

# THE EFFECTS OF CLIMATE CHANGE ON GLOBAL MENTAL HEALTH

PARISWHO E-SIMULATION 2021 THEME GUIDE

With the support of



**RICHARD M. FAIRBANKS  
SCHOOL OF PUBLIC HEALTH**

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# ABBREVIATIONS

**APA** - American Psychological Association

**AAP** - American Academy of Pediatrics

**APHA** - American Public Health Association

**CDC** - Center for Disease Control

**COVID-19** - Sars-Cov-2 Virus

**FAO** - Food and Agriculture Organization of the United Nations

**IDP** - Internally Displaced Person

**IOM** - International Organization for Migration

**IPCC** - Intergovernmental Panel on Climate Change

**LMIC** - Low and Middle Income Country(ries)

**NGO** - Non-governmental Organization

**PTSD** - Post Traumatic Stress Disorder

**SAMHSA** - Substance Abuse and Mental Health Services Administration

**SDG(s)** - Sustainable Development Goal(s) of 2030

**SDH** - Social Determinants of Health

**SUD** - Substance Use Disorder

**UN** - United Nations

**UNFCCC** - United Nations Framework Convention on Climate Change

**UNHCR** - United Nations High Commissioner for Refugees

**WHO** - World Health Organization

# ACKNOWLEDGEMENTS

ParisWHO team hopes this theme guide will provide the readers with insights into climate change and mental health. This document is designed to accompany the participants in the ParisWHO 2021 e-simulation through the challenging yet important theme of this year's conference. All the delegates and chairs are encouraged to take time to read this book while preparing for the event.

Throughout the development of this theme guide, the ParisWHO team has received a great deal of support and assistance. We would like to show our gratitude to our academic advisor, Odessa Dariel, for her patient support and expertise. ParisWHO team also wants to thank Julie Gagnon for her insightful feedback with her extensive experience in the mental health field, as well as sharing insights from her work at the World Health Organization.

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Lastly, we want to thank our dedicated delegates and chairs for being part of the ParisWHO 2021. We also would like to show our appreciation for the hard work and commitment of our student ambassadors. The ParisWHO team looks forward to welcoming you all at the conference!

# ABOUT THE PARIS WORLD HEALTH ORGANIZATION (ParisWHO) SIMULATION 2021



The ParisWHO Simulation is an annual conference, organised by a group of students in the Master of Public Health program from the French school of Public health or École des Hautes Études en Santé Publique (EHESP). The event was first held in 2014, in the city of Paris, France. The goal of the simulation is to build up and strengthen skills in negotiation, critical thinking and leadership for participants, by recreating the process of the World Health Assembly (WHA), which is arranged every year at the WHO headquarter in Geneva, Switzerland, to address global public health problems.

ParisWHO simulation provides opportunities for all participants, regardless of their nations and professional background, to contribute their knowledge and experience through the roles of delegates, represent as a WHO Member state (WHO Ambassador), Non - Governmental Organisation, pharmaceutical companies, the media and other stakeholders, to tackle the problems according to the stimulation theme. At the end of the simulation, an official solution paper will be created and sent to the WHO office for consideration.

This year, ParisWHO 2021 simulation is scheduled from 25th to 26th September 2021, and will discuss the theme of Climate Change and it's Effects on Global Mental Health, as both environmental issues such as global warming and mental health are major threats to global health in the 21st century. (Bourque & Willox, 2014; WHO 2020) Unlike previous years, ParisWHO 2021 team is offering a virtual conference, which opens up the event to global participants, and allows them to conveniently attend the simulation. Moreover, we are very honoured to have the opportunity of having outstanding expertise from various sectors as our guest speakers, to share their experience and perspectives on the simulation theme.

Throughout the simulation, participants will be able to develop not only their skills in communication, diplomacy and leadership, but also professional connections with others. We are dedicated to making the ParisWHO 2021 simulation a practical platform that brings passionate young professionals from different disciplines to brainstorm and work together, in order to find pragmatic and sustainable solutions for the simulation theme.

# ABOUT THE WORLD HEALTH ORGANIZATION (WHO)



## World Health Organization

The World Health Organization (WHO) is a United Nations specialized organization that is responsible for international public health. (The U.S. Government and the World Health Organization, 2021) The organization was officially established on 7 April 1948 by constitution, after meetings of global leaders to form the United Nations in 1945. (History, 2020) Nowadays, WHO is composed of 194 Member States and has the headquarter in Geneva, Switzerland, with 6 regional offices and 150 country offices worldwide. The organization is funded by assessed and voluntary contributions from member states and private donors. (The U.S. Government and the World Health Organization, 2021)

Following its main principle that “health is human right, and all people should enjoy the highest standard of health”, (Milestones for health over 70 years, n.d.) WHO’s mission covers support for universal healthcare, monitoring public health risks, preparing and responding to public health emergencies, and promoting human well-being. (what we do, 2020) Furthermore, the organization plays a leadership role in global health by setting international health standards and guidelines, providing countries with technical assistance, collecting global health data through the World Health Survey, and serving as a convention for discussion on public health issues. (The U.S. Government and the World Health Organization, 2021; what we do, 2020)

As a result, WHO has made several noteworthy public health achievements, for instance the eradication of smallpox, the initiatives of global polio eradication, and the development of an Ebola vaccine. (what we do, 2020) According to the current goals to promote health, to keep the world safe and to serve the vulnerable, WHO has been addressing some urgent public health challenges including human capital across the life – course, prevention of noncommunicable disease, promotion of mental health, climate change in small island developing states, antimicrobial resistance and elimination and eradication of high – impact communicable diseases. (What we do, 2020).

The World Health Assembly (WHA) is a WHO meeting for decision making, held annually at WHO headquarter in Geneva, Switzerland. It is the world’s highest policy setting body. The conference is attended by 194 member states of WHO and focuses on a specific health agenda prepared by the Executive Board. The aim of the meeting is to determine the policies of the organization, designate the Director – General, supervise financial policies, and review and approve budget. (World Health Assembly, n.d.)

# INTRODUCTION TO CLIMATE CHANGE AND MENTAL HEALTH

***“Good mental health is absolutely fundamental to overall health and well-being.”***  
**- Dr Tedros, World Health Organization**

Carbon dioxide and methane are tiny gases that operate as a layer in the Earth's atmosphere, trapping heat from the sun and keeping the planet's temperature at bearable levels (EPA, 2015). Over the last several decades, research has demonstrated that human activities, such as burning fossil fuels for transportation, industry, and electricity, as well as altering natural landscapes for agriculture and flora, has caused significant increases in global warming, with **Figure 1A** illustrating how the temperature of the Earth has increased by 1.5 degrees Celsius since 1850 (ICPP, 2021).

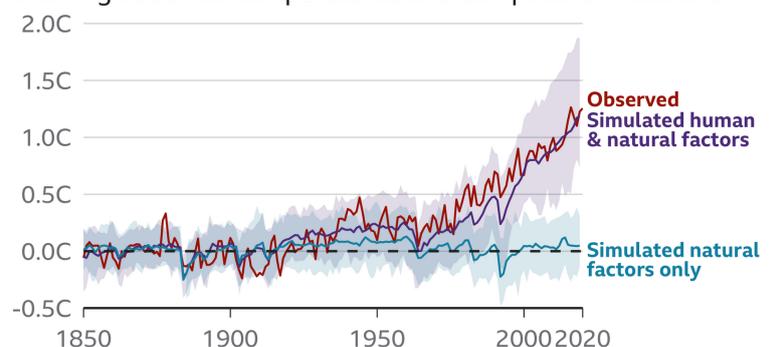
The consequences of human activities on the climate are becoming more apparent as yearly rises in temperatures are having a direct effect on biological, physical, and social systems (UK Climate Risk Assessment, 2017).



**Figure 1A:**

## Human influence has warmed the climate

Change in average global temperature relative to 1850-1900, showing observed temperatures and computer simulations

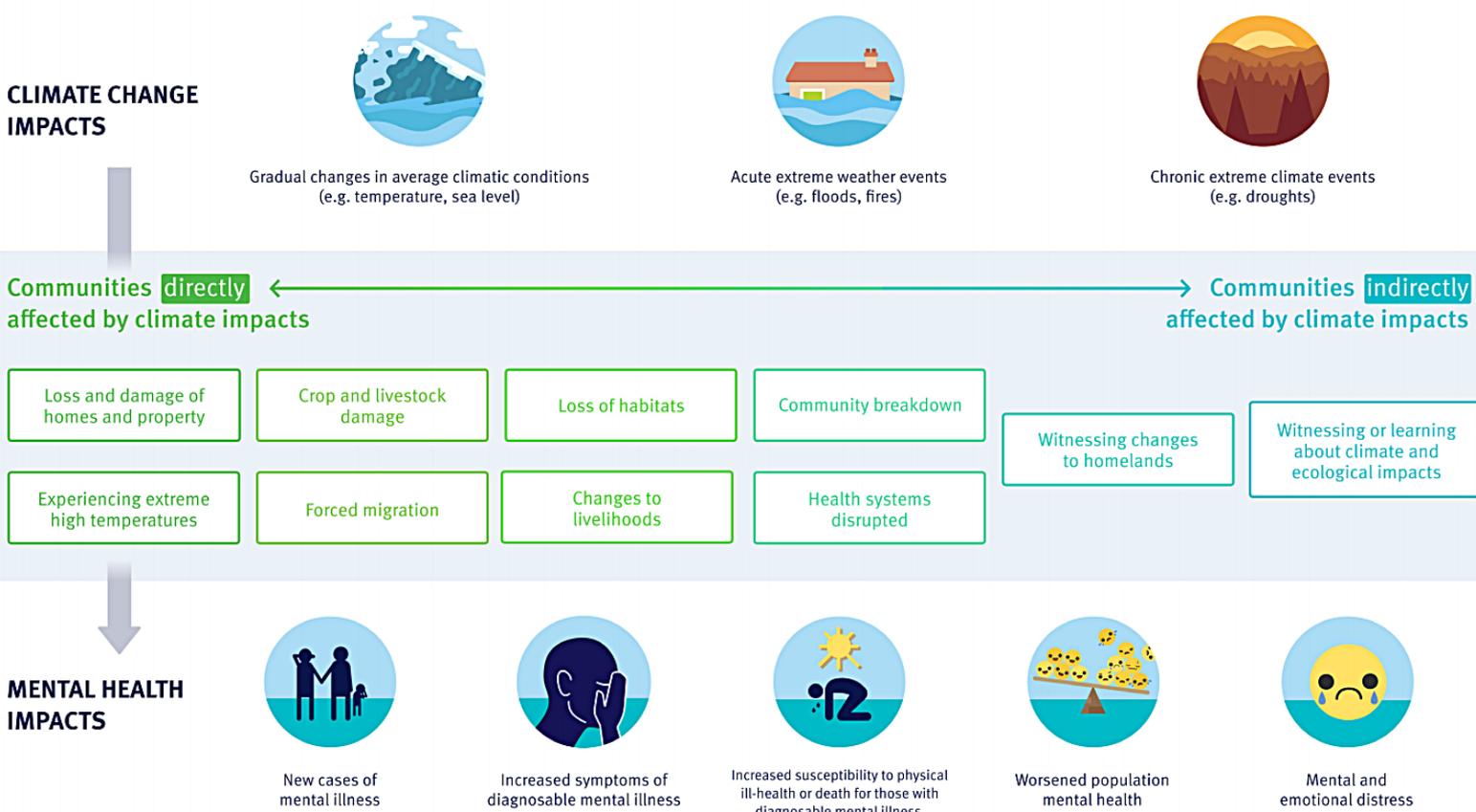


Source: ICPP, 2021. Summary for Policy Makers

The world is witnessing an increase in extreme weather events that are becoming more frequent and intense. These extreme weather events include heavy rainfalls leading to flooding, massive storm surges during hurricanes and typhoons, higher wind intensities, as well as droughts which often lead to wildfires (ibid.). The effects of climate change will differ around the world, yet a commonality is that climate change will have profound effect on both physical and mental health (Lawrance, 2021).



**Figure 2A: Direct and Indirect Effects of Climate Change on Mental Health**



Source: The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice, Lawrence, 2021.

Policies that aim to reduce global warming and improve sustainability can have a positive effect on mental health outcomes, as there are direct and indirect pathways between the two (**Figure 2A - above**). Mental health is important when discussing climate change, as mental illness and emotional distress currently affect over a billion people globally (**Figure 3A**). When not accounting for the added mental health consequences of global warming, the global prevalence of mental health illness is astounding. Murry (2010) revealed that mental illness accounts for 7.8 percent of the worldwide burden of disease over a ten-year period from 1990 to 2010. Mental and behavioral disorders also account for the majority of years spent in the world living with a disability (YLDs).

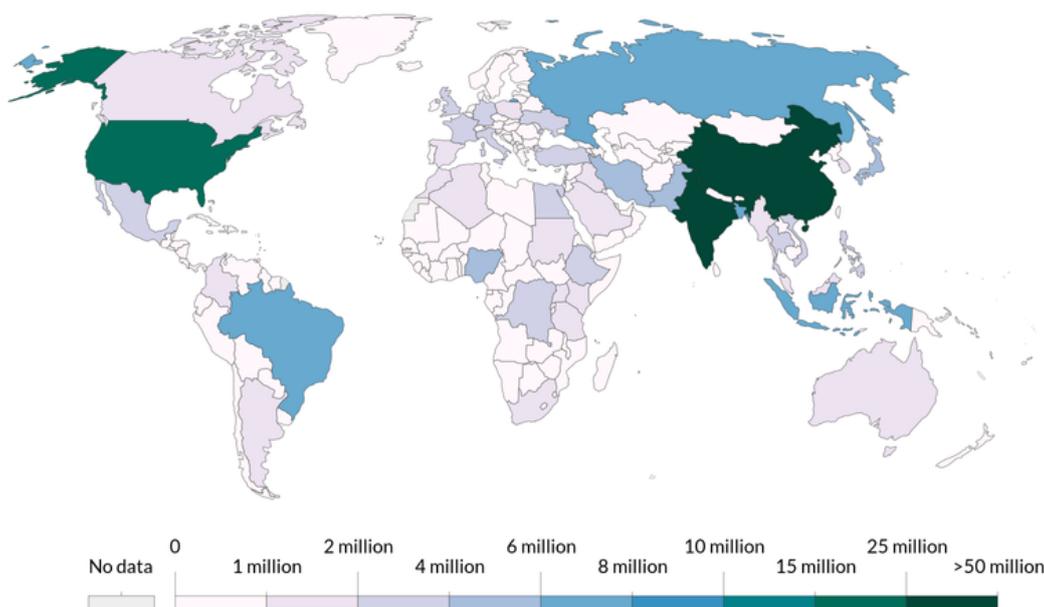
Depression alone affects an estimated 300 million people, and is the main cause of disability worldwide (WHO, 2020). Additionally, it is estimated that up to 75% of mental illnesses begin before 24 years old (Kessler, 2005). This is particularly concerning given that young people will be growing up in a time where they will not only know about the growing crisis but will also be forced to experience its effects, while also having the most responsibility in adapting and responding to climate change (Lawrence, 2021).

