

## REINVENTING EPIDEMIOLOGY AND PUBLIC HEALTH PRACTICE IN NIGERIA

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### Abstract

The overall aim of the practice of epidemiology and public health is to control health problems in populations. While public health is broadly focused on protecting and improving the health of people and communities, epidemiology focuses more closely with study of the distribution and determinants of health-related states or events in specified populations and the application of this study to the control of health problems. Nigeria in recent years like many other African countries has been struggling with public health challenges. These challenges range from the Ebola disease crisis down to the Lassa fever case as well as the monkey pox virus outbreak amongst several other public health threats, Nigerians had to deal with in the last few decades. In light of present-day realities, the need to reinvent the practice of epidemiology and public health in Nigeria becomes of utmost importance. This review focuses attention on the peculiar nature of the previous methods employed by epidemiologists and other public health practitioners in Nigeria, the present-day organizations, facilities and methodologies employed which were mostly not effective and in turn paints a picture of a reinvented epidemiologic and public health practice in Nigeria. Similar to several African countries, Nigeria's public health institutes are still currently in early stages of evolution and the growth process is also going on quite slowly. The Nigeria Centre for Disease Control (NCDC) established in Nigeria shortly before the Ebola Virus Disease crisis and modelled after US centre for Disease Control and Prevention (CDC) played an important role in the control of the Ebola Virus Disease and Covid-19 outbreak in Nigeria. The centre also provided support to other countries that were affected by the crisis. An improved network and awareness of activities of the centre by the public, expanded reach and staff base which includes primarily epidemiologists and other health care practitioners should probably be the future focus of the centre. Furthermore, standardization and provision of improved equipment to aid public health studies and practice in Nigeria will all form the focus of this review.

**Keywords:** Public Health, Epidemiology, Diseases, Reinvent, Population, Control and Prevention.

### Introduction

Public health is "the science and art of preventing disease, prolonging life, and promoting health through the organized efforts and informed choices of society, organizations, public and private communities, and individuals (Wang, 2020). Reinventing Epidemiology and Public Health Practice in Nigeria is one subject matter every stakeholder in the health industry in Nigeria should be interested in. This is particularly because there has been deterioration in health status in Nigeria and many devel-

oping countries mostly as a result of HIV/AIDS and also a growing burden of both infectious and non-communicable diseases (Butcher, 2020). A stakeholder in this regard includes any individual, group or organization integrally involved in the healthcare system and as such would be affected significantly by any reforms made to the system. Primary stakeholders in the health sector include patients, pharmaceutical firms, health care employers, physicians, government, insurance companies and other employees of the system. One would notice that this list simply covers every human coexisting in a society. Gostin *et al.* (2019) investigated the impact of stakeholders in the development of the health sector and discovered that Government regulations and legislations represents to a great degree the most important factors influencing health service development.

United States Department of Health and Human Services in 2006 defines Epidemiology as the study of the distribution and determinants of health-related states or events in specified populations and the application of this study to the control of health problems. The Centre for Disease Control and Prevention (CDC) defines it as the study of the origin and causes of diseases in a community. They went further to explain that Epidemiology is the scientific method of investigation problem-solving used by disease detectives (epidemiologists, laboratory scientists, statisticians, physicians) and other health care providers, and public health professionals to get to the root of health problems and outbreaks in a community. The role epidemiologists and other public health practitioners play in ensuring the health of a society cannot be overemphasized. In addition to the functions that hinge only on professional practice with respect to science, Epidemiologists already participate fully in educational, research funding, and editorial policymaking in public health and thereby have an experiential foundation in some of the basics of policymaking (Rosalie *et al.*, 2014).

Research in the mid-1980s identified five (5) core epidemiologic tasks to include public health surveillance, field investigation, analytic studies, evaluation, and linkages. Very recently, a sixth function, policy development was very recently added to this list (CDC, 2012). The CDC in 2012 defines public health surveillance as the ongoing, systematic collection, analysis, interpretation, and dissemination of health data to help guide public health decision making and action. Public health surveillance guides health care practitioners in the effective and efficient application of prevention measures for disease outbreaks (Orenstein *et al.*, 1990). Epidemiologists carry out this important role of surveillance in the society by gathering morbidity and mortality reports from health-care providers, infection control practitioners, or laboratories that are required to notify the local and state health departments of any patient with a reportable disease such as pertussis, meningococcal meningitis, or AIDS. Public health program data such as immunization coverage in a community, disease registries, and health surveys are also good sources of surveillance data for epidemiologists (CDC, 2012). Summarily, the reporting cycle flows from Public and Health care providers who report to the health department who in turn analyse and evaluate information received and subsequently give feedback that results in possible policy making. Epidemiologists also carry out field investigations and these investigations are geared towards the identification of additional unreported or unrecognized ill persons who might otherwise continue to spread infection to others. It is occasionally carried out to simply learn more about the natural history, clinical spectrum, descriptive epidemiology, and risk factors of the disease before determining what disease intervention methods might be appropriate; an example is seen during the SARS issue of 2003 where early investigations were needed to establish a case definition based on clinical presentation (CDC, 2003). Epidemiologists carry out

