Assessment of the Implementation of Health and Safety Measures among Workers in Selected Water Factories in Umuahia, Abia State

Uka-Kalu, Ezinne Chioma., Samuel Marvellous C., Elekeh, Rosemary Ichita., Uwaeme, Thank God C.

Department of Public Health, Abia State University, Uturu

DOI: https://doi.org/10.51584/IJRIAS.2025.100700113

Received: 27 June 2025; Revised: 10 July 2025; Accepted: 13 July 2025; Published: 18 August 2025

ABSTRACT

Occupational health and safety are vital in industrial settings, especially in water production factories where workers face chemical, physical, and ergonomic hazards. This study examined health and safety practices among 102 workers in selected water factories in Umuahia, Abia State, Nigeria, using questionnaires and observations analysed with SPSS. Results showed that 66.7% of workers were aware of the necessary personal protective equipment (PPE), indicating moderate knowledge, while about one-third lacked this awareness, increasing safety risks. Similar to other developing countries, much PPE knowledge was gained informally from peers rather than formal training. Despite this, consistent and correct PPE use was low due to insufficient training and supervision. Injuries were reported by 59.8% of workers, with falls being the most frequent cause (36.3%), followed by stress, machinery accidents, chemical exposure, electric shocks, and noise. No fire or drowning incidents were noted. These injuries highlight issues like poor housekeeping, unsafe equipment use, and weak enforcement of safety rules. Compliance with safety protocols was poor: only 41.2% always wore PPE, 37.3% followed machinery safety rules consistently, and hand hygiene was inadequate. Attendance at safety briefings was irregular. Overall, while awareness of PPE is moderate, it does not translate into proper use, and safety practices are often ignored. The study emphasizes the urgent need for regular training, improved supervision, better workplace conditions, and a stronger safety culture to reduce injuries. Enhancing regulatory oversight, staff education, and PPE provision is essential to protect workers and ensure safe water production.

Keywords: Occupational health and safety (OHS), Safety measures, Water factories, Nigeria, Health hazards.

INTRODUCTION

Occupational health and safety (OHS) remains a critical global concern, with nearly 2 million deaths and over 374 million non-fatal injuries reported annually across the globe, largely due to work-related diseases and accidents (World Health Organization & International Labour Organization, 2021). Of these fatalities, about 450,000 are attributable to respiratory conditions caused by workplace air pollution, and an additional 360,000 result from injuries—highlighting the heavy toll on worker health and wellbeing (World Health Organization & International Labour Organization, 2021).

In Nigeria's manufacturing sector, workers face various health hazards—from chemical and microbial contamination in the water production process to ergonomic and safety risks during operation. A 2018 study in a bottling facility in Benin City found significant respiratory impairments among workers, with symptoms such as chronic cough and wheezing linked to inhalation of aerosols and lack of appropriate personal protective equipment (PPE) (Oghuvwu et al., 2018). Moreover, systematic reviews of bottled water in Nigeria have identified breaches of chemical safety standards—such as elevated heavy metals (lead, cadmium) and inconsistent adherence to national guidelines (Ojatta, 2022).

Research has also examined health and safety practices in water production facilities. For example, Adebayo et al. (2021) investigated the safety protocols and health hazards in water production facilities in Lagos, Nigeria. The findings revealed that water factory employees were exposed to harmful chemicals like chlorine and lacked adequate access to personal protective equipment (PPE), leading to various short- and long-term health

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

issues such as respiratory problems and skin burns. Furthermore, the study emphasized that a lack of comprehensive training and safety awareness among workers contributed to the high rate of workplace injuries. Research by Chen and Wong (2019) demonstrated that making PPE both accessible and comfortable increased the likelihood of regular worker usage, reducing minor injuries by 40%.

However, a study conducted by Musa and Adeoye (2021) in Nigerian water factories revealed that only about 60% of workers consistently used available PPE due to discomfort or insufficient training on its proper use. Similarly, Okeke and Aina (2020) examined occupational health and safety risks in the water production sector across various Nigerian states, identifying inadequate safety procedures and the absence of systematic safety audits as major factors contributing to workplace hazards. They stressed the importance of enhanced regulatory oversight and increased investment in safety training to minimize injuries and fatalities in water factories.

