

Socio-Economic Vulnerability to Climate Change Among Transgender Individuals: Implications for Health and Social Protection

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Abstract- Climate change is becoming more and more widely acknowledged as a serious threat to human health, to people's ways of earning a living and to social development. Yet the risks associated with climate change are not shared equally among different populations. Marginalised communities, both socially and economically, tend to be more exposed to environmental hazards and at the same time have fewer resources with which to adapt and to recover. Transgender people are one such group for whom pre-existing socioeconomic disadvantages may make their vulnerability to climate-related risks worse. The present study looks at the question of socioeconomic vulnerability among transgender people in relation to climate change and investigates the implications this has for health and social protection in India. It makes use of a secondary analytical research approach drawing on existing empirical literature, research into the relationship between climate and health, and government policy documents. The analysis centres on four closely linked areas: exposure to climate change, socioeconomic sensitivity, adaptive capacity and access to social protection. Current evidence shows that transgender people in India face difficulties in respect of employment, income security, housing, access to healthcare, social inclusion and the use of welfare services. These vulnerabilities could make the effects of heat waves, floods, extreme weather events, disruption of livelihoods and interruptions to healthcare more severe. New evidence from Chennai also points to a connection between the stressors related to transgender identity and concerns about climate threats. The study maintains that climate change can function as a risk multiplier by interacting with existing social and economic inequalities. It suggests an inclusive framework for building climate resilience based on climate-resilient healthcare, protection of livelihoods, adaptive social protection, inclusive disaster management and the involvement of the transgender community. The study concludes that climate justice demands that marginalised gender groups be included in climate-health planning and in the social protection systems.

Keywords- Climate change, transgender individuals, socioeconomic vulnerability, health inequality, social protection, climate resilience, India

I. Introduction

What started as an environmental issue has now become a multifaceted development challenge having important consequences for health, people's livelihoods, poverty and

social inequality. The increase in temperature together with heat waves, floods, cyclones, droughts, changes in the patterns of disease and other extreme weather events have direct and indirect effects on human health. Climate-related hazards can cause injuries and lead to heat illnesses at the same time as they disrupt food systems, employment, healthcare services, housing and social support systems (World Health Organization, 2023).

The way these impacts are distributed is uneven. People and communities who have limited financial resources, are in insecure housing, have unstable jobs, and have little access to healthcare are often not able to prepare for or recover from climate-related shocks. A systematic review of climate-related health inequalities showed that climate change worsens existing health inequalities and leads to the creation of new ones, especially among those who are already socially and economically disadvantaged (Song et al., 2024). Likewise, other evidence shows that climate risks, the ability to adapt, and the health effects are distributed along the existing lines of social and economic inequality (Parsons et al., 2025).

Gender is likewise becoming more widely acknowledged as an important aspect of climate vulnerability. Studies looking at climate change and gender-related health disparities indicate that social and gender inequalities can affect exposure, sensitivity and adaptive capacity (van Daalen et al., 2020). Likewise, more recent research shows that socioeconomic and gender inequalities interact in order to lead to different health effects resulting from climate change (Zavala et al., 2024).

In this more general context, special attention should be given to transgender people since they may face discrimination, social exclusion, insecurity in their employment, a lack of support from their families and obstacles to accessing healthcare. Research carried out in India has shown that transgender people come up against difficulties within the healthcare systems, such as stigma, discrimination, the presence of binary institutional arrangements and insufficient knowledge on the part of the healthcare providers (Raghuram et al., 2024). A more recent scoping review of LGBTQI+ health in India also found substantial research gaps relating to mental health, non-communicable diseases, comprehensive healthcare and the healthcare needs of diverse LGBTQI+ groups (Chakrapani et al., 2023).

The existing vulnerabilities could become more significant in the context of climate change. People who have insecure livelihoods may suffer more severely from disruptions to employment caused by climate change. Individuals residing in poor housing may have greater exposure to floods or extreme heat. People who already have difficulties accessing healthcare may see their situation worsened when climate-related disasters interfere with transportation, the availability of health facilities and the supply of medicine.

