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Full Length Research Article

Environmental Sociology And The Effects Of Environmental Hazards On Women And Their Health

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Abstract
Environmental hazards including droughts, floods, heatwaves, air pollution, and inadequate sanitation disproportionately endanger women's physical and mental health, particularly in developing nations like India. This study, grounded in environmental sociology, examines the gendered dimensions of environmental risk by investigating how structural inequalities amplify women's biological and social vulnerabilities to ecological threats. The primary objectives are to document the differential health burden borne by women during environmental hazard events and to identify the socio-structural determinants driving this disparity. A systematic secondary data analysis design was adopted, drawing from established national and international databases including NFHS-5, WHO, IPCC, and peer-reviewed literature published between 2018 and 2025. The hypothesis posits that women in environmentally stressed regions experience statistically higher rates of adverse health outcomes than men due to intersecting gender-based inequalities. Results confirm significant disparities in maternal mortality, reproductive health, vector-borne disease vulnerability, mental health disorders, and sanitation-related illness. Discussion reveals that patriarchal institutional frameworks, limited resource access, and caregiving burdens structurally expose women to compounded hazard risk. The study concludes that gender-responsive environmental and public health policies are urgently needed.
Keywords: *Environmental hazards, women's health, environmental sociology, gender disparity, climate vulnerability*

1. Introduction

The relationship between environmental degradation and human health has long been a central concern in environmental sociology. However, a critical and frequently underexamined dimension of this relationship is its explicitly gendered nature. Women, particularly those in low- and middle-income countries, face a disproportionate and compounded burden from environmental hazards, shaped not merely by biology but by the social, economic, and cultural structures within which they live. In India a country simultaneously grappling with rapid climate change, urbanisation, agrarian stress, and persisting gender inequalities this intersection constitutes a public health emergency of significant magnitude. Environmental hazards span a broad spectrum: heat extremes, floods, droughts, toxic air, contaminated water, and inadequate sanitation. Each operates through distinct mechanisms, yet all converge upon women with amplified severity. In 2024 alone, India experienced heatwaves on 28% of all days in the first nine months of the year (India Health Fund, 2025). The India Meteorological Department (IMD) recorded approximately 10,000 heat-related deaths between 2003 and 2022, with mortality rising by 34% in the decade 2013–2022 compared to 2003–2012 (CSIS, 2024). In September 2023, 30% of India's total land area experienced drought conditions, severely impacting food production and women's unpaid care labour (CSIS, 2024). These statistics do not exist in a gender-neutral space. Global evidence confirms that women comprise approximately 80% of persons displaced during climate-related emergencies and are 14 times more likely to die during natural disasters (UNICEF, 2023).

Environmental sociology offers a rigorous theoretical lens through which to analyse these dynamics. Rather than treating ecological harm as a purely natural phenomenon, the field interrogates the social relations particularly those structured around gender, class, and caste that determine who bears the greatest environmental burden. In India, where patriarchal norms confine women disproportionately to households near polluted water sources, cooking fires emitting indoor air pollutants, and flooded agricultural fields, the environment acts as a multiplier of pre-existing social disadvantage. Women also shoulder the primary responsibility for household water collection, food procurement, and family caregiving tasks that intensify dramatically during environmental crises, exacerbating physical exhaustion, mental distress, and exposure to pathogenic environments (Sorensen et al.,

2018; Mala et al., 2022). This paper positions itself at the intersection of environmental sociology, public health, and gender studies. By synthesising verified empirical data and peer-reviewed scholarship published up to 2025, it aims to construct a comprehensive, evidence-based account of how environmental hazards interact with gender inequality to produce measurable, preventable harm to women's health in India and globally. It further calls for the integration of gendered perspectives into environmental policy frameworks as a matter of both scientific urgency and social justice.

2. Literature Review

The gendered impact of environmental hazards on health has gained increasing scholarly attention, particularly in the context of South Asia. Sorensen et al. (2018) conducted a seminal analysis demonstrating that climate change in India threatens to widen existing gender-based health disparities through heat exposure, poor air quality, extreme weather events, altered vector-borne disease transmission, reduced water quality, and declining food security. Their findings underscored that women's unique biological vulnerabilities particularly during pregnancy interact with socially assigned roles to exponentially increase health risk. Algur et al. (2021) systematically reviewed the impact of drought on women and children in India, finding that drought significantly elevates risks of malnutrition, anaemia, water-borne disease, and intimate partner violence. Drought-induced water scarcity forces women to travel further and for longer durations to collect water, increasing their physical exhaustion and risk of assault. The study noted that female-headed households are particularly exposed to food insecurity during drought episodes. Priyadarshini and Mandala (2024), using NFHS-5 (2019–21) data, further established a strong positive correlation between access to improved sanitation and women's menstrual hygiene, maternal health outcomes, and reduced anaemia prevalence, revealing how environmental infrastructure gaps translate directly into women's health deficits.

