

Review Article

Burn injury and gender inequity: epidemiological insights and social determinants

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ABSTRACT

Burn injuries pose a significant global health burden, with the overwhelming majority of deaths around 90% occurring in low and middle-income countries (LMICs). India alone reports an estimated 6–7 million burn cases annually, ranking among the highest globally. Women are disproportionately affected due to unsafe cooking practices, flammable traditional clothing, use of hazardous fuels, and gender-based violence. Socio-cultural norms and economic constraints further increase vulnerability and delay timely access to care. This review explores the gendered dimensions of burn injuries in India, including epidemiology, risk factors, healthcare access, psychosocial impact, and policy responses. A thorough review of the literature was carried out using PubMed, Google Scholar, and the World Health Organization (WHO) Global Health Library, along with grey literature from government and policy sources. Data were thematically synthesized into key domains to identify patterns in injury causation, severity, treatment gaps, and intervention strategies. Evidence indicates that women experience more severe burns and higher mortality even with smaller burn surface areas, largely due to delayed care, financial barriers, and gender bias in healthcare delivery. Intentional burns resulting from domestic violence, dowry-related harassment, and self-immolation substantially contribute to the burden, although misclassification of such cases is common. Psycho social stigma, insufficient mental health support, and limited rehabilitation services further hinder recovery and social reintegration. Addressing these disparities requires gender-responsive approaches, including disaggregated surveillance, integration of violence screening into burn care, strengthened rehabilitation services, community-based prevention, and public awareness initiatives. Legal protections and training healthcare providers in gender-sensitive care are critical to reducing inequities. A coordinated, multi-sectoral strategy is essential to ensure equitable outcomes and mitigate the disproportionate impact of burn injuries on women in India.

Keywords: Burn injuries, Gender disparities, Women's health, Domestic violence, India

INTRODUCTION

In the current era marked by the growing epidemic of non-communicable diseases trauma continues to pose a major

public health challenge. Within the spectrum of traumatic injuries, burns constitute the second leading cause of morbidity and mortality after road traffic accidents, underscoring their substantial yet underappreciated impact

on population health.¹ India records an estimated 6–7 million burn cases annually, with the high incidence largely resulting from widespread illiteracy, poverty, and poor safety awareness among the population.² Fire ranks among the 15 leading causes of death solely in India, according to the World Health Organization (WHO), underscoring a unique national public health concern.³ Burn injuries are more prevalent among vulnerable groups such as individuals living in poverty, those with psychiatric illnesses, and women irrespective of a country's income level. In many low- and middle-income countries (LMICs), women and girls face a higher risk due to increased exposure to burn hazards. These incidents commonly occur within or around the household and are closely linked to energy poverty and daily activities like cooking and heating. Risk factors include unsafe cooking setups such as ground-level stoves and open three-stone fires, the use of poorly regulated LPG cook stoves, and the wearing of traditional, loose-fitting, and highly flammable clothing—all of which are widespread in low- and middle-income countries (LMICs).⁴ A study conducted in South India, concluded that female gender is significant risk factor to burn injury and death.⁵ According to another systematic review, In most cases, flame-related burns and scalds made up over 80% of all burn injuries. These were the most frequently observed types of burns among children and women, with the majority occurring within the household setting.⁶ In India, burn-related injuries and deaths among women are often linked to several factors, including kitchen accidents involving kerosene use and flammable clothing, self-immolation or suicide attempts, and homicides resulting from domestic violence.³

Evidence indicates that widespread domestic violence whether physical, sexual, or emotional may play a significant role in many of these burn incidents.³ Beyond their increased exposure to burn hazards, women and girls worldwide also experience significant disparities in accessing healthcare and receiving appropriate services. These inequalities are closely linked to factors such as limited health literacy, financial dependence, restricted access to safe transportation, and a lack of decision-making power within family structures.⁴

