

Research Article

Collaborative Governance in Risk Mitigation of Climate Change's Impact on Health

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ORCIDRastri Paramita: <https://orcid.org/0000-0002-5705-4793>Susi Haryanti: <https://orcid.org/0000-0002-2317-4551>**Abstract.**

This study aims to evaluate the absence of climate change risk mitigation policies that are not yet part of the authority of the Ministry of Health despite the large potential impact of climate change on public health. The implementation of climate change risk mitigation on health intersects with various sectors, including the Ministry of Public Works and Public Housing, the Ministry of Finance, the Ministry of Agriculture, and the Ministry of Environment and Forestry. However, the Ministry of Health has still not implemented risk mitigation, which can be reflected in the absence of a climate change risk mitigation budget or what is called green budget tagging. In addition to the absence of risk mitigation in the Ministry of Health's budgeting, the implementation of climate change risk mitigation is still lacking in inter-sectoral coordination, and the roadmap for handling climate change impacts is still being carried out by sector and has not been carried out nationally. The methodology used in this research is a qualitative approach, data collection was done by studying literature and secondary data. The results of the study indicate that collaborative governance is needed in handling the impact of climate change on health, both between ministries and institutions, the Central and local governments, as well as academics, media, and international parties.

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1. INTRODUCTION

Climate change can lead to an increase in air temperature, extreme rainfall, sea level rise and an increase in pollutant concentrations that increase the risk of disease, especially environmental-based diseases. This increased risk of a disease must be identified and managed immediately so as not to cause public health problems [1]. Based on a World Bank study, Indonesia is ranked 12th out of 35 countries with a high risk of death due to various hazards, including tsunamis, earthquakes, floods, landslides, and droughts. Based on research results, the impact of climate change on Indonesia reaches 0.66% -3.45% of Gross Domestic Product (GDP) in 2030 [2].

According to WHO (2021), the impact of climate change in 2030-2050 will cause an estimated 250,000 deaths annually due to malnutrition, malaria, diarrhoea, and heat

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stress. Meanwhile, the cost of direct damage to health is estimated to be between USD2-USD4 billion per year in 2030 [3]. Therefore, The Intergovernmental Panel on Climate Change (IPCC) concluded that the world should limit temperature rise to 1.5°C. If this temperature limit is not immediately implemented, then every tenth of an additional degree of warming will have serious impacts on human life and health. The impact of climate change on health in the short and medium term will be determined primarily by the vulnerability of the population, its resilience to the current rate of climate change and the degree and speed of adaptation. While the impact in the long term is highly dependent on the extent to which transformational actions are taken now to reduce emissions and avoid violating harmful temperature thresholds and potential tipping points that cannot be changed.

Research conducted by the Ministry of Health (2021) indicates that there is a direct or indirect link between climate change and health, specifically the disease incidence profile. Climatic factors used as variables affect the increased risk of a disease in the form of rainfall, temperature, and humidity. Meanwhile, the diseases that became the dependent variable were malaria, dengue, pneumonia, ARI, TB, diarrhoea, and under-five nutrition. The result is that there is a correlation between the climate variable and the total cases of malaria and dengue is a vector-borne disease; Pneumonia and ARI are airborne diseases; and TB and diarrhoea are also sensitive to temperature changes. These six diseases have a distribution pattern similar to the pattern of climate variables in seasonal events. Meanwhile, under-five nutrition is not statistically proven to have a direct relationship with climate change. Transmission of under-five nutrition to climate change through low food security due to climate change and infected population such as malaria, dengue, and diarrhoea accompanied by unfavourable socio-economic conditions so that sufferers are exposed to malnutrition. So that the influence of one disease can cause or worsen other diseases [4].

The following are some indications of climate change that can have an impact on health in Indonesia, namely (Ministry of Health, 2021) [4]:

1. The impact of climate change in Indonesia affects various sectors of life including agriculture, health, water resources and marine.
2. Climate change is characterized by: increasing global air temperature, rising sea levels, increasing extreme events/events, changes in rainfall, increasing acidity of seawater and increasing the composition of the atmosphere, especially Greenhouse Gases (GHG).

