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Prevention and Control of Communicable and Non-Communicable Diseases

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ABSTRACT

Communicable and non-communicable diseases are two major challenges in global and national health systems, including in Indonesia. Communicable diseases such as tuberculosis, malaria, and HIV/AIDS are still the main causes of morbidity and mortality, while non-communicable diseases such as heart disease, cancer, and diabetes mellitus have increased significantly along with changes in lifestyle and epidemiological transition. This article is a literature review that aims to describe prevention and control strategies for both groups of diseases based on scientific sources and official reports. The results of the study indicate that surveillance-based approaches, public education, health promotion, and multidisciplinary interventions are key to overcoming these health problems. Therefore, strengthening preventive and promotive policies must be a priority in the Indonesian health system to reduce the burden of disease in the future.

Keywords:
infectious diseases, non-infectious diseases, prevention, control, public health, literature review

INTRODUCTION

Health is a fundamental pillar of sustainable human development. In recent years, countries around the world—including Indonesia—have been grappling with a double burden of disease: the simultaneous prevalence of communicable and non-communicable diseases (NCDs) [WHO, 2024]. This dual challenge poses significant threats to public health, particularly in regions with inadequate sanitation, limited healthcare access, and low awareness of healthy living practices.

Communicable diseases such as tuberculosis, malaria, HIV/AIDS, and leptospirosis remain prevalent in many Indonesian provinces. These illnesses are often exacerbated by environmental and socioeconomic factors, and their transmission—via vectors, air, or direct contact—demands integrated approaches combining disease surveillance, immunization, behavioral change, and environmental sanitation programs [Ministry of Health, 2023]. For instance, despite national efforts, Indonesia remains one of the countries with the highest burden of tuberculosis globally, with an estimated incidence of over 950,000 cases in 2022 [WHO, 2023].

Simultaneously, the country faces a surge in NCDs fueled by rising life expectancy, urbanization, and shifts in dietary and lifestyle habits. According to the World Health Organization, over 74% of global deaths in 2022 were attributed to NCDs, with the majority occurring in low- and middle-income nations [WHO, 2024]. In Indonesia, Ministry of Health

reports show a consistent increase in cases of hypertension, diabetes, and cardiovascular diseases, particularly among urban populations [Ministry of Health, 2024]. These conditions now rank among the leading causes of death, surpassing many infectious diseases in both rural and urban areas.

This epidemiological transition calls for a paradigm shift in health system strategies. Effective disease control can no longer rely solely on curative measures. It necessitates a balanced integration of promotive, preventive, curative, and rehabilitative interventions supported by strong intersectoral collaboration, community empowerment, and evidence-based policymaking.

This article presents a literature review of key conceptual and policy approaches to managing infectious and non-infectious diseases in Indonesia. By synthesizing current scientific literature and health data, this review aims to inform and support policymakers, practitioners, and researchers in developing responsive and adaptive strategies for the complex and evolving landscape of public health challenges.

METHOD

This article is based on a literature review of 47 relevant scientific sources published between 2002 and 2024, encompassing the fields of public health, epidemiology, and health policy. The references include peer-reviewed scientific journal articles, academic textbooks such as Detels et al. (2002), as well as official reports from international health organizations, notably the World Health Organization (WHO) and the Ministry of Health of the Republic of Indonesia. The analysis employs a thematic approach centered on key public health concepts, including the chain of infection, causative agents, modes of transmission, susceptible hosts, and preventive strategies for non-communicable diseases such as health promotion, early detection, and community-based interventions. This review is intended to offer a comprehensive and evidence-based synthesis of current practices and policies in disease prevention and control, thereby contributing to the development of more effective and sustainable public health strategies.

RESULTS AND DISCUSSION

Prevention and Control of Infectious Diseases

Infectious diseases have been and will continue to be the leading cause of illness, disability, and death in the world. Control of infectious diseases has always been the job of every health worker in both developed and developing countries. In the history of infectious diseases, the only disease that has been eradicated from the face of the earth is Variola disease. The international world is trying to eradicate Poliomyelitis and Dracontiasis from the face of the earth. Eradication of other infectious diseases such as TB and Malaria has failed and has become a threat to several countries. Several new infectious diseases such as AIDS, show the truth of McNeill's statement (Detels, 2002) where infectious diseases will remain one of the important parameters and determinants of human life history.