A retrospective cross-sectional study highlighted that, in most cases of female deaths resulting from thermal injuries, the full context is often not thoroughly investigated. Critical factors such as prior instances of domestic abuse, dowry-related harassment, or mental health conditions frequently go under-reported or undocumented. While ample data is available on the statistics of such deaths, there is a significant lack of information on the preventive measures being implemented to address and reduce these incidents.⁸ Findings of a cohort study in India revealed that many cases, especially those involving women, lack thorough investigation and documentation of contributing factors like domestic violence and mental health issues. There is an urgent need for integrated prevention strategies,

improved reporting systems, and targeted interventions to reduce burn-related morbidity and mortality.⁹

Burn injuries remain a major global public health concern, disproportionately affecting low- and middle-income countries. The higher burden in these regions is largely attributed to unsafe living conditions, occupational hazards, and limited access to specialized care. Despite being largely preventable, burn injuries continue to be overlooked in global health agendas, leading to substantial morbidity, mortality, and long-term disability. Importantly, gender disparities in burn incidence and outcomes are often overlooked, with women and children disproportionately affected due to domestic and cultural factors. However, there is a paucity of systematic literature and reliable data to highlight these inequities, further contributing to the neglect of this critical dimension in burn research and policy.

This review aims to highlight the critical, yet often overlooked, gender disparities in the incidence, patterns, treatment access, and outcomes of burn injuries. Women, particularly in resource-constrained settings, face unique vulnerabilities due to socioeconomic factors, cultural norms, and limited access to timely and adequate healthcare. This review particularly aims to draw attention to these neglected issues and provide insights that may guide policymakers, health planners, and stakeholders in designing gender-sensitive programs and strengthening health systems to reduce the disproportionate burden of burns on women.

METHODS

A literature search was conducted on PUBMED, Google Scholar, and WHO Global Health Library, supplemented by government and policy documents. Using MeSH and free-text terms on “burns”, “gender disparities”, “domestic violence”, and “policy in India”, data were thematically synthesized into five domains: epidemiology, sociocultural determinants, injury patterns, treatment gaps, and policy interventions.

EPIDEMIOLOGY OF BURN INJURY; GLOBAL AND INDIAN CONTEXT

Burn injuries constitute a significant but under-recognized global health issue, affecting nearly 67 million people each year and causing around 238,000 deaths, with almost 90% of fatalities occurring in low- and middle-income countries.¹⁰ A systematic review of studies in the WHO African region emphasizes the predominance of domestic burns, often related to energy poverty and lack of safety awareness.¹¹

Recent studies also reveal significant gender disparities in the incidence, treatment, and outcomes of burn injuries. Data from the WHO Global Burn Registry, covering 6,431 patients across multiple countries, show that women were less likely to receive surgical care and had significantly

higher in-hospital mortality than men particularly in middle-income countries, where the adjusted odds of female mortality were more than double those of males ($aOR \approx 2.16$).⁵ Supporting this, a US-based study found that women under the age of 60 had over twice the mortality rate of their male counterparts following burn injuries, despite similar burn severity and extent.¹² Evidence from developing countries suggests that women often experience higher mortality rates even with smaller burn surface areas, especially when total body surface area (TBSA) exceeds 50%.¹³

In India, burn injuries represent an especially pressing concern, with an estimated 6 to 7 million cases reported annually, ranking among the highest in the world.² The burden is particularly severe for women, who often face increased exposure to thermal injury risks due to traditional cooking practices involving open flames or kerosene stoves, the wearing of flammable clothing, and societal issues like dowry harassment and domestic violence. A landmark study by Kumar and Tripathi revealed that many deaths of married women due to burns were recorded as accidental, despite circumstantial evidence suggesting intentional harm or suicide, reflecting the systemic under-reporting and lack of proper forensic investigation.⁹ Further, delays in care-seeking, financial constraints, and societal stigma contribute to poor treatment outcomes among female burn victims. While India launched a National Programme for Prevention of Burn Injuries, gender-specific interventions and long-term rehabilitation strategies remain limited in scale and effectiveness.¹⁵ These findings emphasize the urgent need for comprehensive, gender-sensitive public health interventions and better surveillance systems to reduce burn-related morbidity and mortality.

