CLIMATE CHANGE AND HUMAN VULNERABILITY: ANALYZING DISPROPORTIONATE IMPACTS ACROSS POPULATIONS

V. Swati & M. Swathi, Assistant Professor, Vels Institute of Science, Technology & Advanced Studies (VISTAS)

ABSTRACT

Climate change is a global crisis, but its impacts are not equally distributed. Vulnerable populations including Indigenous communities, Small Island Developing States (SIDS), low- income groups, and those dependent on climate-sensitive livelihoods—bear a disproportionate burden. These communities often lack the economic, political, and infrastructural capacity to adapt to environmental shifts, making them especially susceptible to climate-induced hardships.

Indigenous peoples, for instance, are deeply connected to the land and natural resources, both culturally and economically. Climate change exacerbates the difficulties already faced by these groups, including political and economic marginalization, displacement, and the erosion of traditional knowledge systems. In Africa's Kalahari Desert, Indigenous communities are increasingly forced to live around government-drilled bores for water due to rising temperatures and expanding dunes, leading to heightened dependence on external support and loss of autonomy. Similarly, SIDS such as Tuvalu are on the frontline of the climate crisis. Rising sea levels, tropical cyclones, coral bleaching, and saltwater intrusion threaten not only livelihoods but also the very existence of these nations. Tuvalu, comprising nine low-lying coral islands, has been classified by the United Nations as "extremely vulnerable" to climate change, highlighting the existential risk posed by environmental degradation.

This paper explores how climate change intensifies existing inequalities, disrupts traditional ways of life, and threatens cultural and biological diversity. It underscores the urgent need for climate justice recognizing the unique vulnerabilities of these communities and ensuring their inclusion in global and national policy responses. Adaptation strategies must be locally grounded, culturally sensitive, and supported by robust financial and technological aid from the international community. Without immediate action, climate change will continue to widen the gap between the resilient and the vulnerable, turning an environmental issue into an even deeper social

crisis.

Keywords: extremely vulnerable, global crisis, national policy, environmental issue, climate crisis.

Introduction

Climate change is an important aspect that needs to be understood in depth, especially taking its effects on vulnerable communities into consideration, as it is crucial to learn about ways to provide a better lifestyle and reduce the hardships faced by these populations. When we emphasize these vulnerable communities, we refer to communities of colour, aged people, persons with disabilities, migrant workers, gender minorities, religious minorities, displaced persons or homeless individuals, children, and women. Inequality, in a way, is deeply intertwined with climate change and often determines how severe the impact of global warming and related changes can be. In the Indian context, the issue becomes even more critical. India is among the countries most vulnerable to the effects of climate change, ranking 7th on the Global Climate Risk Index 2021.

Rising temperatures, irregular monsoons, droughts, and severe flooding have intensified socioeconomic disparities across regions. According to NITI Aayog's 2023 report, nearly 600 million Indians face high to extreme water stress, while climate induced migration is expected to displace more than 45 million people by 2050. Marginalized communities such as rural farmers, tribal groups, slum dwellers, and coastal populations bear the brunt of these effects due to their limited adaptive capacity and economic vulnerability.

While the rich and privileged largely contribute to greenhouse gas emissions, the vulnerable communities are the most affected and left to suffer the consequences. Therefore, climate change cannot be viewed merely as an environmental crisis—it is also a social and developmental crisis, exposing the deep inequalities in wealth, access to resources, and resilience capacities within societies like India. Addressing climate change thus requires an intersectional approach that combines environmental action with social justice and inclusive development.

Women in the Face of Climate Change

Climate change disrupts traditional livelihoods, particularly in agriculture, disproportionately affecting women. Women make significant contributions to the agricultural

sector, especially in developing countries like India, where nearly 80% of rural women are engaged in agricultural work (FAO, 2023). They are responsible for crucial tasks such as food production, livestock care, and water collection. Extreme weather events such as droughts, floods, and erratic rainfall destroy crops, reduce productivity, and worsen food insecurity, placing women's livelihoods and household nutrition at severe risk. In states like Maharashtra, Odisha, and Jharkhand, prolonged droughts have pushed thousands of women farmers into poverty, forcing seasonal migration or dependence on unpaid labor.

