



PSYCHOLOGICAL RESPONSES TO CLIMATE CHANGE: A META-ANALYSIS.

Wakil Ajibola ASEKUN,

*Department of Psychology,
Faculty of Social Sciences,
University of Lagos, Akoka, Lagos, Nigeria.*

ABSTRACT

The anthropogenic activities responsible for climate change in Africa may not be the same with Europe and America, but the impacts of climate change on vulnerable people are nonetheless similar across the globe in literature. However, it is only the harm to our physical health caused by climate crisis that is well reported, while the psychological outcome of the crises is often overlooked or totally ignored. This article examined the effect of climate change on psychological wellbeing of vulnerable population. The study conducted a systematic search of Psych INFO, Scopus, Web of Science, and PubMed from January 1990 to January 2024. In all, a total of 115 studies with a total of 3560 participants met the criteria for inclusion. A significant meta-analytic effect size indicated that climate change is significantly related with psychological distress, and manifested in depression, anxiety, post-traumatic stress disorder, insomnia, substance use, and behavioral disturbances. Further, the findings from the study showed that different vulnerable population groups were affected by climate change which includes young adults, pregnant women, indigent people, and persons with disabilities and those with preexisting or chronic medical conditions. Recommendations for action by relevant authorities as well as stakeholders were made.

Keywords: *Distress, health, psychological wellbeing, climate change,*

INTRODUCTION

Climate change is one of the greatest threats the world is facing today, unfortunately there is the false notion among certain people in Africa that climate change is essentially the western world's problem and so Africans have little to worry about on climate change and its impacts, however, the evidence in literature suggests otherwise. (See, IPCC 2018, 2022a; Patz et al. 2005). Although people in the continent have contributed little to the problem, they remain vulnerable to the effects of climate change (Campbell, 2023). Climate is changing at an unprecedented and alarming rate with far reaching negative consequences on the life of humans (American Psychological Association, 2021). It threatens the health, economic prospects, security, and basic food and water resources of billions of people around the world (WHO, 2023), as evidenced in the destructions caused by heat waves, heavy downpours, flooding, and droughts among others. An estimated 5 million deaths occur annually which are related to climate change (Bloomberg, 2021) thereby constituting a matter of great danger and concern for government and non-governmental organizations as well as a great number of researchers globally. This study thus attempts to aggregate and synthesize studies that examined the psychological impacts of these harms. The psychological responses to climate change seems less obvious (Clayton, 2024) and thus often not taken seriously whereas it has far reaching consequences on human functionality, there is substantial evidence for this. Climate change is associated with increased frequency and severity of extreme weather events, and the impacts of discrete events such as natural disasters on psychological health. One major way climate change impacts vulnerable people is making them experience psychological distress (Koder et al, 2023).



Psychological distress refers to be unpleasant deep feelings aroused by a traumatic or highly stressful environment or event thereby leading to experiences of sadness and anxiety by an individual. Life events such as loss of home, natural disasters like flood, can trigger psychological distress. According to literature, Psychological distress has been found in several studies to correlate with suicide risk (e.g, May & Klonsky, 2016), particularly with forced migrant populations (e.g. Kashyap & Joscelyne, 2020; Cohen, 2021 et al; Goosen et al., 2011; Rahman & Hafeez, 2003). This align with similar studies that suggest that displacement due to effects of climate change could be stressors that may impact the victims of displacement. (see Chen et al., 2020; Li, Liddell, & Nickerson, 2016; Morgan, Melliush, & Welham, 2017). For example, the temporary and uncertain nature of insecure displacement may cause hopelessness (Procter et al, 2018), and in turn, hopelessness has been consistently implicated with increased suicide risk (Ribeiro, Huang, Fox, & Franklin, 2018; Van Orden et al., 2010). In literature, there is a consensus that there exists an interconnected relationship between physical and psychological health, this forms the basis of many past interventions and has also informed many present intervention, for example, Studies have shown that Longer term climate change is associated with temperature-related illness and mortality, spread of vector-borne disease, respiratory issues and allergic response, compromised fetal and child development, thus, the knowledge of the human health impacts of climate change offers the basis upon which we can understand the interconnection of physical, psychological, and community health and well-being of the people. Failing physical health can be a source of stress which threatens psychological wellbeing. In the same vain, poor mental health can threaten physical health, such as weakening the immune system. Community health and well-being are interconnected with both. (Annis et al., 2004)

Climate Change: Physical and Psychological Health outcome in Africa

In the recent times many extreme events have occurred across Africa which is considered to be due to climate change. There have been heavy rainfall, floods, tropical cyclones, droughts, heat waves, wildfires, and sandstorms, in fact, not less than 1,839 disasters attributable to weather; climate or water hazards impacted Africa between 1970-2021. These disasters have cumulatively led to 733,585 deaths. (World Meteorological Organization 2023), these extreme events cut across different parts of Africa; North, West, East and Southern Africa. The events have spared none of the vulnerable people in these blocks. One particular way in report in which it has affected people is in the temperature/humidity which has been implicated in the easy transmission and distribution of vector-borne diseases such as malaria (Liheluka et al, 2023), this is particularly so because much of Africa is under heat stress most days of the year. Heat exposure during pregnancy has been found to be associated with increased hospitalization and mortality in newborn children. (Bekkar, 2023, et al.) During flooding drinking water become contaminated and spread cholera and other diseases.(WHO, 2021). For example, following floods in Lagos in 2017, about 50% of the hospitalizations were due to water-borne diseases, such as cholera and typhoid, flooding can also render hospitals unusable or inaccessible, thereby putting the few accessible ones nearby under pressure and putting the healthcare under heavy strain (Emhanna, 2021 et al.) In addition, extreme weather events can lead to anxiety, depression and post-traumatic stress disorder (Haase, 2023) through both the events themselves and the subsequent loss of livelihood that people face. Aside this, there is also the socio-emotional dimension to the crises occasioned by climate change, (Neckel & Hasenfratz, 2021) For example In Nigeria, After an unusual years-long drought (considered by many to be caused by climate-change) much of the country's arable land have become unsuitable for farming activities and animal husbandry, consequently, rural farmers and herders from the northern part of the country moved their activities towards southern communities, this move usually spark inter-ethnic suspicion and hostilities. What usually follows these negative affect is ethnic violence leading to loss of lives and



