OCCUPATIONAL HEALTH HAZARDS AND SAFETY PRACTICES AMONGST WORKERS OF SEVEN-UP BOTTLING COMPANY, BENIN CITY, EDO STATE

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DECLARATION

We hereby declare that this research project titled "**Occupational health hazards and safety practices amongst workers of Seven-Up Bottling Company, Benin City, Edo State**" was conducted under supervision and has not been submitted in part or in full for any purpose.

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CERTIFICATION

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LIST OF ABBREVIATIONS

ATS:	American Thoracic Society
DALYs:	Disability-Adjusted Life Years
dB/dBA:	Decibel/A-weighted decibels
ERS:	European Respiratory Society
GDP:	Gross Domestic Product
ILO:	International Labour Organization
ISO:	International Organization for Standardization
kHz:	Kilohertz
MRC:	Medical Research Council
NIHL:	Noise-Induced Hearing Loss
OSH:	Occupational Safety and Health
PPE:	Personal Protective Equipment
SBC:	Seven-Up Bottling Company
SPL:	Sound Pressure Level
WHO:	World Health Organization

DEFINITION OF TERMS

Occupational Hazards: factors in the work environment, the presence of which can lead to adverse health condition or injury to the worker.

Occupational Health: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.

Personal Protective Equipment (PPE): specialized clothing or equipment used to prevent or minimize exposure to hazards

ABSTRACT

Introduction: Occupational hazards remain a major public health concern, particularly in manufacturing industries where workers are exposed to physical, chemical, ergonomic, and psychosocial risks. Despite existing global and national regulations aimed at ensuring workplace safety, such as those guiding occupational health practices, these hazards persist, especially in developing countries due to poor compliance and underreporting, thus this study assessed occupational health hazards and safety practices among workers of Seven-Up Bottling Company, Benin City, Edo State.

Objective: This study was conducted to assess occupational hazards and safety practices among workers in Seven-Up Bottling Company, Benin City, identify the common occupational health hazards present and factors predisposing workers to these hazards, with the goal of guiding targeted prevention and occupational health promotion to reduce workplace risks.

Methodology: A descriptive cross-sectional study was conducted among 105 workers selected using a systematic sampling technique. Data were collected using a structured interviewer-administered questionnaire and analysed using IBM SPSS version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize data, while Chi-square test and binary logistic regression were used to determine associations and predictors at a 5% level of significance.

Results: The mean age of respondents was 32.7 ± 8.1 years. Most respondents were males, 71 (67.6%), and were between 20–29 years, 45 (42.9%). Common occupational hazards identified included psychological stress, awkward posture, repetitive movements, noise exposure, slippery floors, moving machinery without adequate guards, and glass bottle explosions. More than half of the respondents, 58 (55.2%), demonstrated poor safety practices, while 47 (44.8%) had good safety practices. Department/unit was significantly associated with the level of safety practice ($p < 0.001$). Additionally, 42 (40.0%) of respondents sustained work-related injuries in the last 12 months. Among those injured, cuts and lacerations from broken glass or metal were the most common

injury type, affecting 13 (31.0%) workers. Age was significantly associated with the occurrence of injury (p = 0.016). Logistic regression showed that workers with over five years of service were four times more likely to sustain injuries (OR = 4.057; 95% CI: 1.045–15.760), while workers in the inventory department had significantly lower odds of injury (OR = 0.155; 95% CI: 0.026–0.916).

Conclusion: Workers in Seven-Up Bottling Company are exposed to multiple occupational hazards, with suboptimal safety practices and a considerable burden of work-related injuries. Strengthening workplace safety training, improving personal protective equipment (PPE) compliance, enforcing engineering controls, and promoting ergonomic interventions are recommended to reduce occupational risks and improve workers' health.

Keywords: Occupational hazards, safety practices, bottling company, work-related injuries, Personal Protective Equipment, Benin City.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Occupational hazards are defined by the International Labour Organisation (ILO) as various factors, conditions, or situations in the workplace that have the potential to cause harm, injury, or adverse health effects to workers.[1] These hazards encompass physical, chemical, biological, ergonomic, and psychosocial factors present in the work environment.[2]

Globally, a safe and healthy working environment is recognized as a fundamental human right and a legal necessity. The ILO, through its Occupational Safety and Health Convention, mandates that member states, including Nigeria, formulate and implement a coherent national policy to prevent accidents and injuries by minimizing workplace hazards.[1] In Nigeria, this principle is enshrined in The Factories Act of 1990 which explicitly obligates employers to ensure the health, safety, and welfare of all workers. This act details provisions for a clean and safe work environment, including adequate ventilation, prevention of overcrowding, supply of drinking water, and the provision and maintenance of Personal Protective Equipment (PPE) at no cost to the worker.[2] Despite these clear legal frameworks, the manufacturing sector, including the food and beverage industry, remains a high-risk environment.

In the bottling industry, which comprises large industrial establishment primarily engaged in high-volume production and packaging of beverages and related products, occupational and environmental risks are particularly pronounced. These risks largely stem from the extensive of sophisticated machinery, the handling and storage of various chemical substances, and the continuous operational processes required to maintain efficient manufacturing output. Activities such as equipment operation, routine maintenance, cleaning and sanitation procedures, material handling, and packaging line operations all contribute to the potential exposure of workers to physical, chemical, and mechanical hazards. Collectively, these factories make the manufacturing environment in bottling companies inherently complex and risk prone.[2]

The ILO estimate that there are approximately 270 million occupational accidents and 160 million occupational diseases each year, which equates to a lost global Gross Domestic Product (GDP) of four percent.[3] Following a situation analysis of the national Occupational Safety and Health (OSH) Systems in 2010, the ILO embarked on the implementation of a special project with the overall objective of reducing occupational accidents and work-related morbidities in the country. However, nearly a decade down the line, under reporting of occupational accidents and diseases still persists.[4]

Several safety measures have been recommended for minimizing exposure to industrial hazards. Some measures such as use of PPEs, periodic medical examination and personal hygiene, require complete participation by employees to ensure effectiveness. Evidence shows that when workers are fully aware of and comply with recommended safety precautions and practices that minimize exposure to hazards, the impact on occupational health is positive and immense.[5] The eyes are susceptible to serious threats from physical or chemical injuries, which may result in temporary or permanent vision loss if not treated promptly and adequately. These injuries encompass a spectrum ranging from mild eye injuries to severe ocular trauma. However, the majority of eye disorders that workers may experience in their workplace can be prevented by employing appropriate eye protective devices, including safety goggles, face shields, and eye wash centers in cases of chemical splashes.[2]

Safety and health in the workplace are necessary for the attainment of a viable business endeavour both for the employers, labour unions, governments and the society in general. Hence, any form of injury has economic implications for the worker, his/her family or dependents, and the community[5]. Naturally the desire for safety is an intrinsic human pursuit, every individual in life whether employed or not, at the workplace or outside the workplace, has the innate desire to be safe. Therefore, the success of occupational health and safety measures depend on the commitment of individual workers to maintaining safe work environment.[5]

An effective management of the workplace environment involves deliberate efforts to ensure that working conditions are comfortable, safe, satisfactory, and motivating for employees, thereby supporting both their physical well-being and psychological satisfaction.[6] The extent to which employees positively interact with and adapt to their immediate work environment has a significant influence on their level of concentration, frequency of errors, and overall work efficiency. A well-managed workplace environment therefore plays a critical role in enhancing employees performance, reducing mistakes, and improving productivity within an organization.[6]

In general, occupational health and safety are thought to receive less attention and be addressed less thoroughly in developing countries. Compliance with safety recommendations may vary across industries and employee self-awareness of exposure may be insufficient. Occupational safety and health (OSH) does not only seek to secure the safety and health of persons at work but consequentially stimulates productivity in the business of establishments.[7] The United Nations in its universal declaration of human rights recognized the right of all people to just and favourable condition of work. It is, therefore, necessary to uphold OSH standards and be well-coordinated for effective management.

1.2 STATEMENT OF THE PROBLEM

Studies in Nigeria have confirmed that manufacturing settings often fall short of the legal ideal and workers are routinely exposed to hazards.[7,8] A 2022 study done in a brewing and bottling industry in Ibadan identified hazards, including bottle explosions (13%), manual handling/ergonomic stress (10%), slips and trips (10%), falls from height (10%), and high noise levels (7%).[7] In another study done in 3 bottling and brewery industries in South-South Nigeria, major hazards identified were working at height (91%), high voltage areas (90%), loud noise (80%), machines and equipment vibration (69%) and faulty machines and equipment (65%).[8]

The failure to control these hazards has severe and measurable consequences posing a global and national health and economic burden. According to the ILO, occupational hazards lead to an estimated 4% loss of gross domestic product and 3 million deaths globally each year.[9] These work-

related fatalities accounted for 6.71% of all deaths globally in 2019, with the fraction of work-related deaths estimated to be highest in Africa (7.39%)—indicating an ongoing and serious burden in regions with rapid industrial growth.[9] The 2016 report on Nigeria's OSH profile by the ILO indicated that between 2014 and 2016, a total of 3,461 occupational accidents and injuries were reported nationwide, alongside 238 fatalities with the report noting that these figures are likely under-reported and may underestimate the true burden[4]. Work place injuries are also a significant cause of disability. The World Health Organization (WHO) and ILO estimated a total of 90.22 million disability-adjusted life years (DALYs) attributable to 42 specific pairs of occupational risk factors and health outcome[9].

Safety amongst workers in bottling companies in Nigeria has been emphasized by various studies[2,5,8], however there is a critical need for specific, localized data from Benin City to guide any effective intervention. While some studies identified hazards like "bottle explosions,"[7] the specific prevalence of the full spectrum of hazards, physical (noise, heat), chemical (cleaning solvents, CO_2), and ergonomic, within the bottling companies in Benin City are not well-documented. Identifying the predisposing factors of these hazards is also a major gap. It is unknown how specific factors in the bottling industry such as shift work schedules, contract/casual worker status, level of education of workers, production units, the level of supervision, experience, socio-demographic factors such as age and gender are associated with exposure to hazards in the Benin City bottling companies. A report by ILO showed that younger people experience higher rates of occupational injuries while 43% of fatal occupational diseases affect older workers aged 70.[9] Studies report a dangerous "knowledge-practice gap," where workers have good knowledge of safety but very poor practice[10,11]. PPE utilization, in particular, is noted to be extremely low in African factories (as low as 35% in one study), even when equipment is available.[11] A study conducted in a bottling company in Maiduguri found that although workers demonstrated a generally good level of knowledge of occupational health and safety practices (66.7%), only

57.6% showed good adoption of safety precautionary measures and use of PPEs, while 10.4% exhibited poor adherence to these measures.[10]

1.3 JUSTIFICATION OF STUDY

Occupational injuries and work-related diseases continue to pose a significant public health challenge worldwide, despite being largely preventable. According to estimates from the ILO, hundreds of millions of accidents and illnesses occur in workplaces each year. These incidents not only cause physical harm and suffering to workers but also result in substantial losses in productivity and impose serious socioeconomic burdens on communities and nations. The widespread occurrence of such injuries and diseases underscores the critical importance of developing effective prevention and control strategies. To address this issue successfully, there is a pressing need for evidence that is tailored to specific contexts and industries. Such context-specific data can guide policymakers, employers, and health professionals in implementing interventions that protect workers and improve overall workplace safety.