Water scarcity is another critical consequence of climate change that deeply affects women in India. According to NITI Aayog's Composite Water Management Index (2023), around 600 million Indians face high to extreme water stress, with women bearing the burden of fetching water in nearly 80% of rural households. As rivers and groundwater sources dry up or become contaminated, women and girls are forced to travel longer distances sometimes up to 5–10 kilometers daily to collect water. This increases their physical strain, reduces time for education and income generating activities, and perpetuates gender inequality.

Climate change also has serious implications for women's health. Rising temperatures and altered rainfall patterns have led to an increase in vector borne diseases such as malaria, dengue, and chikungunya, which disproportionately affect women and children. According to India's National Vector Borne Disease Control Programme (NVBDCP), cases of dengue have more than tripled in the past decade, partially attributed to changing climatic conditions. Pregnant women and lactating mothers are particularly vulnerable due to limited access to healthcare facilities, especially in disaster prone areas.

Furthermore, climate induced scarcity of clean water and sanitation exacerbates the risk of waterborne diseases, increasing maternal and infant mortality rates in rural India. Climate induced disasters, such as floods, cyclones, and sea level rise, often displace entire communities. In India, disasters like Cyclone Amphan (2020) and Bihar floods (2021) forced millions from their homes women being the most affected due to existing gender inequalities. Studies by UN Women and the National Disaster Management Authority (NDMA) highlight that displaced women face heightened risks of gender based violence, sexual exploitation, and trafficking in relief camps. Additionally, the loss of homes, land, and livelihood opportunities pushes them into deeper cycles of poverty and dependence. Climate change also exacerbates gender disparities by limiting women's participation in decision making processes.

Despite being on the frontlines of climate impacts, women remain underrepresented in policy and community decision making bodies. According to the Ministry of Environment, Forest and Climate Change women constitute less than 15% of participants in local climate adaptation and disaster management committees.

This exclusion prevents the formulation of gender responsive climate policies that reflect the lived experiences of women and local realities. Empowering women's participation in leadership and climate governance is thus essential to achieving equitable and sustainable climate resilience in India.

Elderly Populations Facing Climate Change

Climate change poses severe threats to older adults, particularly through rising temperatures and frequent heatwaves. In India, cities like Delhi have recorded extreme temperatures exceeding 49°C during the 2024 summer, largely due to air pollution and urban heat island effects. Older adults are especially vulnerable to heat related illnesses such as dehydration, heatstroke, and cardiovascular distress. Age related physiological changes, chronic diseases, and reduced mobility limit their ability to adapt to temperature fluctuations, while medications often heighten these risks.

A case study by the Centre for Science and Environment (CSE, 2024) on the Delhi Heatwave Crisis found that the elderly accounted for nearly 68% of heat related hospital admissions and over 70% of deaths during peak heat periods. Poor housing conditions, inadequate cooling facilities, and limited healthcare access amplified these effects, especially among low income senior citizens living in urban slums. Beyond heat, extreme weather events like floods, cyclones, and wildfires disrupt essential services and infrastructure, making evacuation and medical care difficult for the elderly. For instance, during the Assam floods of 2022, many aged individuals were stranded without medication or transport support, highlighting gaps in emergency planning for senior citizens.

Air pollution, another byproduct of climate change, worsens respiratory ailments such as asthma and chronic obstructive pulmonary disease (COPD), which are prevalent among India's older population. According to The Lancet Planetary Health (2023), prolonged exposure to high PM2.5 levels in cities like Delhi and Lucknow has significantly increased mortality rates among those above 60 years of age. Climate change also indirectly contributes to social isolation and

mental health issues among the elderly. Floods, power outages, and damaged infrastructure can trap older adults indoors, cutting them off from family and community networks.