analytic studies and these studies entails designing, conduct, analysis and interpretation which involves putting the study findings into perspective, identifying the key take-home messages, and making sound recommendations. Evaluation of public health services and practices is an important role which requires effectiveness and efficiency on the part of the epidemiologist (WHO, 2016). In addition to the numerous issues addressed by evaluation, the evaluation of a surveillance system might address operations and attributes of the system, its ability to detect cases or outbreaks, and its usefulness (WHO, 2016). Epidemiologists do not work in isolation hence; they are linked with several other health care practitioners and individuals from other disciplines as a team to achieve set goals of disease control and prevention. Epidemiologists working in public health regularly provide input, testimony, and recommendations regarding disease control strategies, reportable disease regulations, and health-care policy (Gostin *et al.*, 2015).

With the enormous roles played by epidemiologists, no society should allow the practice of epidemiology and public health shallow as the overall health and well-being of the populace depends on it (Guliset *et al.*, 2015).

This review aims to focus attention on the peculiar nature of the previous methods employed by epidemiologists and other public health practitioners in Nigeria, the present-day organizations, facilities and methodologies employed which were mostly not effective and in turn paint a picture of a reinvented epidemiologic and public health practice in Nigeria.

### **Historical Perspectives to the Practice of Public Health**

It is believed that the concepts of infection prevention, reducing malnutrition, and sanitizing of the environment have existed since ancient times. We find relevant in modern public health, the ideals of “sanctity of human life” and “improve the world” in Mosaic Law, linked with Greek traditions of healthful nutrition and lifestyle (Tulchinsky *et al.*, 2014). The Roman sanitary engineering and military medicine made pivotal contributions. Hospital organization and university training for physicians developed during Islamic and Christian periods. The rise of cities, the Renaissance, and rapid changes in agriculture, trade, and industry all contributed to public health. In the eighteenth century, there were new social, political, and economic reforms including the rapid growth in voluntary hospitals in England (Barry *et al.*, 2005). All these contributing to sanitation, social reform, improved nutrition and medical care has led to improved longevity and quality of life in the next two centuries up till the twentieth century (Tulchinsky *et al.*, 2014). In the 1800s, the practice of vaccination became prevalent following the pioneering work of Edward Jenner in treating smallpox. James Lind's discovery of the causes of scurvy amongst sailors and its mitigation via the introduction of fruit on lengthy voyages was published in 1754 and led to the adoption of this idea by the Royal Navy (Bryan, 2008).

In the area of Public Health reform laws, the first attempts at sanitary reform and the establishment of public health institutions were made in the 1840s. Thomas Southwood Smith, physician at the London Fever Hospital, began to write papers on the importance of public health, and was one of the first physicians brought in to give evidence before the Poor Law Commission in the 1830s, along with Neil Arnott and James Phillips Kay (Thomas, 2010). Several health acts have been enacted along history lines, notable amongst them include the public health act of 1848, the public health acts of 1875, the infectious disease (notification) act of 1889 and several other acts that have shaped the public health practice (Graham, 2015).

Immunology, social security, health insurance, and health promotion expanded the scope and effectiveness of global health. Biomedical and social sciences, technology, and public health organization are critical as public health faces old and new health challenges.

**Epidemiology** came into existence in the year 1854 after London’s cholera outbreak was identified by John Snow to have come as a result of polluted public water well through an extensive study. Snow who believed in the germ theory as opposed to the miasma theory first publicised his findings in an essay and later on in 1855 in a more detailed treatise including results of his findings (Gunn *et al.*, 2008).

### Overview of Health in Nigeria

The definition for health is universal from the World Health Organization and Nigeria is not an exemption. A critical look at Health in Nigeria which can be measured in terms of indicators such as life expectancy at birth, infant mortality rate, neonatal mortality rate, under-5 child mortality (U5MR) rate, and maternal mortality rate amongst other indicators shows a very unique and “fragile” trend (Richard, 2016).

Luckily for Nigeria, the world bank data on life expectancy shows that life expectancy in Nigeria is on a slow increase as it has increased from 49.4 in 2007 to approximately 54 in 2017. The institute for health metric and evaluation (IHME) in 2017 outlined the topmost causes of death in Nigeria in increasing order to be cirrhosis, stroke, ischemic heart disease, meningitis, tuberculosis, diarrheal disease, malaria, HIV/AIDS, neonatal disorders and lower respiratory tract infection.

