

# OCCUPATIONAL HEALTH, SAFETY COMPLIANCE, AND WORKER AWARENESS IN RESIDENTIAL CONSTRUCTION PROJECTS

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## ABSTRACT

Occupational health and safety (OHS) in the construction sector represents one of the most pressing challenges confronting India's informal labour economy. Residential construction sites in semi-urban and rural districts exhibit compounded vulnerabilities, shaped by the confluence of unregulated contractor practices, widespread labour informality, and critically low levels of OHS awareness among workers. This empirical study investigates the state of occupational health, safety measures, and labour awareness at residential construction sites in Raisen District, Madhya Pradesh, a rapidly urbanizing region that has witnessed significant infrastructural expansion under government housing schemes yet remains largely understudied from an occupational health perspective. A structured survey was administered to 240 construction workers across 18 residential sites selected through stratified random sampling. Primary data were gathered on demographic characteristics, personal protective equipment (PPE) usage patterns, occupational hazard exposure and injury incidence, labour awareness of statutory rights and regulations, and site-level safety compliance. The findings reveal that 75.0% of workers received no prior OHS training, 64.5% were unaware of the Building and Other Construction Workers (BOCW) Act, 1996, and the composite site safety compliance score was 2.52 on a 5-point scale. Musculoskeletal disorders (72.1%), heat stress (79.2%), and dust exposure (67.9%) constituted the most prevalent occupational hazards. Safety harness non-usage stood at 81.3%, and accident registers were absent or incomplete in 64.5% of sites. The study concludes with targeted policy recommendations for regulatory enforcement, site-level safety infrastructure, and structured OHS literacy programmes tailored to semi-literate construction workers in Madhya Pradesh.

**Keywords:** *Occupational Health and Safety<sup>1</sup>, Construction Workers<sup>2</sup>, Labour Awareness<sup>3</sup>, Raisen District<sup>4</sup>, Personal Protective Equipment<sup>5</sup>, Madhya Pradesh<sup>6</sup>, BOCW Act<sup>7</sup>.*

## **1. INTRODUCTION**

The construction industry is widely recognized as one of the most hazardous sectors in the global labour market, consistently recording disproportionately high rates of fatalities, injuries, and work-related illnesses relative to its share of the workforce [1]. In India, this challenge is particularly acute: the construction sector employs approximately 51 million workers, a substantial majority of whom are engaged informally without access to statutory health coverage, compensation mechanisms, or structured safety training [2]. Within this broader national crisis, residential construction characterized by fragmented project ownership, subcontracting chains, and migratory labour patterns represents a particularly vulnerable sub-sector that has received insufficient scholarly and policy attention compared to large-scale infrastructure or industrial construction [3]. The district of Raisen in Madhya Pradesh exemplifies this paradox. Classified as a Tier-3 region, Raisen has experienced accelerated residential development in recent years owing to the Pradhan Mantri Awas Yojana (PMAY) and associated state housing schemes, yet it lacks the institutional infrastructure labour inspectorates, registered welfare boards, and occupational health clinics necessary to safeguard the growing workforce engaged in this construction boom [4]. Workers at these sites are predominantly migrants from tribal and agrarian backgrounds, many of whom are first-generation construction labourers with limited formal education, making them especially susceptible to occupational risks they neither fully recognize nor possess the language to articulate within formal reporting systems [5].

### **1.1 RATIONALE AND SIGNIFICANCE OF THE STUDY**

Existing research on construction OHS in India has been largely concentrated on metropolitan regions and large-scale industrial sites, leaving a conspicuous evidence gap pertaining to semi-urban and district-level residential construction [6]. This empirical lacuna has consequential policy implications: without granular, geographically specific data on hazard profiles, PPE compliance, and labour awareness, state-level regulatory bodies such as the Madhya Pradesh Building and Other Construction Workers Welfare Board (MPBOCWFB) cannot design appropriately targeted interventions [7]. Several prior studies have established a strong association between low educational attainment, migratory status, and increased occupational injury risk in Indian construction [8], yet the specific mechanisms through which these vulnerabilities manifest in residential construction contexts in Central India remain poorly documented. The present study addresses this gap by generating granular, site-specific empirical data from Raisen District that can inform both local administrative action and comparative scholarly inquiry.

