

Public Health Evolution in Liberia

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Over the past two centuries since its independence in 1847, Liberia has made significant progress in building an integrated public health system designed to serve its population. Despite a prolonged period of civil conflict (1990–2003) and the emergence of the 2014–2016 Ebola Virus Disease (EVD) that crippled its already weakened health system, Liberia was able to re-emerge, making significant strides and gains in rebuilding and strengthening its health infrastructure and systems. Lessons learnt from the EVD epidemic have led to developments such as the newly established National Public Health Institute of Liberia (NPHIL) and several tertiary public health institutions to meet the growing demands of a skilled workforce equipped to combat existing and emerging health problems and/crisis, including informing the more recent COVID-19 response.

Keywords: Liberia ; public health ; Ebola virus disease

1. Introduction

In recent years the world has had to combat emerging and re-emerging diseases of epidemic and pandemic proportions. The 2014–2016, West Africa Ebola Virus Disease (EVD) epidemic, COVID-19 pandemic and the recent Monkeypox outbreaks has underscored the need for strengthened and resilient public health systems, institutions, and workforces ^{[1][2][3][4][5][6]}. Although historically considered rare compared to those infectious and chronic diseases that cause much of the disease burden; accelerating climate change, and increasingly mobile/migrant populations have led to more frequent disease outbreaks of public health significance in the past decade ^{[6][7][8]}.

These public health emergencies cause disruptions in health service delivery, amplifies community mistrust, and creates long lasting socioeconomic effects that are of particular importance to low and middle-income countries (LMIC) ^{[9][10][11][12]}. Strengthening of public health institutions could save far more lives at a lower cost, especially in resource constrained countries. Over the past decade, many countries have strengthened, or created national public health institutes (NPHI), often following an event such as the EVD epidemic in west Africa ^{[13][14][15]}.

Liberia has been no exception to the changing tides of public health emergencies and health system strengthening. However, Liberia has made significant gains despite the many existing challenges to strengthen its health systems and better serve its population.

2. Origins of Public Health in Liberia

2.1. Individuals That Pioneered Public Health

From its founding in 1847 till the early 1900s, Liberia's health system consisted to a large extent of disjointed health facilities run by various Christian missionary led organizations and settlers from the United States. The early to mid-1900's saw much advancement and progress being made in the fields of health system building and public health in Liberia ^[16]. In 1946, Dr. Joseph Nagbe Togba, M.D., returned home from the United States after completing his formal training and internship at Meharry Medical College. He was the first Liberian born physician to practice medicine in Liberia, where others prior to him were either white Americans or freed slaves who had settled in Liberia (**Figure 1**). Dr. Togba began his services in 1946 at the Liberian Government Hospital in Monrovia, as the only Liberian doctor and one of twelve physicians in the country. Upon arrival he wrote about his observations of public health in Liberia, "*public health as practiced in Liberia simply applied to Monrovia and its environs. The work of public health was a matter of going along the streets to the homes of prominent officials in the cabinet, legislature, and judiciary. The grass and dirt around their homes were to be cleared. Garbage and dirt were not to be seen in certain places in Monrovia or else the Public Health team was to be taken to task*" ^[16]. Towards the end of 1946, Dr. Togba was appointed Acting Director of Public Health and Sanitation by the government of Liberia. In 1949, Dr. Togba, received his master's degree in Public Health from Harvard University, becoming the first Liberian doctor with a formal training in Public Health.

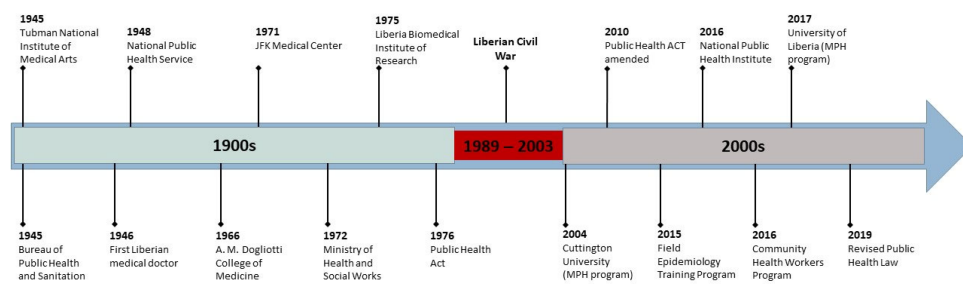


Figure 1. Timeline of key public health events in Liberia.