The loss of social connections leads to higher rates of depression and anxiety, particularly in displacement prone regions such as Bihar and Odisha. These interconnected challenges reveal the urgent need for age sensitive climate policies in India. Heat action plans, early warning systems, and community based healthcare initiatives must be tailored to safeguard the physical and emotional wellbeing of older citizens amid an increasingly unpredictable climate.[1]

Climate Change Through the Lens of Communities of Colour

Communities of colour such as Black, Latino, Asian, and Indigenous populations are disproportionately affected by the impacts of climate change due to systemic racism, economic inequality, and environmental neglect. These groups are often concentrated in areas near polluting industries, highways, or waste disposal sites, exposing them to hazardous air and water quality. This pattern of environmental racism intensifies health disparities, particularly higher rates of asthma, cardiovascular disease, and heat related illnesses.[2] For example, in the United States, a 2021 EPA report found that Black Americans are 40% more likely to live in areas with extreme heat exposure and 1.5 times more likely to be hospitalized for respiratory illnesses linked to air pollution. Climate change further exacerbates food insecurity and displacement among communities of colour.

Rising temperatures and unpredictable rainfall patterns threaten agricultural livelihoods and food affordability. Urban "food deserts"—areas with limited access to affordable, nutritious food—are predominantly located in minority neighborhoods, compounding health and economic vulnerabilities. Disasters like Hurricane Katrina (2005) and Hurricane Maria (2017) revealed the racial inequities in disaster preparedness and recovery, where African American and Latino communities faced greater displacement, slower rehabilitation, and long term trauma.

A comparable scenario exists in India, where Dalit, Adivasi, and minority communities

[1] National Aeronautics and Space Administration (NASA). (n.d.). Climate Change: Vital Signs of the Planet. Retrieved from https://climate.nasa.gov.in

[2] Watts, N., et al. (2015). "Health and climate change: policy responses to protect public health." The Lancet, 386(10006), 1861-1914.

experience similar environmental marginalization. Studies by the Centre for Policy Research (2023) show that industrial pollution and climate related displacement disproportionately affect marginalized castes and tribal populations. For instance, in Jharkhand and Chhattisgarh, largescale mining and deforestation have degraded land and air quality, displacing thousands of Adivasi families and reducing their agricultural and forest based livelihoods.

These communities often lack political representation and access to adaptation resources, making recovery from environmental disasters far more difficult. Such inequities highlight how climate change is not just an environmental crisis but also a social justice issue. Without addressing the underlying structural inequalities limited access to healthcare, financial support, education, and decision making power marginalized communities, whether in the U.S. or India, will continue to face the harshest impacts of a warming planet.

Migrants on the Frontlines of Climate Change :

Climate change is a global challenge that deeply affects migration patterns, particularly among workers who depend on natural resources for survival. In India, millions of internal migrant workers those who move within the country for work—are at the frontline of climate induced risks. According to the World Bank Groundswell Report (2021), over 45 million Indians could be displaced by 2050 due to climate related factors such as droughts, floods, and sea level rise.

1. Impact on Livelihoods and Employment

Climate change significantly disrupts the livelihoods of migrant workers, particularly those engaged in agriculture, fisheries, and construction—sectors highly sensitive to environmental fluctuations. Extreme weather events like droughts and floods directly affect their employment stability and income. In Maharashtra, recurring droughts in districts such as Marathwada and Vidarbha have led to a massive loss of agricultural productivity.

A NITI Aayog (2023) report estimated that over 40% of rural households in Marathwada have at least one member migrating seasonally to cities like Mumbai, Pune, or Nashik in search of work. Similarly, in Odisha, Cyclone Fani (2019) and Cyclone Yaas (2021) displaced thousands of coastal fishers, forcing them into informal labor in construction and urban services, often without security or benefits.

Case Study – Bundelkhand (Uttar Pradesh and Madhya Pradesh):

The Bundelkhand region faces severe drought and groundwater depletion. According to a 2022 study by the Indian Council of Social Science Research (ICSSR), around 70% of male agricultural workers from Bundelkhand migrate seasonally to Delhi, Gujarat, and Haryana. The lack of irrigation and rainfall variability has turned once self sufficient villages into sources of "distress migration."

