

# Governmental public health in Taiwan

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## Abstract

A healthy and safe public health environment is a fundamental responsibility of government; achieving it requires collaboration across multiple sectors. Public health services include, for example, vaccination and quarantine for infectious diseases; health promotion, such as anti-smoking campaigns for non-communicable diseases; and health insurance for universal health coverage. All these services require intersectoral actions in which the government must play a fundamental role, either partially or totally. The Taiwanese outlook on governmental public health infrastructure and professionalization of public health is given in this paper. It also describes the national governmental public health measures that were employed during the Covid-19 pandemic and discusses the challenges ahead for the country's governmental public health. Governmental public health is essential and should not be affected by changes in political forms or socioeconomic development. Instead, effective governmental public health will promote these developments while protecting citizens' right to health.

Keywords: public health; Covid-19; Taiwan

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## Resumen

Un entorno de salud pública sano y seguro es responsabilidad fundamental del gobierno; para lograrlo, se requiere de la colaboración de múltiples sectores. Los servicios de salud pública incluyen, por ejemplo, vacunación y cuarentena para enfermedades infecciosas; promoción de la salud, como campañas contra el tabaquismo para enfermedades no transmisibles; y seguro médico para la cobertura universal de salud. Todos estos servicios requieren de acciones intersectoriales donde el gobierno debe jugar un papel fundamental, ya sea en forma parcial o total. Por esta razón, en este ensayo se describe la perspectiva de Taiwán en cuanto a infraestructura de salud pública gubernamental y profesionalización de la salud pública. Asimismo, se describen las medidas nacionales gubernamentales de salud pública que se emplearon durante la pandemia de Covid-19 y se discuten los desafíos por delante para la salud pública gubernamental del país. La salud pública gubernamental es esencial y no debe verse afectada por cambios de formas políticas o desarrollo socioeconómico. En cambio, una salud pública gubernamental efectiva promoverá estos desarrollos mientras protege el derecho a la salud de los ciudadanos.

Palabras clave: salud pública; Covid-19; Taiwán

A healthy and secure public health environment is the fundamental responsibility and value of the government, and to achieve this would require collaboration between multiple sectors. Public health services include for example vaccination and quarantine for infectious diseases, health promotion such as anti-smoking campaigns

for non-communicable diseases (NCDs), and health insurance for universal health coverage. All of these services call for intersectoral actions where the government must play a pivotal role, either partially or in full.

Governmental public health is the backbone of public health systems. Effective governmental public

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health infrastructures at national and local levels will ensure that essential public health services are delivered and are prepared for public health emergencies such as the current on-going crisis of Covid-19 pandemic. Forms of government and governance, economic growth, and industrialization have all been indicated to have an influence on public health. For example, the Leibniz Institute for Economic Research at the University of Munich (ifo Institute) published a working paper in 2021 that showed democracies tend to have higher government health expenditures than autocracies, since decision makers need to meet the demands of electorates.<sup>1</sup> Lin and colleagues reported that governance indicators such as voice and accountability, political stability and absence of violence, and government effectiveness, as well as urbanization were inversely correlated with national under-five mortality rates.<sup>2</sup>

