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Examining Occupational Safety and Health Awareness Behind the Hustle and Bustle of Traditional Markets: Evidence from Informal Workers in Makassar, Indonesia

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ABSTRACT
Traditional markets in Makassar, Indonesia, are important economic hubs but also complex multi-hazard workplaces for informal workers. This study examines occupational safety and health (OSH) awareness and develops a feasible community-based intervention model. Using a mixed-method design (survey, walkthrough observations, and semi-structured interviews/participatory discussions), the study maps patterns of knowledge, attitudes, and everyday safety practices while identifying barriers in infrastructure and governance. Findings suggest that preventive routines are more consistent when actions are low-cost and compatible with fast-paced market work. Still, adoption weakens when prevention requires extra time, discomfort, or cost. Environmental constraints (wet floors and drainage, congestion points, cable management) and fragmented responsibility further reduce safety signals. The paper proposes an intervention package combining basic environmental and administrative controls, peer-based behavior reinforcement, and routine monitoring embedded in market management to reduce everyday risk and support market quality.

Keywords: Occupational Safety, Informal Workers, Traditional Markets, Makassar, Community Intervention.

I. Introduction

Traditional markets in Makassar City are among the main centers of the people's economy, playing a vital role in supporting community livelihoods. As spaces of social and economic interaction, traditional markets accommodate thousands of small traders, porters, parking attendants, and other informal workers who drive the local economy. While these dynamic and dense trading activities contribute significantly to the regional economy, they often leave behind serious occupational safety and health (OSH) issues. Risky working conditions, a lack of supporting facilities, and low OSH awareness among informal workers increase the likelihood of accidents and health problems (WHO & ILO, 2021; International Labour Organization, 2018). The main issue faced is the low understanding and implementation of OSH principles among market workers. Most informal workers have never received OSH training or education, relying instead on inherited practices

that may not align with modern safety standards. Poor market conditions, such as limited lighting, the absence of evacuation routes, unsafe electrical installations, and minimal supervision by market managers and local government, further worsen the situation. This problem not only affects individual workers' safety but also disrupts trade activities, reduces productivity, and threatens family economic stability (Republic of Indonesia, 1970, 2012; ISO, 2018). To address these challenges, this study was designed using both quantitative and qualitative approaches. The research questions posed are: (1) What is the level of OSH awareness among informal workers in Makassar's traditional markets? (2) What factors contribute to the low OSH awareness? (3) What is the impact of poor OSH implementation on the high number of workplace accidents in traditional markets? By formulating these questions, the study not only seeks to portray existing conditions but also to uncover the underlying cause-and-effect relationships, while offering practical intervention strategies (Ajzen, 1991; Neal & Griffin, 2006).

The urgency of this research is high, given the significant social, economic, and health risks posed by the lack of OSH implementation in the informal sector. From an occupational health perspective, accidents in traditional markets may cause physical injuries and psychological trauma that reduce worker productivity. From a public policy perspective, the findings are expected to provide an empirical basis for formulating more comprehensive OSH regulations and training programs, while improving the suboptimal policy implementation. From a local economic standpoint, proper OSH practices will improve efficiency, reduce accidents, and enhance the competitiveness of traditional markets amid competition with modern markets (WHO & ILO, 2021). In terms of novelty, this study offers a participatory, community-based approach in which traders and market workers are not only research objects but also active subjects in developing solutions. This approach is expected to be more effective at raising OSH awareness than top-down intervention models. The study also fills a literature gap, as most OSH research has focused on the formal sector, such as manufacturing and construction. In contrast, the informal sector, particularly traditional markets, remains relatively overlooked. Thus, this research contributes not only to the development of OSH studies but also to practical strategies for traditional market management in Indonesia (International Labour Organization, 2018; Guldenmund, 2000). In the global context, raising OSH awareness has become a key agenda in developed countries, while developing nations still face significant challenges, particularly in the informal sector. Through this study, recommendations are expected to emerge that will not only have a local impact but also contribute to the global discourse on OSH, which is inclusive and adaptable to local contexts. By involving government, market managers, and worker communities in every stage, this research aims to produce an intervention model that is both practical and sustainable (International Labour Organization, 2018; Guldenmund, 2000).

II. Literature Review and Hypothesis Development

2.1. OSH in the informal economy

The informal economy employs a substantial share of the urban workforce in many low- and middle-income countries. Informal workers commonly experience unstable income, limited social protection, and weaker access to occupational safety and health (OSH) services than formal employees. As a result, risk exposure is often managed through personal experience rather than structured prevention, and work-related injuries and illnesses may be underreported (ILO, 2018; WHO & ILO, 2021). In global OSH policy discussions, improving safety in informal settings is increasingly linked to decent work, inclusive growth, and healthy-city agendas. However, translating OSH standards into daily practice is challenging when work is organized through multiple small actors and when there is no single employer responsible for comprehensive risk management. In such settings, feasible prevention strategies tend to emphasize simple hazard control, community-based capacity building, and governance mechanisms that fit local realities (ILO, 2019).

