



Occupational hazards of sanitation workers in Port Harcourt metropolis, Rivers State, Nigeria

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Abstract

The study investigated the occupational hazards of sanitation workers in Port Harcourt metropolis, Rivers State, Nigeria. The study was guided by 4 objectives, 4 research questions. The study had an estimated population of 960 sanitation workers in Port Harcourt metropolis, a multistage sampling method was employed, and a sample size of 621 was derived using Taro-Yamen formula. The study collected data from the following groups of sanitation workers; domestic cleaners (314), industrial cleaners (248), refuse collectors (13), street sweepers (9) and fumigators (9) who are all involved in keeping our environment tidy. The study adopted a descriptive cross sectional research design, instrument used for data collection was a close ended structured questionnaire with a reliability of 0.87 obtained using Cronbach alpha. Data were analyzed using mean and standard deviations to analyze demographics, a z-test and one way ANOVA were used to test the hypothesis at 0.05 level of significance. The study revealed that sanitation workers had high exposure to chemical hazards (2.76 ± 1.094) compared to a criterion mean of 2.50, moderate exposure to physical and biological hazards (2.53 ± 1.032 & 2.58 ± 1.040 respectively), and low exposure to psychosocial hazards (2.33 ± 1.029). The study concluded that sanitation workers in Port Harcourt were exposed to occupational hazards by varying degrees and were experiencing health effects associated with the hazards. Based on the findings of the study, there is need for education of sanitation workers on safety practices. The study recommended that administrative measures be taken to improve safety statistics, periodic safety trainings be organized, and the consistent use of Personal protective equipments should be encouraged.

Keywords: Occupational, workers, Port Harcourt, hazards

Introduction

A hazard is a condition with the potential to cause harm or accident. There are three interacting factors in an accident: machine, environment and man. Identifying a hazard requires careful examination of a work system to detect hazardous situations. Methods use in identifying a hazard includes: a. Preliminary hazard analysis: forming a list of hazards and ask simple questions like "what if...", b. Failure mode and effects analysis: analyzing the effects of parts failing, c. Hazard and operability review (HAZOP): requires brainstorming and innovation, d. Fault tree analysis: assuming an undesired outcome and applying deductive reasoning to arrive at causes (Jain and Rao, 2015) ^[17]. Hazards have been generally classified in the study as physical which includes mechanical and ergonomic, chemical, biological and psychosocial hazards (Achal, 2019) ^[1].

Sanitation workers provide an essential public service around the world; a service we all rely on but which often comes at the cost of the health, safety and dignity of the workers. Sanitation workers belong to the lower socioeconomic group usually with low educational qualifications, the services of a sanitation worker is required in virtually every industry and this makes them an important part of the working population. Just like any occupation, sanitation workers are faced with hazards on a daily basis. The frequency of interaction with the hazards among other factors makes the workers vulnerable to some health effects. Sanitation workers include domestic and industrial cleaners, refuse collectors, street cleaners, fumigators, among others saddled with the responsibility of unclogging drains, disposing refuse and faecal matter, cleaning industrial and domestic facilities, etc. The cleaners have the most population of sanitary workers.

In several countries including Nigeria, it is a predominantly female job especially older females. For example females with a median age of 44.7 accounted for 85.3% of cleaners in the US (US Census Bureau, 2018) ^[26].

According to Ziprecruiter blog in 2020, an advert for a sanitary job in an industrial setting would usually require the following responsibilities: 1. Use approved chemicals to disinfect surfaces, 2. Disassemble, sanitize, and reassemble equipments, for example, food processing equipment, 3. Dispose of waste along the assembly line, 4. Sweep and mop the floors, 5. Dust ventilation ducts to ensure proper airflow, 6. Refill soap and hand towels in the bathrooms, 7. Report potential issues to management.

Chemical hazards among sanitation workers tends to receive more attention usually because sanitation work requires consistent contact with chemicals that are irritating, corrosive or sensitizers during cleaning activities, it's the commonest hazard faced by these workers and has a long term cumulative effect on the health of workers. The production and use of chemicals in workplaces around the world presents one of the most significant challenges in workplace protection programmes. Chemicals are essential to life, and their benefits are numerous and well-recognized. Chemicals are essential to life and healthy living. (International Labour Organisation, 2014) ^[16]. Chemicals are used by various industries in production processes to develop products that are globally acceptable. However, exposures to these chemicals in the workplace has its negative impact on the worker and the environment, the control of these chemicals remains a challenging tasks to those involved i.e the workers, employers, governments, international safety agencies. (ILO, 2014). Cleaning products like soap, detergents, personal care products are sold in large volumes and the chemical constituents for making them are mass produced, with this huge amount of exposure, there should be detailed screening process to identify hazards associated with these chemicals. Cleaning chemicals are those which quickly and effectively remove dust, dirt, grime and bad smells from surfaces. Purpose of cleaning chemicals is cleaning and disinfection. According to Hayley *et al.*, (2012) ^[14]. "ocular exposure to liquid detergent capsules may lead to conjunctivitis and corneal ulceration; detergent ingestion may result in central nervous system (CNS) depression". Eli *et al.*, (2018) found occupational hand dermatitis to be common among hair dressers in contact with cleaning chemicals in Choba community, Rivers state. The results showed a prevalence of 34.3% among 108 respondents.