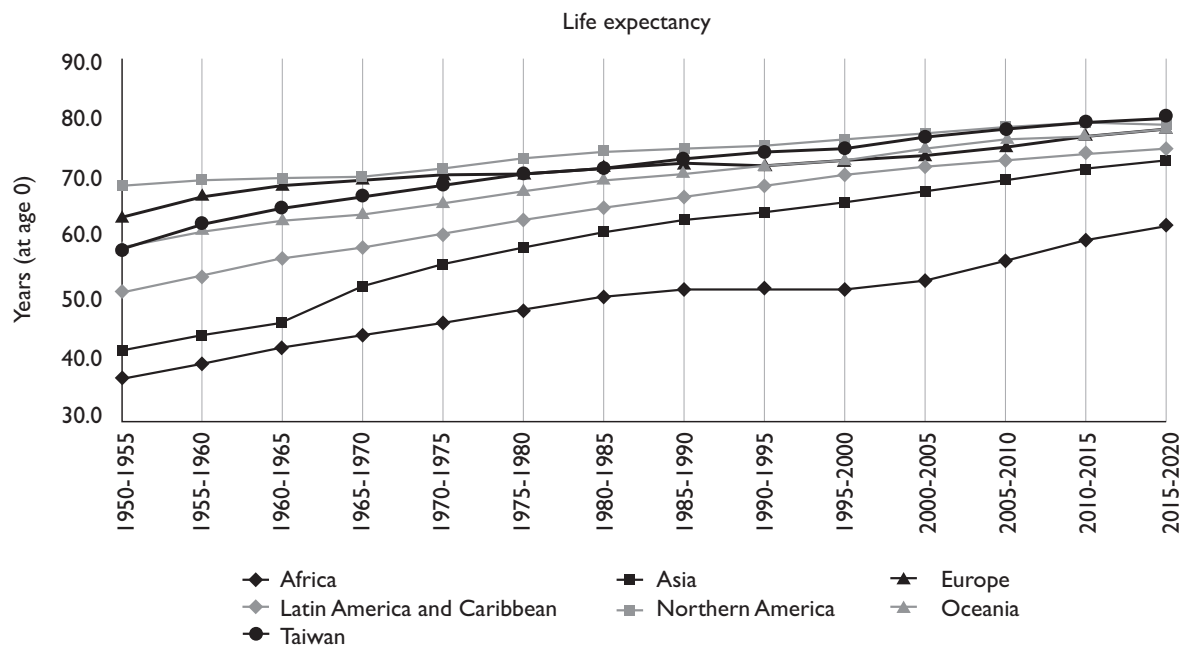
Szreter stated that rapid economic growth, accompanied by industrialization and urbanization, could bring disruption to the ecological relationship between human and habitat, and will require political resolution to implement preventive health measures in order to meet the serious public health challenges brought on by these disruptions.<sup>3</sup>

During the Covid-19 pandemic, governmental public health responses such non-pharmaceutical interventions (NPIs) are effective in mitigating the spread of the disease, but is influenced by governance-related indicators: accountability and political stability.<sup>4,5</sup> Here

we use Taiwan as an example to indicate that through different periods of political and socioeconomical reforms, it is still possible to develop an effective governmental public health infrastructure if the government and society can recognize the value and importance of public health.

Taiwan's life expectancy at birth has risen steadily from 55.3 years in 1950 to 80.94 years in 2020 (figure 1).<sup>6,7</sup> This is due to a series of public health achievements including eradication of infectious diseases smallpox, cholera, malaria, and plague, and establishment of one of the most successful cases of national health insurance in the world, starting in 1995 and now covering over 99% of the population.<sup>8</sup> In this pandemic, Taiwan was one of the first countries to respond by initiating a series of NPI measures, including border control as early as December 31<sup>st</sup>, 2019 and so far, has been relatively successful in containing the pandemic with 15 296 confirmed cases and 828 deaths (August 22, 2021).<sup>9,10</sup> We argue that governmental public health played an essential role in the implementation of NPIs in Taiwan.

Taiwan's governmental public health infrastructure was developed under diverse historical and political backgrounds, including western missionaries who during the late 19<sup>th</sup> century opened hospitals in Taiwan that still stand today, Japan colonization era (1895-1945) when the foundation for Taiwan's public health system was established and public health science academia began (National Taiwan University, Institute of Tropical



**FIGURE 1. TAIWAN LIFE EXPECTANCY FROM 1950 TO 2020 IN COMPARISON WITH WORLD GEOGRAPHIC REGIONS<sup>6,7</sup>**

Medicine, later College of Public Health), and during the second half of the 20<sup>th</sup> century when Taiwan successfully eradicated infectious diseases including smallpox, cholera, malaria, and plague, and established the National Health Insurance (NHI) in 1995.

At the beginning of Japan colonization, Taiwan fought against Japanese occupation, and Japan soon realized the threat of tropical infectious diseases when 164 of their soldiers died in combat while 4 624 died from diseases in 1895.<sup>11</sup> As a result, Japanese Governor-General of Taiwan focused on improving sanitation and established rudimentary health infrastructure in Taiwan to eradicate infectious diseases that were killing Japanese soldiers and officials stationed in Taiwan, causing economic loss, and threatening the stability of their colonial rule. After World War II, Japan colonization ended and Republic of China government retreated to Taiwan, but the governmental public health infrastructure remained, and efforts towards infectious disease control continued.

