

Infectious Diseases and Public Health Challenges in Developing Countries: A Focus on Southeast Asia and Laos

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Abstract: This paper explores the persistent public health challenges facing Laos, with a particular focus on infectious diseases, inadequate sanitation, and underdeveloped healthcare infrastructure. It highlights how factors such as limited resources, economic instability, and uneven access to medical services contribute to high disease burdens, especially in rural and underserved areas. The study examines the critical role of international support in strengthening Laos's healthcare system, including efforts by organizations like WHO, USAID, and the Global Fund. It also reviews the structure and limitations of medical education in Laos, emphasizing the need for investment in training, modern resources, and language-accessible materials. The paper argues that comprehensive policy reforms, expanded global cooperation, improved disease surveillance, and targeted capacity-building are essential to improving health outcomes. By addressing systemic gaps in infrastructure, sanitation, and education, Laos can reduce vulnerability to infectious diseases and build a more resilient public health system.

Keywords: Public health, Infectious diseases, Healthcare infrastructure, Health policy, Global health cooperation

1. Introduction

Infectious diseases continue to be a threat to the health of all and particularly in low-income countries, where not only are resources limited, but weak healthcare systems do not help either. Such reports as the World Malaria Report 2023 stress that the disease burden for these disorders is markedly unequally distributed in developing regions, leaving considerable needs to be addressed for the targeted interventions and international assistance [1]. Malaria and dengue, both transmitted by mosquitoes, are still major causes of illness and death in many low-income regions, especially sub-Saharan Africa, and Southeast Asia. In 2022, the number of malaria cases was 249 million cases worldwide, 93.6 percent of cases occurred in the WHO African Region [2]. Also, in 2023 dengue fever experienced a significant surge across the WHO European Region, with epidemic-prone reporting 4.5 million cases and 2,300 deaths, while pointing to extraordinarily high case numbers in Bangladesh, Malaysia, Thailand, and Vietnam [2,3].

Infectious diseases are a common problem in developing nations because of the multiple interrelated factors. These include feeble healthcare infrastructure, inadequate access to preventive measures and economic hardship, which all lead to high disease incidence and mortality rates [4]. However, it is estimated that large portions of the population find medical treatment unaffordable in 47% of low- and middle-income countries as more than 40% of income is spent on health expenses

[5]. In addition, malaria parasites that are becoming increasingly drug-resistant, as well as some of the same mosquitoes which are becoming drug resistant at the same time, pose new challenges to disease control efforts. The issues presented here underscore the imperative for continuation of public health interventions and collaboration between countries to strengthen healthcare of the most impacted territories [1].

2. The role of epidemiology in disease control

In epidemiology, controlling and preventing infectious diseases is important and its role is crucial - particularly in developing regions where outbreaks are common and healthcare resources are scarce. Epidemiologists collect the information of tracking disease patterns, tracing the risk factors, and evaluating the effectiveness of intervention, and this information, in turn, is of great help in crafting an effective public health policy and appropriately allocation of resources [1]. This field gained even greater significance during the COVID-19 pandemic both as a proof of focus on disease surveillance and preparedness, which did not make attention for endemic diseases like malaria and tuberculosis, and in ending in resources for the others. The tendency to mitigate outbreaks of longstanding public health threats was curtailed in many developing countries at least at the expense of increased disease burdens as healthcare systems became focused on combating the pandemic [6].

3. Infectious disease burden in southeast Asia

Public health challenges in Southeast Asia are distinct from those in other regions of the world due to dense population, high rates of urbanization, and a tropical climate—all of which provide a favorable environment for the spread of infectious diseases [2,3]. Given that malaria continues to be a threat in the region, Southeast Asia accounted for more than 40 percent of the global malaria burden in 2019 [1]. Drug-resistant malaria is particularly worrisome, as artemisinin resistance has become a major problem in the Greater Mekong Subregion [2].

Another issue of importance is dengue fever, which recurs regularly during the monsoon season. Countries such as Thailand, Vietnam, and the Philippines continue reporting hundreds of thousands of cases per year, putting enormous pressure on health systems and giving rise to substantial economic costs. It is an expensive disease, both financially and politically: governments in the region spend millions of dollars each year on its prevention and treatment [2].