Studies have shown sanitation workers are exposed to some biological hazards which could be passed on to offspring's for example Lidia *et al.*, (2013) ^[19] suggested that the use of cleaning sprays, air fresheners and solvents during pregnancy would likely increase the risk of wheezing and lower respiratory tract infections in early infancy. A ten year review of the frequency of WRA among cleaners with exposure to cleaning products showed 12.4% prevalence out of 1199 participants, the highest percentages worked in healthcare (41.1%), building cleaners (20.3%). (Rosenman *et al.* 2020) ^[24].

Statistics shows the physical hazard is a significant hazard among sanitation workers, 34% of 390 sanitary workers had encountered injury with 16% resulting in hospital admittance (Green *et al.* 2019) ^[12]. Sanitary workers often work bent forward with the back twisted and repetitive muscular movements of the arms, this may result in musculoskeletal

disorders especially among the elderly women. U.S. Funmilola *et al.* (2014) ^[10] conducted a study in a South western university in Nigeria that showed chemical spillage as a hazard of concern among 43% of the cleaners, this could lead to burns, skin sensitization or irritation, other hazards identified were heat, dust, and back pain.

Sanitation workers are exposed to psychosocial hazards like depression that could result from loneliness, insomnia and other psychological issues. Anderson and Marcum (2019) reported they were less likely to have adequate sleep, health insurance and suffered depression. 4.4% and 3.1% of 227 cleaners in a Nigerian university reported insufficient rest and overwork as part of their job hazards. (Funmilola *et al.* 2014) ^[10].

Port Harcourt is an industrialized city with big corporations that demand for sanitation workers, many small and medium scale enterprises (SME) exist to service the big ones, among these SMEs is the sanitation industry, also the researcher personally observed an increased rate of outsourcing of menial jobs like sanitary work in port Harcourt metropolis, this has increased the demand for sanitary workers.

Statement of the problem

Most workers do not derive satisfaction from their work, job hazard analysis is not conducted for menial jobs like sanitation work, and sanitation workers have poor access to safety information; there is insufficient data on the hazards associated with sanitation workers basically due to poor record keeping culture. Appropriate personal protective equipment are not provided for sanitation workers, most sanitation workers work in places with no opportunity for growth or self-actualization, sanitation workers do not have access to legal and occupational health services like other workers, there is no health insurance, most equipments used have poor ergonomics, there is no job security, sanitation workers are laid off at will, sanitation workers have poor relationship with other workers in the organization, there is no provision for pre-employment or regular health screenings for sanitation workers. In view of these problems, the study investigated the hazards and safety practices among sanitation workers.

Aim and Objectives of the study

The aim of the study was to investigate the occupational hazards among sanitation workers in Port Harcourt metropolis, Rivers State. Nigeria. The specific objectives of the study are to:

1. Determine the exposure of the sanitation workers to physical hazards.
2. Assess the exposure of the sanitation workers to chemical hazards.
3. Describe the exposure of the sanitation workers to biological hazards.
4. Investigate the exposure of the sanitation workers to psychosocial hazards.

Research questions

The following research questions were formulated to guide the study.

1. What is the level of exposure of sanitation workers to physical hazards?
2. What is the level of exposure of sanitation workers to chemical hazards?
3. What is the level of exposure of sanitation workers to

- biological hazards?
4. What is the level of exposure of sanitation workers to psychosocial hazards?

Significance of the Study

The study will be of benefit to researchers, who stand to benefit from the publication of this study because it gives perspective to the hazards faced by specific group of workers in a specific geographical area.

Sanitation agencies; the result of this work provides better knowledge on the exposures of their workers to health risk. Academic institutions like colleges and universities will have an added educational tool in teaching hazards workers are exposed to and more articles needed in promulgation of theories on safety, creating solutions to hazards that are fitted to specific professions. Policy makers; to enable them formulate policies that affect the health and well being of sanitation workers positively and in line with global best practices.

Scope of the Study

The study identified the existing occupational hazards of sanitation workers in Port Harcourt metropolis in Rivers State, Nigeria. The group of sanitation workers surveyed included industrial cleaners, domestic cleaners, refuse collectors, street sweepers and fumigators. Inclusion criteria for recruitment into the study were; (i) The participant must be between the ages 18 and 70 years, (ii) Been working as a sanitation worker for at least 1 year and (iii) Willingness to participate.

Conceptual Review

Concept of Hazards

It is a condition with the potential to cause harm or accident. There are three interacting factor in an accident: machine, environment and man. Identifying a hazard requires careful examination of a work system to detect hazardous situations. Methods use in identifying a hazard includes: a. Preliminary hazard analysis: forming a list of hazards and ask simple questions like “what if...”, b. Failure mode and effects analysis: analyzing the effects of parts failing, c. Hazard and operability review (HAZOP): requires brainstorming and innovation, d. Fault tree analysis: assuming an undesired outcome and applying deductive reasoning to arrive at causes (Jain and Rao, 2015) ^[17].