2. Health Risks and Working Conditions

Rising temperatures and erratic climatic conditions have intensified occupational health risks for migrant workers, especially those engaged in outdoor labor such as construction and agriculture. Heatwaves in northern and central India are becoming more frequent and prolonged. In Delhi, during the 2024 heatwave, temperatures soared above 49°C, causing a surge in heat related illnesses among daily wage laborers. According to the Centre for Science and Environment (CSE, 2024), construction workers and street vendors many of them migrants faced dehydration, heatstroke, and respiratory distress due to lack of protective gear or access to healthcare.[3]

Additionally, climate driven increases in vector borne diseases such as malaria and dengue are disproportionately affecting migrant populations living in informal settlements without proper sanitation. The National Vector Borne Disease Control Programme (NVBDCP, 2023) recorded higher disease incidence in migrant dense areas of Bihar, West Bengal, and Assam following heavy monsoon flooding.

3. Displacement and Forced Migration

Environmental degradation, sea level rise, and extreme weather events are leading to largescale climate induced displacement. Migrant workers often move not by choice, but as a coping mechanism against uninhabitable conditions.

Case Study – Sundarbans, West Bengal:

The Sundarbans delta, home to millions, faces severe land erosion and rising sea levels. The

[3] Haines, A., et al. (2006). "Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers." The Lancet, 367(9508), 1917-1929.

Jadavpur University School of Oceanographic Studies (2022) reported that nearly 1.5 million people from the region have already migrated inland to Kolkata and other cities due to salinization of agricultural land and cyclone damage. Many displaced persons work as domestic helpers or daily laborers in urban areas, facing exploitation and lack of legal protection. Similarly, the Brahmaputra floodplains in Assam experience repeated displacements due to flooding, forcing rural families to relocate seasonally. Migrant laborers from these areas often end up in brick kilns, textile factories, or construction sites under unsafe conditions.

4. Social Exclusion and Lack of Protection

Migrant workers, especially those with irregular or undocumented status, face severe social exclusion and institutional neglect during climate crises. They often lack access to social protection schemes, healthcare, or compensation mechanisms. During the COVID19 pandemic (2020), which overlapped with a period of climate related disruptions, India witnessed the vulnerability of its migrant workforce. The International Labour Organization (ILO, 2021) noted that over 400 million informal sector workers many of whom are migrants faced livelihood losses. Climate shocks, such as the 2020 Bihar floods, further worsened their economic insecurity, forcing return migration under dire conditions.[4]

Case Study – Kosi River Floods, Bihar (2008 & 2020):

Floods displaced more than 3 million people, many of whom were seasonal migrants. The lack of rehabilitation support and the destruction of farmland left thousands jobless, compelling them to migrate to cities like Delhi and Surat under exploitative labor contracts.

5. Policy Gaps and the Need for Inclusion

Despite their growing numbers, climate migrants remain largely invisible in India's policy framework. There is no national mechanism to recognize or rehabilitate climate displaced persons. Programs like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and National Disaster Management Plan (NDMP) offer partial relief but fail to address the specific vulnerabilities of mobile and informal workers.

Experts recommend integrating "migration sensitive adaptation policies "such as portable

[4] World Health Organization (WHO). (2018). "Climate change and health." Retrieved from https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health .

social benefits, skill building, and affordable housing in destination cities—to enhance resilience. Including migrant representatives in climate governance and disaster response planning is also essential to ensure that their voices shape adaptation strategies. Climate change has become both a driver and a magnifier of migration in India. From the drought stricken regions of Bundelkhand to the flood prone deltas of Bengal and Assam, millions are being forced to move in search of survival. Yet, migrant workers remain excluded from mainstream climate policies and social safety nets. Ensuring inclusive, data driven, and right based climate adaptation is vital to protect this vulnerable yet indispensable segment of India's workforce.

