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Impact of Climate Change on Individual and Community Mental Health

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ABSTRACT

This paper provides an overview of the current and prospective climate change-related risks and impacts on individual and community mental health, as outlined by studies from the United States, Canada, the United Kingdom, Australia, Mexico, and Pakistan, in addition to a few European countries from 2000 to January 2022. It argues three major points, first, certain vulnerabilities exist with regards to which populations are most at-risk of experiencing poor psychological well-being. The main vulnerabilities and risk factors highlighted in the paper are low socioeconomic background, young age, and communities having close cultural and working relationships with the environment. Second, climate change-induced natural disasters such as floods, hurricanes, wildfires, and heatwaves can have several impacts on mental health, mainly due to worsening physical health, disruption of community cohesion, and forced relocation. The concept of community resilience is also discussed. Finally, the relationship between heat waves and increased psychological fatigue and feelings of hostility is also explored, linked with rising crime rate which can further impact individual and community mental health. It was concluded that climate change impacts individual and community mental health in many ways and that certain gaps in knowledge, such as the factors influencing the severity of this impact and the reasons behind the existence of vulnerabilities among populations, need to be addressed and incorporated into future action. Moreover, adaptive action needs to be taken in preparing societies for the impact of climate change. This includes increasing accessibility to quality mental healthcare and creating protective legal frameworks for those who are disproportionately affected by interpersonal violence during and after climate-related natural disasters.

Keywords: Climate Change, Mental Health, Heat Waves, Natural Disasters, Resilience.

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1. INTRODUCTION

Climate change refers to long-term changes in the average weather patterns that characterise the Earth's local, regional, and global climates (NASA 2022). While this was initially a naturally occurring process, since the 1800s, human activities have been the main force behind climate change primarily because of Greenhouse Gas (GHG) emissions through the increased use of fossil fuels (UN 2021). Carbon dioxide and methane are the main contributors to rising temperatures and greater surface-level ozone concentrations (IPCC 2018). Increasing temperatures have already caused irreparable damage to the environment, with effects ranging from rising sea levels to loss of habitats and biodiversity (Jackson 2021). Increased instances of extreme weather events such as heatwaves, droughts, and floods have also been linked to human-driven climate change, and these events are expected to continue occurring in the future, perhaps with greater frequency and intensity. It has already been suggested that people may be at risk of being affected by climate change either directly (during natural disasters) or indirectly (displacement, water scarcity, famine, etc.) (IPCC 2018). However, the mental impact of climate change is relatively a new phenomenon in psychology, leading to the question - *'to what extent does climate change affect individual and community mental health?'*

Mental health refers to an individual's psychological, emotional, and social well-being (DHSS 2022). Difficulty in managing one's thoughts, feelings, and actions with respect to routine stressors may be a sign of poor mental health and consistently poor mental health may develop into a mental illness.

Certain populations are at a greater risk of being mentally affected by climate change. This study, thus, outlines three major risk factors and vulnerabilities that may lead to developing mental disorders due to climate change, namely, low socioeconomic background, young age, and belonging to indigenous or farming populations. People from lower socioeconomic backgrounds are more likely to be affected by climate change-induced economic crises and experience stress brought about by a loss of livelihood and economic opportunities as a result of natural disasters (Cianconi et al., 2020). Some studies have indicated that young people are more likely to experience poor mental health caused by impending climate disaster, experiencing eco-anxiety, ecological grief, and pre-traumatic stress (Vergunst and Berry 2021). People who have close living, working, and cultural relationships to the natural environment may also be more likely to experience distress following ecological losses and environmental change which is why some indigenous populations (Cunsolo et al., 2013) and farming communities (Polain et al., 2011) may be more vulnerable to mental disorders brought about by climate change.

This paper also addresses research conducted on the psychological impact of climate-induced natural disasters such as floods, hurricanes, and wildfires. Following natural

disasters, there is often a noticeable rise in distress reactions, which include insomnia, irritability, increased substance use, and depression (Flynn and Norwood 2004). Depression, anxiety, and Post-Traumatic Stress Disorder (PTSD) are commonly experienced by people who have been affected by hurricanes (McLaughlin et al., 2011) or floods (Tobin and Ollenburger 1993). People are often displaced and forced to migrate after such natural disasters, which can result in loss of community cohesion and social support systems. Those who migrate may then suffer from acculturative stress as they struggle to adapt to the changes that come with migrating and being exposed to a different culture (Berry et al., 1987).