properties. Without adequate measures and global action, up to 216 million people in six world regions could be affected by climate-induced migration and internal displacement by 2050 (Clement et al., 2021), potentially creating new conflicts and exacerbating existing ones. The story is the same in Kenya which suffered a long drought in the northern region of the country and even in Uganda. These led to escalation in food prices on one hand, violent internal strife, and mass migration of more than a million disenfranchised people, The herders from Sudan who were fleeing from drought have seen similar climate-driven conflicts, leading researchers to predict mass violence in these areas of climate induced drought. (Seter,2016) Moreover, changes in the local environment can cause grief, emotional pain, disorientation, and poor work performance as well as harm interpersonal relationships and self-esteem. (APA, 2021) Displacement can cause a range of negative mental health impacts due to loss of place, community, and livelihoods. The loss of personal identity, autonomy, control, and culture can lead to mental distress, insecurity, diminished self-worth, sadness, anxiety, depression, anger, and weakened social and community cohesion. (Clayton, 2021).

A warming climate can also lead to aggravated interpersonal aggression, (such as domestic violence, assault, and rape) and interpersonal violence (murder). (Miles-Novelo & Anderson, 2019). Heightened anxiety and uncertainty likewise negatively impact social relationships and attitudes toward other people. (Alden and Taylor 2004, Heimberg et al. 2014). Forced relocation and the attendant challenges such as competition for scarce resources induce intergroup tension, hostility, aggression, violence (political conflict, war), and even terrorism. (APA, 2021). Worries due to harmful impact of climate change and the future can cause fear, anger, and feelings of loss of control, exhaustion, stress, and sadness. (Clayton, 2023), but it does appear in literature that climate anxiety has high prevalence among indigenous groups.(e.g, Anderson, 2016 et al). et al. There is also a tendency for higher level of vulnerability among Indigenous communities on effect of climate change (e.g, Shaffril, 2020, et al.; Abate, 2013 et al; Ford 2020, et al). This is owing to living in volatile areas such as mountainous areas, coastal areas that are subject to erosion; low-lying islands; dependent on glaciers; or arctic areas affected by melting permafrost. Besides, indigenous cultures often emphasize greater interdependence with, and respect for, the natural world, so that changes to the natural environment mandate changes in traditional practices. Cunsolo Willox (Cunsolo Willox, Harper, Edge et al., 2013. In a study; Cunsolo Willox, Harper, Ford et al. (2013) examined the impacts of climate change on mental health among Inuit communities. Her research participants report personal connection between the land and mental health, and also reported increases in substance abuse and suicidal ideation in their communities.

Objectives

Many studies have been undertaken to gain insight into the impacts of climate change on psychological wellbeing of vulnerable populations including the affective and behavioral responses to the phenomenon. These past studies shall be systematically reviewed in this paper. Thus, the study would evaluate the relationship between climate change impact and psychological wellbeing. This is to be done by means of a meta-analysis, aggregating studies that have measured climate change impact with at least one measure of psychological wellbeing. The paper shall also aggregate and synthesize current and old relevant studies with the aim of knowing how this body of work can inform clinical practice of clinicians, mental health agencies and relevant health organisations, to be able to give and to understand the magnitude of the threat that climate change poses to psychological wellbeing of people particularly in Africa where less attention is paid to the issues of impacts of climate change (Carbon brief, 2023), to understand the best possible support required for the increasing number of persons presenting with psychological distress arising from climate change. Moreover, examining the nature of the relationship would be

useful for the implementation of preventive measures, providing resources to those who need it, planning for future impacts, and preparing adaptation efforts (Clayton, 2020; Kaplan, 2020). As Climate change gets worse, so also is the mental health impacts are expected to worsen (Hayes et al., 2018). The study would therefore contribute to efforts at shedding light on how clinicians should proceed when faced with patients reporting psychological distress arising from impact of climate change.

METHOD

2.1. Search strategy and selection criteria

All articles on Psych INFO, Scopus, Web of Science, and PubMed from January 1990 to January 10, 2024 were reviewed. We Searched for terms that included depression, anxiety, post-traumatic stress disorder, insomnia, substance use, and behavioral disturbances combined with “climate change”, global warming, extreme weather, natural disaster, heat-wave, flood, storm, bushfire, cyclone, sea level, drought, hurricane, wildfire, natural hazard, (search update conducted until 02/02/2024). The terms were also searched for in grey literature using Google. The search focused on articles written only in English Language. We selected papers in which participants had exposures to extreme events associated with climate change (bushfires, droughts, floods, heat waves, hurricanes, sea level rises, storms, and wildfires; (IPCC 2014), studies that reported the psychological consequences of exposures to extreme events, Studies that measured the association between a natural disaster occurrence and the incidence of a psychological distress. All studies designs were selected. Papers were excluded if they were not empirical (i.e., review, commentaries), and studies that were not quantitative (e.g., interviews, focus groups). We excluded papers if it exclusively focused on diseases or physical-medical pathologies. We excluded any studies that did not include any psychological wellbeing measure, we also excluded papers that did not provide a way to extract correlation coefficients. Reference lists of included articles were hand searched to identify further eligible studies. We were guided by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). Retrieved database results were transferred to Endnote X9 (EndNote, 2013), with this any duplicate article was eliminated. Articles were then uploaded to Covidence systematic review software (Veritas Health Innovation, 2022) and screened for eligibility. Titles and abstracts were each independently double-screened by two reviewers. (OE & TA) The author double-screened grey literature. Full texts were then reviewed by the author.

