

ASSESSMENT OF AWARENESS AND COMPLIANCE WITH SAFETY REGULATIONS AMONG DUMPSITE WORKERS IN SOUTHWESTERN NIGERIA

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Abstract

Wastes deposited on dumpsites in major cities in Nigeria are managed by dumpsite workers. These workers demand adequate protection due to hazards attached to their job. Technology has however, developed safety wear for their protection and well-being. This paper investigates awareness and compliance with safety regulations among workers in Ibadan and Abeokuta dumpsites. One hundred and fifty-nine respondents were obtained through random sampling and snowballing methods. Data collected through questionnaire administration were analyzed with descriptive statistics and cross-tabulation. All the selected respondents were adult males and females with different educational backgrounds. All the respondents were aware of safety regulations pertaining to their job through training and other means. Results revealed that 11 % respondents have complete set of safety wear, while 36%, 28% and 13% have overalls, rubber shoes and helmets respectively. Concerning the wearing of protective gear, 69 percent reported that they always wear the safety gear on duty, while 24 percent wear it only when instructed by their supervisors. The study concludes that the use of safety gear by dumpsite workers is currently low due to poor regulation enforcement and a carefree attitude. The study recommends adequate provision of safety wears and serious regulation enforcement to ensure the safety and health of dumpsite workers.

Keywords: Compliance, dumpsite workers, Nigeria, safety regulations

Introduction

Wastes in major cities across Nigeria are commonly disposed off through various means, including dumping on open sites, landfills, and water bodies, or by burning and burial, depending on the available facilities and methods. At dumpsites, waste management activities are largely carried out by men and women collectively referred to as dumpsite workers (DW). These workers play a vital role in waste recovery, recycling, and environmental protection. They help to minimize pollution, reduce the cost of raw materials for industries, and sustain themselves and their dependents, thereby contributing significantly to the economic development of society (Rushton, 2003; El-Wahab et al., 2014). Despite their crucial role in the waste management value chain, dumpsite workers face several challenges, including social discrimination, poor working conditions, and exposure to health and environmental hazards. Recognizing these risks, the government has established environmental regulations to protect their health and safety. In Ogun and Oyo States, for instance, safety and protection of workers in various sectors, including waste management, are enshrined in the state environmental regulations. These regulations mandate employers to provide adequate Personal Protective Equipment (PPE) and to enforce its use

through operational guidelines. Employers are also required to ensure good housekeeping practices, provide adequate waste containers, and make available medical facilities such as first aid, clinics, or hospitals. The regulation stipulates that all waste handlers and drivers must be “adequately kitted” with boots, aprons, uniforms, nose masks, and non-latex hand gloves while on duty.

With technological advancement, several types of Personal Protective Wear (PPW) have been developed to safeguard dumpsite workers from work-related injuries and illnesses. Such protective devices shield workers from direct exposure to accidents, bruises, and various health complications likely to occur during waste handling activities (El-Wahab et al., 2014). Common examples of PPW include gloves, helmets, footwear, raincoats, and ear and eye protectors. Each of these items serves specific protective functions (Table 1). However, the use of PPW among dumpsite workers is often influenced by factors such as educational level, attitude, and poverty. Non-compliance with PPE regulations can lead to severe health consequences, including injuries and infections (Thakur et al., 2018).

Table 1: List of Protective Wear for Dumpsite Workers

PPW	Function
1 Gloves	Protection against physical, chemical and biological hazards
2 Eye protection	Shield particle, chemical and UV-related eye injuries
3 Respiratory gear	Prevent lungs from harmful dust, fumes and vapours
4 Footwear	Protect foot from injuries from sharp or heavy objects
5 Headgear	Shield head from impact and falling objects
6 Hearing protection	Prevent hearing loss in noisy environment
7 Coveralls	Provide comprehensive protection for the body

Source: Suleman et al, 2017

Due to the prevailing poor implementation of waste management policies and the inadequacy of mechanized facilities, most waste operations such as sorting, packing, and movement are performed manually. Manual handling of sharp wastes (needles, blades, knives) increases the likelihood of cuts and injuries, while lifting heavy objects (steel, wood, iron) can result in falls. Exposure to pungent smells may also affect workers’ physical and psychological wellbeing. Consequently, dumpsite workers are frequently exposed to work-related hazards such as injuries from sharp objects and infections from bacteria, viruses, and fungi (Patil & Kamble, 2017).

