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Safety and Risk Exposure In Bakery Work Practices In Nigeria

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ABSTRACT

This paper analyses safety and risk exposure in bakery work practices in Nigeria, emphasizing the considerable occupational, ergonomic, mechanical, thermal, and respiratory dangers encountered by bakery workers. Research from Nigeria and global research indicates a significant occurrence of work-related musculoskeletal problems, recurrent acute injuries, respiratory symptoms associated with flour dust, and increasing risks of heat stress, especially in small and medium-sized bakeries with minimal mechanization. The review elaborates on the significance of structured risk assessment frameworks, postural and physical-strain evaluation instruments, and hazard-control strategies, comprising engineering controls, administrative measures, ergonomic redesign, ventilation, personal protective equipment, and worker training, in enhancing workplace safety. Notwithstanding economic and organizational limitations, the implementation of pragmatic, cost-effective safety measures can significantly diminish injuries, improve productivity, guarantee regulatory compliance, and bolster corporate sustainability. The results highlight the pressing necessity for enhanced safety management systems to safeguard workers, uphold product quality, and facilitate the expansion of Nigeria's baking industry.

Keywords: Safety, Risk Exposure, Bakery, Workplace, Quality, Sustainability, Nigeria, Hazard

1. INTRODUCTION

The bakery sector in Nigeria is a large, rapidly evolving part of the food-processing industry that supplies staple foods, especially bread, and is also seeing a growing market for value-added and convenience baked goods. Rapid urbanization, changing consumer preferences, and the rise of small- and medium-sized bakeries have increased demand, but the sector faces supply-side challenges such as energy and input shortages, inconsistent quality standards, and significant occupational and food safety risks. Effective safety and risk-management systems, ranging from basic housekeeping and PPE to formal HACCP and enterprise risk management, help protect workers, enhance product quality, reduce losses, and are increasingly vital for competitiveness and regulatory compliance.

The rest of this report summarizes the industry's structure and size, highlights common hazards and risks to workers and consumers, discusses why safety and risk management matter for health, economic, legal, and reputational reasons, and provides practical recommendations based on the literature. Bakeries (especially small ones) provide livelihood opportunities, employing bakers, machine operators, packers and delivery staff. Empirical surveys and field studies in Nigerian states document sizeable informal employment in bakery operations and associated risks linked to informal practices and weak enforcement of labour and safety standards (Chidiebere, Udu and Epebinu, 2025).

The industry ranges from informal, micro-scale bakeries serving local communities to large industrial bakeries with automated lines producing for national distribution. Although growth prospects are strong, the sector faces ongoing challenges affecting operations and competitiveness, such as inconsistent power supply, fluctuating input costs (notably wheat and fuel), gaps in cold chain logistics, and variable compliance with food safety and manufacturing standards. These constraints impact both product quality and business sustainability across the entire value chain. Bread and other baked goods are among the most widely consumed processed food products in Nigeria. Market research and industry analyses indicate continued demand growth driven by urbanization, busier lifestyles and preference for convenience foods; several market analysts project continued expansion of the bakery-products market over the coming years (Bhandari, 2025).

The industry is heterogeneous: it includes micro and artisan bakers (neighbourhood/roadside bakeries), small and medium commercial bakeries, and large industrial bakeries that supply supermarkets and institutional buyers. Bread and biscuits historically account for a large share of output in the sector. Local feasibility and academic studies emphasize the dominance of small-scale operations in many cities, with pockets of industrial producers concentrated around major urban centres (Louw, Troskie and Geyser 2013). Bakery industry is sensitive to the price and availability of wheat (mostly imported), vegetable fats, sugar, refined flour, and to energy costs (electricity/NG/kerosene), factors that directly affect production costs and margins for bakeries. Market reports emphasize supply-chain and cost pressures as critical determinants of viability (Kantike and Eglite 2013).