Data Extraction and coding

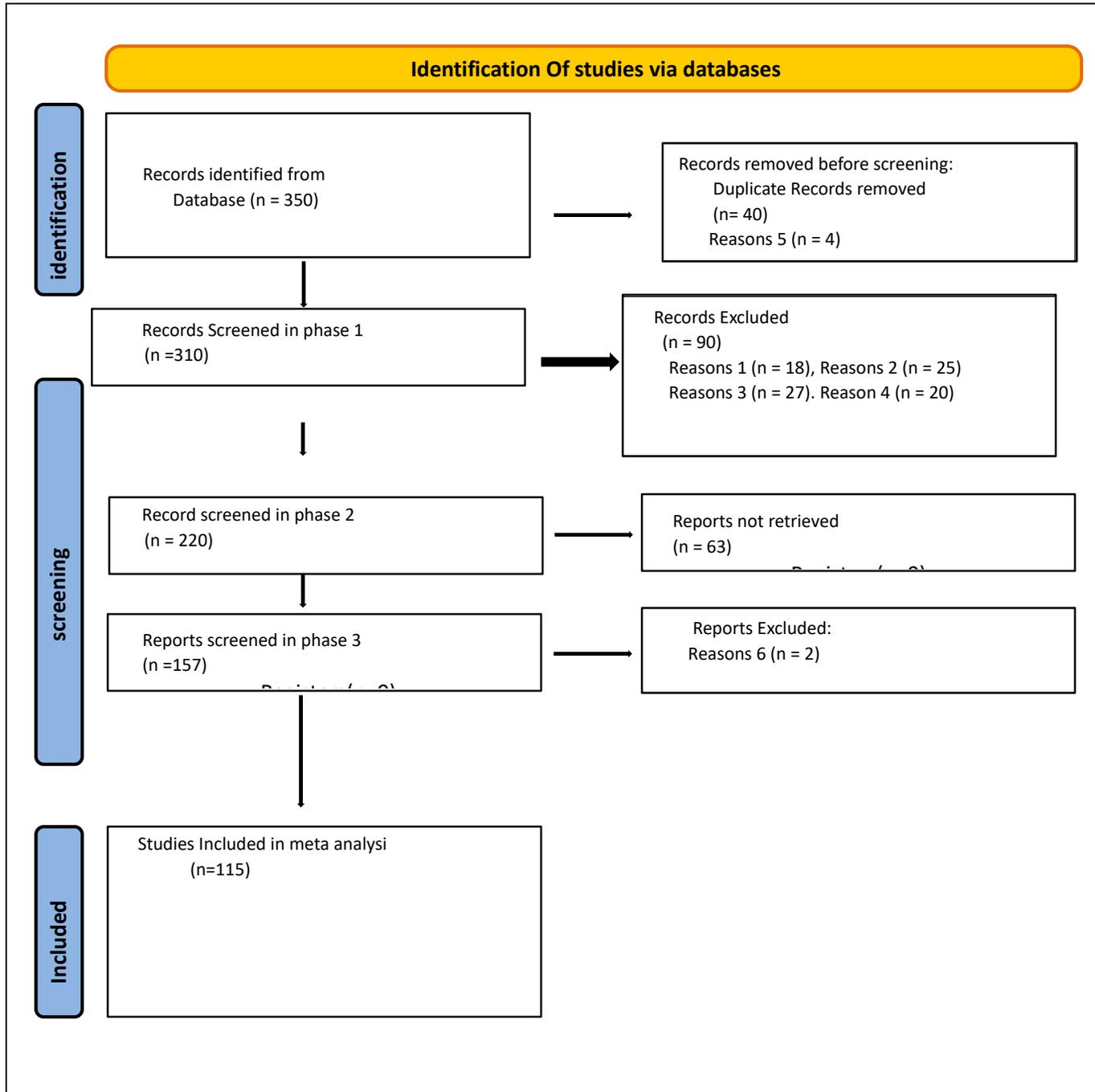
Data were extracted by two reviewers (OE & TA) and organised into tables to allow for comparison and contrasts of included studies, then independently checked by a third reviewer. The data extracted included study design characteristics, sample size, sample characteristics, Data were quantitatively synthesized using meta-analysis. To achieve the research objectives and in order to estimate the effect size, we computed for the correlations directly from from the articles. The wellbeing scales used was coded accordingly and where it was positive (high scores translates to mental health (e.g., SWLS; Diener et al., 1985) or negative (high scores suggests psychological distress, (eg., Spitzer et al., 2006). The effect sizes of negative indicators were transformed to the corresponding negative value to reflect their effect on mental health and to avoid overlap with positive indicators in the analyses. Hence, a negative effect size indicates that higher scores were related to lower wellbeing scores, and a positive effect size indicates that higher scores were associated with higher wellbeing scores. If the wellbeing measure was specific to depression or anxiety disorders or symptoms (or had a subscale that was), this correlation was also coded separately.