Another figure of historical note in the field of public health in Liberia was Mrs. Rachel Pearce-Marshall. Mrs. Pearce-Marshall was the first Liberian nurse to obtain a college degree in public health nursing in 1954 (**Figure 1**) ^[16]. Following her studies in the United States, she was appointed to organize the public health nursing program in Liberia. Two years later she was made the director of Public Health Nursing in Liberia ^{[16][17]}. She was the first Liberian to be elected as president of the West African College of Nurses for the period of 1989–1991.

2.2. Early Public Health Institutions

In the early 1940s, President Tubman requested for American assistance to tackle the many health problems that the country confronted. In response, the U.S. State Department, in November 1944, directed the United States Public Health Service (USPHS) to send a small team of African American health workers to Liberia ^{[16][18]}. In 1945, the bureau of Public Health and Sanitation (**Figure 1**) was established in Monrovia, Liberia. The first policies on disease control and on health interventions for the fledgling country would emanate from this office ^[16]. This is considered by many as the cornerstone of public health and the national health system in Liberia. In 1946, shortly after Dr. Togba's return home, the legislature passed the first ACT meant to impact the health of the public, which stipulated the following: there was to be an annual examination of all school children; there was to be premarital serology and medical examination with free treatment for those found positive; there was to be free treatment to all students and indigents in government clinics and hospitals.

One of the earliest descriptions of the health system at the time was provided by Dr. John B. West who led the USPHS team. Dr. John B. West, wrote of his initial impression in the Public Health Reports, "*we found that to the best of our knowledge there were six physicians, two dentists and an indeterminate number of nurses practicing in Liberia, which has a population estimated at two million*" ^[18]. To prioritize public health and sanitation in and around the Monrovia, on 2 May 1945, President Tubman issued a proclamation that notified the residents to permit representatives of the USPHS mission to enter homes and spray or otherwise apply dichlorodiphenyltrichloroethane (DDT) to walls and ceilings for the purpose of killing mosquitos ^[16]. This could be considered one of the first large scale public health campaigns to be initiated in Liberia.

In 1948, the Bureau of Public Health and Sanitation was dissolved and in its place was established the National Public Health Service (NPHS), led by Dr. Togba as the first Director General ^[16]. The NPHS would become the precursor to the present-day Ministry of Health and Social Welfare (MOH&SW). Dr. Togba went on to lead the Liberian delegation to the United Nations International Health Conference in New York in 1948 that culminated in the formation of the World Health Organization ^[16]. In 1950, Liberia's appropriation for Public Health and Sanitation was 12% (10% in 2014) of its total revenues, which was one of the highest health appropriations in the world at the time ^[19].

2.3. Key Institutions Involved in Workforce Development and Services

The mid 1900s saw the establishment of several key institutions meant to produce an essential healthcare workforce such as nurses, physician assistants, and medical doctors. By the late 1980s the Liberian health system was largely staffed by those trained in Liberian health institutions.

The Tubman National Institute of Medical Arts (TNIMA) was established in 1945 through the effort and cooperation of the Liberian National Public Health services (now Ministry of Health and Social Welfare) and the United States Mission (**Figure 1**) ^{[20][21]}. In 1952, a training course of auxiliary health education was established at TNIMA through the effort of the Liberian American Joint Commission for Economic Development. Later that year, the Liberian requested WHO to establish a school of sanitation after realizing that most of the population's common diseases were a result of poor sanitation and hygiene. The school was then established on a one-year training basis until 1961, when it was raised to two (2) years and renamed the School of Environmental Health. In 1964, the government of Liberia in collaboration with

WHO and UNICEF established the Physician Assistant Program, and training started in March 1965 as a two (2) year program and increased to three (3) years in 1976.

The Monrovia Torino Medical College was established in 1966 with the assistance of the Italian government, the Vatican, and the A. M. Dogliotti Foundation (**Figure 1**) ^{[16][22]}. The Catholic Church, under Pope Pius XII collaborated with the Italian government to build the physical structure of the medical college campus, which at the time included the academic building, a dormitory, an administrative office building and a teaching hospital, the St. Joseph Catholic Hospital. In 1970, the College was merged with the University of Liberia as the seventh academic program and the second professional school. It was then renamed The Achille Mario Dogliotti College of Medicine (A.M.D. College of Medicine) after the late Italian philanthropist and founder of the Dogliotti Foundation in Italy ^[16]. The A. M. Dogliotti College of Medicine was established to provide Liberia with medical doctors who were trained within the country and would help provide preventive and curative services across the health system. The first curriculum of the college laid a high emphasis on understanding core public health principles, which was seen to be essential for preparing young doctors who were expected to work in rural parts of Liberia. In 1968, with the publication of the Ten-Year Health Plan (1967–1976), there was a shift of emphasis from curative services to preventive medicine. The A.M.D College of Medicine played a critical role in providing trained physicians skilled in the principles of public health for a decentralized healthcare system.

