



Pediatric Sciences Journal

Published by  
Pediatrics Sciences Journal

## Global impact of climate change on children's health in the world



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Kurniawan Taufiq Kadafi<sup>1\*</sup>, Dimas Dwi Saputro<sup>1</sup>, Martinus Martin Leman<sup>1</sup>,  
Aslinar<sup>1</sup>, Badai Buana Nasution<sup>1</sup>, Dimas Tri Anantyo<sup>1</sup>,  
Niken Wahyu Puspaningtyas<sup>1</sup>, Fathy Zuandy Pohan<sup>1</sup>, I Nyoman Arie Purwana<sup>1</sup>,  
Muhammad Reza<sup>1</sup>, Jaya Ariheryanto Effendy<sup>1</sup>, Yogi Prawira<sup>1</sup>,  
Piprim Basarah Yanuarso<sup>1</sup>

### ABSTRACT

Climate change has a close relationship with the greenhouse effect. The greenhouse effect is needed by the earth, but if there are too many greenhouse gases in the atmosphere this will increase the earth's temperature. Children are a group of people who have a high vulnerability to climate change. Climate change will affect children's health through 4 impacts, namely direct impacts on children's health, impacts on children's health through ecosystems, impacts on children's health through human behavior, and health impacts on children due to natural disasters. To anticipate the impact of climate change on children's health, parents and the government must take anticipatory steps so that children can be saved from the extreme dangers of climate change.

**Keywords:** Climate change, global impact, children's health.

**Cite This Article:** Kadafi, K.T., Saputro, D.D., Leman, M.M., Aslinar, Nasution, B.B., Anantyo, D.T., Puspaningtyas, N.W., Pohan, F.Z., Purwana, I., N.A., Reza, M., Effendy, J.A., Prawira, Y., Yanuarso, P.B. 2023. Global impact of climate change on children's health in the world. *Pediatrics Sciences Journal* 4(1): 28-31. DOI: 10.51559/pedscij.v4i1.57

<sup>1</sup>Disaster Task Force, Indonesian Pediatric Society.

\*Corresponding to:  
Kurniawan Taufiq Kadafi;  
Disaster Task Force, Indonesian Pediatric Society;  
kadafi12.fk@ub.ac.id

Received: 2022-12-18  
Accepted: 2023-01-22  
Published: 2023-02-10

### INTRODUCTION

Climate change is a global issue that is closely related to greenhouse gases. Greenhouse gases themselves are gases in the atmosphere, such as carbon dioxide, oxygen nitrogen, freon, and methane which trap the heat of sunlight around the earth. Naturally, sunlight that hits the surface of the earth will turn into heat and warm the earth. Some of this heat will be reflected by the Earth's surface into outer space. Some of the reflected sunlight will be absorbed by the gases in the atmosphere that surrounds the earth (called greenhouse gases such as carbon dioxide, nitrogen oxides, freon, and methane) so that the radiant heat is trapped in the earth's atmosphere.<sup>1-4</sup>

This event is known as the Greenhouse Effect because the event is the same as a greenhouse, where the heat that enters the house will be trapped inside, unable to penetrate outside the glass, so that it can warm the entire greenhouse. This "greenhouse effect" natural event causes the earth to warm and fit for human

habitation. What if the Earth did not experience the greenhouse effect? If the earth did not experience the Greenhouse Effect, the earth's surface temperature would be 33 degrees Celsius cooler or the earth's average temperature would be below freezing. However, if the gases from greenhouse gases are more and more in the atmosphere and continue to increase, this will result in excessive global warming. A significant increase in greenhouse gases has occurred since the mid-1800s, and this has caused an increase in the earth's temperature and climate change.<sup>1-4</sup>

Since the 1950s, carbon dioxide gas emissions have increased dramatically due to increasingly advanced industries and livestock producing manure with high levels of methane gas. In addition, we are also surrounded by activities that emit greenhouse gases, such as the use of electrical energy, the use of motorized vehicles, and the burning of waste. Climate change has an impact on increasing the earth's temperature, increasing the average melting of glaciers, and increasing the average sea level.<sup>5,6</sup>