Statistical Analysis

We deployed R Studio software to analyse our data using distinct packages, specifically the `esc` (0.5.1; Lüdtke, 2019), `meta` (6.2-1; Balduzzi et al., 2019), `metafor` (4.0-0; Viechtbauer, 2010), `dmetar` (Harrer et al., 2019), and `metapower` (0.2.2; Griffin, 2020) packages. We were guided in our analysis following Harrer et al. (2022). We ran random effects multilevel meta-analyses for each correlation pairing the scores of scales of measure on any of the impact of extreme events and wellbeing indicator score (overall, depression-specific measures, and stress-specific measures), for a total of nine meta-analyses. The meta-analyses adopted Fisher's r -to- Z transformations as the outcome measure, restricted maximum likelihood (REML) model fitting, and Knapp-Hartung adjustments. We also adopted the cut-offs set by Richard et al. (2003) for correlation effect sizes, with .10 indicating a small correlation, .20 a medium, and .30 a strong correlation. Between-study heterogeneity was estimated using tau-squared (τ^2) and I^2 statistics. Publication bias was assessed using contour-enhanced funnel plots and Egger's regression tests. We conducted sensitivity analyses using the `dmetar` package to find outliers and repeated the meta-analyses without these studies, providing more robust results. Furthermore, we performed influence analyses and displayed these results in "leave-one-out" forest plots and Baujat plots. Selection bias, measurement bias and non-response bias were appraised and rated on six items for cross-sectional studies and seven items for cohort studies.

We also adopted the cut-offs set by Richard et al. (2003) for correlation effect sizes, with .10 indicating a small correlation, .20 a medium, and .30 a strong correlation. Between-study heterogeneity was estimated using tau-squared (τ^2) and I^2 statistics. Publication bias was assessed using contour-enhanced funnel plots and Egger's regression tests. We conducted sensitivity analyses using the `dmetar` package to find outliers and repeated the meta-analyses without these studies, providing more robust results. Furthermore, we performed influence analyses and displayed these results in "leave-one-out" forest plots and Baujat plots. Selection bias, measurement bias and non-response bias were appraised and rated on six items for cross-sectional studies and seven items for cohort studies.



Figure1: PRISMA flowchart describing the systemic literature search

Records removed before screening: Duplicate records removed (n = 40) Records screened in phase 1 (n = 310) Records excluded (n = 90) Inaccessible (n =30) Language (n = 22) Unempirical (n = 50) unempirical (n= 40) Reports screened in phase 2 (n = 220) Reports excluded (n = 63) Reports screened in phase 3 (n = 157) Reports excluded (n = 42): Didn't assess wellbeing (n =21) Didn't provide correlation coefficients (n = 5) Studies included in meta-analysis (n = 115)



Identification of studies via databases, registers, and other methods Identification Screening Included Figure 1 PRISMA flowchart describing the systemic literature search

Table 1: Description of the included studies.

Characteristics of Studies	Total no of Articles	Percentage%
Type of Data	115	100
Original	0	0
Secondary		
Study Design		
Longitudinal	22	19
Cross-Sectional	93	81
Continent		
America	55	47.8
Europe	45	39.1
Africa	10	11.5
Australia	05	2.0
Classification on Age		
Young adults	20	17.4
Adults	50	43.5
Aged	30	26.1
Type of climate		
Flooding	50	43.5
Heat wave	43	37.4
Desertification	10	8.6
Others	12	10.4
Socio-economic status		
High	20	17.4
Median	30	26.1
Low	50	43.5
Not stated	15	13.4
Total	115	100

In all, a total of 115 studies with a total of 3,560 participants met the criteria for inclusion. The participants of included studies came from 18 countries of four continents which include America, Europe, Africa and Australia. America. has the highest number of representation with fifty five of the studies (47.8%) undertaken in the continent. Europe followed with 45 number of studies (39.1) while Africa has 10 number of studies (11.5%). Australia has 5 (2, 0%) Quite a handful of the authors conducted their researches on young adults sample n= 20 (17.4%), 50 (43.5) studies used adults for their studies while 30 (26.1%) conducted their studies on the aged. As regards the type of climate, flooding accounted for 50 of 115 papers included (43.5%) while studies on the impact of heat wave are 43(37.4%) while desertification is 10 (8.6%) and others made up the last 12 papers (10.4%). On socio-economic status, participants with high economic social status are 20(17.4), median is 30(26.1%) while low is 50 (43.5%) and finally those who did not state their socio-economic status constitute the last 15 papers (13.4%).

Table 2: A summary of included studies and the characteristics

Study	Res. Title	Design	N	Country	Mean Age S.D	Measure
La greca et al (2023).	Climate change and extreme weather disasters: evacuation stress is associated with youths' somatic complaints.	Cross sectional Cross sectional	226	USA	9.76, 2.55	Before and after the storm Experiences (BASE) Storm Experiences (BASE) Hurricane-Related Traumatic Experiences-II (HURTE-I)
Schwaab et al., (2022)	Climate Change Related Depression, Anxiety and Stress Symptoms Perceived by Medical Students	Cross sectional	249	Germany	25.21 3.71	<i>Posttraumatic Stress Scale-10</i> Generalized Anxiety Disorder Scale-7
Bryant et al. (2014)	Psychological outcomes following the Victorian Black Saturday bushfires	Cross sectional	1017	Australia	NR	K6 screening scale
Acharbasam & Anuga (2018)	Psychological distance of climate change and mental health risks assessments of smallholder farmers in Northern Ghana	Cross sectional	180	Ghana	38.0	A psychological affective style modeling scale
Hickman et al. (2021)	Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey	Cross sectional	10,000	Australia, Brazil, Finland, France, India, Nigeria, Philippines, Portugal, the UK, and the USA	20.82 2.54	Climate-related thoughts, beliefs about government response Negative thoughts about climate change
Lindhe et al, (2023)	Tailored internet-delivered cognitive behavioral therapy for individuals experiencing	Experimental	60	USA	23.73	Measure of depressive symptoms