According to the Health and Safety Executive (2007) and Suleman et al. (2015), dumpsite workers are vulnerable to numerous occupational hazards through direct skin contact with waste materials and inhalation of toxic gases emitted from burning refuse. In Nigeria, the extent of these exposures remains largely undocumented, and enforcement of safety gear usage is weak (Environmental Health Division, 2005).

Globally, occupational health and safety have become major public health concerns. The International Labour Organization (ILO) and the World Health Organization (WHO) have reported alarming figures of workplace-related injuries and fatalities, particularly in developing countries. Approximately 6,300 people die daily due to occupational accidents or diseases, amounting to more than 2.3 million deaths annually (ILO, 2010; WHO, 2010). Moreover, 317 million workplace

accidents occur each year, many leading to prolonged absences from work. In developing nations, weak enforcement of occupational safety measures results in nearly one million workplace accidents annually, with unsafe working conditions causing an estimated 2.4 million deaths and an economic loss equivalent to 4% of global GDP (ILO, 2010). In developing countries like Nigeria, Ghana, and India, waste management is predominantly manual, exposing workers to physical, chemical, and psychosocial hazards (Bleck et al., 2012; Indhira et al., 2014). Municipal Solid Waste (MSW) workers in these regions face occupational risks due to inadequate technology, poor enforcement of regulations, and limited access to PPE. Studies have reported numerous health challenges among MSW workers, including injuries, respiratory problems, and skin infections (Patil & Kamble, 2017; Baral, 2018). In many African cities, dumpsites are located on city outskirts, often near informal settlements where the urban poor reside. These dumpsites serve as both a workplace and a source of livelihood for many who pick and recycle valuable materials (Afon, 2012). However, this activity exposes them to risks such as infections, respiratory issues, and physical injuries.

Exposure to solid waste, particularly medical waste, can be extremely dangerous. Studies have shown that unsafe handling and disposal practices expose workers to infectious diseases such as hepatitis B and C and even Ebola virus (Bassey et al., 2006; Gumodoka, 1997). Similarly, biological hazards such as exposure to bacteria, fungi, and viruses are prevalent among dumpsite workers (Graudenz, 2009; Pedrosa et al., 2010; Pinho, 2010). These microorganisms can cause acute or chronic infections, allergic reactions, and toxic responses. Infections like tetanus, hepatitis C, and gastroenteritis have been reported among dumpsite workers (Sousa et al., 2015).

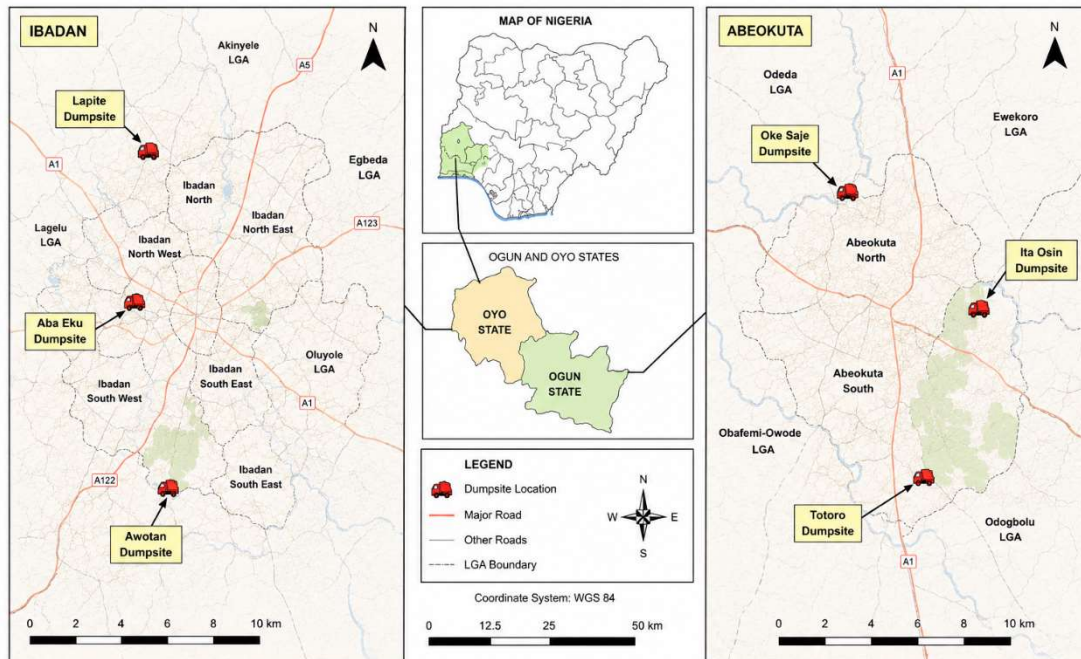
Poor technological adoption, inadequate funding, and public indifference have hindered effective waste management in Nigeria. Most waste collection, sorting, and movement activities are still done manually, increasing workers' exposure to occupational risks. Addressing these gaps through improved enforcement and behavioral change is crucial to protecting dumpsite workers and advancing national and global sustainability goals.