Only recently has the connection between transgender vulnerability and climate change started to attract empirical research. Mann et al. (2024) claim that LGBTQ+ groups might have greater exposure to climate-related disasters, be more susceptible to their effects, and have fewer resources at their disposal for recovery. More specifically, a study from 2025 carried out among 167 transgender people in Chennai revealed considerable concern about climate threats and identified intersecting forms of

marginalisation, systemic exclusion from healthcare, and awareness of climate issues linked to identity as key themes in climate vulnerability (Mithra, 2025).

The growing body of evidence shows that it is important to look at the issue of transgender people's vulnerability to climate change in India. This study thus examines the socioeconomic pathways by which climate change could affect transgender people and looks at the implications for healthcare and social protection.

II. Review of Literature

Climate Change, Health and Inequality

Climate change has a number of effects on health via environmental, economic and social channels. Heat can lead to heat exhaustion, cardiovascular stress and death, and floods and cyclones can cause injuries, force people to leave their homes, bring on infectious diseases and lead to the disruption of health services. It can also have an indirect impact on health through causes such as food insecurity, disruption of livelihoods, poverty and worsening living conditions (World Health Organization, 2023).

The fact that climate change and health inequalities are linked is of particular significance. Song et al. (2024), in a systematic review of 65 studies, found sufficient evidence to show that climate change worsens existing health inequalities. They pointed out that socioeconomic characteristics affect both exposure to climate hazards and the capacity to cope with the health consequences thereof.

Ngcamu (2023) discovered that vulnerable groups in the Global South suffer more than their share from the effects of climate change since socioeconomic and political inequalities lower their ability to adapt, climate-related disasters can damage people's livelihoods and increase existing poverty especially in cases where adaptation measures are inadequate.

Climate vulnerability should therefore be seen as a combination of exposure, sensitivity and adaptive capacity and not merely as the presence of a climate hazard. This approach is especially useful when looking at transgender populations since socioeconomic exclusion may enhance sensitivity while at the same time lowering adaptive capacity.

Gender and Climate Vulnerability

Climate change is being better understood as a phenomenon which is linked to gender. Van Daalen et al. (2020) claim that health inequalities related to climate are the result of gender inequalities and the uneven distribution of social and economic resources.

A scoping review carried out recently on gender inequalities in the health effects related to climate found that socioeconomic and gender inequalities have an impact on mental health, occupational health, illness caused by heat, reproductive health and exposure to violence (Zavala et al., 2024). Even though a great deal of the literature concentrates on women, the general conclusion has relevance for gender-diverse groups since gender identity and social position can affect vulnerability to environmental hazards.

This indicates that climate policy should go beyond a simple division of gender. Transgender people may face vulnerabilities which are not taken into account by the usual male-female categories, especially in cases where discrimination, exclusion from employment and barriers to healthcare come together with climate exposure.

LGBTQ+ Populations and Climate Change

There is still a lack of research that links LGBTQ+ groups with climate change, although this area is growing. Mann et al. (2024) claim that LGBTQ+ communities could have a higher level of exposure to climate-related disasters, be more susceptible to the effects of these disasters, and have fewer resources available for recovery. The authors stress the need for LGBTQ+-inclusive data collection, nondiscrimination safeguards, and sensitivity training for those providing disaster response.

The analysis offers an important conceptual basis for understanding transgender climate vulnerability. Yet since LGBTQ+ populations are diverse, the findings about sexual minorities cannot be taken as directly applicable to transgender people.

It is therefore especially important to have evidence that is specific to transgender people. The study carried out in Chennai interviewed 167 transgender people and found a statistically significant association between stressors related to their transgender identity and their fear of climate threats; it also highlighted the presence of intersecting forms of marginalisation and systemic exclusion from healthcare during environmental disruptions (Mithra, 2025). This study is particularly relevant since it offers evidence from Tamil Nadu, which is the geographical area that is the focus of the current research interest.