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2.2. Regulatory and institutional context in Indonesia

Indonesia's OSH framework is rooted in Law No. 1 of 1970 on Work Safety and is complemented by Government Regulation No. 50 of 2012 on the Occupational Safety and Health Management System (SMK3). While these instruments provide a foundation for risk management in formal organizations, implementation in informal settings faces structural barriers because responsibilities are fragmented across multiple actors, and enforcement mechanisms are weaker. In the context of traditional markets, OSH can be approached as part of local public health and urban management. Local government and market authorities can influence risk conditions through sanitation services, drainage maintenance, traffic circulation, fire safety readiness, and routine supervision. Therefore, OSH improvement in markets often requires collaboration between health offices, market managers, trader associations, and community stakeholders.

2.3. Theoretical lenses to explain awareness and practice

This study uses complementary perspectives to explain why OSH awareness does not always translate into safe behavior. First, the Knowledge-Attitude-Practice (KAP) approach is widely used in public health to describe how knowledge and perceptions influence preventive actions. In informal work, KAP helps identify whether gaps arise from limited information (knowledge), low perceived value or feasibility of prevention (attitude), or barriers to routine implementation (practice). Second, safety climate and safety culture research emphasize shared perceptions about the priority of safety in a work setting. When a workplace climate signals that safety is important—through visible supervision, consistent rules, and adequate facilities—workers are more likely to engage in safe behavior (Zohar, 1980; Neal & Griffin, 2006). In markets, such signals may come from market management (e.g., signage, inspections, cleanliness routines) and from peer norms among traders and porters. Third, the Theory of Planned Behavior (TPB) highlights that intention and behavior are influenced by attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). TPB is relevant here because informal workers may support safety in principle but report low control when personal protective equipment (PPE) is uncomfortable, costly, unavailable, or perceived as incompatible with market work. Finally, the hierarchy of controls encourages risk management beyond PPE by prioritizing elimination, substitution, engineering controls, and administrative controls (NIOSH, 2015). Together, these lenses motivate an approach that combines situational hazard mapping with participatory behavior change strategies and feasible environmental improvements.

2.4. Research gap and contribution

Empirical research on OSH in traditional markets often documents hazards and compliance gaps. Still, it translates evidence less frequently into a locally implementable model that market managers and local government can adopt. This study addresses the gap by integrating a mixed-method situational diagnosis with a practical intervention logic that emphasizes (1) simple controls aligned with the hierarchy of controls, (2) community-based peer support to strengthen norms and perceived control, and (3) governance mechanisms that can be embedded in market management routines. The following section describes the methods used to assess OSH awareness and risk conditions and to formulate the proposed intervention model.

2.5. Community-based OSH interventions in informal settings

OSH interventions for informal workers tend to be most effective when they combine technical improvements with behavior change strategies that respect local constraints. In markets, workers often lack formal training pathways and may rely on peer learning. A community-based approach, therefore, emphasizes short, practical microtrainings, visible reminders, and peer champions who can translate OSH messages into

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daily routines. Evidence from occupational training research suggests that active, participatory methods (demonstration, practice, feedback) produce stronger behavioral outcomes than passive lecturing alone (Burke et al., 2006; Robson et al., 2012). Participatory ergonomics and participatory risk mapping are especially relevant in informal contexts. Instead of imposing external standards, participatory methods invite workers to identify the highest-risk tasks, propose feasible changes, and test low-cost controls. This increases perceived ownership and can reduce resistance rooted in fear of lost productivity. In markets, feasible examples include organizing loading points to reduce congestion, rotating heavy-lifting tasks among porters, agreeing on short "clean-as-you-go" routines during peak hours, and establishing simple rules to keep key walking lanes clear. Importantly, community-based interventions should not rely too heavily on personal protective equipment. The hierarchy of controls encourages shifting attention upstream to environmental and administrative changes that reduce exposure at the source (NIOSH, 2015). For instance, improving drainage and floor cleanliness can reduce slip hazards for all workers and customers, while clearer cable management reduces electrical risk without requiring constant individual vigilance. PPE remains a useful last line of defense for specific tasks (e.g., gloves for handling sharp objects or waste). Still, adoption improves when PPE is comfortable, culturally acceptable, and aligned with the task rather than treated as a generic requirement. Finally, sustainability depends on embedding OSH into routine market governance. One-off training campaigns typically fade when market routines are busy and leadership attention shifts. Sustainable model, therefore, pairs training with simple monitoring tools (monthly walkthrough checklists), feedback loops (brief meetings that prioritize two or three actionable fixes), and role clarity (who cleans, who reports, who responds). When these mechanisms become part of routine management, they reinforce a safety climate in which prevention is seen as usual rather than optional.