Therefore, this study aims to investigate the awareness and compliance with safety regulatory practices among dumpsite workers in Southwestern Nigeria. It also assess awareness of occupational health and safety regulations among dumpsite workers; and examine the extent of compliance with these safety regulations at selected dumpsites.

Materials and Methods

Study Area

The research was conducted in Ibadan (Oyo State), and Abeokuta, (Ogun State) in Southwestern Nigeria with high population densities and substantial volumes of municipal solid waste. These characteristics make the two cities home to some of the busiest dumpsites in the region. In Ibadan, the dumpsites included Lapite, Aba-Eku and Awotan, while in Abeokuta the study focused on Oke-Saje, Ita-Oshin and Totoro. These sites were selected based on their high operational activity and the presence of large numbers of informal waste workers that were suitable for the study. The map of the study area is shown below.



**MAP OF STUDY AREA SHOWING DUMPSITE LOCATIONS
 IN IBADAN AND ABEOKUTA**

Study Design

This study adopted a descriptive cross-sectional design to assess the awareness, availability, and use of personal protective wear among dumpsite workers, as well as their exposure to occupational hazards. The design enabled the researchers to collect information from respondents at a single point in time, allowing for an accurate snapshot of prevailing safety practices and working conditions within the selected dumpsites.

Study Population

The study population consisted of individuals engaged in daily waste-handling activities at the selected dumpsites. These included waste pickers, loaders, pushers, sorters and supervisors who were directly exposed to occupational hazards due to the nature of their work. Only active workers present at the dumpsites during the study period formed the target group for data collection.

Inclusion and Exclusion Criteria

Participants were eligible for inclusion if they were 18 years or older, actively engaged in waste handling at the dumpsite, and willing to give informed consent. Workers temporarily present at the dumpsite but not involved in waste-handling activities were not included. Individuals younger than 18 years, non-consenting persons and visitors or traders who were not directly engaged in waste-related tasks were excluded from the study.

Sample Size and Determination Method

A total of 210 questionnaires were distributed across the six dumpsites. About 35 questionnaires were administered in each dumpsite, while 159 were completed, resulting in a response rate of 75.7%. A formal sample-size formula was not applied because there was no official record of the total number of dumpsite workers. The sample size was therefore guided by the accessibility of respondents, the estimated number of workers present at each site and field research

recommendations for informal populations. The final number of respondents was considered adequate for descriptive analysis.

Sampling Technique

Due to the absence of an organized registry of dumpsite workers and the informal structure of their operations, a combination of purposive and snowball sampling was used. The researchers first identified workers who met the inclusion criteria and then relied on referrals from these initial respondents to reach additional workers who were eligible and willing to participate. This approach ensured access to a hard-to-reach group whose activities depend heavily on interpersonal networks.

Data Collection Tools

Data were collected using a structured questionnaire developed from the study objectives and existing literature on occupational safety among waste workers. The instrument covered socioeconomic characteristics, awareness of safety regulations and use of personal protective wear. The questionnaire was pre-tested among a similar population outside the study area to assess clarity and reliability, and necessary adjustments were made based on the feedback received. Direct observation of PPW use, site conditions and work activities was also conducted to complement the questionnaire data.

Data Collection Process

Data collection took place between May and July 2025 through on-site visits to the selected dumpsites. Research assistants administered the questionnaires in English, Yoruba or Pidgin depending on the respondent's preferred language, and they assisted respondents with low literacy levels. Observations were simultaneously conducted to record workers' behaviour regarding PPW use, waste sorting methods and exposure to physical and biological hazards.