2. RISK MANAGEMENT IN BAKERY WORK PRACTICES

Bakeries are work environments with a wide range of occupational hazards, thermal (hot ovens and steam), mechanical (mixers, cutters, conveyors), ergonomic (repetitive lifting, awkward postures), chemical (cleaning agents, flour dust), slip/trip hazards (spilled dough, wet floors), and biological/food, safety risks (contamination, pest infestation). Flour dust and airborne particulates can cause respiratory symptoms and baker's asthma. Cleaning chemicals, fumigants or inadequate ventilation around ovens and baking areas also pose inhalation risks. Multiple occupational health surveys in Nigeria and elsewhere document respiratory and other exposures among bakers (Orisa-Ubi and Onuoha, 2023). Burns and scalds from ovens, hot surfaces and steam; slips, trips and falls on wet/greasy floors; cuts and lacerations from mixers, slicers and other machinery; and musculoskeletal disorders from manual handling and repetitive tasks. These are commonly cited in both international and Nigerian studies (Bonsu, Adei and Agyemang-Duah, 2020). Loud machinery, poor electrical wiring and the presence of combustible dust/oils create fire and electrical-safety hazards. Studies on bakery accidents in Nigerian towns report incidents linked to machine operation and unsafe electrical installations (Nwachukwu and Ezeobi, 2020).

Empirical studies carried out in several Nigerian states report frequent incidents and health complaints among bakery workers (cuts, burns, respiratory symptoms, musculoskeletal pain), often linked to inadequate training, poor use of personal protective equipment (PPE), and weak implementation of engineering and administrative controls. These findings indicate that many workplace injuries and chronic health problems are preventable with appropriate interventions (Nwachukwu and Ezeobi, 2020). Beyond worker welfare, robust safety and risk, management systems are critical for product quality, regulatory compliance and business continuity. Nigerian regulatory agencies and standards bodies have issued detailed good, manufacturing, food, hygiene and facility guidelines that bakeries are expected to meet; non, compliance can lead to product recalls, fines, reputational damage and loss of market access. Implementing hazard identification, routine risk assessments, safe, operating procedures, preventive maintenance, worker training, and basic occupational, health services reduce accidents, minimizes downtime, improves product safety and enhances consumer confidence, advantages that translate directly into cost savings and competitive strength (NAFDAC, 2023).

Systematic risk management, covering safety, health, environmental, operational and compliance risks, helps bakeries anticipate and mitigate business-level threats (e.g., equipment failure, supply, chain shocks, regulatory changes). Recent sectoral reviews and case studies emphasize that formalized risk, management practices (from simple checklists and hazard, reporting to structured safety management systems) are both feasible and effective in the bakery context, and should be integral to any strategy for sustainable growth in Nigeria's expanding bakery market (Obetta, Ohazulike and Nwachukwu, 2024).

2.1 Postural Assessment in Bakery Work Practices

Bakery work is physically demanding and characterized by repetitive motions, forceful exertions, prolonged standing and awkward body positions. These exposures put bakery workers at elevated risk for work-related musculoskeletal disorders (WMSDs) and reduced productivity. Structured postural assessment (using observational tools such as REBA, RULA, OWAS and QEC, and when possible instrumented measures) identifies high-risk tasks and guides targeted engineering, administrative and training interventions. Evidence from field studies and intervention trials shows that ergonomic workstation redesign, work organization changes (task rotation, rest breaks), and worker training reduce postural load and WMSD symptoms while improving comfort and productivity (Beheshti, 2014).

Postural assessment is the systematic evaluation of body positions and movements during work to identify awkward or sustained postures that increase biomechanical load on the musculoskeletal system. Assessments may be observational (e.g., Rapid Entire Body Assessment (REBA), Rapid Upper Limb Assessment (RULA); Ovako Working Posture Analyzing System (OWAS), Quick Exposure Check (QEC) or instrumented (inertial sensors, inclinometers, video-based motion analysis) depending on resources and the task complexity. Bakers perform manual tasks: mixing, dough handling, shaping, lifting trays, loading/unloading ovens, that commonly involve bending, trunk rotation, reaching above shoulder height, and prolonged standing. These postures generate cumulative mechanical load leading to neck, shoulder, low-back and upper-limb disorders. Identifying risky postures is the first step toward preventing injuries, reducing absenteeism, improving product quality, and maintaining productivity and workforce retention.

Multiple field studies across regions report high postural risk levels and elevated prevalence of WMSDs among bakery workers, underlining the practical significance of routine posture assessments in bakery settings (Abebaw, *et. al.,* 2024).

2. COMMON POSTURES ADOPTED BY BAKERY WORKERS

Based on observational studies and ergonomic surveys of bakery operations, common high-risk postures (as shown in Figure 1) include:

i. Forward trunk flexion / stooping while kneading dough, scraping mixing bowls, or loading ovens (sustained or repetitive bending at the low back) (Nourollahi-Darabad *et. al.,* 2020).
ii. Reaching and overhead work (placing/ removing trays in tall ovens or racks) with shoulder elevation/abduction and trunk rotation (Wadhwa *et. al.,* 2022).
iii. Prolonged standing on hard floors for long shifts, often with little postural change, increasing lower-limb and low-back load (Sojobi, *et. al.,* 2023).