2.6. Implementation considerations for market governance

In traditional markets, OSH responsibility is distributed across local government, market authorities, trader associations, porters, and service workers. This distribution can weaken accountability, but it also creates multiple entry points for improvement. Local government can set minimum service standards (sanitation frequency, waste collection, drainage maintenance, fire readiness) and integrate these standards into routine market supervision. Market authorities can operationalize standards through SOPs, signage, and periodic inspections that focus on practical fixes rather than punitive enforcement. Trader and porter groups are crucial for day-to-day implementation. Peer champions can help translate rules into local norms, encourage mutual reminders, and identify practical barriers that managers might overlook. In addition, markets can leverage existing incentives: cleaner lanes and safer loading points often improve customer comfort and can strengthen market competitiveness. Thus, OSH should be framed not only as compliance but also as a quality and service issue that benefits both workers and consumers. These governance considerations shape the rationale for the intervention logic model presented in this paper: a model that combines modest environmental improvements, peer-based behavior change, and routine monitoring to produce feasible, incremental safety gains. Because this study is exploratory and mixed-method, it does not test formal statistical hypotheses; instead, it develops a practical intervention model grounded in the literature and field diagnosis.

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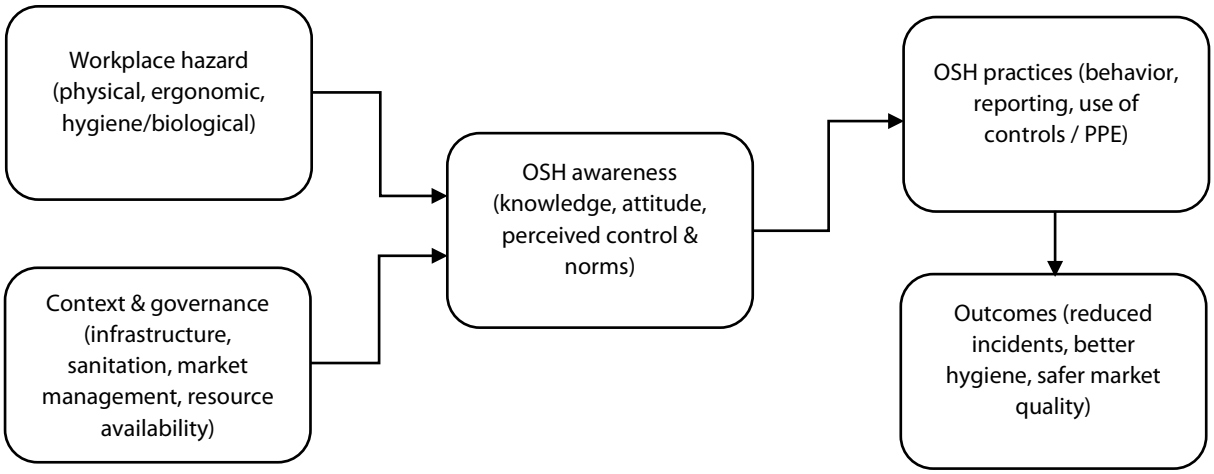

Figure 1. Conceptual Framework

Note: The framework links market hazards and governance context to OSH awareness, practices, and outcomes.

III. Research Method

This study employed an integrative approach combining quantitative, qualitative, and participatory methods to obtain a comprehensive picture of OSH conditions in traditional markets. The research design consisted of five interrelated stages, ranging from literature review to the evaluation of the intervention model. The first stage began with a literature review and preliminary survey. At this stage, theories, regulations, and prior studies on OSH were reviewed, while research instruments, such as questionnaires, were developed and tested. The preliminary survey was conducted across several traditional markets in Makassar to obtain baseline data on OSH awareness among informal workers.

The second stage involved field observations and qualitative data collection. Direct observations were conducted to document the physical conditions of the markets. At the same time, in-depth interviews and a Focus Group Discussion (FGD) were carried out with traders, porters, market managers, and relevant government agencies. This stage aimed to explore the factors hindering OSH implementation and to identify the most common risks faced by workers. The third stage focused on data analysis and the formulation of an intervention model. Quantitative data were analyzed using descriptive and inferential statistical methods, while qualitative data were analyzed thematically. The results of both analyses were then integrated to draft a community-based OSH intervention model, which was subsequently validated through workshops and presentations in academic forums.