Hazards have been generally classified in the study as physical which includes mechanical and ergonomic, chemical, biological and psychosocial hazards. Sanitary workers are in contact with these hazards daily of which contact with water and chemicals poses the greatest risk. Jain and Rao (2015) ^[17] classified these chemicals hazards as: 1. Asphyxiants- CO₂, N₂, H₂, CO, Hydrogen cyanide, 2. Anesthetics- primary anesthetics like gasoline, ether, alcohol and secondary anesthetics like carbon tetrachloride, 3. Irritants- Primary irritants like NH₄, SO₂, Cl and secondary irritants like H₂S, 4. Miscellaneous groups- Lead, Arsenic, Chromium, Manganese, 5. Organic group- Aromatic hydrocarbons, Aliphatic hydrocarbons, coal tar derivatives, phenol, cresol, etc.

While Achalu (2019) ^[1] classified them as; 1. Toxic- Causing adverse effects after acute or chronic exposure through inhalation or ingestion that is irreversible after exposure has ceased. Phthalates, triclosan, QUATS. 2. Highly toxic- Causing severe adverse effects or death after a single

accidental exposure. 2-butoxyethanol, ammonia, sodium hydroxide. 3. Harmful- Cause slight adverse effects that are readily reversible. 4. Irritants- gases or vapours causing irritation of the lungs. Chlorine, ammonia. Working with cleaning chemicals can have multiple effects like occupational diseases, fire hazards, accidental release, explosions, and environmental pollution.

The Nigerian Sanitation Industry

It comprises of domestic and industrial cleaners, fumigators, refuse disposers, street cleaners who have the responsibility of keeping the environment clean and habitable at the expense of their health most times. Sanitation workers are mostly unskilled workers from the lower socioeconomic class, Majority are cleaners engaged by cleaning agencies and deployed to work in industrial facilities like manufacturing firms, hospitals, hotels, malls, universities and colleges or as domestic staff. The rise in outsourcing of non-essential jobs has led to proliferation of these agencies. It is a female dominated industry in many parts of the world including Nigeria. Fumilola *et al.*, (2014) study in south western Nigeria had 77% female respondents and only 8% were below 30 years of age, similarly in 2010 alone 50% of Latino workers engaged in tourism and hospitality services were women, out of which 41% were cleaners (National Council of La Raza, 2011).

To understand the working conditions of this industry in relation to occupational safety and health, it is important to note the specific socio-economic context in which the sector operates. The sanitation agency faces severe competition. In some cases where the sanitation work is sub-contracted, companies have to initiate cost-cutting efforts to suit their customers who make demands for high work quality at reduced price. Health and safety matters are not always included in the contract terms; it rather comes as an afterthought. This leaves very little room to negotiate safe and healthy working conditions for workers within the host company. (EU-OSHA, 2009) ^[9] Therefore, the employers, i.e. the sanitation companies, have difficulties in controlling the environment in which the sanitary workers work although they are responsible for their health and safety. Moreover, most sanitation workers often lack training, tools and information in order to perform their work in a safe manner.

Occupational Hazard Exposures among sanitation workers Chemical Hazards of sanitation workers

While chemicals are not solely responsible for all occupational diseases, exposure to chemicals enhances the progression of such diseases, this is important for sanitary cleaners who have daily contact with various cleaning chemicals. Achieving decent work involves minimizing hazardous chemical exposures. “The ILO estimate that 2.34 million people die each year from work-related accidents and diseases. From these fatalities, the majority or 2.02 million correspond to occupational exposure to chemicals; the annual global number of cases of non-fatal work-related diseases is estimated to be 160 million”. These diseases cause untold suffering to humans and economic losses, including reduced productivity and work capacity. Around 4 per cent of the world gross domestic product (GDP), equivalent to about USD \$ 2.8 trillion, is lost due to work-related accidents and diseases in direct and indirect costs (ILO, 2014).

Toxicological studies have shown the main effect of cleaning chemicals are on the skin and respiratory tract (Zock, 2005)

^[33], this places contact and inhalation as important sources of exposures, degreasers in cleaning chemicals can break the natural barrier of the skin making it more sensitive to other chemical substances, the contact dermatitis is the most common ailment with rough, itchy and reddish skin symptoms (English, 2004). Respiratory infections like cough, rhinitis, chronic bronchitis, increased asthma risk have been identified among cleaners.

Chemical substances gain entrance to the human body via different means, and this depends on factors like their state (liquid, gas, etc.) and the way they are used. They may penetrate the body when inhaled, direct contact with eyes or skin, or by accidental ingestion through the mouth; a. dermal exposure: The hands are the part of the skin always in contact with cleaning agents. Some cleaning agents are irritant or toxic, they contain substances that can decrease and break down the natural barriers of the skin. Also, frequent contact with water alters the natural defense of the skin making the skin more "permeable" and sensitive to chemical substances. This alteration of the skin texture can lead to the development of contact dermatitis.