Despite these documented hazards upstream, limited research has focused on how water factories in Umuahia, Abia State, manage occupational health and safety measures—particularly regarding worker demographic profile, awareness of safety protocols, facility-level implementation, and adherence practices. Given that access to piped public water remains inadequate—with just 67 % of Nigerians having basic water access as of 2015—private water factory production in urban centers like Umuahia has become a vital alternative (WHO & UNICEF, 2015). Understanding the demographic profile, OHS awareness, the presence of safety infrastructure, and compliance behaviors of workers in these facilities is essential. Such understanding will not only reveal current gaps but also support evidence-based interventions aimed at enhancing occupational safety, health outcomes, and regulatory compliance in the context of water industries in Umuahia.

METHOD

The study employed an observational descriptive design. This design is appropriate to achieve the specific objectives of the study. The design is non-experimental and relies on structured data collection tools to gather numerical data for statistical analysis. The descriptive design was chosen because it allows for the collection of quantitative data to describe and analyze the demographic characteristics, knowledge, adherence, and influencing factors related to health and safety measures. This non-experimental approach facilitated the generation of descriptive statistics, providing a comprehensive overview of the existing practices, challenges, and levels of compliance with safety standards within the water production industry in Umuahia, Abia State.

Population of the Study

The target population for this study comprised workers employed in selected water factories in Umuahia, Abia State. This included factory floor workers, supervisors, and managers who are directly or indirectly involved in water production and the implementation of safety measures. These workers were engaged in various tasks, such as water treatment, packaging, maintenance, cleaning, and overseeing safety protocols.

Sample Size and Sampling Technique

A total of 102 respondents were used in this work, which was the total number gotten from the selected water factories in Umuahia. Within the selected factories, convenience sampling technique was used to select workers who were present and available on the day of data collection. While convenience sampling is non-probabilistic, it was deemed practical for this study due to the accessibility of participants and the need to collect data within a limited timeframe.

Instrument for Data Collection

Data was collected using two main tools: a well-structured questionnaire and an observational checklist. A closed-ended questionnaire was designed to collect quantitative data on demographic characteristics, knowledge of safety protocols availability and use of safety measures adherence to safety practices and challenges faced in implementing safety measures.

An observational checklist was used to assess the physical work environment, including the use of PPE, cleanliness and organization of the workspace, availability of safety equipment, and compliance with safety signage and protocols.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Method of Data Collection

For the structured questionnaire, copies of the questionnaire were administered to workers in the selected factories. The questionnaire was self-administered or interviewer-administered depending on the literacy level of the workers. For the observational checklist the researcher conducted direct observations in the factories. Observations focused on the physical work environment, use of PPE, and compliance with safety protocols. Observations were conducted at different times of the day to capture variations in safety practices.

Method of Data Analysis

Data were cleaned, coded, and analysed using Statistical Package for the Social Sciences (SPSS) version 21. Descriptive statistics, such as frequencies, and percentages were used to summarize the data. Inferential statistics, such as chi-square tests, was employed to examine relationships between variables where applicable. The results were presented in tables and charts for clarity and interpretation.

Ethical Clearance

Ethical approval for the study was obtained from the Abia State University Ethical Committee. Participants were informed about the purpose of the study, and their informed consent (verbal) was obtained before data collection. The principles of voluntariness, confidentiality, and anonymity were strictly adhered to. Participants were assured that their responses would be used solely for research purposes and that they could withdraw from the study at any time without consequences.

RESULT AND DISCUSSION

Sociodemographic Characteristics of Respondents

Table 1: Sociodemographic Characteristics of Workers in Selected Water Factories in Umuahia, Abia State.

Variables	Frequency (n=102)	Percent (%)
Age		
>20 years	13	12.7
20-29 years	52	51.0
30 -39 years	30	29.4
40-49 years	6	5.9
≥ 50 years	1	1.0
Gender		
Male	69	67.6
Female	33	32.4
Ethnicity		
Igbo	99	97.1
Yoruba	3	2.9
Religion		
Christianity	101	99.0
Islam	1	1.0
Marital Status		
Single	82	80.4
Married	19	18.6
Separated	1	1.0
Education		
Secondary	74	72.5
Tertiary	28	27.5
Job Position		
Machine Operator	22	21.6

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Supervisor	7	6.9
Cleaner	6	5.9
Safety Officer	2	2.0
Management	12	11.8
Loader	21	20.6
Driver	8	7.8
Others	24	23.5
Duration of Employment		
< 1year	5	4.9
1-3 years	56	54.9
4-6 years	34	33.3
7-9 years	3	2.9
≥10 years	4	4.0

Source: Field Data, 2025

Formal Training on OHS

Table 2: Formal Training on OHS among Workers in Selected Water Factories in Umuahia, Abia State.