The fourth stage involved implementing the intervention model. The designed model was tested in traditional markets through OSH training sessions, dissemination of educational media, and the application of monitoring systems. The success of the intervention was measured through worker participation, behavioral changes, and comparisons of accident rates before and after the training. The fifth stage consisted of evaluation and model revision. The evaluation was conducted by collecting post-intervention data, conducting follow-up FGDs, and analyzing the program's effectiveness. The evaluation results were used to refine the model, develop a policy brief, and formulate evidence-based policy recommendations for local governments and related stakeholders. The entire research process was systematically structured with clear achievement indicators, thereby expected to produce outputs in the form of scientific publications, an applicable OSH intervention model, and policy recommendations for improving workplace safety in traditional markets.

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3.1. Study design and setting

The study used a mixed-method, sequential design combining (1) a quantitative cross-sectional survey, (2) structured observations and walkthrough risk assessments, and (3) qualitative interviews and participatory discussions. The setting comprised major traditional markets in Makassar, South Sulawesi, which vary in size, infrastructure quality, and intensity of daily activity. Data collection focused on capturing both worker-level awareness and environment-level risk drivers to enable recommendations that address behavior and infrastructure simultaneously.

3.2. Participants and sampling

Participants were informal workers operating in or around the markets, including vendors, porters, parking attendants, cleaners, and informal helpers. For the survey component, respondents were selected using a pragmatic sampling strategy that ensured representation of different work roles and market zones (e.g., wet areas, dry goods areas, loading/unloading points). For the qualitative component, key informants were selected purposively to reflect variation in work role, work experience, and exposure to hazards. Because market work is dynamic and workers may move between zones, sampling procedures emphasized time-location coverage (different times of day and different lanes) rather than strict roster-based selection. This approach is commonly used in informal settings where comprehensive worker lists are unavailable.

3.3. Data collection instruments

Survey items assessed (a) hazard knowledge (recognition of common risks), (b) attitudes toward prevention (perceived importance and feasibility), and (c) practices (frequency of simple preventive actions, such as using PPE when appropriate, keeping walkways clear, or reporting near-misses). Items were developed in line with OSH guidance and adapted to market work contexts. Where feasible, items were piloted for clarity and revised to match local terminology while retaining conceptual consistency. An observation checklist was used during walkthroughs to document infrastructure risks (e.g., drainage, lighting, cable management), workflow risks (e.g., congestion points, mixed traffic), and availability of controls (e.g., signage, waste bins, handwashing points, extinguishers). The checklist followed the hierarchy of controls, enabling the team to record not only hazards but also the level of control currently in place. Qualitative instruments included semi-structured interview guides and participatory discussion prompts exploring risk perception, barriers to prevention, informal norms, and feasible improvement actions. Interviews were designed to elicit concrete examples of incidents, near-misses, and daily coping strategies.

3.4. Data collection procedures and quality assurance

Data collection proceeded in stages. First, the team conducted market walkthroughs to map zones and identify high-risk points. Second, the survey was administered in short sessions aligned with worker availability, with clarification provided for items where needed. Third, interviews and participatory discussions were conducted in quieter areas to minimize disruption to work. Field notes and observation records were compiled daily. To enhance data quality, the team used triangulation across methods (survey, observation, and interviews). Consistency checks were performed by comparing self-reported practices with observed routines in selected zones. Discrepancies were treated as analytical signals rather than errors, prompting deeper discussion about feasibility constraints and informal norms.

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3.5. Data analysis

Quantitative data were analyzed descriptively to summarize patterns of knowledge, attitudes, and practices. Where appropriate, cross-tabulation was used to compare patterns across work roles and market zones. The analysis focused on identifying priority gaps that could be addressed with feasible controls. Qualitative data (interview transcripts and field notes) were analyzed thematically, with codes iteratively refined to capture barriers, enabling conditions, and governance dynamics. Integration occurred through a joint display approach: quantitative patterns were interpreted alongside qualitative explanations to produce a coherent narrative of risk drivers and prevention opportunities.

3.6. Intervention logic and evaluation approach

Based on the diagnosis, the study formulated a practical intervention model suitable for market contexts. The model combines low-cost environmental improvements (administrative and simple engineering controls), peer-based behavior change activities, and routine governance mechanisms embedded in market management. Evaluation was designed as a pragmatic pre-post assessment emphasizing feasibility: changes were tracked through brief follow-up observations, short feedback discussions, and comparison of selected self-reported indicators (e.g., PPE use when relevant, reporting of hazards, participation in OSH briefings).

