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Climate Change: Human Impact on the Environment

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ABSTRACT: Climate change is the single biggest health threat facing humanity, and health professionals worldwide are already responding to the health harms caused by this unfolding crisis. The Intergovernmental Panel on Climate Change (IPCC) has concluded that to avert catastrophic health impacts and prevent millions of climate change-related deaths, the world must limit temperature rise to 1.5°C. Past emissions have already made a certain level of global temperature rise and other changes to the climate inevitable. Global heating of even 1.5°C is not considered safe, however; every additional tenth of a degree of warming will take a serious toll on people's lives and health. While no one is safe from these risks, the people whose health is being harmed first and worst by the climate crisis are the people who contribute least to its causes, and who are least able to protect themselves and their families against it - people in low-income and disadvantaged countries and communities. The climate crisis threatens to undo the last fifty years of progress in development, global health, and poverty reduction, and to further widen existing health inequalities between and within populations. It severely jeopardizes the realization of universal health coverage (UHC) in various ways - including by compounding the existing burden of disease and by exacerbating existing barriers to accessing health services, often at the times when they are most needed. Over 930 million people - around 12% of the world's population - spend at least 10% of their household budget to pay for health care. With the poorest people largely uninsured, health shocks and stresses already currently push around 100 million people into poverty every year, with the impacts of climate change worsening this trend.

KEYWORDS: climate change, global heating, human health, environment, crisis, population

I. INTRODUCTION

Climate change is already impacting health in a myriad of ways, including by leading to death and illness from increasingly frequent extreme weather events, such as heatwaves, storms and floods, the disruption of food systems¹, increases in zoonoses and food-, water- and vector-borne diseases, and mental health issues. Furthermore, climate change is undermining many of the social determinants for good health, such as livelihoods, equality and access to health care and social support structures. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged, including women, children, ethnic minorities, poor communities, migrants or displaced persons, older populations, and those with underlying health conditions. Although it is unequivocal that climate change affects human health, it remains challenging to accurately estimate the scale and impact of many climate-sensitive health risks. However, scientific advances progressively allow us to attribute an increase in morbidity and mortality to human-induced warming,² and more accurately determine the risks and scale of these health threats. In the short- to medium-term, the health impacts of climate change will be determined mainly by the vulnerability of populations, their resilience to the current rate of climate change and the extent and pace of adaptation. In the longer-term, the effects will increasingly depend on the extent to which transformational action is taken now to reduce emissions and avoid the breaching of dangerous temperature thresholds and potential irreversible tipping points. Though we often think about human-induced climate change as something that will happen in the future, it is an ongoing process. Ecosystems and communities in the United States and around the world are being impacted today. Global temperatures rose about 1.98°F (1.1°C) from 1901 to 2020, but climate change refers to more than an increase in temperature.³ It also includes sea level rise, changes in weather patterns like drought and flooding, and much more. Things that we depend upon and value — water, energy, transportation, wildlife, agriculture, ecosystems, and human health — are experiencing the effects of a changing climate. The impacts of climate change on different sectors of society are interrelated. Drought can harm food production and human health. Flooding can lead to disease spread and damages to ecosystems and infrastructure. Human health issues can increase mortality, impact food availability,⁴ and limit worker productivity. Climate change impacts are seen throughout every aspect of the world we live in. However, climate change impacts are uneven across the country and the world — even within a single community, climate change impacts can differ between neighborhoods or individuals. Long-standing socioeconomic inequities can make



underserved groups, who often have the highest exposure to hazards and the fewest resources to respond, more vulnerable.⁵

The projections of a climate change-impacted future are not inevitable. Many of the problems and solutions offsite link are known to us now, and ongoing research continues to provide new ones. Experts believe there is still time to avoid the most negative of outcomes by limiting warming offsite link and reducing emissions to zero as quickly as possible. Reducing our emissions of greenhouse gases will require investment in new technology and infrastructure, which will spur job growth. Additionally, lowering emissions will lessen harmful impacts to human health, saving countless lives and billions of dollars in health-related expenses.⁶

We see climate change affecting our planet from pole to pole. NOAA monitors global climate data and here are some of the changes NOAA has recorded. You can explore more at the Global Climate Dashboard.

- Global temperatures rose about 1.8°F (1°C) from 1901 to 2020.
- Sea level rise has accelerated from 1.7 mm/year throughout most of the twentieth century to 3.2 mm/year since 1993.
- Glaciers are shrinking: average thickness of 30 well-studied glaciers has decreased more than 60 feet since 1980.
- The area covered by sea ice in the Arctic at the end of summer has shrunk by about 40% since 1979.
- The amount of carbon dioxide in the atmosphere has risen by 25% since 1958, and by about 40% since the Industrial Revolution.
- Snow is melting earlier compared to long-term averages.⁷