Vulnerability of Unhoused Communities to Climate Change

People experiencing homelessness face profound challenges and heightened vulnerabilities in the face of climate change, which intensifies their already fragile living conditions. The unhoused population is highly exposed to extreme weather conditions such as heatwaves, cold spells, storms, and floods. Without reliable shelter or adequate protection, they are at greater risk of heatstroke, hypothermia, dehydration, and other weather induced health issues.[5]

According to the World Health Organization (WHO), extreme heat events are responsible for over 489,000 deaths annually worldwide, disproportionately affecting those without access to proper housing or cooling systems. Many individuals without stable housing rely on temporary or informal shelters such as tents, encampments, or under bridge dwellings for survival. Climate related disasters like floods, cyclones, or hurricanes can easily destroy these fragile structures, leaving them fully exposed to the elements and endangering their lives. Disruptions to emergency shelters and social support systems during such crises further magnify their suffering. For instance, during Cyclone Amphan (2020) in India, thousands of people living in informal settlements lost their makeshift shelters, with very limited access to relief or rehabilitation support.[6]

Climate change also disrupts access to fundamental necessities such as food and clean water. Altered rainfall patterns and droughts can reduce the availability of potable water, while rising food prices driven by disrupted agricultural production further marginalize those already

[5] United Nations Framework Convention on Climate Change (UNFCCC). (2020). "Health and Climate Change." Retrieved from https://unfccc.int/topics/health-and-climate-change.
[6] Hussain, S., Hussain, E., Saxena, P., Sharma, A., Thathola, P., & Sonwani, S. (2023). Navigating the impact of climate change in India: a perspective on climate action (SDG13) and sustainable cities and communities (SDG11). Frontiers in Sustainable Cities, 5. DOI: 10.3389/frsc.2023.1308684.

struggling to meet daily needs. Individuals experiencing homelessness often depend on community kitchens, religious charities, or municipal aid programs for basic sustenance, which may become unavailable during climate induced emergencies. Health risks among unhoused populations are compounded by environmental degradation. Exposure to poor air quality, extreme temperatures, and unsanitary conditions worsens preexisting illnesses such as respiratory infections, malnutrition, and cardiovascular diseases. Limited access to healthcare services—due to social exclusion, stigma, or lack of documentation—prevents timely diagnosis and treatment. A 2023 study by the Lancet Planetary Health emphasized that climate change is increasingly widening health inequities, particularly for marginalized and unsheltered groups.

Furthermore, climate induced disasters like rising sea levels, wildfires, or flash floods lead to widespread displacement, disproportionately impacting those already living without permanent housing. In India alone, the Census 2011 recorded over 1.77 million homeless individuals, and current estimates by NGOs suggest that the number has since increased, with many living in urban areas highly vulnerable to extreme weather. Displacement events exacerbate their instability, making it even harder to access healthcare, social protection schemes, or safe housing alternatives.

In essence, climate change amplifies the existing socioeconomic and health inequalities faced by people without secure housing. Addressing these challenges requires inclusive urban planning, climate resilient shelter policies, and equitable access to healthcare and disaster relief for all, regardless of housing status.

Conclusion

Addressing the multifaceted challenges faced by people experiencing homelessness in the context of climate change demands a comprehensive and inclusive approach. Policymakers must prioritize the specific needs and vulnerabilities of these populations by ensuring the provision of safe emergency shelters, reliable access to clean water and nutritious food, and equitable healthcare services.

Furthermore, climate resilient urban planning should integrate housing security as a critical component of adaptation and mitigation strategies. This involves developing sustainable, low cost housing solutions, expanding social protection schemes, and creating

early warning and disaster response systems that explicitly include unhoused and marginalized communities. Collaboration between governments, local bodies, civil society organizations, and international agencies is essential to implement long term strategies that reduce climate vulnerability among those without stable housing.

Efforts such as the Pradhan Mantri Awas Yojana (PMAY) in India, UN Habitat's Climate Resilient Housing Initiative, and community based adaptation programs demonstrate that inclusive planning can yield tangible results. Additionally, education and awareness campaigns can empower vulnerable populations to better respond to climate related risks, fostering resilience at the grassroots level.Ultimately, recognizing the intersection between climate change and homelessness is not only an environmental concern but also a social justice imperative.

By addressing the disproportionate impacts of climate change on the unhoused population through coordinated, equity driven policies, societies can move toward a future that is more humane, inclusive, and sustainable. Ensuring that no one is left behind in climate adaptation efforts is essential to achieving both environmental resilience and social equity in the years to come.

