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What Climate Change Can Mean for Our Children's Health

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Introduction

Every year, on the 20th of November, we celebrate Children's Day—a moment to reflect on our youngest generation's well-being, safety, and future. However, as climate change accelerates, it presents new and urgent threats to children's health worldwide. Rising temperatures, worsening air quality, and increasingly severe weather events expose children to various health risks. As these climate-driven challenges grow, ensuring our children's safe and healthy future demands immediate attention and action.

The impact of climate change on children's health is not only a matter of future risk; it is a present reality affecting millions today. This paper explores and summarises some of the climate-health risks faced by children in Malaysia, mainly focusing on how rising temperatures can pose a growing threat to children's public health. These issues are expected to intensify, affecting their physical and psychological well-

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being. Thus, addressing climate is not just an environmental responsibility, it is also a critical aspect of safeguarding our children's right to a healthy and secure future.

Climate change and its risks on children's health

Climate change presents significant risks to the health and well-being of Malaysian children, particularly those in marginalised communities. Climate change is expected to increase temperatures, rainfall, and sea level rise. A combination of these climate factors can then raise the frequency of extreme weather events, causing natural disasters such as floods and landslides.

Floods, exacerbated by the rising sea levels and increased rainfall, pose a serious threat by contaminating water supplies and creating breeding grounds for disease-carrying organisms like mosquitos.[1] This leads to a surge in waterborne illnesses like typhoid fever, which are particularly dangerous for children[2]. The changing climate also creates favourable conditions for the spread of dengue fever, a disease that disproportionately affects children and young adults[3]. Warmer temperatures and increased humidity accelerate the breeding cycle of the Aedes mosquitoes responsible for transmitting the virus[4].

Beyond infectious diseases, air pollution is a growing concern, with Malaysian children facing increasing risks of respiratory problems due to worsening air quality and seasonal haze episodes[5]. Children are particularly vulnerable because they breathe more rapidly than adults, inhaling a relatively larger number of pollutants[6]. Their developing lungs and immune systems make them more susceptible to the harmful effects of air pollution, increasing their risk of developing asthma, bronchitis, and other respiratory illnesses[7]. Haze events, often caused by forest fires in neighbouring countries, lead to school closures, disrupting education and potentially causing long-term economic setbacks for affected children[8].

Marginalised communities, characterised by poverty, limited access to healthcare, and reliant on livelihoods that are sensitive to climate impacts, experience the effects of climate change most acutely[9]. Children in these impoverished communities often lack access to clean water and sanitation, increasing their vulnerability to infectious diseases[10]. This also highlights how other social vulnerabilities can intersect with climate, further exacerbating the climate health risks these children face.

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[1] UNICEF, Universiti Kebangsaan Malaysia, and Universiti Malaysia Sabah (2021)
[2] Ibid.
[3] Ibid.
[4] Wang et al. (2023)
[5] UNICEF, Universiti Kebangsaan Malaysia, and Universiti Malaysia Sabah (2021)
[6] Xu et al. (2012)
[7] Ibid.
[8] Ibid.
[9] UNICEF, Universiti Kebangsaan Malaysia, and Universiti Malaysia Sabah (2021)
[10] Ibid.

The impact of rising temperatures on children's health

In addition to the climate risks mentioned above, the impact of rising temperatures on children's health can often be overlooked. Warmer temperatures induced by climate change increases the exposure of heat stress and heat-related illnesses – of which children are particularly vulnerable. Meanwhile, higher average temperatures can negatively impact agricultural production in Malaysia. This can lead to food shortages and insecurity, impacting children's nutritional intake and further increases them to malnutrition risks.

High heat stress vulnerabilities among children

As global temperatures rise, instances of heat stress can become increasingly common. Heat stress refers to when the heat received is more than what the body can tolerate without suffering physiological impairments[11]. However, there are physical limitations in our body's ability to manage heat. In cases where the heat strain taken on by the body is beyond the individual's ability to cool, it can trigger dangerous physiological responses or pathways. The inability to cope with this heat load can then result in medical conditions referred to as heat-related illnesses (HRI).

While rising temperatures exposes all to heat stress risks, infants and children are more uniquely affected by heat stress due to their different physiological characteristics when compared to adults. This is particularly notable among younger-aged children, especially those who are under the age of five. This, in turn, leaves them more vulnerable to both short- and long-term effects when exposed to conditions with higher temperatures. A summary of how the physiology of this population predispose them to heat stress risks are summarised in Table 1 below.