The problem of maternal mortality is one of concern till date for Nigeria as lack of quality health care, malnutrition; female genital mutilation, abortion amongst other factors still thrive as problems bedevilling maternal and child care. About 560 deaths is recorded out of every 100,000 live births as at 2013 and this number has grown considerably since then (Iyioha, 2015). Effective disease outbreak response has historically been challenging for Nigerian health system due to array of hurdles such as funding, technological limitations, political instability and some inadequate diagnostic capacity which share it large size and complexity. However, the efficiency of response during Covid-19 outbreak 2020 that proved that indeed, though challenging, proactive and effective outbreak response is not impossible (Testimony *et al.*, 2020) (Fig. 1)



**Figure 1:** Limitations against Effective Infectious Disease Outbreak Response  
Source: (Testimony *et al.*, 2020)

## Epidemiology and Public Health Practice in Nigeria

Research shows that in the African context, the practice of Epidemiology and Public Health in Nigeria can be said to have improved tremendously in the last few decades (Adagbadaet *et al.*, 2012). However, one cannot say the same when Nigeria is compared to many countries outside the African continent (Welcome, 2011). This is so because certain indices put Nigeria on the top charts in Africa next to countries like South Africa and Kenya who are clearly in the forefront of growth in the subject area; it is also important to point out that very little has been published about epidemiology and public health capacity (training, research, funding, human resources) in the World Health Organization African Region to help guide future planning by various stakeholders (Nachega *et al.*, 2012).

In the aspect of most commonly reviewed and studied public health concerns, Nigeria just like other African countries has the most common issues in descending order as HIV/AIDS (11.3%), malaria (8.6%) and tuberculosis (7.1%) (Nachega *et al.*, 2012). Nachega *et al.* (2012) also reveals that publications arising from research conducted in Epidemiology and Public Health emanates more from South Africa (1978/8835, 22.4%), followed by Kenya (851/8835, 9.6%), Nigeria (758/8835, 8.6%), Tanzania (549/8835, 6.2%) and Uganda (428/8835, 4.8%) ( $P < 0.001$ , each vs South Africa). The burdens of communicable and non-communicable diseases in Nigeria appear to be three to four times that in many developed countries of the world, yet research and discoveries in these areas are more in these countries than seen in Nigeria.

Epidemiologic and Health training thrives more in South Africa and Nigeria as they have the most academic institutions offering training in public health and epidemiology (IJsselmuiden *et al.*, 2007). How well this level of training compares with those from the developed world is not clearly known owing to the numerous public health problems still bedevilling these nations. There is an improvement in the local and foreign programmes in epidemiology and public health in Nigeria and many other African nations but researchers in epidemiology and public health remain scarce (Meek *et al.*, 2009). In addition to this, most of the epidemiology and public health programmes offer insufficient research experience requiring graduates to undergo further on the job training in epidemiologic practice and research. Research has also shown that it is herculean task for students to assess coordinated ongoing epidemiological studies that could help improve their knowledge of the subject area (Meek *et al.*, 2009). All these make it difficult to link training and research in the field of public health and epidemiology in Nigeria.

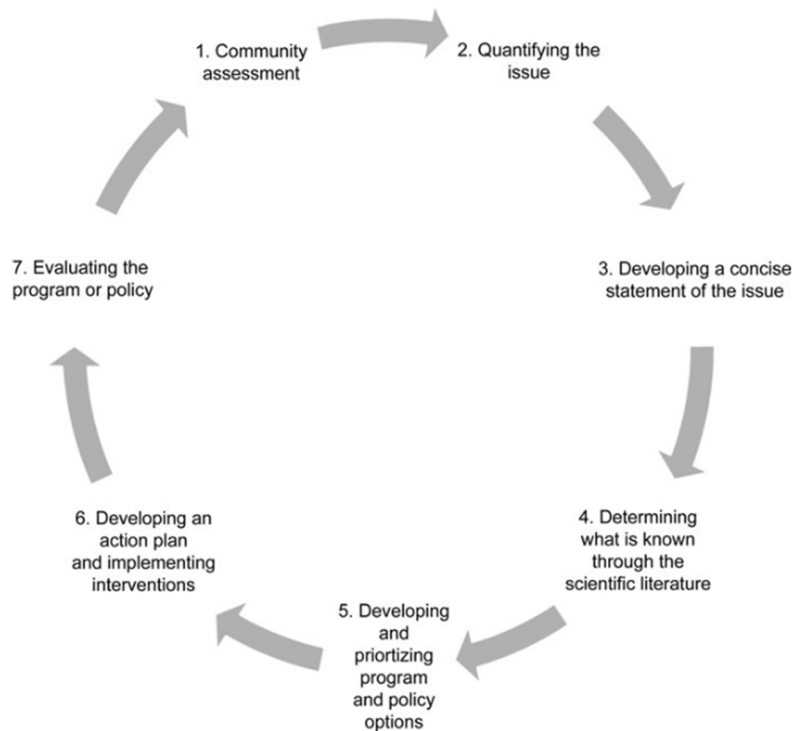
Research by Welcome (2011) reveals that Nigeria's intelligence and surveillance systems are poorly developed till date as Nigeria largely still operates a manual based medical system and this system comes with it several disadvantages. According to his findings, several health reforms have been launched in Nigeria with little or no impact on the health care system. Some of these reforms include but not limited to the ten-year development plan of 1946 to 1956, the primary health care plan of August 1987 still operational till date, Nigerian Health Insurance Scheme established in 2005 and a host of others.