3. Increased potential for disease trends that are directly affected by climate parameters.
4. Adapting and mitigating climate change must be carried out by all levels of society.
5. The forms of adaptation and mitigation of climate change in the health sector include, among others, maintaining environmental cleanliness, disposing of waste in its place, strict medical waste management and according to other procedures and steps.

In the 2015-2019 National Medium-Term Development Plan (RPJMN) policy, risk mitigation for climate change is one of the SDG focuses in the post-2015 development agenda [5]. Mitigation of the risk of climate change impacts is regulated in policy directions that include cross-sectoral efforts to strengthen climate change mitigation and adaptation capacities. This is because many sectors are involved and responsible for mitigating these risks, such as the agricultural sector with policy directions for mitigating the risk of climate change impacts on food security; climate information and disaster information sector; and the marine sector. This policy on climate change is also still being continued in the 2020-2024 RPJMN where climate change is number six of the seven development agendas. However, the policy emphasis in dealing with the impacts of climate change in the 2020-2024 RPJMN is on adaptation, not mitigation [6]. And the regulated adaptation policies to the impacts of climate change have not included the health sector as an important sector for risk mitigation. Although the regulated sector is concerned with risk mitigation, for example maintaining cleanliness and water resources can have an impact on mitigating health risks from improved drinking water.

Based on the description of current conditions related to climate change and its impact on health and research results, the research questions of this journal are:

1. How does Indonesia mitigate the risks of climate change to health?
2. What is the form of inter-agency coordination related to climate change risk mitigation on health?

2. Theoretical Study

2.1. Climate Change in Indonesia

Climate is the average weather where the weather is the state of the atmosphere at a certain time at a certain time. Climate can be defined as a measure of the average

and the variability of the relevant quantities of certain variables (such as temperature, precipitation or wind), over a certain period of time, ranging from months to years or millions of years. There is an interaction between its components and external factors such as volcanic eruptions, variations in sunlight, and factors caused by human activities such as changes in land use, causing the climate to change continuously (Ditjenppi, Ministry of Environment and Forestry, 2020) [7].

Climate change according to the United Nations Framework Convention on Climate Change (UNFCCC) is a change in climatic conditions in the form of changes in the composition of the global atmosphere and natural climate variability over comparable time periods. Climate change is a change in the composition of the global atmosphere, including temperature and distribution of rainfall as a result of human activities over a certain period of time which has a wide impact on various human lives (Permenkes No. 1018 of 2011) [8]. Climate change is caused by internal natural change processes (eg El Nino and El Nina storms) and external (eg changes in air composition and changes in land use due to persistent changes induced by human activities).

Climate, refers to the long-term average regional or global temperature, humidity and rainfall patterns over a season, year or decade. While the weather can change in just a few hours, the climate changes over a longer period of time. Climate change is the significant variation from average weather conditions to being, for example, warmer, wetter, or drier—over several decades or more. This is a long-term trend that distinguishes climate change from natural weather variability (Worldbank, 2021) [9].

Climate change is indicated to have occurred in Indonesia, which can be seen from the increase in the reduction in snow cover and thickness in the Jaya Wijaya Mountains. In May 2020, the total glacier area of 0.34 km² decreased compared to March 2018 with a total area of 0.46 km². Another indication of climate change in Indonesia is the distribution of extreme rainfall events with the criteria for rainfall above 50 mm in one day [4].

2.2. Impact of Climate Change on Health

Based on the NDC roadmap for climate change adaptation, climate change will have an impact on health, both directly and indirectly, which is influenced by environmental, social and public health determinants. Meanwhile, directly increasing weather and extreme climates can cause various environmental problems, including floods, landslides, and droughts. Increased potential for disease transmission can occur due to changes and environmental damage due to rain or flooding. Infectious diseases that will

appear and spread during the rainy and flood seasons are acute respiratory infections (ARI), dengue fever, diarrhea, leptospirosis, malaria, skin diseases, and possibly bird flu (Soeharsono 2002) [10]. When the dry season comes, it has the potential to encourage an increased risk of diarrhea (Azage et al, 2017) [1]. Meanwhile, according to WHO (2019) [11], air pollution caused by carbon emissions causes the deaths of more than 7 million people/year globally, of which 26% of these deaths are caused by systemic liver disease. The NDC roadmap [12] also projects the loss to health due to the impact of climate change in Indonesia on the value of the national Gross Domestic Product (GDP) of 0.10% or around 7.6 trillion rupiahs. If climate change also triggers natural disasters simultaneously, the impact on the national GDP is estimated to reach 1.8% or around Rp. 133.36 trillion.

