics, and provision of public health information (Nachega et al. 2012: 11). To improve the situation of the discipline of epidemiology in Africa, the authors of the article cited recommend the offering of more public health programs on the continent, with epidemiology occupying a prominent role, and the creation of regional or national centers of excellence that would focus on epidemiological research activities and collaboration with other centers internationally, while actively engaging in funding search. The authors were less critical of the leadership in Africa, however, which this author believes is a disappointing omission, as nothing will be done in this respect until the leaders see the value of public health and the need for training a sufficient workforce, with particular emphasis on producing competent epidemiologists, while providing enough resources to build schools of public health, with epidemiology as one of the most needed sociobehavioral science disciplines.

Indeed, more than any other continent today, Africa has a more compelling, more urgent need for focused research and strategies to control and prevent so many diseases of both communicable and non-communicable nature. This would allow Africans to be the agents providing the best solutions to the health problems they grapple with daily. The dogged reliance on expatriates and NGOs to conduct the research they need makes them continue to be the servile appendages of the latter's petty projects. Africa's problem in this respect has been vividly illustrated by the HIV clinical trials in East and Southern Africa, of which many had to be abandoned, and, most recently, the likely unethical drug and non-randomized vaccine experiments that went on in Liberia, Sierra Leone, and Guinea during the 2013–2015 Ebola Crisis. Virtually all of studies and projects have been led and funded by non-Africans. Unfortunately, the opportunity to do clinical trials funded by Africans and led by African epidemiologists is extremely limited. Many health establishments have never seen an epidemiologist on the ground or in the field doing surveillance.

Interestingly, a group of African epidemiologists from South Africa, Zimbabwe, Botswana, Mali, and Nigeria, who met in Johannesburg in

September 2006, summarized the problems their discipline encounters in Africa, beyond the issue of resources and other shortcomings: (1) limitations in data or vital statistics collection, quality, and availability; (2) the duality of the medical system—Western vs traditional medicine, which is still not reconciled; (3) migration of individuals and spread of disease (across borders); (4) climate and environmental variation and diversity, especially more recently, as is the case all over the world; and (5) communication with and clarity of interaction with the public as a whole, given the various local and national languages and weak infrastructure (See dimacs.rutgers.edu/…/Diseases/…group1report12–19…). In the face of such odds, one can only hope and expect that local and international epidemiologists will take action now and not expect others to fight for them, acting as scientists deeply convinced of their relevance regarding the health of the Africans now and during the coming decades.

Nutrition in Africa

Following epidemiology, nutrition, at least for Africa, is perhaps the most critical discipline of public health. Public health nutrition, or nutrition in public health, is a population-based discipline that focuses on proper diet, compares nutrition with health status, monitors food and diet activities or programs, and "provides a leadership in applying public health principles to activities that lead to health promotion and disease prevention through policy development and environmental changes" (Spark 2007: 3). Spark alerts us about the distinction between the concepts of nutrition and public health and nutrition in public health or public health nutrition. Nutrition and public health denotes an independent discipline or a discipline co-existent alongside public health. Even though the two may be separately considered at times, they are normally used synonymously and fit the definition provided above. As a public health discipline, nutrition's ultimate functions are the surveillance and monitoring of risk factors, employing a community-focused approach for assessment, program planning, evaluation, leadership and population based interventions, and leadership in promoting access and quality related to the nutritional needs of a population. For Africa, this discipline is absolutely critical. Malnutrition affects over half of Africa and is responsible for most underweight at birth as well as for older children, who, as a result, grow stunted and are unable to combat disease due to a compromised immune system that normally should help them fight infectious and chronic diseases.

How malnutrition affects the immune system is a complex matter. Scientists still do not understand exactly how the process works in the human body. Good examples are the failure of most studies to precisely determine how obesity and diabetes can be avoided. Here we can only reproduce what Nelson et al. tell us in terms of what a lay person might be able to understand. On the effect of malnutrition on host defense mechanisms, for example, after pointing out that it is best described as the result of loss of protein, carbohydrate fat in the body, and changes in micronutrients—vitamins and minerals—the two experts write:

> A common finding in malnourished patients is the depletion of lymphocytes, particularly in T-cell regions of thymus, spleen, and lymph nodes. Studies suggest that there is a relative reduction in circulating mature T lymphocytes (both helper T and suppressor T cells) so that plasma is enriched with immature and functionally defective cells. As a result, there is a reduction in the efficacy of all host defenses that depend on T-cell function. Serum antibody levels are usually normal or elevated in the presence of malnutrition. This may be due in part to the numerous infections and high antigenic loads faced by malnourished individuals in impoverished areas, and at the same time, a defect in suppressor T-cell function, which normally inhibits antibody production. (Nelson et al. 2007: 384)

To help the lay person, we might note that lymphocytes are a group of white blood cells that, working alone or in combination with others, fight foreign agents, preserving, in the process, our ability to fight infections and other intrusive microorganisms. However, for the immune system to work properly as a defense wall, the lymphocytes must be in optimal functioning condition. This may be the problem in Africa. In East and Southern Africa, some 25 million or 40% of children under five are victims of stunting or irreversible low weight for their age, or have chronic malnutrition. Furthermore, while 18% of the under-fives are underweight, that is, too small for their age, in Sub-Saharan Africa, 7–42% of the children live with acute malnutrition, or wasting, defined as a quick weight loss due to illness and from not having enough to eat. While stunting is "a measure of protein-energy malnutrition, indicated by low weight for age or failure to achieve expected stature," wasting is a "measure of protein-energy malnutrition that occurs when a child's weight for height falls significantly below what is expected in the reference population" (Last 2000: 28).

Stunting alone affects more children than low birth weight and wasting combined. Public health professionals claim that much of the malnutrition cases are the result of the low rate of exclusive breastfeeding during the first six months of life. According to UNICEF (2014), in Eastern and Southern Africa, and most of the continent's regions, over 50% of the children are exclusively breastfed and not given foods of various kinds such as porridge and a combination of popular or common foods, especially in the rural areas. Children with AIDS and locally displaced people are at a higher risk of suffering from undernutrition, a condition caused by quantitatively insufficient intake. In fact, undernutrition is associated with 3.5 million child deaths annually in Africa and with 35% of the disease conditions found among the under-five. Malnutrition is also associated with 20% of maternal deaths at birth (WHO, Regional Office for Africa 2014a, b, c, d). Worldwide, in Asia, the rate of malnutrition is 70% compared to 26% in Africa, and 4% in Latin America. Among the Asian countries, China has been the most successful country in reducing malnutrition among its people. Unfortunately and contrary to predictions of improvement, the number of undernourished people, estimated at 824 million worldwide in 1992, increased to 870 million, or by 47 million in 2010–2012 (Hunger Notes 2013).

In Africa, malnutrition often begins with the poor nutritional conditions of pregnant women, affecting negatively the yet unborn child. One form of malnutrition is manifested in the disease that is called pellagra. Pellagra is an Italian word that means rough skin, which can still be found in South Africa, even though few cases of it exist in the rest of the continent today. It used to be common in refugee camps, as was the case in Zimbabwe, Malawi, Mozambique, DRC, and Angola during the 1980s and 1990s. Pellagra is caused by deficiency in the niacin B-Vitamin complex group, which, biologically, is "a generic descriptor for pyridine 3-carbonylic acid and derivatives which exhibit qualitatively the biological activity of nicotinamide" (Prinzo 2000: 10). Too much reliance on rice, corn, pork meat, and molasses is known to be a major culprit. In its worse stages, pellagra can result in diarrhea, dermatitis, dementia, and even death. The disease is almost extinct but it was a major problem in Africa during the 1930s, when it was discovered. The first doctors to treat the disease, which can deform one's skin, described it as early as 1937, when they wrote that it was:

> …An endemic disease which has been described in certain African tribes both on the East and West coast and also in Central Africa. It is characterized by

> an acute course progressing usually towards a fatal termination in the second and third month. It displays itself by edema [swelling] which is often severe, a rash which in some respects is unlike the classical description of that in pellagrous adults, diarrhea, dysentery, and perhaps fatty stools. Only a few cases develop obvious neurological signs. Differing thus from the more common but slow and remittent type of the disease as seen in adults no clinical observer who has recorded cases in Africa has been able to agree that it is pellagra. It is known variously as in Africa as 'Gillan's edema,' 'Williams disease,' and malnutrition edema, and is believed to be a new clinical entity. (Trowell 1937: 70)

As Zita W. Prinzo remarks, lack of food security, monitoring, and assessment explains the fact that Africans were always caught by surprise and were never able to prevent pellagra in the population.

Another malnutrition or under-nutrition disease in Africa is called kwashiorkor, a term adopted from the Ga language in Ghana. Kwashiorkor is a severe condition of malnutrition, a word that was introduced in the medical lexicon during the 1930s by a Caribbean (Jamaican) pediatrician by the name of Cecily Williams. This disease, which some confuse for pellagra, is also a result of lack of protein from such foods as meat, cheese, eggs, fish, nuts, seeds, beans, soy, and specific grains, including quinoa, as well as milk. Just like pellagra, kwashiorkor, in Africa, we are told by nutritionists and biologists, is often associated with war, frequent famines, and natural disasters, such as floods and drought. Its symptoms are fatigue, diarrhea, edema (swelling), damaged immune system, protruding large belly, enlarged liver, flaky rash, shock, change in skin color and hair, muscle mass loss, irritability, and physical inability to grow.

Malnutrition and undernutrition among school children in Africa and elsewhere are also responsible for academic underperformance, as many studies have shown, for intellectual underdevelopment, and overall poverty. These have been some of the most important causes of death, which, ultimately, are a result of egregious inequalities and the absolute poverty of more than two-thirds of the continent's population, who live on under $1.50–$1.00 a day, and the mismanagement of the natural resources for which the African continent is known. Many health ministries, public health practitioners, African leaders, and communities have heeded the growing and acknowledged need for proper nutrition of children, women, HIV/AIDS orphans, widows, and senior citizens. In summary, Africa's malnutrition rates must be fought from all angles and sectors, including

food security, agricultural production, and child and maternal health. Poverty is a major cause of hunger and malnutrition, but hunger is as well one of the causes of poverty stemming from the inequities in the distribution of economic resources, income, political leaders' "malfeasance," and intermittent conflicts such as wars, and climatic fluctuations in the form of flooding, drought, and volcanoes, which may require abandonment of centuries-old farming and herding lifestyles and the introduction of crop diversification. However, needed changes in lifestyle and livelihood are often hindered by cultural traditions and habits.

War has been a consistent fixture in Africa's political life and has contributed to serious cases of malnutrition, especially among the internally displaced people and refugees fleeing the deadly conditions in their own countries. Egregious examples of wars that have displaced millions of people include the Mozambican and Angolan civil wars, the "fratricide" wars in Liberia, the unending political bloodletting in the Democratic Republic of Congo, the wars between Eritrea and Ethiopia, the Somalia state formation debacle, the Sudanese civil war, and the attempted genocide in Rwanda. In such situations, the people most vulnerable to malnutrition and undernutrition have always been children under the age of five, unaccompanied others, chronically ill people, including those co-infected with HIV/AIDS and tuberculosis, all pregnant and lactating women, the elderly, individuals from households without an adult male, orphans, and certain underserved or discriminated against ethnic or religious minorities (Levy and Sidel 2008). Malnutrition is aggravated by such infectious diseases as measles, diarrhea, and dysentery, which lead to loss of appetite and risk of malnutrition or undernutrition, and increase the metabolic rate exponentially. Invariably, such situations contribute to acute malnutrition and lack of vital micronutrients such as vitamin A and tend to exacerbate other physical and nutritional deficiencies. It is easy now to measure nutritional levels through BMI or body mass index. However, according to Levy and Sidel (2008: 219), at time of emergencies, as happens in Africa, nutritional levels are usually measured through weight-to-weight, because "weight is more sensitive than height to sudden changes in food availability."