Health access in Nigeria stood at 43.3% in the year 2010 and nothing much has happened to this figure since then (Onwujekwe *et al.*, 2010). This is attributable to poor health care facilities, high poverty rate and poor knowledge of public health dictates by the Nigerian populace. Existing reports show that no work has been done in the areas of disease tracking and MIS techniques to meet the need of the Nigerian populace in the modern era; practically, no attention is given to surveillance systems.

Hence, a primary shortcoming of the Nigerian health care system is the absence of good epidemiologic and public health practice system (Welcome, 2011).

### Modern day approach to Epidemiology and Public Health Practice

Today, several literature reports exist on the tremendous developments made in the public health sector and health care in general in the United States, Europe and other developed countries of the world. Research has overly revealed the increasing role of health information, communication as integral to leadership, as well as increasing role of medical intelligence/surveillance in the health care system in the United States and Europe (Onwujekwe *et al.*, 2010). Recently training has been made on how to handle public health practice because new strains of organism of public health concerns is on the rise every day and this approach varies from community assessment, quantifying the issue to evaluating the programme or policy (Carol *et al.*, 2018) (Fig. 2)



**Figure 2:** Training Approach for evidence based Public Health Practice  
Source:(Carol *et al.*, 2018)

Medical information Systems (MIS) has been used to combat and effectively monitor the outbreak of communicable diseases, bioattack (IOM and NRC 2011); they were crucial in the management of SARS and several other outbreaks. One of the most advanced MIS systems used today is the BioWatch which is presently installed in 30 US cities to constantly monitor biothreats (IOM and NRC 2011). It con-

sists of air filter that collects air sample for genetic analysis of any bioweapon of specific interest. Targeted nucleic acid sequence associated with a pathogenic agent is screened for in specialized laboratory. A positive result meant that the pathogenic agent of specific interest is present in the air. The next-generation BioWatch is presently been developed to solve the problem of not automatically analysing filtered air currently experienced by the present-day system (IOM and NRC 2011). Present-day MIS systems integrate their functions with the evaluation of risk. That means public health disaster can be tracked even before it affects a wide population of people. One example of MIS risk system is the Brief Spousal Assault Form for the Evaluation of Risk (IOM and NRC 2011).

### **Conclusion/Recommendation**

This current review has further reiterated the obvious lack of efficient and effective epidemiologic and public health practice in Nigeria. This lacks stem from scarcity of professionals, inadequacy of equipment both for practice and training in tertiary institutions, lack of commitment on the part of government and government agencies saddled with the issues of health care and a host of others. To reinvent is to restart and clearly, this is what the sector in Nigeria requires at a time as this because little or no positives has been achieved by the methods previously employed.

Nigeria has been hit by nearly all disease fears experienced world over in recent years including the most recent COVID-19 pandemic, owing to her porous health care delivery system as well as overwhelming population that is not matched by commensurate health system. The health care delivery system must harness the overwhelming importance of the practice of epidemiology and public health in tackling the spread of diseases in Nigeria.

In light of the above, the following recommendations are made:

- Nigeria should quickly adopt an automated Medical Information System where medical information on diseases outbreaks and citizens can be effectively monitored and managed.
- Intensify efforts to equip training centres (Universities and laboratories) to improve trainee know-how upon completion of training.
- Collaborations should be made with countries whose health sector is working especially in the area of training and retraining health care providers and researchers in Nigeria.
- Government should improve the fund allocated to the health sector particularly that which is meant of epidemiological studies.
- Family planning should be incorporated effectively into the health care delivery system.
- Public and Private agencies should improve funding for research in epidemiology and public health to improve citizen's interest in the area.

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