3.7. Ethical considerations

Participation was voluntary, and respondents were informed of the study's purpose, the confidentiality of their responses, and their right to withdraw at any time. The study minimized disruption to work activities by scheduling data collection around market routines and by keeping sessions brief.

3.8. Operational definition of key constructs

To reduce ambiguity, key constructs were operationalized as follows. OSH knowledge refers to the ability to recognize common hazards in market work (e.g., slip hazards, manual handling risks, electrical hazards) and to identify basic prevention options. OSH attitude refers to the perceived importance of prevention and the willingness to adopt protective routines. OSH practice refers to routine preventive behaviors that are observable or reportable (e.g., maintaining clear lanes, using task-appropriate protection, participating in safety briefings, and reporting hazards). These operational definitions supported consistent interpretation across survey items, observations, and interviews.

IV. Results and Discussion

4.1. Analysis Result

This section reports the situational diagnosis across markets, including observed hazards, survey synthesis, and qualitative themes that explain current OSH practices.

4.2. Study setting and market work processes

Makassar's traditional markets involve dense foot traffic and mixed-use lanes where pedestrians, handcarts, and motorcycles may share space. Informal workers include vendors, porters, parking attendants, and cleaners. Work routines begin early, involve repetitive handling of goods, and intensify during peak trading hours. These characteristics shape exposure to safety, ergonomic, hygiene, and psychosocial hazards.

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4.3. Main hazard profile identified in the markets

Table 1 summarizes dominant hazards observed during walkthrough assessments and the coping practices commonly used by workers. Across markets, hazards were intensified by infrastructure constraints (drainage, lighting, cable management), irregular waste handling, and weak separation between pedestrian and goods-transport flows. These observations contextualize the synthesis of the survey and interview below.

Table 1. Hazard Profile and Priority Controls in Makassar's Traditional Markets.

Hazard category	Examples in traditional markets	Common coping practice observed
Slips, trips, and falls	Wet floors, uneven pavement, cluttered aisles, blocked drainage	Walking slowly; verbal warnings; limited signage
Electrical and fire risks	Open wiring, overloaded sockets, and LPG use near stalls	Avoiding certain spots, improvised cable routing, and limited extinguisher access
Ergonomic risks	Manual lifting/carrying, pushing carts, prolonged standing	Self-paced breaks; shared lifting; using simple trolleys where available
Hygiene and biological risks	Waste accumulation, pests, food contamination, and poor sanitation	Cleaning when possible; handwashing when facilities exist; ad-hoc protective gloves
Organizational and psychosocial risks	Crowding, time pressure, conflict with customers, and income uncertainty	Prioritizing speed, informal coordination, and normalizing risk to maintain earnings

4.4. OSH knowledge, attitudes, and practices (survey synthesis)

The survey indicates that OSH knowledge is generally low to moderate. Many respondents recognized obvious hazards (wet floors, heavy loads, sharp objects), but fewer reported consistent preventive routines. Awareness was more likely to translate into practice when protective actions were perceived as convenient and compatible with work (e.g., keeping lanes clear, reporting hazards to peers). Where prevention required additional cost or discomfort (e.g., specific PPE), adoption tended to be inconsistent.

4.5. Qualitative themes and participatory insights

Interview narratives and participatory discussions highlighted three recurring themes: (1) risk normalization and economic trade-offs (safety is perceived as secondary to daily income); (2) limited access to comfortable and affordable protective resources; and (3) governance gaps, where responsibility for prevention is fragmented among market actors. These themes help explain why knowledge alone is insufficient for sustained behavior change.

4.6. Proposed community-based intervention model

To translate the diagnosis into action, the study formulated a community-based model that combines feasible environmental improvements, peer support, and routine governance mechanisms. Table 2 presents a logic model that links inputs, core activities, and expected short-term outcomes.

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Table 2. Community-Based OSH Intervention Logic Model (Inputs, Activities, Outputs, Outcomes).

Component	Core activities	Responsible actors	Expected short-term outcomes
Administrative controls	Simple SOPs for cleaning, lane clearance, and incident reporting; scheduled OSH briefings	Market managers with trader representatives	Clearer routines; improved hazard reporting
Environmental improvements	Drainage spot repairs; basic signage; designated loading points; improved lighting where feasible	Local government and market authority	Reduced slips/congestion; better navigation and visibility
Peer-based behavior change	OSH peer champions/cadres; brief reminders; mutual monitoring in high-risk zones	Trader groups, porters, and parking units	Stronger safety norms; higher perceived control
Access to protection	Facilitated access to basic PPE (gloves, non-slip footwear guidance); comfort-focused selection.	Market authority with partners	More practical PPE adoption where relevant
Monitoring and feedback	Monthly walkthrough checklist, feedback meeting, and improvement log	Market managers and cadres	Sustained attention to safety; iterative improvements

