

Awofeso, Niya

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Commentary

Leprosy: International Public Health Policies and Public Health Eras

Niyi Awofeso ^{1,2}

¹ School of Population Health, University of Western Australia, 35 Stirling Highway
Crawley WA 6009, Perth, Australia; E-Mail: niyi.awofeso@uwa.edu.au

² School of Public Health and Community Medicine, The University of New South Wales,
Level 3, Samuels Building, Gate 11, Botany Street, Randwick, UNSW, Sydney 2052, Australia

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Abstract: Public health policies continue to play important roles in national and international health reforms. However, the influence and legacies of the public health eras during which such policies are formulated remain largely underappreciated. The limited appreciation of this relationship may hinder consistent adoption of public health policies by nation-states, and encumber disinvestment from ineffective or anachronistic policies. This article reviews seven public health eras and highlights how each era has influenced international policy formulation for leprosy control—“the fertile soil for policy learning”. The author reiterates the role of health leadership and health activism in facilitating consistency in international health policy formulation and implementation for leprosy control.

Keywords: public health eras; international public health policies; leprosy

1. Introduction

A public health policy may be described as a written administrative document detailing a general and deliberate course of action (or inaction) to guide decisions and achieve rational outcomes. It is the answer to the question: What do we want to do, or not do. This description is in line with Lasswell and Kaplan’s definition of policy as a “projected program of goals, values and practices” [1]. However,

public health policy goals and values may not always be explicitly stated, and may in fact not have demonstrable public health benefits. For example, the recently revoked policy on visa restrictions for people diagnosed with HIV in relation to short-term entry to the United States and China was based more on political ideology and prejudices about people affected by HIV/AIDS than on the potential public health benefits of such policies. While such policies may have been justified as precautionary interventions in the 1980s when relatively very little was known about HIV/AIDS transmission patterns, the policy is clearly anachronistic in the 21st century [2,3]. Overreliance on explicit statements of intent by governments and health policy administrators to define public health policies may reduce policy analysis to abstract normative generalizations. In this regard, Mintzberg posits that patterns of actions are more important than explicit policy statements, and that more weight should be given to policies which are backed by a commitment of resources [4].

Modern public health policy is unique in the sense that its implementation predated the establishment of a trained public health bureaucracy. The 1848 Public Health Act is an important milestone in modern public health practice as it introduced the use of administrative sciences into public health practice. Championed by Edwin Chadwick, a lawyer, this Act attempted to provide guidelines for addressing serious sanitary problems in 19th century England. It also provided the legislative framework for future policies for enhancing local government responsibility for public health [5]. However, it was not until 1916 when the first school for training public health graduates was established at Johns Hopkins University, United States. The Welch-Rose report provided a blueprint for global public health training, and was focused on discrete interventions, targeted at reducing infectious diseases [6]. Much has changed in national and international health trends and public health challenges since then, necessitating the need for new policies, and revision or disinvestment of old anachronistic policies. For example, in 2002, the United States Institute of Medicine laid out a much broader vision of public health policy and practice, which recognized the need for a multisectoral systems-based approach to sustainable population health improvement and protection [7].

Implicit in the changing trends and challenges in infectious disease over the past several centuries are two issues with major international health policy implications. First, at major periods in human history, communities have attempted to assure the conditions in which residents can be healthy, in part through policies and legislation. For example, following the 1348–1350 Black Death (plague) which decimated Europe's total population by 30%, a decree of 1377, signed into law by the Rector of Dubrovnik-Ragusa, authorized the world's first quarantine policy whereby ships and people arriving from overseas will be required to spend 30–40 days in secure locations outside of the city. Some of these locations were eventually built up as leprosy colonies, and served to segregate individuals diagnosed as leprosy patients usually for life. Britain introduced its first Quarantine Act in 1710. The recent global emergency of Severe Acute Respiratory Syndrome has rekindled international health policy interest in the use of quarantine (but not segregation, as applied to leprosy) as a useful community health protection strategy [8]. Second, during each era, new public health policies have been developed and existing ones revised or abolished. For example, the change in ideological orientation in Europe and the United States from the 1880s, that most diseases are transmitted via contagion rather than the erstwhile miasma notions of disease causation, led to international health policy changes in infection control principles, including improvements in surgery outcomes, discovery

of infectious microbes as well as corresponding antibiotics and vaccines [9]. However, public health policy development, revision and disinvestment have occurred inconsistently in different nations of the world, and such inconsistencies have important implications for international public health progress. This article utilizes trends in leprosy control to illustrate important factors influencing international public health policy development, as well as the impacts of various policy changes in different public health eras on international leprosy control efforts.