The Liberian Institute for Biomedical Research (LIBR) was established in the 1970s as a premier research facility to develop scientific breakthroughs for a variety of viral infections, including hepatitis B vaccines, and a safe blood sterilization process for blood transfusions (**Figure 1**) ^[23]. Currently, LIBR serves as the country's reference laboratory and an integral component of the NPHIL, and the public health infrastructure in the country.

The John F. Kennedy Medical Center (JFKMC) was established and opened on 18 June 1971 (**Figure 1**) ^{[16][20][24]}. This was a collaboration between the governments of Liberia and the United States of America ^{[16][24]}. The purpose of this institution was to improve medical education and extend preventive practices to the rural areas of Liberia as the center for training of doctors, nurses, midwives, laboratory technicians, and sanitarians. As such the west wing of the JFKMC was occupied by the Tubman National Institute of Medical Arts (TNIMA) classrooms, administrative offices, and library. By the late 1970s, the role of JFKMC as an integral part of the national health system was cemented as it became the national referral and teaching hospital. Today the JFKMC serves as the national teaching and referral hospital hosting both medical students and residents of the newly established Liberian College of Physicians and Surgeons.

3. Key Events Impacting the Public Health System

3.1. The Liberian Civil War and Its Impact on the Health System

Before 1990, Liberia had focused primarily on curative and tertiary health care that had an urban bias. However, just before the war, there were signs that the MOH&SW had begun dealing with the twin issues of decentralization and provision of primary health care (PHC) services. It had acknowledged that it needed to move from the curative to the preventive and that it needed to empower its county health teams.

A decade of civil war (1989–2003) devastated the health system and halted much progress made in the late 1990s ^{[25][26][27][28][29][30]}. At the war's conclusion nearly 250,000 were dead, millions displaced; under-five mortality and maternal mortality were amongst the worst globally ^{[31][32]}. Of 293 public health facilities, 242 were destroyed, health educational/training institutions shut down, and only 10% of the population was estimated to have access to basic healthcare by the conflict's end ^{[29][30]}. Some health facilities were not even staffed, and many lacked the reliable power supply, water, drugs, and equipment the most basic clinic should have. Achieving adequate staffing levels was particularly difficult—most skilled health workers had left during the war years and those left behind missed out on even a basic education, making it hard to find suitable candidates for fast-track training courses. By 1998, the total number of personnel working in the public sector had fallen from 3526 to 1396 ^{[26][29][30][33]}.

In 2005, with donor support the government of Liberia embarked on a massive effort to rebuild the health system, prioritizing access to primary care, particularly in rural areas of the country. The emphasis on rural healthcare was a departure from the previously urban-centric focus of Liberia's health sector. Additionally, postwar assessments of the health system identified an urgent need for national policy and service delivery guidelines to lead the revitalization of primary health care services. Prior to the war, Liberia had national policies that addressed only STDs/HIV/AIDS, EPI, control of diarrheal diseases, and malaria ^{[26][29][30]}. There were no official policies for family planning, non-communicable diseases, safe motherhood, acute respiratory infections, and drugs. Many of the country's current health policies and guidelines were drafted in the period immediately following the end of the civil conflict. To address these varied

challenges, Liberia's post-war government chose to organize their reconstructive efforts around a Basic Package of Health Services (BPHS) ^{[26][29]}. The BPHS is a defined set of evidence-based, cost-effective interventions that are considered essential to improve the health of the population ^{[34][35][36][37]}.

3.2. The Ebola Epidemic's Influence on Public Health

Between 2014–2016, Liberia saw 10,678 cases and 4810 deaths from the Ebola Virus Disease (EVD), further disrupting service delivery across an already weak health system ^{[2][38][39][40][41][42]}. The Ebola epidemic revealed that health system strengthening requires a greater investment in all aspects of the health system (healthcare worker training, surveillance, reporting, analysis, policy, financing) and that post-conflict investments had focused primarily on primary health care and curative services at the cost of prevention ^{[2][25][43][44][45]}.

3.3. Responding to the COVID-19 Pandemic

On 16 March 2020, the first case of COVID 19 was confirmed in Liberia ^[46]. This is significant given that the World Health Organization had only just declared COVID-19 a pandemic on the 11th of March, an indication of the country's capacity and level of preparedness to identify cases and respond to this new health crisis ^[47]. In Liberia, to date (23 November 2022) there have been 8014 confirmed cases and 294 deaths; given its resources and capacity only a few years prior, the low number of fatalities is a formidable feat ^[48]. Liberia has used the many lessons learned from the 2014–2016 EVD epidemic when responding to the COVID-19 pandemic ^{[33][46]}. While healthcare service delivery, such as outpatients and noncommunicable disease clinics, were temporarily shut down, essential services, and healthcare worker training programs quickly adapted to meet the need for social distancing ^{[46][49]}.