In Nigeria's expanding industrial sector, attention to OSH is often inadequate, compliance with safety regulations is inconsistent, and workers awareness of occupational exposures is limited. Workers in bottling companies are exposed to multiple hazards, including high noise levels, heat, chemical agents, ergonomic strain, and psychosocial stressors. Despite these risks, there is a dearth of local research on the pattern of hazards, predisposing factors, and adherence to safety practices among bottling-company employees in Benin City.

Moreover, previous studies in similar industrial settings[2,5,8] have not adequately assessed certain aspects such as identifying common occupational health hazards in bottling companies in Benin City, creating a research gap that this study seeks to fill. By identifying the common hazards, predisposing factors, and levels of safety-practice adherence, the findings of this study will provide valuable evidence to guide management, occupational health professionals, and policy makers. The results can inform the design of preventive interventions, improve workplace safety programs,

and ensure compliance with national occupational safety regulations, ultimately reducing work-related morbidity and improving productivity among workers in bottling companies.

1.4 RESEARCH QUESTIONS

This study seeks to answer the following research questions:

1. What occupational health hazards are commonly encountered by workers in Seven-up bottling company in Benin City?
2. What are the predisposing factors linked to occupational hazards in Seven-up bottling company?
3. What is the level of adherence to safety practices among workers, in Seven-up bottling company and what factors influence these practices?
4. What is the prevalence of occupational injuries and ergonomic morbidity among workers in Seven-up bottling company?

1.5 AIM AND OBJECTIVES

1.5.1 GENERAL AIM

To investigate occupational hazards and safety practices among workers in Seven-up bottling company with a view to guide targeted prevention and occupational health promotion aimed at reducing workplace risks among workers.

1.5.2 SPECIFIC OBJECTIVES

1. To identify common occupational health hazards in Seven-up bottling company, Benin City, Edo State.
2. To identify the predisposing factors associated with the occupational health hazards in Seven-up bottling company, Benin City, Edo State.
3. To assess the practice of safety measures in Seven-up bottling company, Benin City, Edo State.

CHAPTER TWO

LITERATURE REVIEW

Occupational health hazards remain a significant concern in industrial settings globally, with workers in bottling companies facing multiple risks including physical, chemical, ergonomic, and psychosocial hazards that can lead to injuries, illnesses, and reduced productivity. The bottling industry, characterized by high-volume production, automated machinery, chemical handling, and continuous operations, presents a complex occupational health environment requiring comprehensive safety measures and worker adherence to protective practices. Understanding the common hazards, predisposing factors, and safety practices in this sector is essential for developing effective interventions to protect worker health and well-being.

2.1 COMMON OCCUPATIONAL HEALTH HAZARDS IN BOTTLING COMPANIES

A descriptive cross-sectional pilot study conducted in 2018 assessed the respiratory health status of workers at a bottling factory in Benin City, Nigeria involving 18 workers on routine mandatory annual lung screening and 20 healthy male security personnel as controls. Respiratory symptoms and spirometric parameters were assessed using the modified Medical Research Council (MRC) questionnaire and spirometer respectively, according to European Respiratory Society and American Thoracic Society (ERS/ATS) guidelines. Workers in the production department were categorized into exposed or non-exposed based on their contact with caustic and syrup concentrate fumes. The study identified various physical and chemical hazards in the bottling environment. The findings revealed that nine (50.0%) of the 18 exposed workers reported at least one respiratory symptom compared with two (10.0%) of the 20 controls. Specific respiratory symptoms among exposed workers included cough in four (22.2%), sputum production in one (5.6%), breathlessness in two (11.1%), and wheeze in eight (44.4%). These results demonstrated significantly higher respiratory morbidity among bottling factory workers, highlighting the occupational health hazards associated with exposure to chemical fumes in the bottling industry.[12]

A qualitative cross-sectional study was carried out in 2022 among 26 workers in the brewing and

bottling industry in Southwestern Nigeria to determine occupational hazards, injuries, and illnesses. The study used in-depth interviewing with experienced employees in the industry, and thematic content analysis was employed for qualitative data collected. Four major themes were explored: frequency and likelihood of hazard, severity of effects, category in terms of being chronic or acute, and hazard class. Data analysis revealed that certain physical, chemical, ergonomic, and psychosocial high-severity hazards are prevalent in the sector. The most severe hazards identified included falls from height or stairs (10%), high noise levels (7%), collision with forklifts or trucks (5%), carbon dioxide leakage (5%), machine entrapment (5%), fire outbreaks (4%), collapse of stacked items (3%), electrocution (3%), exposure to carcinogenic substances and corrosives (3%), grain dust explosion (1%), and drowning (2%). Moderate severity hazards included bottle explosion (13%), musculoskeletal disorders from manual handling (8%), slips and trips (8%), occupational stress (3%), falling objects (2%), hot surfaces (4%), and insect stings at processing areas (1%). These findings underscore the wide range of occupational health hazards present in Nigeria's brewing and bottling industry, necessitating comprehensive safety management systems to protect worker health.[7]

A cross-sectional study conducted in 2020 investigated noise exposure and hearing loss among 458 brewery employees in Lagos, Nigeria through pure-tone audiometry and personal noise dosimetry. The study found that 59 workers (12.9%) had noise-induced hearing loss (NIHL), with the bottling department recording the highest prevalence of 16.7%, followed by sales at 12.9%. The average noise dose increase per hour in the packaging department was 75.5 dB with a statistically significant increase at packaging areas ($p=0.007$) and filling areas ($p=0.024$). Statistical analysis demonstrated significant associations between noise exposure levels and hearing threshold shifts at 4 kHz frequency ($p=0.007$) and 6 kHz frequency ($p=0.024$). The study concluded that brewery workers, particularly those in bottling and packaging operations, face significant noise-related occupational health hazards requiring urgent implementation of hearing conservation programs and regular audiometric surveillance.[13]

A descriptive cross-sectional study carried out in 2022 examined occupational health hazards among 84 workers at Delta Beverages bottling plant in Zimbabwe using structured questionnaires and workplace inspections. The study categorized hazards into physical, chemical, and ergonomic types, with data analyzed using both descriptive and inferential statistics. Findings revealed that 61.4% of workers identified physical hazards as the most prevalent risk factor, chemical hazards accounted for 14.3%, ergonomic hazards for 22.9% and environmental hazards for 1.4%. Noise measurements in various sections exceeded safe limits with readings above 83 dB in production areas. The most frequently reported health symptoms included hearing difficulties, back pain, and respiratory problems. The study highlighted that despite the presence of personal protective equipment, inconsistent use and inadequate hazard awareness contributed to ongoing occupational health risks, emphasizing the need for enhanced safety training and stricter enforcement of safety protocols in the African beverage bottling industry.[14]

A cross-sectional descriptive study conducted in 2021 assessed occupational noise exposure and audiological consequences among 129 workers on the bottling line at SOBRAGUI brewery in Conakry, Guinea. Clinical examinations, pure-tone audiometry, and noise level measurements were performed to evaluate hearing function and workplace noise hazards. Results showed that 82 (63.8%) of workers reported tinnitus, 73 (56.9%) had hypoacusis (hearing loss), and 68 (52.6%) experienced auditory fatigue. Audiometric testing revealed mild hearing loss in 111 (86.2%) of affected workers, while 18 (13.8%) demonstrated moderate to severe hearing loss. Noise level measurements documented exposure ranging from 85 to 95 dB(A), exceeding the recommended occupational exposure limits of 85 dB(A) for 8-hour work shifts. The study concluded that prolonged exposure to excessive noise in the bottling industry poses significant risks to workers' auditory health, necessitating immediate implementation of noise reduction strategies, mandatory hearing protection use, and regular audiometric monitoring programs.[15]

A cross-sectional study performed in 2016 evaluated noise hazards at a soft drink carbon dioxide (CO2) production plant in Yazd, Iran involving noise measurements across different operational

sections using calibrated sound level meters according to ISO 9612:2009 standards. Sound pressure levels (SPL) were measured at various workstations during normal production activities to assess worker exposure to occupational noise hazards. The findings documented SPL ranging from 88 to 99 dBA across the facility, with the highest noise levels recorded in the compressor room at 98-99 dBA, followed by the filling section at 88-92 dBA and packaging area at 88-90 dBA. All measured values exceeded the permissible exposure limit of 85 dBA for 8-hour time-weighted average exposure. The study emphasized that workers in carbonated beverage production facilities face substantial noise-induced hearing loss risks, recommending implementation of engineering controls, administrative measures, and mandatory hearing protection programs to mitigate occupational noise hazards in the international soft drink bottling industry.[16]

2.2 PREDISPOSING FACTORS TO OCCUPATIONAL HEALTH HAZARDS IN BOTTLING COMPANIES

A cross-sectional study conducted in 2019 assessed occupational hazards and safety practices among 134 workers in food and beverage industries across South-South Nigeria using structured questionnaires analyzed with Proportional Importance Index (PII) and statistical tests. The study identified major workplace hazards and examined demographic factors associated with hazard exposure and awareness. Results revealed that 91% of respondents identified working at height (PII=3.3) as a major hazard, while 90% reported high voltage areas (PII=3.1), 80% identified loud noise (PII=3.0), and 69% indicated machines and equipment vibration (PII=2.8) as significant occupational risks. Analysis demonstrated that the level of awareness regarding safety hazards among workers was statistically significant ($p<0.05$, 95% CI=3.1-3.6). The study concluded that male gender predominance (91% of the workforce) and specific workplace hazards, including working at height, high voltage exposure, noise, and vibration, were significantly associated with occupational health risks in the food and beverage sector, highlighting the need for targeted safety interventions.[8]