Hieronimi et al (2024).	psychological distress associated with climate change: A pilot randomized controlled trial A Germany- wide survey of caregiving professionals on climate change and mental health of children and adolescents – factors influencing their relevance rating of extreme weather event associated mental health impairments	Cross sectional	648	Germany	NR	Questions were created after prior literature research and adapted from existing questionnaires
Thomson & Roach (2023)	Association between mental health, lifestyle factors and worries about climate change in Norwegian adolescents		5,768	Norway	NR	Depressive Mood Inventory
Clayton et al., (2020)	Psychological and emotional responses to climate change among young people worldwide.	Cross sectional	10,000	Australia, Brazil, Finland, France, India, Nigeria, Philippines, Portugal, the UK, and the USA	NR	Climate-related worry
Galea et al (2007)	Exposure to Hurricane-Related stressors and mental illness after Hurricane Katrina	Cross sectional	1043	USA	NR	The K6 scale of nonspecific psychological distress

*NR = Not reported

Meta analytic Effect size

The random effects multilevel meta-analysis revealed a strong negative correlation between the measures and overall wellbeing scores, $r = -.384$, 95% CI [-.432; -.320], $p < .001$, which suggests that the greater the levels of climate change the lower the level of wellbeing. Moreover, the pooled effect sizes ranged from $r = -.412$ (95% CI [-1.244; - 0.135], $p < .001$) for the climate change–wellbeing correlation, to $-.335$ (95% CI [-.3065; -.234], $p < .001$) for the depression. Correlations ranged from $r = -.453$ to $.092$, with 95% being negative. The corresponding prediction interval for Meta-analysis on climate anxiety and wellbeing 23 the standard meta-analysis, not multilevel, ranged from $-.625$ to $.206$, which indicates that although the expected outcome of any individual

study is a negative correlation, it is still possible for positive correlations to occur. And a posteriori power analysis of this random-effects model suggests there were enough included studies to detect the existence of an effect (power = 1)

Aside the result on effect size, the finding of our systematic review indicates that participants responded to incidents of climate change-induced disaster with feelings of distress which range from, anxiety and sleep disturbances to depression, post-traumatic stress, and suicidal thoughts. Other reactions to climate change-caused incidents include its effect on individuals and communities in their everyday life, perceptions, and experiences, having to cope, understand, and respond appropriately to climate change and its implications. It is worthy of note to report that a significant number of participants in the reviewed papers who had exposure to climate or weather-related natural disasters experience stress and serious psychological consequences. The categories of people affected include: children, (e.g., Hickman, 2021; Burke, 2018; Trebble et al, 2023; Rusell & Rusell, 2007), young adults (e.g., Precipe, et al., 2023; Schwaab et al., 2022) pregnant women, (e.g., Olson & Gas, 2020; Porter & Junker 2023) indigent people,(e.g. Tan et al., 2 Deshpande, 2002; Sarma, 2004), people with disabilities (Lindsay et a., 2022; Gaskin et al, 2017; Boon et al. 2011; Polack 2008;), and those with preexisting or chronic medical conditions (e.g., Woodland et al., 2023; Expectedly, Our review also show that reactions to extreme events that involve life disruptions, such as bereavement, loss of properties, resources, social support and social networks, or forced relocation lead to post-traumatic stress disorder (PTSD), depression, and general anxiety, increased substance use or misuse, and suicidal thoughts. Past studies have shown that peri-traumatic experience is highly related to acute stress during and immediately after a disaster, which is expected to lead to the onset of PTSD. Later on, other consequences come out for survivors, such as loss of interest in the normal days activities, which may be due to loss of “sense of place”. These conditions could have an impact and exacerbate mental health risks. Moreover, people could find news concerning climate change very disturbing and creates the feelings of uncertainty, sense of loss of control, and a sense of powerlessness. The concrete impact of those changes in life brings different types of psychopathological reaction to these events. There are also social dimension to this response, this is because When people get uncomfortably hot, their tempers, irritability, and likelihood of physical aggression and violence increase. (Anderson, 1989, 2001; Anderson & Anderson, 1984, 1996, 1998; Anderson, Anderson, Dorr, DeNeve, & Flanagan, 2000; Anderson, Bushman, & Groom, 1997; Anderson & DeLisi, 2011).

That rapid climate change will (and already is) negatively affecting the livelihoods and aggressive tendencies of individuals is obvious, but it is informative to consider how entire populations respond to these effects. Among the most prominent group-level effects anticipated is *ecomigration*, where entire groups migrate in response to the physical, economic, or political instability brought about by an ecological disaster. Although Eco migration is not, in and of itself, a sign of aggression, it can lead to hostility and conflict through a sudden increase in competition for an area’s resources, bringing together people with opposing or incompatible worldviews, concerns about the intentions of both the migrant group and the local population, and a host of socioeconomic issues. Indeed, there are numerous historical examples of climate disasters leading to ecomigration, war, and even dynastic collapse. Unfortunately, some natural disasters are likely to occur more frequently because of climate change if efforts to contain them tarry.