Climate change can increase the risk of disease occurrence caused by increasing air temperature, extreme rainfall events, rising sea levels and increasing pollutant concentrations. The frequency of occurrence of a disease and the potential for increased transmission so that disease infections have increased, especially in environmental-based diseases. The increase in disease infection based on the intensity, scope and magnitude of the impact occurred due to the adaptation of disease agents.

The figure below provides an overview of climate-sensitive health risks, their exposure pathways, and their susceptibility factors.



Figure 1: Climate-Sensitive Health Risks, Pathways of Exposure, and Factors of Exposure. Source: COP26, 2021 [4].

Based on the Pan American Health Organization (PAHO), explains how climate change affects human health, as shown below:

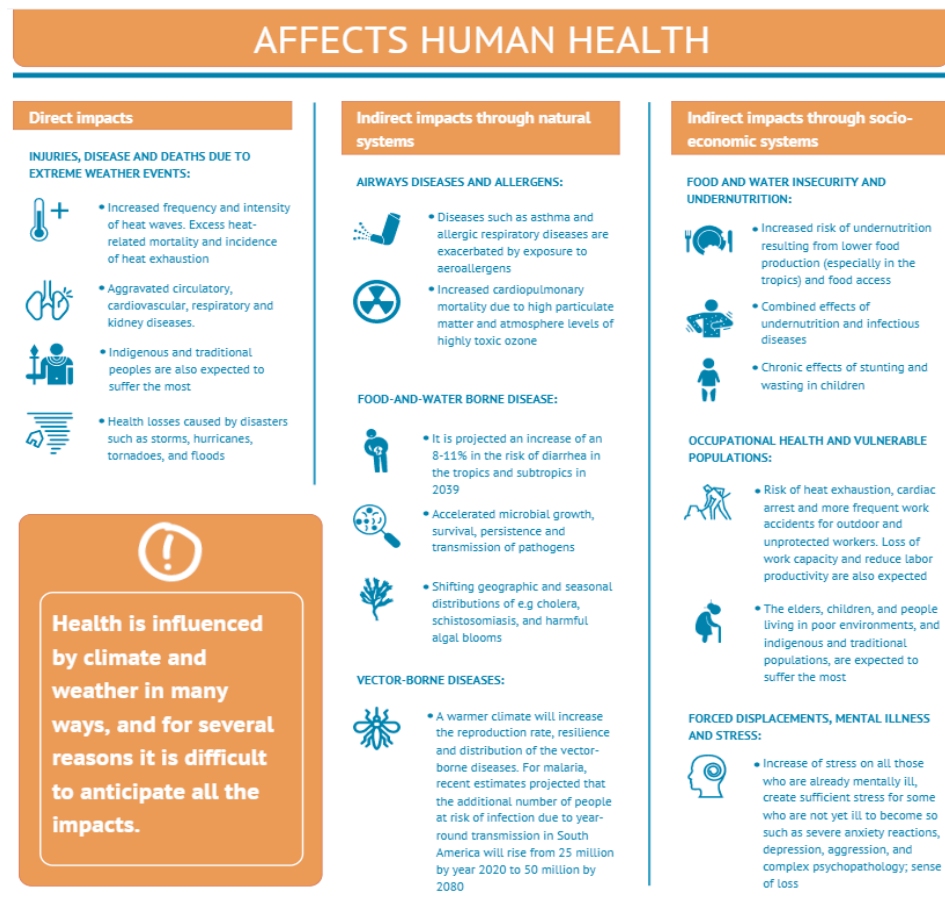


Figure 2: Transmission of The Impact of Climate Change on Health. Source: PAHO, 2021 [13].

2.3. Government Policy Related to Handling the Impact of Climate Change on Health

The Government of Indonesia has demonstrated a strong commitment to addressing the health impacts of climate change. As a form of seriousness and commitment, the Government of Indonesia has taken significant steps to reduce emissions from the land-based sector by adopting a moratorium on primary forest logging and prohibiting the conversion of the remaining forests with activities to reduce deforestation and forest degradation, restore ecosystem functions, and sustainable forest management including social forestry through the active participation of the private sector, small and medium enterprises, civil society organizations, local communities and the most vulnerable community groups.

