

# The Impact of Population Mobility on the Spread of Communicable Disease in Indonesia

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## ABSTRACT

This year, is a pretty tough year for the wider community, because of the spread of the COVID-19 virus that is troubling the community. Migration is one of the causes of the spread of a disease from one region to another. Increasing the number of people with a variety of work activities causes the spread of disease more easily and quickly, both direct transmission and indirect transmission. Mobility can get a person into a high-risk situation. Prevention of the spread of disease due to high human mobilization can be carried out by vaccinations. In general, a disease that is transmitted through goods is a disease that attacks the body's immune system when the body is weak due to decreased endurance. Besides these efforts are still considered as the most effective efforts. The existence of social restrictions is expected to minimize the transmission of Covid-19 virus from human to human.

*Key word: Mobility, Communicable diseases, Covid19*

## Introduction

Human mobility is one of the central topics in this globalization era. Advances in information technology, communication and transportation have made human mobility very easy and difficult to stem. The community then flocked to mobilize with various destinations, ranging from tourism activities, looking for work, taking education, to finding a new place to stay that was felt to be safer. Mobility can occur at the local, regional and international level.

The existence of the Covid-19 pandemic has made human mobility in several major urban areas in Indonesia very limited. Moreover, with the increasing number of people with Covid-19 in the region. As a precautionary measure, various policies have been implemented, including policies on limiting interactions, restrictions on movement, and stopping operational modes of land, sea and air transportation (Yunus and Rezki, 2020).

2020 is a pretty tough year for the wider community, because of the spread of the COVID-19 virus that is troubling the community. The existence of the COVID-19 virus has made people's lives fluctuate, indirectly it does have an impact on community activities, in all aspects of life. Things like this are actually not something new happening in the world of health. If we remember further in 1918 when an influenza outbreak caused 100,000 deaths, and was recorded as one of the darkest history in the world, changes in the environment and people's lives related to this pandemic are closely related. It took quite a long time for the world to find a drug that was good enough to cure influenza (Jilani *et al.*, 2019).

Increased access to transportation and communication facilities has made it easier for people to mobilize or move. This shows the revolution of population mobility. This condition also affects lifestyle patterns and the spread of disease (MacKellar *et al.*,

2005; Ayres *et al.*, 2006; Elisa *et al.*, 2012).

Mobility can get a person into a high-risk situation (Tam, 2006). Because previously they were far from their families and communities, now they have to adapt to the new environment (Sirkeci and Yucesahin, 2020).

Most of the population of Indonesia is a migrant offender. They choose to live apart from family for a certain amount of time to earn a living or work outside the city or even outside the island. This condition occurs because in the village or city where they live can not provide employment with the wages they want. Indonesian people have a high level of mobility when measured by international standards and this trend continues to increase. Indonesia has the largest number of non-permanent migrant workers living far from their families (Munir, 2000)

## Literature

### Migration

Migration is a geographical, spatial or territorial population movement between geographical units that involves a change of residence, i.e. from place of origin to destination (Rusli, 1983). Migration must involve factors that cause permanent residence changes without having to pay attention to the distance traveled in the transfer process. In examining migration there are two important dimensions that need to be reviewed, namely the time dimension and the regional dimension. There is no exact size for the time dimension, because it is difficult to determine how long a person is moving to live as a migrant, but the definition used in the population census is usually used. (Munir, 2000).

A person is said to migrate if he moves permanently or is relatively permanent (for a certain relative period of time) by traveling a certain minimum distance, or moves from one geographical unit to another. Horizontal or geographical population mobility encompasses all population movements that cross certain boundaries over a certain period of time (Mantra, 2003).

In general, there are two types of migration, internal migration and international migration. Internal migration only occurs between geographical units within a country, for example between provinces, cities or other administrative units. While international migration is the migration of people from one country to another (Rusli, 1983).

There are several types of migration that need to be known viz (Munir, 2000):

1. Incoming migration is the entry of a population into a destination.
2. Migration out of the population movement out of a place of origin.
3. Net migration is the difference between the amount of incoming and outgoing migration.
4. Total migration.
5. Migration during life.
6. Partial migration.
7. Migration flows.