DISCUSSION

Climate change-related extreme events and natural disaster cause stress, anxiety, depression and other forms of psychological problems. If concerted and deliberate efforts are not made to halt the increasing change that brings unstable and strained earth systems, this shall continue to



put pressures on the psychological wellbeing of the global populations,(Adger et al 2022), particularly in marginalised demographics. This review was undertaken to examine the research that exists on the psychological impacts of climate change in order to inform ongoing studies, furnish professionals in the mental health profession and even outside the profession on the knowledge about the role of climate change on human's psychological wellbeing and also raising awareness of the issue to other relevant stakeholders who are in position to offer the necessary intervention wherever possible to stem the tide of negative influences of climate change. It is noteworthy that the phenomenon has aroused interest and concern to the point of the emergence of new fields such as climate psychology as well as Eco psychology and is rapidly gaining traction as a cogent area of study (see Koder 2023 et al.). Efforts are also ongoing to develop taxonomy of ecological or Earth emotions (Albretch, 2019). More studies need to be done to build consensus on accurate and effective terms to describe climate-related distress. (Adger et al). As well as coping and resilient building tactics, Interestingly, Indigenous communities have been constantly adapting to the effects of environmental stresses over a very long period with numerous climate-change adaptation mechanisms. However, more recent impacts of climate change have placed significant strain on these communities (Ingty, 2017) as indigenous people are impacted in idiosyncratic ways by climate change (Scoville-Simonds, 2020). It is in the interest of government in Africa, not only to formulate policies that seeks to reduce the impact of climate change to its minimal level but to also ensure that human and natural resources are optimally deployed to enhance the coping and resilience capacity of the vulnerable populations.

This would reduce the barriers to climate change adaptation that are often seen across Africa, which include the unequal global vulnerability of populations, differential responsibility, and unequal power in decision-making concerning policymaking, thus undermining the resilience capability of indigenous communities (Filho, 2020 et al.)

Conclusion

Climate change is not just an environmental, but also a psychological problem. Although psychologists have been involved in addressing implications of climate change for decades, most of that work has focused on risk perception, ways to communicate about climate change, attitudes about climate change, and interventions to promote mitigation through more sustainable behavior. There has been relatively little acknowledgement of the mental health implications of climate change, this article has contributed by reechoing the concerns of experts and researchers in the field on the present danger of climate change. To help the vulnerable to cope with the consequences of the climate change on psychological wellbeing, the vulnerable population's intervention need should to be prioritized by relevant stakeholders. It is easy to overlook the relevance of psychological science to climate change. Therefore, it is unsurprising that many people also overlook the important role that psychological scientists can play in reducing climate change and its effects. One of the ways the discipline helps is by applying what we know about attitude change, decision-making, and behavior change to help educate the general population (e.g., public service announcements, teaching modules), public policymakers, and politicians. For example, psychological studies show that fostering a long-term perspective in people makes them more likely to consider their legacy and engage in more pro-environmental behavior. Other psychologists have found that when you frame climate change in global terms, rather than in terms of specific, localized disasters, people become more peaceful and reconciliatory — something that could prove very useful as a means of counteracting the effects of climate change on aggression. Clearly, indeed there are many ways, in which psychological science contribute in ameliorating the impacts of climate change, particularly the psychosocial dimension of the challenge. These efforts would become more impactful however if we conduct more interdisciplinary research — working hand-in-hand with climatologists, medical science



researchers, political scientists, and economists. For example, some of the best psychological studies on the relationship between temperature and aggression have proven just how beneficial it can be to integrate climatological data into analyses of behavioral data. Incorporating techniques and data from other fields may help to build more accurate models of climate-change effects that include subtler, less-frequently considered outcome variables. An interdisciplinary approach also may prove vital in bridging the gap between what scientists know, what the general public believes, and what government policies exist.

REFERENCES

- Adger, W.N., Barnett, J., Heath, S. (2022). Climate change affects multiple dimensions of well-being through impacts, information and policy responses. *Natural Human Behaviour* 6, 1465–1473 (2022). <https://doi.org/10.1038/s41562-022-01467-8>
- Alden L.E. & Taylor C.T., (2004). Interpersonal processes in social phobia, *Clinical Psychology Review*, 24(7), 857–882.
- APA (2021). Urgent need to address mental health effects of climate change, says report www.apa.org/news/press/releases/2021/11/mental-health-effects-climate-change
- Balduzzi S, Rücker G, Schwarzer G (2019). How to perform a meta-analysis with R: a practical tutorial *BMJ Mental Health* 2 (2), 153-160.
- Bekkar, B, DeNicola, N, B Girma, S. P, Sheffield, P (2021) Pregnancy and newborn health - heat impacts and emerging solutions Bloomberg www.bloomberg.com/news/articles/2021-07-07/climate-change-linked-to-5-million-deaths-a-year-new-study-shows
- Bryant R. A, Waters E, Gibbs L, Gallagher HC, Pattison P, Lusher D, MacDougall C, Harms L, Block K, Snowdon E, Sinnott V, Ireton G, Richardson J, Forbes D (2014). Psychological outcomes following the Victorian Black Saturday bushfires. *Australia New Zealand Journal of Psychiatry*. 48(7):634-43. doi: 10.1177/0004867414534476.
- Burke S. E. L, Sanson AV, Van Hoorn J. (2018). The psychological effects of climate change on children. *Current Psychiatry* 11; 20(5):35. doi: 10.1007/s11920-018-0896-9.
- Campbell .S(2023). How climate change is affecting Africa: New and recent articles on the impacts of climate change on this vast Continent — and what Africans are doing about it. [www.http: How climate change is affecting Africa Yale Climate Connections](http://www.yaleclimateconnections.org/2023/07/20/how-climate-change-is-affecting-africa/)
- Carbon Brief (2006). www.carbonfree.org:In-depth: How climate change affects health in Africa - Carbon Brief Integrated Regional Information Networks. *Uganda: Drought forces Sudanese herdsmen into northeast*. Retrieved from <http://www.irinnews.org/report/57871/uganda-drought-forces-sudanese-herdsmen-into-northeast>
- International Federation of Red Cross and Red Crescent Societies. (2006). *Eastern Africa: Regional drought response* [DREF Bulletin NO. MDR64001]. Retrieved from <http://reliefweb.int/report/burundi/eastern-africa-regional-drought-response-dref-bulletin-no-mdr64001>
- Chen, S., Bagrodia, R., Pfeffer, C. C., Meli, L., & Bonanno, G. A. (2020). Anxiety and resilience in the face of natural Disasters associated with climate change: a review and methodological critique. *Journal of Anxiety Disorders*, 10(2) 297-310.
- Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of*