The psychological dimensions of environmental hazard exposure have received growing attention. Stone et al. (2022) documented through a scoping review that women report higher rates of PTSD, anxiety, and depression following extreme weather events than men, attributable to both heightened exposure and differential coping resources. Rothschild and Haase (2023) extended this analysis to demonstrate that eco-anxiety a chronic fear of environmental doom disproportionately affects women and intersects with reproductive health decision-making. Roy (2024), in a study of climate stress in the Indian Sundarbans, revealed that intersectional vulnerabilities involving gender, caste, and ecological marginalisation produce severe mental health consequences including depression, stress, and nutritional collapse, particularly among women in households experiencing male out-migration. Mala et al. (2022), examining climate change impacts on Indian women, found that structural inequalities in economic, social, and cultural rights caused environmental disasters to affect women critically, as their livelihood dependency on natural resources is substantially higher. Singh et al. (2021) analysed 28 Indian state climate action plans and found that gender considerations remained poorly integrated despite widespread acknowledgement of gendered vulnerability, pointing to a significant policy gap. Sharma and Singh (2023) emphasised that in India, intersectionality of gender and poverty makes women particularly susceptible to degrading environmental and climatic conditions. Globally, the IPCC (2023) confirmed that pregnancy and maternal status heighten vulnerability to heat, infectious diseases, food-borne infections, and air pollution, and that extreme heat events are associated with spontaneous abortion, stillbirth, low birthweight, and preterm birth a pattern intensely relevant to India's climatic trajectory.

3. Objectives

1. To examine the differential health outcomes experienced by women compared to men during environmental hazard events in India, using quantitative secondary data from verified national and international sources (2018–2025).
2. To identify the socio-structural factors rooted in gender inequality that amplify women's vulnerability to environmental health risks and to evaluate the adequacy of existing policy frameworks in addressing these disparities.

4. Methodology

This study employs a systematic secondary data analysis design situated within an interpretivist-constructivist epistemological framework aligned with environmental sociology. The research draws exclusively on published, peer-reviewed empirical literature, institutional reports, and nationally representative surveys available up to 2025. No primary data collection was conducted. The sample for literature analysis comprised 20 peer-reviewed articles and institutional reports accessed from databases including PubMed/PMC, Google Scholar, Scopus, and ScienceDirect, published between 2018 and 2025. Sources were selected using purposive sampling criteria: relevance to gender and environmental hazards, inclusion of verified quantitative data, India-centricity or direct applicability to South Asian contexts, and quality of methodology. Quantitative

data were sourced from the National Family Health Survey 5th Round (NFHS-5, 2019–21), Sample Registration System (SRS) data on maternal mortality, WHO/UNICEF interagency maternal mortality estimates (2023, 2025), and IPCC Sixth Assessment Report (2023). Statistical indicators were extracted and organised thematically into six data tables covering maternal mortality trends, climate vulnerability indicators, sanitation-related health outcomes, drought health impacts, mental health post-disaster, and pregnancy-related hazard outcomes. Analytical technique involved thematic synthesis and descriptive statistics. Each table was interpreted using contextual statistical analysis aligned with the study's theoretical framework. The study draws on ecofeminist sociology, structural vulnerability theory, and intersectionality to interpret findings. Ethical considerations were maintained through accurate attribution, verified citation, and avoidance of data fabrication. Limitations include reliance on secondary data, potential under-reporting in gender-disaggregated national datasets, and the cross-sectional nature of much of the referenced evidence.

5. Results

Table 1: Trend in India's Maternal Mortality Ratio (MMR), 2000–2023

Year	MMR (per 100,000 live births)
2000	327
2010	212
2015	130
2018	113
2020	103
2023	97

Source: WHO, UNICEF, UNFPA, World Bank, & UNDESA (2023, 2025)

Table 1 documents India's MMR decline from 327 per 100,000 live births in 2000 to 97 in 2023, representing a 70.3% reduction over two decades. Despite this progress, India's MMR remains well above the SDG target of 70 by 2030. Environmental hazards especially poor sanitation, contaminated water, and heat stress continue to contribute to maternal mortality, making MMR a critical indicator of environmental health outcomes for women (WHO et al., 2023).

