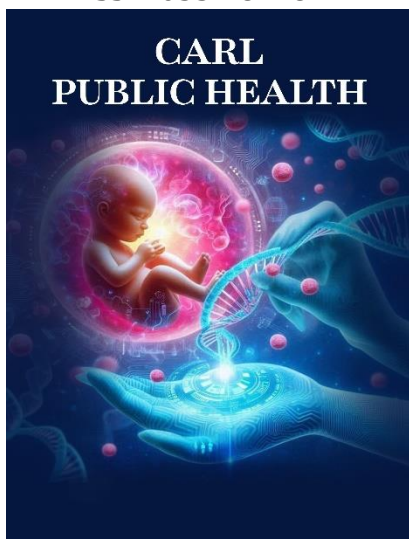




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Impacts of Climate Change in Healthcare: A Review

Abstract

Climate change remains the “biggest threat to global health in the twenty-first century,” and its impact is already manifesting in various ways. The review focuses on identifying and analyzing climate change's impact on the healthcare industry. One of the significant outcomes of climate change is the increase in average temperature across the globe, and the review identifies heat waves as the resulting impact. Heat waves can cause dehydration, heat exhaustion, heat stroke, coma, and death. Furthermore, heat waves can affect the productivity of health workers through effects such as chronic dehydration. Weather-related events such as hurricanes and floods as negatively impacting accessibility to healthcare during such events and the supply chain of their facilities. These events are not limited to the inaccessibility of healthcare facilities; they could destroy the infrastructure, eventually affecting productivity. Climate change events can aggravate mental-related conditions through direct and indirect exposure. It was observed that the impacts of climate change on healthcare have been established among scholars; however, there is a need for more empirical findings to align the effect on patients and the means to prevent the impact.

Keywords: Climate Change, Healthcare, Heat Wave, Hurricane, Flood

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Introduction

The event led to land and oceanic temperature changes, significantly impacting the world (Al-Sayed & Alanizi, 2023). The phenomenon is commonly referred to as climate change, and this, according to (Al-Marwani, 2023), is a long-term change in temperature and weather patterns over a long period. Climate change significantly influences several environmental activities and changes associated with air quality, food production, infectious disease exposure, access to fresh water, and exposure to natural hazards, such as extreme weather events (Lokotola et al., 2023). Although climate change activities can be natural; however, various anthropogenic activities have sped up the rate of changes witnessed in the world. According to the United Nations (2022), changes in climatic events have become noticeable since the 1800s due to anthropogenic activities such as burning fossil fuels, which have led to the emission of heat-trapping gases. Consequently, climate change events are capable of causing health-related impacts, and the evidence has been observed across the world, and the effect has become apparent in recent times (Al-Marwani, 2023).

Climate change events significantly influence human health, wellness, and healthcare services (Lokotola et al., 2023). According to the World Health Organisation (2023), climate change is the “biggest threat to global health in



the twenty-first century.” Through the effect of changes that could be sudden (such as cyclones) or gradual (such as drought), human health has been negatively impacted by a series of conditions such as injury and trauma, malnutrition, infectious diseases, heat-related conditions, non-communicable diseases, and poor mental health (Lokotola et al., 2023). The health-related effect is subsequently supported by socio-economic observed impacts across the globe, such as deprivation of livelihood, displacement, migration, food insecurity, and conflict (Lokotola et al., 2023). Climate change events will have a substantial and profound impact on public health and the health sector in general. Studies have indicated that the effect is manifesting on every continent and is projected to worsen. This impact will be discussed extensively in the following subsections.

Heat Waves Impact on Health and Productivity

One of the significant outcomes of climate change is the increase in average temperature across the globe, which leads to an increase in heat generated during the day or dry season (Louis & Phalkey, 2016). Subsequently, heat waves are created due to consistent temperature increases beyond the acceptable limit that last more than three consecutive days and are measured against the predefined weather conditions of a specific location.

Heat waves cause physiological heat stress, which makes it difficult for the body to maintain coolness and average body temperature. This situation can further cause dehydration, heat exhaustion, heat stroke, coma, and death (Louis & Phalkey, 2016). Vulnerable groups such as children and the elderly are more exposed to heat stress due to the inability of their bodies to regulate heat effectively. In urban centers, the “Urban heat island” effect is exasperated by heat impact due to built-up areas and their retention of heat during the day compared to heat absorbents in the environment (Louis & Phalkey, 2016).

Aggravated heat waves can significantly threaten some patients. Patients with chronic diseases and comorbidities requiring certain drugs to maintain their conditions can be affected by interfering with thermoregulation, which sometimes causes reduced sweating or increased urination to maintain fluid and electrolyte balance in the circulation system (Louis & Phalkey, 2016). Accordingly, such patients become highly sensitive, unable to withstand heat waves, and susceptible to heat-related hospitalization (Layton et al., 2020).

Considering the impact of heat waves on productivity, Louis and Phalkey (2016) asserted that heat waves decrease productivity, especially among manual or outdoor laborers or in situations where the cooling system cannot function. The impact of heat waves can be attested through a series of negative aftermaths, such as chronic dehydration of workers and exposure to health-related risks, which could affect the social and economic status of the workers.

Challenge of Healthcare Accessibility And Supply Chains

Climate change-resulting impacts, such as hurricanes, storms, and floods, can disrupt or destroy healthcare facilities and minimize the healthcare system's operations (Al-Marwani, 2023). Flooding can interfere with service delivery, supply chains, quality services, and internetworking in healthcare systems (Salas & Jha, 2020). Climate-related events are capable of causing inaccessibility to healthcare facilities due to poor weather conditions, road destruction, and excessive water in unusual locations, making it challenging during evacuation activities (Al-Marwani, 2023).