Variables	**Frequency (n=102)**	**Percent (%)**
Received any formal training on OHS		
Yes	48	47.1
No	54	52.9
If yes, when was your most recent OHS training?	**(n=49)**	**(48.0)**
Within the past 6 months	19	18.6
6 months to 1 year ago	26	25.5
More than 1 year ago	4	3.9
How often does your employer provide OHS training?		
Quarterly	18	17.6
Biannually	30	29.4
Annually	13	12.7
Rarely/Never	0	0.0
Not sure	41	40.2

Source: Field Data, 2025

Knowledge of Occupational Health and Safety (OHS)

Table 3: Knowledge of Occupational Health and Safety (OHS) Among Workers in Selected Water Factories in Umuahia, Abia State.

Variables	**Frequency (n=102)**	**Percent (%)**
Aware of specific health and safety hazards associated with job		
Yes	91	89.2
No	11	10.8
Potential hazards in workplace		
Slippery floors	45	44.1
Chlorine gas	16	15.7
Poor posture	8	7.8
Faulty wiring	0	0.0
Entanglement of clothing	0	0.0
Poor ventilation	24	23.5
Fatigue/Stress	9	8.8

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Location of the first aid kit and fire extinguisher		
Yes	100	98.0
No	2	2.0
Familiar with the emergency evacuation plan		
Yes	80	78.4
No	22	21.6
Participated in any emergency drills		
Yes	8	7.8
No	94	92.2
Understand the safety signs and symbols displayed		
Yes	87	85.3
No	15	14.7
Know the steps to take during emergencies such as fire or injury		
Yes	44	43.1
No	58	56.9
Aware of penalties for failing to adhere to safety protocols		
Yes	99	97.1
No	3	2.9

Source: Field Data, 2025

Occurrence of Workplace Injury

Table 4: Occurrence of Workplace Injury among Workers in Selected Water Factories inUmuahia, Abia State.

Variables	**Frequency (n=102)**	**Percent (%)**
Ever had any previous accidents or injuries in workplace		
Yes	61	59.8
No	41	40.2
If 'yes', specify the cause of the accident/injury:	**(n=61)**	
Falls	37	36.3
Captured clothing/body	5	4.9
Electric shock	2	2.0
Exposure to hazardous substances	4	3.9
Exposure to high level noise	2	2.0
Fire/Explosion	0	0.0
Drowning	0	0.0
Stress	11	10.8

Source: Field Data, 2025

Extent of Adherence of Workers to the Health and Safety Measures

Table 5: The Extent of Adherence of Workers to the Health and Safety Measures put in Place in Selected Water Factories in Umuahia, Abia State.

Variables	**Frequency (n=102)**	**Percent (%)**
Always wear the required personal protective equipment (PPE) while working		
Yes	42	41.2
No	60	58.8
Follow the safety protocols for handling machinery and equipment		
Always	38	37.3
Sometimes	51	50.0

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Never	13	12.7
Wash your hands before and after handling production materials		
Always	42	41.2
Sometimes	57	55.9
Never	3	2.9
Participate in routine health and safety briefings conducted by your employer		
Yes	41	40.2
No	22	21.6
Sometimes	39	38.2
The factory provides all the required PPE		
Yes	66	64.7
No	13	12.7
Not Sure	23	22.5
Report hazards or unsafe conditions to your supervisor immediately after noticing them		
Yes	99	97.1
No	3	2.9
Health and safety measures in the factory are enforced by management		
Yes	93	91.2
No	9	8.8

Source: Field Data, 2025

Factors that Influence the Adherence of Workers to the Health and Safety Measures Put in Place in Selected Water Factories in Umuahia, Abia State

Socio-Demographic Factors

Table 6: Socio-Demographic Factors That Influence the Adherence of Workers to Wear PPE In Selected Water Factories in Umuahia, Abia State.