With climate change recognized as a health emergency by governments, advocacy groups, and medical professionals, the focus has primarily been on physical health, yet poor physical health also often leads to negative mental health outcomes and vice versa (Naylor, 2012). Thus, there needs to be a shift in paradigm to include an examination of the direct consequences that climate change has on mental health. Only by recognizing the problem and asking the questions can we build preventative resilience at the individual, community, and systems level (Lawrence, 2021).

### Figure 3A: Our World in Data graphic illustration of global depression

#### Number of people with depression by country, 2017

Total number of people, of all ages and both sexes, with depressive disorders by country. Figures attempt to provide a true estimate (going beyond reported diagnosis) of the number of people with depression based on medical, epidemiological data, surveys and meta-regression modelling.



Source: IHME, Global Burden of Disease

Source: [Our World in Data, 2017](#)

In 2015 the United Nations (UN) developed the Sustainable Development Goals (SDGs), a set of goals to be achieved by 2030 to reduce climate change, improve health outcomes, and reduce inequalities around the globe. Within the SDGs there are several areas which concern public health, as they create the **social determinants of (mental) health**, which includes access to education, food and water security, exposure to violence, and housing. While the links between the UN SDGs and physical health are often clear, it can be difficult to determine how well the goals take into account the social determinants of mental health and well-being (Lund, 2018). **Figure 4A** illustrates that there are several SDGs which can improve the longer term direct impacts of climate change on mental health outcomes. When actions to achieve these SDGs are taken, there can be an improvement to ensure that mental illness is no longer recognized as, “the most ignored of all human health conditions” (The Lancet, 2016).

The non-medical variables that impact health outcomes are known as **social determinants of health (SDH)**. They are the circumstances in which individuals are born, grow, work, live, and age, as well as the larger set of factors and institutions that shape daily living situations. Economic policies and systems, development goals, societal norms, social policies, and political systems are examples of these forces and systems. Research indicates that social determinants of health affect 30% to 55% of health outcomes and these factors may be more important than health care or lifestyle choices (WHO, 2021)

**Figure 4A: Sustainable Development Goals that can improve the social determinants of (mental) health**

Source: [Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews](#). Lund, 2018.



**Solastalgia:** In comparison to nostalgia - the feeling of homesickness experienced by individuals when separated from a loved home - solastalgia refers to the distress caused by environmental changes affecting people while they are in direct connection to their native environment (Albrecht, 2007).

“People are expressing this deep pain, saying, *“I am still living in place, but my home has changed so much, everything around me looks so different, it feels so different that I am homesick for my home even though I am still here.”* - Ashlee Cunsolo, Dean of Arctic and Subarctic studies at Memorial University in St. John, CA

Although they are not diagnosable conditions, experiences of **solastalgia** and climate grief should also be recognized as an indirect risk to mental health and wellbeing due to climate change, particularly as these challenges are often felt by those living in indigenous communities (Michelin, 2020). People often form a bond to where they live, as it can provide feelings of safety, belonging, and personal identity (APA, 2017) with research showing that people who feel connected to their communities are more likely to report higher levels of happiness, life satisfaction, and positivity (Brehm, Eisenhauer, & Krannich, 2004). By acknowledging the effects that **eco-anxiety**, solastalgia, and **climate grief** can have on mental-wellbeing there is an opportunity to provide guidelines in mental health prevention and treatment to assist those going through these experiences and other mental health issues, such as depression and anxiety (Pihkala, 2020). This would help ensure that SDG 3.4 is achieved to promote mental health and well-being.

Evidence shows that clean air, stable food and water, and natural environments are all necessary conditions for human physical and mental health (WHO, 2019). By discussing extreme weather, food and water insecurity, communicable diseases, urban environments, and the social and economic effects of climate change on mental health, there is an opportunity to find solutions to two of the most challenging public health issues around the world.



**Ensure healthy lives and promote well-being for all at all ages**

**“Eco-anxiety** is the persistent worry about the future of Earth and the life it shelters. **Climate grief**, can be a psychological response to loss caused by environmental destruction or climate change.



## EXTREME WEATHER

### High Temperatures

Temperature has an immediate impact on our daily lives and while actions are being taken to mitigate continued global warming, the current report by the Intergovernmental Panel on Climate Change (IPCC, 2021) demonstrates that if drastic measures are not taken soon, there will be dire consequences as many of the effects of human induced climate change will remain for centuries to come. The rising trend in global average temperature shows that more regions are warming than cooling, as temperatures have climbed by  $0.18^{\circ}\text{C}$  every decade since 1981 (NOAA, 2020).

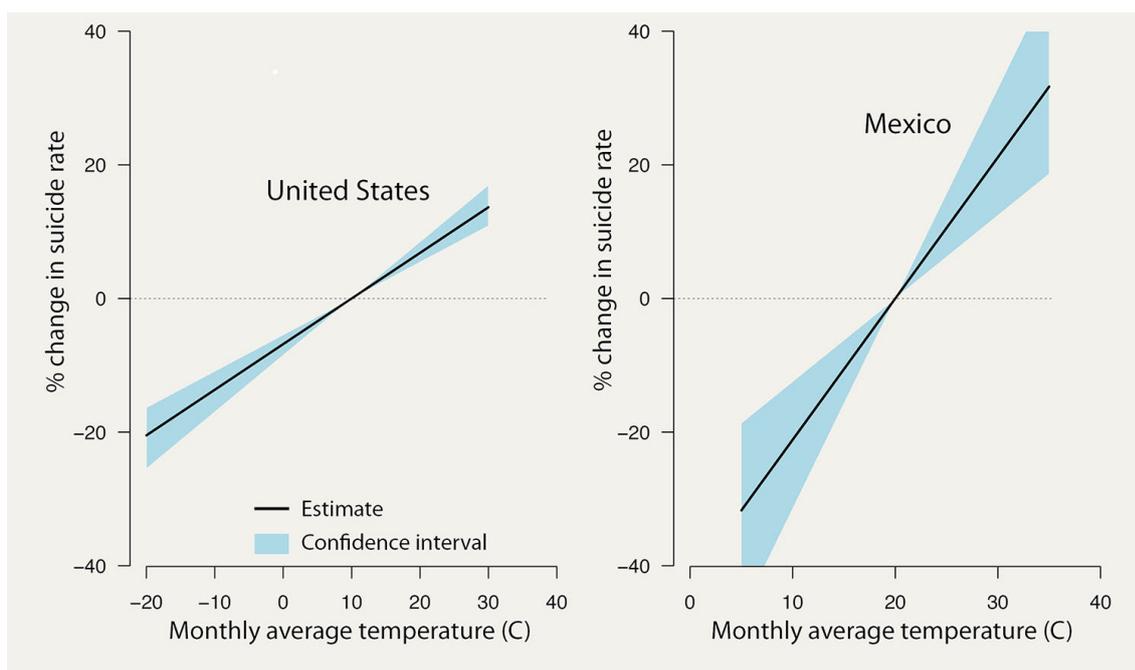
Temperatures around the world have increased faster than they did in any other period of 50 years over the last 2,000 years, exceeding the previous global warming period, which occurred around 6,500 years ago (IPCC, 2021). Since 2014, the world has experienced seven of the ten hottest years ever recorded (Lindsey, 2021). As temperatures continue to rise, there is potential for more frequent and longer heatwaves, which can create a cascade of adverse environmental effects (EPA, 2017).

**Heat waves** can create temperature fluctuations within the body, creating physical changes that impact blood flow and the central nervous system (CNS), which results in alterations in cognitive ability and emotional control, which, in turn, results in a negative influence on mental health and well-being (Löhmus, 2018). Research on high temperatures and mental health have shown that high temperatures increase suicide rates, mental distress, and hospitalizations for those suffering from mental health disorders (Burke, 2019). Additionally, there have been findings that extreme temperatures are associated with an increase in the use of depressive language on social media and crisis seeking support behaviors (Knapp, 2016).

**What are heat waves?** Heat waves happen when a region experiences very high temperatures for several days and nights (EPA, 2021).

A study by Dixon (2014) found that high temperatures have been linked to higher mortality rates for those who fit the criteria for mental illness. Burke (2018) also found that there is an approximately 1% rise in suicide incidence rates for each 1 degree Celsius increase in temperature, with seasonal variation and poverty level being adjusted for. If climate change continues at its current rate with minimal intervention, then the rising temperatures could result in an additional 22,000 suicides in the United States and Mexico by 2050 (**Figure 1B**, *ibid.*). Temperatures are not the only risk factor for suicide, but the findings in these studies illustrate that climate change can have a profound impact on suicide risk, which aids in the further understanding of mental health issues as well as what can be expected as temperatures continue to rise (*ibid.*).

**Figure 1B: Effect of Temperature on Suicide in the United States and Mexico**



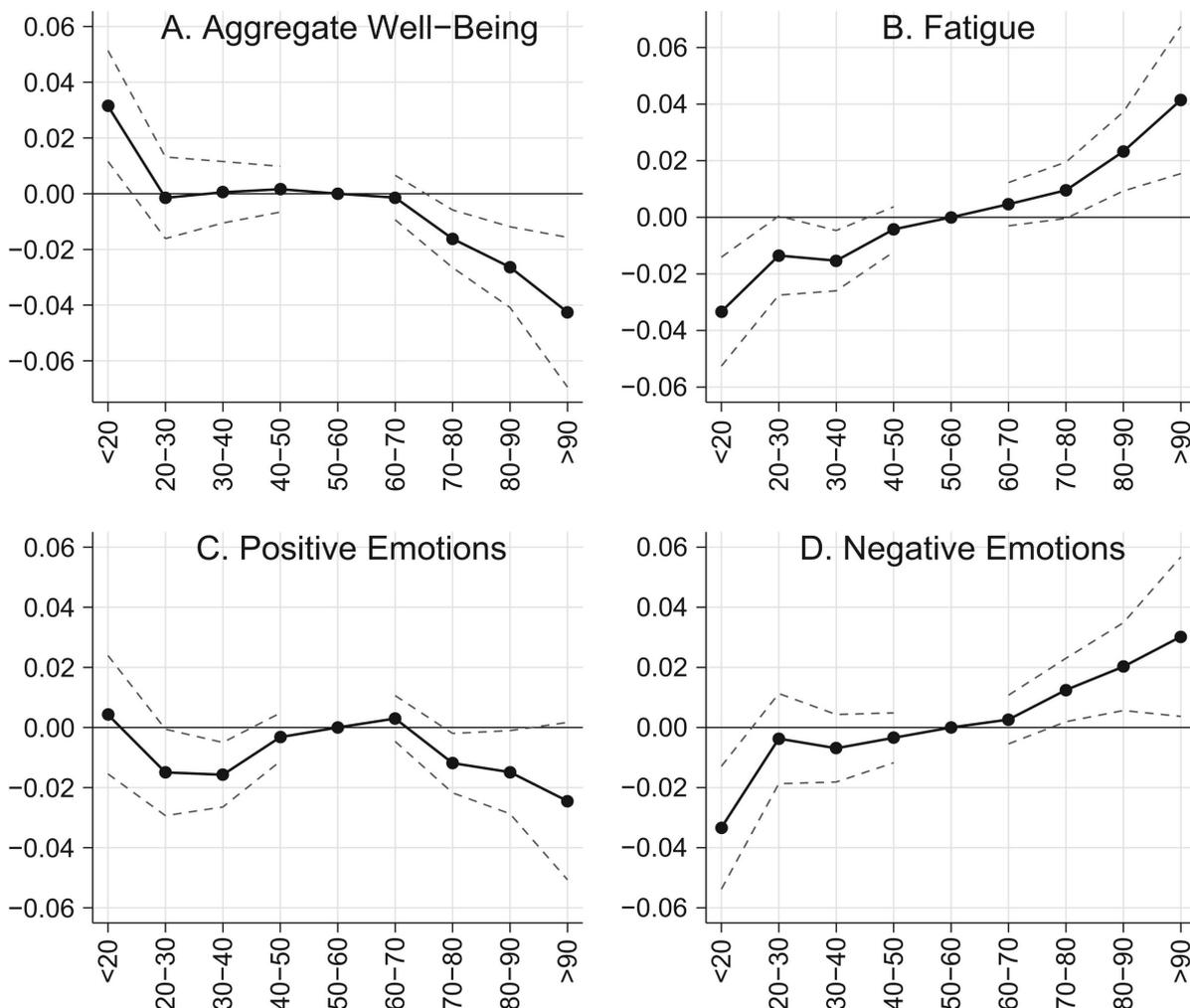
Source: [Burke, 2018](#)

Research has shown that high temperatures not only affect those who had previously been diagnosed with a mental illness but can also impact the mental well-being of those who have not been diagnosed. A 2016 study by Noelke (**Figure 2B**) which surveyed 1.9 million Americans found that temperatures above 21 degrees Celsius decreased positive emotions such as joy and happiness, and increased negative emotions, for example stress and anger, in addition to having an influence on feelings of fatigue or being tired with low energy levels. This may be due to the indirect effects that heat has on mental health, as high temperatures can lead to dehydration, sleep difficulties and an inability to cope (Denissen, 2008).

By recognizing the effects that heat can have on mental health, policy makers have an opportunity to create guidelines to improve mental health services when temperatures are high and to ensure that research in this area is continued so that the most effective treatments can be implemented as global temperatures rise.



**Figure 2B: Effects of temperature on mental well-being**



Source: [Noelke, 2016](#)

## Flooding, Hurricanes, and Wildfires

Climate change is creating **extreme weather** patterns which are becoming more frequent and complex in nature. Globally there has been an increase in wildfires (EPA, 2021), worsening hurricanes (Miller, 2020) and typhoons, and flooding (Nelsen, 2018). This is supported by the IPCC (2021) report which found that heavy precipitation has both increased in intensity and frequency since the 1900's due to the increase in global temperatures (**Figure 3B**). These findings are supported by a study completed by the European Academies Science Advisory Council (EASAC, 2018) which found that global floods and extreme rainfall has increased by more than 50% and are occurring at a rate four times higher than before this time-frame. Since climate change is increasing the amount of rain, higher levels of precipitation are also linked to hurricanes,, in addition to having stronger storm surges and wind speeds (Berardelli, 2019). In addition to increased rainfall, wildfires are occurring more frequently as the global fire season increased by 19% between 1979 to 2013 (World Wildlife Fund [WWF], 2020). While up to 75% of wildfires are started due to human activity (ibid.), they are burning billions of acres of land as climate change has created prime conditions including drought, higher temperatures, and increased wind speeds (Balch, 2020). Wildfires are of particular concern as they contribute to global warming, creating a feedback loop between the two (Xu, 2020).