II. DISCUSSION

Changes to water resources can have a big impact on our world and our lives. Flooding is an increasing issue as our climate is changing. Compared to the beginning of the 20th century, there are both stronger and more frequent abnormally heavy precipitation events across most of the United States. Conversely, drought is also becoming more common, particularly in the Western United States. Humans are using more water, especially for agriculture. Much like we sweat more when it is hot out, higher air temperatures cause plants to lose, or transpire, more water, meaning farmers must give them more water⁸. Both highlight the need for more water in places where supplies are dwindling. Snowpack is an important source of fresh water for many people. As the snow melts, fresh water becomes available for use, especially in regions like the Western United States where there is not much precipitation in warmer months. But as temperatures warm, there is less snow overall and snow begins to melt earlier in the year, meaning snowpack may not be a reliable source of water for the entire warm and dry seasons.⁹

Our food supply depends on climate and weather conditions. Although farmers and researchers may be able to adapt some agricultural techniques and technologies or develop new ones, some changes will be difficult to manage. Increased temperatures, drought and water stress, diseases, and weather extremes create challenges for the farmers and ranchers who put food on our tables.¹⁰

Human farm workers can suffer from heat-related health issues, like exhaustion, heatstroke, and heart attacks. Rising temperatures and heat stress can also harm livestock. Climate change is already impacting human health. Changes in weather and climate patterns can put lives at risk. Heat is one of the most deadly weather phenomena. As ocean temperatures rise, hurricanes are getting stronger and wetter, which can cause direct and indirect deaths. Dry conditions lead to more wildfires, which bring many health risks. Higher incidences of flooding can lead to the spread of waterborne diseases, injuries, and chemical hazards. As geographic ranges of mosquitoes and ticks expand, they can carry diseases to new locations.¹¹

The most vulnerable groups, including children, the elderly, people with preexisting health conditions, outdoor workers, people of color, and people with low income, are at an even higher risk because of the compounding factors from climate change. But public health groups can work with local communities to help people understand and build resilience to climate change health impacts. Climate change will continue to have a significant impact on ecosystems and organisms, though they are not impacted equally. The Arctic is one of the ecosystems most vulnerable to the effects



of climate change, as it is warming at least twice the rate of the global average and melting land ice sheets and glaciers contribute dramatically offsite link to sea level rise around the globe.¹²

Some living things are able to respond to climate change; some plants are blooming earlier and some species may expand their geographic range. But these changes are happening too fast for many other plants and animals as increasing temperatures and changing precipitation patterns stress ecosystems. Some invasive or nuisance species, like lionfish and ticks, may thrive in even more places because of climate change.¹³

Changes are also occurring in the ocean. The ocean absorbs about 30% of the carbon dioxide that is released into the atmosphere from the burning of fossil fuels. As a result, the water is becoming more acidic, affecting marine life. Sea levels are rising due to thermal expansion, in addition to melting ice sheets and glaciers, putting coastal areas at greater risk of erosion and storm surge.¹⁴

The compounding effects of climate change are leading to many changes in ecosystems. Coral reefs are vulnerable to many effects of climate change: warming waters can lead to coral bleaching, stronger hurricanes can destroy reefs, and sea level rise can cause corals to be smothered by sediment. Coral reef ecosystems are home to thousands of species, which rely on healthy coral reefs to survive.¹⁵

III. RESULTS

Physical infrastructure includes bridges, roads, ports, electrical grids, broadband internet, and other parts of our transportation and communication systems. It is often designed to be in use for years or decades, and many communities have infrastructure that was designed without future climate in mind. But even newer infrastructures can be vulnerable to climate change.¹⁶

Extreme weather events that bring heavy rains, floods, wind, snow, or temperature changes can stress existing structures and facilities. Increased temperatures require more indoor cooling, which can put stress on an energy grid. Sudden heavy rainfall can lead to flooding that shuts down highways and major business areas.¹⁷

Nearly 40% of the United States population lives in coastal counties, meaning millions of people will be impacted by sea level rise. Coastal infrastructure, such as roads, bridges, water supplies, and much more, is at risk. Sea level rise can also lead to coastal erosion and high-tide flooding. Some communities are projected to possibly end up at or below sea level by 2100 and will face decisions around managed retreat and climate adaptation.¹⁸

Many communities are not yet prepared to face climate-related threats. Even within a community, some groups are more vulnerable to these threats than others. Going forward, it is important for communities to invest in resilient infrastructure that will be able to withstand future climate risks. Researchers are studying current and future impacts of climate change on communities and can offer recommendations on best practices. Resilience education is vitally important for city planners, emergency managers, educators, communicators, and all other community members to prepare for climate change.¹⁹

Teaching about climate change can be a daunting challenge, but it is a critical field for students to learn about, as it affects many parts of society. The Essential Principles of Climate Literacy, developed by NOAA and other federal partners, are standards that create a framework for teaching climate. The Toolbox for Teaching Climate & Energy explores a learning process to help students engage in climate action in their own communities or on a global scale. For more educator support, NOAA offers professional development opportunities (including the Planet Stewards Program) about climate and other topics. Our health is closely linked to the environment we live in. However, our climate is changing, with significant consequences for our health, wellbeing and safety.²⁰

Climate change is a change in the world's weather systems that occurs over decades. Most of the recent changes in our climate have been brought about by human activity. Without intervention, the changing climate will have far-reaching and catastrophic consequences for our state, the country and the rest of the world. It is an urgent problem with implications at the global, national, community and personal level.²¹



The good news is that there are simple things we can all do now to build our resilience to the effects of climate change and help slow its pace. Many of these actions will also directly benefit our health, the environment and our wallets.

