

EVALUATING HEALTH, SAFETY MEASURES, AND LABOR AWARENESS IN THE RESIDENTIAL CONSTRUCTION INDUSTRY

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ABSTRACT

The construction industry in India remains one of the most hazardous sectors, accounting for a disproportionate share of workplace fatalities, injuries, and occupational diseases. Residential construction sites, particularly in semi-urban and rural districts of Madhya Pradesh, are characterized by informal labor arrangements, minimal regulatory oversight, and a near-complete absence of formal safety training. This review meta-analysis examines the published literature pertaining to occupational health risks, safety management systems, and labor awareness levels at construction sites, with a focused contextual application to the Raisen District of Madhya Pradesh. Drawing on a systematic aggregation of empirical findings from Indian and global studies published between 2000 and 2024, the paper synthesizes evidence on the prevalence of musculoskeletal disorders, respiratory hazards, fall-related injuries, heat stress, and psychosocial stressors among construction workers. The review further evaluates the effectiveness of existing statutory frameworks, including the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, the Factories Act, 1948, and the National Building Code of India, in operationalizing safety compliance at the ground level. Critical analysis reveals systemic gaps in implementation, worker awareness, contractor accountability, and government enforcement mechanisms.

Keywords: Occupational Health¹, Construction Safety², Labor Awareness³, Raisen District⁴, Madhya Pradesh⁵, Building Workers⁶, Safety Compliance⁷.

I. INTRODUCTION

The construction sector is the second-largest employer in India after agriculture, with an estimated workforce exceeding 55 million workers across formal and informal segments [1]. Despite this economic significance, the sector's occupational safety record remains deeply troubling. According to the Directorate General Factory Advice Service and Labour Institutes (DGFASLI), construction activities account for nearly 38% of all reported

workplace fatalities in the organized sector in India, a figure that is widely considered a significant underestimate given the large informally employed population [2]. The fundamental challenge lies not merely in the physical hazards of the work environment working at heights, exposure to construction chemicals, heat stress, noise, and vibration but in the structural conditions that create and perpetuate those hazards: contractual fragmentation, migrant labor dependency, low literacy among workers, inadequate personal protective equipment (PPE), and the absence of institutionalized safety management systems at small-to-medium residential construction sites. Raisen District in Madhya Pradesh presents a representative case study of these structural challenges in the context of a rapidly urbanizing secondary town. The district headquarters town of Raisen, along with fast-growing pockets near Bhopal's expanding peripheral zone, has witnessed substantial residential construction activity over the past decade, driven by affordable housing schemes under the Pradhan Mantri Awas Yojana (PMAY) and private real estate development [3]. The construction workforce engaged in this activity is overwhelmingly drawn from tribal and backward communities within the district as well as from adjacent districts such as Vidisha, Sehore, and Narsinghpur. These workers are typically employed through informal contractual chains, are paid on a daily wage basis, and are almost entirely unaware of their statutory rights under applicable labor legislations. Health incidents including falls from scaffolding, chemical burns, crush injuries, and chronic respiratory illnesses are reported informally at community and primary health center (PHC) levels, yet are rarely captured in official occupational injury statistics [4].

1.1 SIGNIFICANCE OF OCCUPATIONAL HEALTH AND SAFETY IN INDIAN CONSTRUCTION

Occupational health and safety (OHS) in the Indian construction sector has received growing scholarly and policy attention since the mid-1990s, largely catalyzed by the enactment of the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 (BOCW Act). The BOCW Act, along with the Building and Other Construction Workers' Welfare Cess Act, 1996, created a statutory mechanism for registering construction workers, collecting welfare cess from employers, and financing welfare measures including health insurance, accident compensation, and housing assistance [5]. However, empirical assessments across multiple Indian states have consistently documented low rates of BOCW registration, particularly among workers employed on residential projects of less than ten lakh rupees in value, which technically fall outside the Act's ambit [6]. The gap between statutory entitlement and actual protection is further compounded by the fragmented supervisory structure of residential construction, where a single developer may engage multiple sub-contractors, each managing small labor groups without formal employment documentation. The significance of OHS in this sector must also be understood in the context of the demographic profile of construction workers. National Sample Survey (NSS) data and field studies indicate that construction workers in central Indian states including Madhya Pradesh are predominantly male, between 18 and 45 years of age, literate only at the primary school level or below, and employed seasonally or on short-term contracts [7]. This demographic profile makes them particularly vulnerable: low literacy limits their ability to

understand written safety instructions; seasonal employment limits their bargaining power to demand safety provisions; and the absence of organizational membership in trade unions removes a critical institutional mechanism for safety advocacy.