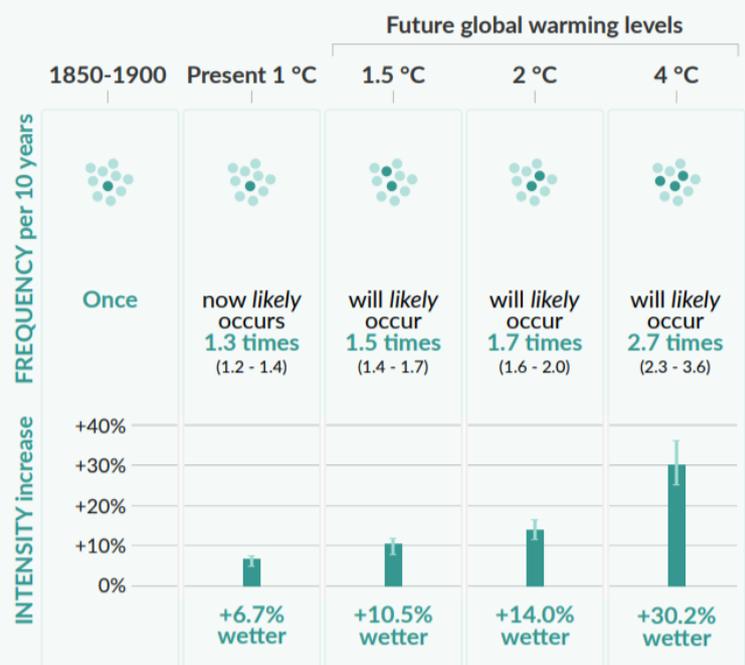
**What is extreme weather?** Extreme weather is unexpected, unusual, severe, or unseasonable weather that occurs at the extremes of historical distribution (ICPP, 2015). Often these extreme events are based on a location's recorded weather history and are defined as being 10% percent out of normal range (ICPP, 2015).



**Figure 3B:**

### Heavy precipitation over land 10-year event

Frequency and increase in intensity of heavy 1-day precipitation event that occurred **once in 10 years** on average in a climate without human influence

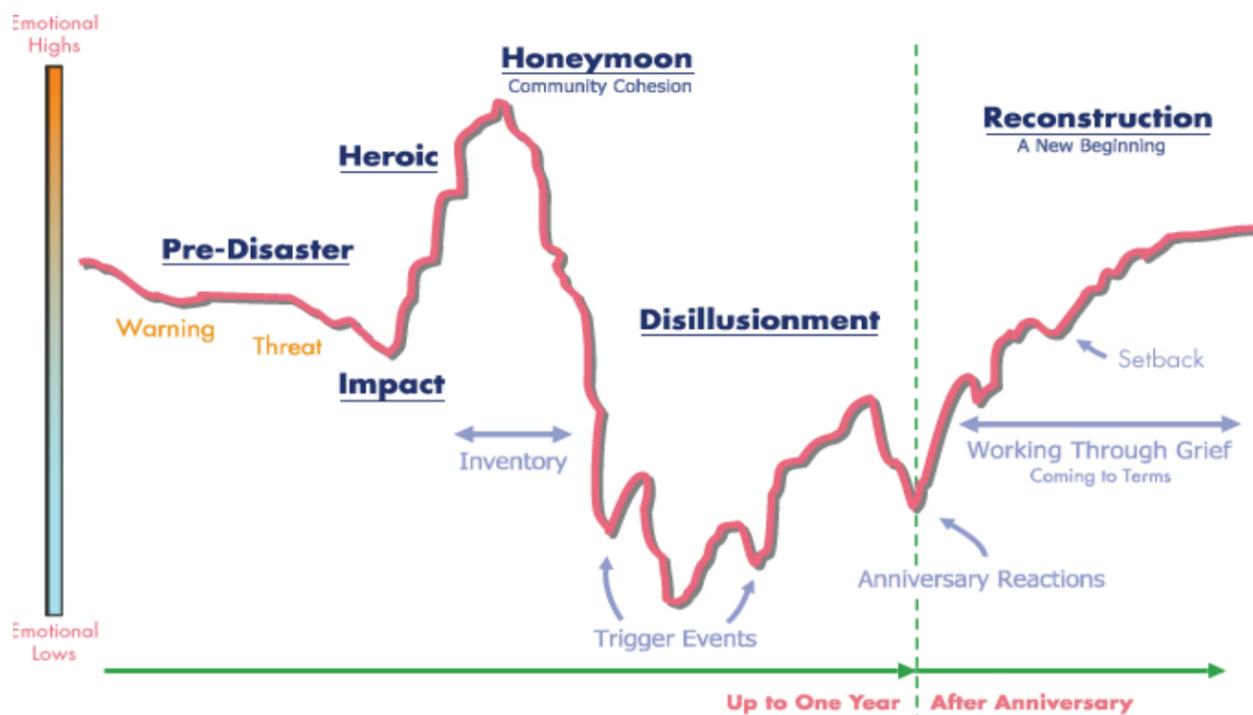


Source: [IPCC Summary for Policymakers, 2021](#)

Extreme weather events can have an effect on mental health as populations who experience these events cope with the stress and emotional trauma that natural catastrophes create when they impact housing, food and water supplies, access to electricity, and potentially physical health (Beier, 2015). Research has found that after a natural disaster, it is more common for individuals to report psychological symptoms than physical ones (WHO, 2019), with the psychological consequences of catastrophe exceeding physical injuries at a ratio of 40-1 (CDC, 2017). Hayes (2018) found that post-traumatic stress disorder is commonly cited as one of the most serious mental health consequences of natural disasters, with individuals also reporting depression and/or low mood, and intense discomfort.

A report by the Substance Abuse and Mental Health Administration (SAMHA, 2015) states that this is likely to occur due to the various psychological reaction phases that can be experienced before, during, and after a natural disaster (**Figure 4B**). These mental health issues often develop six-months to a year after a catastrophe, as recovery pace after the disaster may be slower than an individual anticipates (ibid.). Additionally, extreme weather events can exacerbate symptoms of those who already have a diagnosis for a mental illness, furthering strain on mental health systems during times of crisis.

**Figure 4B: Phased psychological reactions to natural disasters**



Source: [Substance Abuse and Mental Health Services Administration, 2015](#).

Due to these effects, mental health needs to obtain adequate consideration in climate action plans as extreme weather events become more common. While psychological first-aid, which aims to reduce stress and aid in healthy recovery immediately following a natural disaster may be available (WHO, 2020), services for long-term mental health treatment are not always available or capable of accommodating an increase in cases as a result of an already underfunded mental health care system (Mahomed, 2020).

With the links between extreme weather events and mental illnesses such as PTSD, depression, and anxiety established, there needs to be improved collaboration between governments and non-governmental organizations (NGO's) to establish resilient mental health support systems that will be readily available to assist populations in both the short and long term periods after a catastrophe. Additionally, by including mental health in natural disaster plans, research can be conducted to find ways to mitigate the negative impacts on mental well-being, as individuals who volunteer in recovery efforts after a natural disaster are less likely to have poor mental health outcomes (SAMHA, 2015).





## FOOD AND WATER INSECURITY

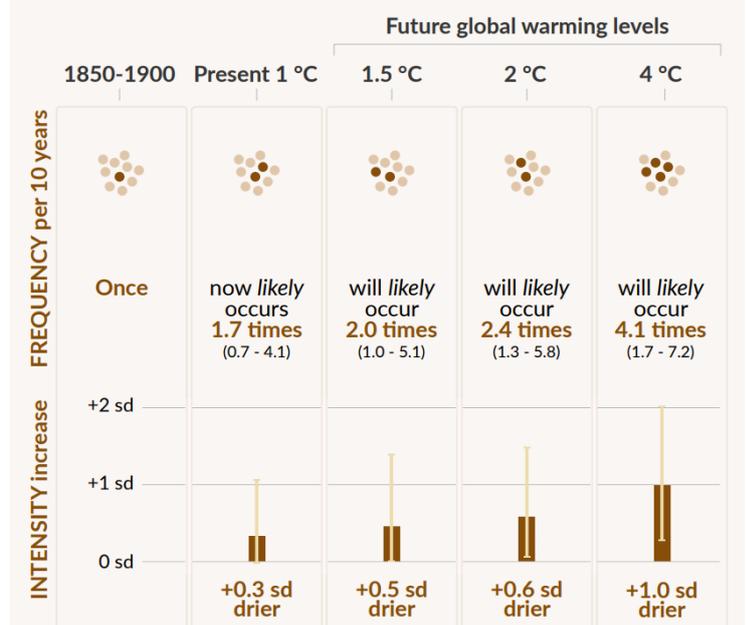
According to the Environmental Protection Agency (EPA, 2016), it is expected that the climate will continue to change, and many historically wet areas will experience more precipitation and flooding risks, while historically dry areas will commonly experience less precipitation. The WHO (2021) estimates that 55 million people around the globe are affected by drought conditions every year, which is concerning as the 2021 IPCC has shown that the odds of a drought occurring are already increasing as the climate warms. As seen in **Figure 1C**, drought events that happened once every decade between 1850 to 1900 are now 1.7 times more likely to occur every ten years at current temperatures (IPCC, 2021). This rate is expected to rise and droughts will have elevated intensity if policies to improve the climate are not made (ibid.).

**Figure 1C:**

### Agricultural & ecological droughts in drying regions

#### 10-year event

Frequency and increase in intensity of an agricultural and ecological drought event that occurred once in 10 years on average across drying regions in a climate without human influence



Source: ICCP Summary for Policymakers, 2021

**Drought:** According to the EPA (2020) there are many definitions and types of drought. Meteorologists define drought as a prolonged period of dry weather caused by a lack of precipitation that results in a serious water shortage for some activity, population, or ecological system. Drought can also be thought of as an extended imbalance between precipitation and evaporation.

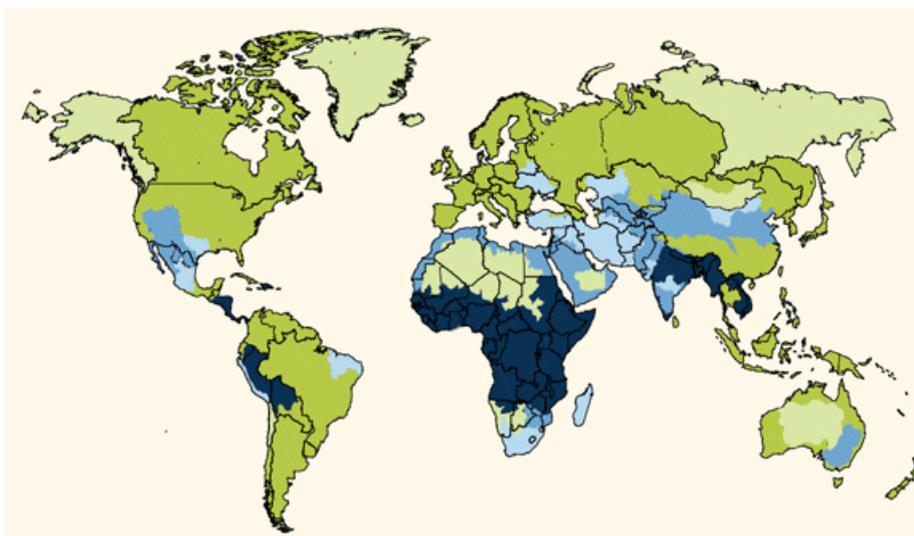
**Hydrological Drought** occurs when a low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought (NOAA, 2021).

## Water Insecurity

The type, location, intensity, and duration of droughts have varying impacts, one being on water supply, creating what is known as a **hydrological drought**. Hydrological droughts are particularly problematic, as water scarcity already impacts 40% of the global population (WHO, 2021) and is expected to worsen due to more frequent and intense droughts (IPCC, 2021). The UN (2014) estimates that by 2025, 1.8 billion people will live in countries or regions with absolute water scarcity, and two-thirds of the world's population may be living under water stress. By 2030, if policies to curb climate change are not implemented, nearly half of the world's inhabitants will live in areas of high water stress, including up to 250 million Africans (**Figure 2C**).

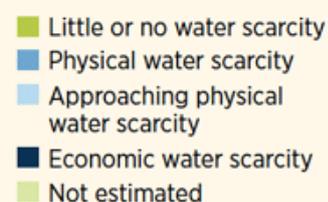
This information demonstrates how vast numbers of humans will be affected by water scarcity. Even though it is widely recognized that water scarcity can create physical illnesses such as cholera, severe dehydration, and diarrhea (WHO, 2019), research is beginning to show that water insecurity can have an indirect effect on mental health and well-being due to physical changes within the body. There are three ways that water insecurity can indirectly impact mental health through the physical mechanisms of the body.