The following are government policies in terms of Handling the Impact of Climate Change on Health, namely:

1. A. Nationally Determined Contribution (NDC) [14].

The NDC is an important part of the Paris Agreement, which contains a statement of state party commitments through the United Nations Framework Convention on Climate Change (UNFCCC). As a follow-up to the statement of Indonesia's commitment delivered by the President of the Republic of Indonesia at COP-21, Indonesia has ratified the Paris Agreement with Law no. 16/2016 on 24 October 2016.

In the NDC, it is stated that in efforts to reduce vulnerability to climate change impacts, Indonesia must strengthen climate resilience by integrating adaptation and mitigation efforts in development planning and implementation through:

1. Conditions that Support Climate Resilience, namely: The direction of Indonesia's development towards low carbon and climate resilience must be developed by building a strong foundation through the support of conditions: Certainty in planning and land use; Tenure resilience; Food security; water resistance; and renewable energy.
2. Economic Resilience: Climate change has a very significant impact on natural resources which will result in disruption to the production and distribution of food, water and energy. High population growth will increase pressure on already limited resources. In response to this, Indonesia plans to transform to a low-carbon economy and build food, water and energy security through the following enhanced actions: Sustainable agriculture and plantations; Integrated watershed management; Reducing deforestation and forest degradation; land conservation; Utilization of degraded land for renewable energy; Improvements in energy efficiency and consumption patterns.
3. Social Security and Livelihoods: Climate change has an impact on the daily lives of people, especially those who are very vulnerable. Natural disasters related to climate change have a greater impact on people below the poverty line and hinder the collection of capital. The increase in food, water and energy prices, which usually occurs after droughts, floods and other disasters, will make the poor even more impoverished. To anticipate these impacts, Indonesia plans to build social resilience through actions which include rapidly increasing disaster preparedness programs in the context of reducing disaster risk and increasing community settlements, providing basic needs and building climate-resistant infrastructure.

4. Ecosystem and Landscape Resilience: As an archipelagic country with a high diversity of wealth, Indonesia's highly diverse ecosystems and landscapes provide various environmental services such as watershed protection, carbon sequestration and conservation and disaster risk reduction. To build climate resilience, Indonesia must protect and maintain the sustainability of environmental services with an integrative, landscape-based approach in managing land, coastal and marine ecosystems. RAN GRK.

Indonesia seriously and consistently continues to carry out its commitment to addressing climate change through Low Carbon Development Planning (PPRK). PPRK is a strategic transformation of the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) as stipulated in Presidential Regulation No. 61 of 2011 [15]. As a form of consistency in efforts to deal with climate change, this issue is one of the national priorities which is a cross-sectoral program in the 2015–2019 National Medium Term Development Plan (RPJMN) document. Meanwhile, in the NDC, the Government of Indonesia projects that GHG emissions from the Energy Sector in 2030 will increase almost four times compared to GHG emissions in 2010. The Energy Sector's total GHG emissions in 2030 will be the largest with a 60% share of total GHG emissions, followed by Forestry and Agriculture Sector (27%), Waste Sector (11%), and IPPU Sector (2%). Thus, the Government conveys that the focus of the national GHG emission mitigation program will shift from the Land Sector to the Energy Sector. The Energy Sector GHG emission reduction target in 2030 is 314 million tons of CO₂e from business as usual conditions or 11% of the total 29% reduction target. This sizable target is a challenge for the Energy Sector.

1. B. .National Action Plan for Climate Change Adaptation (RAN-API)

Responding to the climate change adaptation drive, the Indonesian government took action with the issuance of the RAN-API document (BAPPENAS 2012) [16]. However, the document is still general in nature regarding the direction of climate change adaptation in Indonesia. In the RAN-API document (BAPPENAS 2012) it is written: "consideration of the risks and impacts of climate change needs to be translated into action plans and national adaptation strategies, medium-term development plans, policies and regulations, and institutional structures." The issuance of the RAN-API document shows a positive response from the Indonesian government in an effort to synergize climate change adaptation in sustainable national development.