Data Analysis Methods

Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize the variables. The findings were presented in tables and charts to aid clarity and interpretation.

Ethical Approval and Consent

Ethical principles governing human research were strictly adhered to throughout the study. Participation was voluntary, and all respondents received clear information about the purpose and procedures of the study. Written and verbal informed consent was obtained. No personal identifiers were recorded, thereby ensuring anonymity and confidentiality. The study complied with the principles of respect for persons, beneficence and non-maleficence. Ethical approval details can be added here if an official reference number is available.

Results

Socio-demographic characteristics of respondents

The socio-demographic characteristics assessed in this study included the age, gender, and educational levels of respondents, as presented in Figure 1, Table 2, and Figure 2. As shown in Figure 1, the respondents were distributed across several adult age groups, with the majority falling within the economically active population. Most workers were observed to be younger and middle-aged adults, while only a small proportion of older individuals participated in dumpsite

activities. This pattern reflects the physical demands associated with waste collection, sorting, and lifting, which are more commonly undertaken by individuals within active age brackets.

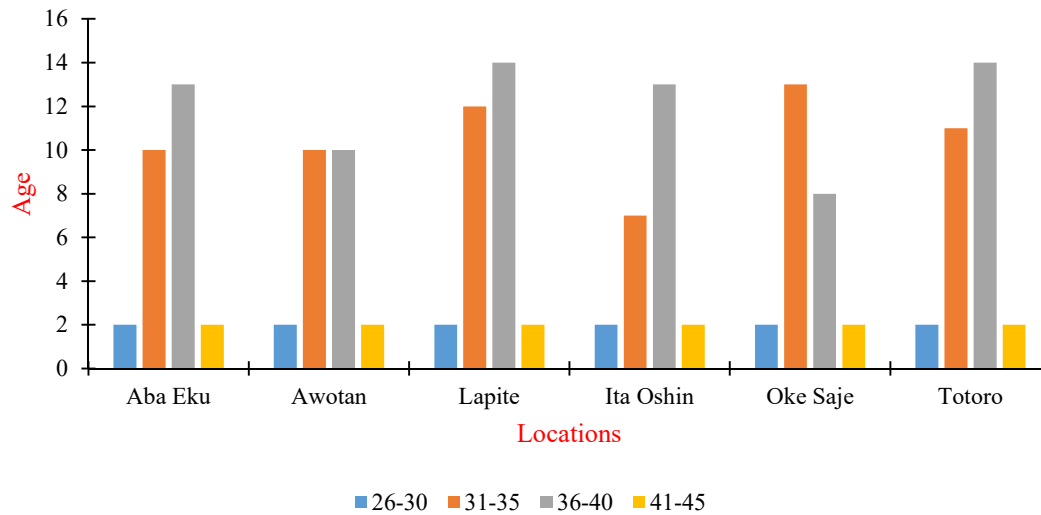


Figure 1: Age of the respondents.

Gender distribution across the six dumpsites revealed a consistent pattern of male dominance (Table 2). In all locations, males constituted between 72% and 83% of the workforce, while females accounted for 17 % to 28 %. Specifically, male representation was recorded as 77.78 % at Aba-Eku, 79.17 % at Awotan, 73.33 % at Lapite, 83.33 % at Ita-Oshin, 72. % at Oke-Saje, and 72.41% at Totoro (Table 2). These findings indicate that dumpsite operations were predominantly carried out by men, which may be associated with the high level of physical effort required for loading, pushing, sorting, and moving waste materials.

Table 2: Gender characteristics of respondents

Dumpsites	Gender	Frequency	Percentage
Aba Eku	Male	21	77.78
	Female	6	22.22
	Total	27	100.00
Awotan	Male	19	79.17
	Female	5	20.83
	Total	24	100.00
Lapite	Male	22	73.33
	Female	8	16.67
	Total	30	100.00
Ita Oshin	Male	20	83.33
	Female	4	16.67
	Total	24	100.00
Oke Saje	Male	18	72.00
	Female	7	28.00
	Total	25	100.00
Totoro	Male	21	72.41
	Female	8	27.59
	Total	29	100.00

The educational characteristics of respondents are shown in Figure 2, where a generally low literacy profile was observed. A substantial proportion of the workers had either no formal education or only primary-level schooling, while fewer respondents reported secondary education and very limited tertiary-level attainment. This distribution suggests that dumpsite work was largely undertaken by individuals with limited educational opportunities, reflecting the low technical skill requirements and minimal formal qualification needed for engagement in this type of informal waste management activity.