Given that Southeast Asia is home to 40 percent of the world's TB cases, tuberculosis (TB) remains one of the most persistent health challenges in the region [2]. Though global efforts have attempted to contain it through directly observed therapy (DOT) and other treatment strategies, TB still impacts millions due to limited diagnostic tools and medications. In addition to these challenges, cholera and other waterborne diseases—usually resulting from poor sanitation and lack of access to clean water—periodically affect both urban slums and rural communities across Southeast Asia [2].

4. Sanitation and healthcare challenges in Laos

The healthcare and sanitation problems of developing nations show no signs of improvement, and Laos is a striking example. Across the country, sanitation issues are serious—especially in healthcare settings. Nearly 19 hospitals lack basic sanitation services, resulting in poor hygiene, limited accessibility, and inadequate maintenance [4]. In non-hospital settings, the situation is even more concerning: only 2 percent of facilities provide at least basic sanitation, and a small but notable number lack sanitation altogether. These poor conditions contribute to the spread of infectious diseases, as inadequate sanitation puts people at greater risk of contracting waterborne illnesses such as cholera or diarrhea [4].

5. Medical education in Laos

Medical education in Laos remains underdeveloped and faces several challenges. Currently, only one institution—the University of Health Sciences (UHS) in Vientiane—offers training to become a medical doctor, while four provincial health colleges provide training for medical assistants [7]. The Ministry of Health oversees all medical education, and according to the Education Development Centre (EDC), ensures its quality.

5.1. Undergraduate medical training

At UHS, students need to spend six years on the curriculum in order to become a medical doctor in Laos. It is divided into three years for basic sciences and three for the clinical training. Entrance exams are used for the admission process and there are different ways through which candidates can be selected, general applicants, employer nominated candidates and students from disadvantaged districts [7]. Written exams, clinical evaluation, and a final thesis project are there through medical school.

5.2. Postgraduate training and specialization

However, if they want to become a specialist, they can register for one of the of nine residency programs available in Laos which are carried out in fields such as internal medicine, surgery, pediatrics and obstetrics & gynecology. These programs usually attend two to three years and need students to pass entrance exam and get a supervisor's recommendation. Clinical rotation is primarily offered in Laos although there are some opportunities for international rotations. Most doctors after some time of specialization return to public hospitals to work in areas of high need [7].

5.3. Continuing professional development (CPD)

In contrast to some other developed nations, continuing professional development (CPD) is not a legal requirement in Laos yet. Although, there are some medical care professionals who can attend conferences, receive short term training, or be enrolled in some of the donor supported educational programs. Financial constraints are the main barrier to participate in CPD, as many health care workers cannot fund more training other than being supported by regulatory fund or external support [5].

5.4. Challenges in medical education

Despite some progress, the medical education system in Laos faces several critical challenges. Equally poor are access to modern equipment and up to date resources, and the quality of the medical training suffers from a shortage of qualified educators. The language barrier in itself is a major obstacle as almost all of the medical textbooks and academic literatures are in foreign languages. Some of the materials are available in Thai because it is a similar language to Lao, however, this is still insufficient, as it does not adequately match the demand for localized and comprehensible medical education [7].

Instability in Laos' economy only makes the public health harder. With the global inflation crisis and the geopolitical conflicts, specifically the Ukraine war, the inflation rate has continually been rising food and fuel prices have put the population far beyond the reach to afford essential goods and services. The survey of 2022, on the other hand, saw 23 percent of the population and 65 percent of Laotian households reducing their spending on food and education [4]. Under such circumstances, there is greater vulnerability to diseases because health clinics are out of reach, which makes access to healthcare even more limited [4].

6. The need for international support in Laos

In light of the major obstacles to better healthcare and the successful treatment of infectious diseases in Laos, international support becomes vital. The country still needs financial and international assistance to solve issues related to public health. In remote, resource-poor areas, increasing financial support for healthcare infrastructure and medical supply chains would significantly bolster disease management efforts. Given the mismatch between supply and demand in Laos's healthcare resources, organizations such as the World Health Organization (WHO), USAID, and the Global Fund play a key role in strengthening the healthcare system. They can provide essential medical supplies, vaccines, and diagnostic tools to Laos [1].