Notes on efforts to eradicate infectious diseases in Indonesia have a fairly long history. During the Dutch colonial era, Indonesia experienced a cholera pandemic that started and developed from the mainland of Sulawesi and then spread almost throughout the world. In the early 20th century, the Dutch government began efforts to eradicate worm infections that occurred in the Banyumas area and eradicated TB by establishing a sanatorium. This effort marked the beginning of the momentum of efforts to improve public health using modern

technology. Another event was the implementation of quarantine regulations for prospective hajj pilgrims who would depart for the holy land by the Dutch government on Onrust Island (Pulau Seribu) which was known as the Pilgrim Ordonantie. This regulation was the beginning of a health quarantine model by taking preventive measures against the entry and exit of infectious diseases that could cause outbreaks (epidemics) or even pandemics such as Cholera and Plague (Hermawan, 2011). Several things that need to be understood when making efforts to control and prevent infectious diseases are as follows:

a. Chain of Infectious Disease Chain

infection is a description of the relationship between the causative agent of infection, the transmission route, and the sensitivity of the host. Prevention and control of this infection depends on the interaction of the three which can ultimately cause disease in the human host (Detels, 2002).

b. Infectious Agents

The causative agent of infection is the first chain of infectious diseases where it is a microorganism that is present or present in large numbers where its presence can cause an infectious disease. Examples of causative agents of infection are bacteria, rickettsia, chlamydiae, fungi, parasites, viruses, and prions. Causative agents can be distinguished based on their ability to cause disease (pathogenicity) and their ability to cause serious disease (virulence). Pathogenicity can be determined by comparing the number of patients who have clinical manifestations with the number of patients who experience infection while virulence can be determined by comparing the number of patients who have serious effects with the number of patients who are sick (Detels, 2002).

c. Transmission Line

Transmission of a disease can occur through direct transmission, indirect transmission, and airborne transmission. Direct transmission can occur through direct contact such as kissing, touching, biting, and sexual intercourse or through direct projection such as infection through droplets which usually occurs within a distance of <1 meter. Examples of indirect transmission are: (a) transmission through objects such as toys, water, food, drinks, or any object that acts as an intermediary, (b) transmission through vectors such as mosquitoes, flies, and others. While transmission through the air is through droplets and dust (Detels, 2002).

d. Host

The host is the last place in a chain of infection. Agents can enter the host's body through several places, namely: the respiratory tract, skin, digestive tract, mucous membranes, urinary tract, and placenta. To prevent the emergence of clinical manifestations of a disease, the host also has a defense mechanism. Human defense mechanisms are divided into specific (B lymphocytes, immunoglobulins, etc.) and non-specific (skin, mucosa, etc.)

e. Infectious Disease Control Devices

The tools used to control a disease include identification, evaluation of disease patterns, and interventions to control the disease. The tools for conducting this identification and evaluation are called surveillance. Thus, surveillance is referred to as information used to determine action. There are several types of means for control related to intervention, namely:

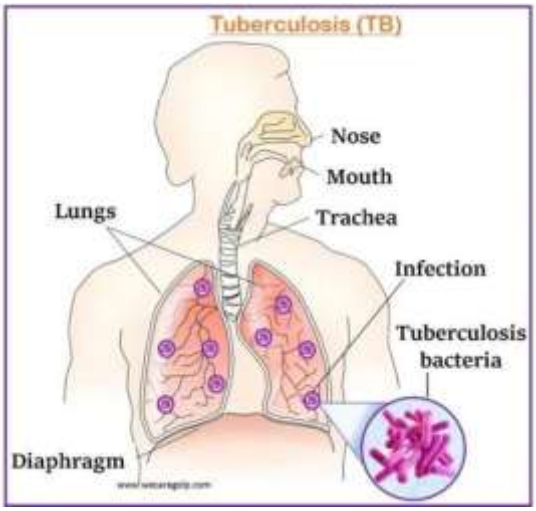
a. Control carried out on the host (immunization, lifestyle changes, etc.)
b. Control carried out on vectors (chemical, biological control, etc.)
c. Control carried out on infected humans (chemotherapy, isolation, etc.)
d. Control carried out on animals (immunization, reduction, restriction, etc.)
e. Controls carried out on the environment (sanitation and environmental cleanliness)

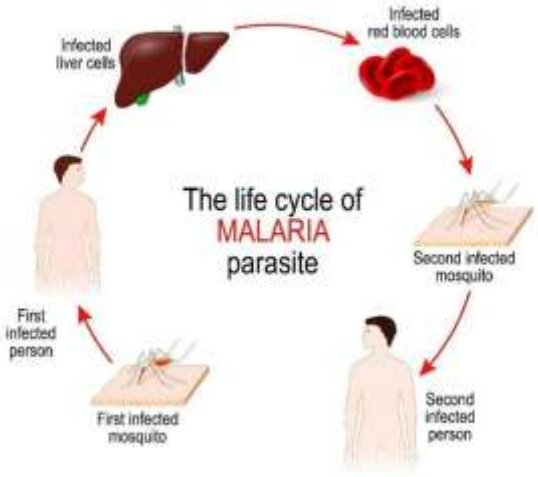
f. Control carried out on infectious agents (sterilization, fogging, etc.)