	ALWAYS WEAR PPE			
Age	**Yes (n=42)**	**No (n=60)**	**Total (n=102)**	**Chisquare**
>20 years	1 (1.0%)	12 (11.8%)	13 (12.7%)	
20-29 years	20 (19.6%)	32 (31.4%)	52 (51.0%)	$X^2 = 11.044$
30 -39 years	16 (15.7%)	14 (13.7%)	30 (29.4%)	$df = 4$
40-49 years	4 (3.9%)	2 (2.0%)	6 (5.9%)	$p = 0.026$
≥ 50 years	1 (1.0%)	0 (0.0%)	1 (1.0%)	
Gender				$X^2 = 0.031$
Male	28 (27.5%)	41 (40.2%)	69 (67.6%)	$df = 1$
Female	14 (13.7%)	19 (18.6%)	33 (32.4%)	$p = 0.859$
Ethnicity				$X^2 = 0.829$
Igbo	40 (39.2%)	59 (57.8%)	99 (97.1%)	$df = 1$
Yoruba	2 (2.0%)	1 (1.0%)	3 (2.9%)	$p = 0.363$
Religion				$X^2 = 0.707$
Christianity	42 (41.2%)	59 (57.8%)	101 (99.0%)	$df = 1$
Islam	0 (0.0%)	1 (1.0%)	1 (1.0%)	$p = 0.400$
MaritalStatus				
Single	32 (31.4%)	50 (49.0%)	82 (80.4%)	$X^2 = 1.886$
Married	10 (9.8%)	9 (8.8%)	19 (18.6%)	$df = 2$
Separated	0 (0.0%)	1 (1.0%)	1 (1.0%)	$p = 0.389$

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Education				$X^2 = 17.055$
Secondary	22 (21.6%)	52 (51.0%)	74 (72.5%)	*df = 3*
Tertiary	20 (19.6%)	8 (7.9%)	28 (27.5%)	*p = 0.001*
Job Position				
Machine Operator	20 (19.6%)	2 (2.0%)	22 (21.6%)	
Supervisor	6 (5.9%)	1 (1.0%)	7 (6.9%)	$X^2 = 50.898$
Cleaner	2 (2.0%)	4 (3.9%)	6 (5.9%)	*df = 7*
Safety Officer	2 (2.0%)	0 (0.0%)	2 (2.0%)	*p = 0.000*
Management	5 (4.9%)	7 (6.9%)	12 (11.8%)	
Loader	1 (1.0%)	20 (19.6%)	21 (20.6%)	
Driver	0 (0.0%)	8 (7.8%)	8 (7.8%)	
Others	6 (5.9%)	18 (17.6%)	24 (23.5%)	
Duration of Employment				
< 1year	1 (1.0%)	4 (3.9%)	5 (4.9%)	$X^2 = 10.313$
1-3 years	17 (16.7%)	39 (38.2%)	56 (54.9%)	*df = 5*
4-6 years	20 (19.6%)	14 (13.7%)	34 (33.3%)	*p = 0.067*
7-9 years	1 (1.0%)	2 (2.0%)	3 (2.9%)	
≥10 years	3 (3.0%)	1 (1.0%)	4 (3.9%)	

Source: Field Data, 2025

Awareness of PPE

Table 7: Influence of Awareness of PPE Required for Tasks on Adherence of Wearing PPE among Workers in Selected Water Factories in Umuahia, Abia State.

	ALWAYS WEAR PPE			
	Yes (n=42)	**No (n=60)**	**Total (n=102)**	**Chi square**
Aware of PPE Required for Tasks				
Yes	40 (39.2%)	28 (27.5%)	68 (66.7%)	$X^2 = 26.229$
No	2 (2.0%)	32 (31.4%)	34 (33.3%)	*df = 1*
				p = 0.000
Ever had any previous accidents or injuries in workplace				$X^2 = 1.419$
Yes	27 (26.5%)	33 (32.4%)	60 (58.8%)	*df = 2*
No	15 (14.7%)	27 (26.5%)	42 (41.2%)	*p = 0.492*

Source: Field Data, 2025

Follow Safe Protocols

Socio-Demographic Factors

Socio-Demographic Factors that Influence the Adherence of Workers to Follow Safe Protocols in Selected Water Factories in Umuahia, Abia State.