III. Socioeconomic Vulnerability among Transgender Individuals in India

Employment and Income Insecurity

Employment plays a significant role in determining climate resilience; having stable employment, saving money and having access to social insurance can enhance an individual's ability to cope with income losses caused by climate-related events, while informal and unstable employment can make someone's economy more sensitive.

Evidence from India shows that transgender people face considerable difficulties in the area of employment. According to Krishna and Sharma (2024), discrimination and a lack of employment opportunities are major challenges encountered by transgender individuals who are looking for work.

A study carried out by Chidambaram in Tamil Nadu also revealed a high level of economic vulnerability amongst transgender people. According to Koushik and Muthukumar (2023), there was considerable engagement in insecure occupations such as sex work, begging and informal labour, and inadequate employment opportunities were identified as a major obstacle to socioeconomic advancement.

The more recent evidence shows that socioeconomic exclusion among transgender people in India starts within families and then continues over into the areas of education, employment and access to economic opportunities (Barik & Parida, 2026). This is

especially important from a climate point of view since people who have low and unstable incomes tend to have fewer resources with which to cope with climate-related shocks.

For instance, extreme heat can decrease a person's ability to carry out outdoor or physically intensive work, while floods may disrupt transport and informal economic activities. Daily wage earners can experience considerable financial stress even if the interruption in work is only for a short time.

Thus, employment that is insecure leads to uncertainty about income, which in turn results in less saving, a reduced ability to adapt, and therefore greater vulnerability to the effects of climate change.

Social Exclusion and Family Support

Social support plays a vital role in building resilience when disasters occur, and family members, friends and community organisations can offer temporary housing, financial assistance, transportation and emotional support.

Transgender people, on the other hand, might face rejection from their families and be socially excluded. According to Kushwah (2023), transgender people in India experience exclusion in the areas of citizenship, the law and healthcare, with discrimination also occurring within institutional systems.

The fact that transgender migrant women were socially and economically vulnerable during the COVID-19 pandemic is highly relevant. According to the study by Raghuram et al. (2023), these women suffered serious disruption to their livelihoods, faced financial difficulties and encountered discrimination during the pandemic. Even though COVID-19 is not a climate-related event, the study shows how a major shock can interact with existing socioeconomic vulnerabilities. The situation thus offers a valuable basis for understanding the possible effects of future climate-related emergencies on economically disadvantaged transgender groups.

Healthcare Vulnerability

According to (Raghuram et al., 2024), who carried out qualitative research with 63 transgender people in India, obstacles to healthcare arise not only outside of healthcare facilities but also within them and as a result of the interactions with healthcare professionals and other staff. Such obstacles involve stigma, discrimination, the existence of binary institutional structures and a lack of understanding of the health needs of transgender people.

The scoping review carried out by (Chakrapani et al., 2023) reached a similar conclusion to the one mentioned above, namely that Indian LGBTQI+ health research has in the past placed a strong emphasis on HIV and on certain groups, while having comparatively little research devoted to comprehensive healthcare, mental health and non-communicable diseases.

Transmasculine people as well encounter obstacles when accessing gender-affirming healthcare. According to Chakrapani et al. (2024), the participants took both quality and affordability into account when deciding between public and private healthcare,

financial limitations causing delays in getting treatment. Information and financial help were often obtained from peer networks and grassroots organisations. Healthcare difficulties could become more severe during climate-related disasters.

A flood, cyclone or extreme heat event can:

- Disrupt transportation
- Damage healthcare infrastructure
- Interrupt medicine supplies
- Reduce healthcare availability
- Increase healthcare expenditure
- Delay routine treatment and
- Disrupt gender-affirming care

The vulnerability of transgender people with regard to health effects of climate change can be seen as resulting from the interaction between prior exclusion from healthcare and disruption caused by climate change.

IV. Mental Health and Climate Vulnerability

Mental health is also a significant aspect of climate vulnerability. Transgender people already face minority stress due to discrimination, stigma and social exclusion. According to Mehar and Verma (2024), who studied transgender individuals in Rajasthan, discrimination was found to have a negative association with mental health and quality of life.