Climate change is caused by increases in the amount of greenhouse gases (such as carbon dioxide, methane and nitrous oxide) in the atmosphere, which cause the earth's average temperature to rise.²²

Greenhouse gases trap heat in the atmosphere, raising air and sea temperatures. They are primarily produced through the burning of fossil fuels (like coal) for electricity generation, as well as through agricultural, mining, land management and transport practices.

The effects of climate change are already being felt. Because of global warming, Australia's climate has warmed on average by 1.4°C since official Bureau of Meteorology records began in 1910.²³

In Victoria, the average temperature has increased by just over 1.0°C across the state since 1910. With this amount of warming, Victoria is already experiencing:

- an increase in the frequency of days of extreme heat
- an increase in dangerous fire weather and length of fire seasons
- a decline in cool season rainfall, resulting in the lowest streamflow on record over the past decades
- a rise in sea levels.²⁴

In recent decades, Victoria's climate has changed by becoming warmer and drier. Victorian climate projections by the CSIRO and Bureau of Meteorology suggest these changes will continue into the future. Climate projections for Victoria suggest:

- further increases in the number of very hot days and extreme heat
- the number of very high fire danger days increasing and the fire season being prolonged
- average annual rainfalls decreasing and a continuous decline in streamflow affecting the health of waterways and Victorian water supplies
- extreme rainfall being of a higher intensity, potentially increasing the risk of flash flooding in some locations
- coastal sea levels continuing to rise.²⁵

Most of Victoria's population lives within 50 kilometres of the coast. Rising sea levels and storm surges will increase risks of flooding and erosion, endangering life, damaging property and causing ecosystem damage that may affect agriculture, forestry, fisheries and tourism.²⁶

IV. CONCLUSIONS

Some people are more vulnerable to the effects of climate change and health:

- Children are vulnerable for several reasons. For example, children are more susceptible to heat stress and dehydration and are more sensitive to exposure to air pollution and smoke from bushfires. Their immune systems are not fully developed, putting them at increased risk of infections. They often need to rely on adults to keep them safe during emergencies and help them to recover afterwards.²⁷
- Pregnant women are at increased risk of heat stress during heatwaves due to the physiological demands of pregnancy. They and their unborn babies are particularly sensitive to exposure to air pollution and smoke from bushfires.
- Older people and people with pre-existing medical conditions are more prone to dehydration, heat stress, infections and exacerbation of heart and lung disease.
- People living in rural and remote areas, Aboriginal and Torres Strait Islander people, people on low incomes and other vulnerable populations are also at increased risk, in part due to inequalities in underlying health outcomes and limited accessibility of healthcare and other services. People living in rural or remote



communities or along the coast are also at risk from extreme events such as bushfires, droughts, storms and sea level rises.²⁸

Over the last century, average temperatures in Australia have increased and heatwaves have become longer, hotter and more frequent. This trend is expected to continue as the world gets even warmer. You can stay healthy in the heat by:²⁹

- drinking plenty of water³¹
- never leaving anyone in a car
- staying somewhere cool
- planning ahead
- checking in on others.³⁰

There are plenty of positive things you can do to help slow or reduce climate change, which will also benefit your health, including:³²

- Increasing your use of 'active transport' (such as walking and cycling) can help to reduce your risk of obesity, diabetes, heart disease, some cancers, and musculoskeletal conditions.³²
- Reducing your reliance on cars by using active transport or public transport will reduce greenhouse gas emissions and improve air quality, helping to reduce rates of lung cancer and other lung conditions (including asthma), heart disease and stroke.
- Eating a diet rich in plant-based foods, including fruits, vegetables, nuts, seeds and whole grains, and with fewer animal-based foods is good for your health and the environment.
- As part of a well-balanced, regular diet and a healthy, active lifestyle, eating the recommended amount of fruit and vegetables for men and women every day can help you reduce obesity and maintain a healthy weight, lower your cholesterol and lower your blood pressure.³³
- Reducing your consumption of high kilojoule processed foods will help to reduce excess energy consumption and reduce the environmental impacts associated with these foods. Processed foods are generally high in saturated fat, added sugars or salt, take more energy to produce and are usually packaged, which contributes to landfill waste.
- Drinking tap water. Victoria has some of the world's best drinking water. Drinking tap water over bottled water or sugary drinks is better for your health and the environment, and it's a lot cheaper too.³⁴
- Cooling and heating your home efficiently will help you remain comfortable all year round, and save on energy.

These benefits are not only important for the health of our communities, but also help to reduce demands on the health system.³⁵

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