In this context, moderate to severe acute malnutrition is defined as "a weight-for-height ratio more than two standard deviations below the mean of CDC/National Center of Health Statistics/World Health Organization reference population," even though measuring the mid-upper arm circumference (MUAC) may be used to determine the state of

under-nutrition. In such cases, Levy and Sidel recommend several strategies that will alleviate the potential for malnutrition and undernutrition, which include:

1. A health information system, e.g., through surveillance of mortality and nutritional status
2. Diarrheal disease control, e.g., through oral rehydration therapy (ORT), community hygiene education
3. Immunization, e.g., of measles for children between ages six and 12 months
4. Basic curative care focusing on maternal and child health, a referral system, and provision of community health workers
5. Selective feeding programs, such as supplementary feeding for those individuals at risk
6. Endemic disease control and epidemic preparedness, which must include surveillance, research protocols, prevention policies, identification of sources of needed vaccines, and partnerships and collaboration with epidemiologists.

In this author's research study of Mozambique refugees in Southern Africa during the country's civil war (1977–1992), many of these strategies were either absent or weakly deployed in the refugee camps and in the country itself regarding the internally displaced (Azevedo 2005). This has also been the case in many refugee situations on the African continent, arguably the setting of the most frequent and most severe refugee malnutrition camps worldwide, as is happening in Kenya with the Somali refugees and in Rwanda and Burundi with the refugees from the Democratic Republic of Congo.

As a result, in Africa, the number of people in extreme poverty has increased since 1981 (*Hunger Notes* 2013). The long-range consequences are that Africa was not able to cut by half the number of undernourished people by the end of 2015. Yet, the realization of the nutritional deficiencies does not seem to ring a bell among many African leaders who do not believe that, by addressing the nutritional needs of these vulnerable populations, they would also raise the living standards of the nation as a whole, increase life expectancy at birth, and enable the containment or control of the high DALYs that stifle and choke economic growth and health quality. Recall that historian Geoffrey Rose argued with the founding fathers of epidemiology that adequate and healthy nutrition would prolong the

population's life expectancy and surpass the need for vaccines and many of the interventions we design to fight disease. Healthy nutrition requires awareness, financial commitment from the state and its leaders, adequate infrastructure, sanitation, and hygiene, and safe food. The absence of these basic health needs kills thousands of children in Africa daily, especially in Sub-Saharan Africa.

In conclusion, one can say that, as science and practice, nutrition in all of Africa is in its infancy, and most of those in charge simply believe that it is enough to provide food to prevent malnutrition and its consequences; they see little connection to other elements and sectoral factors that are a part of the process of introducing "good" nutrition habits, both in quality and needed quantity. Prior to colonialism, people definitely understood how in general nutrition worked to save a child or a sick person, and most people survived from knowledge and experience of traditional practice and remedies. Consequently, they would adjust to the environment. Furthermore, soil contamination, chemicals that interfere with the growth of quality foods, unavailability of land to cultivate vital crops, the introduction of new diseases, and the rapidly disappearing animal kingdom, deforestation, desertification, and drought continue and will continue to prevent Africans' ability to be reasonably well-nourished. In most of the continent, the combination of malnutrition, defined here, as the lack of adequate quality food, and undernutrition, which may be described as lack of enough food intake, even if its quality is adequate, have disturbed the human development process, which was aggravated by frequent periods of hunger and famine during the colonial period in particular.

Finally, the problem with nutrition as a field of health in Africa, in particular, is that it requires continuous studies, laboratory research, and careful collection and analysis of accurate data for assessment and evaluation of outcomes. Also needed is a specific focus and scope so as not to interfere with other fields or disciplines, financial resources, a specially trained and sufficient workforce, and community leaders' participation if any major interventions are to work properly. Such type of leadership is only in its infancy in Africa. It must be stressed, like the other disciplines of public health, nutrition also requires advocacy, strong and clear policy, and studies involving interdisciplinary collaboration (Spark 2007: 1–7). Fortunately for Africa, the colonial harm can be reversed, but it appears that, despite calls from science, public health, and global organizations interested in populations' health, either due to ignorance or lack of concern, leaders in Africa do not respond to the crisis with urgency, especially in the villages.

As noted above, terms and concepts are important. It makes sense, therefore, to remind the reader to attempt to differentiate malnutrition from undernutrition, even though people use the two words interchangeably, thus confusing the listener and the affected individual. It is clear now that nutrition means the absorption or consumption of foods, including liquids, that provide the right amount of calories and energy and allows us to live. Conventionally, this word is used in a positive sense, implying the set of foods and liquids that are good, therefore, of quality, for the body. Malnutrition may refer to sufficient but not quality food intake, that is, consumption of deficient foods. Undernourishment or undernutrition means insufficient intake of good or bad foods undermining physical development and thus survival in good health. In many circles in Africa, the distinction among the three words remains blurred, and most leaders equate nutrition to the amount of food available to a certain individual or a segment of the population, and thus concentrate on filling individuals' stomachs, disregarding the simultaneous importance of quality and amount of the intake.

Maternal and Child Care (MCH) in Africa

Maternal and Child Care (MCH) is another important focus of public health around the globe, but because of the almost uncontrollable number of deaths of both mother and child, particularly at birth and the first three months of the newborn, it is of even more critical import for the survival of the African continent. Millions of mothers die during the perinatal period, and 23% of the deaths of children occur during the first three months of life. In his impressive volume on the issue, Jonathan B. Kotch (editor) thus defines maternal and child health:

> MCH is the professional and academic field that focuses on the determinants, mechanics and systems that promote and maintain the health, well-being, and safety and appropriate development of children and their families in communities and societies, in order to enhance the future health and welfare of society and subsequent generations. (Kotch 2013: ix)

However, in the same breath, he curiously adds that "MCH is a profession and not a discipline" (Kotch 2013: x), and one of the reasons is that MCH focuses on population rather than on theory and methodology, that it requires the collaboration of many disciplines and training both academicians

and practitioners. The WHO and all international organizations have stressed that maternal death in Africa and its prevention, more than any other factors, determine whether or not the continent can expect a better outcome within the next 15 years.

Worldwide, says the WHO, 10% of women do not have access to contraceptives or use them effectively (WHO 2013: 1). It was the WHO's intention to prevent some 33 million unwanted pregnancies worldwide between 2011 and 2015. What are the strategies to prevent or reduce high maternal mortality rates that Africa can adopt? The World Health Organization mentions four strategies, namely:

1. Strengthening health systems and promoting interventions through effective policies and proven working strategies
2. Monitoring and evaluating the "burden of maternal and newborn ill-health" and impact on society and economic development
3. Engaging effective partnerships for effective use of resources and "minimizing duplication in efforts" and
4. Advocating "for investment in maternal and newborn health by highlighting the social and economic benefits and emphasizing maternal mortality as a *human right and equity issue*."

A visual regional comparison among the under-five mortality statistics from 1960 to 2004 provides an idea of the progress made, as shown below (Tables 1.1 and 1.2):

Table 1.1 Under-five mortality by region (1960–200) per 1000 live births

Region	*1960*	*1970*	*1980*	*1990*	*1960–2000*
Sub-Saharan Africa	253	223	194	180	174
Middle East and North Africa	250	196	132	81	62
South Asia	244	206	176	128	100
East Asia and pacific	212	125	77	58	44
Latin America and the Caribbean	153	123	84	54	36
Industrialized Countries	37	26	14	9	7
World	197	147	117	93	82

Source: UNICEF 2004 (Adapted from Kotch 2005: 46)

Table 1.2 Maternal and under-five mortality rate by region (2000 and 2004)

Region	*Maternal Mortality Rate (MMR) per 100,000 live births*	*Under-5 mortality rate per 1000 Live births*	*Stunting prevalence (%) (2000)*	*Total fertility rate (2000)*
Sub-Saharan Africa	1100	173	41	5.7
Middle East and North Africa	360	61	23	3.7
South Asia	430	98	45	3.5
East Asia and Pacific	140	43	21	2.0
Latin America and Caribbean	190	34	16	2.6
Industrialized Countries	12	7	NA	1.6
World	400	82	NA	2.7

Source: UNICEF (Adapted from Kotch 2005: 475)

As estimated, the most common causes of the deaths of children under five during the period 1990–2004 worldwide, including Africa, which still applies today, have been the same in Africa and globally: diarrhea (13%), pneumonia (19%), malaria (9%), measles (5%), AIDS (3%, neonatal causes 42%), injuries (9%), and other infectious and non-communicable diseases (Kotch 2005: 476). Malaria and AIDS have continued to hit Africa harder than any other continent.

In order to emphasize how important the discipline that focuses on the health of mothers and children is to Africa, a brief assessment of the WHO regarding the Millennium Development Goals (MDGs) underscores the precarious conditions and the need to redouble the effort to save mother and child. The WHO and the MDGs Target 5.A. and Target 5.B. goals or universal access to reproductive health wished to see the reduction of maternal mortality in the world by three quarters between 2011 and 2015. Even though the results in Africa have been on the positive side compared to other continents, they are almost negligible. Worldwide, in 2013, some 289,000 women died due to complications during pregnancy and childbirth, even though this represented a decline of 45% over 1990. Whereas in Asia and North Africa, the maternal mortality rate has been reduced by half, in Sub-Saharan Africa, the death rate was 1 per 38 live births, contrasted to 1 in 3700 live births in the developed areas of the globe. Most of the deaths are attributed to lack of access to routine and emergency

health care. Modern family planning in Africa through contraceptives is also minimal. On under-five children's mortality rates, the countries that showed the highest mortality rates for under-five in 2013 were all located in Sub-Saharan Africa, and of the 55 countries that achieved under-five mortality rates lower than 10 per 1000 live births in 2013, nine were in developing countries. However, 26 countries were responsible for 80% of child deaths worldwide, and these included: Angola, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, DRC, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Somali, Sudan, Tanzania, and Uganda (*Lancet* 2014: 5).

The task seems, therefore, daunting for Africa, and if African leaders continue to virtually ignore the seriousness of the crisis, which is not a difficult one to solve, the continent will never progress in health. Maternal and child deaths are two of the most important health indices for any country in the world. As noted throughout the preceding discussion, hospitals, medical schools, Ministries of Health, NGOs, and those in charge of the people's health on the continent need to "wake up and buckle up" to save this generation and many others to come.

Behavioral Health Education and Promotion in Africa

One of the most critical disciplines often given less attention in public health and non-informed health circles is health promotion and education, sometimes known as behavioral health education and promotion, and, other times, simply health promotion. Behavioral health promotion and education is "an approach that aims to promote health, prevent disease, treat illness, care for the infirm and provide health services" (Laverack 2007: 7). In 2005, the WHO described behavioral health education and promotion as one of the "fundamental rights" of all human beings that allows people to enjoy "the highest attainable standard of health." The WHO further noted: "Health promotion is based on this critical human right and offers a positive and inclusive concept of health as a determinant of the quality of life and encompassing mental and spiritual well-being. Health promotion is the process enabling people to increase their health. It is a core function of public health and contributes to the work of tackling communicable and non-communicable diseases and other threats to health" (Quoted in Laverack 2007: 1).