Another related concept is that of 'community resilience', which refers to a community's ability to prepare for anticipated threats, adapt to changing conditions, and recover quickly from crises (NIST 2022). According to Bakic and Ajducovic (2020), strong interpersonal and community relationships were linked to better mental health outcomes in the aftermath of a flood as they led to sharing finite resources, and greater engagement among the members of the affected community, which resulted in fewer symptoms of PTSD and depression. The strength of a community can, therefore, be a key indicator of whether it is likely to experience a deeper psychological impact following climate-induced natural disasters (Cohen et al., 2016). Moreover, heat, drought, and flood-related events are also linked to worsening physical health conditions (such as cardiovascular, respiratory, and gastrointestinal diseases), which may cause additional stress and further impact mental health (Giorgadze et al., 2011).

Finally, the paper also looks into the impact of higher temperatures on individual and community mental health. Studies have indicated that warmer temperatures may be associated with psychological fatigue as well as increased feelings of hostility (Cianconi et al., 2020). Higher temperatures are, thus, linked with a rise in aggressive crimes and domestic abuse (Mahendran et al., 2021). This section of the article explores how increased crime rates and domestic violence may impact individual mental health and family well-being.

2. METHODOLOGY

All articles available on major research sites such as PubMed and ResearchGate published from 2000 until January 2022 were reviewed. Searched terms used included: 'climate change', 'mental health', 'anxiety', 'PTSD', 'depression', 'eco-anxiety', 'ecological grief', vulnerability', 'natural disaster', 'displacement', 'resilience', 'heatwaves', 'crime', 'violence', and 'suicide'.

Articles chosen were written in English. Studies conducted in more recent years were given preference. The articles were screened based on their titles and abstracts.

Ultimately, only two or three most relevant studies from the range of publication years were selected for each of the topics outlined in this study. A number of articles were eligible based on the given criteria, but exclusions were made in order to avoid repetition. Overall, around 40 articles were consulted.

3. RISK FACTORS AND VULNERABILITIES

The Swiss Re Institute (2021) estimates that if global temperatures rise by 3.2ºC by 2050, impact on the worldwide economy would be around 18% less as compared to the economy in a world without global warming. Asian economies would be the hardest hit, especially those in South and Southeast Asia. Since 2010, Pakistan has faced a loss of more than USD 25 billion in flood-related damages to different sectors including agriculture, healthcare, public infrastructure, etc. (Zahra et al., 2016). As climate-related disasters increase, their economic impact could cause increased inflation and unemployment. As shown by Parker (2016), hurricanes and floods increased monthly headline Consumer Price Index (CPI) inflation by 0.05 percentage points, with a greater impact on food prices. While a clear cause and effect relationship is yet to be established, a general correlation has been found between increasing inflation and higher unemployment rates, as is typical in most economic crises, and suicide rates.

As such, it is possible that natural disasters and environmental changes brought about by climate change may trigger economic crises. Rising prices of essential goods, coupled with increased job insecurity, may become a significant source of stress for some individuals, potentially leading to mental distress, anxiety, depression, and suicide (Cianconi et al., 2020). The studies mentioned previously indicate a link between climate change and economic crises. Considering the fact that mental health is highly dependent on socioeconomic and environmental factors, studies have also shown that financial difficulties pose as major risk factors for depression, anxiety, and suicide (Laaksonen et al., 2007). However, there is a rather small amount of research that directly outlines the process through which climate change causes economic difficulties, resulting in poor psychological well-being, and a significantly greater amount of research is required in order to prove a correlation between these factors.

Studies such as Kim and Cho (2020) suggest that there is already a strong link between lower socioeconomic status and poor mental health. The theory of genetic predisposition suggests that some people may be susceptible to certain mental illnesses but may not necessarily develop those disorders unless the individual undergoes additional stressors (Solomon, Kotler and Mikulincer 1988). Economic hardship, brought about by job loss, as well as the threat of poverty or food insecurity brought about by increasing prices following a natural disaster, could be a source of stress that aggravates already existing mental health issues. According to the Diathesis-Stress Model (Caspi et al., 2003), this

increased amount of stress may work in tandem with genetic factors to result in mental disorders such as depression, anxiety, and PTSD. Low socioeconomic status is also linked with reduced access to resources and mental healthcare, which may reduce an individual's ability to cope with the stress caused by economic hardship (WHO 2011).