- Circulation
- Mood and Energy
- Processing capability

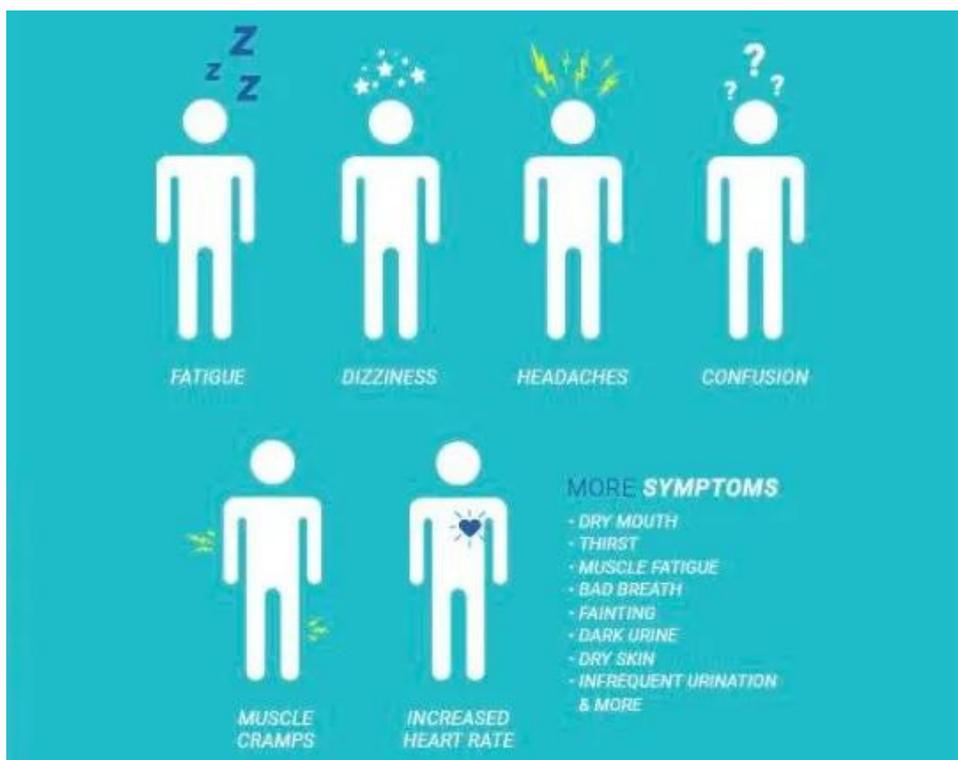


**Figure 2C: Global Water Scarcity**

Source: UNDESA. [International Decade for Action 2005-2015](#)



When a person is not inputting water into their body as quickly as it is being eliminated, the body becomes dehydrated (Mayo Clinic, 2021). Yet, before experiencing any physical symptoms, such as thirst, the brain will have already recognized the lack of hydration and will send signals to the body to lower blood circulation, leading to a decrease in energy and impairment in cognitive functioning due to a lack of blood flow and oxygen to the brain (Frank, 2019). The decrease in energy that is experienced by dehydration can cause fatigue (**Figure 3C**), which research has shown to affect mental well-being as it can have a quick impact on mood stability (Pross, 2013). Research has shown that fatigue can create an increase in levels of anxiety and irritability, which can create more intense emotional reactions to various circumstances (ibid.). A study by Wittbrodit (2018) found that the most extreme impairments to concentration, reaction time, memory and reasoning began when the body had lost only 2% of its body mass due to dehydration, which can occur quite rapidly, with children and the elderly being the most affected.



**Figure 3C: Mental and physical effects of dehydration**

Source: [Organic Authority](#),  
[Emily Monaco, 2018](#)

A lack of access to water can also have adverse effects on the psychological well-being of women specifically, due to menstruation. Dehydration can lead to more intense menstrual cramps and a greater sense of discomfort within the body (Overton, 2019). When an individual experiences an increase in pain, research has shown that this can impair their cognitive functioning (Moritary, 2011) further exacerbating the symptoms that are caused by a lack of hydration. Beyond the physical symptoms which can affect mental well-being during menstruation, research has also shown that women often experience shame and embarrassment when needing water to maintain their menstrual hygiene (Das, 2017). Adolescent females are more likely to experience feelings of shame, which can lead to decreased self-esteem and increases of depression and anxiety within the population (Kammerer, 2019). The combination of feelings of shame and its impact on mental well-being often leads adolescent females without adequate access to water to drop out of school (Das, 2017), which can create a decrease in cognitive development and functioning (Traag, 2012). When adolescent girls and young women are unable to receive an adequate education due menstruation and a lack of water, it can impact their future mental health stability as lack of education can increase the incidence of poverty which further impacts mental health and well-being.

Because of its profound effects on physical and mental health, water insecurity needs to be taken seriously by governments and NGO's. Water is an essential aspect of life and working to have it attainable to all would aid in reaching the UN's SDG number 6, access to water and sanitation by 2030. Additionally, actions to improve water security would improve several other determinants of health that are also linked to SDGs, such as education, gender equality, and poverty.



## Food Insecurity

As discussed in water insecurity above, there are a variety of droughts that can occur, a second type being an **agricultural drought**. As temperatures increase, agricultural droughts will become more likely and are of increasing concern as it could significantly affect food in a near-to-midterm time period (IPCC, 2020). Climate change and its impact on droughts have been identified as one of this century's greatest threats to human health, particularly in regards to under-nutrition (Thomson, 2017). This is of considerable concern as food scarcity has significantly grown within the past five years and is anticipated to worsen going into 2030 (UN, 2021). The UN (2021) estimates that there are already 690 million hungry people in the world and this has increased by 60 million people within the past half decade, with a majority of those with limited access to food residing in Asia (UN, 2021). The WHO (2014) estimates that without any changes, climate change will create 7.5 million additional cases of child poverty by 2030 and 10.1 million by 2050. Although progress is being made within the United Nations SDGs, attempts to improve climate change and reduce hunger are lagging as governments limit the implementation of policies which could be beneficial to both (UN, 2019).

### 4 Pillars of Food Security

- Availability
- Access
- Utilization
- Stability

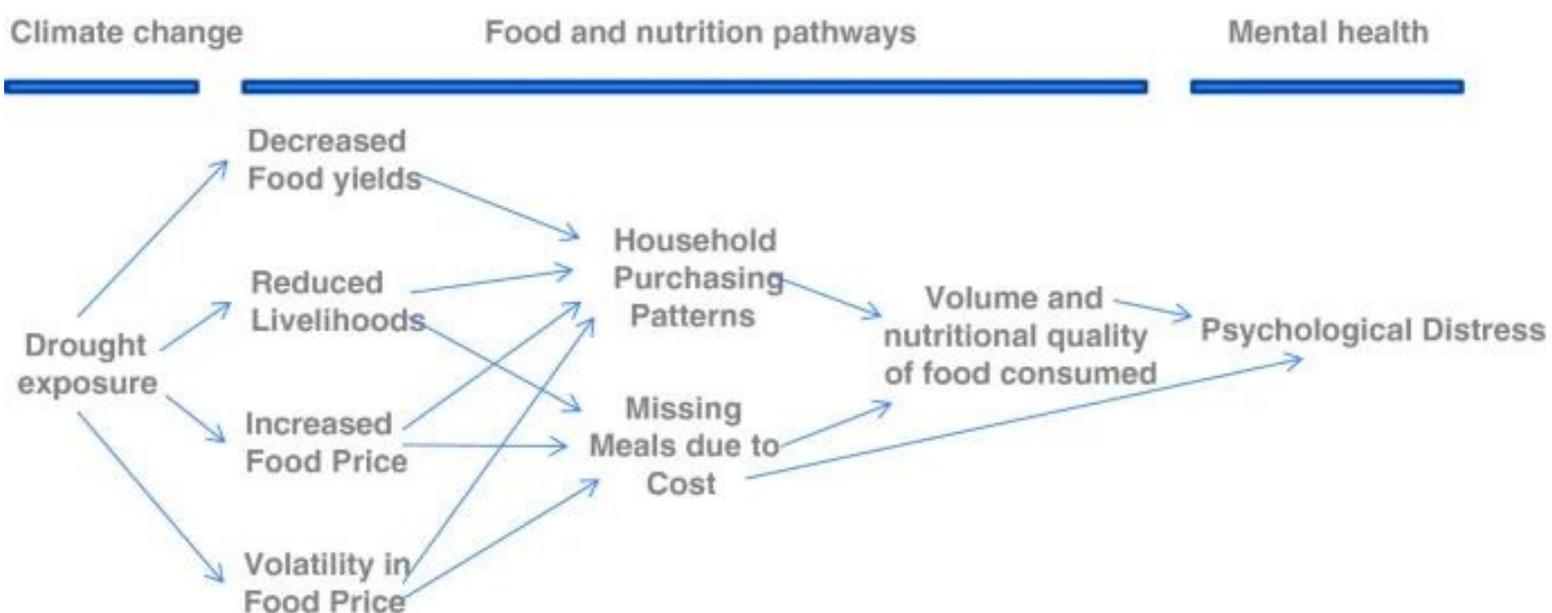
**Agricultural drought:** Agricultural drought refers to a variety of characteristics of hydrological drought that have an impact on agriculture. Agricultural drought focuses on precipitation deficits, differences between actual and potential evapotranspiration, soil water deficits, and reduced groundwater or reservoir levels. The water demand of plants is influenced by many factors, including weather conditions, the type of plant, its stage of development, and the soil's physical and biological characteristics. Drought conditions can adversely affect plant growth and the negative circumstances may range from reduced crop and forage yields to complete crop or forage failure (NDMC, 2021).





The link between food security, nutrition status, and mental health is very strong. As seen in **Figure 4C**, agricultural drought conditions due to climate change can indirectly impact an individual's access to food in a variety of ways which in turn creates psychological distress in both adults and children (Friel, 2014). For example, when an individual experiences hunger they have a decrease in blood glucose or blood sugar levels which increases cortisol levels, as it improves glucose levels but this repeated process over time can lead to higher levels of stress (Aronson, 2009). Additionally, when an individual is concerned about where food will come from (**Figure 5C - next page**), they are also likely to experience high levels of stress, which can lead to mental health issues such as depression, anxiety, and PTSD (Feeding America, 2021).

**Figure 4C: Pathway of climate change's effects on mental health**



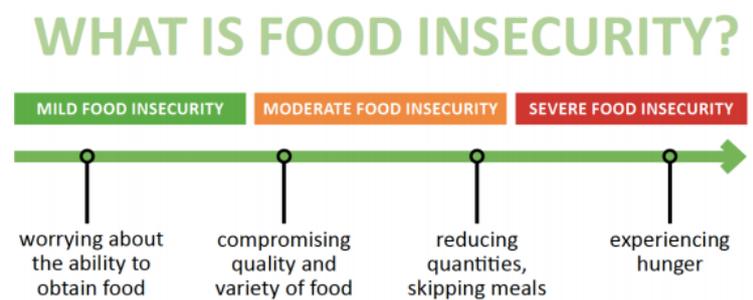
Source: [Friel et al., 2014](#)

A study by the American Academy of Pediatrics (Weinreb, 2002) found that mothers who have school-aged children that experience severe hunger are 56.2% more likely to have PTSD and 53.1% more likely to have depression than mothers who are food secure. As women already experience a lack of appropriate mental health services (Abel, 2018) it is necessary for policymakers to consider gender inequities in regards to the effects that food insecurity has on mental health and how services can be adapted. Efforts made in this area would aid in the progress of the UN's SDGs, with positive results being seen in the improvement in Goal Three, Good Health and well-being (including mental health), Goal Five, Gender Equality, and Goal Two, Zero Hunger.

Research by the American Psychological Association (APA, 2014) has also shown that hunger makes it difficult to concentrate, as an increase in cortisol leads to crankiness, inattentiveness, and hostility, particularly in children. When these behaviors occur, they can distract from school work which leads to delays in development and learning disabilities, with findings showing that 50% of children who experience extended periods of hunger have to repeat a school grade (Feeding America, 2021). Youth between the ages of 12 to 18 are at particular risk for developing mental health issues as a result of food insecurity, with a study of 55,000 Canadian youth finding that those who reported severe food insecurity (**Figure 5C**) were 6.49 times more at risk of experiencing suicidal thoughts (Weinreb, 2002). The study group was also found to have an increased risk of suffering from anxiety, depression, or other mood disorders. As this population is also of school age, there are similar risks to development and learning as described above, with older age groups likely to withdraw from school completely (Belchew, 2011).

Similar to water insecurity, school drop-outs can have future impacts on mental health and well-being, as lack of education increases the likelihood that an individual will experience levels of poverty which will further impact their access to food. These findings demonstrate how policy interventions that work to reduce food insecurity due to climate change, may have an additional impact on child and youth mental health.

**Figure 5C : Levels of food insecurity**



Source: [The Food Foundation, 2017](#)





## Urban Environments

In recent decades, urbanization has increased considerably resulting in air, noise, and light pollution. Noise and light pollution are not as directly connected to climate change as air pollution, yet they have major environmental and health impacts which cannot be ignored. As research shows that elevated levels of air, noise, and light pollution contributes to poorer mental health outcomes in populations, creating an increased risk of depression, sleep disturbance and insomnia, anxiety, and overall worsened mental well-being (Clark, 2018). Reducing noise, light, and air pollution would be in accordance with the UN SDG 11, to make "cities and human settlements inclusive, safe, and resilient, and sustainable." Actions taken to complete this goal would have a positive effect on mental outcomes as well as having an impact on the global environment.

### TARGET 11-3



INCLUSIVE AND  
SUSTAINABLE  
URBANIZATION

### TARGET 11-4



PROTECT THE WORLD'S  
CULTURAL AND  
NATURAL HERITAGE

### TARGET 11-6



REDUCE THE  
ENVIRONMENTAL  
IMPACT OF CITIES

### TARGET 11-B



IMPLEMENT POLICIES  
FOR INCLUSION,  
RESOURCE EFFICIENCY  
AND DISASTER RISK  
REDUCTION

## Air Pollution

Air pollution creates a vicious cycle as one of the primary causes of climate change. High temperatures worsen air quality due to changes in air pressure which then causes pollutants to remain concentrated in one area (UCAR, 2020). Carbon dioxide, methane, and other greenhouse gases created by transportation, livestock and agriculture, wildfires, and industrialization (**Figure 1D**) have led to an increase in global temperatures over the past several decades as these gases become trapped in the heat from the sun (NASA, 2021).

Fine particulate matter or PM 2.5 such as dust, dirt, and smoke also contribute to air pollution, with higher concentrations being located in cities and industrial areas (EPA, 2020). Data by the WHO shows that populations are exposed to over 10 $\mu$ m per year (WHO, 2016). Governments and organizations have agreed to work together to address climate change and air pollution, with the UN's SDGs and the Paris Climate Agreement both addressing the issue. Yet policies to improve air pollution have been slow in execution, with 80% of cities having air pollution levels above the recommended WHO guidelines (**Figure 2D**, WHO, 2018). This is concerning as reports show that by 2030 air pollution will begin to have dire consequences not only on the environment and agriculture, but also on human physical and mental health (Von Schneidemesser, 2020).