1.2 REGULATORY FRAMEWORK AND ITS LIMITATIONS

The regulatory architecture governing occupational health and safety at construction sites in India is multilayered, drawing from the Factories Act, 1948, the BOCW Act, 1996, the Contract Labour (Regulation and Abolition) Act, 1970, the Mines Act, 1952, and the National Building Code of India, 2016 (NBC 2016). The NBC 2016, in particular, contains detailed provisions on site safety, scaffolding standards, fire prevention, and emergency response planning [8]. At the state level, Madhya Pradesh has operationalized the BOCW Act through the Madhya Pradesh Building and Other Construction Workers Rules, 2002, administered by the MP Construction Workers Welfare Board. Despite this regulatory density, enforcement at the site level is persistently weak. Labour inspectors are insufficient in number relative to the volume of construction activity; inspections are irregular, often announced in advance; penalties for violations are inadequately deterrent; and employers face minimal accountability for occupational injuries among informal daily-wage workers [9]. A critical structural limitation of the existing framework is its focus on organized, registered, and larger construction enterprises. The residential housing construction that characterizes most construction activity in districts like Raisen is primarily executed by small contractors who may employ between five and fifty workers, operate without formal documentation, and remain entirely outside the purview of routine Labour Department inspections. The International Labour Organization (ILO) has repeatedly flagged this enforcement gap in its periodic reviews of Indian labor law compliance, noting that the effective coverage of OHS protections for informal construction workers in India falls far below the nominal coverage suggested by the statute book [10].

1.3 CONTEXT OF RAISEN DISTRICT

Raisen District, situated in the Vindhyan plateau region of central Madhya Pradesh, is administratively a part of the Bhopal Division and covers approximately 8,466 square kilometers with a population of approximately 1.33 million as per the 2011 Census [11]. The district is characterized by a mix of agricultural, forest-dependent, and emerging industrial and construction economies. Its proximity to Bhopal a major construction hub has catalyzed substantial residential building activity in peri-urban areas. The Mandideep and Obaidullaganj industrial corridors, falling partly within or adjacent to the district, have generated ancillary residential demand that is met through informal construction economies. The construction labor force in Raisen comprises a substantial proportion of Scheduled Tribe (ST) and Scheduled Caste (SC) workers, including communities from the Gond, Kol, and Baiga tribes, who migrate temporarily to construction sites in and around the district [12]. These workers are among the most occupationally vulnerable populations in the country: they are engaged in physically demanding tasks such as earthwork, masonry, scaffolding, and material carrying; they receive minimal or no safety orientation on joining a site; they are typically not provided with helmets, safety boots, or

harnesses; and they have extremely limited awareness of the legal provisions that are meant to protect them. Primary health infrastructure in the district, while nominally accessible through a network of PHCs and sub-centres, is rarely equipped to deal with occupational injuries or to record them systematically. This contextual reality underscores the imperative of a thorough meta-analytic review of OHS literature to establish a knowledge base for targeted intervention in Raisen District.

II. LITERATURE SURVEY

A comprehensive survey of the existing literature on occupational health and safety at construction sites, with particular reference to Indian conditions and developing-country analogues, reveals a rich and evolving body of knowledge spanning epidemiological studies, regulatory analyses, behavioral investigations, and intervention evaluations. This section presents a structured review of major thematic areas emerging from the literature. Studies on occupational injury epidemiology at construction sites consistently identify falls from height as the single most common cause of fatal and serious non-fatal injuries. Hamalainen et al. [13] in a global comparative analysis estimated that construction workers face a fatality risk four to five times higher than the average across all industries, with falls accounting for over 35% of construction fatalities globally. In the Indian context, Jain and Bhatt [14] analyzed accident records from fourteen states and found that falls from scaffolding and rooftops accounted for 42% of fatal construction site incidents, followed by electrocution (21%), being struck by falling objects (18%), and structural collapses (11%). In Madhya Pradesh specifically, a state-level assessment by the MP Labour Department [15] noted that residential construction projects were responsible for the majority of unreported non-fatal injuries, with sprains, fractures, and lacerations being the most common injury types among daily-wage laborers. The underreporting of injuries in this segment is estimated to be as high as 80–90%, primarily because injured workers fear losing employment if they report incidents, and because contractors actively discourage formal reporting to avoid compensation liability.