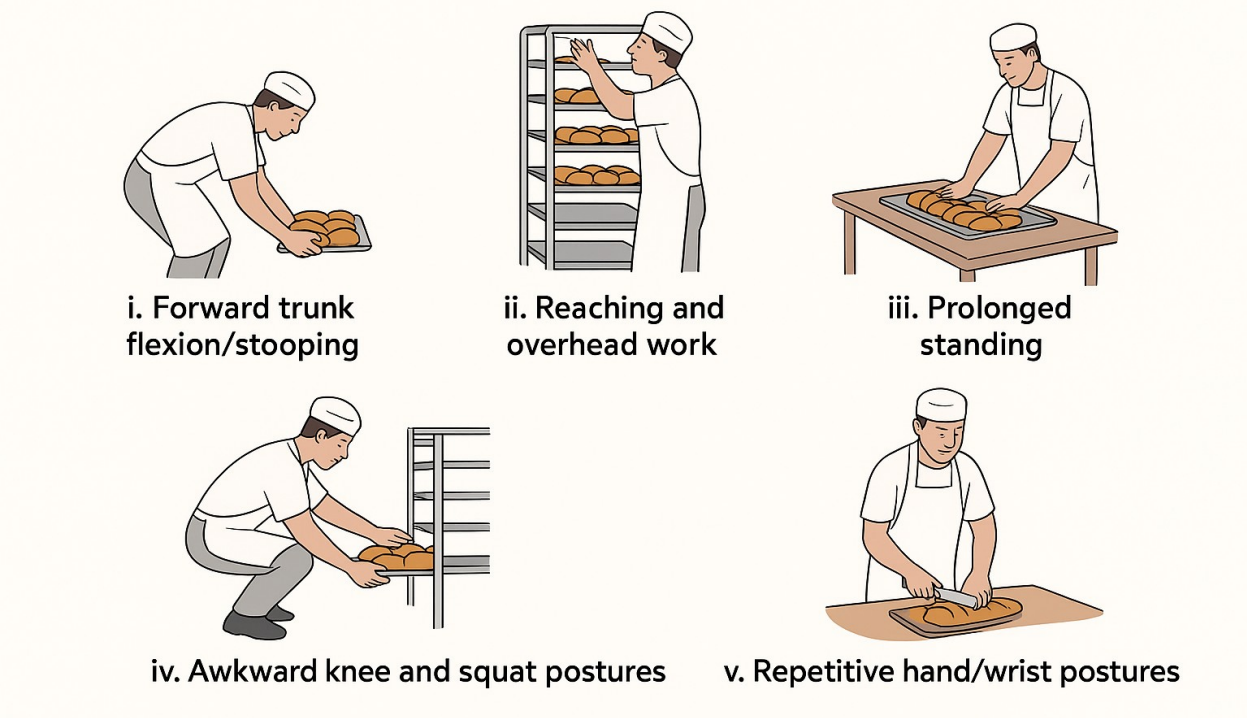

Figure 1: Common Postures Adopted By Bakery Workers

iv. Awkward knee and squat postures when handling materials stored low or when working at low benches, producing knee and hip strain (Raut and Rao, 2021).
v. Repetitive hand/wrist postures during shaping, cutting, and packaging tasks, often with forceful exertions (e.g., heavy dough handling) that increase risk for upper limb disorders (Beheshti, 2014).

Observational assessments often find a mix of postures in a single job; the posture that is worst or most sustained during a shift usually drives risk scoring in REBA/RULA/OWAS studies (Sirikasemsuk *et. al.,* 2024).