	FOLLOW SAFE PROTOCOLS				
Age	**Always (n=38)**	**Sometimes (n=51)**	**Never (n=13)**	**Total (n=102)**	**Chisquare**
>20 years	0 (0.0%)	8 (7.8%)	5 (4.9%)	13 (12.7%)	
20-29 years	19 (18.6%)	30 (29.4%)	3 (2.9%)	52 (51.0%)	$X^2 = 20.590$
30 -39 years	15 (14.7%)	10 (9.8%)	5 (4.9%)	30 (29.4%)	*df = 8*
40-49 years	3 (2.9%)	3 (2.9%)	0 (0.0%)	6 (5.9%)	*p = 0.008*
≥ 50 years	1 (1.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue VII July 2025

Gender					$X^2 = 2.613$
Male	23 (22.5%)	35 (34.3%)	11 (10.8%)	69 (67.6%)	*df = 2*
Female	15 (14.7%)	16 (15.7%)	2 (2.0%)	33 (32.4%)	*p = 0.271*
Ethnicity					$X^2 = 1.212$
Igbo	37 (36.3)	50 (49.0%)	12 (11.8%)	99 (97.1%)	*df = 2*
Yoruba	1 (1.0%)	1 (1.0%)	1 (1.0%)	3 (2.9%)	*p = 0.545*
Religion					$X^2 = 1.010$
Christianity	38 (37.3%)	50 (49.0%)	13 (12.7%)	101 (99.0%)	*df = 2*
Islam	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.0%)	*p = 0.604*
MaritalStatus					
Single	27 (26.5%)	43 (42.2%)	12 (11.8%)	82 (80.4%)	$X^2 = 5.404$
Married	11 (108%)	7 (6.9%)	1 (1.0%)	19 (18.6%)	*df = 4*
Separated	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.0%)	*p = 0.248*
Education					$X^2 = 21.728$
Secondary	19 (18.6%)	42 (41.2%)	13 (12.7%)	74 (72.5%)	*df = 6*
Tertiary	19 (18.6%)	9 (8.9%)	0 (0.0%)	28 (27.5%)	*p = 0.001*
Job Position					
Machine Operator	21 (20.6%)	1 (1.0%)	0 (0.0%)	22 (21.6%)	$X^2 = 62.305$
Supervisor	3 (2.9%)	4 (3.9%)	0 (0.0%)	7 (6.9%)	*df = 14*
Cleaner	1 (1.0%)	4 (3.9%)	1 (1.0%)	6 (5.9%)	*p = 0.000*
Safety Officer	1 (1.0%)	1 (1.0%)	0 (0.0%)	2 (2.0%)	
Management	6 (5.9%)	5 (4.9%)	1 (1.0%)	12 (11.8%)	
Loader	0 (0.0%)	16 (15.7%)	5 (4.9%)	21 (20.6%)	
Driver	0 (0.0%)	4 (3.9%)	4 (3.9%)	8 (7.8%)	
Others	6 (5.9%)	16 (15.7%)	2 (2.0%)	24 (23.5%)	
Duration of Employment					
< 1year	1 (1.0%)	2 (2.0%)	2 (2.0%)	5 (4.9%)	$X^2 = 17.456$
1-3 years	14 (13.7%)	34 (33.3%)	8 (7.8%)	56 (54.9%)	*df = 10*
4-6 years	20 (19.6%)	12 (11.8%)	2 (2.0%)	34 (33.3%)	*p = 0.065*
7-9 years	1 (1.0%)	2 (2.0%)	0 (0.0%)	3 (2.9%)	
≥10 years	2 (2 .0%)	1 (1.0%)	1 (1.0%)	4 (3.9%)	

Source: Field Data, 2025

Awareness of OHS Hazards

Table 9: Influence of Awareness of OHS Hazards and Previous Accidents on Adherence of Following Safe Protocols among Workers in Selected Water Factories inUmuahia, Abia State.

	FOLLOW SAFE PROTOCOLS				
	Always (n=38)	**Sometimes (n=51)**	**Never (n=13)**	**Total (n=102)**	**Chisquare**
Aware of specific health and safety hazards associated with job					
Yes	36 (35.3%)	47 (46.1%)	8 (7.8%)	91 (89.2%)	$X^2 = 12.013$
No	2 (2.0%)	4 (3.9%)	5 (4.9%)	11 (10.8%)	*df = 2*
					p = 0.002
Ever had any previous accidents or injuries in workplace					
Yes	23 (22.5%)	32 (31.4%)	5 (4.9%)	60 (58.8%)	$X^2 = 3.851$
No	15 (14.7%)	19 (18.6%)	8 (7.8%)	42 (41.2%)	*df = 4*
					p = 0.427

Source: Field Data, 2025

Occupational Health and Safety Measures Put in Place in Selected Water Factories

General Safety Measures

Table 10: General Safety Measures Put in Place in Selected Water Factories in Umuahia, Abia State.