In addition, Table 3 maps prioritized control actions to the hierarchy of controls to support feasible, staged implementation in market settings. The findings show that informal workers—including small traders, porters, parking attendants, and cleaning staff—play a central role in market activities but lack formal protection and OSH training. Crowded work environments, poor drainage, limited lighting, and the absence of evacuation routes make this group highly vulnerable to accidents. A work culture that prioritizes daily income over safety further worsens the situation. Observations, interviews, and supporting data revealed that the main OSH risks in Makassar's traditional markets include electrical hazards from disorganized wiring, fire risks from stoves and flammable goods, injuries from non-ergonomic lifting, exposure to pesticides, and sanitation and drainage problems. Frequently reported incidents include slips, being struck by falling objects, cuts from sharp items, and illnesses caused by unhealthy working environments. Overall, the research findings indicate that OSH implementation in Makassar's traditional markets remains low across knowledge, attitudes, and practices among informal workers. Limited outreach, inadequate market infrastructure, and weak regulations are the main factors behind this situation. These findings highlight the urgent need for interventions, including training, the provision of supporting facilities, and community-based monitoring models, so that traditional markets can develop not only as centers of people's economy but also as safe, healthy, and sustainable workspaces.

Table 3. Prioritized OSH Control Actions Mapped To The Hierarchy Of Controls.

Control level	Example action for traditional markets	Main actor(s)	Expected effect
Elimination/Substitution	Remove/relocate hazards: clear blocked lanes; relocate loading	Market authority, local government, and stall owners	Reduced collisions, trips, and electrical incidents system-wide.

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Control level	Example action for traditional markets	Main actor(s)	Expected effect
	points away from pedestrian flow; remove exposed wiring.		
Engineering controls	Improve drainage at hotspot areas; add non-slip surfaces where feasible; improve lighting in dark lanes; install cable covering/trays.	Local government; market authority	Lower slip risk, better visibility, and less accidental contact with hazards.
Administrative controls	Simple SOPs for cleaning & lane clearance; signage; designated routes; incident/near-miss reporting; monthly walkthrough checklist.	Market managers; trader representatives	Stronger routines and safety signals; improved compliance through clarity.
Training & communication	Short micro-trainings; toolbox talks; peer champions; visual reminders at high-risk points.	Health office, market managers, peer champions	Improved awareness, norms, and perceived control; better reporting.
PPE (last line)	Task-appropriate gloves; guidance on non-slip footwear; safer handling for sharp objects/waste.	Workers; market authority (facilitation)	Reduced exposure for unavoidable tasks; fewer minor injuries.

4.7. Synthesis of Quantitative and Qualitative Findings

This study employed both quantitative and qualitative approaches to obtain a comprehensive picture of the level of awareness and implementation of Occupational Safety and Health (OSH) among informal workers in Makassar's traditional markets. From a quantitative perspective, the survey of 100 respondents showed that OSH awareness remained at a moderate level. Only about 40% of respondents understood the importance of using personal protective equipment (PPE), while 65% did not know evacuation procedures in the event of a fire. In addition, about 70% admitted they had never participated in any official OSH outreach program. Statistical analysis revealed that education and work experience significantly affected OSH awareness. Respondents with a secondary education level had a better understanding than those with lower levels of education. Similarly, workers with greater market experience showed relatively higher awareness, though consistent OSH practices did not always accompany this.

Meanwhile, qualitative analysis from 10 in-depth interviews and one Focus Group Discussion (FGD) revealed several important findings. First, most respondents stated they had never received OSH training, so their knowledge usually came only from personal experience or fellow traders. Second, the limited physical infrastructure of the markets—such as unclear evacuation routes, poor drainage, and unsafe electrical installations—increased vulnerability to workplace accidents. Third, the work culture in the informal sector, which emphasizes business continuity and daily income, often leads to safety concerns being neglected. Many workers found PPE inconvenient or costly, leading them to be reluctant to use it regularly. Viewed as a whole, quantitative analysis provided numerical evidence and trends of OSH awareness, which ranged from low to moderate. In contrast, qualitative analysis explained in greater depth the factors underlying this situation. The synthesis of these two approaches shows that efforts to improve OSH in traditional markets cannot rely solely

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on worker training. Systemic interventions, such as improving market infrastructure, enforcing stricter regulations, and developing community-based intervention models, are urgently needed to create safer, healthier, and more sustainable work environments for informal workers.