2.1 Impact of poor posture on health and productivity

- High prevalence of WMSDs: Cross-sectional studies in bakery populations report substantial prevalence of musculoskeletal pain in the low back, neck/shoulders and upper limbs. Poor posture combined with repetition and force increases incidence and chronicity of symptoms (Beheshti, 2014).
- Acute and chronic injuries: Sustained or extreme postures can lead to tendonitis, lumbar strain, and nerve compression disorders over time, with severity influenced by task frequency, force and individual risk factors (Sojobi, *et. al.,* 2023).
- Reduced productivity and quality: Pain and discomfort reduce worker speed and concentration; awkward positions make precise tasks harder, increasing rejects and rework.
- Absenteeism and turnover: WMSDs are a leading cause of sick leave and lost workdays in manual food-processing industries. Studies show ergonomic issues in kitchens and bakeries correlate with higher rates of temporary work loss and reduced work capacity (Abebaw, *et. al.,* 2024)
- Chronic pain contributes to fatigue, reduced job satisfaction and higher likelihood of reported stress, factors that further depress productivity. Ergonomic problems often exacerbate inequities: older workers or those with smaller stature can be disproportionately affected by poorly designed benches, tools or workstation heights (Lee et.al., 2021).

Multiple ergonomic assessments of bakeries consistently find a high proportion of tasks with REBA/RULA scores in the "medium to high risk" range, linking these scores to elevated WMSD prevalence among bakery workers (Wadhwa *et. al.,* 2022).

2.2 Strategies for improving posture in bakery settings

A multipronged approach is needed: engineering controls first, then administrative controls plus worker training and health promotion.

i. **Engineering controls**: Workstation height adjustment and modular benches. Benches and mixing bowls that can be adjusted to worker elbow height reduce trunk flexion and shoulder elevation. Adjustable-height workstations or standardized bench heights matched to workforce anthropometry are effective (Lee et.al., 2021). Oven/rack design modifications. Use of pull-out trays, lower oven entry points, or mechanized loading aids reduces overhead reaching and trunk rotation. Mobile trolley systems allow workers to roll trays at waist height rather than lift above shoulder level (Carrera *et. al.,* (2018). Mechanical aids and automation. Dough feeders, lifts, powered hoists, and mechanized mixers reduce manual force demands and awkward handling. Even low-cost aids (e.g., wheeled trolleys, sliding boards) can dramatically lower biomechanical load (Lee et.al., 2021).

ii. **Administrative controls and work organization**: Task rotation and job enlargement. Rotate workers between tasks that load different body regions to reduce cumulative exposure to a single posture. Structured breaks and micro-break scheduling reduce sustained static load (Sirikasemsuk, et. al. 2024). Shift design and break scheduling. Frequent short breaks and scheduled change of posture (sit/stand opportunities) mitigate sustained standing and trunk flexion effects (Sojobi, *et. al.,* 2023).

iii. **Training, behavior and health promotion:** Ergonomics training for posture awareness, safe lifting techniques, and correct workstation set-up. Training plus participatory problem solving (workers suggest and trial solutions) improves uptake and sustainability (Lee et.al., 2021). Stretching and conditioning programmes. Simple workplace exercise and warm-up routines reduce discomfort and can be integrated into shift starts. Evidence is mixed but generally supportive when paired with broader ergonomic changes (Lee et.al., 2021).

iv. Assessment, monitoring and continuous improvement: Use validated assessment tools (REBA for whole-body, RULA for upper limb–heavy tasks, OWAS for macro posture classification, QEC for exposure checklists) to prioritize interventions and measure change. Repeat assessments post-intervention to confirm risk reduction. Instrumented monitoring where feasible. Wearable inertial sensors or video analysis provide objective exposure metrics for long-duration tasks (recent bakery studies used upper-arm posture monitoring to link posture with symptoms) (Nourollahi-Darabad *et. al.,* 2020)

v. Cost-effective, context-appropriate solutions for small bakeries: Use of rolling carts and slide-out shelves instead of manual lifts, low-cost bench risers/blocks to raise work height to elbow level and workers' involvement: participatory ergonomics, workers' help to design and test changes, often yields high-impact, low-cost fixes (Carrera *et. al.,* 2018)

2.3 Physical Strain Assessment in Bakery Work

Bakery work combines repetitive manual tasks, frequent lifting, prolonged standing, awkward postures (bending, reaching), and thermal stress, all of which increase the risk of work-related musculoskeletal disorders (WRMSDs) and physical strain. Published studies and systematic reviews consistently report high prevalence of musculoskeletal pain among bakers (particularly low back, neck and shoulders), and recommend ergonomic assessment using validated observational tools (REBA, RULA, OWAS), questionnaires (Nordic Musculoskeletal Questionnaire) and objective measurements (inclinometers, EMG, wearable sensors). Interventions that reduce strain include workstation redesign, mechanical aids, task rotation, training, and administrative controls (Roveshti et.al., 2024).