2. Public Health Eras, Disease Control and Health Policy

The author's perspective on the dominant paradigms, policy approaches action frameworks and legacies incorporated into contemporary public health eras are shown in Table 1:

Table 1. Public health eras and associated policy approaches.

	Public Health Era	Dominant Paradigm	Policy Approaches	Action Frameworks
1	Health Protection (antiquity–1830s).	Disease prevention through enforced regulation of human behavior	Development of religious, cultural, legal and policy initiatives and rules presumed to protect community health.	Enforcement of spiritual practices, community taboos, customs and policies such as quarantine and segregation in leprosy colonies.
2	Miasma Control (1840s–1870s).	Addressing unsanitary environmental conditions may prevent diseases.	Demonstration that poor health and epidemics resulted directly from unsanitary environment.	Centralized action to improve environmental sanitation
3	Contagion Control (1880s–1930s).	Germ Theory: Positivist approach to demonstration of infectious origins of diseases.	Demonstration of the presence of disease-causing microorganisms in infected media, their isolation, and experimental transmission.	Interruption of disease transmission through improved water filtration processes; vaccination; and standardized disease outbreak control measures.
4	Preventive Medicine (1940s–1960s).	Focus on the prevention and cure of diseases in 'high-risk groups'.	Focus on treatment of communicable diseases and primary care of 'special populations' e.g., pregnant women.	Environmental interventions directed at disease vectors such as mosquitoes; identification and utilization of 'useful' microbes; enhanced medical care for 'high risk' groups; foundations of modern clinical pathology.

Table 1. Cont.

	Public Health Era	Dominant Paradigm	Policy Approaches	Action Frameworks
5	Primary Health Care (1970s–mid-1980s).	Health For All: effective health care geared towards the community, for the community, and by the community.	Largely preventive health care approach, underpinned by emphasis on equity and community participation in healthcare policy development.	Emphasis on global cooperation and peace; acting on links between health care and socio-economic development; intersectoral cooperation.
6	Health Promotion (mid-1980s–late 1990s).	Advocacy for health, thus enabling individuals and communities to attain optimal health.	Enhance individual and community control of factors influencing health,	Key action areas of the Ottawa Charter: build healthy public policy; create supportive environments; strengthen community action; develop personal skills; and reorient health services.
7	Population Health (2000–date)	Strategic reforms of health systems in areas of (1) universal coverage; (2) People-centered care; (3) healthy public policies; (4) stronger leadership	Health and human rights advocacy; MDG; affordable health insurance; evidence-based health policy; clinical services redesign	Evolving

The dominant paradigm of the Health Protection era—from antiquity until 1830s—was disease prevention through enforced regulation of human behavior. Such regulation was mediated via legislation, cultural practices and religious doctrines. In India, the Laws of Manu (1500 BC) mention various skin diseases translated as leprosy. The Laws prohibited contact with those affected by leprosy and punished those who married into their families. India's Sushruta Samhita (600 BC) recommended treating leprosy with oil derived from the chaulmoogra tree; this ineffective prescription remained a mainstay of treatment in India until the introduction of sulfones [10]. Management of fear of leprosy was a major action framework of the health protection era, during which popular imagination associated leprosy with ghastly images of disfigured bodies, caused by divine punishment due to affected individuals' immorality or heresy. Treatment was also framed along the lines of divine benevolence following adherence to societal religious or cultural practices prescribed by the ruling elite [11]. Policies for the control of leprosy were inconsistent in most nations during this era.