Table 1: Summary of infant and children's physiological characteristics that expose them to higher heat stress vulnerabilities.

Higher heat production	Infants and young children have more internal heat to begin with and produce more heat per kilogram of weight than adults do.
Greater body surface area	Younger children have a higher surface-area-to-mass ratio. This can lead them to absorb more heat from the environment, depending on their body and fitness levels. Conversely, this may be useful for heat dissipation in other environments.
Lower levels of sweat production	Children have a lower rate of sweating than adults do because of a lower sweat rate per gland, and they begin sweating at a higher body temperature.
Under-developed bodily systems	Infants experiencing heat stress are likely less capable of fighting off the symptoms, as they have under-developed sweat glands and less capacity for regulating their temperature independently. They also have a

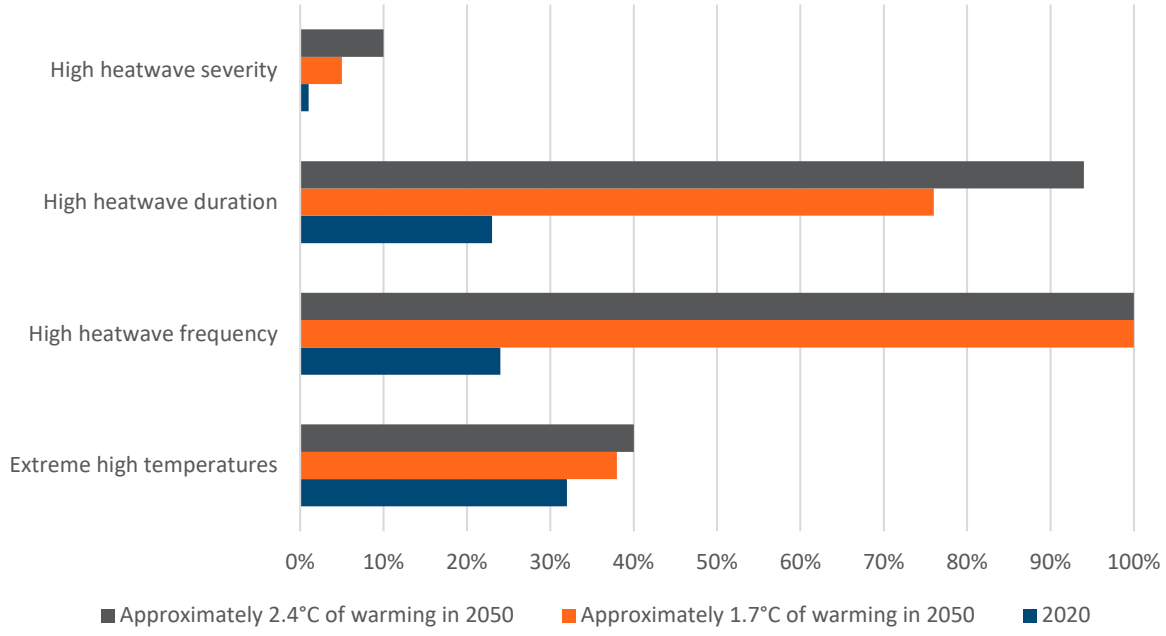
[11] Buzan and Huber (2020)

	developing immune system, which potentially further diminishes their capability. In addition, heat stress in pregnant mammals was observed in recent studies to impair the immunological function of the offspring, further hindering the offspring's ability to regulate extra heat. Thus, children born to mothers who had high levels of heat stress during the pregnancy, may have lower tolerance to heat.
Slower adjustments to changes in weather	Infants and young children adapt to a hot environment more slowly than adults do, typically requiring 10–14 days to achieve adequate acclimatisation. Similarly, when exercising, children and adolescents require 10–14 days to become acclimated, compared to 7 for adults with comparable activity per day.
Poorer practice of fluid replenishment	If not appropriately supervised, children are more likely to inadequately replenish fluid losses during prolonged exercise.

Source: UNICEF (2023)

Rising global temperatures lead to increased exposure and risks of heat-stress among children. A 2021 UNICEF report found that by 2050, almost every child in the world (totalling nearly 2.2 billion) will be exposed to high heatwave frequency compared to only 24% of children in 2020. Currently, approximately 559 million children are exposed to high heatwave frequency, while 624 million children are exposed to at least one of the other three high heat measures (Figure 1).