**Over 80% of the world's cities have air pollution levels over the WHO guideline for safe air**



## Figure 1D: Common Sources of Pollutants



18% of global greenhouse gases are due to agriculture and farming



Industry and Manufacturing create 24% of global greenhouse emissions



16% of global greenhouse gases are caused by transportation



Wildfires can increase particulate matter in the air to over 250  $\mu$ m

Source: [Global Greenhouse Emissions. Our World in Data, 2016.](#) [California Particulate Matter. EIA.gov, 2020.](#)

## Figure 2D: WHO Particulate Matter Air Quality Guidelines, 2018

### Fine Particulate Matter (PM 2.5)

10 $\mu$ g<sup>3</sup> annual mean  
25 $\mu$ g<sup>3</sup> 24-hour mean

### Course Particulate Matter (PM 10)

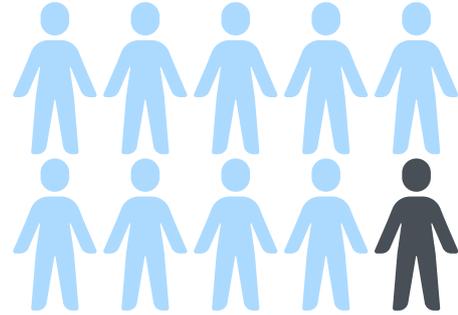
20 $\mu$ g<sup>3</sup> annual mean  
50 $\mu$ g<sup>3</sup> 24-hour mean

Source: [WHO Facts Sheet. Ambient Outdoor Air Pollution, 2018](#)

According to the World Health Organization (2020), nine out of ten people worldwide are exposed to air pollution (**Figure 3D**). While the physical effects of air pollution on human health have long been documented, current research is pointing to the indirect impacts of air pollution on mental health and well-being. Air pollution can indirectly impact mental health, as it has the capacity to create inflammation within the body (Mohankumar, 2008).

Inflammation occurs as the particulate matter passes from the lungs into the bloodstream, and then into the brain (**Figure 4D**). The effects of inflammation on the body and its impact on mental health have long been researched, and although data is limited, there are signs that air pollution can be linked to a range of mental health problems such as increased distress, depression, anxiety, psychosis, and suicide (Braithwaite, 2019).

**Figure 3D: Global population exposed to air pollution**

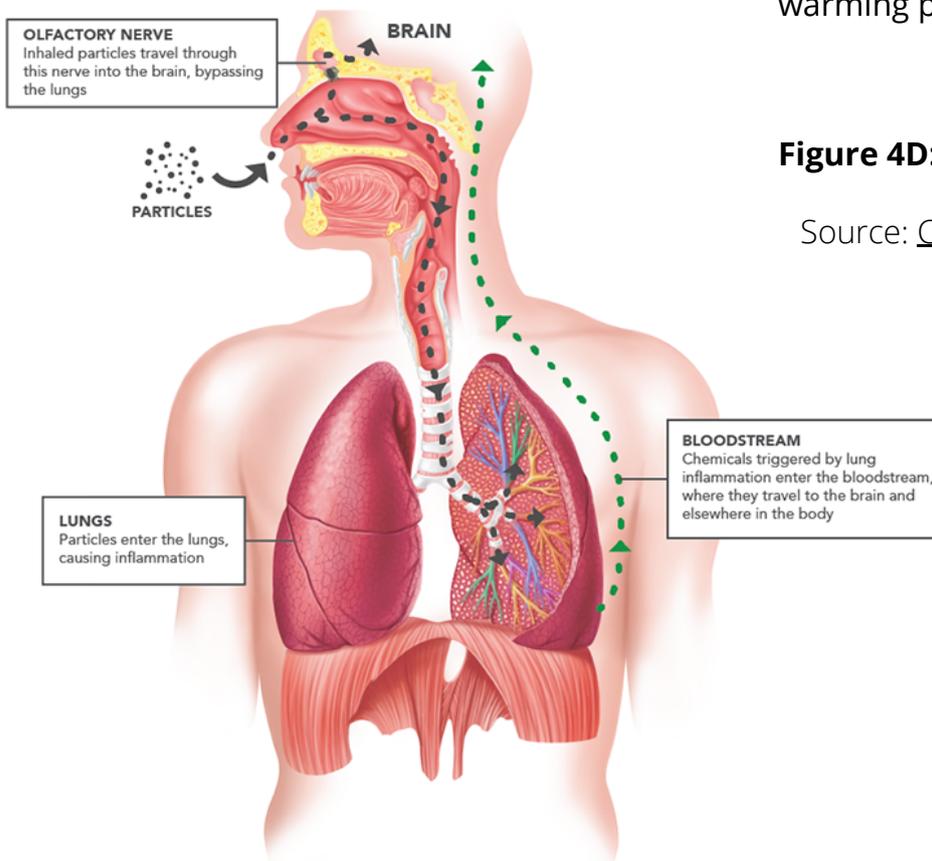


Source: [Air Pollution. WHO, 2019](#)

Bakolis (2020) found that nitrogen dioxide emission exposure increased the odds of being diagnosed with a common mental disease by 39% and fine particulate pollution increased the odds to 18% in a sample size of nearly 1700 adults in London. This is concerning as a study by Lowe (2021) showed that high levels of particulate matter pollution is also linked to an increase in the utilization of mental health services, which could burden already struggling mental healthcare systems if pollution levels are not adequately addressed in global warming policies.

**Figure 4D: Inflammatory Effects of Air Pollution**

Source: [California Air Resource Board, 2021](#)



Beyond its potential to cause mental health issues, air pollution has also been shown to affect brain development in children. Due to their faster breathing rate and less developed natural barriers in the lungs to inhaled particles, children are more susceptible to airborne contaminants in the environment (Brockmeyer, 2016). A study by Calderón-Garcidueñas (2008) found that in Mexico City, which has very high levels of air pollution, children performed more poorly across a variety of cognitive tests, compared to children within the control group. Additionally, the study showed using MRI results that 56% of the children in Mexico City had lesions in prefrontal brain matter, demonstrating that high levels of air pollution can create an adverse environment for healthy brain development and cognition (ibid.). Although children are particularly affected by air pollution, research has also revealed that adults can have an impairment in their cognitive functioning when particulate matter levels are high. Research has shown that low-skilled workers are at particular risk as they are often exposed to high levels of pollutants (Archsmith, 2018). Another study found that short term exposure to air pollution also had the ability to impact decision making in highly skilled individuals as well (ibid.).

As air pollution worsens, cities around the globe need to develop policies to regulate urban development and improve air quality while simultaneously optimizing mental health, cognition, and well-being. There are several characteristics of urban environments that have been identified as targets for improving mental health, including adding green spaces, reducing the number of populations living in proximity to major roads, promoting active transport initiatives, and zoning air polluting industries. As a result of available evidence, the WHO (2020) asserts that "reducing the exposure to air pollution" could contribute to improving urban mental health when implementing urban design elements.



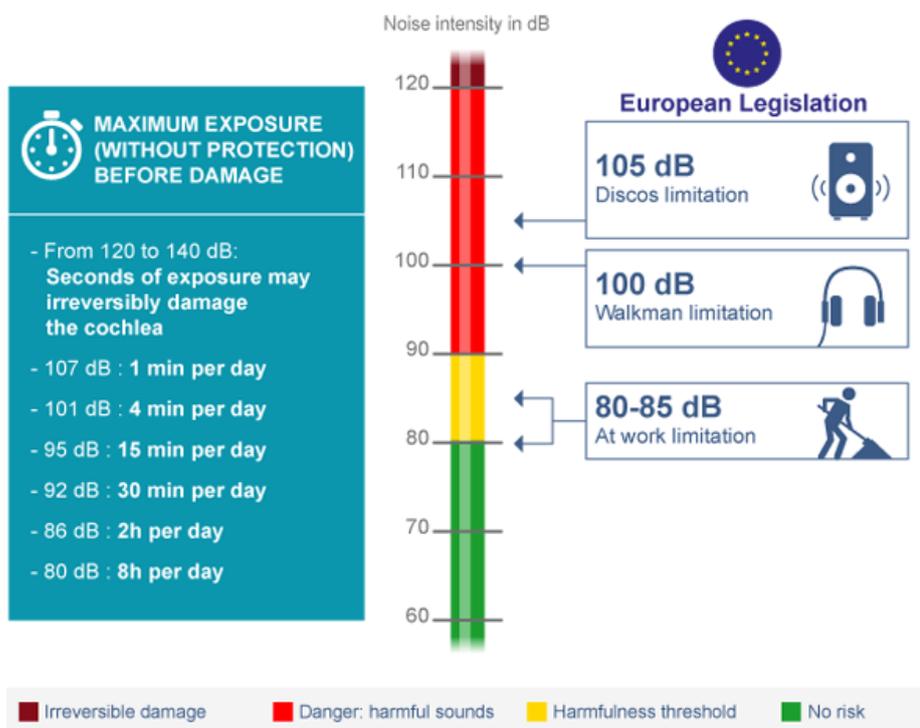
## Noise Pollution

Noise is not visible like other pollutants, so its link to climate change is often overlooked. Yet, a majority of sources producing greenhouse gases and carbon-dioxide are associated with noise, transportation being the major contributor (Iberdrola, 2021). According to the Environmental Protection Agency (EPA, 2020), a passenger car in the United States emits approximately 4.6 metric carbon tonnes per year (EPA, 2018) while also being one of the main causes of noise pollution within cities and towns (Wilson, 2020).

A recent report by the European Environment Agency (2020) showed that 65.5% of Europeans are regularly exposed to traffic noise levels above 50 dB (EEA). As seen in **Figure 6D** while this is a normal threshold for occasional exposure it can create health problems when an individual is continually exposed (EPC, 2003).

**Decibel (dB)** - Decibels measure sound intensity. Amplitude, reported on the decibel (dB) scale, measures its pressure or forcefulness. The more amplitude a sound has, the louder it is. The logarithmic decibel scale measures differently than a linear scale. If a sound is 20 dB, that's 100 times louder than near silence (CDC, 2019).

Beyond the indirect impact that noise pollution can have on climate change via transportation and construction, research shows that it has direct impacts on the environment as well. Noise pollution can affect a variety of wildlife species, from fish to mammals (Kunc, 2019) and may also impact plants and their growth as pollinating species of birds avoid noise ridden areas (Sohn, 2012).

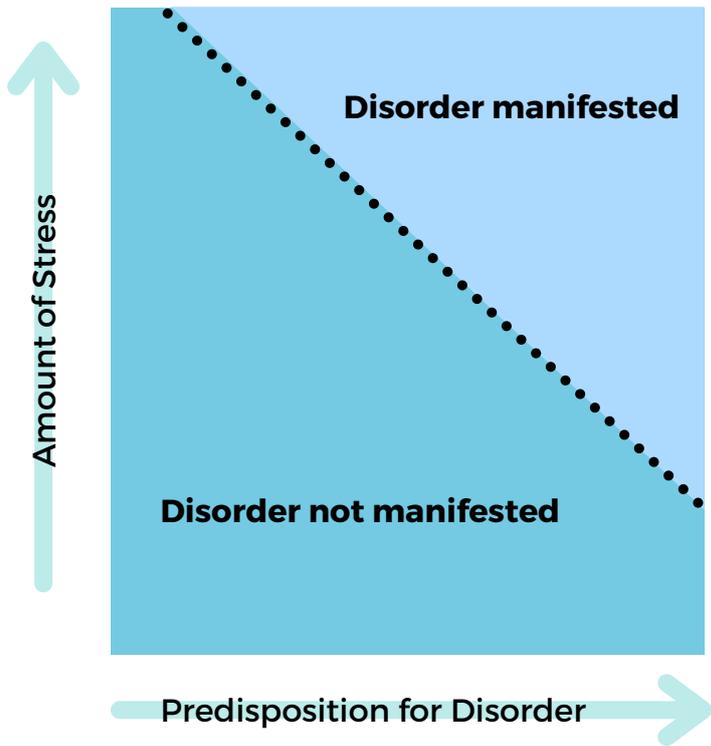


**Figure 6D:** Relationship between noise levels and duration of exposure

Source: Directive 2003/10/EC of the European Parliament and of the Council. [Conchlea.org](http://Conchlea.org), 2021.

The WHO in 2011 found at least 1 million healthy life-years are lost every year in western European countries because of environmental noise

Figure 7D: Diathesis Stress Model

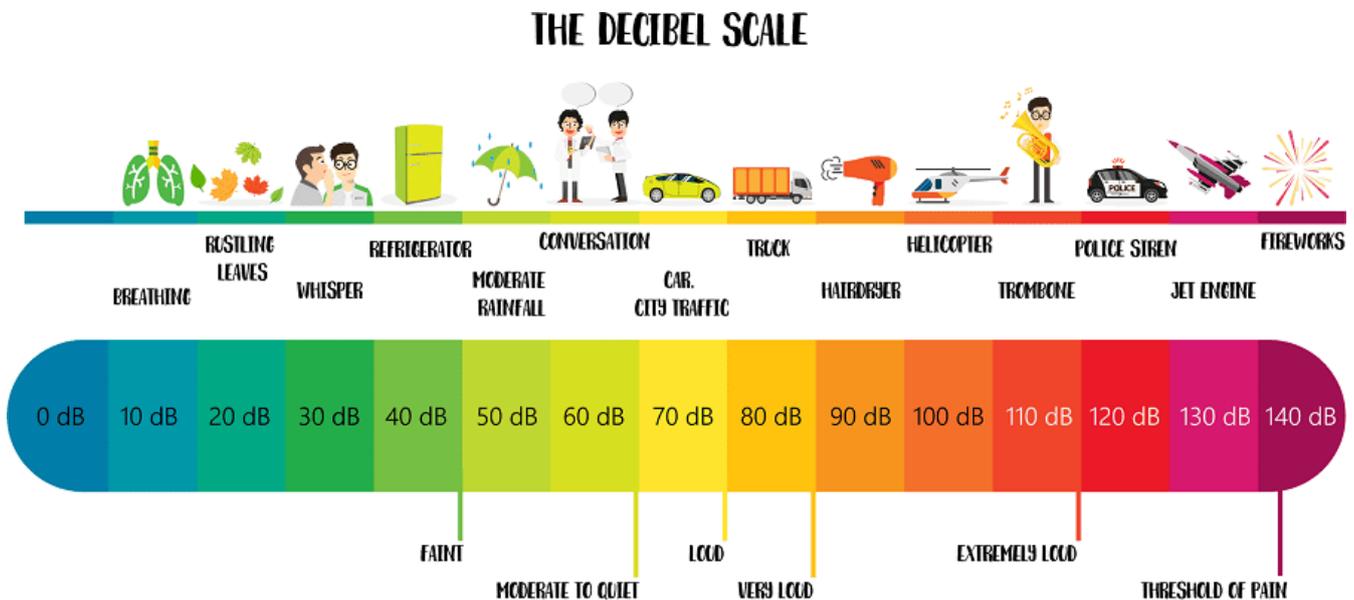


Research has shown that environmental noise can directly affect our mental health, well-being, and quality of life (Basu, 2021). Acute noise can increase cortisol, a stress hormone, as short term noise exposure causes physical arousal, leading to an increase in pulse, blood pressure, and respiration (Babisch, 2011). When noise exposure is prolonged, the continuous activation of these physical responses can result in depression and anxiety (Persson, 2007). Using the diathesis-stress model, **Figure 7D** demonstrates how chronic noise exposure can lead to the manifestation of a mental disorder, particularly for those who are already psychologically vulnerable (Guite, 2006).