A descriptive cross-sectional study carried out in 2020 among 434 beverage industry workers in Enugu State, Nigeria investigated knowledge, practice, and barriers to occupational safety measures using interviewer-administered questionnaires with data analyzed through descriptive and analytical statistics. The study assessed workers' understanding of occupational hazards, adherence to safety protocols, and factors influencing safety compliance. Findings revealed that 66.7% of workers demonstrated good knowledge of occupational safety practices, while 57.6% showed good adoption of safety measures; however, 10.4% exhibited poor adherence to recommended safety protocols. The study identified a significant knowledge-practice gap, where despite adequate theoretical understanding, practical implementation remained suboptimal. Educational level, work experience, and departmental assignment were identified as key factors affecting safety knowledge and practice, though specific statistical associations were not quantified. The research emphasized the need for continuous safety training, supervisory reinforcement, and organizational commitment to bridge the gap between safety knowledge and actual workplace practices in the beverage manufacturing industry.[5]

A community-based cross-sectional survey conducted in 2024 examined the prevalence and associated factors of occupational injuries among 459 workers in the Tema industrial enclave in Ghana from December 2020 to February 2021, using two-stage sampling and multivariate logistic regression analysis. The study collected data on socio-demographic characteristics, occupational health and safety practices, and injury experiences to identify risk factors for workplace injuries. Results showed that 64.7% of workers experienced occupational injuries in the preceding twelve months, with injury mechanisms primarily involving working tools (45.8%) and hot surfaces, substances, or chemicals (14.1%). Multivariate analysis identified several significant predictors: being casual staff (adjusted odds ratio [AOR]=2.26, 95% confidence interval [CI]=1.04-4.92, $p<0.05$), working at Port and Harbour (AOR=3.77, 95% CI=1.70-8.39, $p<0.05$), absence of health and safety training (AOR=2.18, 95% CI=1.08-4.39, $p<0.05$), and dissatisfaction with health and safety measures (AOR=4.31, 95% CI=2.12-8.78, $p<0.05$). Tertiary education demonstrated a

protective effect (AOR=0.03, 95% CI=0.01-0.10, p<0.05). The study concluded that employment status, workplace location, inadequate safety training, and poor safety satisfaction significantly predispose industrial workers to occupational injuries.[17]

A retrospective mixed-methods study using workers' compensation data from 2013 to 2018 in craft breweries in Colorado, USA assessed occupational injuries among brewery workers was conducted in 2021. The study population comprised all brewery workers who filed injury claims during this period, with a total of 570 claims analyzed. Qualitative insights were also obtained through informal interviews with subject matter experts to better understand the circumstances of injuries. The study found that contusions (27%), strains (19%), and lacerations (19%) were the most common types of injuries, with contusions mainly associated with product handling and packaging activities, lacerations linked to cleaning and maintenance tasks, and strains occurring during handling, packaging, and production work. Over 60% of injured workers had less than two years of employment at the time of injury, indicating that short job tenure was a major predisposing host factor. Most injuries occurred in the packaging hall (80%), followed by the brewery area (~32%) and the kitchen, where lacerations accounted for 36% and burns for 29% of claims in that environment. The study highlighted agent-related predisposing factors such as awkward postures, repetitive motions, heavy lifting, sharp edges, and hot surfaces, while environmental factors included crowded production areas and hazardous workplace layouts. Overall, the findings underscore that both worker characteristics and workplace conditions significantly predispose craft brewery employees to occupational injuries. The study emphasizes the need for targeted safety training, improved workplace ergonomics, and enhanced supervision to mitigate risks in brewery operations.[18]

2.3 PRACTICE OF SAFETY MEASURES IN BOTTLING COMPANIES

A 2014 cross-sectional analytical study published in the Journal of Applied and Basic Sciences assessed safety practices among factory workers in beverage industries in Benin City, Edo State. The study aimed to determine the prevalence of occupational injuries and evaluate workplace

safety practices in one bottling and one brewing company. The study population comprised workers who had been employed for at least six months, with a total of 349 respondents recruited (201 from the bottling company and 148 from the brewing company), exceeding the calculated minimum sample size of 256. Data were collected using a pretested structured interviewer-administered questionnaire alongside an observational checklist, and analysis was conducted using SPSS with statistical significance set at $p < 0.05$. Findings showed that 72.5% of respondents had good safety practices however the proportion of workers with good safety practice was higher in the bottling industry 91.0% compared to the brewery industry 47.3%. Age ≥ 35 years ($p=0.021$), being married ($p=0.021$), and being employed for > 5 years ($p < 0.001$) were significantly associated with good safety practices. [19]

A descriptive cross-sectional study carried out in 2020 among 434 beverage industry workers in Enugu State, Nigeria examined the practice of occupational safety measures and barriers to implementation using structured questionnaires analyzed through descriptive statistics. The study documented workers' actual utilization of safety devices, frequency of use, injury experiences, and incident reporting behaviors. Results showed that 97.4% of respondents reported using safety devices; however, only 67.3% indicated daily consistent use of these protective measures. Despite the reported use of safety equipment, 79% of workers experienced occupational injuries during their employment, with 54.5% reporting these incidents to management. The study revealed a significant gap between awareness of safety measures and consistent practical application, with intermittent rather than routine PPE use being common. Barriers to consistent safety practice included perceived inconvenience, lack of supervisory enforcement, and inadequate refresher training programs. The findings emphasized that mere availability of safety equipment is insufficient without continuous monitoring, enforcement, and a robust safety culture to ensure sustained adherence to protective practices in the beverage manufacturing sector.[5]

A facility-based cross-sectional study conducted in 2023 assessed occupational safety practices among 415 workers at Dashen Brewery Share Company in Gondar, Ethiopia using structured

interviewer-administered questionnaires with data analyzed through descriptive and analytical statistics including binary and multivariable logistic regression. The study evaluated the prevalence of good safety practices, PPE utilization patterns, and factors associated with adherence to occupational safety measures. Findings demonstrated that 87.2% of workers exhibited good occupational safety practices overall. Specific PPE utilization rates included safety shoes at 84.1%, safety vests at 83.9%, safety goggles at 78.1%, and earplugs at 72%. The study identified that regular safety training, availability of adequate PPE, and strong supervisory support were significantly associated with good safety practices. Workers in production and bottling departments showed higher compliance rates compared to those in administrative sections. The research concluded that sustained management commitment, continuous safety education, adequate PPE provision, and consistent monitoring are essential elements for maintaining high levels of occupational safety practice in the African brewery and bottling industry.[20]

A cross-sectional study performed in 2022 examined the relationship between environmental hazards, organizational commitment, and safety practices among 125 workers at a Pepsi bottling plant in Cyprus using standardized questionnaires analyzed through correlation and regression analyses. The study investigated how workers' perception of environmental hazards and organizational commitment to safety influenced their adoption of hazard mitigation strategies and PPE usage. Statistical analysis revealed a positive correlation between perception of environmental hazards and PPE use ($r=0.097$, $p>0.05$, not statistically significant), while organizational commitment to safety demonstrated a statistically significant positive correlation with hazard mitigation practices ($r=0.006$, $p<0.05$). The study found that workers who perceived higher levels of environmental hazards and worked in organizations with stronger safety commitments were more likely to engage in proactive safety behaviors. Regression analysis indicated that organizational factors, particularly management's visible commitment to safety through policy implementation and resource allocation, were stronger predictors of safety practice adoption than individual risk perception alone. The research concluded that fostering organizational safety

culture and demonstrating tangible management commitment are critical strategies for enhancing safety measure compliance in the international beverage bottling industry.[21]

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

The study was undertaken in Seven-up bottling company, Benin City, Edo State. Benin City is the capital of Edo State, Nigeria, located in the South–South geopolitical zone. The city lies approximately 322 km south of Lagos and about 700 km south of Abuja, the Federal Capital Territory of Nigeria.[12] Benin City is geographically situated between latitude 6°16′N to 6°33′N of the Equator and longitude 5°31′E to 5°45′E of the Greenwich Meridian. The metropolis originally encompassed three local government areas, namely Oredo, Egor, and Ikpoba-Okha. However, due to rapid urban expansion, the metropolitan area now includes two additional local government areas: Ovia North-East and Uhunmwonde. Overall, the city has an estimated territorial coverage of approximately 1,318 kilometer square.[22]

Seven-Up Bottling Company (SBC) plant is located at KM 13 Benin–Lagos Express Road, Iguosa, in Ovia North-East Local Government Area of Edo State. SBC is a licensed bottler of beverages produced by PepsiCo. The company is one of the major beverage manufacturing companies in Nigeria and was founded by the El-Khalil family in 1959. The Benin City plant is one of the nine major manufacturing facilities of the company in Nigeria. The company manufactures and distributes a variety of non-alcoholic beverages including Pepsi, 7Up, Mirinda, Mountain Dew, Teem, and Aquafina bottled water.[23] The Benin plant primarily produces returnable glass bottles of Pepsi, 7Up, and Mirinda. It also contains important operational units such as the Water Treatment Plant, Effluent Treatment Plant, CO_2 Storage Room, Boiler Room, and Cleaning-In-Place (CIP) system, which are essential for maintaining production hygiene and quality control. SBC, Benin City has a total staff strength of about 400 workers distributed across several departments including production (174), marketing (62), manufacturing (58), quality control (49), inventory (37), and administration (20). The workforce comprises both skilled and unskilled workers with

varying educational backgrounds, and the company operates a 24-hour industrial clinic staffed by full-time nurses and part-time physicians.

3.2 STUDY DESIGN

A descriptive cross-sectional study design was adopted for this study.

3.3 STUDY POPULATION

The study was carried out amongst workers in the Seven Up Bottling Company in Benin City, Edo State.

3.4 SELECTION CRITERIA

3.4.1 INCLUSION CRITERIA

1. Workers directly involved in the operational and production departments of the bottling plants (production, marketing, manufacturing, quality control and inventory)

3.5 SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using the Cochran formula for descriptive cross-sectional studies[25]:

$$n = \frac{z^2 pq}{d^2}$$

Where:

n = Minimum sample size

z = Standard normal deviate set at 1.96 (95% confidence interval)

p = Prevalence rate of a particular characteristic of the target population.

q = The complementary probability (1 – p); 1 – 0.79 = 0.21

d = Desired level of precision (0.05)

For this study, a p-value of 79.0% (0.79) will be used, which is based on a previous cross-sectional study of two breweries in Enugu which accessed compliance with health safety measures among beverage workers and reported a prevalence of respondents who had experienced workplace injuries of 79.0%[5].

Calculation:

$$\mathrm{n} = \frac{1.96^2 \times 0.79 \times 0.21}{0.05^2} = \frac{0.63732144}{0.0025} = 254.928576 \approx 255$$

Adjustment for non-response rate of 10% (nr = 0.1):

$$\mathrm{n}_{adj} = \frac{n}{1 - n_r}$$

n = Minimum sample size = 255

n_r = Non-response rate = 10% = 0.10

n_{adj} = Adjusted sample size

$$n_{adj} = \frac{255}{1 - 0.10} = \frac{255}{0.9} = 283$$

n_{adj} = 283

Therefore, the adjusted sample size is 283 respondents.