The same study on the effects of the COVID-19 pandemic among transgender people in India found that disruption of livelihood, uncertainty, social exclusion and discrimination had led to mental health issues (Raghuram et al., 2023).

Climate-related disasters may cause anxiety, uncertainty, displacement, grief and social disruption; and if such experiences happen in conjunction with existing minority stress, the psychological effects could be made worse.

The 2025 study carried out by Against the Current shows direct evidence of this connection by highlighting transgender identity-related stressors and climate apprehension as being closely related phenomena. It therefore recommends that climate-resilient health systems should include mental health and psychosocial support when preparing for disasters affecting transgender communities.

Climate Exposure and Adaptive Capacity

The fact that someone is socioeconomically vulnerable does not mean that transgender people have greater exposure to every type of climate hazard. Instead, vulnerability occurs because their ability to prepare, respond and recover is limited.

The climate vulnerability of a transgender individual may therefore depend on:

Exposure

- Location of residence
- Occupational environment

- Dependence on public transportation
- Exposure to extreme heat
- Proximity to flood-prone areas

Sensitivity

- Income insecurity
- Health conditions
- Mental health stress
- Housing insecurity
- Limited family support
- Healthcare barriers

Adaptive Capacity

- Savings
- Employment security
- Health insurance
- Access to social protection
- Social networks
- Access to information
- Community support.

The framework is in agreement with more general research which shows that climate vulnerability is greatly affected by socioeconomic inequalities and by differences in adaptive capacity (Ngcamu, 2023; Song et al., 2024).

Wong and others in 2025 stress that it is the systemic barriers which can lead to health inequalities when vulnerable groups come upon climate stressors; their review points out that it is necessary to tackle institutional barriers rather than concentrating solely on individual adaptation.

Climate Change and Social Protection

Social protection can have a major role in reducing vulnerability to the effects of climate change since climate change increases the risks linked to income, employment, poverty and displacement, which is why social protection is an important element of climate adaptation.

(Costella et al., 2023) in their framework and critical review state that climate change is altering the risks experienced by households and that social protection can have a strategic function in achieving climate-resilient development; they stress the importance of having greater integration between climate policy and social protection systems.

Adaptive social protection also aims at achieving poverty reduction, disaster preparedness and climate adaptation (Prihantika et al., 2024).

This method is particularly relevant to transgender people since existing welfare programmes could potentially be extended when facing climate-related shocks.

Existing Social Protection for Transgender Individuals in India

India has set up a number of legal and policy measures relating to the welfare of transgender people. The Transgender Persons (Protection of Rights) Act, 2019, offers protection against discrimination and contains provisions on education, employment, healthcare and welfare. Moreover, the Indian government mandates that welfare measures should be transgender-sensitive and non-stigmatising (Government of India, 2019).

The SMILE – Support for Marginalized Individuals for Livelihood and Enterprise – scheme has a special part which is concerned with the comprehensive rehabilitation and welfare of transgender people, and the measures it implements cover medical facilities, counselling, education, skill development and economic linkages (Government of India, 2025).

The Indian government's framework for the welfare of transgender people also covers skill development and measures to secure a livelihood, healthcare, the provision of safe shelters such as Garima Greh, identity documentation and access to health insurance via the Ayushman Bharat-related mechanisms (Government of India, 2026).

These programmes form an important basis for reducing socioeconomic vulnerability; yet they are mainly intended as welfare and rehabilitation measures rather than as explicit climate-responsive social protection systems.

The key question is therefore:

Can the current mechanisms for providing welfare to transgender people be modified so that they can quickly respond to climate-related shocks?

Implications for Climate-Resilient Healthcare

The National Programme on Climate Change and Human Health in India acknowledges the need to reduce morbidity, mortality, injuries and health vulnerability caused by climate variability and extreme weather events (National Centre for Disease Control, 2026). Yet, a climate-resilient healthcare system should not limit itself to infrastructure.