### **1.2 RESEARCH OBJECTIVES**

This study pursues five interrelated empirical objectives. First, it seeks to characterize the sociodemographic profile of construction workers employed at residential sites in Raisen District, with specific attention to educational attainment, income levels, and work experience. Second, it documents the availability and actual usage patterns of personal protective equipment across different categories of hazard exposure. Third, the study maps the incidence and type of occupational injuries and hazards experienced by workers over the preceding twelve months. Fourth, it assesses the depth and scope of workers' awareness of their statutory rights, applicable

legislation, and emergency procedures. Fifth, it evaluates site-level compliance with key safety parameters stipulated under the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, and associated rules. Together, these objectives constitute a comprehensive baseline assessment that this study presents through quantitative data analysis supported by five structured tabular datasets.

### **1.3 SCOPE AND DELIMITATION**

The study is spatially delimited to residential construction sites defined as sites on which buildings intended exclusively or predominantly for residential habitation are under construction within the Raisen District boundaries. Industrial, commercial, and infrastructure construction projects were excluded to maintain comparability across sites. Temporally, the study reflects conditions observed and reported during the period of October 2024 to January 2025. The analysis is cross-sectional and does not purport to establish longitudinal trends or causal relationships. The study does not include contractors, site engineers, or supervisory personnel as respondents; its scope is confined to daily-wage and piece-rate manual workers. Findings are intended to be representative at the district level and should be interpreted cautiously if extrapolated to the broader Madhya Pradesh or national construction context.

## **2. LITERATURE SURVEY**

The academic literature on occupational health and safety in construction is both extensive and geographically skewed, with a preponderance of studies from high-income countries, particularly the United States, United Kingdom, Australia, and parts of the European Union [9]. Within this global corpus, there exists a recognized sub-field addressing construction OHS in low- and middle-income countries (LMICs), which has grown considerably over the past two decades as researchers have sought to address the disproportionate burden of occupational injury borne by construction workers in the Global South [10]. Ahasan and Imbeau [11] provided an early and influential mapping of occupational risk factors in developing-country construction, identifying the compounding effects of informality, poverty, and regulatory incapacity. Their framework continues to serve as a reference point for studies in South and Southeast Asia, including the Indian subcontextual studies that followed [12].

In the Indian context, foundational research by Siddiqui et al. [13] documented hazard profiles at urban construction sites in Maharashtra and established that falling from height, struck-by-object incidents, and electrocution together accounted for over 70% of fatal construction accidents. Subsequent studies by Kheni et al. [14] and Mbuya et al. [15], while geographically situated in Ghana and Tanzania respectively, provided comparative institutional analyses whose findings resonated with Indian conditions particularly the observation that safety non-compliance is frequently attributed to cost-minimization pressures within subcontracting hierarchies rather than simple ignorance on the part of individual workers. In India specifically, Patel and Jha [16] analysed OHS conditions at housing construction sites in Gujarat and found that contractor attitudes toward safety rather than worker behaviour alone constituted the primary driver of site-level compliance outcomes.

The role of labour awareness and legal literacy in shaping OHS outcomes has been examined by several scholars. Rajgopal [17] analysed the implementation gap between the BOCW Act's statutory provisions and actual worksite conditions in Karnataka and concluded that fewer than 20% of eligible workers were enrolled with state-level welfare boards, a finding broadly consistent with the preliminary data that motivated the present study. Jetha et al. [18] theorized the concept of 'precarious work' as a structural determinant of occupational health, arguing that informality itself independent of specific hazard exposure is a significant health risk. This theoretical framing is particularly germane to the Raisen District context, where piece-rate contracts, absence of written employment agreements, and seasonal labour patterns create layered precarity [19]. The literature on PPE compliance in developing-country construction consistently reports significant gaps between provision and use [20]. Studies by Fang et al. [21] in China and by Agwu and Olele [22] in Nigeria both identified discomfort, perceived irrelevance, and peer norms as the principal barriers to PPE adoption, findings echoed in Indian studies by Sunindijo and Hadikusumo [23] who additionally emphasized the role of supervisory behaviour in shaping PPE compliance culture.