Typical bakery tasks; dough mixing and kneading, lifting flour sacks and trays, repetitive rolling/hand-shaping of dough, loading/unloading ovens, long periods of standing and bending, expose workers to multiple ergonomic risk factors simultaneously: high repetition, forceful exertions, awkward joints, and prolonged static postures. These exposures are compounded by hot environments (oven heat), shift length (early mornings/long hours) and often limited mechanization in small bakeries. Several field studies and reviews identify bakery work as a high-risk occupation for WRMSDs (Bonsu, Adei and Agyemang-Duah, 2020).

3. TYPES OF PHYSICAL STRAIN EXPERIENCED BY BAKERY WORKERS

i. **Musculoskeletal strain (WRMSDs) (Figure 2):** Low back strain from frequent lifting and bending (loading ovens, moving trays), Neck/shoulder strain from repeated reaching and awkward upper-limb postures (rolling, shaping dough), Wrist/hand disorders from repetitive hand movements and forceful grip (kneading, cutting), Lower-limb and foot discomfort from prolonged standing on hard floors and Evidence from cross-sectional and observational studies shows these body regions dominate symptom reports among bakery workers (Chen *et. al.,* 2020).

ii. **Cardiorespiratory / thermal strain:** Heat exposure near ovens elevates cardiovascular and thermal load, especially during long shifts, increasing perceived exertion and fatigue which can indirectly raise injury risk (Al-Otaibi, *et. al.,* 2022).

iii. **Fatigue and cumulative load:** Repetition and insufficient recovery lead to cumulative microtrauma and reduced muscle capacity over a shift or across weeks. Repetitive low-force tasks can still produce fatigue when frequency is high (Roveshti, *et. al.,* 2024)

iv. **Mechanical impact and contact injuries:** Handling heavy sacks or trays can cause acute strain and small-impact injuries (e.g., slips, trips, crush injuries). Poor housekeeping and wet floors near ovens exacerbate this risk (Bonsu, Adei and Agyemang-Duah, 2020).

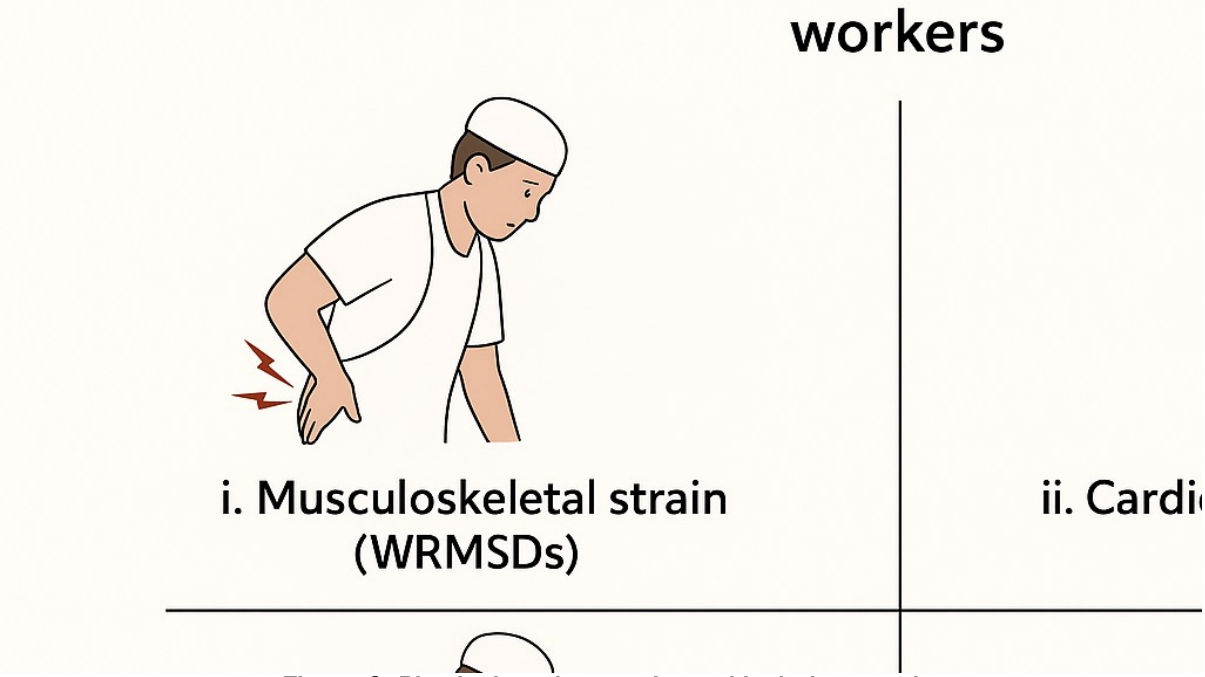

Figure 2: Physical strain experienced by bakery workers

3.1 Tools and methods for assessing physical strain

Assessment should be multimodal: subjective questionnaires, structured observational tools, and objective instrumentation where feasible. Some commonly used validated instruments with typical bakery applications are.