The definition of migrant according to the United Nations is someone who moves residence from an administrative or political unit to another administrative area or political area. Many experts and research say that migrants are selective. There are special characteristics that distinguish migrants and non-migrants, especially in terms of age, sex, education, marital status and type of work. With the selective nature of the migration process, the characteristics or characteristics of those who participate in the migration process arise.

### Causes of Migration

The occurrence of migration is caused by three factors namely (Hardjosudarmo, 1965):

1. Push factor existing in the area of origin, namely the increase in population resulting in population pressure, the drought of natural resources, climate fluctuations, and incompatibility with the environment.
2. Pull factor existing in the destination area, namely the existence of natural resources and new sources of livelihood, the existence of new income, and a very good climate.
3. Other factor that is, technological changes, such as the emergence of agricultural mechanization which can cause a decrease in labor demand for agriculture. This forces the farm laborer to move to another place or job. In addition, it is also due to market changes, religious, political and personal factors.

### Communicable diseases

Based on its characteristics, diseases can be classified into 2 namely communicable and non-communicable diseases. Infectious diseases get more attention from the government compared to non-communicable diseases. Communicable disease is a disease caused by bacteria, viruses, or parasites that can be

transmitted through certain media. Communicable diseases are often also called infectious diseases because this disease is suffered through viral, bacterial, or parasitic infections which are transmitted through various media such as air, syringes, blood transfusions, food or drink places, etc. (Chin, 2006).

Communicable disease is the result of a combination of various factors that influence each other. Infectious diseases and health problems in humans, can't be separated from the role of environmental factors. Interactive relationships between humans and their behavior with environmental components that have the potential for disease hazards, also known as disease occurrence processes. While the process of disease occurrence with each other has its own characteristics. In this case environmental factors play a very important role. Human interaction with the environment has caused contact between germs, viruses, and bacteria with humans (Chin, 2006). It often happens that microorganisms living in the body of the host then move to humans because humans are not able to maintain environmental cleanliness. This is reflected in the high incidence of environmental-based infectious diseases which is still the biggest health problem for the people of Indonesia.

Infectious diseases can spread through direct media, air, water, objects and disease vectors. One of the contagious diseases that is being talked about in the world is COVID-19. Coronavirus Disease (COVID-19) is a new type of virus that has never been identified before in humans. Corona virus is zoonosis (transmitted between animals and humans). Research says that SARS is transmitted from civet cats to humans and MERS from camels to humans. Some coronaviruses are known to circulate in animals but have not been proven to infect humans.

Clinical manifestations usually appear within 2 days to 14 days after exposure. Common signs and symptoms of coronavirus infection include acute respiratory distress symptoms such as fever, coughing and shortness of breath. In severe cases can cause pneumonia, acute respiratory syndrome, kidney failure, and even death (Lippi and Plebani, 2020).

On December 31, 2019, the WHO China Country Office reported a case of pneumonia of unknown etiology in Wuhan City, Hubei Province, China. On 7 January 2020, China identified pneumonia of unknown etiology as a new type of coronavirus (COVID-19). On March 11, 2020 the WHO has des-

ignated the corona virus as a global pandemic. The increase in the number of COVID-19 cases has taken place quite rapidly and has already spread to other parts of Wuhan and other countries. As of May 4, 2020, a total of 3,595,662 cases were reported globally in 215 countries with 247,652 deaths.

## Discussion

### Human Mobilization of Spread of Disease

Increasing the number of people with a variety of work activities causes the spread of disease more easily and quickly, both direct transmission and indirect transmission. Direct transmission can be through the bite of malaria mosquitoes or dengue fever which is a vector of disease and affected patients do not recognize or even appreciate risk factors or potential transmission related to people, domestic animals or wildlife, and the environment (Beay *et al.*, 2017).

Another disease that is often attacked in humans is leptospirosis. *Leptospira* is an example of a pathogenic agent of disease whose distribution is influenced by human activity and mobility. Travel by humans both in the wilderness or in the wild causes contact with or inadvertently ingest contaminated leptospira water (Bandara *et al.*, 2014).

*Leptospira* are pathogenic agents that have a reservoir of infection, namely domestic animals and wildlife such as dogs, sea lions, and mice and are transmitted by excreting leptospira through urine. *Leptospira* require moist soil or stagnant water to maintain virulence and persistence outside the host body. Leptospirosis is common in divers, swimmers, canal workers, and tourists who travel through forests and swamps (Bandara *et al.*, 2014).