Source: [Practical Psychology, 2020](#)

Figure 8D: Decibel Scale of Environmental Sounds



Source: [Understanding Decibels - A Beginner's Guide](#)

Studies from the European Environmental Agency (EEA, 2020) show that 20% of the EU population lives in a region where there are excessive noise levels, which is having a detrimental effect on mental health and well-being (**Figure 9D**). Reports of high levels and sleep disturbance and annoyance can be linked to noise pollution, as noise exposure above 45-dB (Figure 8D - above) can prevent populations from falling asleep or experiencing a restful sleep which can lead to mood disorders and those who already struggle with mental health issues can have an increase in symptoms, such as insomnia, leading into a potential cyclical event (Newsom, 2021).

A noisy environment can lead to a decrease in focus and memory, particularly in children and adolescents, which can cause cognitive impairment (EEA, 2020). This should be of particular concern as impairments in learning can increase risks to the social determinants of health, notably for children who are already at high risk due to other environmental exposures as they are more likely to already be exposed to excessive noise levels (Moore, 2012). Research supports the findings from the EEA on cognitive impairment in children. According to a recent study of college students, adolescents who slept well performed 25% better in educational settings than those who did not, a concerning disparity given that people of colour, immigrants, and non-English speakers disproportionately live within 150 meters of a highway (Okana, 2019).

- What actions can governments and organizations take to address mental health in urban environments?

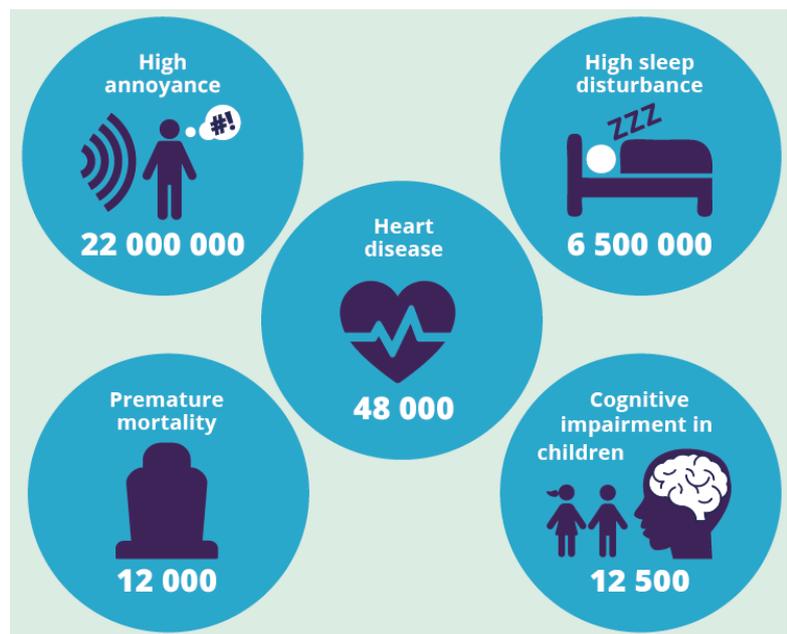
The WHO recommendations for community noise levels are set at less than 30 A-weighted decibels (dB(A)) in bedrooms during the night to create quality conditions and prevent adverse health effects. It is recommended that classrooms have a noise level of less than 35 dB(A) in classrooms to promote the best teaching and learning conditions.

#### How many people are affected?

- About 40% of the population in EU countries is exposed to road traffic noise at levels exceeding 55 dB(A);
- 20% is exposed to levels exceeding 65 dB(A) during the daytime, and more than 30% is exposed to levels exceeding 55 dB(A) at night.

Source: [WHO/EUROPE 2011](#)

**Figure 9D:** Mental and Physical Effects of Environmental Noise



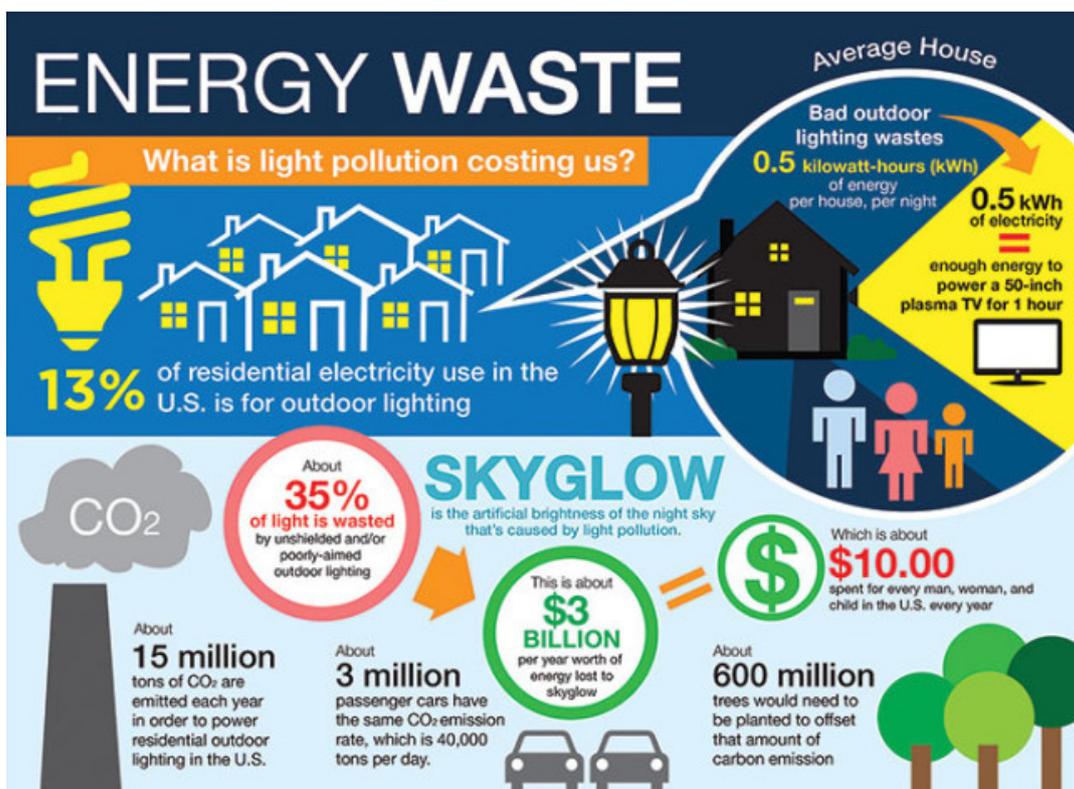
Source: [European Environmental Agency, 2020](#)

## Light Pollution

Many environmentalists, naturalists, and medical researchers consider **light pollution** to be one of the fastest growing and most pervasive forms of environmental pollution. Light pollution contributes towards climate change and has adverse effects on both human and wildlife health. The global estimate of the amount of carbon dioxide that is emitted into the environment to supply power for outdoor lighting is unknown, yet it is estimated that 35% of outdoor lighting in the United States is wasted due to ineffective design (**Figure 10D**, U.S. Department of Energy, 2011).

In addition to the large amounts of energy lost due to excess lighting, scientists in the United Kingdom have discovered that trees and plants are producing buds earlier in some areas of the country due to the warmer temperatures and extended light cycles caused by artificial lighting in cities, potentially creating yet unknown environmental effects (Ffrench-Constant, 2016). Light pollution also creates risks for human health as it leads to changes in a variety of animal behaviours that lead to an increase in infectious diseases, such as West Nile Virus (Kernback, 2018), which are further discussed in a later portion of this brief.

**What is light pollution?** Light pollution occurs when streetlights and other artificial light sources brighten up the night sky, disrupting ecosystems and obscuring stars. Light pollution is wasted light that has a negative effect on the environment, human health and well-being. More than 80% of the global population are exposed to light polluted skies (Falchi, 2016) and 99% of people living in the United States and Europe cannot see the Milky Way due to light pollution.



**Figure 10D:** Light Pollution waste in the United States

Source: [DarkSkyAssociation.org](http://DarkSkyAssociation.org).  
Data from US Department of Energy, 2011

Beyond its impact on climate change, light pollution can indirectly affect mental health through its ability to affect the circadian clock. As shown in **Figure 11D**, the CDC (2021) recommends differing hours of sleep based on age group. When sleep and the circadian clock are disrupted due to light pollution, similar to noise pollution, populations can experience an increase in sleep disorders, such as insomnia, which can lead to or trigger mental health issues such as depression and anxiety (Chepesiuk, 2009). Because depression can also trigger insomnia, this population is particularly at risk for a decrease in mental well-being (Bell, 2019).

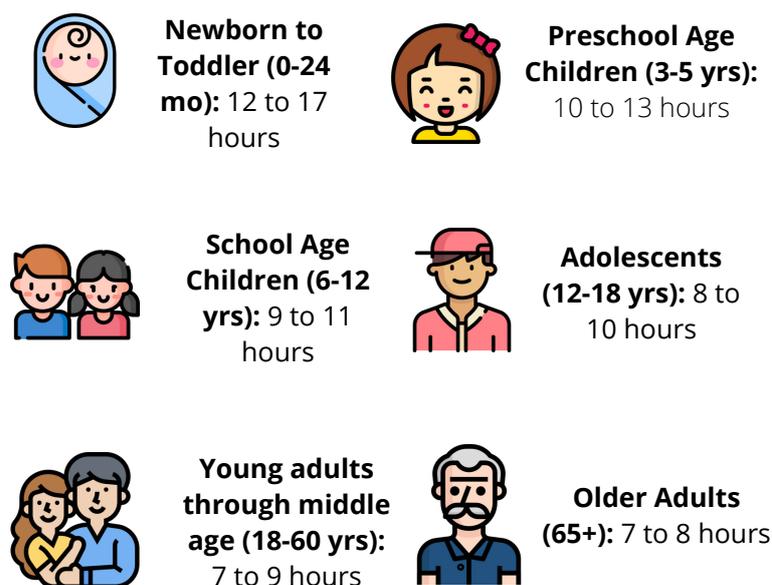
**Circadian clock (Figure 12D)** - an internally driven 24-hour rhythm that tends to run longer than 24 hours but resets every day by the sun's light/dark cycle (CDC, 2021).

**Figure 12D:** Circadian Clock



Source: [Medical News. Smith, 2021](#)

**Figure 11D:** Recommended hours of sleep by age group



Source: [CDC.gov](https://www.cdc.gov), 2021

Bell (2018) found that adults in urban cities who are exposed to higher levels of light pollution compared to those in rural areas had a 22% to 27% increase in depressive symptoms and a 17% to 27% increase in suicidal ideation. A study by Paksarian (2020) showed that teenagers are also affected by excessive outdoor lighting during sleep, as they were more likely to develop mood disorders when compared to teenagers living in regions with less outdoor lighting. It has also been proposed by scientists working in the emerging field of ecopsychology, that light pollution can affect mental well-being due to populations losing the ability to be awe-inspired by viewing the night sky (Ballew, 2018), which can limit feelings of joy, wonder, and other positive psychological experiences (Blair, 2017).

Because of its effects on mental health and well-being, governments and organizations need to consider the impacts light pollution can have on human well-being when making improvements to urban areas in efforts to reduce their impact on climate change.



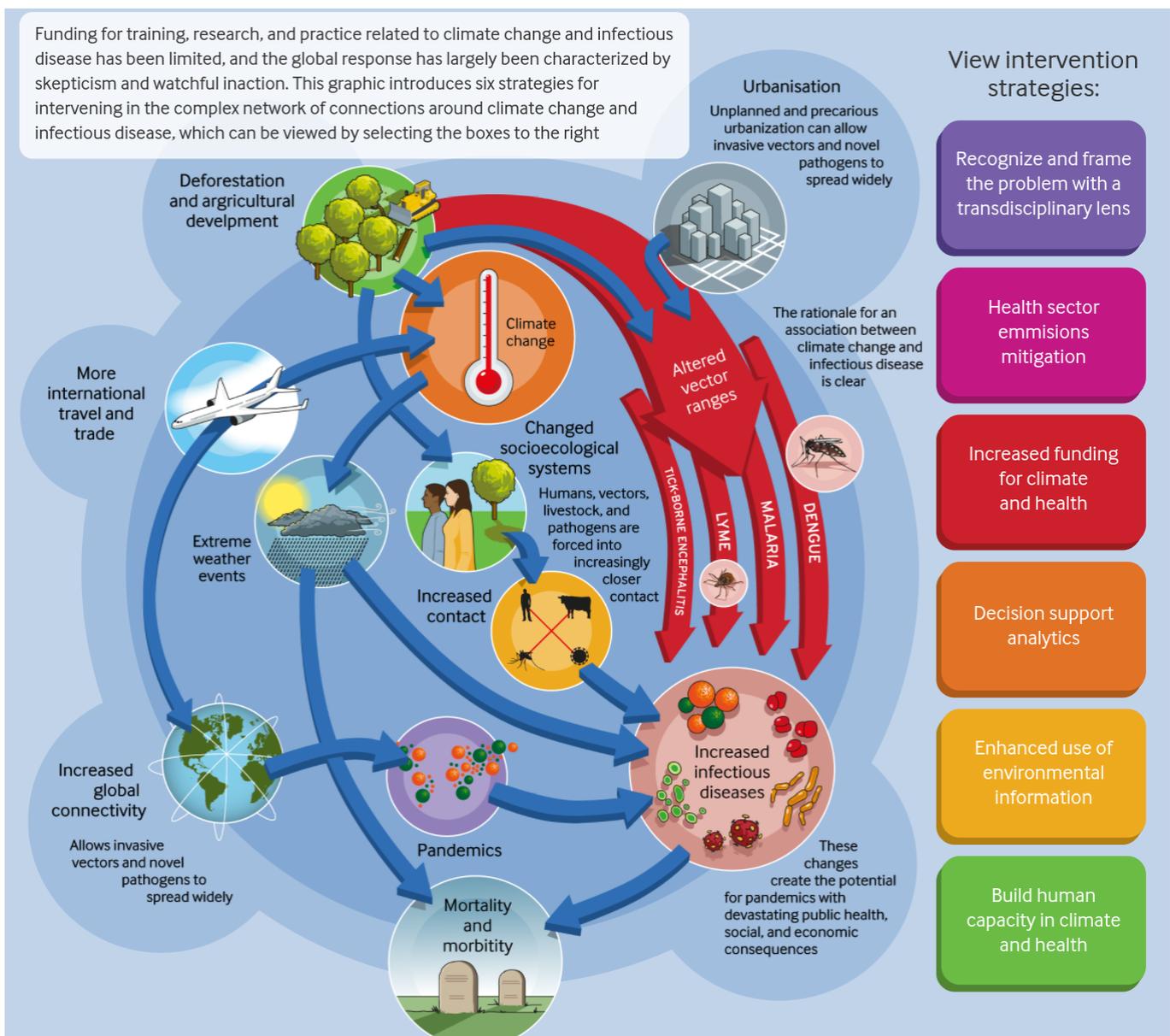
Given the strong associations between climate change and the incidence, spread, and prevalence of many infectious diseases that have been reported, the WHO (2020) has recognized climate change as a major health challenge. **Zoonotic and vector-borne diseases** are impacted by a complex set of variables that include policy-level choices related to land use and pest management, as well as cultural factors, including bush-meat hunting (Keusch, 2009) and socioeconomic factors, such as a lack of protection from mosquitoes and ticks (Winch, 1998). Changes in climate and the built environment create adaptability in vectors and pathogens, thus increasing their possibility for expansion beyond the geographic regions these populations naturally occur in (**Figure 1E**. CDC, 2020).