4.8. Risk prioritization and quick-win opportunities

A central practical output of the diagnosis is a prioritization logic for action. In markets, not all hazards can be addressed simultaneously, and repair resources or equipment are often limited. A feasible prioritization approach is to select controls that (1) reduce risk for many people at once (workers and customers), (2) can be implemented quickly with minimal disruption, and (3) are maintainable within routine management cycles. Drainage hot spots, key congestion points, and visibly hazardous electrical wiring are examples of issues where minor fixes can yield outsized benefits. From a prevention standpoint, the highest-leverage controls often sit at the administrative and simple engineering levels. Clear lane-marking and designated unloading points can reduce collisions and falls without requiring individual PPE compliance. Similarly, predictable cleaning schedules and accessible waste bins reduce hygiene risks across the system. These quick wins are also easier to communicate politically and socially because they align with market cleanliness and customer comfort. For tasks with unavoidable exposure—such as handling sharp tools, sorting waste, or repetitive lifting—task-appropriate PPE and ergonomic micro-practices remain important. Here, peer champions can demonstrate safe routines that do not slow down work, such as coordinated lifting for heavy loads, short recovery breaks, and stall layout adjustments that reduce awkward postures. This combination of quick wins and task-specific practices supports gradual, credible improvement rather than unrealistic 'zero risk' messaging.

4.9. Stakeholder readiness and sustainability

Sustainability depends on stakeholder readiness and role clarity. Market authorities are best positioned to coordinate environmental improvements and monitoring routines, while trader and porter groups can anchor peer-based reinforcement. The diagnosis suggests that readiness increases when safety is framed as part of market quality—cleaner lanes, fewer disruptions, and better customer trust—rather than as a purely regulatory demand. This framing can also motivate small investments because the benefits are more visible and immediate. A practical sustainability mechanism is a short feedback cycle: a monthly walkthrough checklist, a brief meeting to agree on a small set of fixes, and a simple log to record actions taken. Over time, this cycle can build a market-level' memory' of what works and can normalize safety as routine. Importantly, the cycle should remain light-weight; overly complex reporting may discourage participation in informal settings.

4.10. Discussion

For local government, the most immediate opportunity is to treat OSH as part of routine market service delivery. Simple indicators—such as drainage functionality, timeliness of waste removal, lane clarity, and availability of basic fire safety equipment—can be audited regularly and linked to management accountability. Health offices can support by providing periodic micro-training sessions that target high-risk tasks and by helping markets develop quick reporting mechanisms for incidents and near-misses. For market managers, feasibility is essential. Rather than complex compliance systems, markets can adopt short SOPs tailored to work processes, such as where goods are unloaded, how lanes are kept clear during peak times, how wet areas are cleaned, and how electrical hazards are reported and addressed. Managers can also institutionalize brief monthly walkthroughs using a checklist that prioritizes a small number of fixes. This approach aligns with continuous improvement principles and reduces the burden of significant, infrequent interventions. For informal workers themselves, peer support is a practical lever. The findings suggest that

workers are more willing to adopt safety practices when they are normalized and do not threaten income generation. Peer champions can demonstrate small actions that are compatible with work (e.g., reorganizing a stall layout to reduce tripping hazards, agreeing on hand signals or verbal warnings during cart movement, and encouraging task-appropriate protective gloves). When peer action is supported by management responsiveness—such as prompt hazard removal and visible maintenance—workers gain confidence that reporting and prevention are worthwhile.

A key implication is that OSH improvements in markets can create positive externalities: safer lanes and better hygiene benefit customers and can reduce market reputational risks. Therefore, framing OSH as part of market quality and customer service may increase stakeholder buy-in and facilitate resource allocation. The diagnosis confirms that both behavior and environment drive OSH challenges in traditional markets. Survey synthesis suggests that workers often recognize hazards but cannot consistently implement preventive measures when doing so is perceived as costly, uncomfortable, or incompatible with fast-paced market routines. This pattern is consistent with behavioral models in which perceived behavioral control and subjective norms shape intention and action (Ajzen, 1991). From a safety climate perspective, the fragmentation of responsibility in market governance weakens safety signals. Where market managers provide visible routines (cleaning schedules, signage, consistent supervision), workers receive cues that prevention is prioritized—conditions associated with safer behavior in organizational research (Zohar, 1980; Neal & Griffin, 2006). In contrast, when facilities are inadequate and enforcement is inconsistent, risk normalization becomes an adaptive strategy to maintain income and workflow.