The WHO's 1986 description of health promotion education stresses the point that this discipline enables people to "increase control over and improve their health," hence the concept of people's empowerment or self-efficacy. On the individual, community, organizational, societal, and national, and now, global level, it is the core function of health education and promotion to allow people to change behavior, if deemed unhealthy, and embrace evidence-based healthy practices. Health *education* focuses on the dissemination and understanding of the risks and positive effects of certain behaviors, while *promotion* refers to urging individuals and communities to behave in certain ways. This is where the role of professionals and advocates is critical. So, health promotion and health education are both internal acts in that a personal decision is always required, along with an externally observable manifestation of changed behavior.

Regrettably, behavioral health awareness does not necessarily lead to behavioral change, because the latter requires stronger will from the individual, determination, and consistent maintenance of a changed lifestyle. The major constraint is, however, that in the effort to influence people's behavior, the government and the academic and health professional community, along with business, the movie industry, the media, advertising outlets, musicians, artists, civil society, advocates, educators, international organizations and agencies, and influential individuals from all walks of life must work hand-in-hand to make the goal of this discipline realizable. The government and all individuals in position of leadership and authority must ensure that adequate resources are made available and that strong and relevant policies are enacted by the legislatures, as has happened with cigarette smoking in public places, helmet wearing for cyclists, and seat belts for vehicle drivers and passengers.

As a branch of public health, behavioral science helps people engage in various educational and health promoting activities and requires careful planning, management, implementation, and evaluation, all of which call for a budget and collaboration with and among partners, announcement of effective strategies to and with the community, building the necessary skills among both the health professionals and the consumers, research on interventions, building community consensus and capacity, and advocacy for establishment and implementation of enlightened necessary policies. In the process, training the workforce, including academic and health professionals, is a necessary lifelong activity as the need for healthy behaviors will always be with us as human beings, given that we are constantly interacting with one another domestically and globally. Just like public health in general, behavioral promotion and education targets all determinants of health with the aim of reducing or eliminating inequalities or disparities

that influence healthy or unhealthy behavior, such as the impact of fast food restaurants and businesses that pollute the air and contaminate our soil. This is the reason why, at times, behavioral health as a discipline is closely associated with environmental health, as reflected in its designation as "Behavioral and Environmental Health" that one sees in textbooks and government health instructions.

For the goal of behavioral health to be achieved, individuals and populations must often be targeted and followed over time, at times from childhood to adulthood, providing them with the appropriate messages while clearly articulating the reasons why such and such behavior is healthier or unhealthy, all delivered at the target audience's educational level. In the developing world, where there is a double burden of communicable and non-communicable diseases, behavioral health education and promotion is even more pressing. For Africa, the nature of this discipline, the application of its principles, and the body of knowledge it can provide to the community are all a part of the critical ingredients of the field of public health. Unfortunately, quite often, the relevant information is available to people but not the skills or will needed for them to modify their behavior. In other words, knowledge and skills rarely go together in Africa, a continent that is viewed globally as having one of the weakest health systems, programs, and outcomes in this arena. In the words of Dennis Raphael in the Oxford *Health Promotion International* some time ago (2000), in Africa, "the major distinguishing features included the incorporation of cultural and spiritual factors, emphasis on the community, and emphasis on health promotion as a set of tools rather than a process." The last dimension implies that imparting information and skills is the key strategic option.

Together, these features reflect the "specific socio-economic and political environments within which the development of the field is occurring in the region." Why has Africa been so slow in its acceptance of the premise that behavioral health promotion and education is at the core of health, as we see very little incorporation of it in the curriculum of the school system, in the workplace, in outdoor activities, and the household itself? How prevalent is the habit of smoking in public, excessive drinking even in the home, consumption of clearly poor diet, neglect of issues of hygiene and sanitation, and absence of infrastructure designed to protect children and those under five from preventable diseases, from careless habits that increase the risk of infectious diseases, such as HIV/AIDS, TB, and malaria, the latter continuing to kill millions of people? In fact, health education and promotion assures that many deaths could be prevented in Africa through simple methods such as use of mosquito bed nets, safety and protective gear during rides and hazardous work activities, and the drenching of stagnant

water. How many precious lives could be saved by preventing children from unnecessary contact with mosquitoes, fleas, flies, and other disease vectors?

Health Promotion International notes that, after independence, African leaders and others justified the lack of seriousness in adapting the tenets of the new public health field as being a result of ignorance, but this can no longer be the main excuse as Africans have now taken control over their own destiny. Indeed, says the Medical and Research Foundation (1997), "the health behavior movements so popular in other parts of the world have not really taken root in Africa," especially in Francophone and Portuguese Africa. Presently, in Africa, despite heroic efforts by individuals, awareness campaigns often do not reach their targeted audience, particularly in rural areas, "while screening for the risk factors is seldom achieved due to lack of skills and training among health workers" (Delobelle et al. 2010: 1).

David Houet (2008: 49) at the Centre de Recherche Pour le Développement de la Promotion de la Sante en Afrique (CREDEPSA) says: "L'Afrique est le continent qui affiche les indicateurs de santé les plus moins reluisants au monde." The author ends up by noting that health promotion, 20 years after its adoption (at the Bamako Initiative in 1987), is little known, particularly in the Francophone areas in general, this notwithstanding the value of health promotion, which includes: "participation, empowerment, contextualization, multisectoralism, multistrategy, and durability. These elements all search for an efficient resolution, for example, of the problems that are well known on the continent of Africa." Ijsselmuiden et al. also note that, even by 2001,

> There was neither a vision for developing capacity to educate staff to manage health systems and public health, nor plans for educating sufficient personnel to manage and develop health systems in Africa… Medical and health science faculties, business schools and schools of public administration all tended to ignore such concerns… With the exception of a Rockefeller Foundation initiative in the Democratic Republic of Congo, Ghana, Uganda, and Zimbabwe, little multidisciplinary, system-oriented training in public health [which includes Behavioral Health Promotion and Education] was available in Africa, and no continent-wide assessment of highlevelpersonnel in public health or academic public health capacity had been undertaken. (Ijsselmuiden et al. 2007: 11).

The reason for this unbelievable sad state of affairs regarding health education and promotion are not difficult to discern. First, as Houet and many others have noted, Africa is still operating under the influence of its colonial legacy, whose main aim was to look after the health of the white colonial administrators and the army—now replaced by the African elite—

focusing on eradicating disease through vaccination campaigns when epidemics would strike; very little did the colonial apparatus do to change the behavior of the colonial subjects, except when it interfered with the effort to find reasonably healthy manpower.

Second, ignorance about healthy behaviors still prevails, especially in rural areas, even though, since independence, there has been a growing number of well-informed and educated Africans who realize the importance of changes needed in this arena; yet, not much has been done to substantially alter the situation. Third, long-held cultural practices continue to hinder much progress in the health and other sectors, most of which have direct or indirect impact on the spread and prevention of diseases on the continent. We are also advised that "health promoters should not look at the role of culture as a barrier but rather embrace the cultural dimension in health and not equate health development to Westernization," which seems to be the case in most of Africa. Recall that people will change behaviors if there is an incentive, if the outcome is what they expected, and are self-convinced that they can do it (Govender 2005: 39–420). Fourth, there are competing forces and agents in Africa, including the governments themselves, which pit one health organization against another, or overlapping activities that are not coordinated to achieve one clearly defined and targeted goal. On this, Health Promotion International observes that, "In Africa, there exists an undeclared war for supremacy among different practitioners. While there seems consensus that health education practitioners are the protagonists of this 'war,' medical doctors, nurses, and professionals from areas seen as social mobilization, behavioral change, communication and social marketing are jostling for niches in a complex pecking order" (WHO 2001). Furthermore, lack of effective data collection methods and analysis for outcomes assessment are at their initial stage and little research is conducted by governments and their scholars on the subject of behavioral change. Even worse, for the past 20 years, autonomous schools and programs of public health that would strengthen the role of education and promotion in Africa have been rare.

Even though the WHO notes that absence of data and their reliability in Africa has been attributed to lack of financial resources, it adds: "We submit that even within the existing budgetary limitations, programs can incorporate process documentation in health promotion so as to facilitate experience sharing. Such documentation can also be realized with more operational research and interventions" (Nyamwaya 2003). Finally, as a thesis of this volume, there is a vacuum of effective, informed, visionary, and committed leadership. It is important to mention as well that strategies for behavioral change did not reach Africa before implementation of the Bamako Initiative in 1987. Many of the relevant targets and strategies, imported

from former mother countries, were, therefore, not based on the real needs of the Africans. Yet, to fill this imbalance, African universities have not created more autonomous public health degree programs apart from just offering courses that are simply appendages to the medical schools. Leaders and policy-makers never contextualized the programs and the initiative.

What is also missing in Africa is better cooperation between the Ministries of Health and their various branches, and the mobilization of all relevant agencies, other ministries, and national and international sectors to work together, using all means at their disposal. Further studies should also be conducted on the impact of the messages seen on the billboards in the cities and, occasionally, on the highways, the song lyrics such as the ones that appeared during the Ebola crisis in 2013–2015, sanctioned movies and films, and the advertisements in movie theaters across Africa. As Andrew McNab et al., of the Department of Pediatrics, University of British Columbia, Vancouver, Canada, write, cross-disciplinary health promotion is needed at the learning institutions in Sub-Saharan Africa, the effective use of social media, and cell phone messaging to "deliver health promotion to at-risk teen populations." Studies have shown that the role of messages expressed in music, theater, and performances seems to have greater impact in Africa than in other parts of the world. Just the beating of the drums can carry a clear message, for example, of impending war, a meeting of the village or the community-at-large, an important funeral taking place, the presence of a lion or a dangerous animal around a compound, or any activity that people must know and take action against, so can the lyrics of a song, the masquerades, and the speeches or utterances of the performers.

As Falola and Heaton note (2008: 21), "In Africa, ritual is diffused with drama; drama is ritualistic; hence they overlap…Thus, ritual and theater are conflated…Many genres of African theater or drama are drawn on in healing; these include masquerades; syncretic theatrical forms from colonial and post-colonial eras; concert parties; literary dramas; and theater for development." All these can be used effectively to induce health behavioral change. Patrick Ebewo, citing Paulo Freire, who called this type of education "functional literacy," posits that the role of this participatory education as seen in African folklore and performance is designed to awaken the "people's critical awareness…thus, the mission of this kind of education is to 'lead forth' and cause to develop the good that is latent in everyone; the goal of this education identifies desirable adaptability and changes in human behavior for the betterment and prosperity of mankind. This is a kind of education [he continues] that is appropriate in a lifelong learning situation" (Ebewo 2008: 471). The power of theater and drama was highlighted in an evaluation of a program implemented in Lesotho and Botswana, which showed theater to be "a powerful tool for community education, one which

captured the minds of communities and sensitized them to the spread of HIV/AIDS and the need for prevention and imparted skills for care and support" (see Gasennelwe and Rantona 2000). Challenges include "the need for multi-sectoral collaboration and *Ministries leadership,* paucity of human resources and stable funding, and the limited research and evaluation of best practices" (McNab et al. 2013: 246–259). Others point to the need to invest in distance learning technologies, both educational and technical, to optimize the available human and financial resources. However, nothing effective will impact health promotion and education until the presidents and the remaining kings, relics of the distant past, as well as the ministries of health in Africa realize the need for change and advocacy, appropriating the needed funds, and taking action to implement robust programs and activities that aim at creating people awareness and changing health behaviors. As things stand right now, the vision and human seem to be missing, while the universities and medical schools continue to pay lip service through a few courses here and there so often under the "community health" or "community medicine" banner. A study conducted on public health programs in Africa published in 2007 showed the following realities: Overall, out of 53 countries at the time, 54.7% offered no postgraduate training in public health. Eleven countries, 20.7%, had one program. Eleven others or 20% had more than one program, almost all located in Anglophone countries of Sub-Saharan and Northern Africa. Very few postgraduate programs in Francophone, Portuguese, and Hispanophone countries existed, the Portuguese showing the worse record, where 91% of the population lived without any public health program whatsoever, followed by (Spanish) Equatorial Guinea at 34%. Of the 854 staff workers in institutions that had a postgraduate program only 493 were full time.