Providing cash support and low-cost treatment for common mental illnesses may reduce overall rates of depression and anxiety among low-income individuals. For example, the Oregon Health Insurance experiment in 2012, which offered almost free mental healthcare to low-income recipients, showed a 25% decrease in rates of depression in just a few months (Ridley et al., 2020). These findings may especially be important for developing countries as they indicate that the high costs associated with mental healthcare facilities can act as a deterrent to people from low socioeconomic backgrounds, thus reducing accessibility to mental healthcare (Rowan et al., 2013). Untreated psychological disorders can compromise the economic well-being of a country by reducing worker productivity and increasing overall health costs for both physical and mental illnesses (Müller et al., 2021). Thus, if a significant segment of society is unable to access quality mental healthcare, there will be a negative impact on the economy. Providing easier access to mental healthcare facilities, such as by offering low-cost or free mental healthcare, can boost employment and productivity, and reduce annual physical healthcare costs by an average of 20% (Layard 2016). This means that it is ultimately more cost-effective for developing nations to offer quality mental healthcare at low costs than suffer the effects of having a society with poorer psychological well-being.

Children and adolescents have been pinpointed as another group that is likely to experience poor mental health as a result of climate change by Vergunst and Berry (2021). Many mental disorders, especially depression or anxiety begin early in life and appear as a result of a mixture of genetic and environmental factors. From the ages of 6-12, children remain acutely sensitive to environmental stressors and as such, they are especially vulnerable to experiencing stress and anxiety about climate change (Ibid.). Moreover, as children do not have fully developed brains, they lack the emotional maturity required to handle the burden of hearing negative news regarding climate change and its expected impacts (Burke, Sanson and Hoorn 2018). Furthermore, normal childhood development can also be disrupted on many levels by climate change-induced disasters, from biological disruptions (changes to stress response mechanisms and epigenetic changes) to stress caused by disruption of family and social functioning (Vergunst and Berry 2021). Exposure to climate-related natural disasters during the developmental period (specifically ages 6-12) may also result in a range of distress reactions, such as attachment problems, disturbed sleep patterns, substance abuse, PTSD, depression, and anxiety disorders (Ibid.), which greatly affect mental resilience in the developmental stage.

Although they have not been included in the Diagnostic and Statistical Manual of Mental Disorders yet, experts are suggesting that adolescents are now developing disorders such as ‘eco-anxiety’ or ‘Pre-Traumatic Stress Disorder’ characterised by growing feelings of fear or worry about the Earth’s future, even if they have not been directly affected by climate change. About 72% of Americans between the ages of 18 to 34 have reported experiencing negative emotional outcomes (including anxiety, sleep-related problems, and a general feeling of uneasiness) after being exposed to negative news regarding the environment (Lawrance et al., 2021). Similar findings have also been reported in the United Kingdom and Australia, with 44% to 82% of university students reporting feelings of anxiety or grief related to the Earth’s future (Kelly 2017).

Many teenagers experience a loss of control and autonomy with reference to climate change, which may further exacerbate such emotions and negatively affect their psychological well-being, even resulting in suicidal ideation in some cases (Ali and Soomar 2019). While teenagers are old enough to realise the possible impacts of climate change and the need to act as soon as possible, many feel that they do not have an adequate say in the decisions made. In an article written by McKeever (2021), the author stated that 64% of young people surveyed across ten countries felt that their governments were not taking enough action to avoid a climate crisis. Faced with such inaction from those in charge, teenagers are likely to feel helpless. This helplessness, in turn, can aggravate pre-existing mental health conditions, or significantly lower the benchmarks to develop new ones. In addition to eco-anxiety, an alternate reaction to climate change-related stressors may be ‘learned helplessness’ (Salomon, Preston and Tannenbaum 2017). When adolescents are repeatedly told that the worsening of the climate crisis is inevitable and beyond their control, they may adopt a maladaptive response characterised by an avoidance of challenges and low motivation to employ problem-solving strategies and take action when faced with obstacles (Martin and Seligman 1972). A major consequence of this learned helplessness in adolescents is that it undermines individual efforts to combat climate change, such as recycling and personal energy conservation, as they believe that the climate crisis is well beyond the scope of one person, thus, modifying individual behaviour will not be very impactful. This passivity and lack of morale greatly inhibits personal and community efforts to stop climate change.