Policy Suggestions for Addressing Climate Change Impacts on Vulnerable Communities

Vulnerable communities, including people experiencing homelessness, low income groups, informal workers, and marginalized populations, are disproportionately affected by the adverse impacts of climate change. Therefore, climate policy must adopt an equity centered and inclusive framework that protects these groups and enhances their adaptive capacities. The following policy suggestions can help guide governments and institutions toward sustainable and just climate action:

1. Integrate Social Equity into Climate Governance:

Climate policies at national and local levels should embed principles of climate justice and social inclusion, ensuring that vulnerable groups are explicitly recognized in adaptation and mitigation frameworks. National Action Plans and State Action Plans on Climate Change must include housing, health, and livelihood resilience for a risk populations.

2. Develop Climate Resilient and Affordable Housing:

Governments should promote the construction of sustainable, low cost, and disaster resistant housing, particularly in urban areas prone to floods, heatwaves, or cyclones. Initiatives like Pradhan Mantri Awas Yojana (PMAY) can be expanded to include green building technologies and renewable energy systems to reduce long term environmental vulnerability.

3. Strengthen Early Warning and Emergency Response Systems:

Municipal bodies must ensure that disaster management systems are accessible to vulnerable groups. This includes community based early warning networks, mobile alerts, temporary shelters, and dedicated resilience hubs that provide food, water, and medical aid during climate emergencies.

4. Enhance Access to Healthcare and Social Protection:

Vulnerable populations should be covered under universal healthcare programs, with mobile clinics and outreach services during extreme weather events. Expanding social safety nets, such as climate linked insurance, employment guarantees, and cash transfer schemes, can provide immediate support during displacement or loss of livelihood.

5. Inclusive Urban Planning and Data Mapping:

Urban planning processes should include representatives of marginalized communities in decision making. Data driven mapping of vulnerable zones can help authorities target adaptation investments and disaster preparedness more effectively.

6. Collaboration with Civil Society and International Agencies:

Partnerships between governments, NGOs, and international organizations such as UN Habitat, UNDP, and World Bank can ensure the sharing of resources, expertise, and technology to implement inclusive climate adaptation strategies.

7. Education, Capacity Building, and Awareness:

Climate education programs should focus on raising awareness about risks, adaptation techniques, and local resilience strategies. Training vulnerable communities in sustainable

livelihoods and environmental conservation can reduce long term dependency and vulnerability.

8. Adopt a "Whole of Society" Approach:

Policymaking should move beyond top down governance by involving local governments, private sectors, and community networks. A whole of society approach ensures that adaptation strategies reflect the lived realities of affected populations and promote accountability.

BIBLIOGRAPHY

1. Reid, H., Swiderska, K., King-Okumu, C. & Archer, D. (2015). *Vulnerable communities: climate adaptation that works for the poor.* London: International Institute for Environment and Development.

2. Joseph, Debra D. (ed.) (2023). *The Impact of Climate Change on Vulnerable Populations: Social Responses to a Changing Environment*. Basel: MDPI Books. ISBN 978-3-0365-5504-1.

3. Kavas Bilgiç, A. (2022). "The Struggle of Vulnerable Groups with Climate Change on the Example of Istanbul Metropolitan Municipality." *İdealkent*, 13(37), 1691-1711.

4. "Identifying vulnerable groups for health effects of climate change." (1999). In *Encyclopaedia of World Problems and Human Potential*. Geneva: United Nations University/UIA.

5. U.S. Environmental Protection Agency. (n.d.). *Climate Change and the Health of Socially Vulnerable People*. Washington, D.C.: EPA. (Environmental Protection Agency)

6. National Collaborating Centre for Determinants of Health. (n.d.). *Climate change — who is most vulnerable and why?*

7. "Climate change effects on vulnerable populations in the Global South: a systematic review." (2023). *Natural Hazards*, 118, 977-991.

8. United Nations Framework Convention on Climate Change. (2018). *Considerations regarding vulnerable groups, communities and ecosystems in the context of the National Adaptation Plans.* Bonn: UNFCCC.