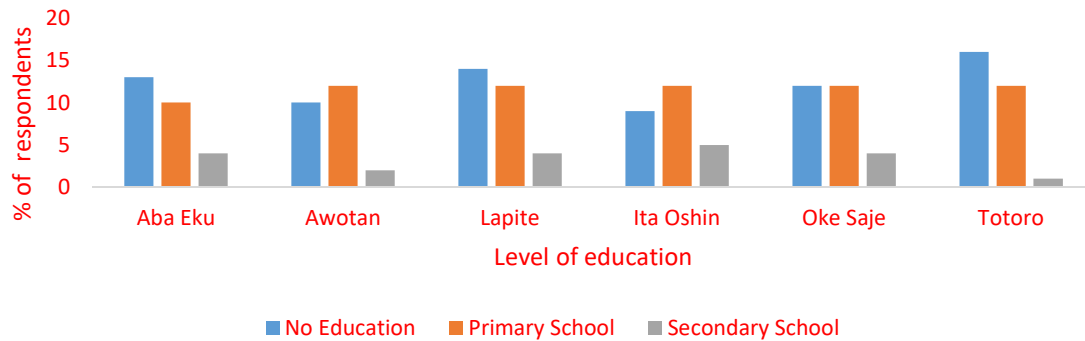


Figure2: Level of education of respondents

High levels of awareness were reported across the six dumpsites. Most respondents indicated that information regarding safety practices had been obtained through various channels, including formal training sessions, on-the-job demonstrations, peer interactions, and informal sensitization efforts within the dumpsite (Table 3). These multiple sources contributed to broad exposure to safety-related information among the workers.

The sources of workers' awareness about safety regulations include formal training, on-the-job training, peer-to-peer learning and Mass media or public campaigns. The responses of the selected workers on the sources of awareness about the safety regulations is shown in Figure 3 below.

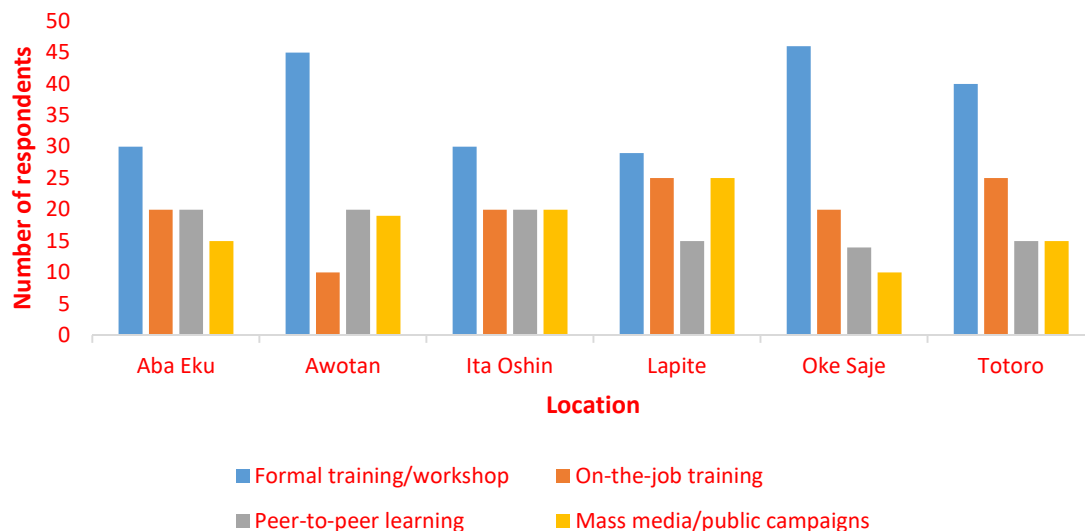


Figure 3: Sources of workers awareness about safety regulations

The use of protective wears is a major safety regulation for the workers. The study investigates the awareness of the workers about the ownership and use of protective wear at work. It was found that a substantial majority were aware of the need to use personal protective wear during waste-handling activities (Figure 4). Only a small proportion of respondents expressed limited or no awareness of specific safety requirements. The high level of awareness indicated that most workers understood the existence of safety regulations and were informed about the protective measures expected to be used in their daily operations.