Environmental Psychology, 69 101434. <https://doi.org/10.1016/j.jenvp.2020.101434>

- Clayton, S., Manning, C. M., Speiser, M., & Hill, A. N. (2021). Mental health and our changing climate: Impacts, inequities, responses. Washington, D.C.: American Psychological Association, and ecoAmerica
- Clayton, S.D.; Pihkala, P., Wray, B. & Marks, E. (2023). Psychological and emotional responses to climate change among young people worldwide: Differences associated with gender, age, and country. *Sustainability* 15, (3) 540-554. <https://doi.org/10.3390/su15043540>
- Clement V., Rigaud K. K., de Sherbinin A., Jones B., Adamo S., Schewe J., Sadiq N & Shabahat E. (2021). *Groundswell Part 2: Acting on Internal Climate Migration*. The World Bank.
- Cohen, J., L. Agel, M. Barlow, C.I. Garfinkel, & I. White. (2021). Linking Arctic variability and change with extreme winter weather in the United States. *Science*, Vol 373 (Issue 6559), 1116-1121. DOI: 10.1126/science.abi9167
- Cunsolo Willox, A., Harper, S. L., Edge, V. L., Landman, K., Houle, K., & Ford, J. D. (2013). The land enriches the soul: On climatic and environmental change, affect, and emotional health and well-being in Rigolet, Nunatsiavut, Canada. *Emotion, Space and Society*, 6, 14–24.
- Deshpande R S.(2022). Suicide by farmers in Karnataka: Agrarian distress and possible alleviatory steps. *Economics and Politics Weekly*. 37:2601–10.
- Doherty, T (2015). Mental health impacts In B. Levy, & J. Patz (Eds.). *Climate change and public health* (pp. 195–214). New York: Oxford University Press
- Emahanna, M & Najeeb S.B (2021). Causes and impacts of rising water table Adjabiya city, Libya. *International Journal of Environment and Water*, 10 (2) 721
- Filho Leal, W., Matandirotya, N. R., Lütz, J. M., Alemu, E. A., Brearley, F. Q., Baidoo, A. A., Kateka, A., Ogendi, G. M., Adane, G. B., Emiru, N., & Mbih, R. A. (2021). Impacts of climate change to African indigenous communities and examples of adaptation responses. *Nature communications*, 12(1), 6224. <https://doi.org/10.1038/s41467-021-26540-0>
- Ford, J.D, King, N., Gallappatti., E.K., Pearce., T. McDowel., G., Harper., S.L (2020). The resilience of Indigenous peoples to environmental change. *One Earth* 2, 532–543 (2020)
- Gaskin, C. J., Taylor, S. Kinnear, J. Mann, W. Hillman, & Moran, M. (2017). Factors associated with climate change vulnerability and the adaptive capacity of people with disability: A systematic review. *Weather Climate Sociology*, 9, 801-814
- Haase, E (2023). How Extreme Weather Events Affect Mental Health. Retrieved from: [www. Psychiatry.org](http://www.Psychiatry.org) - How Extreme Weather Events Affect Mental Health
- Hayes, K., & Poland, B. (2018). Addressing mental health in a changing climate: Incorporating mental health indicators into climate change and health vulnerability and adaptation assessments. *International Journal of Environmental Research and Public Health*, 15(9), 1806. <https://doi.org/10.3390/ijerph1509180>
- Heimberg RG, Hofmann SG, Liebowitz MR, Schneier FR, Smits JA, Stein MB, Hinton DE and Craske MG (2014) Social anxiety disorder in DSM-5' *Depression and Anxiety*, 31(6), 472–479.
- Ingt, T. (2017). High mountain communities and climate change: adaptation, traditional ecological knowledge, and institutions. *Climate Change*. 145, 41–55
- Intergovernmental. Panel on Climate. Change (2018). Special report: global warming of 1.5°C. Rep., Geneva, Switzerland. <https://www.ipcc.ch/sr15/>
- John P. B, Russell S, Russell P. S. (2007). The prevalence of posttraumatic stress disorder among children and adolescents affected by tsunami disaster in Tamil Nadu. *Disaster Management Response*. 5:3–7
- Kaplan, E. A. (2020). Is climate-related pre-traumatic stress syndrome a real condition? *American Image* 77(1), 81–



104. <https://doi.org/10.1353/aim.2020.0004>

Kashyap, K Joscelyne, A. (2020). *Refugees and suicide: when the quest for a better life becomes thwarted*, Academic Press