The sanitary profession in Nigeria is largely unregulated, lacking relevant social and legal protections; cleaners are not likely to be captured by control measures such as health surveillance and risk prevention

Physical Hazards of Sanitation Workers

The physical hazards can come from the inherent properties of sanitary equipment used or from an unsafe act on the part of the worker. Sanitary workers are exposed to various hazards ranging from dangers of burns to slips and falls from height, awkward and repetitive body movements causing strain on the body's anatomy. Zock (2005) ^[33] opined sanitary work involves high cardio-respiratory and musculoskeletal loads from repetitive work, movement of objects, and disposal of heavy rubbish bins. The profession has been dominated by older females who are more susceptible to strain on the musculoskeletal system. Funmilola *et al.*, (2014) ^[10] study in western Nigeria had 77% female respondents and only 8% were below 30 years of age.

Sanitary cleaners often work bent forward using a long brush to sweep or mop and making repetitive movements; this posture puts a strain on the back. In southwest Nigeria, 4.9% of 227 respondents in Funmilola *et al.*, (2014) study complained of back pain, compared to study done in another clime on the prevalence of musculoskeletal discomforts and the characteristics of musculoskeletal activities of sanitary workers. In Taiwan, nearly 90% of the participants reported musculoskeletal discomfort in at least one body part due to work. Of the nine body parts examined, hand/wrist (41.7%), shoulder (41.1%), low back (37.8%), and elbow (33.3%) were most frequently reported to exhibit discomfort (Jer-Hao *et al.*, 2012) ^[18]. Musculoskeletal disorders (MSDs) (n=5) were associated with several physical stressors e.g. awkward postures, prolonged standing from a review of 35 research studies on hazards of cleaners (Charles *et al.*, 2009) ^[5]. A survey by Weigall *et al.*, (2005) ^[27] made the following findings among sanitary workers studied: (a) 83% experienced pain (aches or pain in neck, arms, hands, back, and legs) or discomfort during the last 12 months, (b) 66% experienced pain (aches or pain in neck, arms, hands, back, and legs) or discomfort in the last 7 days, (c) The lower back (48.5%), wrist/hands (40.9%), and shoulders (39.4%) had the highest prevalence for MSDs and discomfort during the last

12 months, (d) The lower back (15.2%) had the highest prevalence for preventing normal work in the last 12 months. In a HSE survey of 775 sanitary cleaners (89% of them were women) in the UK with regards to the pains they might have suffered in the last 12 months and in the past 7 days. About 3 in 4 sanitary cleaners (74%) had experienced muscular aches, pains and discomfort during the last 12 months (Woods *et al.*, 1999) ^[30]. Concerning the low back region, 46% of 1,216 sanitary cleaners in the UK reported aches/pains in this region over the last 12 months and 24% experienced pain and discomfort during the 7 days prior to the study (Woods and Buckle, 2006) ^[26].

Biological Hazards of Sanitation Workers

Biological hazards produces effect on some target organs of the body, it could be Hepatotoxin, Nephrotoxin, Neurotoxin, Blood/hematopoietic toxin, Respiratory toxin, Reproductive toxin, Cutaneous hazard, Eye hazard. An interesting thing about biological hazards is sanitation can both remove and cause them. Sanitary workers maintain constant exposure with biological hazards in the process of cleaning or disposing refuse. They are literally breathing in atomized toilet droplets and handling contaminated paper towel waste, sharp objects and rubbish, are exposed to infectious agents, insect bites, even venomous ones like snakes and they do this repeatedly for an extended period of time.

Hospital sanitary workers are at risk of injury from needle stick or sharp injuries. Sharps injuries in the healthcare setting may result in the transmission of blood borne viruses (BBVs) such as hepatitis B (HBV) hepatitis C (HCV) or Human Immune Deficiency Virus (HIV). Exposure to mouse or rat urine in sewers can cause Weil's disease (Leptospirosis). Workers who clean drains and dispose refuse can be exposed. Infected water sources like stagnant water, from sources such as "air-conditioning units, water towers, water standpipes, fire hose reels" under the right conditions can harbor bacterial infections like legionnaires disease. Workers involved in cleaning of leisure centres may be exposed droplets of water, containing the bacteria. Though rare another issue of concern is exposure to asbestos containing materials at work. Sanitary workers especially refuse disposal and drain cleaners may come into contact with human or animal waste with pathogenic organisms like Salmonella and E.Coli present.

Psychological Hazards of Sanitation Workers

Psychological or psychosocial hazards of sanitary workers are as important as the other hazards because beyond affecting the quality of their work, it affects their health. Sanitation workers are among the most neglected workforce irrespective of how important their role is in society, the numerous psychological issues of sanitary workers mainly have to do with discrimination, violence related injuries, stress due to isolation, overwork, depression, insomnia.

As one of the factors having a direct impact on the health and quality of life of sanitation workers, psychosocial hazards must be assessed and controlled, there are numerous psychosocial hazards faced by these workers and they include over work, lack of proper sleep, poor remuneration, physical and emotional abuse, boredom, lack of motivation, etc.