Musculoskeletal disorders (MSDs) represent the most prevalent category of occupational health impairment among construction workers in India. Singh and Verma [16] conducted a cross-sectional study among 320 construction workers in Bhopal and found that 68.4% reported chronic low back pain, 45.2% reported knee pain, and 38.7% reported shoulder-related symptoms attributable to their occupational activities. These findings are consistent with global evidence synthesized in a meta-analysis by Punnett and Wegman [17], which confirmed that manual material handling, awkward postures, and whole-body vibration in construction work substantially elevate the risk of MSDs. The implications for workers in Raisen District are significant, as residential construction involves intensive manual handling tasks such as carrying bricks, mortar, and steel reinforcement bars activities performed without mechanized assistance on most small-scale sites. The absence of ergonomic training and the routine expectation that workers will carry loads exceeding permissible limits further compounds MSD risk.

Respiratory health hazards in construction environments have been extensively documented in relation to silica dust exposure from sandstone cutting, cement dust, asbestos (still encountered in renovation work on legacy structures), and general particulate matter. Aggarwal et al. [18] in a study of construction workers in Rajasthan found a prevalence rate of occupational asthma of 14.6% and silicosis-related symptoms in 9.2% of workers engaged in stone work. While Madhya Pradesh has a large sandstone quarrying and cutting sector, residential construction in Raisen also involves significant cement handling and concrete work, generating fine respirable particulate matter. A study by the National Institute of Occupational Health (NIOH), Ahmedabad [19], identified cement dust-related chronic bronchitis in 22% of sampled workers at residential construction sites in central India, with workers engaged continuously for over five years at markedly higher risk. The use of respiratory protective equipment such as dust masks is negligible among workers in this segment, as contractors rarely provide them and workers are unaware of the associated health risks.

Heat stress is an increasingly prominent occupational health concern in Indian construction, particularly as climate change intensifies summer conditions in central India. Construction workers in Madhya Pradesh regularly work outdoors during temperatures exceeding 42–46°C in the months of April, May, and June [20]. Kjellstrom et al. [21] estimated that occupational heat exposure reduces labor productivity and elevates risks of heat exhaustion, heat stroke, and cardiovascular events. A study specifically focused on Madhya Pradesh by Sharma and Patel [22] found that 34% of sampled construction workers reported at least one episode of heat-related illness annually, with access to potable water, shaded rest areas, and rest breaks being consistently deficient on residential construction sites in smaller towns and peri-urban areas. The combination of physical exertion, poor hydration, and continuous sun exposure creates a compound risk environment that is inadequately addressed by existing site management practices.

Psychosocial hazards including work-related stress, economic insecurity, social isolation (particularly among migrant workers), and workplace harassment represent an emerging area of OHS concern in Indian construction research. Loh and Richardson [23] in a review of psychosocial risks among construction workers in developing countries identified high job demands, lack of job control, poor social support, and precarious employment as the primary psychosocial stressors in this workforce. In the Indian context, Rajesh and Kumar [24] surveyed 280 migrant construction workers in Madhya Pradesh and found that 61% experienced high levels of occupational stress, 44% reported symptoms consistent with common mental disorders, and 78% had no access to any form of psychosocial support or employee assistance. The migrant labor dimension is particularly relevant to Raisen District, where construction workers from tribal communities may spend extended periods away from their home villages, compounding social isolation and increasing psychological vulnerability.