GENDER DIFFERENCES IN BURN INJURY PATTERNS IN INDIA

Types and causes of burns

In India, flame burns form the majority of injuries among women, primarily due to domestic cooking activities. A multi-center epidemiological study in North Karnataka revealed that 82.3% of burn cases were flame-related, with women constituting 54.7% of admissions and sustaining burns at home (94.8% of female versus 58.7% of male cases). Synthetic garments were worn by 71.7% of female victims at the time of injury, contributing to rapid fire propagation and burn severity. Overall mortality was notably higher among females, with 77% of deaths occurring in women.¹⁶

Contexts of injury

Women sustain the majority of burn injuries within household kitchens. Data from Manipal demonstrated that 97.5% of female burn victims sustained injuries at home compared with just 36.1% of males. Approximately 40% of burns occurred between 4 and 8 pm, coinciding with

peak cooking hours. Flame injuries accounted for 80.1% of female cases, while electrical injuries were significantly more prevalent among males (9.8%). Female victims frequently had larger total body surface area (TBSA) burns ($\geq 68\%$), while a higher proportion of males presented with smaller ($<19\%$) TBSA injuries.¹⁷

Cultural and behavioral risk factors

Several key factors exacerbate women's vulnerability to severe burns. The prevalent use of kerosene pressure stoves, floor-level cooking setups like chulhas, and inadequate ventilation in rural and low-income households elevate exposure risk.¹⁶ Traditional loose-fitting synthetic attire such as sarees and dupattas was commonly ignited during cooking, leading to extensive flame burns.^{16,17} Additionally, there is often a pattern of burns being officially recorded as accidental despite underlying contexts of domestic abuse or intentional self-harm. Qualitative evidence indicates that these narratives may mask incidents of self-immolation, dowry-related assaults, or intimate partner violence, reflecting systemic under-reporting and medico-legal misclassification.¹⁸

TREATMENT ACCESS AND HEALTH SYSTEM GAPS IN BURN INJURY CARE: AN INDIAN CONTEXT

Delayed presentation significantly undermines burn care outcomes in India. A prospective study involving 439 burn patients across five states (65.6% women, 56.7% living in poverty) found that delays in reaching definitive care markedly increased mortality, especially among female patients and those with larger total body surface area (TBSA) burns.¹⁸ Emergency medical services (EMS) interventions—such as fluid resuscitation, oxygen delivery, and wound stabilization—were found to reduce delay impact, yet many regions still lack systematic pre-hospital care infrastructure.¹⁸

Economic and geographic challenges further restrict access to care. Evidence indicates that in North India, the average out-of-pocket expenditure for an injury-related hospitalization was approximately ₹32,200, with nearly 30% of families experiencing catastrophic health expenditures (CHE). Such high costs often force households to delay, interrupt, or forgo essential medical care.¹⁹ In addition, India's burn care capacity remains insufficient: with limited tertiary center availability and shortages of trained personnel, patients frequently travel long distances sometimes over 20 km for treatment.⁴ Gender dynamics compound these gaps, as women often face delays due to dependence on male decision-makers, leading to poorer access and outcomes.^{17,18}

PSYCHO-SOCIAL AND SOCIETAL FACTORS IN BURN INJURIES IN INDIA

Burn injuries among women in India are entangled with severe psychosocial distress, often stemming from

domestic violence, dowry-related abuse, and mental health issues. A forensic cohort study of 152 married burn victims revealed that 31% of cases were confirmed as homicidal burns, often occurring within the first few years of marriage. Many incidents involved fire deliberately ignited using kerosene, indicating systemic dowry-related violence frequently disguised as accidents or suicides.²⁰ Qualitative interviews conducted in major burns units in Delhi and Mumbai further revealed that many survivors initially reported their burns as accidental; only later, when separated from in-laws or supported by natal relatives, did they disclose suicide or intentional harm linked to dowry harassment or intimate-partner violence.²¹

This psychosocial burden is compounded by pervasive social stigma and limited rehabilitation opportunities. A multi-site qualitative study conducted across nine Indian states revealed that women with disfiguring burn injuries experience severe social exclusion—limited access to education, employment, and social support. Disfigurement was often interpreted as a moral deficit, undermining their social acceptance and mental health recovery.²² Moreover, systemic gaps in legal investigation and classification further marginalize survivors. Despite thousands of dowry death cases reported annually, police investigations often rely heavily on family narratives, with conviction rates historically low at around 32–35%, reflecting weak forensic standards and investigative discretion that impede justice for affected women.²¹