The leitmotiv of all leprosy control policies during the Health Protection era, however, was stigmatization and social exclusion of people diagnosed with the disease. Such policies were justified on religious and cultural grounds. Taboos, such as Chinese and African legends associating leprosy

with necrophilia and incest, constituted a major action framework during the Health Protection era. The legacies of the Health Protection era in relation to leprosy control were largely negative, with erroneous knowledge about leprosy's etiology resulting in stigmatization and social exclusion of those purportedly diagnosed with the disease. Diagnosis of leprosy was very crude, and relied largely on stigmatizing deformities, at which stage those diagnoses with the diseases would have been infectious many years prior. Misdiagnosis with ulcerative and neuropathic diseases such as syphilis and cutaneous sarcoidosis was also common during this era [11]. Policies and legislation which heightened social exclusion and stigmatization of people affected by leprosy were, until recently, incorporated into societal structures. For example, *Tai Ge*, the Taiwanese term for leprosy, also describes all filthy open and ulcerative wounds. This linguistic term reflects a negative cultural-social perception of leprosy. Such negative perception is also prevalent in many other cultures in which leprosy is viewed as both a public health and a social disease [12].

The persistence of classical health protection approaches to the management of people living with leprosy in contemporary era is illustrated by policies and legislation in India, where, until recently, the Christian Marriage Act (1872), the Muslim Marriage Act (1939), and the Hindu Marriage Act (1956) granted divorce on the grounds of leprosy. Indian electoral laws disqualified people diagnosed with leprosy from contesting elections and the Motor Vehicle act (1939) prohibited known leprosy patients from obtaining a vehicle license. Such discriminatory laws have contributed to the persistence of negative public perceptions and stigma towards leprosy sufferers [13]. These policies and legislations exemplify the difficulties in international public health policy coordination, given that efforts to reduce ostracism against people living with leprosy had been canvassed consistently since the 5th International Congress on Leprosy held in Havana in 1948 [14]. The expert use of social marketing practices—defined as “the planning and implementation of programs designed to bring about social change using concepts from commercial marketing”—has been shown to reduce stigma and improve health outcomes of leprosy patients, and is therefore a useful tool in addressing some adverse contemporary health protection legacies [15].

The Miasma doctrine for disease control was the most widely accepted paradigm in the Western world between the 1840s and 1870s, following its propagation by British health administrator Edwin Chadwick. The hegemony of the miasma doctrine and its associated policies in Industrializing Europe were largely attributable to its utilitarian calculus that judged all government action in relation to how optimally they expedited industrial production. Better health from environmental investment was viewed by Chadwick and his allies as a means of reducing governments' bureaucracy and expenditure on welfare. Miasma's advocates posited that miasma (ancient Greek: “pollution”), a noxious form of “bad air” was the cause of epidemic diseases like cholera and leprosy [16]. Although policies related to the miasma doctrine were instrumental in improving environmental sanitation during this era, the same policies ‘targeted’ those affected by leprosy, labeling them as unclean and justifying their social exclusion. For example, Colonial agencies in Australia and Canada racialized the miasma doctrine by labeling Chinese migrant workers as unclean, leprosy-polluted races, thus justifying their stigmatization and exclusion from mainstream society [17]. The use of leprosy policies as subterfuge for racial policies was also documented in the United States during this era. Gussow [18] argues that the Victorian and subsequent Christian missionary zeal that emphasized the potential deformities of leprosy reinforced popular revulsion and stigma against the disease, not only in the United States, but

also in the destination nations of missionaries, which essentially was most developing nations. The Miasma doctrine was largely Eurocentric, although some colonized developing nations such as India benefitted later from its action frameworks. It left a largely negative legacy in leprosy control, as it facilitated the racialization and stereotyping of entire communities with high leprosy prevalence as immoral and filthy, while largely oblivious of the infectious nature of the disease.

Although Edwin Chadwick, the major proponent of the Miasma era, was successful as a health advocate, he fell short as a public health leader. In the words of Hamlin and Sheard:

“Chadwick's personality was his success and his undoing: he was tenacious in pushing a reform by all available means until action was taken, but he was overbearing and unresponsive to the views of others. He did not negotiate or converse but lectured at people, again and again, until they acted. With no faculty for accommodating differences of opinion, he failed as a practical politician, notwithstanding his ability as a political analyst. After his expulsion from the General Board of Health in 1854 he never again served in public administration.”[19]