For smallpox, vaccination began in 1896 during Japan colonization. Later due to high vaccine coverage, smallpox was eradicated in 1955, 20 years prior to World Health Organization (WHO)'s confirmation of global smallpox eradication on December 9, 1979.<sup>12</sup> In the period of 1906-1911, malaria was the top cause of death in Taiwan. By the end of Japanese rule, 208 malaria control posts had been established to conduct blood sample tests, environmental control, and mosquito control all around Taiwan. However, by 1951, the infection rate in pre-school children had raised from the 3% in 1941 to 10%. After an island-wide dichlorodiphenyltrichloroethane (DDT) spraying program during 1952-1956, the infection rate dropped to 0.006% in 1957, and Taiwan was certified by the WHO for malaria elimination in November 1965.<sup>13</sup>

During this period, Taiwan was also going through social-economic changes, from an agriculture economy (before 1950), to industrialization economy (1950-1980), to service industry. Gross domestic product (GDP) per capita rose from 1950's US154 to 2 389 in 1980, and 28 371 in 2020.<sup>14</sup> Population has also grown from less than 10 million in the 1950s, to nearly 20 million in the 1980s, to the current population of 23 million.<sup>6,7</sup> Taiwan's governmental public health infrastructure has been around for more than 70 years, and remains intact regardless of political transitions and socioeconomic development.

Taiwan's success in combating infectious diseases and efforts on non-communicable diseases prevention resulted in a steady increase of life expectancy, reaching a new high of 80.94 years in 2020.<sup>6</sup> However, the 2003 SARS outbreak in Taiwan resulting in 346 cases and 37 deaths revealed that our public health system was not

prepared for emerging infectious diseases and that we should not expect timely and accurate infectious disease information from China.

### Taiwan's governmental public health infrastructure

As of 2020, Taiwan has 14 707 civil servants in health administration agencies, and 19 699 in hygiene and medical service organizations.<sup>15</sup> This manpower is distributed in the Ministry of Health and Welfare (MOHW) under the Executive Yuan of the central government, 22 public health bureaus under local administration (six special municipalities, 13 counties and three autonomous municipalities), and 374 public health centers that form the basis of Taiwan's public health infrastructure.

MOHW's mission is to "promote the health and well-being of all citizens".<sup>16</sup> In order to achieve this, MOHW has nine implementation departments (green), six supporting administrative departments (purple), seven mission-oriented task forces (blue), and six third-level agencies (yellow), with 26 hospitals and 13 social welfare institutions (red) working towards health promotion, disease control, food safety and drug management, medical care, social insurance, social welfare, social assistance, and protective services.<sup>17</sup> This structure was developed through time and is based on disease type, age, medical and drug affair, etc., making it easier for administrative process but also to breed silo mentality and sectorial administration, which could be obstructive when coping with public health crises such as the Covid-19 pandemic.

Public health bureaus and centers are directly under the jurisdiction of local governments, with professional supervision by the central government, *i.e.*, MOHW. The existence of public health bureaus signifies that public health is an important governmental and administrative affair for Taiwan local governments. This kind of governmental infrastructure that benefits people's health and safety is not common in developed democratic countries. Effective and efficient execution of disease control and health promotion programs by public health bureaus and centers locally is the foundation of public health achievements in Taiwan. For example, in urban metropolitan area, Taipei City (capital city of Taiwan) with a population of 2 570 090 in an area of 271.80 km<sup>2</sup> has a Department of Health with nine divisions (disease control, food and drug, public health inspection, medical affairs, mental health, long-term care, health promotion, general planning, and laboratory), six offices (administrative service, system administration, accounting, personnel, and government ethics), 12 district health centers, and eight city hospitals. In central rural Taiwan,

Changhua County with a population of 1 266 670 in an area of 1 074.40 km<sup>2</sup> also has a similar structure, with ten divisions (medical administration, pharmacology and substance abuse prevention, food hygiene, health promotion, disease control, laboratory, planning information, long-term care, public health inspection, and administration), three offices (personnel, accounting, government ethics), and 27 public health centers. Public health centers work under the supervision of public health bureaus, and are the first layer of governmental public health infrastructure in Taiwan. Taiwan's 374 public health centers are located in districts and townships providing public health service to areas ranging from 0.88 to 1 641.86 km<sup>2</sup>, and population density from 5 to 38 392 person per km<sup>2</sup>.<sup>18</sup>

### Taiwan's public health professionalism

Taiwan's public health centers were first established in 1946, starting with only 30 centers. Staff in public health centers consists of a team of public health professionals including licensed medical doctors, registered nurses, public health inspectors, medical examiners, pharmacists, and dentists who have passed Taiwan's Civil Service Exam.