**Zoonotic infection:** A zoonosis infection is an infectious disease that has jumped from a non-human animal to humans. Zoonotic pathogens may be bacterial, viral or parasitic, or may involve unconventional agents and can spread to humans through direct contact or through food, water or the environment (WHO, 2020).

According to a report in *The Lancet*, the effect of climate change and an increase in vector-borne diseases had already been observed in Nepal as early as 2004, following the identification of their first case of Dengue (Pandey, 2019). The mosquito, *Aedes aegypti*, typically thrives in the Tarai region of Nepal but, due to increasing temperatures and rainfall from climate change, the mosquito has begun to spread into the hilled regions that had been previously unaffected by the disease (Adhikari, 2020).

**Vector-borne disease:** Disease that results from an infection transmitted to humans and other animals by blood-feeding arthropods, such as mosquitoes, ticks, and fleas. Examples of vector-borne diseases include Dengue fever, West Nile Virus, Lyme disease, and malaria (WHO, 2020).

**Figure 1E:** Climate change and its effect on infectious diseases



Source: Strengthening the global response to climate change and infectious disease threats. [British Medical Journal, 2020](#)

Infectious diseases have historically had direct and indirect detrimental effects on mental health. The direct link between infectious diseases and mental health was established in the 20th century, when Kraepelin and Jauregg found that the increased inflammatory response caused by infectious diseases could trigger the onset of psychiatric illnesses, such as major depressive disorder and schizophrenia (Muller, 2015). Additionally, research that was conducted during the 1918–19 influenza pandemic found that children of mothers who had been infected with influenza during pregnancy had higher rates of schizophrenia (Kępińska, 2020). Current research supports previous findings that virus infection during pregnancy may be one risk factor for developing immune-related mental illness. Given the high number of COVID-19 infections worldwide, even a small increase in the risk of mental illness in newborn children could have a large impact on mental health systems (ibid.).

Research on COVID-19 and mental health makes it evident that the emergence of new communicable diseases should be taken into account in regards to mental health policies, as the long term mental health effects of the disease will remain unknown for a period of time. A study on 69 million health records performed during the COVID-19 pandemic supports past findings that infectious disease can directly impact mental health (Taquet, 2021). It was shown that those who were infected with the virus were at an increased risk of being diagnosed with dementia and other psychiatric conditions after recovering from the virus, in addition to insomnia which itself is not a psychiatric condition but is often a symptom or a manifestation of a mental illness (ibid.).

Communicable diseases and their effect on mental health and well-being are often disproportionate amongst certain populations. Research during the beginning of the COVID-19 pandemic showed that women and mothers, young adults, and communities of colour were particularly inflicted with a decrease in mental well-being, reporting higher levels of anxiety, depression, insomnia and poor sleep quality during the pandemic (Vizheh, 2020). There are various reasons why these populations are experiencing higher levels of mental distress. For example, women during the COVID-19 pandemic have been more likely to be “front-line workers” such as nurses and teachers, and have also been at an increased risk for domestic violence due to prolonged contact with their abuser within the home, and more likely to be the primary caregiver of children who were also required to remain at home (Thibaut, 2020). It is already known that a lack of adequate domestic and emotional support can have consequences on women’s mental health, and surveys regarding mental health support for health care workers shows that it is also lacking (WHO, 2020). As these populations are already under served, it is necessary that policies ensure that these populations will remain protected when infectious disease outbreaks occur.



### WHO Survey on Mental Health Services and COVID-19

- Over 60% reported disruptions to mental health services for vulnerable people, including children and adolescents (72%), older adults (70%), and women requiring antenatal or postnatal services (61%).
- 67% saw disruptions to counselling and psychotherapy; 65% to critical harm reduction services; and 45% to opioid agonist maintenance treatment for opioid dependence.
- More than a third (35%) reported disruptions to emergency interventions, including those for people experiencing prolonged seizures; severe substance use withdrawal syndromes; and delirium, often a sign of a serious underlying medical condition.
- 30% reported disruptions to access for medications for mental, neurological and substance use disorders.

As has been discussed, the COVID-19 pandemic has shown the need to develop mental health policies in the context of climate change, as nations throughout the world have been unable to cope with the increasing demand for mental health assistance. The WHO (2021) named mental health a key component of the COVID-19 response, as the organization discovered that there were major disruptions to services providing mental health support on a global scale. Of additional concern is that a 2019 WHO Health and Climate Change survey reported that of 101 countries, only 23 have developed vulnerability and adaptation assessments for health in regard to vector-borne diseases and only 6 countries have established the same type of assessment for mental health issues (**Figure 2E**). As these assessments are used to determine the harm that climate change can cause to health, it is vital that more countries adopt this tool in order to mitigate the effects of communicable disease on mental health.

**Figure 2E:** Main climate sensitive diseases identified in the vulnerability and adaptation assessments for health



Source: [WHO Health and Climate Change Survey Report, 2019](#)



## SOCIAL AND ECONOMIC IMPACTS

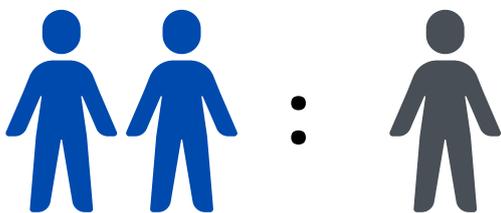
### Social Impacts

The actual impacts of climate change on systems, communities, and people are just beginning to be understood as research on global warming and its potential social impacts continues to grow (UNFCCC, 2019). Although more research is needed in these areas, this brief has demonstrated the effects that climate change can have on water, food, pollution, and droughts, and how these will have detrimental effects for decades to come. We know, for example, that when access to natural resources becomes limited, there is an increased potential for violence and instability (UN News, 2021). The UNHCR (2021) reported that over the past decade, 21.5 million people per year are forced to relocate due to climate change-related weather emergencies.

**Are there climate refugees?** The phrase has become popular in the media yet according to international refugee laws that were established by the United Nations in 1951, the word "refugee" refers to a person who has a "well-founded fear of being persecuted for reasons of race, religion, nationality, membership in a certain social group, or political opinion." People fleeing their country for reasons connected to climatic stressors may not be deemed refugees under this agreement since the environment is not recognized as a persecuting agency.

According to the same report, about 90% of refugees move from countries most susceptible and least prepared to respond to climate change's effects (UNHCR, 2021). The same countries that are most vulnerable to climate change also create 70% of the displacements due to civil unrest and violence (UNHCR, 2021). While a majority of current refugees and migrants originally resided in low and middle income countries, developed nations are also at risk of having portions of their populations forced to relocate due to extreme weather events caused by climate change. Governments in developed countries may be more equipped to aid those who are displaced yet even in these nations, it is the most vulnerable populations who are the most affected by climate change (APHA, 2021). The IOM (2019) estimates that up to 1 billion people globally could be internally displaced due to climate change. Governments and organizations need to work not only to prevent continued global warming but also to ensure the safety and security of vulnerable populations both physically and mentally.

### Internally Displaced Persons outnumber refugees 2:1

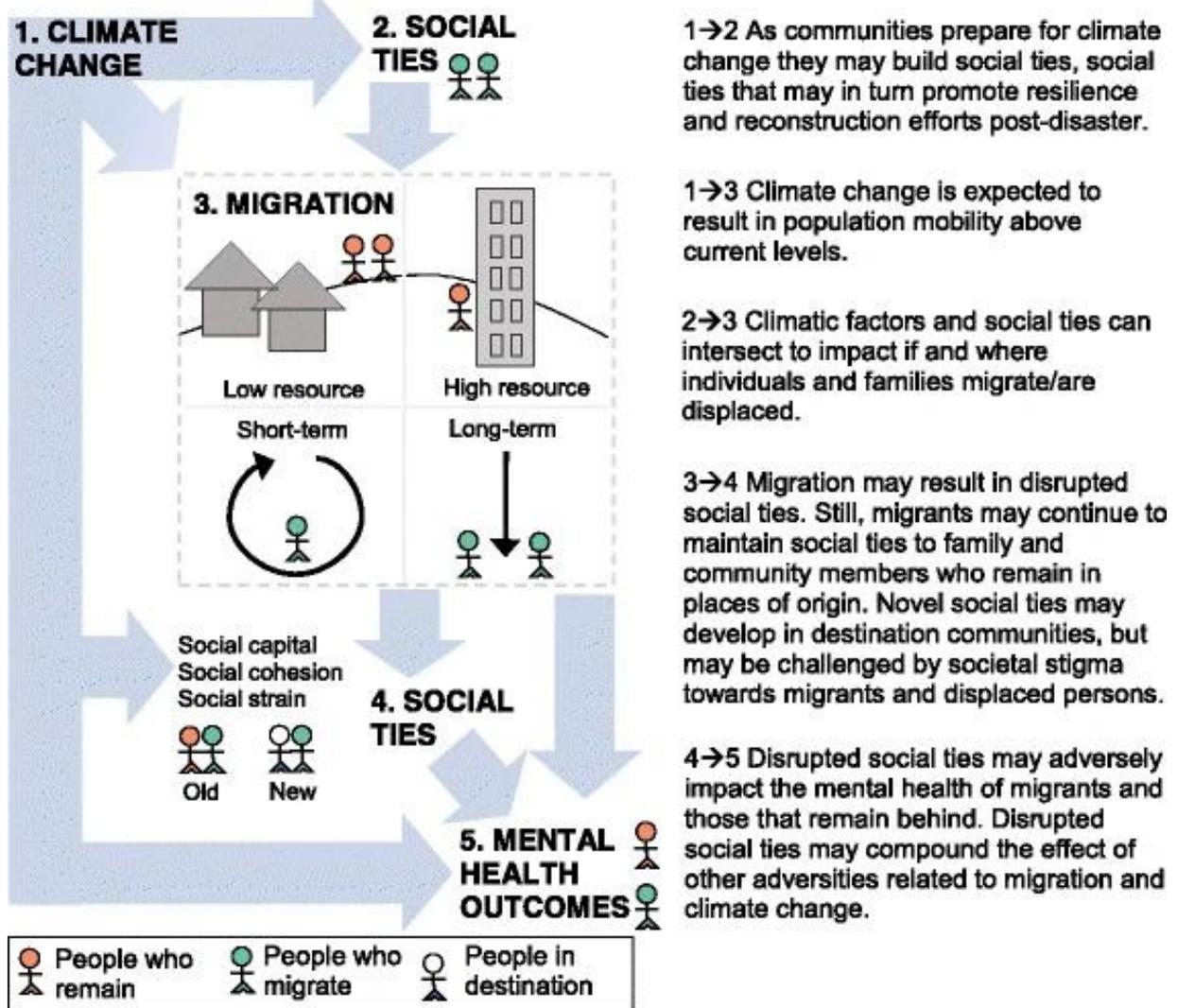


Source: [Global Report on Internal Displacement, 2017](#)

**Internally Displaced Person (IDP)** - An internally displaced person is someone who is forced to leave their home but who remains within their country's borders.

Migration and displacement have well established negative effects on mental health and well-being. Individuals who experience displacement or migration are likely to experience mental health issues such as PTSD, depression, and anxiety (Morina, 2018). A study by Salah (2013) found that in Sudan, out of 1,876 adults who had been internally displaced, the prevalence of mental health disorders was 53%, with the most common disorders being depression (24.3%) and anxiety (23.4%). Studies have provided evidence that these conditions occur often as a result of system failures to provide basic needs for individuals who are experiencing displacement, such as employment, housing, adequate food security (Siriwardhana, 2013), healthcare, education, and social support (IDMC, 2018). Additionally, research has shown that disruption of social networks, such as separation from family and community members due to migration or displacement, may be a source of stress for people in motion (**Figure 1F**, Torres, 2017). Migration may contribute to negative mental health outcomes through a variety of factors, including exposing migrants to stressful situations along the migration route and discriminatory attitudes and treatment at destinations. Research has shown that mental health issues can persist for decades after an individual has migrated. Marshall (2005) found that after 20-years, Cambodian refugees in the United States were still at a high risk of experiencing mental health issues such as PTSD and depression, with older populations being particularly vulnerable.