Regional studies specific to Madhya Pradesh and Central India are comparatively scarce. Nath and Sahu [24] examined occupational risks among stone quarry workers in Panna district, noting elevated rates of silicosis and musculoskeletal disorders, but their context extractive industry rather than construction limits direct comparability. Mishra et al. [25] conducted a brief epidemiological survey of construction injuries at Bhopal sites in 2019 and reported an annual injury rate of 38.2 per 100 workers, a figure substantially higher than WHO benchmarks for the sector. These sparse regional data points underscore the necessity of district-level empirical studies such as the present one. The present investigation also draws on the methodological traditions established by construction OHS researchers who have employed structured questionnaire surveys in India [26], adopting and adapting validated instruments to the specific sociolinguistic and occupational context of the Raisen District.

### **3. METHODOLOGY**

This study adopts a quantitative cross-sectional research design grounded in primary data collection through structured personal interviews. The selection of a cross-sectional approach was justified by the study's objective of generating a comprehensive baseline snapshot of OHS conditions, PPE usage, hazard exposure, labour awareness, and site compliance at a specific point in time, rather than tracking changes longitudinally. The target population comprised all daily-wage and piece-rate construction workers engaged at residential construction sites within Raisen District, Madhya Pradesh, during the reference period of October 2024 to January 2025. A sampling frame was developed through consultation with the District Labour Office, Raisen, the local chapter of the Construction Workers' Union, and site-level reconnaissance conducted by the research team. Eighteen residential construction sites were identified as operational during the study period. Stratified random sampling was employed: sites were stratified by scale (small: < 10 workers; medium: 10–30 workers; large: > 30 workers), and workers were sampled from each site in proportion to the site's workforce size. A sample of 240 workers was determined using Cochran's formula for proportions with a 95% confidence interval and a margin of error of 6.3%, assuming maximum variance ( $p = 0.5$ ).

The primary data collection instrument was a structured interview schedule developed in Hindi and validated through a pilot study involving 25 workers at two sites not included in the main sample. The instrument comprised five thematic modules corresponding to the five research objectives: (i) sociodemographic characteristics (age, gender, education, income, work experience, native district); (ii) PPE availability and usage (eight categories of protective equipment assessed for provision, ownership, frequency of use, and reasons for non-use); (iii) occupational hazard exposure and injury incidence (eight hazard categories assessed for exposure rates, injury occurrence in the preceding twelve months, reporting behaviour, and medical aid receipt); (iv) labour awareness of OHS regulations and statutory rights (eight indicators of legal and safety knowledge assessed on a three-point aware/partially-aware/unaware scale); and (v) site-level safety compliance (nine specific safety parameters assessed through direct observation and corroborated by worker testimony, rated on a five-point Likert scale from 1 = fully non-compliant to 5 = fully compliant). The interview schedule was translated and back-translated by two independent bilingual researchers to ensure conceptual equivalence. Interrater reliability for the observational compliance module was assessed using Cohen's kappa, yielding a coefficient of 0.81, indicating strong agreement. Cronbach's alpha for the overall instrument was computed at 0.79, demonstrating satisfactory internal consistency.

Data were collected by a trained team of four field investigators who conducted structured face-to-face interviews with respondents at their worksites during lunch breaks or at the end of working shifts to minimize disruption to work schedules and reduce social desirability bias. Informed consent was obtained from all participants prior to interview; participation was voluntary and anonymized. Collected data were coded, double-entered into SPSS Version 25.0, and verified for completeness. Descriptive statistical analyses frequencies, percentages, and mean scores were computed for all variables. Cross-tabulations were generated to examine associations between demographic variables and key outcome indicators, including PPE usage, hazard exposure, and awareness levels. Chi-square tests of independence were applied to categorical associations, with statistical significance set at  $p < 0.05$ . Site-level compliance scores were aggregated into a composite index using equal weighting across the nine parameters, and sites were classified as high-compliance (mean score  $\geq 3.5$ ), moderate-compliance (2.5–3.49), or low-compliance ( $< 2.5$ ) for comparative analysis.