These qualification enables them to exercise public authority with the highest level of professionalism. This is necessary when enforcing public health regulations such as tobacco control, health inspections, substance abuse prevention, and especially during critical periods of epidemic control. They are the main reason behind Taiwan's achievements during 2003 SARS and the Covid-19 pandemic so far. As of 2020, 5 625 staff are stationed at 374 public health centers, providing essential public health services on an average of 5 315 citizens per staff, to the 23 561 236 citizens residing in 36 197 square kilometer of Taiwanese territory. For more than 70 years they have provided first line public health services to the people, including but not limited to vaccinations, health examinations, prenatal checkups, applying fluoride on children's teeth, and the four screening tests under Health Promotion Administration's (HPA) cancer screening program: mammography, pap smear, fecal occult blood test, and oral mucosa examination.<sup>19</sup>

Some public health officials take it a step further. Dr. Yen-Po Yeh is a medical doctor with a PhD degree in public health. He specializes in infectious disease epidemiology, and became the director of Changhua County Public Health Bureau in 2005. During his 15 years as director, he initiated a comprehensive screening program in Changhua County for cancer, non-communicable diseases, infectious diseases, and risk factors, complete with medical referrals, health

promotion, and chronic disease care services, and so far has provided services for 14 371 person-time. He also supported the hepatitis C elimination plan that began in 2019. He and his team worked efficiently and so far has already completed screening of 201 388 residents, identifying 13 609 positive cases, of which 8 381 requires treatment. Novel oral drug treatment has been provided for 6 477 patients, achieving their initial goal of treating 4 500 patients in 3.5 years one year early.<sup>20</sup> Public health centers in Changhua County provide health checkups, personalized fitness plans, and set up gyms for the elderly, in order to promote their physical and mental health. These programs and activities not only help develop connections and trust with the local community, but also enhance the knowledge and skills of public health workers, both are necessary to ensure an effective public health system that can competently deliver essential public health services in the time of need. Dr. Yeh's achievements helped him stay as director throughout changes in ruling political parties in Changhua County, and Changhua County Public Health Bureau's long-term collaboration with National Taiwan University College of Public Health won the 2020 Association of Schools and Programs of Public Health (ASPPH) Harrison C. Spencer Award for Outstanding Community Service. Dr. Laura Magaña, president of ASPPH, said during presentation of the award: "their initiatives are science-based, developed in conjunction with community and policy leaders, and address needs identified by community and health leaders... making a huge difference in their communities". ASPPH also stated that "the working relationships established through these initiatives have proven vital for containment efforts during this ongoing Covid-19 pandemic, as evidenced by a low number of confirmed cases in these communities".

### Taiwan's governmental public health measures during Covid-19

After 2003 SARS outbreak, Taiwan passed the Infectious Control Law and strengthened its public health system by creating new agencies and scientific institutions at national and local levels, and trained medical and scientific personnel for the purpose of protection against emerging infectious diseases. Hospital outbreaks during SARS also motivated us to improve health care institutions by building negative-pressured intensive care units and conducting medical practice in line with strict infection control guidelines. These newly established systems for controlling emerging diseases have been repeatedly challenged and improved accordingly by several disease outbreaks over the past few years,



including the 2009 H1N1 pandemic and more recently the 2018 African swine flu (ASF) outbreak.