A genuinely inclusive climate-resilient health system should include:

- Physical resilience, which refers to the ability of healthcare facilities to continue operating during extreme weather.
- Financial resilience, which means protection against having to pay excessive amounts out of pocket.
- Continuity of care – the ability to keep accessing essential medication and treatment without interruption.
- Gender responsiveness – healthcare systems that are able to meet the specific needs of transgender people.
- Preparing mentally – providing psychosocial support both during and after disasters.
- Transgender-led organisations taking part in the provision of emergency healthcare.

Incorporating transgender people into climate-health planning would therefore be a way of extending current health-equity principles rather than setting up a completely new health system.

Proposed Conceptual Framework

The study proposes the following framework:



Climate-resilient healthcare + adaptive social protection + livelihood protection + inclusive disaster management + community participation

What this framework shows is that vulnerability is cumulative.

It does not follow that climate change will lead to socioeconomic vulnerability among transgender people; instead, it can worsen vulnerabilities that are already present.

Policy Recommendations

Include transgender individuals in climate vulnerability assessments

Where appropriate, government assessments of climate impacts on health and disaster risk should take into account transgender populations, provided that ethically collected data are available.

Develop transgender-inclusive disaster preparedness

The authorities responsible for disaster management should make sure that the emergency shelters they manage offer safety, privacy, sanitation and protection against discrimination.

Strengthen climate-resilient livelihoods

Skill-development programs should link to steady jobs that can handle changes in the climate.

Develop shock-responsive social protection

Existing schemes aimed at supporting transgender people should be connected to emergency cash payments, food aid, temporary housing, and efforts to restore people's livelihoods after climate-related disasters.

Ensure continuity of healthcare

Healthcare systems must set up emergency procedures to ensure access to essential medication, mental healthcare, routine healthcare and gender-affirming services.

Strengthen community-based resilience

Transgender-led organisations ought to be formally incorporated into disaster preparedness, climate-health communication and emergency response, since community organisations can function as trusted intermediaries between government systems and transgender people, especially in cases where there is institutional distrust or discrimination.

Integrate climate change into transgender welfare planning

When future versions of transgender welfare programmes are revised, climate vulnerability and disaster preparedness should be included as specific components.

V. Conclusion

The experience of climate change is not the same for all members of different social groups, and the inequalities that currently exist regarding income, employment, housing, access to healthcare and social protection can influence an individual's capacity to prepare for and to recover from climate-related hazards.

Transgender people in India encounter a number of socioeconomic and institutional obstacles. Research currently available shows that they experience exclusion from healthcare (Raghuram et al., 2024), face financial and employment limitations (Koushik & Muthukumar, 2023; Barik & Parida, 2026), suffer mental health effects due to discrimination (Mehar & Verma, 2024), and have difficulties accessing gender-affirming treatment (Chakrapani et al., 2024).

The growing body of literature on climate change shows that these vulnerabilities could overlap with climate-related hazards. There is international evidence to indicate that LGBTQ+ groups may experience greater exposure, sensitivity and difficulties in recovering from climate disasters (Mann et al., 2024). Even more significant is the recent evidence from Chennai, which specifically identifies climate-related issues affecting transgender people and underscores the multiple forms of marginalisation and exclusion from healthcare (Mithra, 2025).

The paper therefore argues that climate change should be seen as a potential risk multiplier with respect to the socioeconomic and health inequalities experienced by transgender people.

India has already set up significant institutional arrangements via the Transgender Persons (Protection of Rights) Act, the SMILE scheme, transgender health initiatives and the National Programme on Climate Change and Human Health. The chance to develop policy consists in bringing these systems together.

A climate-resilient approach for transgender individuals should therefore integrate: health resilience, economic resilience, social protection, disaster preparedness, community participation.

This method would make a contribution to SDG 13: Climate Action as well as to SDG 3: Good Health and Well-being and to SDG 10: Reduced Inequalities.

Climate action cannot be regarded as genuinely sustainable unless it takes into account the needs of those who are affected by structural exclusion. It is therefore not just a matter of welfare to ensure that transgender people are included in climate adaptation, health planning and social protection; it is an essential element of climate justice and of inclusive sustainable development.

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