		Water Factories				
Items		**Sons**	**Aqua Cecil**	**Delunar**	**Chichebem**	**Total**
General Safety Measures						
Are clear and visible safety signs and instructions displayed in the factory?	*Yes*	0 (0.0%)	0 (0.0%)	1 (25.0%)	0 (0.0%)	**1 (25.0%)**
	No	1 (25.0%)	1 (25.0%)	0 (0.0%)	1 (25.0%)	**3 (75.0%)**
Are emergency exits clearly marked and accessible?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Are fire extinguishers available, clearly labelled, and serviced regularly?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Are first aid kits readily available and adequately stocked?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**

Source: Field Data, 2025

Personal Protective Equipment (PPE

Table 11: Personal Protective Equipment (PPE)Put in Place in Selected Water Factories in Umuahia, Abia State.

		Water Factories				
Items		**Sons**	**Aqua Cecil**	**Delunar**	**Chichebem**	**Total**
Personal Protective Equipment (PPE)						
Are clear and visible safety signs and instructions displayed in the factory?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Is there a system for ensuring PPE is worn correctly and consistently?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	**3 (75.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	**1 (25.0%)**
Is the condition of PPE regularly inspected and replaced when necessary?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	**3 (75.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	**1 (25.0%)**

Source: Field Data, 2025

Machinery and Equipment Safety Measures

Table 12: Machinery and Equipment Safety Measures Put in Place in Selected Water Factories in Umuahia, Abia State.

		Water Factories				
Items		**Sons**	**Aqua Cecil**	**Delunar**	**Chichebem**	**Total**
Machinery and Equipment Safety						
Are all machines equipped with safety guards to prevent accidents?	*Yes*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
	No	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
Is regular maintenance conducted on machinery and equipment to ensure safety?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Are lockout/tag out procedures in place to prevent accidental machine start-ups during maintenance?	*Yes*	0 (0.0%)	0 (0.0%)	1 (25.0%)	1 (25.0%)	**2 (50.0%)**
	No	1 (25.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	**2 (50.0%)**

Source: Field Data, 2025

Workplace Environment and Sanitation Measures

Table 13: Workplace Environment and Sanitation Measures Put in Place in Selected Water Factories in Umuahia, Abia State.

		Water Factories				
Items		**Sons**	**Aqua Cecil**	**Delunar**	**Chichebem**	**Total**
Workplace Environment and Sanitation						
Is the factory floor clean and free of hazards such as spills, clutter, or exposed wires?	*Yes*	0 (0.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	**2 (50.0%)**
	No	1 (25.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	**2 (50.0%)**
Are adequate handwashing and sanitation facilities available for workers?	*Yes*	0 (0.0%)	1 (25.0%)	0 (0.0%)	1 (25.0%)	**2 (50.0%)**
	No	1 (25.0%)	0 (0.0%)	1 (25.0%)	0 (0.0%)	**2 (50.0%)**
Are the factory ventilation and lighting sufficient for a safe working environment?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	**3 (75.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	**1 (25.0%)**

Source: Field Data, 2025

Emergency Preparedness Measures

Table 14: Emergency Preparedness Measures Put in Place in Selected Water Factories in Umuahia, Abia State.

		Water Factories				
Items		**Sons**	**Aqua Cecil**	**Delunar**	**Chichebem**	**Total**
Emergency Preparedness						
Are workers trained in emergency response procedures, such as evacuation and fire drills?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Are emergency contact numbers and protocols displayed prominently?	*Yes*	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	**4 (100.0%)**
	No	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
Are assembly points clearly marked and known to all workers?	*Yes*	0 (0.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	**2 (50.0%)**
	No	1 (25.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	**2 (50.0%)**

