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Global climate change issues, natural disasters and their impact on Indonesian children

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ABSTRACT

Climate change that contributes to the destruction of the earth is one of the impacts of human behavior. One example of damage to the earth due to human behavior is global warming. One of the effects of global warming is the melting of permafrost. Melting of glaciers due to global warming will result in an isostatic rebound phenomenon, where melting glaciers will cause the weight of the earth's crust to decrease and it is easy to move and bounce, resulting in the movement of earth faults and increased activity in the magma chamber (increased seismic activity). The big impact is the occurrence of natural disasters that not only occur in parts of the world where glaciers melt but in other parts of the world far from where glaciers melt. Natural disasters that can occur are earthquakes, volcanic eruptions, tsunamis, and landslides. Global warming will also have an impact on the emergence of disease outbreaks.

Indonesia is the meeting place of three major tectonic plates in the world, namely the Eurasian plate, the Indo-Australian plate and the Pacific plate. In addition, Indonesia is also located in the Pacific ring of fire, making Indonesia an area with high volcanic activity and seismic activity. Climate change will increase the risk of disasters in Indonesia. The long experience of the Indonesian people in dealing with natural disasters that often occur should be used as a strategy to prevent and reduce the impact of disasters in the future.

Keywords: Climate change, Indonesian children, Natural disasters.

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EDITORIAL

Climate change is one of the most hotly discussed global issues. The impact of climate change is very serious on various aspects of life. Climate change is also one of the contributors to the destruction of the earth. The condition of the earth today is very alarming. The earth is getting older every day, but it is also increasing in damage. Humans as its inhabitants experience fear of the impact of its damage. But has there been any real effort from humans at least to reduce the damage to the earth day by day? The answer right now is that humans are trying. Damage to the earth due to human actions is closely related to climate change which is also inseparable from human behaviors. People are very commonly talking about and cannot be ignored regarding the damage to the earth is the existence of global

warming. The Intergovernmental Panel on Climate Change (IPCC) ten years ago shows that the earth's average temperature has increased to 3°C compared to 1990.

Moreover, the use of carbon-related technology is very widely used. This is certainly related to global warming. If global warming continues to occur, humans will only have to reap disasters in the future. Global warming cannot be viewed as a problem in a particular country or part of the world but a problem in all parts. One example of the contribution of global warming is forest fires. Even though it happened in Indonesia, its impact can be felt in other countries. This is one proof that global warming does not only have a local impact in one country but has a wide impact on other countries.^{1,2}

Global warming is closely related to natural disasters. One of the impacts of global warming is melting permafrost

or a layer of frozen soil. An example is the thawing of permafrost in Siberia and Alaska, which formed 11,000 years ago. This is due to the earth's temperature increase in the past six decades.¹ The increase in the earth's temperature is due to carbon dioxide and other pollutants. As a result of combustion, carbon dioxide will later be retained in the layers of the atmosphere at an altitude of 10-20 km. The accumulation of carbon dioxide will retain heat from the earth's surface to escape, causing a greenhouse effect.³ The melting of permafrost in Siberia and Alaska led to a global increase in sea levels of 0.19 meters.^{1,4} It is exacerbated by the loss of ice masses in Greenland, Antarctica, the Arctic and mountain glaciers worldwide. The melting of glaciers due to global warming will result in an isostatic rebound phenomenon, where melting glaciers will result in reduced

weight of the earth's crust and easily move and bounce, resulting in the movement of earth's faults and increased activity in the magma chamber (increased seismic activity). The big impact is the occurrence of natural disasters that occur not only around the part of the world where the glaciers are melting but in other parts of the earth far from where the glaciers are melting. Natural disasters are earthquakes, floods, volcanic eruptions, tsunamis, and landslides.^{1,5} Global warming will also impact the emergence of disease outbreaks. One of the impacts of global warming is the emergence of dengue fever outbreaks. Increase in temperature above the annual average and the decrease in annual rainfall in some areas affect mosquito-borne diseases such as dengue virus infection.⁶

As a country far from the north and south poles, is Indonesia also affected by melting glaciers? What will Indonesia's fate if glaciers continue to melt due to global warming? Indonesia is one of the countries with a varied topography. Some part of Indonesia's area is mountainous and another part is valleys, oceans and rivers. This makes Indonesia a paradise for nature lovers. But what needs to be remembered is that Indonesia is the meeting place of three major tectonic plates in the world: the Eurasian plate, the Indo-Australian plate and the Pacific plate. In addition, Indonesia is also located in the Pacific ring of fire, making Indonesia an area with high volcanic activity and seismic activity. So far there are about 129 active volcanoes in Indonesia. The situation described above makes the risk of natural disasters in Indonesia is very high.^{7,8} Moreover Indonesia is currently an endemic area for several deadly infectious diseases, one of them is Dengue Haemorrhagic Fever. In the last 45 years, cases of Dengue virus infection have increased dramatically following an intermittent hyperendemic pattern. So what does global warming have to do with the emergence of outbreaks like Dengue Haemorrhagic Fever? It turns out that temperature is important in the life cycle and reproduction of mosquito-borne viruses including dengue viruses. Humidity caused by the high rain intensity makes an environment suitable for the growth of *Aedes* mosquitoes. Therefore the impact of global warming on Indonesia

will be very large, such as natural disasters and disease outbreaks appear if it is not anticipated before.⁶ The long experience of the Indonesian nation in dealing with frequent natural disasters should be used as a strategy to prevent and reduce the impact of future disasters. In the event of a natural disaster in addition to a massive impact on damage to buildings, public facilities, and the economy, there is also an impact on the health of victims of natural disasters. In addition, natural disasters also greatly affect children's education. Slow post-disaster recovery will hamper and disrupt the planned education curriculum.⁹