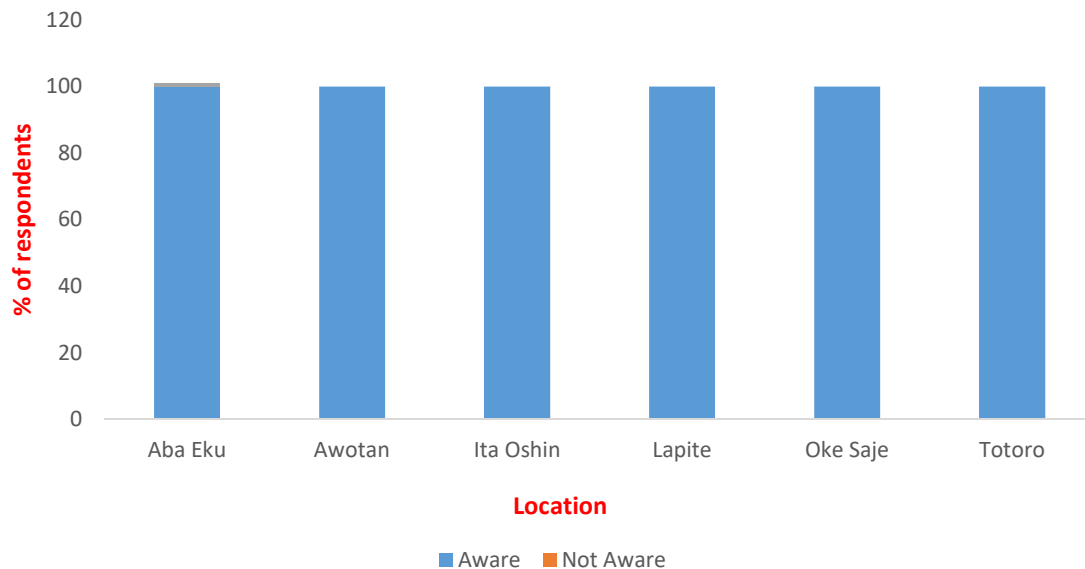


Figure 4: Dumpsite Workers' Awareness about the Use of Protective Wear During Operation

Overall, possession of complete protective wear was found to be inadequate across all dumpsites. Only 11% of the respondents reported owning a full set of the recommended safety gear, indicating that comprehensive protection was available to only a small fraction of the workforce (Table 3). The distribution of individual protective items further showed wide variation in ownership. About 36% of respondents possessed overalls, while 28% owned rubber shoes or boots. Headgear was reported by 13%, and heavy-duty gloves were held by 5% of the workers. Ownership of eye protection and respiratory devices was particularly low, with only 2.5% of respondents reporting possession of eye shields or dust masks (Table 5).

Table 3: Possession of Safety Wear by Dumpsite Workers

Type of Protective Wear	Frequency	Valid Percentage
Rubber shoes/boots	44	27.7
Dust masks	4	2.5
Ear masks	4	2.5
Headgear	20	12.6
Overalls	57	35.8
Eye Shields/ Goggles	4	2.5
Heavy duty gloves	8	5.0
All of the Above	18	11.3
Total	159	100.0

Dumpsite Workers' Level of Compliance with Safety Regulations: Compliance with safety regulations among dumpsite workers was assessed by examining the frequency and consistency of using personal protective wear during waste-handling activities. The patterns of compliance observed across the six study locations are presented in Figures 5 and 6. Overall, the majority of respondents reported that protective wear was used regularly while on duty. Specifically, 69% of the workers indicated that they always wore their protective gear during operations. In contrast, a substantial proportion approximately 22–24% reported that safety gear was worn only when instructions were given by supervisors, reflecting a conditional pattern of compliance. A smaller group of respondents acknowledged irregular or occasional use of protective wear