Source: Field Data, 2025

SUMMARY OF FINDINGS

This study assessed the implementation of occupational health and safety (OHS) measures among workers in selected water factories in Umuahia, Abia State. The findings revealed a mixed level of implementation and adherence to safety standards. Results showed that 66.7% of workers were aware of the necessary personal protective equipment (PPE), indicating moderate knowledge, while about one-third lacked this awareness, increasing safety risks. Similar to other developing countries, much PPE knowledge was gained informally from peers rather than formal training. Despite this, consistent and correct PPE use was low due to insufficient training and supervision. Injuries were reported by 59.8% of workers, with falls being the most frequent cause (36.3%), followed by stress, machinery accidents, chemical exposure, electric shocks, and noise. No fire or drowning incidents were noted. These injuries highlight issues like poor housekeeping, unsafe equipment use, and weak enforcement of safety rules. Compliance with safety protocols was poor: only 41.2% always wore PPE, 37.3% followed machinery safety rules consistently, and hand hygiene was inadequate. Attendance at safety briefings was irregular.

While foundational safety structures such as emergency exits, fire extinguishers, and first aid kits were present in all factories, critical elements such as safety signage, machinery safety guards, and consistent PPE enforcement were lacking in some. These infrastructural gaps contribute to the observed high incidence of workplace injuries, particularly those caused by falls, stress, and mechanical entrapment. The study also found that awareness of occupational hazards and knowledge of PPE requirements significantly influenced workers' adherence to safety protocols. Workers who were educated, younger, and held technical roles—such as

machine operators—were more likely to comply with PPE use and follow safety instructions. In contrast, socio-demographic factors such as gender, ethnicity, religion, and marital status did not significantly influence safety behaviour. Importantly, while most workers had received basic safety training, many had never participated in emergency drills, and formal training frequency was irregular.

The results of this study align with similar findings across low- and middle-income contexts. Studies from Nigeria, Kenya, and Iraq confirm that while physical infrastructure for health and safety may be partially in place, enforcement, training, and compliance monitoring remain weak (Abdulrahman & Bebo, 2021; Akinwale & Olusanya, 2016). The lack of significant impact of previous injury experience on adherence further underscores the need for continuous, structured safety education and follow-up practices, rather than relying on workers' personal experiences to drive behaviour change. Overall, while awareness of PPE is moderate, it does not translate into proper use, and safety practices are often ignored.

CONCLUSION

In conclusion, although water factories in Umuahia have taken foundational steps toward occupational safety, the implementation is inconsistent and often superficial. There is a clear need for stronger institutional commitment to OHS practices—particularly in hazard communication, machinery protection, PPE compliance systems, and post-incident training. Strengthening these areas will not only reduce workplace injuries but also enhance productivity, regulatory compliance, and worker well-being.

REFERENCES

1. Abdulrahman, M. A., & Bebo, K. K. (2021). Evaluation of health and environmental safety in food and water production factories in Duhok Governorate. Journal of Life and Bio Sciences Research, 2(2).
2. Adebayo, A., Olayiwola, M., & Johnson, B. (2021). Occupational health and safety risks in water production facilities in Lagos, Nigeria. Journal of Occupational Safety and Environmental Health, 15(2), 68-75.
3. Akinwale, A. A., & Olusanya, O. A. (2016). Implications of occupational health and safety intelligence in Nigeria. Journal of Global Healthcare Systems, 6.
4. Chen, H., & Wong, M. (2019). Personal protective equipment in manufacturing: Assessing the effectiveness of PPE usage in reducing workplace injuries. Safety and Health Journal, 18(4), 101-113.
5. Musa, Y., & Adeoye, K. (2021). PPE usage among factory workers: An evaluation of effectiveness and compliance. Journal of Health and Safety in Africa, 9(2), 58-70.
6. Oghuvwu, S. O., Egbagbe, E. E., Aigbirior, J. O., Oniovokukor, B. E., & Erhabor, G. E. (2018). Respiratory health status of workers in a bottling factory in Benin City, Nigeria. International Journal of Environmental Research and Public Health, 15(9), 1919. https://doi.org/10.3390/ijerph15091919
7. Ojatta, D. O. (2022). Chemical quality of bottled water in Nigeria: A systematic review. Journal of Good Governance and Sustainable Development in Africa, 7(2), 10–21.
8. Okeke, F., & Aina, K. (2020). Occupational hazards and safety practices in Nigeria's small-scale water factories. African Journal of Environmental Health, 14(1), 56-65.
9. WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). (2015). Progress on drinking water and sanitation: 2015 update and MDG assessment.
10. World Health Organization & International Labour Organization. (2021). WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury, 2000–2016. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_dialogue/@lab_admin/documents/publication/wcms_819788.pdf