Self-report questionnaires:

i. **Nordic Musculoskeletal Questionnaire (NMQ)**: widely used to capture prevalence and location of musculoskeletal symptoms (12-month and 7-day prevalence) in bakery worker studies. Good for surveillance and baseline assessment (Chen *et. al.,* 2020)
ii. **Perceived exertion / Borg RPE scale**: quick measure of subjective effort during tasks, useful when evaluating heat/fatigue interaction.

a. Observational and checklist methods:

i. **REBA (Rapid Entire Body Assessment)**: whole-body observational tool sensitive to awkward postures and dynamic tasks; commonly applied in food production and bakery studies for complex multi-joint tasks (Hita-Gutiérrez *et. al.,* 2020).
ii. **RULA (Rapid Upper Limb Assessment)**: focused on neck, trunk and upper limbs; useful for kneading and hand-intensive operations (Al Madani, D and Dababneh, 2016).
iii. **OWAS (Ovako Working Posture Analysis System):** useful for classifying back/arm/leg postures over time during material handling tasks (Shahu, 2016).
iv. **Quick Exposure Checklist (QEC), PLIBEL, and other short checklists**: rapid hazard screening tools for workplace walk-throughs (Shahu, 2016)

Video-record representative tasks (kneading, tray loading, bag handling), then score posture snapshots with RULA/REBA. Combine with frequency and duration data to estimate exposure. REBA is often preferred when whole-body posture is critical (e.g., bending + lifting) (Hita-Gutiérrez *et. al.,* 2020)

Objective instrumentation

i. **Inclinometers / wearable IMUs**: measure trunk and upper-arm angles and durations; useful for quantifying time spent in flexed postures. Long-duration assessments capture accumulated exposure better than short observational snapshots (Nourollahi-Darabad *et. al.,* 2020)
ii. **Electromyography (EMG)**: measures muscle activity and fatigue patterns during repetitive tasks (e.g., wrist/forearm during kneading). Studies in bakeries have combined EMG with posture measurement for detailed insights (Chen *et. al.,* 2020).
iii. **Grip dynamometry and force sensors**: quantify forceful exertions (lifting weights, pushing/pulling trays).
iv. **Environmental monitors (heat, humidity)**: to assess combined strain from temperature exposure (Al-Otaibi, *et. al.,* 2022).

b. Task-specific risk assessment approaches

i. **NIOSH Revised Lifting Equation**: to compute Recommended Weight Limits (RWL) for specific manual lifting tasks (sacks of flour, stacked trays). Use when lifting is a principal exposure (Shahu, 2016).
ii. **Time-study and workload sampling**: capture how often and for how long risky postures and heavy lifts occur, supporting exposure quantification for RULA/REBA/NIOSH inputs (Al Madani, D and Dababneh, 2016).

4. WAYS OF MINIMIZING PHYSICAL STRAIN

Interventions should follow the hierarchy of controls (elimination, substitution, engineering, administrative and PPE). Evidence from reviews of bakery workers and similar manual work populations supports multi-component programmes. Some of the interventions needed in bakery are:

a. Engineering controls:

i. **Mechanical aids**: lifts, trolley/cart systems to move heavy flour sacks and stacked trays; height-adjustable racks for oven loading to avoid excessive bending.
ii. **Workstation redesign**: adjust bench, table and oven heights to the anthropometry of workers; provide anti-fatigue mats to reduce lower-limb strain.
iii. **Tools redesign**: lighter, ergonomically shaped rolling pins, knock-out trays with handles, and easier-grip tools to reduce wrist/hand loads.
iv. **Process automation**: where feasible, mechanize repetitive forceful tasks (mixing/kneading machines with ergonomic interfaces).
These measures directly reduce force and awkward postures and have strong evidence for reducing MSD risk when implemented correctly (Bonsu, Adei and Agyemang-Duah, 2020)