It was in 1873, towards the end of the Miasma era that Armauer Hansen, a Norwegian physician, discovered *Mycobacterium leprae* as the cause of leprosy. This discovery, and subsequent identification of disease causing microbes such as the tuberculosis bacillus (1882) and *Vibrio cholerae* (1883) by Robert Koch, marked the ascendancy of the contagion era from the 1880s until the 1930s. However, while the contagion paradigm radically transformed the way many infectious diseases were managed, the discovery of the microbiologic origin of leprosy did not radically change its management policies. For example, the isolation of leprosy patients, a practice introduced since the miasma era was maintained in Japan until the “Act to Abolish the Leprosy Prevention Law” was passed at the 136th Session of the Diet on March 27, and took effect on April 1, 1996. At the time of its abolition, the average length of stay of the 5316 remaining patients in the leprosaria was 40 years [20]. Similar findings have been noted in all leprosy-endemic nations. At the first international conference about leprosy in Berlin in 1897, a resolution was introduced: in countries in which leprosy forms foci or has great extension, isolation is the best means of preventing the spread of the disease. This resolution formed the rationale for the expansion of leprosaria in the early 20th century [21]. Bias in expert opinions about leprosy transmission did not seem to adequately consider an important consequence of segregation on case finding—individuals will hide symptoms of leprosy until deformities occur hence defeating the primary purpose of segregation—limiting the transmission of infection. Furthermore, segregation creates a ‘once leprosy, forever leprosy’ mentality among those secluded in leprosy colonies as well as among members in the general community, thus severely hampering societal reintegration efforts [15,21]. In Japan, only six of the 5316 individuals in leprosy colonies actually moved out of these centers two years after leprosy colonies were officially abolished.

The Preventive Medicine era (1940s–1960s) focused on improvements in public health through research on risk factors, chemotherapy, vaccines, prevention and cure of diseases in “high risk groups”, as well as hospital-based and community-based infection control programs [22]. In relation to leprosy control, Dr. Guy Faget, chief medical officer at Carville Leprosarium in Louisiana, demonstrated the efficacy of intravenous promin in treating leprosy patients, and his pioneering efforts were instrumental in the Fifth International Leprosy Congress resolution in 1948 to officially adopt

sulphones as the standard treatment for leprosy globally. The demonstration of the effectiveness of low-dose oral dapsone tablets (the root molecule of promin) as leprosy treatment by Dr. Robert Cochrane and his assistants in the 1950s provided a scientific evidence base to discourage segregation of some leprosy cases. In addition, Cochrane advocated that patients with paucibacillary forms of the disease posed no significant infection risk and should be allowed to leave leprosaria. He was also instrumental in addressing religiously-inspired leprosy stigma using medical science and historical analysis of biblical text. In a 1961 leprosy advocacy article, he stated:

“To apply, then, the biblical conception of leprosy to the disease we know by this name is unfortunate, for it makes a particular illness, which is frequently a disease of innocent childhood, a religious synonym for sin, and places the sufferer under the mental agony of thinking that he is cursed above all men. The perpetuation of this idea has brought untold misery to men and women, and it is unfair to select a particular disease and suggest that it is a type of sin” [23].

This quote illustrates the fact that even during the preventive medicine era, leprosy workers had to deal with policies associated with health protection and contagion eras. Thus, Cochrane demonstrated fine qualities of health leadership and health activism. His health leadership approach was collaborative and evidence based, and his health activism optimally incorporated the important components of health advocacy; Precision, Passion, Promptness, Perseverance and Personality. The availability of effective treatment and the advocacy by leprosy patients’ activists such as Cochrane resulted in reversals of some of the most serious aspects of leprosy-related social exclusion. In Carville leprosy colony for example, the infamous barbed wire fence that encircled the facility was removed in 1948 and that same year saw the first patient ever given a medical discharge. At the government level, legislation PL-105-78 was signed into law in 1997. This legislation effectively ended compulsory isolation. The legislation offered a \$33,000 annual stipend to any patient who moved out of Carville leprosy colony, and reassured the remainder that they could stay at Carville as long as they were able to live independently [24].