International assistance has already played a crucial role in improving healthcare in Laos. For example, USAID and WHO launched a five-year partnership aimed at addressing health security threats in Laos, including preparedness for future risks and building on progress made during the COVID-19 pandemic [6].

The Lao Ministry of Health has collaborated with the WHO, USAID, and the Centers for Disease Control and Prevention (CDC) to strengthen the healthcare system, improve disease surveillance, and train medical professionals. As a result of these efforts, healthcare infrastructure has improved, infectious disease response has become faster, and medical services have reached previously underserved areas [1].

Nevertheless, Laos continues to face serious healthcare challenges. Hospitals are underfunded and understaffed, leading to overcrowding and equipment shortages. By 2020, the physician density in Laos stood at 0.35 physicians per 1,000 people (4 doctors per 10,000 inhabitants)—several times lower than the global average of 17.2 physicians per 10,000 people in 2022 [8]. This low density is partly due to the limited number of medical schools and resource constraints. Restricted resources make it difficult for healthcare workers to provide quality care, and some citizens seek medical treatment outside the country [4].

There is also a significant shortage—and uneven distribution—of skilled health workers, especially in rural areas. This issue is driven in part by poor training programs, low salaries, and limited professional development opportunities [5].

These challenges highlight the need for international cooperation in medical training and capacity building. Strengthening international partnerships would likely expand training programs for Laotian healthcare workers. Scholarship programs and exchange opportunities could help Laotian students study abroad, improve their skills, and bring critical expertise back to the country [5]. Additionally, efforts to enhance the quality of medical training could include translating medical texts into the Laotian language and increasing access to modern medical education resources [7].

In recent times, the deaths of six tourists poisoned by methanol (methyl alcohol) in the tourist area of Vang Vieng have highlighted the urgent need for stronger regulation and emergency response systems in healthcare. These tragedies underscore the importance of stringent oversight to prevent similar incidents from happening again [4].

International support must continue if such challenges are to be overcome. Continued assistance can help improve healthcare infrastructure, expand medical education, and implement effective public health policies. The global community can play a vital role in supporting Laos to build a more resilient and equitable healthcare system through sustained collaboration [1].

Laos also needs international efforts to improve sanitation and hygiene. With investment in sanitation infrastructure and education, it is possible to significantly reduce the transmission of waterborne diseases. Public awareness campaigns on hygiene and disease prevention can empower communities to take action and protect their health [1].

7. Policy recommendations for infectious disease control in Laos

For Laos to effectively combat infectious diseases there must be a detailed and inclusive public health strategy, involving government, the international community, and in particular, the community itself. Expanding of community based health programs would help in strengthening primary healthcare services and early disease detection and better treatment. Investment in the government's preventive care measures for malaria and dengue, for example, vaccination programs and mosquito control, would also reduce the incidence of malaria and dengue [1].

The other critical step is to enhance the surveillance and data collection. By doing so in collaboration with international health organizations, it would help in the implementation of real time tracking system for better outbreak response with reduced loss of precious resources. Further help in reducing mortality rates would be developing pharmaceutical subsidies so that access to essential medicines and diagnostic tools could expand [1].

It would also be vital in promoting preventive behaviors through health education campaigns that will raise public awareness. The implementation of the community driven solutions could be facilitated with local leaders, NGOs and global partners collaborate. This will also facilitate cross border effort to contain and eliminate infectious diseases in collaboration with neighboring countries like Thailand, Vietnam and Cambodia [1].

8. Conclusion

Weak health infrastructure, economic instability, and limited resources make infectious diseases a persistent public health threat in Laos and the broader Southeast Asia region. These challenges call for greater international collaboration and urgent, strategic policy reforms. By improving healthcare systems and sanitation, strengthening disease surveillance, and fostering global cooperation, Laos can take meaningful steps to protect its population, reduce its disease burden, and improve public health outcomes.

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