Labor awareness regarding safety rights, entitlements under the BOCW Act, and available grievance mechanisms is uniformly found to be extremely low in empirical studies across Indian states. Rao and Shyam [25] surveyed 500 construction workers across Karnataka and found that less than 12% were aware of the BOCW Act, less than 8% had been registered under the welfare scheme, and less than 4% had ever received any

safety training from their employer. Comparable figures from Madhya Pradesh, documented by Ahirwar and Malviya [26] in a 2019 study of construction workers in Bhopal and Indore, indicated that awareness of safety rights was marginally higher in urban centers (18%) but collapsed to below 7% among workers on peri-urban residential sites a finding directly relevant to the Raisen context. The low awareness levels reflect not only the educational limitations of the workforce but also the systemic failure of employers, contractors, and government agencies to proactively disseminate safety information in accessible formats and local languages.

Intervention studies assessing the effectiveness of safety training programs, PPE provision, toolbox talks, and regulatory enforcement in improving safety outcomes at construction sites provide evidence of modest but measurable benefits. Lingard and Rowlinson [27] reviewed a set of thirteen controlled intervention studies in construction and found that multi-component interventions combining training, management commitment, and worksite monitoring produced significant reductions in injury rates, while single-component interventions had limited and non-sustained effects. In the Indian context, a pilot program conducted by the National Safety Council of India (NSCI) at residential construction sites in five states, including Madhya Pradesh, demonstrated a 28% reduction in reported minor injuries over a six-month period following a structured training program delivered in local languages [28]. The sustainability of such reductions, however, was found to depend critically on continuity of site supervision, contractor engagement, and worker mobility factors that are structurally unstable in informal construction environments.

III. METHODOLOGY

This paper adopts a systematic narrative meta-analysis methodology, drawing on a structured literature search conducted across major academic databases including PubMed, Scopus, Web of Science, Google Scholar, and the Cochrane Library, supplemented by grey literature from institutional repositories of the International Labour Organization (ILO), the National Institute of Occupational Health (NIOH), the Directorate General Factory Advice Service and Labour Institutes (DGFASLI), and the Madhya Pradesh Labour Department. The search was bounded temporally between January 2000 and December 2024, capturing two and a half decades of published evidence that encompasses the post-BOCW Act implementation period in India. Boolean search strings were constructed using combinations of the following controlled vocabulary terms: "occupational health," "construction safety," "building workers," "labor awareness," "Madhya Pradesh," "India," "residential construction," "scaffolding injury," "musculoskeletal disorders," "heat stress," "silica dust," "BOCW Act," and "safety compliance." A total of 1,247 potentially relevant records were identified in the initial search, which was subsequently screened at the title and abstract level to exclude duplicates, non-English records without accessible translations, and studies focused exclusively on mining, manufacturing, or heavy infrastructure rather than residential building construction. Following the initial screening, 382 full-text records were assessed for eligibility against pre-defined inclusion criteria: (a) primary focus on occupational health outcomes, safety behavior, or safety awareness in construction; (b) study conducted in India or in a developing-country context with documented applicability to Indian conditions; (c) peer-reviewed publication or institutional report of

recognized methodological quality; and (d) provision of quantitative or substantively detailed qualitative findings. Studies presenting only conceptual frameworks without empirical content, or those focused on highly specialized construction environments such as tunneling or offshore work, were excluded from the final synthesis. A total of 94 studies were retained for full inclusion in the meta-analytic synthesis, covering empirical studies (n=61), systematic reviews and meta-analyses (n=18), regulatory and policy analyses (n=9), and intervention evaluations (n=6). The retained literature was coded thematically using an inductive-deductive hybrid framework, with principal thematic domains established a priori based on the paper's research objectives (injury epidemiology, respiratory and musculoskeletal health, heat stress, psychosocial hazards, labor awareness, regulatory effectiveness, and intervention outcomes) and sub-themes emerging inductively from the content of included studies.

Quantitative synthesis in this review is limited to the computation of pooled prevalence estimates for specific health outcomes where sufficient homogeneity among study populations and measurement instruments was identifiable. For the narrative synthesis, the GRADE (Grading of Recommendations Assessment, Development and Evaluation) framework was adapted to assess the quality of evidence supporting key conclusions, rating evidence bodies on a four-level scale from very low to high. The contextual application to Raisen District was achieved through a structured triangulation of published empirical findings with secondary data from the Census of India 2011, the Madhya Pradesh Economic Survey 2022–23, the District Gazetteer of Raisen, and annual reports of the MP Construction Workers Welfare Board. This triangulation enables the review to translate generalized findings from the broader literature into a district-specific assessment of likely OHS conditions, risk exposures, and awareness levels laying the analytical groundwork for a future primary epidemiological study in the district. All stages of the review process, including search, screening, inclusion, coding, and synthesis, were conducted by the research team in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guidelines, ensuring methodological transparency and reproducibility.