Table 2: Gender-Disaggregated Vulnerability Indicators During Environmental Hazard Events in India

Indicator	Impact on Women	Source
Share of climate-displaced persons	80% are women	UNICEF (2023)
Relative mortality risk during disasters	14× higher than men	IPCC (2023)
Increased underweight likelihood during heatwaves	+35%	IHF (2025)
Increased likelihood of gender-based violence (GBV) during heatwaves	+50%	IHF (2025)
Increased likelihood of child marriage during heatwaves	+37%	IHF (2025)
Early menopause prevalence (women aged 35–39, India)	~7%	NFHS-5 (2021)

Source: UNICEF (2023); IPCC (2023); India Health Fund (2025); NFHS-5 (2021)

Table 2 presents stark evidence of the disproportionate climate hazard burden on women. The finding that women constitute 80% of climate-displaced persons and are 14 times more likely to die in disasters underscores the structural amplification of risk. A 50% increase in GBV likelihood during heatwaves, combined with elevated rates of early menopause linked to environmental stress, confirms the multi-domain health impact on women (Mala et al., 2022; Sharma & Singh, 2023).

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Table 3: Sanitation Access and Women's Health Indicators in India NFHS-5 (2019–21)

Health Indicator	Women with Improved Sanitation (%)	Women without Improved Sanitation (%)
Good menstrual hygiene practice	65.4	31.2
≥4 Antenatal Care (ANC) visits	58.6	38.4
Institutional delivery	81.3	59.7
Anaemia prevalence (15–49 years)	48.4	61.2

Source: Priyadarshini & Mandala (2024); NFHS-5 (2021); UNICEF & WHO (2023)

Table 3 reveals a consistent positive correlation between improved sanitation access and women's health outcomes, as established through NFHS-5 data. Women without improved sanitation are approximately twice as likely to have poor menstrual hygiene, and their anaemia prevalence is 12.8 percentage points higher. These findings illustrate how environmental infrastructure deficits a core concern of environmental sociology directly translate into measurable health deprivation for women (Priyadarshini & Mandala, 2024; Vogel et al., 2022).

Table 4: Health Impacts on Women During Drought Events in India

Health Outcome	Evidence of Impact	Key Reference
Anaemia	Significantly elevated among women	Algur et al. (2021)
Malnutrition	Substantially higher risk	Algur et al. (2021)
Water-borne disease exposure	Markedly increased	Sorensen et al. (2018)
Intimate partner violence (IPV)	Positive drought–IPV association	PMC (2024)
Food insecurity (female-headed households)	~36% increase during drought	IPCC (2023)

Source: Algur et al. (2021); Sorensen et al. (2018); IPCC (2023)

Table 4 consolidates evidence on drought's health consequences for women in India. The data confirm that drought not only increases direct health risks such as anaemia and malnutrition but also elevates violence and food insecurity among women. In September 2023, 30% of India's land area was drought-affected, with rural women disproportionately shouldering water-collection burdens that further their exposure to physical and psychosocial harm (Algur et al., 2021; IPCC, 2023).

Table 5: Mental Health Outcomes in Women Following Environmental Disasters

Mental Health Condition	Finding	Source
Post-traumatic stress disorder (PTSD)	Higher prevalence in women than men	Stone et al. (2022)
Generalised anxiety disorder	Significantly elevated post-flood/drought	Stone et al. (2022)
Clinical depression	Prevalent among rural environmental-disaster- affected women	Roy (2024)
Eco-anxiety	Disproportionately affects women; shapes reproductive decisions	Rothschild & Haase (2023)
Malnutrition-related neurological stress	Documented in Indian Sundarbans	Roy (2024)

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Source: Stone et al. (2022); Rothschild & Haase (2023); Roy (2024)

Table 5 confirms that women face a double jeopardy: physical health threats from environmental hazards alongside a disproportionate psychological burden. The gendered mental health toll documented across PTSD, anxiety, depression, and eco-anxiety reflects both heightened exposure and socially constrained coping resources. In the Indian Sundarbans, Roy (2024) found that intersecting ecological and gender stressors produced severe mental health deterioration, particularly in households experiencing male out-migration.

Table 6: Adverse Pregnancy and Reproductive Outcomes Linked to Environmental Hazards in India

Environmental Hazard	Adverse Reproductive Outcome	Magnitude of Evidence
Occupational heat exposure (Tamil Nadu)	Miscarriage and adverse pregnancy outcome	~2× risk increase
Extreme heat / high ambient temperature	Preterm birth, low birthweight	Confirmed — IPCC (2023)
Air pollution (particulates)	Stillbirth, spontaneous abortion	Confirmed — IPCC (2023)
Malaria during pregnancy	Severe malaria	3× risk vs. non-pregnant women
Drought-induced food insecurity	Child stunting, low birthweight	Elevated — Sorensen et al. (2018)

Source: Sorensen et al. (2018); IPCC (2023); India Health Fund (2025)

Table 6 reveals that pregnancy constitutes a period of acute environmental vulnerability for women. The IPCC (2023) confirms that heat events, air pollution, and food-borne infections are associated with spontaneous abortion, stillbirth, low birthweight, and preterm birth. A Tamil Nadu-specific study found that women engaged in moderate to heavy physical labour faced nearly double the risk of miscarriage due to occupational heat exposure, demonstrating the localised severity of these hazards in India (IHF, 2025; IPCC, 2023).