3.6 SAMPLING TECHNIQUE

A systematic sampling technique was conducted within each department to recruit the specific workers. A sampling frame (such as the staff nominal roll) was obtained from the Human Resources department of each facility. The number of respondents to be recruited from each department was based on the proportional allocation.

$$n_\sigma = \frac{\text{Number of staff in unit}}{\text{Total number of eligible staff in facility}} \times \text{Estimated sample size for the facility}$$

Where n_σ = estimated sample size per strata.

3.7 DATA MANAGEMENT

3.7.1 DATA COLLECTION

Data was collected using a pre-tested, structured, interviewer-administered questionnaire adapted from previous studies[8,10,26,27]. The instrument, consisting of both open- and close-ended questions, was administered via questionnaire.

The questionnaire is divided into five (5) sections as follows:

Section A: Socio-demographic and Job-Related Characteristics; Age, gender, marital status,

highest level of completed formal education, employment status, department, duration of continuous employment, shift pattern, monthly income and average daily working hours.

Section B: Occupational Health Hazards Experienced; Exposure to physical, chemical, mechanical, ergonomic, and psychosocial hazards was assessed using an 11-item, 5-point Likert scale (1 = Never, 5 = Frequently) to determine the frequency of exposure to specific conditions such as high ambient noise, hazardous chemicals, unguided heavy machinery, and extreme thermal conditions.

Section C: Predisposing Factors to Occupational Health Hazards; Evaluated using a 7-item, 4-point Likert scale (1 = Strongly Disagree, 4 = Strongly Agree) to assess the organizational and systemic vulnerabilities that predispose workers to hazard exposure. This section quantitatively measures management's commitment to safety and the factory's safety climate. It assesses factors such as the provision of operating safety manuals, the promptness of repairing damaged equipment, management's responsiveness to reported hazards, and the psychological pressure placed on workers to break safety rules to meet production targets.

Section D: Practice of Safety Measures and PPE Compliance; Was evaluated using a series of questions assessing the provision of formal safety training, the frequency of refresher training, and the company's provision of Personal Protective Equipment (PPE). Compliance was assessed by asking respondents to identify strictly required PPE for their roles and how frequently they actually wear them (graded from Always to Never). Additionally, the primary barriers to consistent PPE use (e.g., heat stress, restriction of movement, or management enforcement) was evaluated.

Practice of occupational safety by respondents was determined by their response to three key questions that bordered on safety training and the consistent use of PPE which included the receipt of formal occupational safety training before commencing work, the frequency of safety refresher training and emergency drills and the frequency of wearing all required PPE during shift work. Numerical weights were assigned to the responses, with appropriate behaviors (such as "Always" wearing PPE or receiving training) receiving higher points. The least possible score was 0, and the

highest possible score was 4. A score of 0 to 2 was graded as poor practice, while a cumulative score of 3 to 4 was graded as good practice.

Section E: Prevalence of Occupational Injuries and Ergonomic Morbidity; Occupational injuries was assessed with a dichotomous (yes/no) question asking if the respondent had sustained any work-related injury within the last 12 months, followed by multiple-choice questions detailing the primary nature of the injury and official reporting practices. Ergonomic morbidity and musculoskeletal discomfort was evaluated assessing the presence of pain or ache in specific anatomical areas (neck, shoulders, elbows, wrists/hands, back, and lower limbs) and whether the discomfort prevented normal work duties.

3.7.2 PRETESTING

The questionnaire was pre-tested at Uniben water factory, University of Ekehuan Campus, Ogogugbo, Benin City to ensure its comprehensibility, sensitivity, validity and reliability, using 10% of the minimum sample size of this study.

3.7.4 DATA ANALYSIS

The collated data was compiled, cleaned, and checked for completeness before being sequentially entered into IBM SPSS version 26.0 software for analysis.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, was used to summarize the socio-demographic characteristics of the respondents and to map the absolute prevalence of specific hazards and occupational injuries. Furthermore, mean scores was calculated to objectively quantify the organizational safety culture.

Inferential statistics was applied to identify predisposing factors and test associations. Bivariate analysis using the Chi-square test was employed to test rudimentary associations between categorical variables, such as determining if PPE compliance differs significantly between permanent staff and casual workers, or if the prevalence of injuries varies across different operational departments. Additionally, multivariate binary logistic regression analysis was applied to identify the risk factors associated with occupational injuries. The level of statistical

significance was set at $p < 0.05$.

3.7.5 DATA PRESENTATION

Results obtained was presented using frequency distribution tables, contingency tables, charts and prose.

3.8 ETHICAL CONSIDERATIONS

Ethical approval for this study was obtained from the Health Research Ethics Committee (ADM/E22/A/VOL.VII/14865491272123) of the University of Benin Teaching Hospital. In addition, institutional permission was sought from the management of Seven Up Bottling Company. All participants provided informed consent with their participation remaining voluntary. Confidentiality and anonymity were strictly maintained throughout the research process.

3.9 STUDY LIMITATION

1. Data collection was influenced by institutional administrative protocols and the time-sensitive nature of production schedules at the study site, which impacted the pace and volume of respondent recruitment.

CHAPTER FOUR

RESULTS

A total of one hundred and five (105) respondents participated in this study with all questionnaires retrieved giving a response rate of 100%. The results are presented as follows:

Section A: Socio-demographic characteristics

Section B: Occupational hazard exposure

Section C: Predisposing factors to occupational health hazards

Section D: Safety training and PPE use

Section E: Work-Related Injuries and Ergonomic Morbidity

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (n=105)	Percent
Age (years)		
20 – 29	45	42.9
30 – 39	41	39.0
40 – 49	14	13.3
≥ 50	5	4.8
Mean ± SD = 32.7 ± 8.1		
Sex		
Male	71	67.6
Female	34	32.4
Marital status		
Single	54	51.4
Married	41	39.0
Divorced/Separated	6	5.7
Widowed	4	3.8
Ethnic group		
Benin	34	32.4
Esan	23	21.9
Etsako	12	11.4
Igbo	11	10.5
Yoruba	10	9.5
Urhobo	9	8.6
Others*	6	5.8
Education level		
No Formal Education	2	1.9
Primary	7	6.7
Secondary	35	33.3
Tertiary	61	58.1
Employment status		
Permanent/Full-time staff	64	61.0
Contract/Casual	29	27.6
Temporary/Trainee	12	11.4
Department/Unit		
Production	38	36.2
Manufacturing	24	22.9
Marketing	22	21.0
Inventory	14	13.3
Quality Control	7	6.6
Shift pattern		
Rotating Shifts (Alternating Day and Night)	52	49.5
Morning Shift only	34	32.4
Afternoon Shift only	15	14.3
Evening Shift only	4	3.8
Years of service		
1 – 2	32	30.5
3 – 5	48	45.7
> 5	25	23.8
Mean ± SD = 4.6 ± 4.0		
Daily working hours		
1 – 7	21	20.0
8	54	51.4
> 8	30	28.6
Mean ± SD = 8.2 ± 1.6		

*Others – Ibibio, Igala, Ijaw, Itsekiri, Hausa

The largest proportion of participants fell within the 20 – 29 year age group, accounting for 45 (42.9%) of the sample, followed by those aged 30 – 39 years at 41 (39.0%). The participants aged 40 – 49 years and those aged 50 years and above constituted 14 (13.3%) and 5 (4.8%) of the population, respectively. The mean age of the respondents was 32.7 ± 8.1 years. In terms of sex distribution, there was a male preponderance, with 71 (67.6%) males compared to 34 (32.4%) females. Regarding marital status, more than half of the respondents, 54 (51.4%), were single, while 41 (39.0%) were married. A smaller segment of the sample consisted of individuals who were divorced or separated, 6 (5.7%), or widowed, 4 (3.8%). The ethnic distribution revealed that the Benin group was the most represented at 34 (32.4%), followed by the Esan at 23 (21.9%) and the Etsako at 12 (11.4%). Other represented ethnic groups included the Igbo at 11 (10.5%), Yoruba at 10 (9.5%), Urhobo at 9 (8.6%), with 6 (5.8%) belonging to other ethnic groups. Academically, a majority of the respondents had attained a tertiary level of education, 61 (58.1%), while 35 (33.3%) had secondary education. Those with primary education and no formal education accounted for 7 (6.7%) and 2 (1.9%) of the sample, respectively. Regarding employment details, 64 (61.0%) of the participants were permanent or full-time staff, while 29 (27.6%) were contract or casual workers, and 12 (11.4%) were temporary staff or trainees. Distribution by department showed that the highest number of workers were in Production, 38 (36.2%), followed by Manufacturing, 24 (22.9%), Marketing, 22 (21.0%), and Inventory, 14 (13.3%), with the fewest in Quality Control at 7 (6.7%). Nearly half of the respondents, 52 (49.5%), worked rotating shifts, while 34 (32.4%) worked morning shifts only, 15 (14.3%) worked afternoon shifts, and 4 (3.8%) worked evening shifts. The mean duration of service for the respondents was 4.6 ± 4.0 years, with 48 (45.7%) having served for 3–5 years, 32 (30.5%) for 1–2 years, and 25 (23.8%) for more than 5 years. Finally, the respondents worked a mean of 8.2 ± 1.6 hours daily. Just over half of the participants, 54 (51.4%), worked 8 hours daily, while 30 (28.6%) worked more than 8 hours, and 21 (20.0%) worked between 1 and 7 hours per day.