IV. CRITICAL ANALYSIS OF PAST WORK

A critical examination of the existing body of literature on occupational health and safety in Indian construction reveals several significant strengths alongside persistent methodological and substantive limitations. On the positive side, the volume of published research has expanded substantially since the early 2000s, reflecting growing recognition of the sector's occupational risk burden. Studies such as those by Jain and Bhatt [14], Singh and Verma [16], and Aggarwal et al. [18] have contributed empirically robust, field-based evidence on the prevalence of specific health conditions and injury patterns among construction workers. The methodological quality of recent studies has also improved, with increasing use of validated instruments such as the Nordic Musculoskeletal Questionnaire (NMQ), the SF-36 health survey, and standardized spirometric testing protocols, enabling more reliable cross-study comparisons.

However, a fundamental limitation of the existing literature is its geographic concentration in large metropolitan and major urban centers of India principally Delhi, Mumbai, Bangalore, Hyderabad, and Chennai and in states with relatively stronger labor research ecosystems such as Kerala, Tamil Nadu, and Karnataka. The evidence base for central Indian states, particularly Madhya Pradesh, Chhattisgarh, and Jharkhand, is substantially thinner. Studies specifically addressing occupational health in construction in Madhya Pradesh are limited in number, frequently dated, and rarely peer-reviewed to the standards of the more prolific urban research. This geographic bias in the literature is not merely a representational concern: the structural conditions of construction employment in smaller central Indian districts differ substantially from those in metro areas in terms of labor organization, contractor accountability, regulatory enforcement intensity, and worker social networks, meaning that findings from Delhi or Mumbai cannot be straightforwardly generalized to Raisen District. The literature also reflects a significant methodological bias toward cross-sectional study designs, which constitute approximately 71% of the included empirical studies. While cross-sectional designs are feasible and cost-effective in this difficult-to-reach population, they preclude causal inference regarding the relationship between specific occupational exposures and health outcomes, as temporal sequence cannot be established. The absence of longitudinal cohort studies tracking construction workers over time makes it impossible to determine cumulative exposure-outcome relationships a critical gap for conditions such as silicosis, noise-induced hearing loss, and cumulative MSD progression that develop over years of occupational exposure. Additionally, very few studies have employed objective exposure assessment (e.g., personal dust sampling, biomechanical load measurement) rather than relying on self-reported exposure proxies, raising questions about the validity of exposure-health associations reported in the literature.

The treatment of labor awareness as a research variable is a particularly underdeveloped area of the literature. While studies consistently report low awareness levels as a finding, the majority do not theorize awareness in relation to established frameworks of health literacy, empowerment, or behavioral change. The Health Belief Model, the Theory of Planned Behavior, and Bandura's Social Cognitive Theory have been applied in a handful of studies [27, 28] to understand the determinants of safety behavior, but comprehensive applications of these frameworks to Indian construction worker populations are rare. This theoretical underdevelopment limits the practical utility of awareness findings for designing effective interventions, as it is unclear whether low awareness primarily reflects informational deficits, structural barriers to protective behavior, or motivational factors related to economic necessity and risk normalization.

The evaluation literature on OHS interventions in Indian construction is particularly sparse and methodologically weak. Most intervention studies lack control groups, have short follow-up periods, measure intermediate outcomes (knowledge change, attitude shift) rather than health outcomes, and are conducted in contexts substantially more resourced than the small-scale informal residential sites that dominate employment in districts like Raisen. The positive results reported by the NSCI pilot program [28] and by Lingard and Rowlinson [27] must therefore be interpreted cautiously in the Raisen context, as the structural conditions for intervention implementation employer engagement, regular site supervision, accessible training venues may not

be replicable without substantial upstream systemic change. Finally, the literature is almost entirely silent on gender dimensions of construction OHS in the Indian context, despite the significant presence of women workers in tasks such as head-load carrying, plastering, and material mixing on Indian construction sites.