The proposed intervention mode, therefore, emphasizes feasible controls aligned with the hierarchy of controls (NIOSH, 2015). While PPE remains important for specific tasks, market-level improvements can often reduce exposure more effectively by addressing environmental drivers such as drainage, congestion points, and cable management. Peer-based strategies complement these controls by strengthening norms and reducing the social cost of 'being safe' in a setting where speed and service are valued. Policy implications follow directly from the multi-actor nature of market OSH. Local government can integrate OSH into routine market management indicators (sanitation, circulation, fire readiness) and can support periodic joint walkthroughs with health offices and trader leaders. Market managers can institutionalize simple reporting and feedback mechanisms, while trader and porter groups can operationalize peer champion roles that are practical and culturally acceptable. This approach aligns OSH improvement with broader healthy-city and decent-work objectives (UN, 2015; ILO, 2019).

Several limitations should be considered. First, survey data rely partly on self-reports and may be influenced by social desirability or recall bias. Second, the informal nature of market work limits the availability of comprehensive worker rosters, so sampling prioritizes time-location coverage rather than probability sampling. Third, this study emphasizes feasibility and practical intervention logic; long-term impact evaluation (e.g., sustained injury reduction) requires extended follow-up and stronger routine reporting systems. In addition, the study focuses on practical diagnosis and intervention logic rather than on long-term clinical outcomes. Although injury and illness reduction is the ultimate objective, meaningful measurement of such outcomes requires longer follow-up and more systematic incident recording than is typically available in informal market contexts. Establishing simple reporting mechanisms is therefore an important intermediate goal for both practice and research. Future research could (1) test the intervention model with a more formal pre-post design, (2) examine the differential feasibility of controls across market zones (wet areas versus dry goods), and (3) explore gendered dimensions of risk and prevention roles in market work. Building simple incident-reporting systems acceptable to informal workers would also improve the quality of evidence for local policy decisions.

V. Conclusion

The findings indicate that OSH awareness among informal workers in Makassar's traditional markets remains moderate. Most workers do not fully understand the importance of using personal protective

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equipment (PPE) or emergency evacuation procedures. Education and work experience were shown to influence awareness levels, with workers with secondary education and longer work experience tending to have a better understanding. The qualitative analysis reinforces these findings by highlighting three main issues: the lack of OSH outreach, the limitations of physical market facilities, and an informal work culture that prioritizes daily income over safety. This combination of structural and cultural factors makes OSH implementation in traditional markets still far from optimal.

Based on the research findings regarding the occupational safety and health (OSH) conditions of informal workers in traditional markets in Makassar City, several recommendations can be made as follows: For the Local Government and PD Pasar Makassar Raya, such as:

a. Strengthen OSH outreach and training programs regularly for traders, porters, parking attendants, and other informal workers.
b. Improve and add OSH-supporting facilities in markets, such as evacuation routes, adequate lighting systems, drainage repairs, and the provision of portable fire extinguishers (APAR).
c. Integrate OSH aspects into policies on traditional market protection and empowerment so that occupational safety becomes an essential part of market governance.

For Market Managers

a. Develop and implement simple standard operating procedures (SOPs) related to OSH, including monitoring and regular inspections.
b. Establish trader-based community cadres or small teams to serve as agents of change in promoting OSH practices in markets.
c. Provide adequate sanitation and hygiene facilities and ensure regular waste management.

For Informal Workers

a. Increase awareness of the importance of workplace safety by starting to adopt simple OSH practices, such as keeping stalls clean, using PPE as needed, and reminding each other among workers.
b. Actively participate in training and outreach programs organized by market managers and local government.

For Academics and Future Researchers

a. Conduct further studies with broader coverage, either in other cities or with specific focuses such as gender aspects or particular health issues of informal workers.
b. Develop community-based OSH intervention models that can be replicated and adapted to the characteristics of markets in various regions.

In practical terms, market OSH improvement is most sustainable when it becomes part of everyday management rather than an external project. Routine walkthroughs, low-cost signage, and peer champions can operate as 'soft infrastructure' that continuously reinforces safe behavior. When combined with gradual infrastructure maintenance, these mechanisms can shift safety norms without undermining the market's economic function. These observations further support the intervention's emphasis on minor, targeted fixes that can be implemented incrementally. In practice, markets can prioritize two or three high-impact improvements per month—such as clearing a key congestion point, repairing a drainage hotspot, or improving signage at a hazardous intersection—and track progress through a simple improvement log. Additional contextual observations reinforced the importance of environment-level controls. In wet-market areas, drainage and cleanliness strongly shaped slip risk, and minor maintenance gaps could quickly escalate into repeated incidents during peak hours. In dry-goods lanes, congestion points and mixed vehicle–pedestrian flow were more prominent, suggesting that route design and designated loading zones could reduce exposure without demanding constant individual vigilance.

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