Studies also suggest that people who have close working and cultural relationships with the natural environment may be at risk of experiencing poor mental health as a result of climate change. Thus, indigenous populations may be especially vulnerable as they could experience loss of personal or cultural identity and ways of knowing, which leads to poorer mental health (Cunsolo and Ellis 2018). For example, many of Australia’s indigenous populations have spiritual ties with the land, and the natural environment, as well as the pre-existing ecological rhythms, are essential for traditional cultural practices.

Cunsolo and Ellis also researched indigenous Inuit populations in Canada and discovered that reduced access to significant cultural sites and an inability to participate in cultural traditions such as fishing and hunting as a result of melting ice caps were accompanied by strong emotional reactions, including sadness, fear, and anger. Changing local landscapes and disruptions to cultural practices, thus, negatively affect feelings of place attachment, with implications for Inuit physical, mental, and emotional health and well-being. A related concept is that of 'solastalgia', which is similar to nostalgia, however, refers to the sense of homesickness and loss of place as a result of a rapidly changing environmental landscape. Symptoms of solastalgia include feelings of grief, trauma, nostalgia, alienation, depression, anxiety, and loss.

Similar to indigenous people such as the Inuit, many farmers also have close affiliation with the land. Being a primarily agricultural country, Pakistan's increased vulnerability to prolonged drought caused by climate change does not bode well for farmers' mental health. In addition to experiences of solastalgia, farmers may also experience economic distress as a result of the loss of income following prolonged periods of drought (Polain, Berry and Hoskin 2011).

Conclusively, it can be seen that certain groups of people are at greater risk of experiencing poor mental health as a result of climate change. Ecopsychology, or the mental health impact of climate change, is a relatively new field, and current knowledge is limited in many aspects. However, this knowledge is enough to indicate that climate change can have varied and long-lasting effects on human mental health. Low socioeconomic status, younger age, and belonging to indigenous or land-focused cultures are only some of the vulnerabilities and risk factors for experiencing poor mental health or developing mental disorders. Protective strategies need to be developed for the at-risk populations and available healthcare resources should be mobilised in order to reduce the psychological impact of climate as much as possible.

4. IMPACT OF THE INCREASED FREQUENCY OF NATURAL DISASTERS ON MENTAL HEALTH

Individuals directly impacted by natural disasters may undergo near-death experiences and witness the destruction of their communities. The immediate aftermath of a disaster shows an increase in distress reactions such as anger issues, sleeping difficulties, etc. While most people exposed to natural disasters tend to recover from these distress reactions quickly, others may develop disorders such as PTSD, major depression, anxiety, and substance abuse (Flynn and Norwood 2004). Natural disasters can often disrupt communities and damage homes. For an individual undergoing a natural disaster, this loss of property, as well as the deaths of loved ones, may create a sense of instability and insecurity, increasing their psychological vulnerability towards disorders such as

depression, anxiety, and PTSD. A telephone survey conducted by McLaughlin et al., (2011) found that 17.1% of participants had a history of hurricane-related PTSD following Hurricane Katrina, and the number rose to 29.2% in the follow-up study. Only 39% of participating adults had recovered after a mean duration of 16.5 months, indicating that majority of the survivors of Hurricane Katrina, who had developed PTSD, exhibited slow recovery times.

Within the context of Pakistan, the country is ranked 9th out of 162 countries with regards to damage caused by floods (Bhamani et al., 2012). Some preliminary studies have indicated that incidences of PTSD, survivors' guilt, and generalised depression begin to rise after floods, but there is a serious absence of in-depth research into this phenomenon in Pakistan. However, generalising data from studies conducted in other areas, such as Tobin and Ollenburger (1993), it is likely that symptoms of PTSD become prominent in a significant percentage of the affected population around three months after a flood. In Pakistan, women are at greater risk of experiencing negative psychological outcomes following a natural disaster (Bukhari et al., 2015). Displaced women are likely to face food insecurity, poor reproductive health and greater instances of sexual harassment (SCF and ARROW 2015). According to Fatema et al., (2021), the greatest factors influencing women's mental health, following natural disasters in South and Southeast Asia, were being older than 18, lacking a formal education, low socioeconomic status, poor physical health, and death of a family member. After the 2010 floods in Pakistan, women living in camps did not receive adequate reproductive healthcare, resulting in a greater maternal mortality rate and increased instances of pregnancy-related complications, which contributed to poor psychological well-being (SCF and ARROW 2015). Moreover, women also faced food insecurity and malnutrition, which had a negative impact on both physical and psychological health.