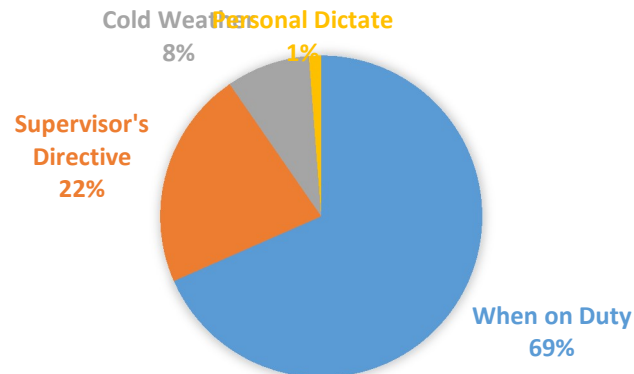


Figure 5: Determinants of using safety wears in the selected study areas

Considerable variation in compliance was observed across the individual dumpsites. In locations such as Aba Eku, Awotan, Lapite, It's Oshin, and Oke Saje, over 60% of workers were reported to use their protective wear consistently while on duty, indicating relatively high adherence to safety protocols (Figure 5). In contrast, in locations such as Totoro, fewer than 50% of workers consistently wore protective gear during operations. Across all study areas, less than 30% of respondents reported using protective wear solely under the presence of a supervisor, highlighting a generally low level of conditional compliance. Additional contextual factors were noted, with workers in Totoro and Awotan more likely to wear protective gear during cold weather, suggesting that environmental conditions also influenced compliance patterns, while less than 10% in location like Oke Saje uses protective wears sometimes as a result of personal desire.

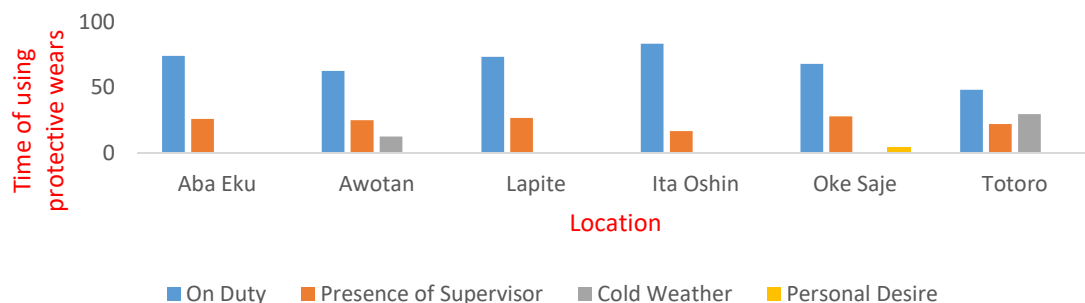


Figure 6: Time of Using Protective Wear by Dumpsite Workers in Each Location

It was found that the majority of respondents 79% procured their protective gear independently, indicating a high reliance on personal initiative for safety (Figure 7). In contrast, 21% of workers reported that protective wear was supplied by their employers, reflecting limited organizational provision.

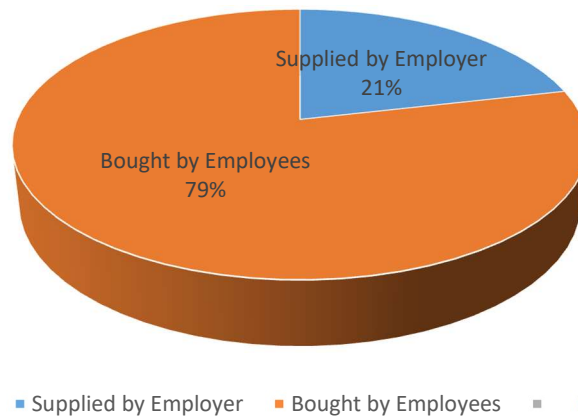


Figure 7: Sources of Protective Wear used by Dumpsite Workers in All the Study Areas.



Figure 8: Sources of protective wears of Dumpsite workers

All the respondents in three dumpsites (Aba Eku, Lapite and Ita Oshin) reported that they bought the safety wear themselves. Also, 33.3 %, 12 % and 37.9 percent of the respondents reported that employers provided safety wear for them in Awotan, Oke Saje and Totoro respectively (Figure 8).

Discussion

Workforce Demographics and Vulnerability

The predominance of young and middle-aged males in dumpsite activities is consistent with earlier studies on informal waste management in developing countries. In Nigeria, Afon (2012) found that 87% of scavengers at the Olusosun dumpsite in Lagos were young adult males, largely because waste picking involves physically demanding tasks requiring strength and endurance. Similarly, Bleck and Wettberg (2012) reported that waste collection and recycling activities in

developing countries are characterized by intensive manual labor, making the sector more attractive to economically active adults. Low educational attainment among waste workers has also been linked to limited employment opportunities and reduced understanding of occupational health and safety procedures, thereby increasing vulnerability to workplace hazards.