**Figure 1F:** Social Ties' Role in Climate-Related Migration and Mental Health: A Conceptual Framework



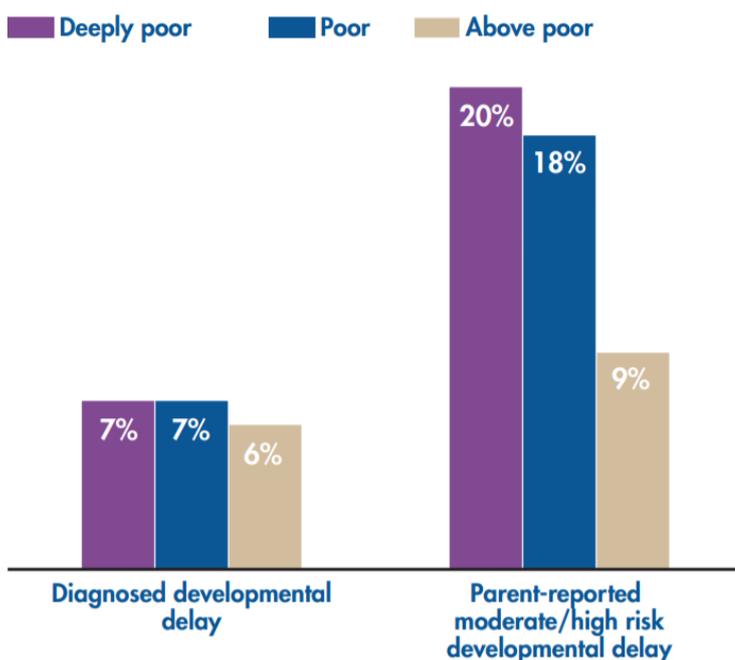
Source: [Torres and Casey, 2017](#)



## Economic Impacts

In addition to the devastating impacts on both the environment and populations that have already been experienced, climate change will also severely challenge economic stability. As has been discussed, hurricanes, floods, and other natural disasters will increase and continue to wreak havoc on millions of people, with many risking poverty following the loss of their homes and livelihoods. Moreover, heat waves lead to less productivity and a decrease in human's capacity to work, especially outdoors. Droughts will continue to reduce crops, adding challenges to feeding the world's growing population, which the UN estimates will reach 10 billion by 2050 (UN, 2019). Climate change, according to the World Bank (2020) could force more than 100 million people into poverty by 2030 if measures are not taken soon. Additionally, climate change has the potential to create damage to infrastructure and supply networks, which can further impair economic stability and nations ability to cope with increasing demands (Lawrence, 2021).

Climate change and its effects on economic stability on individual and community levels will have profound consequences for mental health. Poverty is one of the most significant social determinants of health and mental health. Those who experience poverty, particularly early in childhood or for an extended period of time, are at risk of the many harmful effects that it has on health and development. Poverty in childhood is connected with decreased education performance, in addition to worsened cognitive, behavioral, and attention-related outcomes; higher rates of delinquency, depression and anxiety, and higher rates of nearly all mental illnesses in adulthood (Simon, 2018). Findings in the United States show that children who live 100% below the poverty line are 22% more likely to be diagnosed with a behavioral disorder when compared to their peers (CDC, 2020) and 18 to 20% more likely to experience a developmental delay (**Figure 2F**). Research in the United Kingdom reports similar findings, with children where neither parent is working having a 20% higher likelihood of being diagnosed with a mental illness or disability compared to 8% of children who have parents that both work (Elliot, 2016). This data is alarming, as children who live in poverty are more likely to be exposed to Adverse Childhood Experiences (ACE) which further increases their risk for physical and mental health complications in adulthood (**Figure 3F**. Wavetrust, 2021).

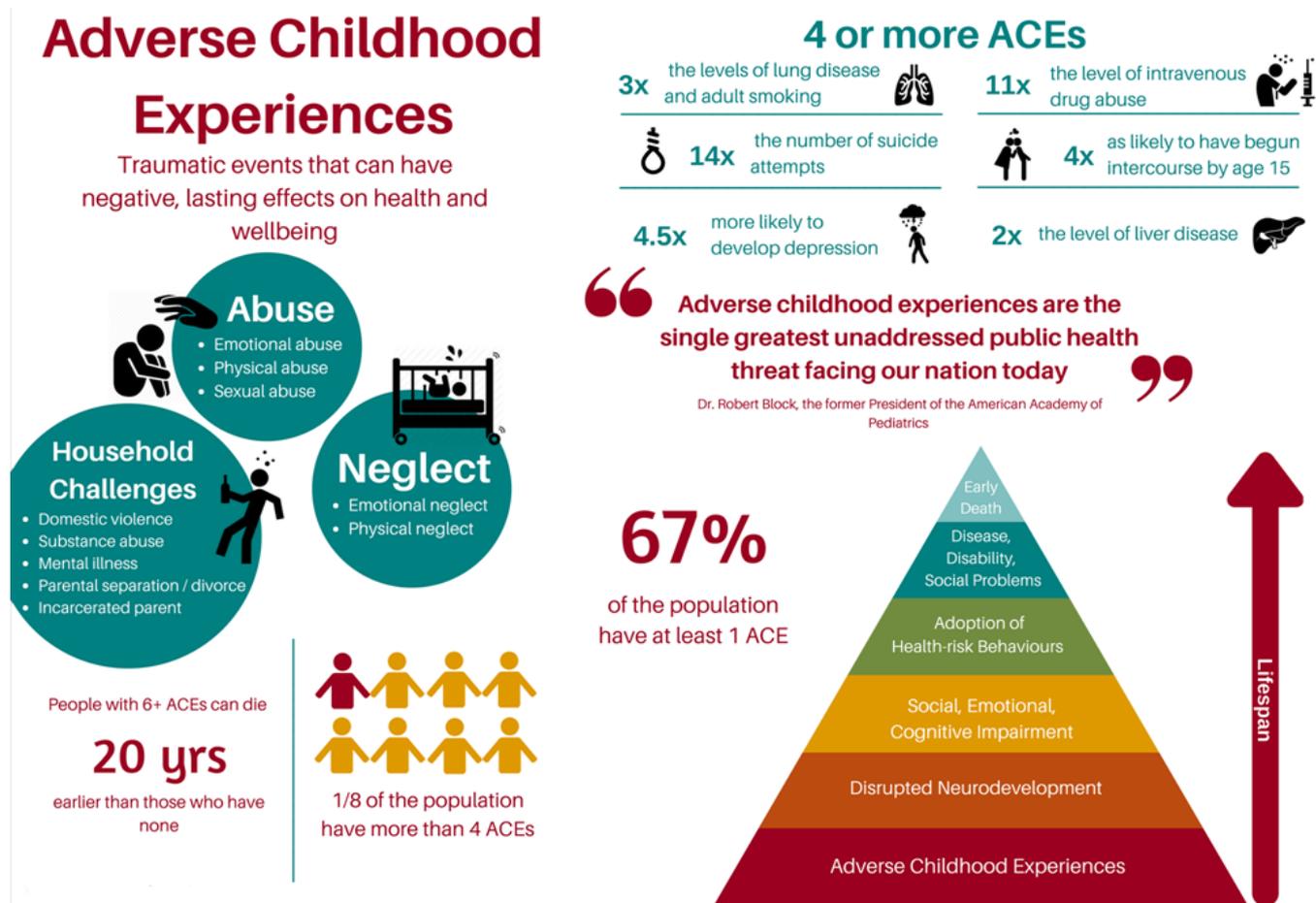


**Figure 2F:** Prevalence of Developmental Delay of children in families experiencing poverty

Source: Young Children in Deep Poverty. NCCP, 2016

\*Note: Parent-reported moderate/high risk for delays is among children 4 months to 5 years  
Source: NCCP analysis of data from the National Survey of Children's Health (NSCH) 2011-2012

Figure 3F:

Source: [Wavetrust, 2020](#)**What is poverty?** “Poverty is hunger.

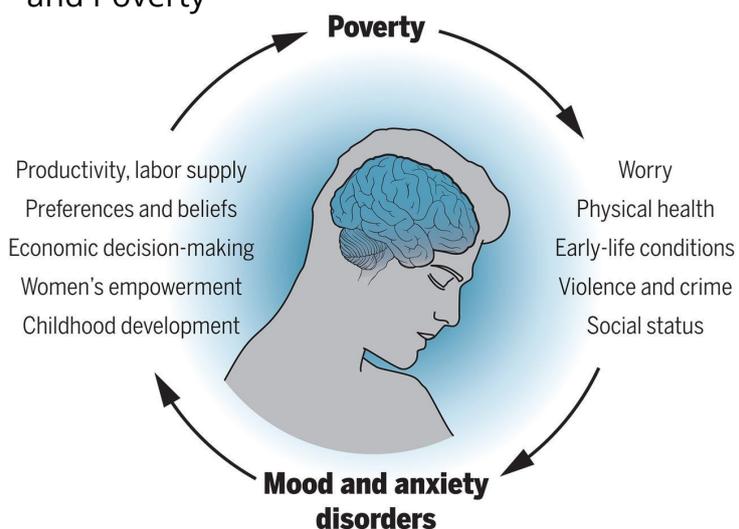
Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not having access to school and not knowing how to read. Poverty is not having a job, it is fear for the future, living one day at a time.

Poverty has many faces, changing from place to place and across time, and has been described in many ways. Most often, poverty is a situation people want to escape. So poverty is a call to action -- for the poor and the wealthy alike -- a call to change the world so that many more may have enough to eat, adequate shelter, access to education and health, protection from violence, and a voice in what happens in their communities.” - World Bank Organization, 2020

According to a study by the Center for Children in Poverty at Columbia University (2016), around five percent of adults who never experienced poverty as children were poor at ages 20 and 25. For those who spent eight to 14 years in poverty as children, 46 percent were poor at age 20, and 40 percent were poor at age 25. Adults who experience poverty are at an increased risk for depression, anxiety, psychological discomfort and suicide (Simon, 2018). In the United States, one study found that 9.8 million adults experience mental illness, with 2.5 million of those individuals being below the poverty line (SAMHSA, 2016). Ridley (2020) states that adults who have a low-income, are 1.5 to 3 times more likely to experience depression and anxiety when compared to those in higher income levels.

Poverty should be of particular concern when addressing challenges caused by climate change, as research has shown that the mental health and developmental issues that occur as a result of poverty prevent individuals and families from being able to escape poverty (**Figure 4F**), which creates an inter-generational cycle (McLoyd, 1998). Research has shown that it can take three to five generations, and potentially more, to escape the cycle of poverty. With “No Poverty” being a part of the UN’s SDGs, actions that are taken to mitigate the negative effects of climate change and poverty will additionally improve mental health outcomes.

**Figure 4F:** Cyclical Pattern of Mental Health and Poverty



Source: [World Economic Forum, 2021.](#)

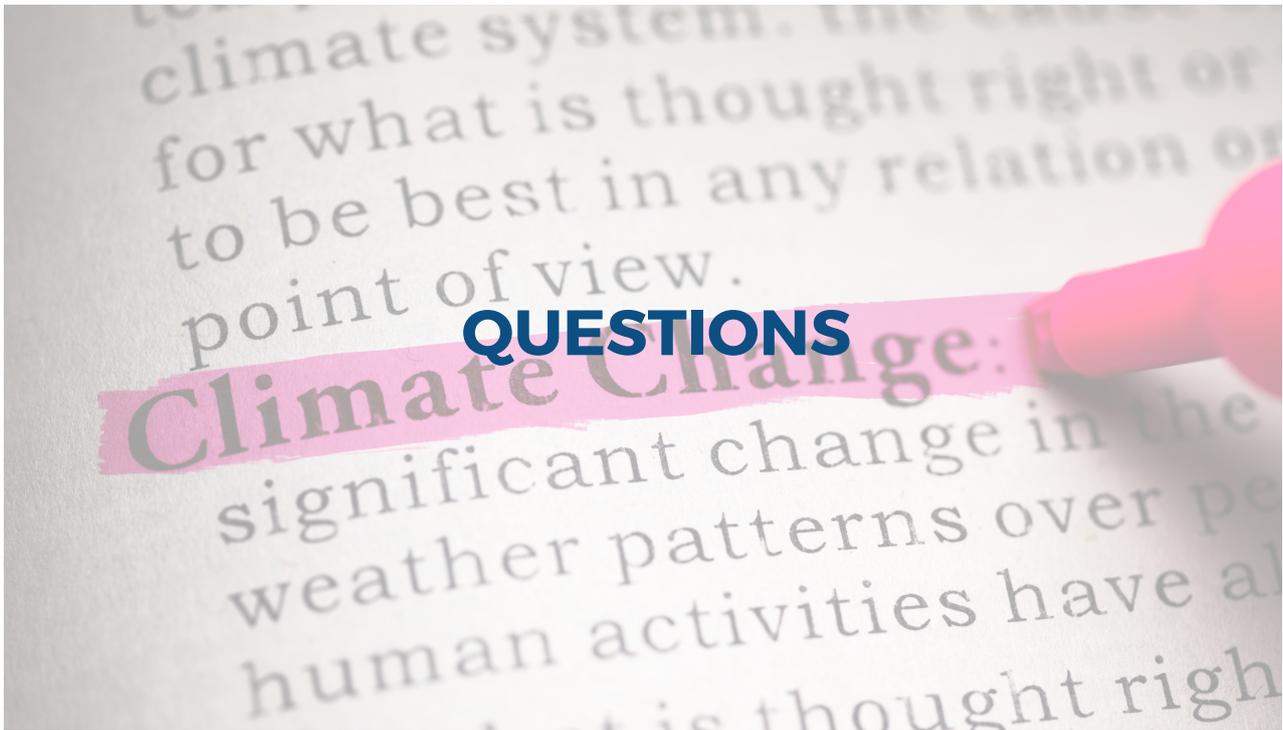




***“Our mental well-being is just as vulnerable to global warming as is our Earth.” - American Psychological Association, 2017***

The impacts of climate change on mental health have long been ignored in climate change action plans, as taking steps to improve the two will be a complex process involving numerous stakeholders, ranging from the individual, community, and systems levels. Although challenging, addressing Extreme Weather, Food and Water Insecurity, Urban Environments, Infectious Diseases, and Social and Economic Impacts and the effects that occur as a result of climate change within these areas will allow for the promotion of good mental health and well-being, while reducing inequalities created by the two.

This Fall, you will be addressing these challenges during the ParisWHO, World Health Assembly e-simulation and it is now time to begin preparations with the aid of this theme book. It is essential that research is performed prior to the event, as you will be expected to have prepared a position paper. Additionally, you will need to be able to debate and discuss these issues during the event so that you and your fellow delegates can come to resolutions to mitigate the effects that climate change has on mental health and well-being. On the next page, there are questions to aid in the development of ideas and thoughts for addressing climate change and mental health.



How is mental health being addressed in climate change policy? Are there any established policies in place? Will the actions we take today be enough to forestall the direct and indirect impacts of climate change? Or is it too little too late?

What can be done to raise awareness on the emerging evidence of the impact of climate change on mental health? How can organizations engage policymakers and health systems leaders?

How can research agendas for climate change and mental health be developed and communicated? What are the priority research questions that need to be asked? Who needs to be involved in the process? How can research findings be shared with the public?

Where can funding come from to further research and develop programs for the impacts of climate change on mental health?

Which voices are the most vulnerable to the impacts of climate change on mental health? How can their stories be told?

How can governments and organizations develop, identify, evaluate and support effective programs and interventions in regards to climate change and its effect on mental health? What type of training programs should be developed?

What are the gaps in efforts of current stakeholders addressing climate change and mental health?

How can governments and organizations work to ensure that mental health is a key component in emergency response efforts during and after a climate related disaster?

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