The preceding cited authors, Gasennelwe and Rantona, conclude by noting that the graduate programs offered were still very traditional in focus, "with a narrow view of public health, limited access to health workers or even to medical practitioners only," adding that, 14 years ago, "there were neither a health system and public health nor plans for educating sufficient personnel to manage and develop health systems in Africa." Prominent countries among those offering degrees were Egypt, Tunisia, Morocco, Algeria, South Africa, Nigeria, Uganda, Kenya, and Ghana. Thus, studies and programs on public health in Africa are sorely needed, though indications are that things are slowly improving. An innovative idea on health promotion and education being implemented in Africa, currently still in its pilot phase, is the concept of health promotion hospitals (HPHs). Health promotion hospitals aim at improving "the quality of health care; the living conditions, and hence the satisfaction of staff, patients, and their

relatives, by integrating health promotion and provisions of services and the creation of a healthy environment" (Delobelle et al. 2010: 34). This innovative idea is in the process of creating the indicators that will allow monitoring and assessing behavioral health outcomes in the near future.

Health Policy and Management in Africa

These days, virtually every discussion of health policy and management begins with the statement that this public health discipline constitutes one of the fastest growing "industries" which, by 2018, and according to the Bureau of Labor Statistics, will have grown by 16%, beating many other competing occupations in the US and abroad. Health policy and management experts include those who deal with in- and out-patients in direct or indirect, private and public health care settings, such as hospitals, clinics, pharmaceuticals, health organizations, all physician practices, companies that provide health equipment, hospices, senior citizen homes, and consulting corporations and individuals employed in some capacity in health care administration or business. According to Buckbinder and Thompson (2010: 2), "healthcare administration is the profession that provides leadership and direction to organizations that deliver personal health services and to divisions, departments, units, or services within these organizations," whose major aim is achieving the goals of the organization and ensuring that adequate resources are provided to meet the needs.

The Johns Hopkins Bloomberg School of Public Health (2014) defines health policy simply as "the planning, development, and implementation of interventions designed to maintain and improve the health of a group of individuals." Health care administration or management is described as having two domains in which it operates, namely, internal and external, depending on the targets of the organization or health care business. On the one hand, the internal domain, which it controls and provides the clear mission and vision, is made up of staff, budget, quality resource, patient needs to be met, doctors' relations, performance, purchasers or procurers of needed technology or those who are known as "hospital information technology solution architects," biotech executives, and the development of new service or care. The external domain, on the other hand, includes issues of licensing or licensure, accreditation of related programs by bodies such as the Council on Education for Public Health (CEPH), regulations for the industry and the specific ideal organization, CEOs, stakeholders' views and relations, think tanks, business process managers, competitive rival organizations and groups, Medicaid and Medicare (so specifically

called in the United States), and insurance or insurers and managed care organizations (Buckbinder and Thompson 2010: 4).

Many of these necessary components are dictated by or derived from political considerations. The Centers for Disease Control and Prevention (2013) define policy as a "law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions," all of which impact "public health direction, national health strategies, organizational plans, initiatives, maintenance of integrity of process and accountability, allocation of resources, fairness, and social justice by taking all means at disposal to eliminate or reduce health inequities and gross disparities." The WHO, on its part, defines health policy as "a set of decisions or commitments to pursue courses of action aimed at achieving defined goals for improving health, stating or inferring the values that underpin these decisions; the health policy may or may not specify the source of funding that can be applied to the action, the planning and management arrangements to be adopted for implementation of the policy, and the relevant institutions to be involved" (WHO 2014a, b, c, d: 2). In this context, health care administrators or managers operate from a population-based framework: they measure population status, analyze the issues and determinants of health, and recommend and implement interventions, set priorities, take action, assess and evaluate outcomes, institute measures of accountability, and ensure that resources are appropriate and spent efficiently and effectively, and preserve the quality of care, which is a tall order in poor countries.

The WHO lists six critical functions associated with health care policy and management or administration, and these include: planning, organizing, staffing, controlling, directing, and decision making. Managers and administrators of health care must therefore be people who are highly professionally trained, knowledgeable, and ethical, who know but can also influence policy, as health is intrinsically linked to the politics of each setting, including government, legislatures, law enforcement at all levels, relations governing the various levels of authority in the organization, influence peddling by lobbyists and those who deal with patients, such as companies or organizations that provide emergency services, insurers, advocates, stakeholders, and the like. Health managers, therefore, must be hired using procedures that respect the training, experience, and the ethical conduct of the applicants through merit rather than acquaintance, kin, or family ties—unlike many of the hiring practices in Africa. In policy and management, the organizational structure is usually presented in a pyramidal form (say the experts), clarifying the hierarchy and the various types of responsibility and the chain of command, specifying who is in charge of what and of whom, determining whether one is to work alone or in a team

or unit, and the overall structure of the type of care. Within this context, the manager or administrator is expected to work to improve the quality and direction of the organization and hire and retain the appropriate individuals, aspects that are often run over by health systems on the continent, "shaping health policy," and "succession planning."

This is the reason, as noted earlier, why health policy and management requires well-trained and experienced individuals, who may acquire further skills through academic training, apprenticeship, observation, and practice in a health care setting licensed to provide the needed conceptual and operating skills. Because health care policy and management is one discipline of public health that recommends, manages, and allocates funds for the health of the population, those in position of responsibility are expected to be impeccable in character and ethical in their private and public behavior. As David Eboh (2013) has written about Africa, "Healthcare is one of the key public services that require significant investment of public fund. As a result, health care institutions need the skills, knowledge, experience and competence of the people that are primarily trained and qualified in the field of business leadership and corporate strategic management, who can think outside the box about ways to maximize clinical productivity, economic profitability, income sustainability, organizational growth and services expansion/contraction." Simply put, health policy and management focuses on the provision of effective, efficient, and equal access of health services to the individual and the population. Finally, we might summarize the major distinctions between clinical sector management and non-clinical sector management, as the James Lind Institute does:

> Healthcare managers in the clinical sector work on provision of quality and efficient control in costs, implementation of novel technology methods such as electronic medical records, recruitment and retention of healthcare professionals to ensure that it is in compliance with changing regulations, reimbursement and implementation of programs to improve the health of communities. In the non-clinical sectors, managers work in enrollment of health insurance benefits, health care marketing, and health information, provider networking contracts, pharmacy benefit management, medical devices, health policy and biomedical consulting. (James Lind Institute 2014: 1–2)

David Eboh suggests that Africa's health systems should be based on "... robust strategic management models, interagency collaborations and interprofessional partnerships, and require proactive support, promotion, and management," while infusing further resources to make them work, one of the weakest aspects of health care delivery in Africa, even though the resources are not always scarce. The excuse of lack of resources is always

used by leaders to justify their shortcomings and the weakness of the system. Since the revision of many primary health care systems in Africa at the Ouagadougou Conference (see *Ouagadougou Declaration on Primary Health Care Revitalization*), under the auspices of WHO, UNICEF, UNFPA, UNAIDS, AFDB, and the World Bank in 2008, African states are at varying stages of strengthening the managerial and policy aspect of public health. Some countries have decided to make the system community-based, while immediately strengthening district systems in capacity building, planning, management, integration of activities, supervision, and monitoring and evaluation. In contrast, while others have decided to use their scarce resources on high impact interventions and develop the tools to accomplish the goals, others have focused, at least in theory, on quality assurance and rapid assessment. In terms of the Health Policy and Management, the conference underscored the need to strengthen capacity in *policy analysis* for the WHO African Region (World Health Organization 2014a, b, c, d: 1–3).

As noted at the onset of this section, health care managers and administrators are expected to be well-trained to fulfill the responsibilities they assume in a health care organization. Thus, in academic institutions that prepare future candidates to perform this tasks, students are required to familiarize themselves with the core competencies of management, strategic planning, marketing, human resource management, and motivation strategies, and are taught "how to evaluate the role of governmental institutions in the policy process; examine policy models; and learn how health policies uniquely differ from country to country, from organization to organization, and from town to country." With this critical training, financial matters are taught and discussed, along with the social and legal principles that impact health care delivery (See *Accreditation Guidelines*, Council on Education for Public Health, Jackson State University 2013: 88). There is no doubt that not every aspect of the health care system is always working in a crisis mode. However, the fact that health care is impacted by almost everything people and the government do, one sector will not run smoothly, if part of it is "ill." Most analysts today will agree with Morfaw's study (2008: 249) which showed that: "Actually, the African health-care industry is experiencing serious management, organizational, and structural problems. Isolated examples of excellence are not the goal, but system-wide quality," which requires the use of a total quality control approach to prune and improve the whole system, a strategy proven effective by the physicist W. Edwards Deming who saved the Japanese economy during the 1980s. The WHO has made it clear that a good system to be called such must have the six building blocks in quality

and shape on a scale that benefits efficiently and effectively its citizens, whose application in health care is recommended by Morfaw (2008).

Total quality control implies that a system must strive for quality in every sphere of its operation. As enunciated by Edwards Deming himself, following are the 14 points he advocated, which health care managers in Africa should perhaps learn from, as advised by the WHO:

1. Create consistency of purpose for improving products and services
2. Adopt the new philosophy
3. Cease dependence on inspection to achieve quality
4. End the practice of awarding business on price alone; instead, minimize total cost by working with a single supplier
5. Improve constantly and forever every process for planning, production and service
6. Institute training on the job
7. Adopt and institute leadership
8. Drive out fear
9. Break down barriers between staff areas
10. Eliminate slogans, exhortations and targets for the workforce
11. Eliminate numerical quotas for the workforce and numerical goals for management
12. Remove barriers that rob people of pride of workmanship, and eliminate the annual rating or merit system [which can be controversial]
13. Institute a vigorous program of education and self-improvement for everyone and
14. Target as a goal for everyone in the company to work and accomplish transformation.