POLICY LANDSCAPE AND PROGRAMMATIC RESPONSE IN INDIA

India's National Programme for Prevention and Management of Trauma and Burn Injuries (NPPMT and BI) was initiated to strengthen the country's trauma care infrastructure, including burn care services at primary, secondary, and tertiary levels. Implemented under the National Health Mission, it aimed to establish dedicated burn units, enhance human resource capacity, and improve data collection through burn registries and surveillance systems.¹⁴ However, this programme lacks a strong gender lens. It does not explicitly address the unique vulnerabilities of women, such as burns due to domestic violence, dowry-related abuse, or self-immolation.

Gender-specific gaps persist in both policy design and implementation. For instance, there are no national guidelines mandating screening of female burn patients for domestic violence, nor is there routine integration of mental health or legal support in burn units.²⁰ Despite the high proportion of non-accidental burns among women, these often go underreported or misclassified due to social stigma, inadequate medico-legal training, and fear of reprisal.

Promising models do exist at the community level. In a pilot project conducted in Madhya Pradesh, educational interventions and environmental modifications led to a significant reduction in domestic burn injuries, especially

among women and children.²³ These findings underscore the importance of low-cost, culturally adapted, gender-sensitive strategies in reducing burn burden and guiding national responses.

CONCLUSION

Burn injuries are a critical public health issue in India, disproportionately affecting women of reproductive age due to unsafe cooking practices, flammable clothing, hazardous fuels, and intentional harm linked to domestic violence, dowry harassment, and self-immolation. Gendered barriers such as financial dependence, limited autonomy, stigma, delayed care-seeking, inadequate rural burn units, and poor integration of physical and psychological rehabilitation further worsen outcomes, while under-reporting and weak medico-legal systems conceal the true burden. Although the National Programme for Prevention and Management of Burn Injuries has improved infrastructure, it remains largely biomedical and gender-neutral, failing to address sociocultural drivers. A paradigm shift is needed to re-frame burns as both a health and social issue, with priorities including gender-disaggregated data, provider training to recognize intentional burns, accessible gender-sensitive mental health services, and integration with violence prevention. Community engagement must go beyond awareness to challenge patriarchal norms and empower women through education, legal literacy, and financial inclusion, ensuring an equity-focused response that reduces women's vulnerability and breaks cycles of harm.

Recommendations

Addressing gender disparities in burn injuries in India demands a multi-level, gender-responsive strategy. A critical first step is the establishment of robust, gender-disaggregated data systems. Existing burn registries and national surveys rarely capture gender-specific details on causes, contexts, and outcomes, resulting in a systemic underestimation of the true burden on women and girls. Without accurate data, their experiences remain invisible, and policies risk overlooking the structural and social drivers of these injuries.²⁴

Routine gender-disaggregated surveillance and medico-legal documentation of violence-related burns are essential to inform targeted interventions. Strengthening health systems through expanded burn units, integrated mental health support, trained providers, and financial or transport assistance can improve equitable access to care. Policies like the NPPMT and BI must adopt gender-sensitive protocols, screening tools, and legal aid, while community-based initiatives—such as awareness campaigns, behavior change programs, and women's self-help groups—can challenge harmful norms. A coordinated effort across government, health systems, civil society, and communities is critical for sustainable and equitable burn prevention and care in India.