6. Discussion

The findings presented in this study unambiguously confirm the hypothesis that women in environmentally stressed regions experience substantially higher rates of adverse health outcomes, shaped by the intersection of gender inequality and environmental hazard exposure. This discussion interprets these results through the lens of environmental sociology, aligning with both study objectives. Objective 1 sought to document differential health outcomes. The evidence is unequivocal: across every domain examined maternal mortality (Table 1), hazard mortality and displacement (Table 2), sanitation-linked health (Table 3), drought-associated illness (Table 4), mental health (Table 5), and reproductive outcomes (Table 6) women experience measurably worse outcomes than their male counterparts. India's MMR of 97 per 100,000 live births in 2023, while significantly improved, remains nearly 40% above the SDG target, and environmental factors including polluted water,
inadequate sanitation, and heat stress remain major contributors (WHO et al., 2023). That heatwaves raise GBV likelihood by 50% and increase miscarriage risk by approximately double among labouring women confirms that environmental hazards are not gender- neutral events they are gender-amplifying ones (IHF, 2025; Sorensen et al., 2018).

Objective 2 focused on the socio-structural determinants of this vulnerability. The sociological analysis reveals several interlocking mechanisms. First, gendered division of labour assigns women primary responsibility for water collection, cooking, and caregiving roles that intensify during crises and increase exposure duration to environmental threats (Sorensen et al., 2018; Algur et al., 2021). Second, property rights deprivation less than 10% of female farmers in India own their land eliminates women's economic buffers against drought and crop failure, pushing them into nutritional and financial crises faster than men (Sorensen et al., 2018). Third, sanitation infrastructure deficits disproportionately harm women given their specific menstrual, maternal, and caregiving needs, as confirmed by the NFHS-5 data showing a 34.2-percentage-point menstrual hygiene gap between women with and without improved

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sanitation (Priyadarshini & Mandala, 2024). Fourth, patriarchal social structures restrict women's mobility, information access, and decision-making authority during disasters, contributing to their 14-times-higher disaster mortality relative to men (IPCC, 2023; Sharma & Singh, 2023). Fifth, the mental health consequences documented in Tables 5 and 6 are mediated by social isolation, loss of livelihood, fear of violence, and reproductive anxiety factors that are structurally shaped by gender norms rather than simply by exposure intensity (Stone et al., 2022; Rothschild & Haase, 2023; Roy, 2024).

An analysis of India's climate policy architecture reveals a critical gap. Singh et al. (2021) found that among 28 state climate action plans in India, gender integration remained superficial, with few containing actionable, measurable gender-specific targets. This policy failure reproduces structural vulnerability in the face of growing hazard frequency. The IPCC (2023) has called for the integration of gendered perspectives into all climate adaptation frameworks, yet implementation remains laggard. The evidence from Tables 1 through 6 collectively argues that gender- blind environmental policy is not merely an ethical failure it is a measurably health-damaging one. Environmental sociology further illuminates how caste and class intersect with gender to produce compounding disadvantages. Dalit women in India, who often occupy land in flood- and cyclone-prone areas, experience the simultaneous weight of caste-based and gender-based discrimination, severely limiting their access to disaster relief, healthcare, and post-hazard recovery support (CSIS, 2024; Roy, 2024). This intersectionality demands that any effective policy response move beyond single-axis gender analysis toward a comprehensive structural transformation of environmental governance in India.

7. Conclusion

This study confirms that environmental hazards are profoundly gendered phenomena. Across six evidence domains maternal mortality, disaster vulnerability, sanitation-linked health, drought health outcomes, mental health, and reproductive risk women in India and globally bear a disproportionate and structurally driven burden. The findings are rooted in verified national and international data through 2025. The sociological mechanisms driving this disparity include gendered labour roles, unequal resource access, property rights exclusion, patriarchal institutions, and intersecting caste and class disadvantage. Gender- responsive environmental policy, gender-disaggregated data systems, and women's meaningful inclusion in climate governance are not optional enhancements they are essential public health imperatives for India's environmental future.

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