b. Administrative controls:

i. **Job rotation and task variation**: rotate workers between high-repetition/upper-limb tasks and lower-limb or less repetitive duties to reduce cumulative loading. Empirical studies in bakeries show high benefits from reducing time in dominant repetitive tasks (Sojobi, *et. al.,* 2023).
ii. **Work–rest scheduling**: introduce short, frequent micro-breaks and scheduled recovery periods to limit fatigue accumulation.
iii. **Training and safe work procedures**: ergonomics training on safe lifting, posture, and tool use; involve workers in participatory ergonomics programmes to co-design fixes. Reviews highlight training plus workstation changes as more effective than training alone (Roveshti et.al., 2024).

Personal Protective Equipment:

i. **Supportive footwear and anti-fatigue mats** reduce lower-limb discomfort from prolonged standing.
ii. **Knee pads** where kneeling is required. Note: PPE is last line and should complement engineering/administrative measures.

c. Health surveillance and early reporting

i. **Regular screening:** using NMQ and periodic physical assessments to identify early symptoms and intervene early.
ii. **Access to physiotherapy/exercise programmes**: supervised stretching and strengthening programmes for core and shoulder girdle muscles can reduce symptom progression when combined with workplace changes (Roveshti et.al., 2024)

d. Environmental controls: ventilation near ovens, breaks in cooler areas, hydration protocols to reduce thermal strain that compounds physical load. Studies show physiological changes in bakers working near ovens; mitigating heat reduces perceived exertion and may reduce injury risk (Al-Otaibi, *et. al.,* 2022).

e. Implementation and evaluation:

i. **Pilot interventions** on selected high-risk tasks with pre-/post-assessment using the same tools (REBA/RULA scores, inclinometry, EMG, NMQ) to evaluate effect.
ii. **Participatory ergonomics**: involve bakery workers in solution design to improve uptake and practicality. Evidence suggests interventions designed with worker input are more sustainable (Roveshti et.al., 2024)

5. RISK EVALUATION IN BAKERY OPERATIONS

Bakery operations involve manual handling, high-temperature equipment, combustible powdered ingredients, sharp instruments, and repetitive labour, resulting in a convergence of physical, chemical, ergonomic, and fire/explosion hazards. A systematic risk assessment employing established frameworks (HSE five-step approach and ISO 31000 principles) and industry-specific controls (machine guarding, dust control, ergonomics, training) is crucial for mitigating injuries, illnesses, downtime, and regulatory non-compliance. A risk assessment is a methodical procedure to identify risks, assess potential victims and the nature of harm, analyse and quantify the risk level, and establish and execute suitable measures (HSE, 2024).

5.1. Prevailing dangers in bakery work environments

Principal danger categories accompanied by evidence-based annotations (as shown in Figure 3) are:

i. **Combustible dust and fire/explosion hazards:** Flour and powdered components generate fine particles that can create explosive clouds when confined and ignited.
ii. **Thermal dangers (burns, heat stress):** Ovens, steam, hot oil, and heated surfaces expose workers to burns and heat strain; extended exposure may impact cardiovascular strain in elevated-temperature bakeries (Abu-Elmatty *et. al.,* 2022).
iii. **Mechanical dangers (lacerations, entanglement, crush injuries):** Mixers, slicers, conveyors, and other powered apparatus pose squeeze, shear, and cut risks if inadequately safeguarded and maintained.
iv. **Ergonomic risks and musculoskeletal diseases (MSDs):** Repetitive tasks (kneading, shaping), uncomfortable postures, heavy lifting, and prolonged shifts contribute to a high incidence of work-related musculoskeletal disorders (WRMSDs) among bakers, affecting the neck, shoulders, lower back, and wrists. Numerous studies and evaluations indicate increased musculoskeletal disorder rates among bakery workers (Roveshti *et. al.,* 2024)

v. **Slip, trip and fall hazards:** Spilt dough, flour, water and disorganized flooring significantly contribute to a considerable proportion of non-fatal injuries in bakeries. Effective cleaning is a fundamental preventive strategy (Abu-Elmatty *et. al.,* 2022).
vi. **Respiratory and allergic hazards:** Inhaling wheat dust may lead to respiratory irritation, occupational asthma, and allergic sensitization in affected workers. Ventilation and dust mitigation are essential measures (Lakshmi, Deepika, and Bindu, 2021).
vii. **Chemical and biological hazards:** Cleaning agents (alkalis, acids) and sporadic mould/microbial concerns due to inadequate hygiene may lead to dermal and respiratory complications. Proper storage and safety data sheets (SDS) are mandatory (Tomoda, 993).
viii. **Psychosocial Risks and Fatigue:** Extended hours, early shifts, production demands, and insufficient staffing can lead to weariness, hence elevating error rates and risk exposure.