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REFERENCES

- Gautam R, Rajoura OP, Sharma AK, Rajpal, Bhatia MS. Socio-demographic features and quality of life post burn injury. *J Family Med Prim Care*. 2022;3(3):1032-5.
- Gupta JL, Makhija LK, Bajaj SP. National programme for prevention of burn injuries. *Indian J Plast Surg*. 2010;43:S6-10.
- Bhate-Deosthali P, Lingam L. Gendered pattern of burn injuries in India: a neglected health issue. *Reproductive Health Matters*. 2016;24(47):96-103.
- Mehta K, Arega H, Smith NL, Li K, Gause E, Lee J, et al. Gender-based disparities in burn injuries, care and outcomes: A World Health Organization (WHO) Global Burn Registry cohort study. *Am J Surg*. 2022;223(1):157-63.
- World Health Organization (WHO). Global Burn Registry cohort study. *Am J Surg*. 2022;223(1):157-63.
- Golshan A, Patel C, Hyder AA. A systematic review of the epidemiology of unintentional burn injuries in South Asia. *J Public Health (Oxf)*. 2013;35(3):384-96.
- Golshan A, Patel C, Hyder AA. A systematic review of the epidemiology of unintentional burn injuries in South Asia. *J Public Health*. 2013;35(3):384-96.
- Harshitha K, Raghava V, Mahesh C. Social and psychological profile of pattern of female burn casualties. *Egypt J Forensic Sci*. 2022;12(1):61.
- Kumar V, Tripathi CB. Fatal accidental burns in married women. *Legal Med (Tokyo)*. 2003;5(3):139-45.
- Global Burden of Disease Cancer Collaboration. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: a systematic analysis for the global burden of disease study. *JAMA Oncol*. 2017;3(4):524.
- Forjuoh SN. Burns in low-and middle-income countries: a review of available literature on descriptive epidemiology, risk factors, treatment, and prevention. *Burns*. 2006;32(5):529-37.
- McGwin Jr G, George RL, Cross JM, Reiff DA, Chaudry IH, Rue III LW. Gender differences in mortality following burn injury. *Shock*. 2002;18(4):311-5.
- Lam NN, Hung NT, Duc NM. Influence of gender difference on outcomes of adult burn patients in a developing country. *Ann Burns Fire Disasters*. 2019;32(3):175-8.
- Ministry of Health and Family Welfare. National Programme for Prevention of Burn Injuries (NPPBI) – Operational Guidelines. Government of India. 2013.
- Shankar G, Naik VA, Powar R. Epidemiological study of burn injuries admitted in two hospitals of North Karnataka. *Indian J Community Med*. 2010;35(4):509-12.
- Honnegowda TM, Kumar P, Udupa P, Rao P. Epidemiological study of burn patients hospitalised at a burns centre, Manipal. *Int Wound J*. 2019;16(1):79-83.
- Daruwalla N, Belur J, Kumar M, Tiwari V, Sarabahi S, Tilley N, et al. A qualitative study of the background and in-hospital medicolegal response to female burn injuries in India. *BMC Women's Health*. 2014;14(1):142.
- Newberry JA, Bills CB, Pirrotta EA, Barry M, Rao GV, Mahadevan SV, et al. Timely access to care for patients with critical burns in India: a prehospital prospective observational study. *Emerg Med J*. 2019;36(3):176-82.
- Prinja S, Jagnoor J, Chauhan AS, Aggarwal S, Nguyen H, Ivers R. Economic burden of hospitalization due to injuries in North India: a cohort study. *Int J Env Res Public Health*. 2016;13(7):673.
- Kumar V, Tripathi CB. Burnt wives: a study of homicides. *Med Science Law*. 2004;44(1):55-60.
- Belur J, Tilley N, Daruwalla N, Kumar M, Tiwari V, Osrin D. The social construction of 'dowry deaths'. *Social Sci Med*. 2014;119:1-9.
- Jagnoor J, Bekker S, Chamanian S, Potokar T, Ivers R. Identifying priority policy issues and health system research questions associated with recovery outcomes for burns survivors in India: a qualitative inquiry. *BMJ Open*. 2018;8(3):e020045.
- Chamanian S, Chouhan R, Awasthi A, Bendell R, Marsden N, Gibson J, et al. Pilot project in rural western Madhya Pradesh, India, to assess the feasibility of using LED and solar-powered lanterns to remove kerosene lamps and related hazards from homes. *Burns*. 2015;41(3):595-603.
- Peck MD. Epidemiology of burns throughout the world. Part I: Distribution and risk factors. *Burns*. 2011;37(7):1087-100.

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