These findings show that in the absence of adequate mental resources following major natural disasters, a significant number of people experience poor mental health and struggle to access treatment, and that certain vulnerabilities exist within the general population with regards to demographic factors, such as gender. These vulnerabilities need to be accounted for during rehabilitation efforts in order to achieve better psychological outcomes.

5. INTERSECTIONS BETWEEN PHYSICAL HEALTH AND MENTAL HEALTH IN THE AFTERMATH OF NATURAL DISASTERS

Climate change affects global temperature and precipitation patterns. This, in turn, influences the frequency and intensity of certain environmental events such as wildfires,

hurricanes, floods, etc. Many disasters directly impact public health by increasing the threat of acute disease and physical trauma. Additionally, they also increase the morbidity of chronic and infectious diseases (Giorgadze et al., 2011). According to Freedy et al., (2007), victims of disasters typically develop acute physical health problems such as gastroenteritis or viral syndromes. Physical and mental health are interlinked, according to a psychological approach known as 'interactionism' (APA 2020b) - worsening physical health may result in poorer mental health and vice versa. Natural disasters may exacerbate chronic health conditions such as diabetes or hypertension, which then lead to increased rates of depression among patients (Freedy et al., 2007). These physical health conditions may then become additional sources of stress, for the patients as well as their careers in some cases, which can then develop into mental disorders, such as depression and anxiety. Moreover, this is a bi-directional correlation as additional levels of stress and an inability to cope can have a negative effect on the body's immune system, possibly resulting in the development of more physical illnesses (Cohen 2008). As a result, the interaction between stress, mental health, and physical health becomes a repetitive cycle.

6. DISPLACEMENT AND MIGRATION AS A RESULT OF CLIMATE CHANGE-INDUCED NATURAL DISASTERS

Another major predictor for poor mental health was forced relocation as a result of the destruction caused by natural disasters. According to Schultz et al., (2018), population displacement caused by climate change would lead to an estimated 200 million people migrating as a result of climate change by 2050. Aside from being exposed to increased instances of trauma and violence, these migrants would also experience a loss of pre-existing social ties and the stress caused by moving to an unfamiliar place. Social support systems and positive social interactions with loved ones reduce anxiety and develop feelings of security (Harandi et al., 2017). When an individual migrates or is displaced because of climate-related factors, they are forced to leave these social support systems behind. Moreover, they are likely to face acculturative stress. 'Acculturation' is the process of assimilating into a different culture than one's own. This process can be rather stressful, as people may face difficulties in understanding and adopting the beliefs, values, and norms of the dominant culture. As such, acculturative stress refers to the psychological, social, and somatic symptoms accompanying the process of acculturation (Berry et al., 1987).

Two main factors that affect the degree to which individuals suffer acculturative stress are the motivation for migrating and the attitudes of the host population towards the migrants. For example, in a study conducted by Zhang and Goodson (2011), it was found that an estimated 15-20% of international students in US higher education institutions experienced mental health issues due to acculturative stress. In contrast, Middle Eastern

refugees showed higher rates of depression (ranging from 37-44% for Syrian female refugees in Germany) and PTSD (48% in Iraqi refugees in Australia) (Slewa-Younan et al., 2012). One reason for this might be that international students choose to migrate to other cultures as compared to refugees, who might have been forcefully displaced. As a result, international students might experience less acculturative stress as compared to refugees because they might have migrated by choice rather than by necessity. However, another explanation could simply be that refugees have higher stress rates and more experiences of trauma, regardless of whether they are displaced as a result of violence (as is common with many Middle Eastern refugees from the aforementioned sample), or as a consequence of climate-related factors, thus, making them more susceptible to disorders such as depression and PTSD. Secondly, perceived discrimination or lack of social support may also be correlated with higher levels of acculturative stress (Poyrazli and Grahame 2007), which suggests that if the new population has a welcoming attitude towards the migrants, they may experience lower levels of acculturative stress than if the host society has a hostile and unwelcoming attitude.