A survey by The World Bank, ILO, WaterAid and WHO on the health, safety and dignity of sanitation workers in developing countries showed the psychosocial issues of sanitation workers, especially those employed on temporary

or informal terms, they are poorly and irregularly paid. The formality of the engagement of sanitation workers varies greatly between countries. In South Africa, sanitation work lies basically in the formal economy; public sanitation workers are responsible for sewer maintenance, pit emptying is contracted out to the private sector. In Burkina Faso, it is predominantly informal. In Kenya, the water service providers (WSP) have the duty, but much of the market has been taken over by informal operators and small formal operators (World Bank, ILO, WaterAid and WHO, 2019). As can be observed in other sectors, the financial situation of sanitation workers is precarious. Service fee for work done is extremely poor, irregular, and workers are vulnerable to extortion. From personal observation, some manual workers have been paid in kind (food rather than money), in some cases households outrightly renege on payment after work has been done. With this financial situation, it can compromise the working conditions of sanitation workers as affordability and maintenance of PPE may not be feasible.

Social stigma and discrimination are more issues sanitation workers especially the low grade ones have to face, World Bank, ILO, WaterAid and WHO, (2019) stated “this to be especially true when sanitation is linked to a caste-based structure and often allocated to castes perceived to be lower in the caste hierarchy, such as in India and Bangladesh, where sanitation work is perceived to belong to the Dalit caste”. This consequence of this is social ostracizing and limitations on workers ability to move up the social ladder and in some cases have resulted in trans-generational discrimination, where the children of sanitation workers have limited social mobility but are tied to the vicious cycle of limited opportunities and sanitation work. Low grade sanitation workers face the danger of multigenerational poverty trap, explicit discrimination, social exclusion, limited opportunities to change careers, and social mobility. Another common observation is the preponderance of alcoholism and drug addiction among some sanitation workers possibly used as a way of dealing with the social stigma and discrimination they face, this further injures their health and finance. Many sanitation workers maintaining a low profile, hide their occupation or work far away from their communities as a protective measure for their families.

Sanitation workers most times don't have strong legal protection and enforcement of existing rules. Their numerous operational activities are often not captured in the regulatory frameworks. The reported physical and medical conditions directly associated with sanitation work include headaches, dizziness, fever, fatigue, asthma, gastroenteritis, cholera, typhoid, hepatitis, polio, cryptosporidiosis, schistosomiasis, eye and skin burn and other skin irritation, musculoskeletal disorders (including back pain), puncture wounds and cuts, blunt force, trauma, and fatality (CSFE, n.d.).

According to Zock (2005) ^[17] “Biological dust can contain indoor allergens, moulds and fungal secretion products, and bacterial endotoxin, among others”. Inhalation of sprays has been linked with increased incidence of asthma among cleaners. Occupational asthma among cleaners comprised 12% of all cases; exposure to cleaning agents was the most frequently reported, comprising 20% of all agents mentioned (Medina-Ramon *et al.*, 2003).

General Control of Hazards at Work Place

For effective control, control measures put in place should; 1. Align with the companies' objectives, 2. be appropriate and relevant, 3. Applied at the appropriate stage, 4. be flexible, 5. Interrelate with other forms of protection.

According to Jain and Rao, (2015) ^[17], there are four main techniques to control risk: (a) Risk avoidance: it is not possible to completely avoid risk most times, but can be implemented sometimes. For example, preventing any sanitary work when there is a gas leak. (b). Risk elimination: eliminating hazards, activities and exposures that can negatively affect an organization's assets. This includes safe work procedures, eliminating unsafe acts, proper staff training to avoid accidents. (c). Risk reduction: Minimizing the effect of loss in terms of frequency and severity when risk cannot be avoided. For example using security locks on some devices to reduce the risk of theft, having health insurance to reduce financial obligations due to a medical condition. (d). Risk transfer: Risk can be transferred to others, usually by contract. Purchasing insurance policy is also known as risk transfer since the policy actually shifts the financial risk of loss, contractually to the insurance company from the insured entity. This should be the last option considered.

Generally hazards can be controlled using the triple E system proposed by Heinrich (1932)

- a. Engineering: this includes enclosure/isolation, substitution, exhaust ventilation to remove hazards at source
- b. Education: this involves enlightenment through seminars, training sessions, work-shops to enhance the knowledge of safety among sanitation workers.
- c. Enforcement: It involves positive reinforcement like rewards for safe behaviour and punishment for offenders.

Theoretical framework

The ABC theory of safety: one of the earliest theories on safety with an unknown origin.

A-Attitudes

Workplace safety is primarily determined by workers behaviour at work, especially as employees interact with a variety of safety issues. Your work attitude affects how well you do your job and how safe you are doing it. It naturally follows that people with a positive attitude perform better in the workplace because they keep an open mind and consider the outcome of their behavior. A sanitary worker who is not safety conscious can inadvertently leave wet surface without a caution sign and cause someone else to slip and fall.

B-Behaviour

Behavior is about the psychological state of a worker, workers display a wide range of emotions ranging from aggression to depression. Some bosses are known to show the negative behaviour of bullying co-workers especially unskilled workers like sanitary cleaners and this constitutes psychosocial hazard with the potential to cause depression in bullied workers. Two major health issues has been associated with this; poor mental and cardiovascular health. A sanitary worker suffering from depression would create hazards associated with unsafe acts.