An important contribution of the preventive medicine era to leprosy control was the identification of close contact with an index case and microbe inhalation as likely routes of leprosy transmission. Coupled with the treatment of index cases, the practice of dapsone chemoprophylaxis was introduced to control leprosy transmission during the Preventive Medicine era [25]. The emergence of dapsone resistance resulted in the disinvestment of the dapsone prophylaxis policy. However, the importance of chemoprophylaxis in leprosy is being revived in contemporary era, with the use of two 600 mg prophylactic dose of rifampicin among contacts found to be a socially acceptable and effective in halving leprosy incidence, in addition to current leprosy control programs [26]. A recent study of this initiative in Bangladesh found that, to protect patient confidentiality, chemoprophylaxis may need to be provided as part of a mass campaign for the whole population in areas with index cases [27].

The short-lived Primary Health Care (1970s–1980s) era was launched by the 1978 Alma Ata “Health for All” Declaration, and characterized by intensification of global partnerships for leprosy control as well as its integration into Primary Health Care. The Alma Ata Declaration was a significant milestone in public health history as it was the first global document to provide a health systems approach to addressing health issues, recognizing issues hitherto considered superficial to public health

such as human rights and social justice [28]. The international collaboration and equity promoting values of this public era contributed to the intensification of research into more effective leprosy chemotherapy. Between 1977 and 1981, the Tropical Diseases Research's Leprosy Committee conducted clinical trials on leprosy treatment in India and Mali, culminating in the global implementation of multidrug therapy for leprosy from 1981 onwards. The shortened duration of treatment and impressive bacteriological cure rates positively changed societal perceptions about the disease and accelerated a gradual demise of segregation as a strategy for leprosy control, given that leprosy was subsequently shown to be curable [29].

Another important contribution of primary health care to leprosy control policy was that it provided a platform for the integration of leprosy control and treatment services into the general health system. The integration of leprosy into primary health care initiative was strengthened by empowerment of people affected by leprosy to take active part in the management of their disease. The integration process was a difficult initiative, given high levels of leprosy stigma and perception among a significant proportion of staff that integration of leprosy into primary health care might lead to situations in which targets cannot be met, supervision would be difficult, knowledge of the staff was inadequate, and leprosy would be accorded low priority in the mix of primary health care functions [30]. Despite formidable challenges, the integration strategy was largely successful globally because it was substantially reinforced by the global health policy of Health for All by 2000 [31]. This global policy was adapted to leprosy in remarkably effective ways, including funding support. In some nations, leprosy funding was sufficient enough to develop vertical leprosy control programs to such an extent that it was feasible to integrate some primary health care functions into vertical leprosy control programs [32].

The Primary Health care era was short-lived partly because it was viewed by some political and health policy leaders in Western nations as over-ambitious, socialist in orientation, and not suited as a framework for addressing evolving public health challenges in European nations. Instead, they advocated a selective primary health care approach which effectively sidestepped the core values of the Alma Ata primary health care approach, such as the notion that health outcomes are strongly determined by factors such as power, ownership, equity and dignity. It is noteworthy that the influence of these Western nations on global health policy at the time was so strong that they won the support of global health organizations such as Unicef, which advocated and promoted selective maternal and child health programs such as GOBI-FF [33,34].

A key result of this primary health care counter-revolution was the birth of the Health Promotion era. This era (late 1980s–1999) was formally launched by the 1986 Ottawa Charter, and was primarily focussed on efforts to enhance positive health and prevent ill-health, through the overlapping spheres of health education, prevention, and health protection. In 1991, the World Health Assembly adopted a resolution to eliminate leprosy by the year 2000, using as benchmark, a registered prevalence of less than one case per 10,000 population. This 'selective' approach to evaluating progress in international leprosy control policies was evident in findings that new case detection continued to increase in some settings, such as in Bahia, Brazil, where it increased from 0.2 to 1.4 cases per 10,000 population between 1974 to 1997 despite no significant change in case finding strategies. Contrasting sharp falls in leprosy prevalence in India, new case detection rate was stable during the health promotion era [35]. However, a positive contribution of the health promotion era to international leprosy control policies

was enhanced awareness raising about the fact that leprosy is curable, development and implementation of sophisticated fundraising techniques for leprosy (exemplified by the generous donation of \$US 50 million by Japan's Sasakawa Memorial Foundation for providing free multi-drug therapy to all leprosy endemic nations between 1995 and 2000), and introduction of community arts and other health activism programs to reduce stigma against leprosy nationally and internationally [36].