### Mobilization of Goods Against Disease Spread

Some infectious diseases have cross-border and inter-regional characteristics, specifically related to the dynamics of goods mobility. The era of globalization has been proclaimed by the growing free trade between countries that have almost no boundaries and applies in various fields including livestock sub-sector, both live livestock commodities and their products, so that the possibility of contracting a number of zoonoses, foodborne diseases and other exotic diseases must be examined.

One source of disease transmission is the mobility of food products from animals originating from

places that do not have good food hygiene. Food and feed mobility, from processing to distribution, is highly vulnerable to contamination that can transmit disease if there is no good hygiene.

As we know, zoonotic outbreaks such as symptoms of poisoning that caused diarrhea are examples of the result of mobilization of food that is not handled properly. In addition, laboratory tests on food of animal origin still found pathogenic germs *Staphylococcus aureus* and *Salmonella sp.* which can cause anxiety in the community.

Disease in animals can be transmitted directly or indirectly through food products of animal origin such as meat, milk, eggs including diseases caused by consuming food (foodborne disease) and diseases caused by the entry of pathogenic agents into the digestive tract (food infection).

Food products from livestock have a high risk of microbial contamination which is harmful to human health. Some diseases caused by food from livestock origin are anthrax, salmonellosis, brucellosis, tuberculosis, clostridiosis, and diseases caused by contamination of *Staphylococcus aureus* (Supar and Ariyanti, 2005). After cattle are slaughtered, the microbes found in animals begin to damage the tissue so that animal food quickly deteriorates if they are not properly handled. Microbes in livestock products mainly come from the digestive tract. If the meat is contaminated with digestive tract microbes, the meat can carry pathogenic bacteria such as *Salmonella*. Pathogenic bacteria from contaminated meat can contaminate other foodstuffs such as vegetables, fruits, and ready-to-eat foods if they are placed close to contaminated meat (Djaafar and Rahayu, 2007).

### **Mobilization of Transportation Services for Spread of Disease**

Along with technological advances, transportation has also evolved from time to time, from the use of horses and sailing boats to the use of steamers, trains, automobiles and airplanes so that they can reach an area in a short time. In 2006, air travel from international travel reached 46%, land travel 43%, water transportation 7%, and railroad 4% (Chen and Wilson, 2008). This shows that the risk of passengers being exposed to infectious diseases is higher given the global aviation network that connects almost all regions of the world and the mixing of people from various regions so as to enable the spread of disease quickly and widely.

Infection can occur through the spread of air in the aircraft, such as influenza, measles, tuberculosis, meningococcal infection, and *severe acuterespiratory syndrome* (SARS). Food-borne infections served on the plane can be *Salmonella*, *Staphylococcus*, and *Vibrio cholerae* (Chen and Wilson, 2008). Infection in passengers on a cruise can be through pathogenic agents *Salmonella*, *Shigella*, *Staphylococcus*, *Vibrio Cholera*, *Legionella*, and *Rubella* (Chen and Wilson, 2008).

### **The Impact of the Pandemic on Human Mobility in Indonesia**

There are several policies issued by the Indonesian government, ranging from border closure and entry restrictions, large-scale social restrictions (PSBB), to the ban on going hometown (mudik) (Yunus and Rezki, 2020) large-scale social restrictions implemented by Indonesia include appeals for learning, work and worship activities carried out from home, restrictions on activities in public places or facilities, restrictions on socio-cultural activities, as well as restrictions on stopping the Asia mode of transportation. The implementation of this policy can reduce the spread of Covid-19 if it is implemented correctly. However, there is no (or not yet) strict sanctions for those who violate it which makes the community disobedient in complying with existing regulations. As a result, existing policies are seen as less effective.

The existence of the application of social restrictions makes most of the industry players have to temporarily close their production activities. This causes workers to be laid off, with uncertainty when or whether they will work again. This will be a big problem for daily workers in the non-essential sector, who cannot work due to social restrictions. The policy, which is considered more concerned about citizens than foreign workers, also reaps the polemic because of the lack of Covid-19 tests and health facilities provided by the government for them. Meanwhile, migrant workers' mobility patterns have also changed due to these policies. Migrant workers who originally worked in other countries are now returning to their home countries due to closure of the workplace (Yunus and Rezki, 2020).