Koder, J.; Dunk, J.; Rhodes, P. Climate distress: A review of current psychological research and practice. *Sustainability* 15, 8115. <https://doi.org/10.3390/su15108115>

Li, SS, Liddell, BJ and Nickerson, A (2016) The relationship between post-migration stress and psychological disorders in refugees and asylum seekers. *Current Psychiatry Reports* 18, 82. [CrossRefGoogle ScholarPubMed](https://doi.org/10.1007/s11845-016-0388-8)

Liheluka EA, Massawe IS, Chiduo MG, Rumisha S. F, Ishengoma DS.(2023). Community knowledge, attitude, practices and beliefs associated with persistence of malaria transmission in North-western and Southern regions of Tanzania. *Malaria Journal*. 22(1)

Lindhe N, Bengtsson A, Byggeth E, Engström J, Lundin M, Ludvigsson M, Aminoff V, Berg M, Andersson G. Tailored internet-delivered cognitive behavioral therapy for individuals experiencing psychological distress associated with climate change: A pilot randomized controlled trial. *Behaviour Research Therapy*. 104438. doi: 10.1016/j.brat.2023.104438. PMID: 38006766

Lindsay S, Hsu S, Ragunathan S, Lindsay J.(2023). The impact of climate change related extreme weather events on people with pre-existing disabilities and chronic conditions: a scoping review. *Disability Rehabilitation*. 45(25):4338-4358. doi: 10.1080/09638288.2022.2150328. Epub 2022 Nov

May, AM . Klonsky E.D (2016). What distinguishes suicide attempters from suicide ideators? A meta-analysis of potential factors *Clinical Psychology: Science and Practice*, 23 (1) (2016), pp. 5-20, 10.1111/cpsp.12136

Mohamed Shaffril, H. A. et al. Systematic literature review on adaptation towards climate change impacts among indigenous people in the Asia Pacific regions. *Journal of Clean Production*. 258, 120595 (2020)

Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. (2021) The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLoS Med* 18(3): e1003583. <https://doi.org/10.1371/journal.pmed.1003583>

Patz JA, Campbell-Lendrum D, Holloway T, Foley J. A. (2005). Impact of regional climate change on human health. *Nature* 4 (38):310–317

Prencipe, L, Houweling, T.A, van Lenthe & Kajula L. (2023). Climate distress, climate –sensitive risk factors, and mental health among Tanzanian youth: a cross sectional study. *The Lancet Planetary Health*. 7 (3), 234

Procter , N.G, Kenny, M. A, Eaton, H & Grech .C. (2018)Lethal hopelessness: Understanding and responding to asylum seeker distress and mental deterioration. *International Journal of Mental Health Nursing*, 27,{448–454},

Rahman, A and Hafeez, A (2003) Suicidal feelings run high among mothers in refugee camps: a cross-sectional survey. *Acta Psychiatrica Scandinavica* 108, 392–393. [CrossRefGoogle ScholarPubMed](https://doi.org/10.1080/0803888031000163888)

Ribeiro, J.D, Huangn X, Fox K.R., and Franklin J.C (2018).Depression and hopelessness as risk factors for suicide ideation, attempts and death: meta-analysis of longitudinal studies}, *British Journal of Psychiatry*}, 212}, 279 - 286

Sarma, E. A.(2004).. Is rural economy breaking down? Farmers' suicides in Andhra Pradesh. *Economics and Politics Weekly*, 39:3087–9.

Schwaab L, Gebhardt N, Friederich HC, Nikendei C. Climate Change Related Depression, Anxiety and Stress Symptoms Perceived by Medical Students. *Int J Environ Res Public Health*. 2022 Jul 27;19(15):9142. doi: 10.3390/ijerph19159142. PMID: 35897512; PMCID: PMC9332784

Seter H. (2016). Connecting climate variability and conflict: implications for empirical testing. *Political Geography*. 53:1–9



- Tan H. Z, Luo Y. J, Wen S. W, Liu A. Z, Li S. Q, Yang T. B, (2004). The effect of a disastrous flood on the quality of life in Dongting lake area in China. *Asia Pacific Journal of Public Health.*;16:126–32.
- Treble M, Cosma A, Martin G.(2023). Child and adolescent psychological reactions to climate change: A narrative review through an existential lens. *Current Psychiatry.* 25(8):357-363. doi: 10.1007/s11920-023-01430-y. Epub 2023 Jun 24. PMID: 37354373.
- Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner TE Jr. The interpersonal theory of suicide. *Psychol Rev.* 2010 Apr;117(2):575-600. doi: 10.1037/a0018697. PMID: 20438238; PMCID: PMC3130348.
- WHO's fact sheet at <http://www.who.int/hac/techguidance/ems/en/floodingandcommunicableiiseasesfactsheet.pdf>
- WHO (2023) [www.Climate change \(who.int\)/news-room/facts-sheets/detail/climate-change-and-health](http://www.who.int/news-room/facts-sheets/detail/climate-change-and-health) World meteorological Organisation (2023).WMO confirms that 2023 smashes global temperature record. Retrieved from: [2023 shatters climate records, with major impacts \(wmo.int\)](https://www.wmo.int/news/2023-shatters-climate-records-with-major-impacts)
- Woodland L, Ratwatte P, Phalkey R, Gillingham EL. Investigating the health impacts of climate change among people with pre-existing mental health problems: A scoping review. *International Journal of Environmental Research and Public Health.* 18; 20(8):5563. doi: 10.3390/ijerph20085563. PMID: 37107845; PMCID: PMC10138675