Climate change has a significant impact on natural resources in Indonesia which will affect the production and distribution of food, water and energy. Therefore, the

Government of Indonesia considers efforts to mitigate and adapt to climate change as an important integrated concept in building the resilience of food, water and energy resources. The Government has made significant efforts in developing and implementing the National Action Plan.

2.4. Collaborative Governance

To be able to implement the implementation of climate change management, good governance is needed from the government. Good governance is influenced by organizational factors, policies and related stakeholders. Good governance can support climate change management. To improve good governance (city capacity) in implementing climate change management, it is analyzed through internal and external factors that influence it.

As a concept, collaboration is defined by Imperial (2019) [17] as “a purposive relationship designed to solve problems by creating or finding solutions to existing problems.” So collaboration occurs by crossing organizational and sectoral boundaries (Fung, 2015) [18]. Government collaboration is also referred to as the process and structure of public policy making and governance by involving the community, private sector, NGOs, from various institutions and existing levels to determine common goals that are difficult to formulate alone (Emerson, Nabatchi, & Balogh, 2011). [19]. While Quik, Wright, Rashid, & Thiruchelvam, (2015) [20] explain that collaborative governance is a concept in government management as a process of facilitation and implementation by various institutions, both government, community, and NGOs that aim to solve common problems that cannot be resolved. resolved by a single government agency. Another paradigm about collaborative governance was put forward by Hartley, Sorensen, & Torfing (2019) [21], which defines that cooperation has the meaning of working together or working together with other parties, whether it is individual, group, or organizational.

2.5. Mitigation

Things that can be done to reduce the impact of climate change on health need to be done. This effort will not succeed if each party works individually to achieve its own interests, it requires a global joint effort. This is because climate change has the characteristics of being a shared global problem so that efforts need to be made to tackle it together and apply on a global scale (IPCC (syr) 2014) [22]. Several world cities have identified key sectors for implementing adaptation and mitigation measures.

Maputo City, for example, in dealing with climate change, climate change management in the form of adaptation and mitigation, specifically for the coastal city area, several strategic steps can be taken.

2.6. Institutional

As mentioned above, climate change mitigation may not be the responsibility of only one Ministry/Agency but involves many institutions including:

1. KLHK.
2. Ministry of Health.
3. Ministry of ATR.
4. The Ministry of Public Works (PU) has been involved in efforts to address climate change since the preparation of the 2007 National Action Plan for Climate Change Mitigation and Adaptation (RAN MAPI).
5. National Disaster Management Agency.
6. Local Government.
7. NGOs.

3. Methods

This study uses a qualitative approach based on a review of existing policies related to mitigating the risk of climate change impacts on health and literature study. This type of research is descriptive qualitative. In this analysis, most research results are described using words (Huberman, Michael & Matthew B Milles 1994) [14]. By analyzing collaborative governance in mitigating the risk of climate change impacts on health, the theory used is the theory related to collaborative governance and the theory of climate change and its impact on health and then presents it in the form of a description. Source of data from this research is secondary data. Secondary data is data that is used as an alternative to primary data to obtain information that is often not found in primary data. The data sources of this research are secondary data sources, namely from policies issued by the government in terms of climate change, books, journals and news information from the web or internet related to the research discussion. The data collection technique carried out by the researcher is a literature study, namely

by examining theoretically through references and scientific literature, various kinds of information or news, reports and notes related to the object of research within a certain time span. To get information that can be mutually reinforcing and later can be drawn at a conclusion.

According to Miles and Huberman (1994) [14] data analysis techniques include data reduction, data presentation and conclusions or verification. Reducing data is an activity of summarizing, filtering the core things and then determining the theme and pattern. In this study, the authors searched for data related to the discussion and then filtered data that could be used to support research. Presentation of the data is done with a brief description, charts, relationships between categories. make it easier to understand the problems that occur and arrange further work, because the method used by the researcher is a case study, the presentation of the data is poured in the form of a description. The conclusion contains the results of the research conducted by the researcher, this conclusion may answer the existing problem formulation but also may not because the case studies discussed are still temporary and can develop in the future.