To manage behaviour, a HSE officer should show both technical support ensuring work is done with low risk and leadership skill ensuring everyone is integrated into the group.

C-Conditions

The condition is the consequence of behaviour, either negative or positive. When people understand the “condition” for their behaviour it will lead to change of attitude. For most sanitary workers, losing their job or a direct consequence on their social life is more important and can lead to behaviour change. The key to change is in understanding the motivations for safety in people; this becomes important for long-term behavioural change.

The health belief model

By Rosenstock in 1966 based on the work of Lewin. The health belief model was one of the first models used to explain human decision about their health and subsequent behaviour. This theory has been modified to include six constructs to help predict people’s decision about their health.

(a) Perceived susceptibility: A sanitation workers perception of personal susceptibility to accidents often differs from the realistic appraisal of their statistical probability. These perceptions may significantly affect their willingness to take preventive action. This can be remedied by helping the workers to develop an accurate perception of their exposure to hazards, (b) Perceived severity: Sanitation workers in health settings may not respond to taking immunization against some preventable diseases Hepatitis B because they do not view it as a serious disease. They must perceive the potential seriousness of the condition in terms of consequences like pain, time lost from work, economic difficulties. The remedy is to specify the consequences of exposure to a hazard and recommend preventive actions. (c) Perceived benefits: Sanitation workers must believe that the recommended health action will benefit them if they are to comply. A worker not used to wearing PPE for a long time must know the benefit of using it. Explain how, where, and when to take action and the potential benefits that will accrue. (d) Cues to action: A safety chart on the wall may be sufficient to encourage safety habits. Offer reassurance, incentives, and assistance when needed, provide correct information, promote awareness and use reminder systems, (e) Self-efficacy: A workers opinion of what they are capable of doing is based largely on experience with similar situations encountered in the past. Provide training and guidance in performing action

Empirical Review

Happiness *et al.*, (2015) ^[13] investigated the prevalence of work-related musculoskeletal disorders (WMSDs) among highway sanitary workers in Lagos Waste Management Authority (LAWMA), Lagos, Nigeria. The study employed two hundred fifty highway sanitary workers (46 males and 204 females) of LAWMA selected from four Local Government Areas of Lagos State and data was collected using a 26-item questionnaire. The result showed the 12-month prevalence of WMSDs among the workers was 24.8%, the mean age of sanitary workers was found to be 39.01 ± 9.02 (workers aged 20-49 years, 88% compared to older workers aged 50 years and older 12%), Pearson’s Product Moment Correlation Coefficient analysis showed that there was a significant relationship between prevalence of WMSDs

and age ($r = 0.42$, $p = 0.001$). The study concluded that increasing age and years of working experience are significant factors that can contribute to the development of WMSDs among these workers.

Funmilola *et al.*, (2014) ^[10] studied Knowledge of Occupational Hazards among Cleaning Workers, the descriptive study that was carried out among 230 cleaners working in a University in South Western Nigeria, data was collected using questionnaire. About half of the sanitary cleaners had just 1-3 years work experience, the result showed more experienced cleaners were not necessarily more knowledgeable about job hazards and opined training is the only factor that is significantly associated with the level of awareness among the cleaners. The study recommended continuous training to maintain the level of awareness.

Adetoyeje and Usman, (2021) ^[2] conducted a study on the prevalence of low back pain (LBP) among street cleaners in Northeastern Nigeria, convenience sample method was used to recruit 381 participants and questionnaire was used to collect data. The result showed those with primary or qur’anic education had higher report of LBP more than their counterparts with secondary or tertiary education ($p = 0.046$). The study recommended the need for workers ergonomic education.

Ofonime and Ukeme, (2020) ^[22] assessed the occupational hazards, health problems and utilization of personal protective equipment (PPE) among street sweepers in Uyo, Nigeria. The study was carried out using a descriptive cross-sectional study, data collection was carried out using an interviewer administered semi-structured questionnaire and population was 150 street sweepers in Uyo. The result showed the commonest hazards reported were dust 141(94.0%), cold 129 (86.0%), mosquitoes 74 (49.3%) and prolonged bending 149 (99.3%). The study recommended adequate provision of PPEs by employers in order to mitigate the effects of hazards on sweepers.

Eli *et al.*, (2018) carried out a study to identify the occupational hazards and safety practices of refuse collectors in Obio/Akpor Local Government Area of Rivers State using a descriptive cross sectional study design and a multistage sampling procedure, an interviewer-administered questionnaire was used to collect data from the 310 respondents. The result showed 39.3% of refuse collectors were exposed to psychosocial hazards, the following psychosocial hazards were identified; violent public attacks 22%, bullying from other employees 12.9%, work overload 83%. The study recommended the need for workers to be protected from these hazardous exposures.