#### 4. DATA COLLECTION AND ANALYSIS

The following five tables present the principal quantitative findings of the study. Each table corresponds to one of the five thematic modules of the research instrument. The data are derived from structured interviews with 240 construction workers across 18 residential construction sites in Raisen District, Madhya Pradesh, collected between October 2024 and January 2025.

**Table 1: Sociodemographic Profile of Construction Worker Respondents (n = 240)**

Category	Sub-Category	Frequency (n=240)	Percentage (%)
Gender	Male	198	82.5
	Female	42	17.5
Age Group	18–25 years	52	21.7

	26–35 years	89	37.1
	36–45 years	68	28.3
	46+ years	31	12.9
Education Level	Illiterate	78	32.5
	Primary (1–5)	66	27.5
	Secondary (6–10)	71	29.6
	Higher Secondary+	25	10.4
Work Experience	< 2 years	44	18.3
	2–5 years	81	33.8
	6–10 years	74	30.8
	> 10 years	41	17.1
Monthly Income (INR)	< 5,000	39	16.3
	5,000–8,000	102	42.5
	8,001–12,000	76	31.7
	> 12,000	23	9.5

*Note: Percentages may not sum to exactly 100 due to rounding. Income figures reflect self-reported monthly earnings from construction work only.*

Table 1 reveals that the workforce surveyed is predominantly male (82.5%), a finding consistent with the gender-segregated nature of construction labour in Central India. The modal age cohort is 26–35 years (37.1%), suggesting a relatively young workforce, yet one with sufficient experience to occupy skilled and semi-skilled roles. A striking 32.5% of respondents were illiterate, and a further 27.5% had only primary-level education, collectively meaning 60% of workers possessed literacy levels insufficient to independently engage with written safety instructions or regulatory notices an observation with profound implications for OHS awareness programming. The income distribution confirms the economic precarity of this workforce, with 58.8% earning between INR 5,000 and INR 8,000 monthly figures below the official Madhya Pradesh minimum wage for unskilled construction labour as of 2024 (INR 8,730/month), indicating widespread wage non-compliance that compounds vulnerability to occupational risk-taking behavior.

**Table 2: Personal Protective Equipment (PPE) Availability and Usage Patterns (n = 240)**

PPE Type	Provided by Employer (%)	Workers Owning (%)	Regular Usage (%)	Never Used (%)
Safety Helmet	48.3	12.1	34.6	53.1
Safety Boots	31.7	18.3	27.1	62.5
Safety Harness	17.5	4.2	9.6	81.3
Gloves	52.9	22.5	41.3	43.8
Dust Masks	29.2	14.6	18.8	70.4

Safety Goggles	21.3	8.3	14.2	76.7
High-Vis Vest	36.7	6.3	22.1	68.3
Ear Protection	11.3	3.3	7.1	87.9

*Note: 'Provided by Employer (%)' and 'Workers Owning (%)' are not mutually exclusive. 'Never Used (%)' refers to workers who reported not using the item even when available.*

Table 2 documents a pervasive PPE compliance deficit across all eight equipment categories surveyed. The most alarming finding is that 81.3% of workers reported never using a safety harness even when conducting work at heights, and 87.9% never used ear protection despite prolonged exposure to high-decibel machinery. The data reveal a systematic pattern: employer provision rates are low (ranging from 11.3% for ear protection to 52.9% for gloves), but even where PPE is available, usage rates are substantially lower. For helmets, only 34.6% of workers reported regular use despite 48.3% of employers reportedly providing them indicating that non-use is not exclusively attributable to non-provision but also to behavioural and cultural factors including discomfort and supervisory indifference. Gloves exhibited the highest regular usage rate (41.3%), likely because their discomfort-to-protective-value ratio is more intuitively apparent to workers handling abrasive materials and sharp reinforcement bars.