To accomplish this quality level of assurance in all sectors of business, Deming stresses the use of accurate data, collected carefully and consistently, which is not the case in Africa. Again, important to consider is the fact that these recommendations for quality assurance have been embraced by the WHO, Advance Africa, Quality Assurance Project, Johns Hopkins Program, the Population Council, the Council of Health Service Accreditation in Southern Africa, USAID, the Center for African Family Study, and the African Medical and Research Foundation (Morfaw 2008: 252). According to Morfaw, implementation of a system of total quality control (TQC) requires the following characteristics:

1. Commitment and determination to implement total quality control
2. Corporate strategic planning, which includes vision, goals, and objectives
3. Quality organization where functional, project and matrix organizational structures exist
4. Organizational structure that comprises an "executive director, quality council, quality management consultants and contractors, specialized panels representing various departments and divisions, quality improvement teams, division of quality and planning, and ongoing monitoring and evaluation"
5. Implementation and training programs
6. Adoption of a Quality Council
7. Awareness programs communicating to the employees the management system
8. Training of team leaders and facilitators
9. Undertaking an initial status survey to find "gaps"
10. Addressing all nonconformance with a documented implementation plan
11. Implementing a documented system to control quality of the generated management systems
12. Monitoring of the implementation system through internal quality audits and management review
13. Establishing a pre-assessment audit
14. Formal application for accreditation, if applicable, as is the case with public health and medical schools

Morfaw then admonishes that "certification of TQC standards is not an end. The organization should continually seek to improve the effectiveness and suitability of the quality management system through the use of quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions, and management reviews" (Morfaw 2008). It has been noted by the WHO and Africa's health care systems analysts that the workforce in Africa is not only small but also not well-trained; supervision of doctors is minimal; data collection is one of the weakest among the various continents compared; resources are not used efficiently; high level of bribery and corruption go hand-in-hand; the quality of drug provision is wanting in every respect; and the infrastructure allowing faster mobility of the patient transport system is missing or functioning at a minimal level. As a result of the globalizing technological advances in communication

and the expansion of telephones, IPads, fax machines, the Internet, the desk computer and the laptop, the radio, the smartphone and the newspapers (which are still popular in Africa), the continent has, in a sense, undergone a radical change in the way people communicate with each other and how fast news is spread, prompting Adebayo Fayoyin to write excitingly that Africa is no longer on the "periphery" in the flow of global information or "losing out" or "neglected in the global highway of information." Fayoyin then adds:

> While we do not suggest that information asymmetry has been totally eliminated on the continent, it is noteworthy that advances in digital technology have created a data revolution in Africa [author's emphasis]. The continent has one of the highest levels of digital penetration in the world and young people are now more connected via social media then before. In many African countries, there are initiatives [that are] revolutionizing the pattern and flow of information and enhanc-ing a vibrant culture of data utilization. (Fayoyin 2014: 530).

Though this might hold true in the future, the question that comes to mind is: From what levels of communication has the new revolution come? If one starts from zero and reaches 100 feet in a matter of decades when others start at 100 and reach 1000, the achievement might be impressive but it is comparatively inadequate. Furthermore, it all depends, as is the case with health, on whether one refers to communicating at long distances or reporting instantly events of great importance that affect populations and the state of health indicators, such as epidemics, which require advanced and consistent surveillance—as we learned from the Ebola virus in Guinea, Liberia, and Sierra Leone: The quality and nature of the "communication's revolution" may be superficial. One is quite sure that data on sports attendance and scores, tourists' arrivals at airports, and money transfers from abroad that go through the proper channels are documented in Africa, but not the vital issues and data on health. However, the rate of fund disap-pearance, for example, that fuels corruption cannot be accounted for; data needed after an epidemic outbreak; hard information necessary to forecast earthquakes and floods; climatic changes and damage to water supplies; and acceptable and reliable records on maternal and child mortality at the hospitals and other health facilities have not experienced a revolution from the digital age. Hospital registries are still done by hand in most places, including the cities, and causes of death, if they are listed, are often unreli-able, at the time when globally known ways of ensuring some measure of accuracy are available.

In other words, collection of critical data that count for economic development, health, and health care, is still in its infancy on the continent—the reason why the UN and all its agencies have noted that this accurate and consistent information, which could be used to improve the lives of Africans, is one of the most serious shortcomings of the health systems on the continent. It is also important to remember that, besides the inaccuracy and the paucity of databases, many sources of information sought by researchers are unavailable and remain in secret vaults, underscoring incompetence, corruption, mismanagement, and lack of vision. Even Fayoyin (2014: 528–530), who writes of an information revolution in Africa, is compelled to admit that:

> Although most governments have their own statistics divisions set up to collect and process data on various sectors, such as health and population, climate change, water management, etc., they rarely update the databank. In some cases it is impossible for the public (e.g., researchers, aid groups, companies) to obtain access to existing data due to bureaucratic red tapes, lack of appropriate legislation or policy and incompetence…The external groups eventually turn to online publications and other secondary sources that are unreliable.

Short of accelerated and robust funding research at universities and Ministries of Health and focused organized data collection and transparency at vital institutes and from donor activities in the continent, prioritization of important data that allow critical decisions to be made on the basis of statistical evidence, freedom to researchers who wish to use the few databanks available, and better and more efficient use of the new technology are the only way the continent will come out of its ranking as having the most ineffective health systems in the world.

Biostatistics in Africa

The branch of science called biostatistics or the use of numbers when applied to life and health issues is defined by Mosby's Medical Dictionary (2009) as the "numerical data on births, deaths, diseases, injuries, and other factors affecting the general health and condition of human populations." As important as epidemiology is to public health and medicine, as noted here, some experts hold biostatistics as being more relevant for the prevention and preservation of health (Gezmy et al. 2011) than laboratory sciences, as it provides "order to chaos." Simply put, "biostatistics is a discipline that applies theory and methods to biomedical public health

and health services research" (Gezmy et al. 2011). The developed world is way ahead in its application of this discipline often dubbed the most "difficult" of the public health disciplines, and has reaped the benefits of being able to make generalizations from stored data, predicting the likelihood of certain events such as elections results of carefully designed polls, case-control studies, cohort studies, and clinical trials, based on prior determination of the sampling technique (Machekano et al. 2015) expressed by the worlds "research protocol."

In Africa, several factors explain why biostatistics as a tool of wise decision is lacking. These include: lack or resources; inability to understand that data collection is not important to governments alone but also to all institutions, businesses activities, assessment of health conditions, attainment of educational goals and outcomes; absence of a professional code of behavior among the few practicing biostatisticians; the perception that the field is not profitable; Africa's inadequate or dismal infrastructure, including the scarcity of tools that allow easy and fast collection of data in the form of new technology and software; and poor leadership, vision, and commitment to the health of the citizens on the part of both political and academic institutions, such as the university system. In the best scenario, universities in Africa may teach statistics at undergraduate level but they often do not offer Master's or Ph.D. programs in the field, and those who teach or earn a degree in statistics are not trained to apply it to life and health situations (Thabane et al.). If offered, the programs are usually not connected to public health institutions or medical hospitals (Machekano et al. 2015) for the training of a strong and indispensable workforce.

Indeed, apart from a few institutions such as Kwazulu University that houses the Kwazulu-Natal Research Institute for TB and HIV (K-RITH) funded by the Gates Foundation in 2014 (K-RITH 2014), most of the training in biostatistics is provided and funded piecemeal via short workshops and fellowships sponsored by international organizations. The precarious condition in Africa regarding the issue at hand was highlighted by a 2008 study that showed that, out of 53 countries then, 50 provided 826 institutions that offered university or post-secondary education; out of 242 of these that had a website, 97 offered a statistics course or statistics-related programs; and among the latter, namely those with a website, only four universities in four separate countries offered a co-op or internship statistics program—the University of Nairobi (School of Mathematics), the University of Ilorin in Nigeria through the Department of Statistics, the University of Zimbabwe in Harare, and the University of Kwazulu-Natal, Faculty of Science and Agriculture (

Thabane et al. 2008). What is needed in Africa includes the following: effective and visionary leadership among university presidents, the leaders of the various ministries, and intellectuals; advanced degrees in public health, including biostatistics; infusion of new resources; partnerships with institutions at home and abroad and through biostatistics interregional centers; emphasis on data collection and analysis; long-term plans designed to "build the capacity and the infrastructure of Sub-Saharan research institutes and universities [(see Network of African Sciences Academy (NASAC) 2009)].

Environmental Health in Africa

The next discipline of public health is environmental health, which has recently become a critical concern for scientists due to increased population globally—Africa is estimated to account for three out of every four people added to the world population during the next 100 years—and the waste it accumulates, rapid climate change, uncontrolled use of fossil energy, the dwindling scarce agricultural and mineral resources due to heightened land use, and the fierce competition for water among nations that share the same rivers and the animal kingdom. The UN defines environmental health as the discipline that focuses on "those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychological factors in the environment…It also refers to the theory and practice of assessing, correcting, controlling and preventing those factors in the environment that can potentially affect adversely the health of present and future generations." Environmental health as part of public health should not be confused with environmental science, which goes much deeper scientifically into the issues of the environment, examining the biological, chemical, and molecular structure, and the evolution and transformation processes that may ultimately result in harmful impact on humans, animals, and the ecosystem. Scientists and sociobehavioral experts divide the environment into "biophysical, or natural, and human, or socioeconomic and political dimensions." The biophysical dimension (Nhamo and Inyang 2011: 1) involves climate change, temperature, rainfall, wind and evaporation, air, topography, geology, soil, vegetation or flora, fauna or animals, groundwater or hydrogeology, and surface water or hydrology. The human dimension includes people, land tenure and use, and archaeological, social, cultural, political, and economic factors. Understandably, both dimensions constantly interact to produce minor or major global changes.

In Africa, controlling the environment for better health results includes eradicating mosquitoes, flies, and helminthes harmful to men and animals, which are linked to deforestation, dam building, and rising temperatures, taking measures for water conservation and purification, managing sanitation through the proper disposal of human, animal, and industrial waste in the form of refuse, agrochemicals, organic pollutants (POPs), chemical stockpiles, e-waste, petroleum, and ozone depletion. United Nations Environment Programme (UNEP 2013) notes that lack of access to improved water, sanitation, and hygiene is responsible for 10% of the disease burden in Africa, affecting mainly children, 28–30% being a result of contaminated water, which causes diarrhea and air pollution. These risks are responsible for a number of respiratory diseases. It is also estimated that out of the 54 countries in Africa today, only 19 will reach the Millennium Development Goal "of halving the proportion of people without access to basic water and sanitation" by 2015 (quoted by Lamere 2013). The impact of pesticides in Cote d'Ivoire, for example, is said to account for 65% of the illnesses among market gardeners, cotton growers, producers, and consumers. The UN, citing its Fourth Assessment of the Intergovernmental Panel on Climate Change, also notes that climate change in terms of higher temperatures is faster in Africa than worldwide and that the temperatures could rise by as much as 3 to 4 degrees C. on the average during the next 100 years.

Freshwater pollution on the continent is caused by untreated city waste effluents, through "seepage to natural wells and springs from latrines, nitrate ground water by fertilizers, cadmium-rich water releases, from phosphates mines, and eutrophication of dam reservoirs as a result of organic pollution" (UNEP 2014). Furthermore, whereas, by 2010, improved drinking water sources had risen 11% since 1990, only 60% of the people in Sub-Saharan Africa had access to safe water. As a whole, only North Africa, mentioned in Volume Two, has already reached the Millennium Development Goal of sanitation, with access coverage reaching 89% in 2008 from 72% in 2004. On air pollution, the Third African Environmental Outlook notes that, while outdoor pollution globally kills 800,000 people annually, mainly in urban areas, Africa accounts for 40,000 of the deaths per year. In fact, indoor pollution caused by smoke from cooking charcoal, heat, and prolonged exposure to second hand cigarette smoke has the highest effect in children, and, in Nigeria, studies have shown that quite often these conditions are responsible for such respiratory diseases as capillary bronchitis or bronchopneumonia and asthma. Frightening is the fact that scientists have estimated that home

indoor pollution in Africa is higher than the pollution allowed in environmental pollution in industrialized countries. Thus, while in Angola, for example, according to a UNEP Report, 6.9% of the burden of disease comes from solid fuel use, in Malawi it accounts for 5.2% of the deaths. The continent contributes 70% to the global land leased or purchased for food production crops and bio-fuels, which has "adverse impacts on local food security and livelihoods" (UNEP, Third Africa Environmental Outlook 2014: 3).