Table 2: Occupational hazard exposure among respondents

Variables	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Constantly n (%)
Noise Exposure	38 (36.2)	24 (22.9)	26 (24.8)	8 (7.6)	9 (8.6)
Chemical Exposure	64 (61.0)	27 (25.7)	7 (6.7)	6 (5.7)	1 (1.0)
Irritating Fumes, vapours or gases	55 (52.4)	28 (26.7)	10 (9.5)	9 (8.6)	3 (2.9)
Heavy, high-speed moving machinery that lacks adequate physical safety guards	27 (25.7)	14 (13.3)	27 (25.7)	26 (24.8)	11 (10.5)
Glass bottle explosion	34 (32.4)	25 (23.8)	16 (15.2)	22 (21.0)	8 (7.6)
Slippery/wet/uneven floor surfaces	34 (32.4)	23 (21.9)	20 (19.0)	17 (16.2)	11 (10.5)
Temperature Extremes	46 (43.8)	18 (17.1)	16 (15.2)	17 (16.2)	8 (7.6)
Heavy Lifting	40 (38.1)	27 (25.7)	11 (10.5)	18 (17.1)	9 (8.6)
Highly Repetitive Movements	31 (29.5)	13 (12.4)	22 (21.0)	27 (25.7)	12 (11.4)
Awkward Posture	18 (17.1)	22 (21.0)	29 (27.6)	29 (27.6)	7 (6.7)
Psychological Stress	9 (8.6)	25 (23.8)	34 (32.4)	27 (25.7)	10 (9.5)

Regarding noise exposure, 38 (36.2%) respondents reported never being exposed, while 26 (24.8%) were exposed sometimes and 9 (8.6%) were exposed constantly. Exposure to heavy, high-speed moving machinery lacking adequate safety guards was reported as constant by 11 (10.5%) respondents and frequent ("often") by 26 (24.8%) participants. For hazards involving glass bottle explosions, 34 (32.4%) respondents never experienced them, whereas 22 (21.0%) reported frequent exposure and 8 (7.6%) reported constant exposure. Slippery, wet, or uneven floor surfaces were never a factor for 34 (32.4%) workers, although 11 (10.5%) indicated constant exposure to this risk. Additionally, 46 (43.8%) respondents reported never being exposed to temperature extremes, while 17 (16.2%) experienced them often. Chemical-related hazards were reported less frequently within the study population. A significant majority, 64 (61.0%), reported never being exposed to chemicals, with only 1 (1.0%) worker reporting constant exposure. Similarly, 55 (52.4%) respondents never experienced irritating fumes, vapours, or gases, while 28 (26.7%) experienced them rarely and 3 (2.9%) reported constant exposure. Ergonomic and psychological hazards were more prevalent among the workforce. Highly repetitive movements were reported as

occurring often by 27 (25.7%) respondents and constantly by 12 (11.4%). Regarding awkward postures, 29 (27.6%) respondents reported exposure sometimes and an equal number, 29 (27.6%), reported being exposed often, while 7 (6.7%) were exposed constantly. Exposure to heavy lifting was never a factor for 40 (38.1%) participants, but 18 (17.1%) and 9 (8.6%) reported experiencing it often and constantly, respectively. Finally, psychological stress was widely reported, with 34 (32.4%) experiencing it sometimes, 27 (25.7%) often, and 10 (9.5%) constantly; only 9 (8.6%) respondents reported never experiencing psychological stress.

Table 3: Predisposing factors to occupational health hazard

Variables	Strongly Disagree n (%)	Disagree n (%)	Agree n (%)	Strongly Agree n (%)
Management provides workers with operating safety manuals	6 (5.7)	2 (1.9)	66 (62.9)	31 (29.5)
The safety procedures, warnings, and instructions provided by the company are highly practical and easy to follow during a real shift	5 (4.8)	4 (3.8)	61 (58.1)	35 (33.3)
Management ensures that safety hazards discovered during inspections or reported by workers are addressed immediately	3 (2.9)	9 (8.6)	61 (58.1)	32 (30.5)
Usually follow safe work procedures while carrying out my duty	3 (2.9)	6 (5.7)	60 (57.1)	36 (34.3)
Sometimes feel pressured to break safety rules in order to complete my work on time	11 (10.5)	52 (49.5)	30 (28.6)	12 (11.4)
Workers here feel completely free to stop their work if they believe a situation is immediately dangerous to their health, without fear of being fired	8 (7.6)	19 (18.1)	57 (54.3)	21 (20.0)
Company usually carries out prompt repair of damaged equipment and electrical systems	5 (4.8)	12 (11.4)	60 (57.1)	28 (26.7)

A significant majority of the respondents affirmed that management provides operating safety manuals, with 66 (62.9%) agreeing and 31 (29.5%) strongly agreeing with this statement. In terms of the practicality of safety procedures, instructions, and warnings, 61 (58.1%) respondents agreed and 35 (33.3%) strongly agreed that they are easy to follow during a shift. Similarly, management's responsiveness to hazards was viewed positively, as 61 (58.1%) agreed and 32 (30.5%) strongly agreed that safety hazards are addressed immediately when discovered or reported. Personal adherence to safety protocols was high, with 60 (57.1%) workers agreeing and 36 (34.3%) strongly agreeing that they usually follow safe work procedures while carrying out their duties. When assessing work-related pressure, 52 (49.5%) respondents disagreed and 11 (10.5%) strongly disagreed with feeling pressured to break safety rules to complete work on time, although a combined 42 (40.0%) either agreed or strongly agreed that such pressure exists. Regarding workers' autonomy in dangerous situations, 57 (54.3%) respondents agreed and 21 (20.0%) strongly agreed that they feel free to stop work if a situation is immediately dangerous to

their health without fear of being fired, while 19 (18.1%) disagreed with this sentiment. Finally, the company's commitment to maintenance was noted, with 60 (57.1%) respondents agreeing and 28 (26.7%) strongly agreeing that damaged equipment and electrical systems are repaired promptly.

Table 4: Safety training and PPE use among respondents

Variables	Frequency (n=105)	Percent
Received formal, comprehensive occupational safety training before commencing work		
Yes	91	86.7
No	14	13.3
Management conduction of safety refresher training frequency		
Monthly	37	35.2
Annually	30	28.6
Weekly	24	22.9
Rarely/Never	14	13.3
The company provides all necessary PPE entirely free of charge		
Yes	69	65.7
Partially	23	21.9
No	13	12.4
PPEs strictly required to wear*		
Safety Goggles/Face Shield	53	50.5
Coveralls/Chemical Aprons	53	50.5
Ear Muffs/Ear Plugs	50	47.6
Safety Helmet (Hard Hat)	48	45.7
Hand Gloves (Chemical or Cut-resistant)	46	43.8
Safety Boots (Steel-toed, Anti-slip)	45	42.9
Respirator/Dust Mask	22	21.0
How frequently all required PPE is worn during shift work		
Always	45	42.9
Often	34	32.4
Sometimes	17	16.2
Rarely	5	4.8
Never	4	3.8
Primary reason for not using PPE consistently (n=60)		
Heat/Discomfort	23	38.3
Restricts movement, vision, or ability to communicate	10	16.7
Slows work and affects production quota	10	16.7
No enforcement	10	16.7
Not provided/worn out/damaged	7	11.7

*Multiple response question

A substantial majority of the workforce, 91 (86.7%), reported receiving formal and comprehensive occupational safety training before commencing their work, while 14 (13.3%) did not. Regarding the frequency of safety refresher training, 37 (35.2%) respondents indicated these occur monthly, 30 (28.6%) noted they happen annually, and 24 (22.9%) reported weekly sessions; however, 14 (13.3%) indicated such training is rarely or never conducted. In terms of resource provision, 69

(65.7%) workers affirmed that the company provides all necessary PPE entirely free of charge, though 23 (21.9%) received only partial provision and 13 (12.4%) reported that it was not provided for free. The PPE items most strictly required for job roles included safety goggles or face shields and coveralls or chemical aprons, both cited by 53 (50.5%) respondents. Other required equipment included ear muffs or ear plugs for 50 (47.6%) respondents, safety helmets for 48 (45.7%), and hand gloves for 46 (43.8%). Safety boots were required for 45 (42.9%) workers, while respirators or dust masks were required for 22 (21.0%). Despite these requirements, only 45 (42.9%) of the respondents reported always wearing all required PPE during shift work. The remaining participants reported wearing PPE often, 34 (32.4%), sometimes, 17 (16.2%), rarely, 5 (4.8%), or never, 4 (3.8%). Among the 60 participants who reported inconsistent PPE use, the primary reason cited was heat or discomfort, affecting 23 (38.3%) of this subgroup. Other significant barriers included PPE restricting movement, vision, or communication, 10 (16.7%), the perception that it slows work and affects production quotas, 10 (16.7%), and a lack of enforcement, 10 (16.7%). Finally, 7 (11.7%) respondents indicated that PPE was not provided, was worn out, or was damaged.

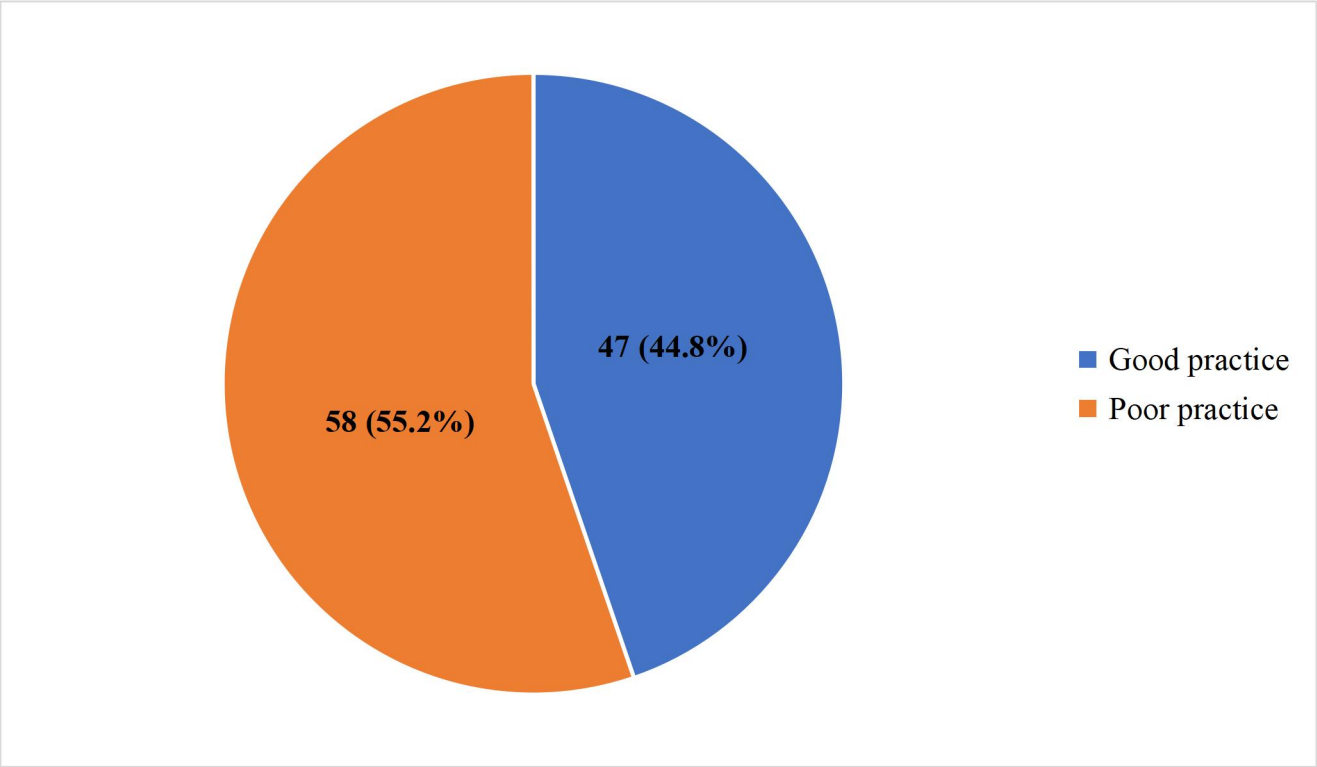

Figure 1: Safety practice among respondents

The overall distribution of safety practice levels among the 105 study participants is illustrated in the figure. A majority of the respondents 58 (55.2%) were found to have poor safety practice, while 47 (44.8%) demonstrated good safety practice.