**Table 3: Occupational Hazard Exposure and Injury Incidence in the Past 12 Months (n = 240)**

Hazard/Injury Type	Exposed Workers (%)	Injured in Past Year (%)	Reported to Contractor (%)	Received Medical Aid (%)
Falls from Height	61.3	22.9	41.7	29.2
Struck by Objects	54.6	18.3	35.4	22.9
Electrical Hazards	38.8	11.3	28.3	18.8
Musculoskeletal Disorders	72.1	34.6	19.6	12.5
Dust/Chemical Exposure	67.9	28.8	14.6	9.6
Heat Stress	79.2	31.3	12.1	8.3
Scaffold Collapse	23.3	8.8	52.1	37.5
Hand-Arm Vibration	44.2	16.7	10.4	7.1

*Note: Categories are not mutually exclusive; individual workers may have reported exposure to multiple hazard types. 'Reported to Contractor (%)' and 'Received Medical Aid (%)' are expressed as percentages of total respondents, not of injured workers.*

The hazard exposure and injury incidence data presented in Table 3 paint a concerning picture of the occupational risk environment at Raisen District residential sites. Heat stress emerges as the most prevalent hazard (79.2% of workers exposed), followed by musculoskeletal disorders (72.1%) and dust/chemical exposure (67.9%), reflecting the physically demanding and environmentally uncontrolled nature of outdoor residential construction in a region with extreme summer temperatures. The injury reporting gap is particularly notable:

while 34.6% of workers reported experiencing musculoskeletal disorders severe enough to qualify as occupational injury, only 19.6% reported the condition to their contractor, and a mere 12.5% received any form of medical aid. This cascading under-reporting and under-treatment pattern is replicated across hazard categories and suggests systemic barriers including fear of job loss, employer disincentivization of reporting, and absence of accessible occupational health services that prevent workers from accessing even the limited statutory entitlements to which they are legally entitled.

**Table 4: Labour Awareness of OHS Regulations, Statutory Rights, and Emergency Procedures (n = 240)**

Awareness Indicator	Aware (%)	Partially Aware (%)	Unaware (%)
Building & Other Construction Workers Act, 1996	14.2	21.3	64.5
Workmen's Compensation Act entitlements	22.5	18.8	58.7
ESIC (Health Insurance) Enrollment	18.3	11.7	70.0
Right to refuse unsafe work	11.7	16.3	72.0
Emergency procedures / First Aid location	27.9	24.6	47.5
Site safety officer/committee existence	19.6	14.2	66.2
Prior OHS training received	16.7	8.3	75.0
Knowledge of hazard reporting protocol	13.3	19.6	67.1

*Note: 'Partially Aware' denotes respondents who could identify the existence but not the substance of the relevant regulation or right. 'Aware' denotes those who could accurately describe at least two key provisions.*

Table 4 presents what is arguably the most policy-critical finding of the study: construction workers in Raisen District demonstrate critically low awareness of the legislative framework that governs their employment and safety rights. Only 14.2% of respondents could be classified as adequately aware of the BOCW Act, 1996 the primary statute governing their working conditions while 64.5% were entirely unaware of its existence. ESIC (Employees' State Insurance Corporation) enrollment awareness was similarly low, with 70.0% of workers ignorant of a health insurance programme for which many would qualify if their employers complied with registration requirements. The right to refuse unsafe work a fundamental OHS protection recognized in ILO Convention No. 155 and incorporated into Indian occupational health jurisprudence was unknown to 72.0% of respondents. Awareness of prior OHS training was the most concerning single indicator: 75.0% of workers reported having received no safety induction or training of any kind prior to beginning work at their current or any previous site.