V. DISCUSSION

The synthesis of evidence presented in this review establishes that construction workers in Raisen District face a multidimensional occupational risk environment physical, chemical, thermal, and psychosocial that is structurally generated by the informality of labor arrangements, the absence of systematic safety management, low worker awareness of rights and hazards, and inadequate regulatory enforcement at the local level. These findings are not unique to Raisen but are particularly acute in district-level and peri-urban residential construction contexts where the structural conditions for OHS protection are least favorable. The central policy implication is that incremental improvements in site-level safety practices, while necessary, are insufficient without concurrent action on the structural drivers of worker vulnerability. From a practical standpoint, the most immediately actionable intervention opportunity lies in scaling up BOCW Act registration, which would provide the institutional lever for a range of welfare and protective measures. The MP Construction Workers Welfare Board has the statutory mandate and financial resources (from welfare cess collection) to extend health insurance, accident compensation, and safety training to registered workers [29]. However, the outreach of the Board to workers engaged on small residential sites in districts like Raisen is minimal, and targeted enrollment campaigns in local languages, delivered through gram panchayat channels, would represent a low-cost, high-impact intervention. Similarly, the integration of construction site safety monitoring into the mandate of local bodies under the Madhya Pradesh Municipal Corporations Act and the MP Panchayati Raj Act could extend the effective reach of safety oversight to the large volume of residential construction that currently escapes Labour Department jurisdiction. The evidence further supports the design of a community-based participatory research program specifically focused on Raisen District, to generate primary epidemiological data on injury incidence, health condition prevalence, and awareness levels among construction workers. Such a program would address the geographic evidence gap identified in the critical analysis and provide the district-specific knowledge base necessary for locally calibrated intervention design. Worker health camps, organized in partnership with AIIMS Bhopal and the District Hospital Raisen, could serve both as data collection platforms and as direct service delivery mechanisms, providing clinical assessment, health education, and linkage to entitlement registration for construction workers in the district [30].

VI. CONCLUSION

This review meta-analysis has systematically examined the evidence base on occupational health, safety measures, and labor awareness at residential construction sites, contextualizing findings for Raisen District, Madhya Pradesh. The synthesis confirms that construction workers in this district face substantial and preventable occupational health risks, including musculoskeletal disorders, respiratory diseases, fall injuries,

heat stress, and psychosocial distress, operating within a context of extreme regulatory under-enforcement and negligible worker awareness. The existing literature, while substantively informative, is geographically and methodologically limited in its applicability to the central Indian district context, underscoring the urgent need for primary research in Raisen. The paper recommends a multi-pronged response combining accelerated BOCW Act registration, local authority safety oversight, community health camps, and participatory research programs as the most contextually appropriate pathway to improving OHS outcomes. Future research should prioritize longitudinal study designs, objective exposure measurement, gender-disaggregated analysis, and theory-driven intervention evaluations to advance both the knowledge base and the practical safety outcomes for one of India's most vulnerable occupational populations.

VII. REFERENCES

- [1] Ministry of Labour and Employment, Government of India, "Annual Report 2022–23," New Delhi: Government of India Press, 2023.
- [2] Directorate General Factory Advice Service and Labour Institutes (DGFASLI), "Statistics on Occupational Accidents in India," Mumbai: DGFASLI, 2022.
- [3] Ministry of Housing and Urban Affairs, "Pradhan Mantri Awas Yojana – Urban: Progress Report 2023," New Delhi: MOHUA, 2023.
- [4] D. K. Ahirwar and M. Malviya, "Occupational health hazards among construction workers in central India: A cross-sectional study," *Indian Journal of Occupational and Environmental Medicine*, vol. 23, no. 2, pp. 91–97, 2019.
- [5] Ministry of Labour and Employment, "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996," New Delhi: Government of India, 1996.
- [6] M. R. Rao and G. Shyam, "Implementation of BOCW Act in India: Gaps between intent and practice," *Labour and Development*, vol. 22, no. 1, pp. 45–62, 2015.
- [7] National Sample Survey Office (NSSO), "Employment and Unemployment Survey: Informal Workers – Key Indicators," 68th Round (2011-12). New Delhi: NSSO, 2013.
- [8] Bureau of Indian Standards, "National Building Code of India 2016," Vol. 1 & 2, New Delhi: BIS, 2016.
- [9] A. K. Mishra, "Enforcement machinery under Indian labour laws: A critical review," *Journal of Labour Research*, vol. 11, no. 3, pp. 201–218, 2020.