Table 5: Sociodemographic characteristics and safety practice among respondents

Variables	Safety Practice		Chi-Square	p-value
	Poor Practice n (%)	Good Practice n (%)		
Age (years)				
20 – 29	24 (53.3)	21 (46.7)	4.998**	0.177
30 – 39	23 (56.1)	18 (43.9)		
40 – 49	6 (42.9)	8 (57.1)		
≥ 50	5 (100.0)	0 (0.0)		
Sex				
Male	40 (56.3)	31 (43.7)	0.107	0.743
Female	18 (52.9)	16 (47.1)		
Marital Status				
Single	31 (57.4)	23 (42.6)	4.974**	0.177
Married	19 (46.3)	22 (53.7)		
Divorced/Separated	4 (66.7)	2 (33.3)		
Widowed	4 (100.0)	0 (0.0)		
Education Level				
No Formal Education	1 (50.0)	1 (50.0)	0.809**	0.869
Primary	3 (42.9)	4 (57.1)		
Secondary	21 (60.0)	14 (40.0)		
Tertiary	33 (54.1)	28 (45.9)		
Employment Status				
Permanent/Full-time	33 (51.6)	31 (48.4)	3.454	0.178
Contract/Casual	20 (69.0)	9 (31.0)		
Temporary/Trainee	5 (41.7)	7 (58.3)		
Department/Unit				
Production	21 (55.3)	17 (44.7)	25.956**	**<0.001***
Marketing	17 (77.3)	5 (22.7)		
Manufacturing	6 (25.0)	18 (75.0)		
Quality Control	1 (14.3)	6 (85.7)		
Inventory	13 (92.9)	1 (7.1)		
Years of Service				
1 – 2 years	19 (59.4)	13 (40.6)	0.421	0.810
3 – 5 years	25 (52.1)	23 (47.9)		
> 5 years	14 (56.0)	11 (44.0)		
Shift Pattern				
Morning Shift only	19 (55.9)	15 (44.1)	2.173**	0.551
Afternoon Shift only	6 (40.0)	9 (60.0)		
Evening Shift only	3 (75.0)	1 (25.0)		
Rotating Shifts (Day and Night)	30 (57.7)	22 (42.3)		
Daily Working Hours				
1 – 7 hours	12 (57.1)	9 (42.9)	4.151	0.125
8 hours	34 (63.0)	20 (37.0)		
> 8 hours	12 (40.0)	18 (60.0)		

*** Statistically significant ** Fisher's Exact Test**

The department/unit of the respondent was the only variable found to have a statistically significant association with the level of safety practice ($p < 0.001$). Quality Control workers had the highest proportion of good safety practice at 6 (85.7%), followed by those in Manufacturing at 18 (75.0%) and Production at 17 (44.7%). Conversely, the majority of respondents in the Marketing and Inventory departments demonstrated poor safety practice, with 17 (77.3%) and 13

(92.9%) respectively. Regarding age, those in the 40–49 year group had the highest percentage of good safety practice at 8 (57.1%), while all 5 (100.0%) respondents in the ≥ 50 age category had poor safety practice ($p = 0.177$). In terms of sex, 31 (43.7%) males and 16 (47.1%) females demonstrated good safety practice ($p = 0.743$). The distribution by marital status showed that married respondents had the highest frequency of good safety practice at 22 (53.7%), whereas all 4 (100.0%) widowed respondents were graded as having poor practice ($p = 0.177$). Education level did not significantly influence safety practice ($p = 0.869$), with those having primary education showing the highest proportion of good practice at 4 (57.1%), compared to 28 (45.9%) for those with tertiary education and 14 (40.0%) for secondary education. For employment status, 7 (58.3%) temporary staff or trainees and 31 (48.4%) permanent staff had good safety practice, while 20 (69.0%) contract or casual workers had poor practice ($p = 0.178$). No significant associations were observed for years of service ($p = 0.810$) or shift patterns ($p = 0.551$). However, within the shift patterns, those on the afternoon shift had the highest level of good safety practice at 9 (60.0%). Finally, respondents working more than 8 hours daily had a higher proportion of good safety practice at 18 (60.0%) compared to those working exactly 8 hours, 20 (37.0%), or between 1 and 7 hours, 9 (42.9%), although this relationship was not statistically significant.

Table 6: Work-Related Injuries and Ergonomic Morbidity

Variables	Frequency (n=105)	Percent
Sustained work-related injury in last 12 months		
Yes	42	40.0
No	63	60.0
Type of most severe injury (n = 42)		
Skin cut/laceration from broken glass/metal	13	31.0
Crush injury/entrapment in machine parts	9	21.4
Fracture/severe sprain from a slip, trip, or fall	7	16.7
Thermal burn (from hot water/steam/surfaces)	5	11.9
Road traffic accident (during distribution/logistics)	4	9.5
Chemical burn to skin	2	4.8
Eye injury (chemical splash or flying foreign body)	2	4.8
Officially reported injury (n = 42)		
Yes	33	78.6
No	9	21.4
Experienced tinnitus		
Yes	17	16.2
No	88	83.8
Experienced respiratory Symptoms		
Yes	7	6.7
No	98	93.3
Neck pain/ache	37	35.2
Neck Pain prevented normal work duties (n = 37)	8	21.6
Shoulder pain/ache	33	31.4
Shoulder pain prevented normal work duties (n = 33)	9	27.3
Elbow pain/ache	32	30.5
Elbow pain prevented normal work duties (n = 32)	3	9.4
Wrist/hand pain/ache	34	32.4
Wrist/hand pain prevented normal work duties (n = 34)	5	14.7
Upper back pain/ache	38	36.2
Upper back pain prevented normal work duties (n = 38)	5	13.2
Lower back pain/ache	48	45.7
Lower back pain prevented normal work duties (n = 48)	12	25.0
Knees/lower legs/ankles pain/ache	33	31.4
Knees/lower legs/ankles pain prevented normal work duties (n = 33)	9	27.3

It was observed that 42 (40.0%) of the respondents sustained a work-related injury, while 63 (60.0%) reported no such incidents. Among the 42 workers who sustained injuries, the most frequent severe injury was skin cuts or lacerations from broken glass or metal, reported by 13 (31.0%) individuals. This was followed by crush injuries or entrapment in machine parts in 9 (21.4%) cases and fractures or severe sprains from slips, trips, or falls in 7 (16.7%) cases. Other reported injuries included thermal burns in 5 (11.9%) respondents, road traffic accidents during distribution in 4 (9.5%), and chemical burns to the skin and eye injuries, each reported by 2 (4.8%)

workers. Of those injured, 33 (78.6%) officially reported the incident, while 9 (21.4%) did not. Regarding other health symptoms, 17 (16.2%) workers experienced tinnitus, and 7 (6.7%) reported respiratory symptoms. Ergonomic morbidity was widely prevalent across various anatomical sites, with lower back pain/ache being the most common complaint, reported by 48 (45.7%) of all respondents. Among those with lower back pain, 12 (25.0%) indicated that the pain was severe enough to prevent them from performing normal work duties. Upper back pain was reported by 38 (36.2%) respondents, with 5 (13.2%) of those affected experiencing a disruption in work duties. Neck pain/ache affected 37 (35.2%) workers, preventing normal work for 8 (21.6%) of them. Furthermore, wrist or hand pain was reported by 34 (32.4%) respondents, with 5 (14.7%) of those cases resulting in an inability to perform work. Shoulder pain and pain in the knees, lower legs, or ankles were each reported by 33 (31.4%) participants. Notably, 9 (27.3%) individuals in each of these two categories reported that the pain prevented them from carrying out their normal work duties. Finally, elbow pain/ache was reported by 32 (30.5%) respondents, though it only prevented work duties for 3 (9.4%) of those affected.

Table 7: Sociodemographic characteristics and work-related injury in the last 12 months among respondents

Variables	Work-Related Injury in Last 12 Months		Chi-Square	p-value
	Yes n (%)	No n (%)		
Age (years)				
20 – 29	15 (33.3)	30 (66.7)	9.965**	**0.016***
30 – 39	17 (41.5)	24 (58.5)		
40 – 49	10 (71.4)	4 (28.6)		
≥ 50	0 (0.0)	5 (100.0)		
Sex				
Male	31 (43.7)	40 (56.3)	1.225	0.268
Female	11 (32.4)	23 (67.6)		
Marital Status				
Single	16 (29.6)	38 (70.4)	5.885**	0.097
Married	22 (53.7)	19 (46.3)		
Divorced/Separated	2 (33.3)	4 (66.7)		
Widowed	2 (50.0)	2 (50.0)		
Education Level				
No Formal Education	1 (50.0)	1 (50.0)	0.594**	0.908
Primary	2 (28.6)	5 (71.4)		
Secondary	15 (42.9)	20 (57.1)		
Tertiary	24 (39.3)	37 (60.7)		
Employment Status				
Permanent/Full-time	28 (43.8)	36 (56.3)	0.965	0.617
Contract/Casual	10 (34.5)	19 (65.5)		
Temporary/Trainee	4 (33.3)	8 (66.7)		
Department/Unit				
Production	18 (47.4)	20 (52.6)	6.354**	0.167
Marketing	7 (31.8)	15 (68.2)		
Manufacturing	12 (50.0)	12 (50.0)		
Quality Control	3 (42.9)	4 (57.1)		
Inventory	2 (14.3)	12 (85.7)		
Years of Service				
1 – 2 years	8 (25.0)	24 (75.0)	5.722	0.057
3 – 5 years	20 (41.7)	28 (58.3)		
> 5 years	14 (56.0)	11 (44.0)		
Shift Pattern				
Morning Shift only	13 (38.2)	21 (61.8)	3.809**	0.287
Afternoon Shift only	5 (33.3)	10 (66.7)		
Evening Shift only	0 (0.0)	4 (100.0)		
Rotating Shifts (Day and Night)	24 (46.2)	28 (53.8)		
Daily Working Hours				
1 – 7 hours	8 (38.1)	13 (61.9)	1.803	0.406
8 hours	19 (35.2)	35 (64.8)		
> 8 hours	15 (50.0)	15 (50.0)		

*** Statistically significant ** Fisher's Exact Test**

Respondent age was the only variable found to be significantly associated with sustaining an injury ($p = 0.016$). The highest prevalence of injuries was observed in the respondents aged between 40 – 49 years, where 10 (71.4%) respondents reported an incident, followed by respondents between 30 – 39 years at 17 (41.5%) and 20 – 29 years at 15 (33.3%). In terms of sex distribution, 31 (43.7%)

males reported sustaining an injury compared to 11 (32.4%) females, though this difference was not statistically significant (p = 0.268). Marital status also did not reach statistical significance (p = 0.097), although married respondents had a higher frequency of injury at 22 (53.7%) compared to single respondents at 16 (29.6%), those who were divorced or separated at 2 (33.3%), and widowed respondents at 2 (50.0%). The duration of service showed a notable trend although it was not statistically significant (p = 0.057). The proportion of injuries increased with longer tenure, rising from 8 (25.0%) among those with 1–2 years of service to 20 (41.7%) for those with 3–5 years, and 14 (56.0%) for those with more than 5 years of experience. Regarding departments, the highest injury rates were found in Manufacturing with 12 (50.0%) and Production with 18 (47.4%), while the Inventory department had the lowest at 2 (14.3%), though these variations were not statistically significant (p = 0.167). Other variables such as education level (p = 0.908), employment status (p = 0.617), shift pattern (p = 0.287), and daily working hours (p = 0.406) showed no significant association with work-related injuries. Within these categories, injuries were more frequent among respondents working more than 8 hours daily at 15 (50.0%) and those on rotating shifts at 24 (46.2%).