Additionally, the concept of 'community resilience' also comes into play when considering the individual and community mental health impact of climate-related natural disasters. In psychological terms, resilience refers to the 'process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility and adjustment to external and internal demands' (APA 2020a). Similarly, community resilience refers to a community's ability to anticipate and prepare for threats, and cope with their negative impacts (Cohen et al., 2016). Stronger communities tend to have stronger social ties and support systems, which have often been correlated with increased psychological resilience. For example, in a sample of childhood sexual abuse survivors, self-esteem support (the individual perceives that they are valued by others), and appraisal support (the individual feels that they can approach people for advice), were both instrumental in preventing the development of PTSD (Hyman, Gold and Cott 2003). This suggests that if individuals have a strong social support system to depend on, following a traumatic experience, they may be able to cope with it in a healthier manner, thus decreasing the likelihood that they would experience poor mental health as a result of said experience. Higher community resilience predicts a better response to changing conditions due to climate change. Resilient communities will be better placed to adapt to the impacts of climate change on physical and mental well-being. However, it has to be noted that communities are made up of individuals, and if majority of the individuals are trained to adopt better coping strategies and stress management skills, then the community as a whole will be more resilient. Improved mental healthcare resources may also help build self-efficacy, which refers to an individual's belief in their ability to execute specific behaviours in order to achieve a goal

(American Psychological Association 2020). Increased self-efficacy may equip individuals and communities to actively fight climate change rather than simply deal with its impacts.

This section conclusively highlights two main points:

1. Forced displacement as a result of natural disasters can cause migrants to experience acculturation stress, which can seriously impact psychological well-being if no intervention takes place; and,
2. Community resilience is incredibly important in recovering from the physical and mental impacts of climate-related disasters.

Improving disaster mental health programmes and organising workshops for coping strategies and stress management will allow individuals to become more resilient, and as a result, their communities will become better equipped to handle the impacts of climate change, in addition to actively combating it.

7. IMPACT OF HIGHER TEMPERATURES ON MENTAL HEALTH

One unexpected consequence of climate change on human mental health is that increased temperatures may result in poorer mental health both directly and indirectly. Mahendran et al., (2021) found that rising temperatures increased instances of violent crimes such as intentional homicides, sex offences, and assault. This suggests that hotter temperatures may be directly linked to increased crime rates. If this is the case, interpersonal violence during hot weather is likely to continue rising in the future, as climate change causes higher temperatures. In fact, Ranson (2014) estimated that there could be an additional 22,000 murders, 1-2 million aggravated assaults, and 2-3 million simple assaults by the end of the 21st Century as compared to 2010 as a result of rising temperatures. Heatwaves and higher temperatures are also linked to increased instances of domestic violence. Sanz-Barbero et al., (2018) investigated this correlation within the geographical context of Madrid and found that the risk of domestic violence increased three days after a heatwave, police reports increased one day after, and helpline calls increased five days after, and thus, concluded that increased temperatures were associated with a noticeable increase in domestic violence. Hotter temperatures lead to increased discomfort, which has been linked to an increased amount of hostile and aggressive thoughts, which may develop into actions (Cianconi et al., 2020). This may result in higher crime rates and more instances of domestic violence.

Higher temperatures have also been linked to increased suicide rates. Using data from multiple decades, Burke et al., (2018) found that for every 1^{o}C increase in temperature,

suicide rates rose by 0.7% in the US and 2.1% in Mexico. This study also analysed more than 600 million social media updates and found that the use of depressive language increased during warmer periods, indicating a deterioration of mental well-being. In addition, they predicted that unmitigated climate change could thus cause 9,000 to 40,000 additional suicides across the US and Mexico by 2050.

In a study conducted on a global scale by Ngu et al., (2021), two main groups were found to be more vulnerable in terms of suicide rates during heatwaves. A more significant change in suicide rates was found among women. One explanation for this could be that women are more likely to be prescribed psychotropic drugs than men, which interfere with the body's thermoregulatory processes and increase vulnerability to heatwaves (Simoni-Wastila 2000), while another explanation suggests that the existing inequality and marginalisation faced by women becomes more pronounced during extreme weather events, such as heatwaves. As indicated previously, rising temperatures can increase incidents of physical or sexual violence against women, which can result in poor mental well-being and suicide. Younger age groups (ages 15-24) also showed a significant increase in suicide rates during heatwaves. This could be linked to the fact that the brain and the central nervous system are still developing during these ages, making younger people more vulnerable to the influence of environmental changes.