4. Result and Discussion

4.1. Mitigation of Climate Change Risks to Health in Indonesia

Based on the findings of the Intergovernmental Panel on Climate Change (IPCC), climate change has had an impact on ecosystems and humans around the world and poses major risks to human health, global food security, and economic development. Facing this risk, Indonesia has made policies and regulations related to climate change, environment, and health that Indonesia has carried out starting from ratifying the Paris Agreement to The United Nations Framework Convention On Climate Change through Law Number 16 of 2016 concerning Ratification of the Paris Agreement to The United Nations. Framework Convention On Climate Change to carry out climate-resilient development. There are 11 directive regulations, 2 incentive regulations, and 3 reference regulations [4]. A complete picture related to regulations for mitigating the impact of climate change on the health sector can be seen in Figure 3 below:

Mitigation of the risk of climate change impacts on health cannot run alone without coordinating with other ministries/agencies. This is because health consists of many factors that form the occurrence of a disease. Based on the theory of Blum (1974) [15], the degree of health is determined by 40% of environmental factors; 20% lifestyle factors;

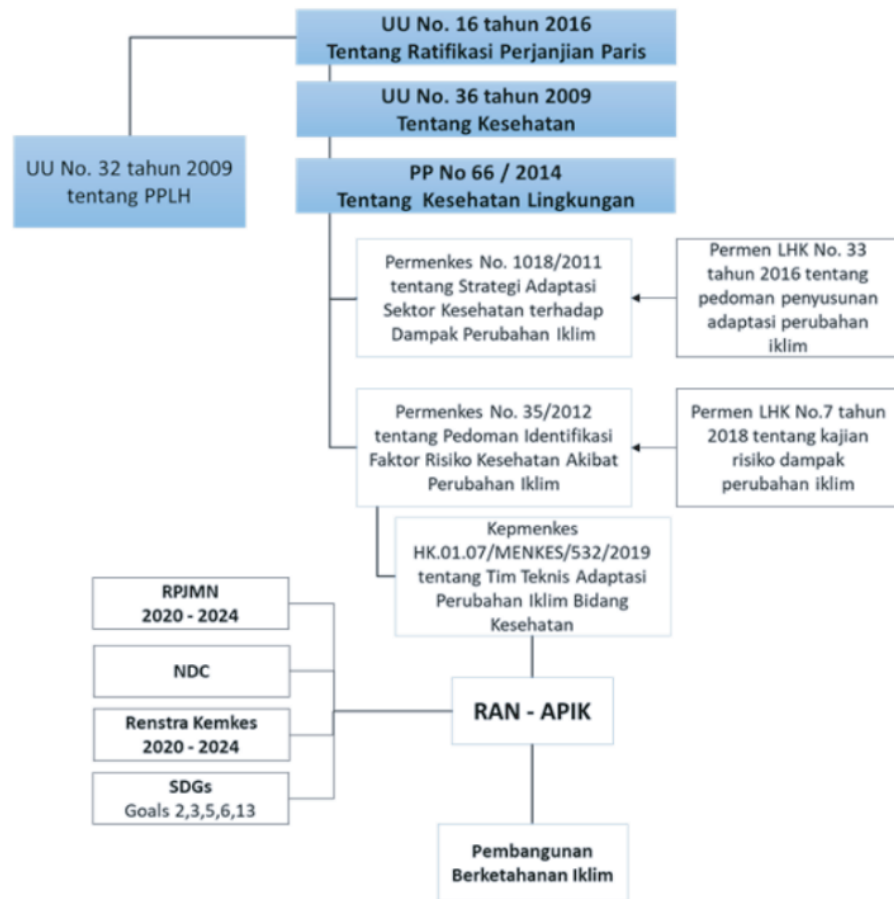


Figure 3: Development of Regulations for Mitigating the Impact of Climate Change on The Health Sector. Source: Kemenkes (2022) [4].

20% health care factors and 10% genetic factors (heredity). In every occurrence of a disease, it has different forming factors from other diseases. Therefore, it is necessary to identify the factors forming the occurrence of a disease to determine the availability of existing data [4].