The Population Health era arose in part to address the polarization of the public health movement between front-line health promotion workers and medically qualified or biomedical scientists and statisticians. This polarization was an unintended consequence of efforts to ensure egalitarianism in the international public health movement, following its dominance of medically qualified public health practitioners for over a century. This structural anomaly, coupled with health promotion practitioners' pragmatic but ultimately inadequate program evaluation approaches necessitated a new international public health era which is reunifying the public health community and developing global health policies as well as comprehensive evaluation frameworks for addressing leprosy and other global public health challenges. This is the Population Health era.

Population Health refers to the health of a population as measured by health status indicators and as influenced by social, economic and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services. It may be defined as "the health outcomes of a group of individuals, including the distribution of outcomes within the group" [37]. In relation to leprosy control, the population health era has largely succeeded in unifying the public health community, and facilitated synergistic approaches for leprosy control in areas such as genetic susceptibility [38] vaccine development [39], surgical and community-based rehabilitation [40] and the development of comprehensive evaluation indicators [41]. A newly developed global strategy for leprosy control focuses on reducing the rate of new leprosy cases with grade 2 disabilities per 100,000 population by at least 35% of 2010's 0.25/100,000 population level by the end of 2015. Achieving such reduction would indicate that leprosy is being detected and treated early, before stigmatizing nerve damage can develop, and provides a more comprehensive measure of case-finding, case holding and rehabilitation than the elimination goal of the health promotion era [41].

3. Conclusions

Leprosy control has been appropriately described as a fertile soil for international health policy learning [42], given its intricate links with religion, culture, social prejudice, politics, science and the essence of public health—social justice. This article charts core policy responses that have been adopted in leprosy control internationally, and highlights successes, shortcomings and legacies of such policies since the Health Protection era. Due in part to its professionally more inclusive nature, the current era of Population Health appears to be the most promising leprosy era in terms of formulation of an appropriate and sustainable policy framework for global leprosy control.

Three themes which are evident in this review are: the need for strong leadership, effective health activism, and inclusive public health platform, in assuring consistency in international leprosy control policies. The healthcare leadership styles demonstrated by proponents of various public health eras have important implications for consistency in global policy development. Although the need for

health leadership was highlighted in the 2008 World Health Report [43], consensus on health leadership competencies is lacking, and this lack of consensus has contributed to inconsistencies in global health policy implementation. A health leadership model proposed by the American Center for Health Care Leadership comprises three domains and 26 competencies, and is currently widely used by graduate programs in healthcare management (Figure 1) [44].

Figure 1. Domains and competencies of health leadership.



In relation to leprosy policies, the commendable leadership qualities shown by Dr. Tofu Kyoka, former Director General of Japan's Health Ministry and, until his death, the Director General of Japan's Tofu Kyokai Foundation, which had been established to serve patients with leprosy are exemplary. Through skilful negotiations with stakeholders, including leprosy patients' association leaders, Kyokai was able to facilitate the abolition of Japan's anachronistic leprosy isolation law and its associated policies. Importantly, he adopted a salutogenic approach to leprosy control and was influential in the development of socio-economic rehabilitation policies for people affected by leprosy [22].

Second, health activism, defined as "energetic advocacy in a civil society," [45] has been instrumental to the success of many health promotion activities on stigma reduction and should be preserved as one of its important leprosy control legacies contemporary public health era. The social marketing and other health activism approaches incorporated into "World Leprosy Day" activities exemplify the important role of active advocacy in contemporary leprosy control. The demise of the health promotion era reduced the momentum of health advocacy efforts commenced in the 1980s. This low momentum contrasts with effective patient-centered health activism associated with HIV/AIDS [46] and breast cancer [47], which were largely organized by civil society groups outside of the public health community. Renewed leprosy control-related activism, involving people affected by

leprosy is needed to complement current approaches to reduce leprosy incidence and prevalence, as well as effectively socio-economically rehabilitate individuals and groups affected by leprosy [48].

Finally, the public health platform on which international health policies are formulated and disseminated is an important determinant of the acceptability and sustainability of public health policies. The Population Health era policy platform appears to be the most multidisciplinary, collaborative, and globally cohesive platform for the formulation of health policies [49].

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