Table 8: Binary logistic regression model for predictors of work-related injury in the last 12 months

Factors	B (Regression Coefficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Department/Unit					
Production		1.000**			
Marketing	-0.629	0.533	0.163	1.743	0.298
Manufacturing	0.268	1.307	0.432	3.951	0.635
Quality Control	-0.326	0.722	0.120	4.360	0.723
Inventory	-1.865	0.155	0.026	0.916	**0.040***
Years of Service					
1 – 2 years		1.000**			
3 – 5 years	0.580	1.786	0.579	5.506	0.313
> 5 years	1.401	4.057	1.045	15.760	**0.043***
Age (years)					
20 – 29		1.000**			
30 – 39	-0.218	0.804	0.276	2.341	0.689
≥ 40	-0.333	0.717	0.163	3.162	0.660
Marital Status					
Single		1.000**			
Ever Married	0.971	2.642	0.963	7.250	0.059

*** Statistically Significant; ** Reference category**

Note: OR = odds ratio; CI = confidence interval; R^2 = 20.4%

In relation to the predictors of sustained work-related injury, respondent's department/unit and years of service were identified as significant predictors. In relation to respondent's department/unit, the odds of sustaining a work-related injury were over six times significantly lower among respondents in the inventory department (OR: 0.155; CI: 0.026–0.916) compared to those in the production department. In relation to respondent's years of service, the odds of sustaining a work-related injury were four times significantly more likely to occur among respondents with over five years of service (OR: 4.057; CI: 1.045–15.760) compared to those with one to two years of service. In relation to respondent's marital status, the odds of sustaining a work-related injury were over two times higher among respondents who were ever married (OR: 2.642; CI: 0.963–7.250) compared to those who were single, although this was not statistically significant.

CHAPTER FIVE

5.1 DISCUSSION

The study revealed a high prevalence of ergonomic and psychosocial hazards, particularly repetitive movements, awkward postures, and psychological stress. Physical hazards such as exposure to high-speed moving machinery and high noise levels were also prominent, while chemical exposures were relatively low. The dominance of ergonomic hazards, physical hazards and occupational noise exposure is likely due to the highly mechanized, fast-paced nature of beverage manufacturing which requires continuous manual handling, and close proximity to loud, vibrating machinery. Prolonged exposure to ergonomic strains leads to chronic musculoskeletal disorders (MSDs), resulting in decreased productivity, high absenteeism, and reduced quality of life for the workers. These findings are similar to a study conducted among industries in South-East Nigeria which showed high prevalence of exposure to hazardous levels of noise as well as prominent psychosocial stress amongst majority of the workers.[28] Another study conducted in Ethiopia to describe the existing occupational safety and health services in workplaces also identified occupational noise, dust exposure and chemical exposure in the manufacturing and other sectors in the country.[29] To mitigate these hazards, targeted ergonomic interventions, such as the introduction of mechanical lifting aids and mandatory job rotation, to reduce repetitive strain should be implemented as well as the provision of engineering controls such as ear muffs and ear plugs for high-speed noisy machinery. Additionally, to combat psychosocial hazards experienced, establishing a workplace-based intervention programme to provide confidential counseling and psychosocial support, coupled with enforcing mandatory, structured rest breaks away from the noisy factory floor, will significantly reduce acute mental strain among the workforce. Periodic welfare and recreational activities will also help to improve morale and teamwork.

Organizational safety structures such as the provision of safety manuals and prompt equipment repair were largely in place, however, a notable predisposing factor identified was the pressure

workers felt to bypass safety rules to meet production targets. Working in the Production department and having over five years of service emerged as a significant predictor of sustaining work-related injuries. The pressure to evade safety protocols is likely driven by the demanding, time-sensitive quotas common to the competitive beverage industry. The higher vulnerability of long-serving workers suggests that as workers become highly experienced and over-familiar with their routine tasks, their attention declines predisposing them to accidents. Moreover, the high injury risk in the Production unit reflects the reality that this department is the center of factory operations, containing the highest concentration of glass, high-speed machinery, and moving parts compared to other units. A workplace culture that implicitly rewards speed over safety fundamentally creates an environment where injuries become inevitable creating significant socioeconomic burdens including long-term health effects, productivity losses, and strain on healthcare systems. The finding that longer length of service predisposes workers to hazards contrasts with a study conducted amongst factories in Anambra State to determine workplace hazard exposure which showed that length of service had a significant influence on the level of hazard exposure but was higher amongst workers with shorter length of service in the that factory.[30] The management of Seven-Up Bottling Company should place greater emphasis on workers safety and welfare rather than prioritizing daily quotas and production targets. Additionally, advanced scenario-based safety refresher courses should be specifically designed for long-term employees to combat workplace complacency.

The study demonstrated an overall poor level of safety practice among more than half of the workforce. Despite high rates of formal safety training and the company providing PPE entirely free of charge, less than half of the respondents consistently wore their required PPE during shifts. The primary reason cited for the non-compliance was heat and discomfort. Additionally, safety practice was significantly influenced by the worker's department, being optimal in Quality Control and Manufacturing but notably poor in Marketing and Inventory. This non-compliance could be due to Nigeria’s tropical climate and the ambient heat generated by industrial boilers and

machinery, making standard, heavy PPE highly uncomfortable. The departmental disparity suggests that safety enforcement is rigorous in areas perceived as high-risk departments (like manufacturing) but neglected in other departments perceived as lower risk (like Inventory), creating an inconsistent safety culture. When workers possess theoretical safety knowledge but fail to implement it practically, they remain entirely vulnerable to preventable occupational injuries threatening the physical well-being of the workers. The poor level of overall safety practices is in tandem with a study conducted among workers in industries in Ethiopia where a vast majority of workers do not adhere to occupational health and safety measures.[31] The low level of safety practices in this study however, contrasts with findings from another study conducted among factory workers in Northwest Ethiopia where more than half of participants demonstrated good level of safety practices.[32] In addition, the high frequency of occupational safety programs received by workers in this study is in contrast with another study conducted among workers in a bottling company in South East Nigeria where a vast majority of the workers reported unavailability of safety training programs.[33] To promote better safety practices, the Seven-Up Bottling Company should invest in climate-appropriate PPE ergonomically designed and suited for tropical industrial environments to eliminate the discomfort caused. Safety enforcement and continuous monitoring should be standardized across all departments, ensuring that safety is treated as a universal requirement rather than a department-specific option.

The study demonstrated a considerable burden of occupational injuries, with two out of every five workers having sustained a work-related injury in the preceding 12 months. The most severe injuries were predominantly physical and mechanical, led by skin cuts and lacerations from broken glass or metal then followed by crush injuries and entrapments in machine parts. Ergonomic morbidity was also highly prevalent across the workforce. Lower back pain was the most common complaint, affecting nearly half of the respondents, and a notable proportion of workers with lower back, shoulder, or knee pain reported that the discomfort was severe enough to prevent them from performing their normal duties. The high prevalence of lacerations and crush injuries is essentially

linked to the core operations of a glass-bottling facility, where workers continuously handle fragile, pressurized containers and operate high-speed conveyor belts and filling machines. The widespread ergonomic morbidity is a direct consequence of the physical demands of the job, which involve prolonged standing on hard factory floors, repetitive manual sorting, and the heavy lifting of beverage crates. The annual injury prevalence represents a substantial occupational health burden that directly translates into increased Disability-Adjusted Life Years (DALYs) and high rates of absence from work due to health-related reasons. Findings from this study are similar to a study conducted among employees in three brewery companies in Ethiopia where the major injuries sustained were laceration, fracture, and musculoskeletal injuries.[34] A study conducted among workers of bottling industries in Benin City showed findings similar to this study where a higher proportion of injured workers were male and a significant association was seen between duration of employment and occurrence of injury.[35] There was much higher prevalence of musculoskeletal injury reported in a study conducted among beverage factory workers in Eastern Nigeria where a vast majority of the workers reported Work Related Musculoskeletal Discomfort (WRMD) with majority of these workers reporting that the discomfort impaired activity at work, and the common complaints were shoulder, neck and upper back ache.[36] To reduce this high burden of injury and morbidity, the use of cut-resistant hand gloves and safety goggles, particularly in the production and manufacturing units should strictly be enforced. For ergonomic hazards, the management of Seven-Up Bottling Company should invest in mechanical lifting aids to reduce manual crate handling, provide anti-fatigue mats for workers required to stand for long hours, and institute mandatory job-rotation schedules to minimize continuous repetitive strain. A comprehensive hearing conservation program, and routine audiometric screening, should also be established to address the risk of irreversible hearing loss.

5.2 CONCLUSION

The study revealed that workers in Seven-Up Bottling Company were exposed to multiple occupational health hazards, mainly physical, ergonomic, noise-related, and psychosocial risks. Common hazards included unsafe machinery, slippery floors, excessive noise, repetitive tasks, heavy lifting, work-related stress, and musculoskeletal complaints such as lower back pain.

The study also identified several predisposing factors associated with these occupational hazards, including departmental assignment, age, years of service, unsafe working conditions, and inconsistent use of personal protective equipment. Workers in production-related departments and those with longer years of service were more likely to experience injury and hazard exposure.

Although most respondents reported receiving safety training and having access to personal protective equipment, the overall practice of safety measures was poor among more than half of the workers.