### **Conclusion**

The Covid-19 pandemic resulted in a change in patterns of community mobility throughout the world,

including in Indonesia. In an effort to “flattening the curve”, people are now being asked to move from home and not take unnecessary trips. So far, these efforts are still considered the most effective efforts. The existence of social restrictions is expected to minimize the transmission of Covid-19 virus from human to human. But on the other hand, the handling that is more focused on the individual citizens makes migrant workers and refugees the most vulnerable group. The mobility patterns of migrant workers and refugees have also changed.

Endemic diseases can be influenced by the spread of disease caused by increased mobility of people, goods, and services, direct or indirect contact. Humans can become a biological vector or even a mechanical vector, that is, from the clothing of the items they possess. Transportation services also affect the spread of a disease caused by technological advances so that an area farther away can be traveled in short time so as to enable the rapid spread of the disease.

This can be overcome with disease prevention measures (preventive) and disease control (curative) in advance and followed by providing education to the public about the importance of maintaining human health in order to avoid zoonotic diseases

## Recommendations

### Anticipating the Spread of Disease

Contact made by sick people or tools used to treat diseased animals and facilitated mobilization are considered sources of disease transmission. This results in contact with people who are sick is considered a dangerous thing. Prevention of zoonotic diseases needs to be done so that an area can maintain its area free from endemic diseases or endemic diseases that can be prevented and not spread into pandemic diseases.

Prevention of the spread of disease due to high human mobilization can be carried out vaccinations to tourists who want to travel long distances and conduct health tests, ensuring that tourists who travel are not infected with the disease, and do not bring the disease back to the area. Nevertheless, in the era of globalization, it is still difficult to limit human mobilization, especially when land routes and private vehicles are used.

In general, a disease that is transmitted through goods is a disease that attacks the body's immune

system when the body is weak due to decreased endurance. Humans or animals can be infected by a disease and animal products by animals affected by a disease. This problem can be overcome by testing the nutritional content of a food and testing positive for a food against an illness.

Transportation services such as transportation that carries contaminated animal goods or products can also transmit a disease mechanically to humans. This causes the spread of the disease to proceed quickly. This can be overcome by applying a biosecurity mechanism where the transportation activities of animals and animal products are very closely monitored so that they can guarantee that animals or animal products that will be brought to an area are safe from contaminants or infectious diseases.

### Physical and Social Distancing

One of the steps taken to reduce the chain of spread of influenza, the thing done by the European community is to do social distancing. Is social distancing itself? Is it very influential on the level of community mobility? What are the effects of doing social distancing? These matters will be discussed further. Social distancing, or can also be called Physical Distancing, which is to keep a distance between ourselves and others when we are outside the home. The application of social distancing is done in a way, maintaining a safe distance with others with a distance of 1.8 m from others (Center for Disease Control and Prevention, 2020). In addition to keeping a distance from people around us when outside the home, CDC recommends not to gather and create groups when outside the home, too, avoiding crowds or crowded places. Keeping the distance between yourself and others is considered quite effective in preventing ourselves from being exposed to the virus and slowing the spread of the virus. Indirectly, social distancing does affect the level of community mobility in daily activities. Human activities that move from one place to another, both to move permanently or to work, study, or to just shop for daily needs are strictly restricted. Limitation of community mobilization activities is also quite reasonable. When associated with the understanding of social distancing, community mobilization activities may inadvertently cause people to gather in a crowded place so that they can move from one place to another, while the appeal made to the community to keep a distance in order to avoid the spread of the

wrong virus one avoiding crowds. Community mobility is limited, daily activities outside the home are limited. It could be, accidentally when we are moving from one place to another, we carry the virus in what we use. Such a thing cannot be avoided. The impact of the implementation of social distancing that is inhibiting the spread of the COVID-19 virus that threatens the community, also, has an impact on the surrounding environment. Because community mobility activities are declining, this affects the reduction in consumption of fuel for vehicles, thus, an impact on air quality that is getting better over time. The ozone layer begins to thicken a little bit again, due to the lack of exhaust gas in the air.

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