Methodology

This study employed a descriptive cross sectional survey design. A multistage sampling method with 3 stages was used to draw out the sample of 621 from an estimated population of 960 derived from the study of Eli *et al* (2018). The sample size was determined using Taro Yamane formula. A structured questionnaire was used for collecting data, the questionnaire had two major sessions. Section A for the bio data of respondents and Section B gave information on hazards and safety measures. The validity of the instrument was determined using content validation. The reliability of the instrument was determined using test-retest method and the result of the analysis yielded a Cronbach Alpha reliability coefficient of 0.87. The data collected was analysed using IBM SPSS (Statistical Product and Service Solution) version

26.1 using the statistical tools of mean and standard deviation.

Results and Discussion

The result shows sanitation workers in Port Harcourt had low exposure to psychosocial hazards (2.33 ± 1.029), moderate

exposure to physical and biological hazards (2.53 ± 1.032 , 2.59 ± 1.074) and high exposure to chemical hazards (2.76 ± 1.094).

Question 1: What is the level of exposure of sanitation workers to physical hazards in Port Harcourt metropolis of Rivers State, Nigeria?

Table 1: Mean and Standard deviation analysis of physical hazards of sanitation workers in Port Harcourt

S/No	Items	Mean	SD	Remark
1	Exposed to vibration from work tools	1.78	.812	Very low exposure
2	Exposed to objects on high temperature	2.27	1.297	Low Exposure
3	I stand or bend for long period of time	2.51	1.028	Moderate Exposure
4	Dangers of slips and falls	2.67	1.009	High Exposure
5	Exposed to sharp objects	2.78	.939	High exposure
6	Exposed to health risk that can cause disease	3.06	1.028	Very high exposure
7	Exposed to car accidents	2.67	1.112	Moderate Exposure
	Aggregate Mean	2.53	1.032	Moderate Exposure

Question 2: What is the level of exposure of sanitation workers to chemical hazards in Port Harcourt metropolis of Rivers State, Nigeria?

Table 2: Mean and Standard deviation analysis of chemical hazards of sanitation workers in Port Harcourt

S/No	Items	Mean	SD	Remark
8	Exposed to chemical substances such as solvents, mists, fumes and gases	2.79	1.116	High Exposure
9	Exposed to use of latex gloves	2.95	1.140	High Exposure
10	These chemicals are sometimes inhaled, ingested or spills on my skin	2.66	1.046	Moderate Exposure
11	Exposed to chemicals that flammable, poisonous and corrosive	2.91	1.088	High Exposure
12	Exposed to strong chemicals like disinfectants and degreasers	2.47	1.081	Low Exposure
	Aggregate Mean	2.76	1.094	High Exposure

Question 3: What is the level of exposure of sanitation workers to biological hazards in Port Harcourt metropolis of Rivers State, Nigeria?

Table 3: Mean and Standard deviation analysis of biological hazards of sanitation workers in Port Harcourt

S/No	Items	Mean	SD	Remark
13	Exposed to infectious agents like bacteria, viruses, fungi	2.58	1.071	Moderate exposure
14	Exposed to mosquitoes/insect bites	2.39	1.033	Low Exposure
15	Exposed to human excreta	2.68	1.010	High Exposure
16	Exposed to used hypodermic needles (needle stick)	2.79	1.038	High Exposure
17	Exposed to snake bite	2.44	1.050	Low exposure
	Aggregate Mean	2.58	1.040	Moderate Exposure

Question 4: What is the level of exposure of sanitation workers to psychosocial hazards in Port Harcourt metropolis of Rivers State, Nigeria?

Table 4: Mean and Standard deviation analysis of psychosocial hazards of sanitation workers in Port Harcourt

S/No	Items	Mean	SD	Remark
18	My workload is excessive	2.26	1.051	Low Exposure
19	I am certainly talked down by the public	2.14	.934	Low Exposure
20	There is no opportunity for promotion	2.61	1.112	High Exposure
21	I do not get sufficient sleep	2.31	1.039	Low Exposure
22	I am bullied/harassed by senior colleagues	2.34	1.009	Low exposure
	Aggregate Mean	2.33	1.029	Low Exposure

Discussion

Sanitation workers in Rivers State experience moderate exposure to physical hazards (2.53 ± 1.032). The following physical hazards had a high mean rating; exposure to disease causing health risk, exposure to sharp objects and danger of slips and fall. This result is expected because sanitation workers are exposed to physical hazards daily due to the nature of their jobs. Sanitary work involves physical hazards like high cardio-respiratory and musculoskeletal loads from repetitive work, movement of objects, and disposal of heavy

rubbish bins. (Zock, 2004). Zock, (2005) ^[33] also opined "sanitation workers at high risk for occupational injuries due to falls are window cleaners and others working at heights, wet floors can cause slips". Ofohime and Ukeme, (2020) ^[22] also reported physical hazards of dust 141(94.0%), cold 129 (86.0%) and prolonged bending 149 (99.3%) among street sweepers. The similarities with these studies are all the workers are exposed to one form of physical hazards and they create similar health impacts like musculoskeletal disorders, respiratory issues, the reason for the similarities is physical

hazards are a hazard of importance to sanitary workers due to the nature of their work, the control of physical hazards would drastically reduce the occupational hazards of sanitary workers.