Fortunately, the UN reports, leaders and educated Africans are beginning to understand the problem and have vowed to do something to arrest the harmful impact of environmental neglect and its reckless use by people and industry. They have all endorsed the December 2015 Paris Agreement on the reduction of carbon dioxide and the impact of greenhouse gases on Africa. However, as the world body has warned Africa and other developing areas of the world, awareness and promises are empty gestures unless followed and reinforced by action and appropriate policies. The cited report found that several environmental policies exist on the continent and that "Africa is moving into a new phase that could see the continent become a major player in the transition to a global inclusive Green Economy…, but to do that it needs a healthy population with guaranteed access to well-managed natural resources." The report further noted that "The AEO-3 gives policy makers a clear pathway to a sustainable and healthy future by focusing on the areas that need urgent attention, showing how to remove barriers to policy implementation, and highlighting new policies." Submitted verbatim, the following is the list of the key messages and policy recommendations that came out of the 2013 Third Africa Environment (AEO-3) Outlook on the Key Environmental Risks for Human Health and Pathways for a Sustainable Future applicable to Africa (see http://www.unep.org/NEWSCENTRE/default.aspx?DocumentId=2704&articled=9414), which shows the reader how much Africa still has to do to protect the health and the lives of its people as well as the animal kingdom through proper use of the ecosystem:

1. Environmental and health issues deserve priority consideration in national development
2. Indoor and outdoor air pollution, unhygienic or unsafe food, inadequate waste disposal, absent or unsafe vector control and exposure to chemicals are key environmental health hazards in most African countries

3. Effective reduction of indoor air pollution requires rethinking national electrification programs and accelerating access to improved technologies and alternative sources of cleaner energy
4. Measures such as Community Based Natural Resources Management and Payment for Ecosystem Services should be scaled-up to conserve biodiversity, which provides services such as food and medicinal plants and thus promotes human health
5. Chemicals bring benefits in many sectors, but if improperly handled can result in environmental pollution and serious risks to human health (Recommended policy directions include strengthening the knowledge and evidence base of health risks; accelerating domestication and implementation of the Basel, Stockholm and Bamako Conventions; and including issues relating to e-waste in national legislation)
6. Climate change and variability impact human health because of Africa's underdeveloped capacity to cope with the negative impacts (Policy options include integrating climate-related scientific findings into decision making; building adaptive capacity; and strengthening early warning systems, preparedness and response)
7. Coastal and marine resources contribute to human health and need to be conserved and used sustainably (In addition to scaling up Integrated Coastal Zone Management, there is need for effective surveillance in order to protect the coastal and marine environment from degradation and pollution)
8. Access to safe water and adequate sanitation is vital to human health and therefore requires action to improve infrastructure, reduce pollution of available water sources, and address poor hygiene
9. Assessing the suitability of land-use changes, regulating large-scale land acquisition, and promoting technologies that enhance land productivity and more-efficient water use can promote sustainable land management and boost food and nutrition security
10. Adequate adaptation to domestic and global uncertainties, which affect human health, can benefit from scenario analyses that emphasize the various ways in which environmental management may impact human health well into the future and make it possible to make flexible long-term plans
11. Options to improve weak implementation of existing policies include: adequate data and information systems; stakeholder

engagement; institutional mechanisms to ensure alignment and collaboration; capacity development of all stakeholders; and clear implementation roadmaps with realistic targets and funding mechanism

Tick-borne diseases, including Rift Valley fever, are as well-sensitive to climate change, the same being suspected of the distribution of meningitis, "even if the mechanism by which it exerts is poorly understood" (Omer 2010: 11). We also know that water-borne disease carriers, such as giardia, amoeba, and cryptosporidium, cause diarrhea and cholera and kill thousands of infants in Africa every year. These are all related to variations in water supply. When the aforementioned diseases are added to malnutrition impacted by agricultural changes and natural catastrophes and, over the past three decades, by HIV/AIDS, Africans are urged to take these factors into heightened consideration when making policies and planning their health budgets.

There is no doubt that Africa, as well as the rest of the world has a long way to go in the effort to adequately protect its precious environment in the face of the many recurring natural and man-made disasters that contribute to both communicable and non-communicable diseases. UNEP advises that "while it can be convenient to think that human health and the environment are unrelated silos, they are in fact closely related." Nhamo and Inyang (2011: 41) concluded their remarks about Africa's environmental problems by noting: "Degradation related to global concerns, such as climate change, is simply not a priority for many governments regionally, though its potential importance is recognized globally. The truth is that *there are almost no domestic or external pressures at present for African countries to implement policies related to global environmental problems* [author's emphasis], given the lower level of greenhouse gas emissions in many of these countries and the possibility that there is a net sink for carbon dioxide on the continent." It is certainly unfortunate that there are people, especially politicians in the US, who still dismiss the dangers of climate change to our planet, when the majority of the scientists—at least 95% of them, collectively—are convinced that something is happening to the globe, which is manifested in the fast melting of the glaciers, the frequency of tornadoes, hurricanes, monsoons, and tsunamis, higher temperatures, flooding that now can occur without El Nino, soil erosion, desertification, deforestation, the rising of the oceans' waters, and the virtual extinction of certain species of the animal kingdom.

Poaching in Africa, for example, presents a major challenge to critical animal species, pitting man against animal for feeding territory and water; also the unplanned and accelerated building of dwellings, businesses, bridges, and roads without consideration of their impact on the ecosystem; the careless disposal of human, industrial, chemical, mining, and fossil fuel extraction waste; and the release of greenhouse gases into the atmosphere without regard to the health and environmental consequences. Most disheartening on the part of responsible politicians, and a few who call themselves scientists, is their dismissal of the authority of the overwhelming majority of the scientists who now use the highest evidential bar to make predictions about what will happen if we continue to treat the Earth the way we have over the past 300 years. Doubters and unbelievers seem to react this way based on job and economic considerations. In fact, they cling to the ideological propensities and theories that the free market will adjust whatever problems we may encounter, using the "dismal science" of economics (as some historians have characterized the pseudo-statistical claims of economists and business professionals). Experience has, in fact, discredited these quack scientists who compel people to try to predict a rosy future for our planet, invoking, in the process, economic falsehoods and religious beliefs that contradict science. The rise and fall of stock markets, for example, and the explanations from economists have proven beyond doubt that we should take their predications with many grains of salt, as most of what they claim as science is based on speculation and self-preservation as "scientists."

In this context, it seems that Africans can still learn from the mistakes made by the industrial world and save their continent from the impending doom that might end the civilization of the so-called developed world as we know it. However, environmental improvements that impinge on health in Africa positively will not happen until the continent's leaders see the urgent need for advanced scientific research and data collection on issues of continental and global import. Indeed, the level of participation of Africans in scientific endeavors through internal and global research leaves much to be desired. A most recent study conducted by Omer (2010: 22–23) showed that "The impact of the work of Africa-based scientists on the body of globally available knowledge on global change is far smaller than the number of researchers would suggest." His interesting analysis of Africans' scientific publications in known first-tier journals is truly disconcerting. Omer's review of the three leading journals on global change indicated that the contribution of African scientists was between 0.5% and 1% during the period 1995–2004. South Africa had 13 contributors on

Global Change Biology, Nigeria 1, Egypt 4, Ghana 1, Cameroon 6, and Botswana 2, a total of 28, for a global total of 5040; on Climatic Change, South Africa had 4, Senegal 3, Nigeria 2, and Cameroon 2, a total of 14, the global total being 2710; on Global Environmental Change, South Africa had 2, Ghana 2, Nigeria 1, Kenya 1, and Zimbabwe 1, a total of 8, for a global total of 710.

As expected, there are many reasons, of which some were discussed earlier, why African scholars come short in this respect including lack of resources to conduct meaningful research and the negative role of Western gatekeepers, many of whom, as widely known, simply ignore the writings by Africans. A regional distribution of scientists in Africa shows that West Africa has some 350 scientists, Southern Africa 175, East Africa 150, North Africa 47, and Central Africa, the Horn of Africa, and the Indian Ocean Islands, not more than 15 each. Regarding known African scientists who deal with global change, then comes South Africa with close to 48; Kenya is next, with a little over 30; Senegal and Egypt tie at close to 20 each; and Zimbabwe's number is close to 10. The reader is asked to further probe into the subject in the appropriate chapters in this Volume and Volume Two.

Global Health Versus Public Health

Global health has become a new discipline in public health, albeit amidst major disagreements among the experts as to its definition, focus, and strategies. It is now a topic that grapples the imagination of a dozen major international foundations, most of which are discussed in Chap. 3. As a result, it has caught the attention of those who believe that health is a right of all people and that globalization, particularly in terms of communication advances, economic expansion worldwide, and technological novelty, has made our globe smaller and interdependent, to the extent that, even when one epidemic hits a small region, it can instantly affect the rest of the world, as was the case with the 2013–2016 Ebola outbreak in parts of West Africa. Ebola temporarily affected Europe (Spain and the UK), and the US. Thus, despite the controversy, global health has been an attractive theme in Africa and virtually all African leaders have endorsed the concept and its goals. However, experts must make it clear or define what they mean when they talk about global health. It stands to reason that an acceptable definition of global health must be found before we can recommend and apply common and unique evidence-based strategies, provide

funds that are commensurate with the magnitude of the problems at hand, agree on the metrics that will allow us to evaluate the expected outcomes, and share, throughout these changes, the most effective approaches to gathering and delivering health information and the building of the most appropriate infrastructures for the globe.

The UN and its agencies will continue to play their role on a higher and larger scale, providing countries over the world with, as Bryant stresses, "assistance for the implementation of organizational and administrative methods of handling problems associated with health and diseases [especially] in developing countries worldwide" (*Encyclopedia Britannica* 2014). Obviously, some definitions of global health are better than others. The most widespread and most discussed is one submitted by Koplan et al., which was endorsed by the Ottawa, panel, in 2009. The team defined global health as "an area of study and practice that places priority on improving health and achieving equity—in health for all people worldwide" (Koplan, et al. 2009), one that encompasses "transnational health issues, determinants, and solutions; involves many disciplines within and beyond the health sciences and promotes interdisciplinary-based prevention with individual-level clinical care" (quoted by Gitta et al. 2011: 2).

Koplan et al.'s definition, as good as it is said to be, has encountered criticism from those who believe that public health is neither different nor indistinguishable from global health because the latter encompasses "a broader perspective on the determinants of health (including political, social and economic as well as biomedical factors), a health concern for all countries of the world [including those with high and low incomes]; integration of population-based health and individual medicine; and primary emphasis on collective global rather than national good, while recognizing that local context and other acts are intimately linked with the global scale" (Fried et al. 2010: 2). The focus of global health should not primarily be to middle and low income nations, as the 1986 Ottawa Charter for Health Promotion seems to imply, as it focuses on infectious diseases, maternal and child care and "the complex array of global forces that influence them" (Battams 2014). To confuse the matter further, the Ottawa Charter seems to define "international" as referring to the work of departments within government ministries that are responsible or dealing with the work of international organizations such as the WHO.

In the daily use of the two words, even though a government department may deal with an international organization or an international issue, it is still national and internal, with international implying sharing responsibility, which is often not the case. Thus, the fact that the public health

unit within the Ministry of Health in Mozambique, for example, deals closely with UNAIDS does not make it international. It is important to remember that the WHO is not a nation or an entity made up of various nations merged into one to govern as a nation. It is a loose association of the UN member states and world organizations whose primary purpose is to prevent disease and treat sick people. In the same vein, as the overarching organization, the UN is a loose association of countries and organizations that attempt to prevent war and preserve the world's security—it is not a sovereign state. International should literary mean inter- (between) (sovereign) nations and not between nations and an organization that may have some internationally accepted responsibilities and rules of conduct. The American Dental Association seems to be certainly inaccurate when it notes that "international/global health is an area that addresses the health of people living in low- and middle-income countries (sometimes known as developing countries), focuses on infectious diseases (such as HIV/AIDS, tuberculosis, sexually transmitted diseases, and malaria), but also chronic non-infectious diseases, as well as age-related disorders, illnesses, and conditions."