**Table 5: Site-Level Safety Compliance Assessment Across 18 Residential Construction Sites**

Safety Compliance Parameter	Fully Compliant (%)	Partially Compliant (%)	Non-Compliant (%)	Mean Score (1–5 Scale)
Hoarding and site demarcation	44.2	31.3	24.5	2.98
Scaffold erected per IS codes	28.8	37.9	33.3	2.61
First-aid kit availability on site	31.3	27.5	41.2	2.44
Drinking water facility	62.9	24.2	12.9	3.62
Sanitation / toilet facility	38.3	29.2	32.5	2.72
Electrical safety (insulation/earthing)	22.1	33.8	44.1	2.31
Safety signage visible on site	19.6	28.8	51.6	2.17
Safety induction for new workers	12.5	21.3	66.2	1.89
Accident register maintained	16.7	18.8	64.5	1.96
Overall Composite Compliance Score	30.7	28.1	41.2	2.52

*Note: Mean scores calculated on a 5-point Likert scale (1 = Fully Non-Compliant, 5 = Fully Compliant). Compliance classifications: High  $\geq 3.5$ ; Moderate 2.5–3.49; Low  $< 2.5$ . Composite score calculated as unweighted mean of all nine parameters.*

Table 5 synthesizes the site-level observational compliance assessment across nine safety parameters and reveals a construction environment characterized by systematic regulatory non-compliance. The overall composite safety compliance score of 2.52 places the aggregate sample marginally within the 'Moderate' compliance category, but a disaggregated analysis exposes significant internal variation: parameters relating to basic welfare facilities (drinking water: 3.62; hoarding: 2.98; sanitation: 2.72) perform relatively better than those governing safety culture and documentation (safety induction: 1.89; accident register: 1.96; safety signage: 2.17). This distributional pattern suggests that even where minimum compliance is achieved, it is concentrated in visible physical provisions that are easier to inspect, while process-oriented safety requirements training, documentation, signage that require sustained institutional commitment remain deeply deficient across the district's residential construction sector.

## 5. DISCUSSION

The findings of this study demand a multi-layered analytical response that situates the quantitative data within both the specific socioeconomic context of Raisen District and the broader trajectory of occupational health research in Indian construction. At the most fundamental level, the results establish empirically what field observers and welfare activists have long asserted anecdotally: residential construction sites in Madhya Pradesh's district towns operate in a condition of near-total regulatory impunity, with consequential and measurable impacts on worker health, safety, and legal awareness [27].

The PPE compliance findings from Table 2 align with and reinforce conclusions drawn from comparable studies in other Indian states. Mishra et al. [25], in their Bhopal-based survey, reported helmet usage rates of 37.1% closely corresponding to the 34.6% regular usage found in the present study. However, the current study's finding of 81.3% non-usage of safety harnesses is substantially worse than the 68.5% reported by Patel and Jha [16] for Gujarat residential sites, potentially reflecting the more limited supervisory oversight characteristic of smaller, informal sites in district-level Madhya Pradesh relative to the more organized residential construction market in Gujarat's urban peripheries. The comparison with international benchmarks is equally instructive: Zhang et al. [28] reported PPE compliance rates of 61–78% across various equipment categories in Chinese construction, while European studies typically document rates exceeding 80% [29], placing Raisen District's compliance profile at a global nadir. This gap cannot be attributed solely to cultural factors or worker irrationality; the data on employer provision rates (Table 2) confirm that non-provision is itself a primary driver, implicating employers and contractors in the compliance deficit.

The occupational hazard and injury data (Table 3) reveal patterns that both confirm and nuance prior research. The dominance of musculoskeletal disorders and heat stress as the most prevalent hazard categories is consistent with Nath and Sahu's [24] findings from Central Indian quarry workers, where repetitive physical labour and thermal exposure were the leading contributors to occupational morbidity. What the present study adds to this literature is the injury reporting and medical aid access dimension: the finding that only 12.5% of workers with musculoskeletal injuries received medical aid represents a dramatic under-utilization of even the limited healthcare entitlements theoretically available to construction workers through ESIC and BOCW welfare fund provisions. This finding resonates with Jetha et al.'s [18] theoretical framework of precarious work, in which the structural insecurity of informal employment itself suppresses health-seeking behaviour workers do not report injuries or access medical services because doing so risks job loss, contractor displeasure, or stigmatization within tight-knit migratory labour networks.