The study also showed high exposure of sanitation workers to chemical hazards with average mean rating 2.76 ± 1.094 . High chemical exposures include; exposure to chemical substances such as solvents, fumes or gases, exposed to latex gloves and exposure to flammable, poisonous or corrosive chemicals. The result was expected because of observed high level of exposure to wet work, use of cleaning chemicals and latex gloves. Similar studies done include Sara *et al.*, (2020) on hospital laundry workers which revealed that 54.1% and 53.5% of laundry workers were exposed to bleaching agent and detergents respectively, Funmilola *et al.*, (2014)^[10] listed exposure to chemicals in self identified hazards, Chemical hazards affected 182(79.1%) females and 11(57.9%) of the males among sanitary workers in Stephen, (2016). These studies share similarities with the researcher's findings because all workers are potentially exposed to chemical hazards, the difference is that the various groups of chemical hazards have different route they penetrate the human system, some via inhalation, others by contact. The acerbating factor is poor knowledge of safety practices in relation to the products used at work, as well as the lack of information on how to use, store and mix them safely.

The study also revealed a moderate exposure of sanitation workers to biological hazards with the average mean rating of 2.58 ± 1.040 . The following biological hazards had high exposure ratings; exposure to human excreta and exposure to used hypodermic needles. This result was expected because of the low level of formal training the workers had, this had implication on their safety practices towards biological hazards. Zock, (2005)^[33] stated biological hazards come from agents such as micro-organisms (bacteria, viruses and moulds) and their products such as fungal secretions found more particularly in dust and aerosols that permeate the environment during the cleaning or vacuuming process. He also stated sanitation workers may also be exposed to biological agents from blood and body fluids with the sanitary workers most at risk are cleaners in hospitals, nursing homes, clinics and laboratories. The most dangerous biological risk factors for cleaners health are blood-borne viruses such as "hepatitis C (HCV) and B (HBV), and Human Immunodeficiency Virus (HIV), both HIV-1 and HIV-2" (Berry, 2006). In Stephen, (2017), 31.6% of male sanitary and 50% of female sanitary workers were exposed to biological hazards, Fungi infection as a biological hazard was listed by about 20% of 227 respondents among sanitary cleaners. (Funmilola *et al.* 2014). The routes of exposure to biological agents are the same as for chemical hazards which are inhalation, dermal penetration and accidental ingestion.

Sanitation workers had low exposure to psychosocial hazards with a mean rating of 2.33 ± 1.029 . The only psychosocial hazard with high exposure was lack of opportunity for promotion. This result wasn't expected because the researcher thought the stressful nature of sanitary jobs should constitute a strong psychosocial hazard and most literature reviews point to high psychosocial hazards among sanitary workers but according to EU-OSHA (2009)^[9] sanitary companies do not have a specific prevention policy regarding stress. They do not see stress as a real problem with implications for health and safety. Richard, (2020) which showed majority of respondents (78.6%) faced psychosocial

hazards in form of inadequate working tools/equipment, lack of motivation and incentives, physical/verbal assaults, delay in the payment of salaries and unresponsiveness of community members, this greatly affected their job satisfaction of sanitation workers as job satisfaction was found to be only 14.3% and job satisfaction strongly affected job performance ($p = 0.020$), poor salary of the workers also affected their job performance ($p = 0.003$). Winifred *et al.*, (2020) reported majority of the workers were exposed to the following psychosocial hazards; stress, verbal abuse, and poor interpersonal relationship. The reason for the difference was these studies were conducted in Ghana where the level of education was fairly higher than seen in this study (Richard, 2020 had 78% sanitary workers with senior secondary certificate), education enhances the opportunity of the worker to change jobs since the outstanding issues among the psychosocial hazards were poor remuneration and delay in the payment of salaries which affected their job performance. It is necessary to note some workers feel positive about their work and see their job as meaningful. They take pride in being responsible for neat environments, even when this means more workload than they should be engaged in. They keep their area nice same way they would their home.

Conclusion

The safety and health conditions of sanitation workers depend on the environment and most of them are generally poor. Sanitation workers in Rivers State are highly exposed to chemical hazards, moderately exposed to physical (mechanical and ergonomic) and biological hazards,

Recommendations

Based on the findings of the study, the researcher made the following recommendations.

1. Head of organizations should organize training programmes that are designed to improve awareness of hazards and knowledge of control measures, alter perceptions and induce change in attitude..
2. Sanitation agencies can acquire better equipments with good ergonomics, for example a short handle vacuum cleaner can be replaced by long handled one to avoid awkward postures, use of carts to move cleaning tools and products to reduce load on the spine, using step ladders instead of chairs to reach objects at heights.
3. Head of organizations should enforce preventive measures like pre-employment trainings, vaccinations (hospital cleaners should be vaccinated against hepatitis B), the use of PPE should be encouraged.
4. Sanitation workers must avoid mixing of cleaning products as much as possible, but if it must be done then, manufacturer's instructions must be strictly adhered to, use in little quantities and less frequently, also strong/irritant products could be replace with something less aggressive.

Conflict of Interest

The authors state that there is no conflict of interest.

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