5.3 RECOMMENDATIONS

1. The Management of Seven-Up Bottling Company should strengthen hazard control measures, especially in high-risk departments such as production and manufacturing, through regular machine maintenance, installation of effective machine guarding, improved workplace design, and elimination of slippery or unsafe floor conditions to reduce physical and mechanical injuries.
2. Ergonomic improvements should be implemented by redesigning workstations, introducing mechanical lifting aids, training workers on correct posture and safe manual handling practices to reduce repetitive strain injuries and musculoskeletal disorders such as lower back pain.
3. Strict enforcement of personal protective equipment (PPE) use should be strengthened, with particular attention to improving comfort and usability to address barriers such as heat, discomfort, and restriction of movement that reduce compliance.
4. Regular and structured safety training programmes should be sustained and expanded, with targeted refresher courses for high-risk departments and long-serving workers to reinforce hazard awareness, improve compliance, and reduce complacency.
5. Routine occupational health surveillance should be established, including periodic medical examinations, early detection and treatment of work-related conditions, and efficient injury management systems supported by proper and timely incident reporting.
6. Supervisory enforcement of safety practices should be strengthened, particularly in production areas, to ensure consistent compliance with safety procedures and reduce pressure on workers to compromise safety for productivity.
7. Psychosocial risk management strategies should be introduced, including improved shift scheduling, adequate rest breaks, and workload balancing to reduce occupational stress and fatigue among workers.

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APPENDIX I

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE

UNIVERSITY OF BENIN, BENIN CITY

OCCUPATIONAL HEALTH HAZARDS AND SAFETY PRACTICES AMONGST WORKERS OF BOTTLING COMPANIES IN BENIN CITY

Dear respondent, we are final year medical students of the University of Benin, conducting a research project on the "Occupational Health Hazards and Safety Practices amongst Workers of Bottling Companies in Benin City." This questionnaire will aid as a tool of data collection in this research. Your sincere response will be helpful, and the information given here will be appreciated and treated with strict anonymity and confidentiality. It is collected solely for independent research purposes and will under no circumstances be shared with factory management to penalize or identify you.

Section A: Socio-Demographic and Job-Related Characteristics

1. Age (as at last birthday)? _____ Years
2. Sex: Male [ ] Female [ ]
3. Marital status: Single [ ] Married [ ] Divorced/Separated [ ] Widowed [ ]
4. Ethnicity: Benin [ ] Esan [ ] Etsako [ ] Hausa [ ] Igbo [ ] Yoruba [ ] Urhobo [ ] Others _____
5. Highest level of completed formal education? No formal education [ ] Primary education [ ] Secondary education (SSCE/GCE) [ ] Tertiary education (OND/HND/BSc/MSc/PhD) [ ]
6. Current employment status at this company? Permanent / Full-time staff [ ] Contract / Casual worker [ ] Temporary / Trainee [ ]
7. Which department or unit do you primarily work in? Production/Bottling Line [ ] Marketing [ ] Quality Control [ ] Warehouse/Inventory/Logistics [ ] Maintenance [ ] Engineering [ ] Utilities (Boiler/Water Treatment/CIP) [ ]
8. How long have you worked continuously in this specific facility? (in years) _____
9. What shift pattern do you predominantly work? Morning Shift only [ ] Afternoon/Evening Shift only [ ] Night Shift only [ ] Rotating Shifts (Alternating Day and Night) [ ]
10. On average, how many hours do you work per day (including mandatory or voluntary overtime)? 8 hours or less [ ] 9 to 12 hours [ ] More than 12 hours [ ]

Section B: Occupational Health Hazards Experienced

Instruction: Thinking about your daily job duties over the past month, how often are you exposed to the following specific conditions?

Hazard Description	*Never*	*Rarely (Once a month)*	*Sometimes (A few times a week)*	*Often (Every day)*	*Constantly (Always present during my entire shift)*
11. Ambient noise levels so high that you must shout to be heard by someone standing 1 meter away.					
12. Direct physical contact or proximity to hazardous chemicals (e.g., Caustic soda, industrial acids, strong cleaning solvents).					
13. Inhalation exposure to irritating fumes, vapors, or gases (e.g., Ammonia leaks, CO2 gas, syrup concentrate fumes).					
14.Working near heavy, high-speed moving machinery that lacks adequate physical safety guards.					
15. Danger of pressurized glass bottle explosions or flying glass shrapnel in your immediate work vicinity.					
16. Slippery, perpetually wet, or uneven floor surfaces in your primary work area.					
17. Extreme thermal conditions: intense heat (e.g., near boilers, pasteurizers, or outdoor solar radiation) or extreme cold.					
18. Manually lifting, pushing, or carrying loads heavier than 20kg (e.g., crates, chemical drums, ingredient sacks).					
19. Performing highly repetitive hand/wrist movements (e.g., manual sorting, packing) for					

more than 3 hours consecutively.					
20. Working in awkward, bent, reaching, or twisted physical postures for prolonged periods.					
21. High levels of psychological stress, intense pressure to meet impossible production targets, or workplace harassment/bullying.					

Section C: Predisposing factors to occupational health hazard

Instruction: Please indicate how much you agree or disagree with the following statements regarding the culture at your workplace.

Predisposing factors Statement	*Strongly Disagree*	*Disagree*	*Agree*	*Strongly Agree*
22. Management provides workers with operating safety manuals				
23. Management ensures that safety hazards discovered during inspections or reported by workers are reported immediately.				
24. I usually follow safe work procedures while carrying out my duty				
25. I sometimes feel pressured to break safety rules in order to complete my work on time.				
26. Workers here feel completely free to stop their work if they believe a situation is immediately dangerous to their health, without fear of being fired.				
27. My company usually carry out prompt repair of damaged equipment and electrical systems				
28. The safety procedures, warnings, and instructions provided by the company are highly practical and easy to follow during a real shift.				

Section D: Practice of Safety Measures and PPE Compliance

29. Did you receive formal, comprehensive occupational safety training before you commenced work? Yes [ ] No [ ]

30. How often does management conduct safety refresher training, emergency drills, or "toolbox talks"? Weekly [ ] Monthly [ ] Annually [ ] Rarely / Never [ ]

31. Does the company provide all necessary Personal Protective Equipment (PPE) entirely free of charge? Yes, all provided free [ ] No, I have to buy my own [ ] Partially (some free, some I buy) [ ]

32. Which of the following PPE items are you strictly required to wear for your specific job role? (Select all that apply) Safety helmet (Hard hat) [ ] Ear muffs / Ear plugs [ ] Safety goggles / Face shield [ ] Hand gloves (chemical or cut-resistant) [ ] Safety boots (steel-toed, anti-slip) [ ] Coveralls / Chemical Aprons [ ] Respirator / Dust mask [ ]

33.How frequently do you actually wear all your required PPE while working your shift? Always (Every single day) [ ] Often (Most days) [ ] Sometimes [ ] Rarely [ ] Never [ ]

34. If you do not use your PPE consistently, what is the PRIMARY reason? (Select the most significant factor) It causes severe heat stress and physical discomfort [ ] It restricts my movement, vision, or ability to communicate [ ] The company did not provide it, or the provided PPE is worn out/damaged [ ] It slows down my work pace and affects my production quota [ ] Management does not strictly enforce its use [ ] Not applicable (I always wear it) [ ] Others _____

Section E: Prevalence of Occupational Injuries and Ergonomic Morbidity

35. Have you sustained any work-related injury (no matter how minor) in this factory within the last 12 months? Yes [ ] No [ ]

[If No, skip to question 24]

36. If YES, what was the primary nature of your most severe injury? (Select all that apply) Skin cut/laceration from broken glass/metal [ ] Chemical burn to skin [ ] Thermal burn (from hot water/steam/surfaces) [ ] Crush injury / Entrapment in machine parts [ ] Fracture/severe sprain from a slip, trip, or fall [ ] Eye injury (chemical splash or flying foreign body) [ ] Road Traffic Accident (during distribution/logistics) [ ] Others _____

37. Did you officially report this specific injury to the factory management, supervisor, or company clinic? Yes [ ] No [ ]

(If No, specify why not: _____)

38. Do you currently experience continuous ringing in your ears (tinnitus) or notice difficulty hearing normal conversations outside of work? Yes [ ] No [ ]

39. Do you frequently experience respiratory symptoms (such as chronic cough, wheezing, or shortness of breath) that worsen during or immediately after your shift? Yes [ ] No [ ]

During the last 12 months, have you had trouble (ache, pain, or discomfort) in any of the following body areas that you believe is caused or worsened by your work? Furthermore, did this pain prevent you from doing your normal work duties?

40. **Neck**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]

41. **Shoulders (Right, Left, or Both)**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]

42. **Elbows**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]

43. **Wrists / Hands**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]

44. **Upper Back**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ]

No [ ]
45. **Lower Back**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]
46. **Knees / Lower Legs / Ankles**: Experienced Pain/Ache? Yes [ ] No [ ] | Prevented normal work duties? Yes [ ] No [ ]

APPENDIX II

ETHICAL CLEARANCE FORM

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR Prof. (Mrs) I.N Ize-Iyamu

DIRECTOR OF ADMINISTRATION Jim Uwadie, Esq

CHAIRMAN Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14865491272123

PROPOSAL TITLE: "OCCUPATIONAL HEALTH HAZARDS AND SAFETY PRACTICES AMONGST WORKERS OF BOTTLING COMPANIES IN BENIN CITY"

PRINCIPAL INVESTIGATOR(S): UYIOGHOSA NOSAYISE NOSA-IHAZA, NNEMEREZE MIRABELL ODOM, IZIEGBE MATTHEW OGBEWI, OSAYANDE JOSEPH OGIEVA

DEPARTMENT/INSTITUTION: DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DATE CONSIDERED: MARCH 31ST, 2026

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 31/03/2026 TO 19/03/2027. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY
REMARK.

CHAIRMAN: PROF. (MRS) A.N. OFILI SIGNATURE & DATE 31/3/2026

UNIVERSITY OF BENIN TEACHING HOSPITAL ETHICS & RESEARCH COMMITTEE Sign. Date. BENIN CITY P.M.B. 1111

SUPERVISOR (S): PROF. A. R ISARA

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates and you are to furnish the committee with the research activities at the completion of the study. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date.....

ubthresearchethics@gmail.com Registration Number: NHREC/24/01/2020

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

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MATRIC NO: MED1807435

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FACULTY: MEDICINE

SESSION OF GRADUATION: 2024/2025

DIRECTOR
DATE .....
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UNIBEN, BENIN CITY
Head Of Unit (IPTTO)

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FACULTY: MEDICINE DIRECTOR

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FACULTY: MEDICINE

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