Knowledge-Practice Gap in Occupational Safety

The observed gap between awareness of safety regulations and actual compliance with protective measures is well documented in occupational health literature. Studies have shown that although waste workers often understand the risks associated with their occupation, knowledge alone does not guarantee safe behavior. Financial constraints, discomfort associated with personal protective equipment (PPE), workplace culture, and lack of enforcement frequently limit compliance. A study among waste pickers in Bauchi, Nigeria, found that despite reasonable awareness of occupational hazards, utilization of PPE remained low because of affordability issues and poor enforcement mechanisms.

This finding supports the argument that occupational safety interventions should go beyond awareness creation and address practical barriers that prevent workers from translating knowledge into protective action.

Structural and Economic Determinants of Safety Compliance

The finding that ownership and use of PPE are influenced by economic and organizational factors is supported by previous studies. Waste workers in developing countries often purchase their own protective equipment, leading to inconsistent use due to financial limitations. Bleck and Wettberg (2012) emphasized that occupational health improvements require addressing hazards at their source while simultaneously ensuring access to adequate protective equipment. Research has also shown that workers are more likely to comply with safety measures when employers provide PPE and actively enforce safety standards. Consequently, interventions that subsidize or provide protective gear can significantly improve compliance and reduce exposure to occupational hazards.

Environmental and Contextual Influences

Environmental conditions and workplace culture play important roles in shaping safety behavior among waste workers. Studies indicate that workers often respond more readily to immediate and visible risks than to abstract occupational safety regulations. Site-specific conditions such as weather, terrain, supervision, and peer influence affect PPE usage and adherence to safety protocols. Research on informal waste pickers has shown that local workplace norms significantly influence safety practices and risk perception. Furthermore, a systematic review by Bentley et al. (2021) highlighted that occupational risk among waste pickers vary considerably across contexts, emphasizing the need for locally adapted interventions. These findings suggest that occupational health programs should be tailored to the specific environmental and social conditions of individual dumpsites.

Policy and Public Health Implications

The findings have important implications for occupational health policy and public health practice. The dependence on self-procured protective equipment reflects gaps in employer responsibility and regulatory enforcement. The International Labour Organization has consistently emphasized that employers should provide safe working conditions and appropriate protective equipment for workers. Similarly, studies on waste management workers have shown that stronger institutional

support, regular monitoring, and enforcement of occupational health regulations can significantly reduce workplace injuries and illnesses.

The observed knowledge-practice gap further highlights the need for targeted training programs, behavior change communication, and community-based interventions. Combining regulatory measures with practical support mechanisms such as PPE provision, safety training, and regular health monitoring can improve worker safety and contribute to more sustainable waste management systems.

Conclusion

The study shows that occupational safety among dumpsite workers is influenced by demographic characteristics, economic limitations, workplace conditions, and institutional support. Although workers possess considerable awareness of occupational hazards, compliance with safety practices remains constrained by limited access to protective equipment, financial challenges, and weak enforcement of safety regulations. Therefore, improving occupational health outcomes requires a combination of safety education, provision of affordable protective equipment, and stronger regulatory oversight to promote safer and more sustainable waste management practices.

Recommendations

With a view to improving the safety of dumpsite workers' health and productivity, the following recommendations are made:

- i. **Provision of Protective Equipment:** Employers and waste management authorities should ensure regular supply of affordable or free personal protective wear to reduce reliance on self-procurement and improve compliance with safety standards.
- ii. **Targeted Training and Education:** Safety training programs should be designed to suit the low-literacy workforce, using practical demonstrations, visual aids, and peer-led sessions to enhance understanding and consistent use of protective measures.
- iii. **Context-Specific Interventions:** Safety strategies should account for local environmental and site-specific conditions, such as weather variations and physical layout, to promote adherence to protective practices under real working conditions.
- iv. **Strengthening Supervision and Policy Enforcement:** Effective supervision and enforcement of occupational safety regulations at dumpsites are critical to ensure that workers consistently apply safety measures, while formal policies can incentivize employer responsibility.

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