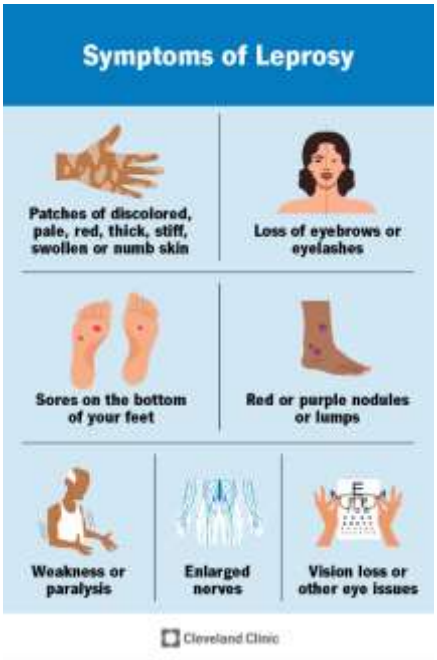
f. Challenges in Control and Prevention of Infectious Diseases

The challenges of the Indonesian government in controlling and preventing infectious diseases are still very heavy. This can be seen from the still high incidence of infectious diseases in Indonesia. Based on the World Health Organization (WHO) Indonesia, infectious diseases will remain the biggest cause of morbidity and mortality in Indonesia (WHO Indonesia, 2010). Some infectious diseases that are major problems are:

a. Tuberculosis (TB)
b. Malaria
c. Poliomyelitis
d. Leprosy
e. HIV/AIDS







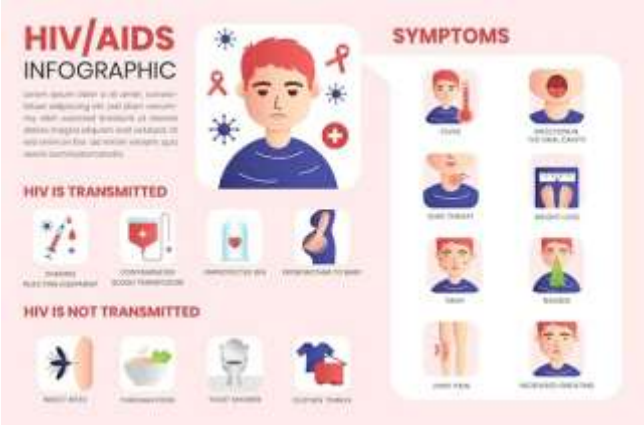


Figure 1. Some infectious diseases

Prevention and Control of Non-Communicable Diseases

The population conditions in many developing countries are currently in a state where there is an increase in fertility rates and a decrease in life expectancy. Improvements in social conditions will cause an increase in fertility rates in the early stages where there will be an increase in the population before reaching a stable state. This process is called the demographic transition which will then be followed by an epidemiological transition that will cause changes in the prevalence of disease patterns from infectious diseases to non-infectious diseases (Detels, 2002).

The history of handling Non-Communicable Diseases (NCDs) by the government in Indonesia began in 2005 with the establishment of a new unit in the Ministry of Health, namely the Directorate of Control of Non-Communicable Diseases. This PPTM Directorate was then divided into five sub-directorates (subdit), namely: sub-directorate (subdit) of Heart and Blood Vessel Diseases, sub-directorate (subdit) of Diabetes Mellitus and Metabolic Diseases, sub-directorate (subdit) of Cancer, sub-directorate (subdit) of Chronic and Degenerative Diseases, and sub-directorate (subdit) of Disorders Due to Accidents and Injuries (Ministry of Health of the Republic of Indonesia).

Non-communicable diseases that are often found are mainly Cardiovascular disease, Diabetes, Cancer, Stroke, and chronic Lung disease. Based on data from the Ministry of Health, the proportion of deaths due to NCDs increased from 41.7% in 1995 to 49.9% in 2001 and 59.5% in 2007. The highest cause of death from all causes of death is stroke (15.4%), followed by hypertension, Diabetes, Cancer, and chronic obstructive pulmonary disease. Deaths due to NCDs occur in urban and rural areas.

WHO estimates that by 2020, NCDs will cause 73% of deaths and 60% of morbidity worldwide. Provisions issued by WHO relating to the prevention and control of non-communicable diseases have been outlined in the WHO Global Action Plan for The Prevention and Control of NCD's 2013-2020 (WHO, 2013).

In order to prevent and control non-communicable diseases, activities that can be carried out by a public health practitioner include: (1) disease prevention, (2) disease screening, (3) determining causes, (4) health promotion, (5) prevention and treatment. An explanation of each of these activities can be seen below.

a. Disease Prevention

Disease prevention is divided into primary, secondary, and tertiary prevention. Primary prevention aims to reduce the incidence of disease (example: reducing the incidence of

disease). Secondary prevention aims to reduce the incidence of disease to become an advanced/final stage. This is done by screening to find the disease in its early stages. Tertiary prevention aims to reduce the social impact that occurs as a result of a disease (Detels, 2002).