Data from the Intergovernmental Panel on Climate Change (IPCC), the increase in earth's surface temperature since the late 19th century was 0.9 degrees Celsius. But a very rapid increase was obtained in the last 35 years. The average temperature of the earth has increased by up to 3°C when compared to 1990. This is of course a problem if the earth's surface temperature continues to increase. The impact of increasing the temperature of the earth's surface, among others, is an increase in the melting of ice at the poles.<sup>7</sup> This can be seen from the situation in Greenland, the ice mass has decreased since 2000 with the largest loss of ice mass occurring since 2010. The decrease in ice mass has reached 286 gigatonnes per year. This would be dangerous because it would have an impact on sea level rise and cause an isostatic rebound phenomenon, in which melting glaciers would reduce the weight of the earth's crust and make it easier to move and bounce, resulting in movement of the earth's faults and increased activity in the magma chamber (increased seismic activity). The impact is the occurrence of

natural disasters that do not only occur around the world where the glaciers are melting but in other parts of the world that are far from where the glaciers are melting. Natural disasters that can occur are earthquakes, volcanic eruptions, tsunamis, and landslides. Then how the impact of climate change on children's health.<sup>1,8</sup>

Children are a group of people who have a high vulnerability to climate change. This cannot be separated from the unique characteristics of children. This is of course because children have aspects of growth and development that are attached to them. The unique characteristics of children are different when compared to adults, including that children easily inhale harmful substances in polluted air, children also have a high sense of curiosity so it is not uncommon for children to often put things they see into their mouths, besides that children take advantage of playing time in the open, but when children experience problems with their physical bodies, children find it difficult to express or express these complaints. And if the child is already sick, then the child needs different medicines, both types and doses compared to adults. Children are also not mini-adults, because anatomically, physiologically, growth and development and psychology are very different from adults. Physiologically, children are more susceptible to fluid loss due to various reasons. In addition, children's growth and development are not yet perfect, so when a major natural disaster occurs, it is difficult for children to avoid it. Children also have a great curiosity that causes children to try everything around them. This makes them vulnerable to climate change.<sup>9</sup> Therefore, this study aims to review the global impact of climate change on children's health in the world.

### **Global Impact of climate change on Children's Health**

What are the health impacts on children due to climate change? We can divide the health impacts on children into 4 impacts, namely direct impacts on children's health, impacts on children's health through ecosystems, impacts on children's health through human behavior, and health impacts on children due to natural disasters. The direct impact on

children's health includes the effects of extreme heat and the effects of extreme weather on children's health.<sup>10</sup> A report in Canada states that extreme heat can cause sudden death in infants, especially aged 1-12 months. Sudden death in infants can be caused by extreme heat that occurred 1 day before the child died or the child died on the day of extreme heat.<sup>11</sup>

In Indonesia, maybe we rarely encounter such a situation, but in other parts of the world, this is a threat to the lives of our children. In addition to the effects of extreme heat, direct health impacts on children can also occur due to extreme weather changes, including droughts, forest fires, storms, floods, and extreme changes in rain patterns.<sup>10</sup> A study in Bangladesh stated that the impact of the flood disaster apart from having an impact on socio-economic factors and infrastructure also had an impact on children's health, that is, after the flood disaster, many children experienced fever, broken bones, diarrhea, skin diseases, and other diseases. In addition, many children experience difficulties in getting access to school, due to damaged road facilities, some areas are still under water or the parents' economy has been destroyed because the fields where they work were destroyed by the floods. Children are also not infrequently forced to leave school.<sup>12</sup> The impact of extreme weather changes is also being felt in Indonesia, these weather changes are due to forest fires that occur almost every year. Children and women are vulnerable groups due to forest fires. They are prone to respiratory infections.<sup>13</sup>

The impact of climate change on children's health is mediated by ecosystems, including air pollution, and an increase in diseases transmitted through water, food, and vectors.<sup>10,14</sup> Air pollution can be divided into 2 namely air pollution outside the house and air pollution inside the house. Air pollution outside the home occurs due to increased combustion in industry, agriculture, and burning waste. Data from Unicef, air pollution outside the home contributed to causing 4.2 million premature babies to die in 2019, and 154,000 children aged less than 5 years died. Indoor air pollution is caused by cooking using kerosene or firewood with poor ventilation. Indoor air pollution

also contributes to the death of 3.2 million premature babies and 237,000 children aged less than 5 years.<sup>15</sup> This is certainly an emergency alarm for our earth. Not to mention the impact of climate change causing water, food, air, and soil to be contaminated with bacteria that thrive due to increasing temperatures on earth. This has an impact on increasing water and food-borne diseases such as typhoid, diarrhea, and cholera.<sup>14</sup> Significant climate change has also led to an increase in cases of vector-borne diseases, such as dengue fever and malaria.<sup>14</sup> In particular, dengue fever, which contributes to an increase in child mortality almost every year, is related to natural conditions such as an increase in the earth's surface temperature, humidity, and high rainfall.<sup>15</sup> Based on data from a referral hospital in East Java, from January 2021 to March 2022 42 children had severe Dengue Virus infections and had to be treated in the intensive care unit. 11.9% needed invasive breathing apparatus, and 7.1% needed non-invasive breathing apparatus. Of the total patients with severe Dengue Virus infection (DHF), 14.3% died.<sup>16</sup> If global warming conditions are not immediately addressed, it will indirectly have an impact on increasing morbidity and mortality due to dengue virus infection. The impact of climate change on children's health, which is mediated by human behavior, includes malnutrition, displacement due to displacement which has a psychological impact on children, and violence against children due to living in evacuation posts.<sup>10</sup>