Taiwan was able to react quickly and efficiently during the beginning stages of the Covid-19 pandemic because of these preparations. At a national level, border control, contact tracing, resource allocation, and social distancing were the four major NPIs that Taiwan successfully implemented to contain the Covid-19 epidemic.<sup>9</sup> Border control started as early as December 31<sup>st</sup>, 2019 with onboard quarantine for direct flights from Wuhan, China. Contact tracing began by integrating travel history into the NHI database.<sup>21</sup> Resource allocation refers to the central government's decision to suspend N95 and surgical mask exports on January 24, 2020, announce nationwide requisition of domestically produced surgical masks on January 30, and offering an online named-based mask rationing system in February. Social distancing measures included delayed school opening in February, and discouraging gatherings such as religious parades.<sup>22</sup> These measures prevented Taiwan from the grim outcome predicted by John Hopkins University (JHU), who's predictions were based on Taiwan's level of trade and travel with China, suggesting high risk of voluminous imported cases.<sup>23</sup>

Taiwan's central government first set up a response team on January 2, and established level 3 of the Central Epidemic Command Center (CECC) on January 20, led by the Director-General of Taiwan Centers for Disease Control (CDC), a third-level agency under MOHW. The next day, Taiwan had the first confirmed case of Covid-19, leading to the establishment of level 2 CECC on January 23, with the Minister of MOHW serving as commander. As the situation worsened globally, CECC elevated to level 1 on February 27. Level 1 CECC is supposed to be led by the Premier of Executive Yuan under Taiwan's Infectious Control Law, but instead the Premier asked the Minister of MOHW to remain as the commander. The CECC served as the face of the government, holding daily public briefings, communicating calmly and efficiently with the public, earning the trust and support of Taiwanese society. However, the actual command center is a four-tiered system consisting of the Office of the President, Executive Yuan, MOHW, and CDC. Under the President's leadership, all-government actions were taken to control the pandemic, including situation evaluation, decision-making, issuing commands, and execution. This system allowed all governmental branches to work together in a timely way. Take facemask policies for example: Ministry of Economic Affairs mobilized private companies to rapidly increase production with direct commands from the Executive Yuan. Name-based facemask rationing system was developed by Audrey Tang, Minister without Portfolio of

the Executive Yuan. The system was then implemented by the Food and Drug Administration (FDA) of the MOHW, which oversees the distribution. The Ministry of Foreign Affairs under the direction of the President, was responsible for the donation of masks to other countries, in order to meet global health demands and Taiwan's diplomatic needs. This is the backdrop of success of the Taiwan's governmental public health measures during the Covid-19 pandemic: having a majority government in both executive and legislative branches, an efficient command system, collaborative ministries, and good public trust and communication. On this basis, Taiwan was able to prevail in the first stage of Covid-19 outbreak control.<sup>22</sup>

Locally, public health bureaus and centers also worked to prevent Covid-19 outbreaks in the community. Changhua County Public Health Bureau mobilized their highly trained public health professionals to monitor those in quarantine and isolation, perform contact tracing of confirmed patients, and actively provide viral and antigen testing for people in high-risk groups. When an outbreak occurred in May, 2021, Changhua County was able to respond swiftly to the crisis, actively implementing contact tracing, and since May 13<sup>th</sup> have conducted 117 463 PCR tests, 3 159 home quarantines, averaging 12 home quarantines for each confirmed case (total 271).<sup>24</sup>

### **Challenges ahead for Taiwan's governmental public health**

Even with Taiwan's well-established governmental public health infrastructure, we still see insufficient testing capacity and delayed vaccine procurement during the Covid-19 pandemic, especially with the increasing threats of SARS-CoV-2 variants, showing a lack of partnership with private sectors. The current vertical line of command and disease-specific administration of our governmental public health can handle everyday public health issues, but may be insufficient in responding to new emerging public health crises. Global health issues including air pollution, one health, and climate change pose as unprecedented catastrophic health threats that our current governmental public health infrastructure is unprepared for. How we strengthen governmental public health capabilities and form strong partnerships with all sectors will be our next major challenge. A major reform may be urgently needed to increase the resilience of our governmental public health. Decentralized command-and-control is needed to implement rapid and effective response to pandemic in democratic countries. Reforms have to take a more profound step by a public-private partnership and a holistic approach to

solve problems in time. If we fail to act and reform for resilience, we may not be able to achieve Goal 3 of the Sustainable Development Goals: Ensure healthy lives and promote well-being for all at all ages.

## Conclusion

Governmental public health is essential and should not be affected by changes of political forms or socio-economic development. Instead, an effective governmental public health will promote these developments while protecting citizens' right to health.

*Declaration of conflict of interests.* The authors declare that they have no conflict of interests.

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