Examples of primary, secondary and tertiary disease prevention activities can be illustrated through the following activities. Providing folic acid to all pregnant women is primary prevention. Ultrasound examination (USG) to determine the presence of neural tube defects due to folic acid deficiency is secondary prevention, and if found, the baby will likely be advised to be aborted. Surgery followed by rehabilitation for babies born with neural tube defects is tertiary prevention, with the aim of reducing the social impact that may arise due to existing disabilities.

b. Disease Screening

Screening is considered a secondary prevention measure because screening aims to detect disease during a period when it can still be treated effectively. Therefore, screening should be done before the disease reaches the terminal phase. Screening should be implemented as part of a program. Even in cases where a screening tool is well-accepted and has shown benefits, a screening program should be evaluated before it is implemented. This is not only due to the cost factor but also to be able to assess the side effects that may arise.

The possible results obtained from a screening are: (1) true positive where this result will actually provide benefits if the screening is carried out before the critical point is exceeded, (2) true negative where this result shows the absence of disease and can provide certainty to the object of examination, (3) false negative which can cause a delay in diagnostic certainty considering that the results are negative, and (4) false positive where the object of examination must undergo an examination to confirm the diagnosis which may contain risks.

To determine the validity of a screening program can be done by determining sensitivity and specificity. Sensitivity is the probability of a positive result that will prove that the object is really sick. While specificity is the probability of a negative result that will prove that the object is really not sick.

c. Determination of Cause

Causative factors are usually the primary determinants of a disease because they must be able to distinguish the outcome of a person who is exposed to a causal factor or not. For example, it is believed that nicotine in tobacco and asbestos are the causes of lung cancer, so eliminating exposure to cigarettes and asbestos will reduce the number of people who get lung cancer. Murray and Lopez (1999) estimate that the five major risk factors for disease in the world are malnutrition, tobacco, hypertension, poor water supply, and physical inactivity (Detels, 2002).

d. Health Promotion

Health promotion is an effort to improve health status and is not limited to disease prevention. In the past in developed countries or currently in developing countries, infectious diseases can be reduced by conducting health promotion through communication-information and education activities, providing clean water, improving housing, and good nutrition according to WHO, (1999) prevention of non-communicable diseases can be done by promoting healthy lifestyles such as quitting smoking, physical activity, consumption of low-fat foods and high in fruits and vegetables, and reducing stress by improving social relationships (Detels, 2002).

e. Prevention and Treatment

The allocation of funds for disease prevention is usually much smaller than the allocation of funds for health screening and examination (Cohen and Handerson, 1988). This is because the funds spent on prevention are often not seen as a benefit because the target is a healthy population, so it will be very difficult to convince donors that the prevention program carried out brings benefits that may be greater than treatment efforts. An example is a prevention effort carried out by telling parents to put their children to sleep in a supine position and not in a prone position. Although this effort is believed to save many babies from sudden infant death syndrome (SIDS), they cannot see directly the objects saved by these preventive efforts (Detels, 2002).

The challenges faced by the Indonesian government are similar to the global challenges in fighting non-communicable diseases. To address the global challenges of non-communicable diseases, several Non-Governmental Organizations (NGOs) in the world have joined forces to formulate the problems, challenges, and solutions faced to reduce the impacts of non-communicable diseases. These organizations formed the Non-Communicable Disease (NCD) Alliance whose members are NGOs in the world that handle various non-communicable diseases such as Cardiovascular disease, Diabetes, Cancer, and chronic Lung disease.

According to NCD's Alliance data, non-communicable diseases are the number 1 killer in the world, and have brought great hardship to both rich and poor countries. Non-communicable diseases have contributed the most to the death rate globally and also in the majority of low- and middle-income countries. Worldwide, non-communicable diseases have contributed to 60% (35 million) of all deaths. Of these, about 80% (28 million) occur in low- and middle-income countries. This has made non-communicable diseases a major cause of poverty and development problems. Non-communicable diseases will also be the leading cause of disability by 2030.

CONCLUSION

This study shows that the challenges in preventing and controlling infectious and non-infectious diseases are still very large, especially in Indonesia. For infectious diseases, control can be done by understanding the chain of transmission, controlling vectors, increasing immunization, and strengthening disease surveillance. Meanwhile, for non-infectious diseases, effective efforts include promoting a healthy lifestyle, early screening, reducing risk factors, and community-based interventions. Increasing the capacity of the health system through policies that support promotive and preventive approaches is very much needed. Cross-sector integration and community empowerment are important elements to reduce the burden of disease now and in the future.

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