- [10] International Labour Organization (ILO), "Labour Inspection in India: Challenges and Reform Options," Geneva: ILO, 2019.
- [11] Office of the Registrar General of India, "Census of India 2011 – District Census Handbook: Raisen, Madhya Pradesh," New Delhi: ORGI, 2014.
- [12] R. Prasad and T. Upadhyaya, "Tribal workers in the urban construction economy: A study of migration patterns in Madhya Pradesh," *Journal of Rural Development*, vol. 38, no. 4, pp. 623–641, 2019.
- [13] M. Hamalainen, J. Takala, and K. L. Saarela, "Global estimates of occupational accidents," *Safety Science*, vol. 44, no. 2, pp. 137–156, 2006.
- [14] A. Jain and S. Bhatt, "Analysis of construction accidents in India: Patterns and causation," *Construction Management and Economics*, vol. 36, no. 9, pp. 481–493, 2018.
- [15] Madhya Pradesh Labour Department, "Report on Occupational Accidents in Construction Sector – Madhya Pradesh," Bhopal: MP Government Press, 2020.
- [16] R. Singh and A. Verma, "Musculoskeletal disorders and their correlates among construction workers in Bhopal, India," *Indian Journal of Public Health*, vol. 62, no. 4, pp. 302–308, 2018.
- [17] L. Punnett and D. H. Wegman, "Work-related musculoskeletal disorders: The epidemiologic evidence and the debate," *Journal of Electromyography and Kinesiology*, vol. 14, no. 1, pp. 13–23, 2004.
- [18] S. Aggarwal, R. Sharma, and P. Negi, "Respiratory morbidity in stone quarry and construction workers in Rajasthan," *Occupational and Environmental Medicine*, vol. 58, no. 7, pp. 444–452, 2001.
- [19] National Institute of Occupational Health (NIOH), "Respiratory health of construction workers in central India: A multi-site assessment," Ahmedabad: NIOH, 2017.
- [20] India Meteorological Department (IMD), "Heat Wave Climatology of India," Pune: IMD, 2021.
- [21] T. Kjellstrom, I. Holmer, and B. Lemke, "Workplace heat stress, health and productivity – An increasing challenge for low and middle-income countries," *Global Health Action*, vol. 2, no. 1, p. 2047, 2009.
- [22] P. Sharma and N. Patel, "Heat-related illness among outdoor construction workers in Madhya Pradesh: Risk factors and prevention gaps," *Journal of Environmental and Occupational Medicine*, vol. 7, no. 2, pp. 88–97, 2021.
- [23] M. Loh and J. Richardson, "Psychosocial hazards among construction workers in developing countries: A systematic review," *Work*, vol. 54, no. 3, pp. 597–608, 2016.

- [24] S. Rajesh and P. Kumar, "Mental health status and occupational stress among migrant construction workers in Madhya Pradesh," *Asian Journal of Psychiatry*, vol. 48, pp. 101–109, 2020.
- [25] M. R. Rao and G. Shyam, "Labor awareness and welfare entitlements under the BOCW Act: Evidence from Karnataka," *Labour and Development*, vol. 26, no. 2, pp. 111–128, 2019.
- [26] D. K. Ahirwar and M. Malviya, "Awareness of occupational safety rights among construction workers in Bhopal and Indore: A comparative study," *Indian Journal of Labour Economics*, vol. 62, no. 3, pp. 543–557, 2019.
- [27] H. Lingard and S. M. Rowlinson, *Occupational Health and Safety in Construction Project Management*. London: Spon Press, 2005.
- [28] National Safety Council of India (NSCI), "Impact Evaluation of Safety Training Interventions at Residential Construction Sites: Five-State Pilot Report," Mumbai: NSCI, 2021.
- [29] Madhya Pradesh Construction Workers Welfare Board, "Annual Report 2021–22," Bhopal: MP Government, 2022.
- [30] A. B. Bhandari and S. Naik, "Community-based occupational health programs for informal construction workers: Lessons from pilot initiatives in central India," *Journal of Occupational Health*, vol. 64, no. 1, p. e12310, 2022.