The thing that is often overlooked when natural disasters occur is the state of children. Children are often rated as a package with their parents. Even though children have specific needs that differ from parents in terms of growth and development. The impact of natural disasters and disease outbreaks is not only on the child's physique but also on the child's psychology. Data from the Disaster Task Force of the Indonesian Paediatric Society at the time of the earthquake in Lombok in 2018, 836 children experienced health problems while in displacement and they had to be treated in Field Hospitals and at health posts. The state of dense isolation makes some diseases very contagious. At the time of the earthquake disaster in Lombok there was a shift in disease patterns in children from week to week. At the time of the beginning of the disaster, many children were taken to health posts and Field Hospitals due to injuries and fractures. Still, at the end of the first week and the second week respiratory infections increased drastically. In the third and fourth weeks, respiratory infections decreased and were followed by increased cases of infections in the gastrointestinal system. With this disease pattern, it can be used as a disaster management strategy in the future, and was proven during the Palu earthquake disaster. A team of medical volunteers from the Indonesian Paediatric Association has prepared medical assistance to learn in the case of the Lombok earthquake disaster.^{10,11} Different disasters, different approaches to medical assistance, especially for children. In December 2021, Mount Semeru

Erupted and had a far-reaching impact on children. Unlike the disease pattern of the earthquake disaster in Lombok, when the Mount Semeru disaster erupted, respiratory infection infections increased in the first week and persisted until the fifth week. This is in addition to the fact that children have to live in a dense area, the possibility of the impact of volcanic dust can also affect disease patterns in children. In addition to respiratory tract infections, gastrointestinal infections are the second most common disease.

Another thing that is worried about when the child is in displacement is the emotional impact and stress. However, from the observations of the Disaster Task Force Indonesian Paediatric Society, the children did not experience emotional disturbances and stress based on the assessment scale used by the volunteers from the first week to the fifth week. Many volunteers came with toys and were invited to play. Still, the long-term impact had to be investigated after volunteers left the evacuation site and the children were waiting for the relocation of their homes. Thus who will monitor the long-term health and psychological impacts of children? This is a problem that must be solved. When a natural disaster occurs, many Indonesians are willing to help disaster victims, but who will remain consistent in helping, especially for children for the next few months? A rhetorical question that should be our shared responsibility. For the outbreak of Dengue Haemorrhagic Fever, it is also currently rampant. There are so many children who are victims of it. Based on data from one of the referral hospitals, from January 2021 to March 2022 42 children experienced severe Dengue Virus infection and had to be treated in an intensive room. 11.9% needed an invasive breathing apparatus, 7.1% needed a non-invasive breathing apparatus. Of the total severe Dengue Virus (DHF) infection patients, 14.3% died. If global warming conditions are not addressed immediately, then indirect weather changes will impact the number of morbidities and deaths due to Dengue Haemorrhagic Fever. This situation cannot be separated from the hyper-endemic dengue virus infection in Indonesia due to global warming which is

becoming increasingly uncontrolled daily.

Philosophically, disaster is the interaction between hazards and objects in the form of humans or the environment. Meanwhile, prevention efforts are to prevent interactions and efforts to reduce or eliminate hazards that are the root of disasters.¹² Then what about efforts to overcome natural disasters caused by the impact of climate change on children? Children should already be taught what to do before a disaster occurs, at the time of a disaster and after. Children need to be taught to care about the environment if there is no disaster or before a disaster occurs. This concern is realized by acting, for example minimizing the use of plastic, children are invited to plant trees around their homes, save energy by turning off lights when not in use. Children also need to be taught things to do when a natural disaster occurs, for example what to do when a child experiences an earthquake, flood, volcanic eruption and other disasters. In addition, children are also taught diseases that can be transmitted when they have to gather with many people in refugee camps and how to prevent them, for example, wearing a mask to prevent respiratory infections (such as Covid-19), using clean water while in the refuge to prevent the transmission of gastrointestinal infections and skin diseases. After a natural disaster, children need to be taught how to stay healthy and mentally strong. It will be more effective if the abovementioned things are included in the educational curriculum. In addition to children, parents also need to get counseling about natural disasters and what to do with their children when facing disasters. Vaccination is also very important to overcome outbreaks in the midst of disasters, such as measles outbreaks in the midst of disasters. Health counseling on the importance of vaccination is one of the steps that can be a real step in anticipation of natural disaster management, especially in areas with the potential for natural disasters. Parents and

children also need to be invited together not to behave consumptively by buying things that are not so needed because if it is not controlled, it will have an impact on the accumulation of plastic waste from goods consumed with the consequences of plastic production and plastic elimination has an impact on the greenhouse effect. Children and parents need to be given an understanding of junk food restrictions. Consuming junk food derived from ruminant farms in moderation and being able to control children's weight remains in the ideal weight indirectly also reduces global temperature increases and can contribute to the prevention of natural disasters. So with good planning and behaviour natural disasters due to climate change can be prevented. The limitation of our review is the lack of resources that discuss the occurrence of natural disasters due to climate change. Therefore, we hope that this review can stimulate research on the impact of natural disasters on children.

CONCLUSION

The conclusion of this review is that changes in the earth's climate will have a negative impact on humans. One of them is the occurrence of natural disasters. Indonesia has a very large risk of natural disasters. So that by teaching and providing examples of real behavior in preventing climate change starting from children, it is hoped that they can prevent more serious damage to the earth.

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AUTHOR CONTRIBUTION

All author contributed equally in preparing and writing this editorial.

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