4. Public Health as a Growing Field

4.1. Post Graduate Public Health Education

The period following the civil war and the 2016 EVD epidemic saw significant investments being made in the field of public health training. By 1998, the total public health personnel had fallen from 3526 to 1396, with the number of physicians declining to fewer than 30 ^{[30][33]}. According to a WHO 2021 report, there were 234 doctors, 9415 nurses/midwives, 1071 laboratory technicians, 3391 community health workers, and 4758 other health workers in Liberia ^{[50][51]}. Specialist physician and nurses were in critical need ^[10]. Several institutions of higher learning, including the NPHIL has prioritized training skilled public health practitioners to help meet the many health challenges that face the Liberian people today ^{[25][33][52][53][54]}.

4.2. Community Health Worker Program

In 2016, Liberia established a robust community health worker (CHW) program. A 2008 study found that only 15% of rural Liberians could access basic health services for childhood diseases such as diarrhea, malaria, measles, and malnutrition ^{[27][29][55]}. The Liberian government and partners agreed that the best way to address this gap in services was to use a cadre of community health workers (CHWs). Between 2016–2019, Liberia recruited, trained, and fielded 3177 CHW ^[55].

4.3. Key Public Health Interventions, Policy, and Laws

The 2014–2016 Ebola epidemic served as a catalyst for the MOHSW. The need for universal access to safe and quality services through; a robust Health Emergency Risk Management System; and an enabling environment that restored trust in the health authorities' ability to provide services through community engagement in service delivery and utilization, improved leadership, governance, and accountability at all levels was seen as crucial ^{[2][27][39][42][44][52][56]}. In response to the need for a resilient and responsive health system, several key policies, plans and legislation was passed in the years following the Ebola epidemic.

4.3.1. National Public Health Institute

After the devastating EVD epidemic, Liberia began to rebuild its health system. The need to strengthen Liberian expertise in infectious disease preparedness and response and in a host of other areas became obvious to policy and Ministry of Health leaders. The National Public Health Institute of Liberia was established by the Liberian government in December 2016 ^{[23][57][58]}. The Institute collaborates with and advises the Ministry of Health on infectious disease control, environmental health, occupational health and safety, and other issues. NPHIL is mandated to improve the public health status of the Liberian population in collaboration with relevant agencies and government institutions, in alignment with IHR core capacities (prevention, detection, and response to public health threats and events). It shall provide real-time

surveillance and expert advice on public health morbidity and mortality to the Government of Liberia, key stakeholders, and the public. Public health workforce training and capacity building is an integral component of the Institute.

4.3.2. Private Public Health Institutions

There are several non-governmental organizations both local and international that support public health interventions in Liberia [59]. One such local organization is the Public Health Initiative Liberia (PHIL) which was conceived in 2011 by Liberian health professionals to contribute towards the effectiveness of the health care delivery system of Liberia through leadership, partnership, innovation, advocacy, and empowerment. PHIL is a non-governmental organization registered in Liberia with a mission to promote and enhance Liberia's quality of health care delivery through leadership, partnership, innovation, and capacity building [60]. Since its start, PHIL has been involved in various public health initiatives such as: cervical cancer screening, menstrual hygiene, breast cancer awareness, and community engagement during the Ebola epidemic and the current COVID-19 pandemic.

4.3.3. Public Health Law

Liberia adopted its first public health law on 16 July 1976, and which stayed in effect for over forty years [58]. The 1976, law did not address new and emerging public health challenges such as emergency treatment, discrimination, mental health, regulation of marketing of products for infants and young children, zoonotic disease, non-communicable diseases, antimicrobial resistance, clinical trials, and alternative medicine [58]. In 2019, the 1976 public health law was revised to address these concerns and more. The Act to Establish the National Public Health Institute of Liberia that was approved on 27 December 2016 and states the NPHIL's objective is to improve the health of the Liberian population in collaboration with relevant agencies and institutions of government.

5. Conclusions

Over the past several decades Liberia has made significant progress, from rebuilding its healthcare system after a devastating civil war to strengthening its public health system post EVD epidemic, to being able to respond to the demands of new pandemics such as COVID-19. However, such progress can only be maintained at the present trajectory if serious considerations are given to continued prioritization by the government and sustained investments by the international community in the public health sector.

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