Figure 3: Dangers In Bakery Work Environments

5.2 Framework for Executing a Risk Assessment (Methodical Step-by-Step Approach)

The HSE five-step process, organized according to ISO 31000 principles (systematic, proportionate, and iterative), consists of the following steps:

i. Step 0: Preparation and Scope (Management Commitment): Designate qualified individual(s); delineate scope (retail versus industrial bakery; shifts; processes). Distribute time and resources. Document methodology (ISO, 2018)
ii. Step 1: Identify hazards: Comprehensive guide (beginning to end: acquiring ingredients, combining, fermenting, baking, cooling, packing, storing). Utilize checklists for prevalent bakery hazards, including dust, hot surfaces, moving components, manual handling, and slips. Engage employees who execute the tasks.
iii. Step 2: Identify potential victims and the nature of the harm: Identify vulnerable groups: bakers, maintenance personnel, cleaners, contractors, guests. Take into account at-risk populations (pregnant employees, novice or youthful workers).
iv. Step 3: Assess risk (probability × impact): Utilize a basic risk matrix (e.g., 1–5 probability × 1–5 impact) for prioritization. Take into account the current controls during the scoring process.

v. Step 4: Identify and install controls (hierarchy of controls): Implement hierarchy: Elimination, Substitution, Engineering, Administrative, Personal Protective Equipment (PPE).
vi. Step 5: Document findings and convey information: Maintain accessible documentation: dangers, risk assessments, management measures, designated individuals, goal deadlines. Educate personnel on updated protocols and verify the accessibility of Safety Data Sheets and emergency plans.
vii. Step 6: Evaluate and oversee: Regular evaluation following occurrences, modifications in processes, or on an annual basis. Utilize near-miss reports, injury statistics, and exposure monitoring to enhance evaluation.

6. CONCLUSION

The subsequent conclusions derived from this review are as follows:

i. **Elevated incidence of occupational health issues, particularly musculoskeletal problems**: Numerous Nigerian researches indicate exceedingly high prevalence rates of musculoskeletal pain (MSP) among bakery workers, with 12-month prevalence frequently exceeding 70%, particularly for lower-back and neck pain. Significant ergonomic risk factors include sustained bending, repetitive hand motions, lifting, and uncomfortable postures (Sojobi, *et. al.,* 2023).
ii. **Recurrent acute injuries (lacerations, thermal injuries, machinery incidents) and heat-related complications:** Surveys and field studies in Nigerian locations, record incidents of machine cuts, burns, slips, and heat-related ailments resulting from ovens and high-temperature work settings. A multitude of injuries can be averted with fundamental engineering controls and personal protective equipment. Nwachukwu and Ezeobi (2020)
iii. **Respiratory and allergic hazards associated with flour dust and chemical exposure**: Flour dust and cleaning chemicals are identified as hazards in bakeries; unregulated exposure may lead to cough, rhinitis, and occupational asthma without enough ventilation and suitable respiratory protection (Enitan, Osakue, and Adejumo, 2023).
iv. **Insufficient safety awareness, limited utilisation of personal protective equipment (PPE), and inadequate housekeeping:** Numerous local studies indicate low levels of hazard recognition, inconsistent or nonexistent use of PPE (such as gloves, goggles, and masks), inadequate machine guarding, and insufficient first-aid or emergency protocols in many small and medium-sized bakeries (Joshua *et. al.,* 2017).
v. **Heat stress is an increasingly acknowledged, escalating issue:** Bakeries subject employees to prolonged elevated temperatures; recent global recommendations and local research emphasize the physiological and productivity impacts of heat exposure, an issue becoming increasingly pressing as ambient temperatures escalate.
vi. **Economic and organizational impediments hinder safety investments:** Financial apprehensions, informal ownership frameworks, and inadequate regulatory enforcement frequently deter bakery proprietors from allocating resources towards safer machinery, ventilation, training, or occupational health services, despite evidence correlating safety investments with enhanced business performance and diminished downtime (Ilemona, S. A. 2022).

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