Figure 1: Percentage of children worldwide affected by different heatwave measurements and projections based on various emission scenarios



Source: UNICEF (2023)

It is also worth noting that the effects of rising temperatures are not felt equally around the world. Infants and children from Africa, Western Pacific, and Southeast Asia are exposed to more days of heatwaves compared to other regions[12]. Furthermore, as Malaysia's average and maximum temperatures are projected to increase within the next few decades, it is highly likely to lead to a rise in exposure and vulnerability of Malaysian children to heat stress, and thus their likelihood in developing heat-related illnesses.

As of 2022, children (defined by DOSM as those aged 0–14) make up a total of 23.2% of Malaysia's population[13]. Among them, 31.5% of children were under the age of 5, while another 34.1% were aged between 5-9[14]. During the 2023–2024 El Nino event, a total of six young children (those 12 years and below) and 25 teenagers (those aged between 13–18) were reported to have heat-related illnesses (Table 2).

Table 2 Total number of heat-related illnesses and fatalities reported, by age group, 2023-2024

Age group	2023		2024	
	Reported HRI	Fatalities	Reported HRI	Fatalities
Children	3	2	3	1
Teenagers	9		16	
Adult	25		67	2
Elderly	2		2	
Total	**39**	**2**	**88**	**3**

Source: NADMA (2024), MalaysiaNow (2023)[15]

While only six of the 127 reported cases of heat-related illnesses involved young children, half of those cases resulted in fatalities. All three of these mortalities recorded were among children under the age of 5[16]. This underscores the added vulnerability children face in managing heat stress compared to adults.

Nutritional challenges and food insecurity impacting children's development

Nutritional challenges and food insecurity resulting from climate change can severely impact children's health and well-being. Rising temperatures alongside changing precipitation patterns can lead to lower crop yields and livestock productivity[17], decreasing food availability and potentially driving up food prices[18]. With less reliable food production, food scarcity can lead to

[12] UNICEF (2023)
[13] DOSM (2022)
[14] ibid
[15] "Health Ministry Records 39 Heat-Related Cases" (2023)
[16] The children fatalities are- 2023: , 2024: 1 boy aged 3, Kelantan
[17] Mahmood, Rajaram, and Guinto (2022)
[18] World Weather Attribution (2021)

higher prices and reduced availability of nutritious foods[19]. This can exacerbate food insecurity, especially among families that already face limited access to affordable, nutritious food.

Children are particularly vulnerable to the effects of undernutrition, as they require more nutrients per unit of body weight than adults[20]. Chronic malnutrition in early childhood can lead to irreversible damage, including stunting, wasting, micronutrient deficiencies, and an increased risk of illness and death[21]. Additionally, the effects of malnutrition in children extend beyond physical health, impacting cognitive development as well[22]. Proper nutrition is essential for brain development, especially in early childhood, as it influences memory, learning capacity, and overall mental health[23].

In areas where food insecurity is severe, children may also face higher rates of developmental delays and mental health disorders, limiting their ability to thrive and break cycles of poverty[24]. This highlights the interconnectedness of climate change, nutritional challenges, and other socioeconomic factors – further emphasising how climate is increasingly a social concern.

Building a climate-resilient future for our children's health

The impact of climate change on children's health is undeniable and demands urgent action. While this paper brings forward several health risks that are worsened by climate change, it is important to note that it is non-exhaustive. Climate change can lead to both direct and indirect impacts onto children's health, which can range from their susceptibility to various illnesses all the way to physical and psychological impacts of extreme weather events. Recognising these health challenges faced by children offers us a powerful opportunity to respond with innovative solutions that protect the health and future of our youngest generation.

However, children are rarely involved in the discussion of Malaysia's rule of law and policy. This year's World Children's Day theme, "*Listen to the Future*", emphasises the importance of children's voices and opinions in the development of policies and initiatives that involve them. Hence, it is crucial to make sure that children are meaningfully involved in climatic and environmental processes, either directly or through representatives, when child safety and protection measures are needed.

Building a climate-resilient future for our children is both a responsibility and a hopeful path forward. Climate action for Malaysia must extend beyond efforts in reducing emissions and should also heavily emphasise on adaptation efforts needed to mitigate the risks brought on climate. By addressing climate issues head-on, we can mitigate these risks and improve the quality of life for children worldwide, ensuring they grow up in safer, healthier environments.

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[19] Mahmood, Rajaram, and Guinto (2022)
[20] Agostoni et al. (2023)
[21] De and Chattopadhyay (2019)
[22] Agostoni et al. (2023)
[23] Ibid.
[24] Mirzabaev et al. (2023)

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