Not only do such events impact individual mental health by increasing the likelihood that survivors may develop PTSD, depression, or anxiety, but they also increase the possibility that the families or descendants of these survivors may develop such disorders, or at least experience generally poor mental well-being. This is supported by research conducted into the 'intergenerational transmission of trauma.' In a study conducted by Gartland et al., (2019), 29% of women reported instances of interpersonal violence (IPV) in the first four years of motherhood, while 41% reported having experienced abuse as a child. A particularly interesting aspect of this study, however, is that if the mother had experienced IPV or childhood abuse, or if they had poor mental or physical health, then their children had a greater likelihood of exhibiting emotional/behavioural disturbances by the age of four. These results support the idea that if rising temperatures lead to increased instances of Violence Against Women (VAW) in family set-ups, then children within those families may also be mentally impacted by the violence, despite not having experienced it directly. Another study, conducted by Lünnemann et al., (2019), found that individuals who had experienced IPV during childhood were more likely to become either victims or perpetrators of violence as adults, which shows that if higher temperatures result in increased instances of violence against children, then the cycle of abuse can repeat itself over generations. Moreover, abused or neglected children were also more likely to develop trauma symptoms. The development of trauma might have a biological basis (through genetic predisposition and epigenetic changes to DNA which can be

passed on to future generations), or a sociocultural basis (traumatised parents may use unhealthy parenting techniques, and result in disorganised attachment styles and negative psychological development among children). Thus, increased instances of violence caused by climate change may result in trauma that can impact multiple generations, not just the person experiencing the event.

8. CONCLUSION

In conclusion, it is clear that climate change is likely to impact individual and community mental health in a number of different ways. Two main impacts of climate change are rising temperatures and increased rates of natural disasters, and vulnerability among populations is interdependent and relational, that is, specific segments of a population may be more vulnerable to poor psychological well-being as a result of climate change than others.

It has to be noted, however, that a relatively little research exists on the mental health impact of climate change generally, and this research is close to non-existent in the context of developing countries, such as Pakistan. There are huge gaps in knowledge surrounding the factors influencing the severity of this impact and more research is needed to outline why certain communities may be more vulnerable to experiencing poor mental well-being as a result of climate change. Cross-cultural differences may also result in a completely different presentation of symptoms in some populations as compared to others, which is another area that requires further research. Eco-psychology is a growing field and future research should include a greater operationalisation of the involved factors as well as increased use of statistical and correlational analysis techniques to increase the credibility of the relationships that have been indicated in previous research by presenting them as numerical values.

Conclusively, it is apparent that climate change does have an effect on individual and community mental health, either directly (through rising temperatures) or indirectly (through climate-induced natural disasters and related experiences), and that some populations may be more vulnerable to experiencing poor mental health as a result of climate change. One thing that is obvious, however, is that the impact does exist to some extent, and it will continue to become worse in the coming years unless key stakeholders take serious action to mitigate climate change and/or adapt to changing climatic conditions. Global mental health, within the context of climate change, is severely underestimated. Majority of the funds allotted towards climate change action are put towards curative measures such as curbing GHG emissions as compared to more adaptative action such as preparing societies and economies for the impact of climate change. Out of the budget that is allotted towards health-related projects, a very small part goes towards mental health.

The key policy recommendations that may be suggested in light of the research highlighted by this paper are as follows: 1) increasing the fraction of government health expenditure for mental health can result in greater accessibility of quality mental healthcare, which can boost productivity and reduce physical health costs, showing that the benefits of providing psychological treatment outweigh the costs. This will also increase individual resilience towards adverse life events, which will collectively result in a more resilient community that is less vulnerable to the psychological impact of climate change, and is better equipped to adapt to the changes; 2) considering that women and children have been shown to be more vulnerable to interpersonal violence during heatwaves and other natural disasters, protective legal frameworks need to be put into place, and existing laws need to be amended in order to reduce this vulnerability. This is especially important as instances of interpersonal violence can go on to affect multiple generations, not just one individual. One thing that is apparent, however, is that a great amount of work is yet to be done in terms of research regarding the psychological impact of climate change as well as the application of the data that currently exists.

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