Currently, Indonesia has only regulated the adaptation of the impact of climate change on health as regulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 1018/Menkes/PER/V/2011 concerning the Health Sector Adaptation Strategy to the Impact of Climate Change [16]. There are ten strategies for adapting the health sector to the impacts of climate change and indicators of success, namely:

1. Socialization and advocacy on adaptation of the health sector to the impacts of climate change;
2. Mapping of populations and areas vulnerable to climate change;
3. Improvement of the health sector’s climate change response system;

4. Laws and regulations;
5. Increasing the affordability of health services, especially in areas vulnerable to climate change.
6. Increasing the capacity of human resources in the health sector.
7. Improved control and prevention of diseases due to the impact of climate change;
8. Increased partnerships;
9. Increasing community empowerment in adapting to climate change according to local conditions; and
10. Improved surveillance and information systems.

Adaptation to climate change in the health sector is any effort or program that is structured in response to either minimizing/eliminating the impact of climate change in the form of potential climate-related diseases and/or maximizing the potential or related resources. The selection of recommended adaptations should be locally specific. In general, climate change adaptation in the health sector considers:

1. Intervention target areas.
2. Problems in the target area.
3. Socio-economic conditions of the community and biophysical areas.
4. Information on vulnerabilities and risks of climate change in the health sector.
5. Information on impacts due to climate change (occurrence of specific diseases due to climate etc.).
6. Information on Human Resources (local capacity, related parties, parties who must be involved, local wisdom, customs or local culture) that can support the process of implementing adaptation.
7. Natural Resource Information, such as landscapes and information on vital locations that can support the implementation of adaptation.
8. Existing or planned solutions.

Risk mitigation measures take decades to be able to affect the current increase in the earth's temperature. Mitigation of climate change means avoiding and reducing emissions of heat-trapping greenhouse gases into the atmosphere to prevent the earth

from warming to more extreme temperatures. While adaptation is more about the way we live to protect our families, economies, and the environment in which we live from climate change. The more we can reduce emissions, the easier it will be to adapt to climate change. Therefore, the government prioritizes adaptation to climate change. However, risk mitigation and adaptation to the impacts of climate change should be carried out in tandem in order to minimize the impact on health.

Mitigating the risk of climate change on health requires cooperation between stakeholders. For example, clean energy development is carried out by the Ministry of Energy and Mineral Resources, which is in charge of the energy sector. Through the development of new renewable energy will support the reduction of greenhouse gas production. Another example is about food security, which also affects health, can be handled by the Ministry of Agriculture as the holder of authority in the food sector. As a result of climate change causing changes in cropping patterns that affect harvest time. Harvest time that is no longer predictable will affect food availability or security. The issue of food security is the responsibility of the Ministry of Agriculture to mitigate the risk of climate change on food security. One example of risk mitigation is providing superior seeds that are resistant to various climate changes and produce low emissions. With the seriousness in maintaining food security, the indirect impact of changes to health can be minimized. This collaboration in mitigating health risks should be built by the government in order to be able to reduce greenhouse gas emissions more optimally. Collaboration between ministries/agencies is important because it will determine how big the impact is on efforts to minimize the impact of climate change on health.

In addition to collaborating with relevant ministries/agencies, the Ministry of Health also needs to mitigate the risk of climate change impacts on health. The current policy that has just been carried out is in the form of adaptation to the impact of climate change on health as stipulated in the Decree of the Minister of Health of the Republic of Indonesia Number Hk.01.07/Menkes/423/2017 concerning the Technical Team for Adaptation to the Impact of Climate Change in the Health Sector [17]. One of the risk mitigation that the Ministry of Health can do is to disseminate information to health workers and the public to change lifestyles that support carbon emission reductions. For example, by using environmentally friendly home appliance technology, saving electrical energy, or using bicycle transportation that is zero emission but is good for health. Building public awareness to have a healthy lifestyle and support the reduction of carbon emissions is very important, because it takes a long time to build this awareness. This socialization must have achievement targets and be evaluated periodically. The results of this risk mitigation can be used as the basis for the formulation of adaptation

policies for the impact of climate change on health. This risk mitigation has not been carried out by the Ministry of Health because it considers that risk mitigation is more appropriate to be carried out by relevant ministries/agencies outside the Ministry of Health.

Changing healthy people's lifestyles and supporting the reduction of carbon emissions, which should be financed with a green budget. This form of mitigation is important as a preventive measure from the negative impacts caused by climate change. This socialization can be carried out in stages from the central level to the RT/RW level. This socialization must also be carried out regularly to update data and information on health workers and the public in mitigating the risk of climate change impacts on health. With the change in people's behavior, it is hoped that it will reduce the budget allocation for adaptation to the impact of climate change for health.