Global health should also address "mental disorders and the health consequences of trauma, violence, war, and displacement" (Global Health Overview, American Dental Association 2014) (see http://explorehealthcareers.or/en/career/51/Global_Health). Kurkbush considers (global) public health to be the discipline that deals with "those issues that transcend boundaries and governments and call for actions to influence the global forces that determine the health of people." As such, it "requires new forms of governance at national or international level which seek to include a wide range of actors." In this definition, the emphasis on collective action and agency are elements that at times do not appear in some. The point made by Beaglehole and Bonita (2006) is that global health, unlike public health, avails itself of all strategies regardless as to whether they are "population-based or individual-based, combined with those of all sectors and not simply the health sector." Kirkbush's position is that global health transcends the usual approach from developed to developing nations, positing that all are "equal, interdependent, [and] transcending frontier, policies, and sectors," often requiring change from local governance to achieve global governance.

Gitta and colleagues note that all definitions must contain the primary characteristics of the concept which, in their own words (here replicated verbatim), include the following: (1) equity in health status and access; (2) global conceptualization (as opposed to international or supranational

perspectives) and causes (of health issues); (4) means (for health activities); and (5) solutions (to address health issues). The secondary characteristics in the definition should contain the following: (1) source of obligation (to help those who do not have the means); (2) multidisciplinary approach (joint work of various disciplines and health professionals); (3) actors (individuals or groups as agents of global health); and (4) reactive/proactive measures and interventions (provision of global health). Yet, this heralded definition has been disliked by certain scholars who believe that insisting on the concept of equity or inequity as part of the definition is unjustified as it interjects ideology or opinion, expressed by one scholar as "ideological baggage," thus making it less attractive to those who try to be less intrusive in the objective discussion and provision of health. To this author and many others, the criticism seems paradoxical and misplaced. Eliminating inequalities (and unjustified disparities) has been one of the most important foci in public health literature endorsed by the UN and all its agencies for decades, including condemning unfair disparities which result in or perpetuate poverty and ill health as the cause or associated cause of many diseases and deaths. It is therefore a legitimate concern in all international pronouncements and strategies. The WHO has agreed on the following with the member nations:

> The poorest of the poor have high levels of illness and premature mortality. But poor health is not confined to those worst off. In countries at all levels of income, health and illness follow a social gradient: the lower the socioeconomic position, the worse the health. It does not have to be this way and it is not right that it should be like this. Where systematic differences in health are judged to be avoidable by reasonable action, they are, quite simply, unfair. It is this that we label health inequity. Putting right these inequities—the huge and remediable differences in health between and within countries—is a matter of social justice. Reducing health inequities is, for this WHO Commission of Social Determinants of Health, an ethical imperative. *Social injustice is killing people on a grand scale* (author's emphasis). (see Krieger 2011: 291)

Furthermore, experience has shown that, where the premise of health and access to (quality) health care as a human right is rejected, the US being a prime example, people at the margin do not have access to quality health, if any at all, creating the false impression among the wealthy that they are isolated from infections and other ailment common to poor people, when actually the ill tend to drag the healthy down and end up costing more to

the health system than if they were all treated as equal citizens along with the wealthy. The same argument therefore may be used to justify the goals and well-conceived strategies of global health.

The Institute of Medicine again gives us a definition that is simple and substantive, as it sees global health as all "health problems, issues, and concerns that transcend national boundaries and may be addressed by cooperative actions." Unfortunately, though concise, this definition does not specify agency, and makes it sound as if global health happens in a vacuum and from happenstance, when it must start with the health professionals, politicians or decision makers, academicians, and community leaders. A similar iteration is provided by Merson et al. when they note that global health is the "application of the principles of public health to health problems and challenges that transcend national boundaries and to the complex array of global and local forces that affect them" (Merson et al. 2010). A minor shortcoming of this definition and the preceding announced by the National Institute of Medicine lies in the use of the term "national" rather than international or transnational, because global health might be construed as transcending only national boundaries, when it should transcend continental, regional, national, and bilateral boundaries.

Bonita and Beaglohole have submitted a short definition, which sees public health as "collaborative—national research and action for promoting health for all." They differentiate global health from public health in that the former "builds on national public health efforts and institutions. "In many countries [they write], public is equated primarily with population-wide interventions; global health is concerned with all strategies for health improvement, whether population-wide or individually based health care actions [medical treatments] and across all sectors, not just the health sector" (2014: 2). Here, the operative words and functions are "collaboration on all aspects of health, transnational (transcending national and international boundaries); research (resulting in evidence-based interventions) or translation involving many disciplines; action (or actual implementation of interventions); and promotion, which means using "public health and health promotion strategies to improve health."

One element that is unique and legitimate in public health as well as global health is advocacy. Advocating for people's health, for better policies, and for equal access to (quality) health care is one of the priorities held by public health practitioners and professionals, which does not constitute unethical focus as might be the case in many other fields that are individual- or population-based. The UN believes and urges that

"the health sector should be the advocate across government," since it cares more than anyone else about the issue of people's health (ECOSOC 2009: 33). One of the reasons why there is such confusion about the understanding of global health is its novelty as it became a catchy word only two decades ago. Gitta and colleagues proved this assertion when they carried out a meta-analysis of the use of the concept recently. They came up with the following interesting results: In 2000, the concept of global health appeared only 110 times in journal articles, having jumped to 1,250 in 2010, to 1714 in 2011, and to 2268 in 2012. From the first article in 1966 used by the Canadian mobile forces, the number grew each year thereafter by some 10 articles but, by 2013, the number of articles had reached 9243 (Gitta et al. 2011).

Thus, it appears that, the future of global health is secure. In fact, endorsing the concept of global health, the Harvard Business School (see Porter et al. 2009) notes that, since 2001, more than $85 billion have been used to ensure that global health becomes a reality, adding that the funds will continue to be available in the future, as nations have accepted how vital it will be, especially for the developing world in such continents as Africa and Asia. However, these areas of the globe will themselves be asked to contribute to the effort based on the level of their economic resources and overall developmental status. Conceived this way, the global approach promises to solve the many existing shortcomings in global health, including: "sliced" delivery or uncoordinated or non-integrated delivery of care, across districts, regions and nations; care delivery based on projects, which ends up making the services either overlap or duplicate, thus depriving those areas that need the most critical assistance; lack of adequate and critical data to allow for accurate measurement of health and health-related outcomes; (notwithstanding the urging of Alma-Ata in 1978), the practice of stressing treatment rather than the less expensive focus on prevention; and the superficial evaluation of quantity and scope of services rather than their quality. The weaknesses noted here must be remedied through careful thought, well-crafted strategies, which the Harvard Business School outlines, namely: (1) devising care delivery "value chains for medical conditions;" (2) creating adequate infrastructure that is shared among all health sectors; (3) ensuring that health goals are aligned with the countries' economic and social conditions and resources; (4) delivery that takes into account the "external context" or creating programs and services that are potentially global and not simply local in impact; and (5) enlisting support and collaboration of the pharmaceutical

industry to ensure fair prices that are affordable to the majority of the global community, mainly the poor, the vulnerable, and the underserved (see Porter et al. 2009).

Global health experts also note that an approach superseding the commonly understood public health concept is necessary not only because the world has, in a sense, shrunk due to scientific and technological advances but also due to the fact that the global community is suffering from many diseases and experiencing deaths that could be prevented by a wider transregional, transnational, and transcontinental approach. Robinson et al. (2007), after noting the novelty of the discipline, say that public health has both the positive and negative transnational aspects of health, such as "cross-border movement of goods, people, practices, and services (including infections, the marketing of unhealthy products on the Internet or satellite TV, and the illicit trade in tobacco or pharmaceutical products) all fall under the general rubric of global health." To this statement they add the crucial point, namely, that these global conditions

> …require international norms, global surveillance, multi-country responses, and the engagement of many players…Progress has been made in developing a set of international rules to address infectious diseases (for example, through the acceptance of the 2005 version of the International Health Regulations) and also in tackling tobacco use—a core risk factor for chronic diseases. (Robinson et al. 2007: 54)

The defining specific factors that make global health necessary are well-known. Some 1.2 million people globally live in absolute and abject poverty, surviving on less than $1.00 a day, and live in miserable conditions that lack the most basic necessities of life, namely, food, shelter, clean water, and sanitation, with 85% of them found in low- and middle-income countries. These also suffer from 12% of the global disease burden, including infectious diseases and malnutrition. Unfortunately, for Africa, 41% of children's deaths worldwide occur in Sub-Saharan Africa, and, of these, 34% take place in South Africa alone. We also know that 11 million children under the age of five die in the middle- and low-income nations annually (*Lancet* 2009). This dire situation is worsened by a high rate of maternal death during child birth: 500,000 women die in developing countries each year due to complications at birth, Africa experiencing the highest rate. A global approach to health delivery and disease prevention can alleviate disease and the death burden, as several studies and health projects have shown.

The global acceptance and institutionalization of the Millennium Development Goals (MDGs) is certainly a major thrust toward true global-focused health. It represents the will of all governments and states to invest in the health of all people and in other vital sectors such as the economy, governance, reduction and eventual elimination of poverty, infrastructure, education, and international cooperation. The MDGs seem to be realistically attainable using the present and projected future resources in all 189 countries that placed their signatures on the document in 2000. What makes the goals achievement skeptical to some observers is lack of enforcement mechanisms, if countries begin to stall and even go their own way, a problem that can result from individual countries' leadership deficiencies, ignorance, selfishness, misuse of resources, and lack of vision and action to protect the well-being of future generations through robust investment of financial, human, and natural resources. The world community has not had the will and the courage to lay down what consequences there might be for a member state that is delinquent due to its own behavior rather than from unexpected calamities that befall it for no fault of its own. It is clear, for example, that no country in Africa can achieve the three health-related goals without an increased budget allocated to health, notwithstanding the fact that some 10 countries may have raised theirs from 4% to close to 15% as the Abuja Declaration prescribed. It is impossible for Africa to improve its health if it does not invest massively in the health infrastructure and in the training of a competent and sufficient health workforce.

The clearest catastrophe that highlighted Africa's problems and the impotence of the world community, including the UN and its WHO, was the outbreak and impact of the Ebola virus in 2013–2016. The awful condition of the health infrastructure (i.e., capable and sufficient number of hospitals and clinics to isolate and treat the infected persons), the lack of essential drugs, mobile units such as ambulances, health emergency gear, and sufficient trained health workers (nurses and doctors), proved that leaders in Liberia, Sierra Leone, Guinea, and several West-Central African countries were absolutely unprepared for any unexpected or expected health emergencies, despite warnings emanating from previous outbreaks in the area. Undoubtedly, these countries endangered the health of the whole world, which, unfortunately, was not itself prepared to deal with a calamity of such magnitude. This was made worse by the fact that states began to quarrel about what quarantining someone meant, when quarantine should be used, and what the criteria were for the globe to apply when

similar catastrophes occur—at the time when even citizens and states in the most developed corners of the world began questioning the very idea of quarantining and isolating someone. In the US, the controversy ended up in a court of law, resulting in a victory of the nurse citizen who had worked in West Africa, while the rest of the country, including the supposedly "infallible," know-it-all Centre for Disease Control, led by Director Tom Frieden, and the National Institutes of Health, continued to squabble about what to do. Would the global community not be better served if there were serious sanctions against any country that accepts global responsibilities but does not follow them through? Should behavior that threatens the health of a country and the international community not be carefully scrutinized and be subject to accountability? Presently, for example, any country that does not achieve the eight MDGs suffers no consequences.