This situation is often missed because this impact usually does not occur immediately after a natural phenomenon occurs. For example, incidents of violence against children, especially girls, occurred in evacuation posts several months after the natural disaster and the children and their families lived in evacuation posts. Then what is the impact of climate change on natural disasters? Data from Unicef states that natural disasters due to climate change have caused 820 million children to be exposed to heat waves, 400 million children to cyclones, 330 million children to floods along rivers, 240 million children to coastal flooding, 920 million children to water scarcity and

drought. 2 billion children are exposed to air pollution and 815 million children are exposed to lead pollution. Data from the Disaster management task force, Indonesian Pediatric Society at the time of the Mount Semeru eruption on December 4, 2021, the impact of the eruption was quite extensive, including on children. Respiratory tract infections increased in the first week and lasted until the fifth week. This is apart from the fact that children have to live in densely packed refugee camps, it is possible that the impact of volcanic ash can also affect children. Apart from infections of the respiratory tract, digestive tract infections are also the second most common disease after respiratory tract infections. Apart from physical problems, the impact of the eruption of Mount Semeru is psychological. However, from the observations of the Disaster management task force, Indonesian Pediatric Society, from the first week to the fifth week, the children did not experience emotional disturbances and stress based on the rating scale used by the volunteers. Long-term observations need to be made to determine the physical and psychological impact of the eruption of Mount Semeru.<sup>17</sup>

How can we together contribute to this situation? Maybe we can learn from other countries that are struggling to reduce damage to the earth due to climate change. Bangladesh is a country that is vulnerable to floods, storms, and typhoons. To anticipate events that always result in high mortality rates, Bangladesh uses an adaptation mechanism and this has proven to be effective. The adaptation mechanism is carried out by making the people literate so that they can be given education on how to prepare in the event of a natural disaster. In addition, Bangladesh is also developing an early warning system using all means of communication, from high technology to conveying messages between people using bicycles. For example, in a hurricane disaster, the warning is carried out in the form of conveying information about imminent dangers and where a safe place to take shelter from the dangers of a hurricane. And this helps reduce the number of fatalities that have been proven over the last 40 years.<sup>18</sup> Another step that can help reduce the impact of

climate change is by developing a public transportation network, supporting people to use bicycles in carrying out their daily activities to reduce air and noise pollution and minimize motor vehicle accidents. In addition, environmentally friendly technology using solar power also needs to be developed to reduce the use of emission gases. For people and health workers, efforts that can be made to reduce the impact of climate change on children's health include optimizing immunization and facilitating access to health services, teaching children to use environmentally friendly energy such as solar energy, understanding air quality indicators, and introducing early warning and response to natural phenomena/environmental damage due to climate change. Another step is to identify individuals who are prone to health problems so that they can be anticipated early. The government also needs to develop a health profile program related to climate, so that people generally know about health problems related to climate change either directly or indirectly. The government should also continue its vector control program to prevent vector-borne diseases. In terms of community, government and society need to protect the quality and supply of drinking water and clean water, support local agriculture, and develop cross-sectoral partnerships and cooperation to reduce the impact of climate change on health in general and children's health in particular.<sup>14</sup>

## CONCLUSION

Children are the most vulnerable individuals when compared to adults. This is because children are not mini adults who are physically, physiologically, and psychologically different from adults. If climate change occurs, children are one of the age groups most vulnerable to being affected, especially their health. These impacts can be in the form of direct impacts on children's health, impacts on children's health through ecosystems, impacts on children's health through human behavior, and health impacts on children due to natural disasters. Therefore, parents as the individuals closest to children must be ready to protect children from the effects of climate change, besides that parents must also communicate with policymakers and

the government to make prevention efforts so that children's health is maintained.

## CONFLICT OF INTEREST

The author declared that there is no conflict of interest.

## FUNDING

No funding.

## AUTHOR CONTRIBUTION

All authors contributed equally to preparing and writing this editorial.

## ETHICAL STATEMENT

This article was created for editorial purposes so it does not require an ethical statement

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