Destruction of infrastructure limits the healthcare facilities' functions and service deliveries. Patients or individuals might be challenged in accessing care services due to the impact of climate change events on social amenities such as electricity, road destruction and blockage, and inaccessibility to emergency medical services (Salas & Jha, 2019). This situation could lead to an extra burden on the administration of healthcare facilities in terms of the cost of services and insurance providers. In the case of a power outage, healthcare facilities will have to rely on their backup electrical source if not affected by the weather event. In many cases, the backup source might not give power for operation. Therefore, patients with chronic health conditions are exposed to reduced quality of service and supply service due to severe climate-weather events (Salas & Jha, 2019).

In a situation of undamaged healthcare facilities, climate change events could negatively impact the supply chain system of facilities due to factory disruption, increased demand, or transportation system interruption, leading to a shortage of resources (Salas & Jha, 2019). In many instances, hurricanes and cyclones have destroyed production facilities (such as saline production plants in Puerto Rico), leading to a shortage of production and supply of saline solution (Mazer-Amirshahi and Fox 2018). Shortage in healthcare supplies could impact

service quality, create a high risk for patients, and lead to poor health conditions.

Mental Health Effect of Extreme Weather Events

Research in recent times has indicated the impact of climate-weather-related events on mental health, and emerging evidence has suggested that the effect on mental health can be direct and indirect exposure pathways and flow-on effect pathways (Ma et al., 2022). Studies have indicated that climate-weather-related events are capable of aggravating mental health issues such as posttraumatic stress disorder (PTSD), major depressive disorder (MDD), anxiety, depression, complicated grief, survivor guilt, vicarious trauma, recovery fatigue, substance abuse, and suicidal ideation (Padhy et al., 2015; Hayes et al., 2018; Ma et al., 2022).

Direct exposure entails the direct experience of weather-related events such as floods, hurricanes, wildfires, and drought, which, most of the time, are accompanied by stress-related psychiatric disorders (Padhy et al., 2015; Ma et al., 2022). Individuals or populations that witness these events are highly at risk of developing posttraumatic stress disorder (PTSD), which comes with unforgettable experiences of the event and sadness, which are overall capable of damaging the individual quality of life and leaving them with long-lasting distress (Padhy et al., 2015).

The indirect exposure entails mental and emotional patterns developed through perception, thinking, and observation related to climate change events without necessarily experiencing the event. Observing or viewing climate-weather events such as hurricanes or extreme flooding events and their resulting impact is capable of indirectly causing emotional and trauma such as depression, guilt, sadness, anger, fear, anxiety, and hopelessness, and even lead to mental disorders (Clayton, 2020; Ma et al., 2022). To this revelation, several concepts and terms have been developed to explain the emotions and trauma developed with issues related to indirect exposure to climate-weather events. For instance, “climate anxiety refers to anxiety associated with perceptions about climate change” (Clayton, 2020), and “eco-anxiety refers to a person’s experience of difficult emotions and mental states arising from knowledge of environmental conditions” (Pihkala, 2018). There is no generally acceptable term or definition to describe the emotions and mental effects of the indirect impact of climate-weather-related events (Ma et al., 2022).

Way Forward

Reliable organizations such as WHO have asserted that global healthcare is threatened by climate change events such as heatwaves, hurricanes, floods, and droughts. Presently, some of the effects of climate change as related to the healthcare system have been discussed, and the following recommendations are made;

- i Encourage the Adoption and Investment in Renewable Energy Sources: The world has relied on coal and fossil fuels as energy sources for a long time, which has, over the years, increased the concentration of heat-trapping elements in the atmosphere. Therefore, there is a need to reduce the reliance on fossil fuels and encourage the adoption of renewable energy sources such as solar and wind (Padhy et al., 2015; Al-Marwani, 2023). Many healthcare facilities should be placed on renewable energy sources to reduce greenhouse gas (GHG) emissions, considering that the healthcare industry alone emits 4.4% of the global GHGs into the environment (Karliner et al. 2020).
- ii Awareness Creation and Preventive Measures: Recent studies have indicated that inadequate knowledge still exists concerning the health impacts of climate change on vulnerable communities (WHO, 2021). There is a need to understand the health effects of climate change, which could spurn the motivation for implementing more stringent climate action to ensure that healthcare systems are well protected against climate change events (Luyten et al., 2023). Also, preventive measures include creating afforestation/planting trees to provide adequate fresh, healthy air in the environment (Al-Sayed, 2023).
- iii Need For Healthcare System to Build Resilient Towards Climate Change: Building resilience entails the ability to prepare effectively ahead of weather-related events to ensure that healthcare operations are not affected. According to Al-Marwani (2023), building climate-resilient health systems involves investing in resources to prepare for climate change and implementing actions to direct health care’s role to climate change and better preparedness for worst-case possibilities like heat stroke waves or infectious diseases epidemics. Also, having alternative power sources is another way to prevent poor operations during electricity outage due to weather-related events.

Conclusion

Evidence is beginning to manifest on the fundamental impact of climate change on human health and the entire healthcare system. In the preceding section, some of these impacts on healthcare were reviewed. Firstly, climate change brings about heat waves that can complicate the health condition of individuals and patients. Furthermore, events associated with climate change are capable of destroying healthcare infrastructures and supply chains. This situation can affect patients' health conditions and the healthcare system's efficiency. The impact of climate change could be psychologically driven due to its possible long-term effect on the environment, which could lead to mental health challenges for an individual. Many of these impacts have been well established among scholars, and there is a need for more empirical findings to align the effect on individuals and the means to prevent the impact.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Credit Authorship Contribution Statement

All authors contributed equally.

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