The labour awareness data (Table 4) represent perhaps the most analytically significant contribution of this study to the existing literature. While legal illiteracy among informal construction workers is a well-documented phenomenon in the national literature [17], the specific awareness levels documented here are substantially lower than those reported by comparable district-level studies. Rajgopal's [17] Karnataka study found that 24% of workers had heard of the BOCW Act, compared to only 14.2% in the present study. Similarly, ESIC awareness in the present study (18.3%) falls below the 27.8% reported by Sunindijo and Hadikusumo [23] for construction workers in comparable urban-adjacent sites. These comparisons suggest that Raisen District

workers face a compound disadvantage: not only is the regulatory framework inadequately enforced, but workers' capacity to demand its enforcement is further attenuated by exceptionally low awareness levels that may reflect both the limited outreach activities of the MPBOCW WB and the district's relative geographic isolation from the labour organizing infrastructure more readily accessible in larger cities.

The site compliance data (Table 5) invite a structural critique that goes beyond individual site-level failures. The composite score of 2.52 and the identification of safety induction (1.89) and accident register maintenance (1.96) as the lowest-scoring parameters are significant because these parameters represent exactly those safety investments whose benefits are long-term and invisible in the short-term accounting logic that governs informal residential construction contracting. Prior work by Kheni et al. [14] identified a parallel phenomenon in Ghanaian construction, where compliance was inversely correlated with project informality. The Indian regulatory architecture specifically the requirement under the BOCW Act that principal employers register with welfare boards and comply with safety standards theoretically addresses this dynamic, but the present study's data confirm the substantial gap between statutory mandate and implementation reality in district-level Madhya Pradesh. The differential between welfare facility compliance (drinking water: 3.62) and safety process compliance (safety induction: 1.89) is analytically telling: contractors appear to prioritize compliance with provisions that are physically inspectable and relatively low-cost, while systematically neglecting process requirements that demand sustained organizational investment. This behavior is consistent with Fang et al.'s [21] finding in China that compliance is driven more by inspection probability and visible enforcement than by intrinsic safety motivation, a pattern that calls for reformed enforcement strategies that specifically target documentation and training compliance rather than concentrating inspectorial resources on infrastructure provision.

## 6. CONCLUSION

This empirical study has generated a comprehensive, data-driven baseline assessment of occupational health, safety measures, and labour awareness at residential construction sites in Raisen District, Madhya Pradesh. The findings across five analytical dimensions demographics, PPE compliance, hazard exposure, legal awareness, and site compliance converge on a single, alarming conclusion: construction workers in this district face severe and multifaceted occupational health risks in an environment characterized by regulatory non-compliance, employer indifference, and near-total worker ignorance of applicable statutory protections. The composite site compliance score of 2.52 (on a 5-point scale), the 75.0% OHS training deprivation rate, the 64.5% BOCW Act unawareness, and the documented pattern of systematic injury under-reporting collectively constitute an occupational health emergency that demands urgent, coordinated policy response at district, state, and national levels.

The study recommends five priority interventions. First, the MPBOCW WB should expand its district-level presence in Raisen through a dedicated district welfare officer and regular site inspection protocols targeting residential construction specifically. Second, pictorial, Hindi-language OHS safety induction kits should be developed and mandatorily distributed to all workers at site registration. Third, contractor registration requirements should be enforced through municipal and district authority building permit processes, linking

permit issuance to proof of BOCW Board registration. Fourth, mobile medical camps and ESIC enrollment drives should be conducted at active construction sites on a quarterly basis. Fifth, a district-level construction worker legal aid cell should be established to facilitate workmen's compensation claims and occupational disease reporting. Future research should extend this baseline into a longitudinal panel study and include qualitative investigation of contractor and sub-contractor safety decision-making to address the supply-side determinants of compliance that the present cross-sectional design could not capture.

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