4.2. Inter-Agency Coordination in Implementing Climate Change Risk Mitigation on Health

In addition to establishing a health system that is able to overcome the impacts of climate change, another important thing to establish is a coordination mechanism between ministries and agencies that have the authority to mitigate the risks of climate change to health. Because health risk mitigation involves several sectors, such as infrastructure, environment, energy, agriculture, and fisheries. Risk mitigation policies must be carried out by sitting together with the ministries/agencies that have the authority to reduce greenhouse gases. Policies between one ministry/institution must be aligned to ensure continuity in mitigating the risk of climate change impacts on health. What is a risk mitigation program at the Ministry of Public Works must support risk mitigation carried out by the Ministry of Agriculture, all of which are targeted at minimizing the impact of climate change on health? Meanwhile, the Ministry of Health itself should also take preventive steps, one of which is increasing public awareness of climate change which can have an impact on health. This increase in public awareness is expected to be able to encourage public awareness in dealing with climate change by changing daily behavior that supports the reduction of greenhouse gas emissions.

Ideally, from planning to evaluation of climate change risk mitigation on health, it is carried out jointly between the Ministry of Health and the ministries/agencies authorized to support the mitigation of these risks. The understanding between the Ministry of Health and related ministries/agencies must be the same so that they have the same goals and support each other in mitigating the risk of climate change impacts on

health. Routine coordination also needs to be done to determine future goals and resolve existing problems. For example, the relevance of environmental issues such as extreme heat that can contribute to death, diseases related to cardiovascular failure, and heat-related diseases. Environmental issues are under the authority of the Ministry of Environment and Forestry (KLHK). When the Ministry of Environment and Forestry conducts tree planting to reduce extreme heat, the risk mitigation carried out by the Ministry of Environment and Forestry will have an impact on reducing the incidence of death, cardiovascular failure-related diseases, and heat-related diseases.

Collaborative governance is an absolute necessity to address the impacts of climate change on health. A form of collaborative governance that approaches the need to address the impact of climate change on health is collaborative governance proposed by Chris Ansell and Alison Gash (2008) [18]. Chris Ansell and Alison Gash (2008), argues that collaborative governance is governance where government institutions directly involve actors outside the government such as communities, communities, NGOs, and the private sector in carrying out formal decision-making processes that are oriented towards common interests with the aim of implementing policies and managing programs and resources in an effective manner. together. The involvement of parties outside the government in formulating policies and implementing policies to control the impact of climate change is very much needed so that the impacts can be controlled properly and minimize negative impacts on the community. In fact, the issue of climate change is a global issue that must be tackled together. Not only between ministries/agencies but between countries. This is because the causes and impacts are global, so it is necessary to help each other in overcoming them.

5. Conclusion

The purpose of this study is to find out the current forms of climate change risk mitigation on health in Indonesia and the forms of coordination between institutions related to mitigating climate change risks to health. The methodology used in this study is qualitative with secondary data derived from research results, data from ministries/agencies both domestically and abroad as well as other literature reviews.

The result is that currently; Indonesia has not mitigated the risks of climate change impacts on health. This is the answer why the Ministry of Health does not carry out green budget tagging to mitigate the risk of climate change impacts on health and only allocates green budget tagging to adapt the impacts of climate change on health. In fact, the Ministry of Health can mitigate the risk of climate change impacts on health by

outreaching to health workers and the public to build a healthy lifestyle that supports reducing carbon emissions, such as using bicycles as a means of transportation that is environmentally friendly but good for health.

Regarding the issue of coordination between institutions in implementing climate change risk mitigation on health, Collaborative governance is an absolute necessity to deal with the impacts of climate change on health. Collaborative governance was initiated for the first time by government institutions by directly involving actors outside the government such as communities, communities, NGOs, and the private sector in carrying out formal decision-making processes that are oriented towards common interests with the aim of implementing policies and managing programs and resources together. The involvement of parties outside the government in formulating policies and implementing policies to control the impact of climate change is very much needed so that the impacts can be controlled properly and minimize negative impacts on the community.

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