The Ebola crisis will probably come and go, while many countries in Africa and the rest of the world that claim not to have the resources will continue to rely on international hand-outs and sit on their meager laurels giving the impression that they are doing their best, when in reality they learn little from previous catastrophes that should allow them to prepare for impending emergencies related to infectious and chronic diseases. These will continue to plague the world precisely because "the more things change the more they remain the same," as long as agreements rely on trust but not also on verifiable commitments. As Sewankambo aptly notes (from an analysis of Africa done by Cooper and Kirton):

> The MDGs represent a 'welcome agenda for action' and, coupled with vertical and horizontal programs, should continue to work to deliver effective, equitable, and affordable health services. With a population of more than 660 million, Sub-Saharan Africa would require approximately 1 million healthcare workers (including 700,000 physicians) to meet the MDGs and deliver basic healthcare services. The current capacity has been unfortunately neglected by governments, donors, agencies, and global health initiatives. (Cooper and Kirton 2013: 13; Sewankambo 2013: 159–182)

This inexcusable neglect has been clearly underscored in parts of West Africa, which has enjoyed billions of dollars from the international community over the years, while committing a ridiculously small amount of their own GDP to it. These countries continue to waste their meager resources on armaments and their armies, unsustainable projects, and the purchase of luxurious items for their leaders. Meanwhile, the population languishes in a cesspool of poverty, misery, and disease. Short of prosecut-

ing at the Hague the perpetrators of health "crimes" against the citizens, the global community should find ways of isolating, ignoring, and politically "quarantining" leaders and countries that seriously violate human rights, of which health is one, while they endanger the health of the whole planet through neglect, indifference, and selfishness. Indeed, Geoffrey Rose made a profound statement when he said that "a large number of people exposed to a small risk may generate many more cases than a small number exposed to a high risk" and that "widespread risk calls for widespread response," which often requires "age-specific approaches" (Rose 1992: 24–27).

Conclusion

Summing up this chapter, the issue of public health's credibility needs to be made clear because it has created a major rift with the so-called "hard" science and medicine and among the very experts of this fast evolving field. Paul Starr's criticism of an all-encompassing public health definition is not the only one leveled against the field and its practitioners. The frequent recalls of health products that are prematurely allowed in the community, and the tendency of public health to pose itself as a predicting science, rather than a field that is subject to the whims of individuals and populations' behaviors, and therefore not as solid as a natural science, are major pitfalls that make people distrust what epidemiologists, behaviorists, and nutritionists claim and "preach" to be good for people. Indeed, no matter what theories public health practitioners may come up with, they are not always applicable to all individuals and all populations and must always be tailored to specific circumstances, and specific places and times, if possible, and to specific genetic make ups. Public health dilemmas were well expressed by Johnson in 2009 when he wrote that "achieving public health outcomes for the society involves a contentious process of blending 'science, politics and activism,' resulting in battles fought along both political and behavioral lines" (quote by Fayoyin 2014: 188).

Among the most globally celebrated achievements of public health the following stand out, deservedly touted by the UN and its agencies, such as the WHO, WTO, GATS, and FAO:

1. Vaccination and control of infectious diseases
2. Motor-vehicle safety
3. Safe workplaces

4. Safer and healthier foods
5. Safe drinking water
6. Healthier mothers and babies and access to family planning
7. Decline in deaths from coronary heart disease and stroke and
8. Recognition of tobacco as a health hazard

Overall, public health performs the following essential functions (WHO 2014a, b, c, d):

1. Assessing and monitoring the health of communities and populations at-risk to identify health problems and priorities
2. Formulating public policies designed to solve identified local and national health problems and priorities and
3. Assuring all populations access to adequate and cost-effective care, including health promotion and disease prevention services.

Understandably, prevention versus treatment has been an issue of controversy among public health practitioners and academicians but more so among the latter. However, both are important concepts and goals and critical to the health of populations. Often, treatment or direct service has been viewed as a more critical task than preventive medicine or preventive health care, perhaps because it is more related to individuals and doctors who often receive more attention than populations. Prevention or preventive health care is antecedent to or the anticipatory step against disease occurrence or ill health if certain measures are not taken or behaviors are not dealt with seriously, and is often seen to be on a higher scale of impact as it aims to preserve the health of populations through what some colonialists in Africa termed "social prophylaxis." In the colonial battles against smallpox, jiggers, yaws, and sleeping sickness on the African continent, there was little distinction between the two, as colonial administrators and their physicians often "treated to prevent" or "tested and treated," without much considering the benefits of prevention. The ambiguity is carefully examined by Guillaume Lachenal, who calls it the "treat-and-treat strategies" or the "test-and-treat paradigm" in colonial Africa. Says Lachenal (2013: 84), "From quinine to pentamidine, a constant ambiguity prevailed between individual prophylaxis and collective prevention through "test-and-treat" strategies," when these were actually based "on fragile theories, hubristic hopes, naïve faith in wonder drugs, and racial, and colonial paternalism, all of which will sound familiar to many global

health practitioners who are aware of public health history." Indeed, treating may lead to prevention, as is the case with the HIV/AIDS where the most recent therapies do not only make the sick better but they also stop the easy transmission of the virus to others.

Contextually, therefore, Alma-Ata's focus on primary care was an attempt at underscoring the importance of prevention but not to the detriment of the patient's treatment. Indeed, after each treatment, there is often the need for secondary and even tertiary prevention. In other words, this is often the case where the two go hand-in-hand. One thing is clear, though: When preventive steps are not taken, like cigarette smoking cessation, the disease outcome stage is costlier than when the smoker changes his behavior, which often results in no cancer or in a prolonged life span. However, an individual with genetic pre-disposition, at least for most major non-communicable diseases, may not benefit as much from preventive measures, at least at this stage of our public health and medical scientific advances. Unfortunately, even in developed countries, and more so, of course, in the developing nations, budgets for prevention are minimal—they hover around 4–5% while the remainder goes to salaries, equipment procurement, maintenance of health facilities, and treatment. Studies by Weinstein Station conducted in 1976 and 1978 intimated that preventive measures that attempt to reduce the need for treatment against a heart attack, for example, through reduction of early death, may be, in the long run, more costly than the treatment itself, mainly as a result of drug costs. The same seems to be true of the efforts to prevent diabetes by decreasing high cholesterol: The cost is higher than the resulting heart disease treatment (see Okorafor 2010). This suggests that other factors than simple preventive care should be considered along those that might result in greater positive health outcomes.

However, where high inequalities exist, like in Africa, prevention may be a luxury, forcing the patient to visit the hospital only when extremely sick, as he expects some attention from the doctors or nurses or free treatment, even though, due to his low socioeconomic status, he may not have access to the best treatment. Thus, Physicians for Human Rights Tools and Resources (2010) were enraged when, in 2001, the highest ranking aid official in the Bush Administration, Andrew Natsios, advised, regarding AIDS, that Africa should only be given funding for prevention "as treatment regimes were too complex for Africans who 'have never seen a clock or a watch their entire lives.'" Such a policy stand is certainly a perversion of the emphasis on preventive care. Denying critical treatment to poor populations

due to cost seems to be immoral, as "no one suggested [prevention] as the only response to AIDS in wealthy countries." Natsios showed his insensitivity and the ugly side of false public health by insinuating that prevention can only be done through Western-centered intervention modalities and knowledge of Western preventive practices, forgetting that there are other means of combating or treating disease that are not an exact replica of Western practices (Human Rights Tools and Resources 2010).

Obviously, for global health, the new focus of public health disciplines, to make any sense and be realized, the UN 2009 Economic and Social Council (ECOSOC) recommendations, which have been accepted by all participating members, are worthy of serious consideration by leaders, scholars, professionals, practitioners, and academicians everywhere. They include (ECOSOC 2009: 5–14):

1. Governments taking the lead in designing "effective" health systems
2. Governments maintaining investments that will sustain the health care services in the short- and long-run
3. Governments and institutions giving precedence to and investing in the challenge presented by the neglected tropical non-communicable diseases
4. Maintaining strong partnerships and international cooperation in health
5. Continuing the effort to eradicate infectious diseases and
6. Accelerating the improvement and adoption of E-health models using advanced information communication technologies.

On the last recommendation, the UN is in agreement that, in Africa, and many other countries of the developing world, "E-Health plans, policies, strategies, legal, ethical, and legislative frameworks [have] remained very weak, leading to minimal progress in effective development and integration into mainstream health care" (See ECOSOC 2009: 81). The world must take the issue of global health seriously and agree on how to improve the health of all people on the planet. Currently, says the ECOSOC Forum, three burdensome universal factors will affect everyone and every health system: an aging population throughout the planet, "rapid and unplanned urbanization," and the "globalization of unhealthy environments and behaviors" (ECOSOC 2009: 18). Concluding his analysis of global health and the resources that have been made available so far, Yach,

like this author, sees a continued bright future of cooperation between governments, foundations, and NGOs in Africa. However, this partnership with and assistance from major economic conglomerates should be transparent, unbureaucratic, and accountable. Yach cautions that:

> Many commitments represented new ways—and overcame the concerns of many skeptics in governments and NGOs about working with business… The economic leadership for global health has now moved beyond the World Bank and the traditional development agencies to include major corporations and the world's largest foundations. (Yach 2007: 56)

As expected, resources will always remain a major problem in the eradication of diseases from the earth and the improvement of the health of the people globally. Unfortunately, at present, despite all financial assistance provided by the major external donors and funders, ECOSOC maintains that the gaps are still too many to make global health a reality, especially in health care systems (ECOSOC 2009: 22). For African institutions of higher learning, global health is considered by many to be another branch of public health. Despite its great appeal at our African institutions today, global health has its own potential negative side for Africa. Institutions with a global health program sometimes have avoided working directly with their African counterparts through African structures or bureaucracy and have tended to use "[Western] American certified laboratories" rather than those of the developing countries. Furthermore, by making itself different from public health, it appears that global health is moving toward providing resources to a smaller group of people and relegating supplies and treatment to private institutions. In the end, global health science carries with it a new set of inequalities, which in every case have favored the West and its institutional allies. As Crane puts it:

> It is not only African public health that is absent from global health experience—it is also African expertise….In order to truly enact the ethic of partnership it espouses, global health science must account for the social relations of knowledge production it engenders. Moreover, it must strive to make these social relations of science more equitable just as it aims to make health more equitable. (Crane 2013: 180)

Those who have been advancing the interests of Africa and the health conditions of its people and following the involvement of the West on the continent should have learned this lesson and not continue to be tricked

by research schemes, assisted often by the unsuspecting elite that, willingly and unwittingly, ultimately serve not the needs of Africans but those of the outside world. We might conclude this discussion by echoing the words of Spielberg and Adams (2011: 5–6), when they wrote: "The primary aims of global health are to improve population health, reduce the existing disparities in the health between population groups, and protect populations from health threats…A characteristic of global health is that its activities are best carried out in ways that are collaborative and cooperative, and involve multiple interested partners, often from a variety of disciplines" (see also Farmer 2004).

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