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RISK ASSESSMENT ON WASTE MANAGEMENT OFFICIALS IN UYO METROPOLIS, AKWA IBOM STATE

Godwin A. Usoh[1*], Enobong O. Umoh[2], and Emmanuel O. Sam[3]

[1-3]Department of Agricultural Engineering, Akwa Ibom State University, Ikot Akpaden, Nigeria.

[*]Corresponding Author's Email: godwinusoh@aksu.edu.ng; Tel: +2348067080232

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ABSTRACT: *The study was conducted on risk assessment of waste management officials/workers in Uyo Metropolis of Akwa Ibom State. It aimed at identifying the occupational hazards affecting waste management officials in the study area, assessing the health effect of the hazards on waste management officials in the study area, assessing the safety packages and medical conditions available for waste management officials in the study area as well as identifying constraints to effective solid waste management in the study area. Respondents were drawn from waste collection points and dumpsites in Uyo Metropolis. A total of one hundred and twenty (120) waste management officials were selected for the study using a stratified random sampling technique. They were given well-structured questionnaires and out of 120 questionnaires issued, 118 questionnaires were retrieved from waste management officials in usable forms. The questionnaires were analyzed using descriptive statistics. Results showed that occupational hazards affecting waste management officials in the study area include risk of musculoskeletal disorders due to lifting and carrying of heavy loads and pushing pushcart, contaminated materials, and working in contaminated environment, contact with hazardous substances in the course of working with mixed waste, mechanical hazards due to unintentional contact with sharp items and working near moving parts of machinery/vehicles and psychological burden in working with waste and disrespect by members of the society. Common health risks associated with waste management in the study area include cholera, diarrhea, nasal irritation, eye irritation, high temperatures in working environments causing dizziness, insect bites and musculoskeletal injuries. Mechanical Hazards include cuts on hand, finger, thumb, or foot from broken glass or sharp objects and eye injury. Severe health complaints among the waste management officials in the study area include chronic back pain, chronic neck pain, chronic shoulder pain, eye injury, excessive heat and skin diseases. These complaints are indications that waste management officials are at risk in the study area. Only protective gears for waste handlers, protective clothing and safety shoes were confirmed by the majority of the respondents as the only available safety equipment confirming that these officials are exposed to occupational risks and hazards. From the study, high ranking constraints identified by the respondents include insufficient funding, lack of sufficient awareness of officials on the danger of some waste items, policies and education while low ranking constraints include inadequate capacity of waste managers and regulators and poor attitude of waste management officials. It is therefore recommended that hazardous waste items should be eliminated at source through proper waste sorting and segregation as well as provision of safer safety equipment and packages.*

KEYWORDS: Health effect, Hazards, Officials, Respondents, Constraints.

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INTRODUCTION

Waste is a product or substance which is no longer suited for its intended use. Waste is regarded as unwanted material that is gotten through anthropogenic activities either from residence, commercial or industrial activities. Waste can create significant health problems and a very unpleasant living environment if not disposed of safely and appropriately. According to Usoh *et al.* (2023b), food wastes, broken glasses, plastics, metals, papers and textiles are among the possible generated wastes. Usoh (2023) noted that the composition of waste generated varies greatly and contains dissolved and suspended materials and depends on the type and age of the waste while Udom *et al.* (2023) observed that pig waste contains excessive nutrients that can negatively affect water bodies and aquatic environments. Nta *et al.* (2017) posited that various forms of wastes generated have destroyed most water bodies and aquatic lives as well as causing human death. According to Uchacha *et al. (*2024), waste dumpsites have been one of the forms of waste disposal management as they reduce environmental unfriendliness mostly for reducible, recyclable and combustible wastes. Soil contaminated by heavy metals from waste disposal sites is a serious problem because soils are regarded as the ultimate sink for heavy metals discharged into the environment (Usoh *et al.,* 2023a). Due to soil toxicity at specific concentrations, Zinc (Zn) and Lead (Pb) present in these wastes have significant ecological relevance; it is known to have a variety of effects on plant, which can decrease the quality of food and in turn affect human health (Isak *et al.,* 2013) but high crop production depends mainly on relationship between quality soil and water (Usoh *et al.,* 2017). Generally, lack of appropriate soil and water conservation measures has led to land degradation (Ahuchaogu et al., 2022) and inappropriate waste disposal has major negative consequences for soil, water, plant and human health (Usoh *et al.,* 2022).

Environmental pollution has been a major problem in Akwa Ibom State and other urban areas in Nigeria and other parts of the world due to improper waste management systems and the risk incurred by its officials (Usoh *et al.,* 2023c). Protection of human health and the environment is one of the major challenges facing developing as well as developed countries of the world (Couth and Trois, 2012). The original aim of regulating waste disposal is to reduce the introduction of polluting substances into the environment since protection of the environment is a major challenge facing developing countries such as Nigeria. The activities in waste management in the informal enterprises of Uyo involve risk either to the waste management officials directly involved or to the informal enterprise operators.

Risks occur at every stage in the process of waste management, from the point where enterprise operators handle waste in their enterprises for collection or recycling to the point of ultimate disposal (Vehlow, 2015). The informal sector enterprise activities generate large quantities of waste which could be detrimental not only to the environment but to the waste management officials/workers as well. Many concerns have been raised about the potential harm from waste to the environment and general public, but the risks and consequent costs of occupational hazards in waste management have received little attention in the rush to adopt or adapt technologies such as composting. In some countries of the world, attention seems to have shifted towards policies and legislation designed to minimize the generation of waste and to secure its beneficial reutilization. The process of collecting, handling, and disposing of waste materials can be inherently hazardous, posing risks to the health and safety of waste management officials/workers and the environment. It is therefore vital in this study to examine the occupational safety and health hazards associated with waste generated and disposed of in the informal enterprises of the city of Uyo, the largest urban settlement in Akwa

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Ibom State. Hence, this study seeks to assess the risk on waste management officials/workers in Uyo Metropolis, Akwa Ibom State.

METHODOLOGY

Study Area

The study was conducted in Uyo Local Government Area, Akwa Ibom State. Akwa Ibom State is one of the six states in the South-South geopolitical zone in Nigeria. The state is endowed with abundant mineral resources, including enormous crude oil, which has remained the mainstay of Nigeria's foreign currency and economy. Uyo, the capital of Akwa Ibom State, is located between 4°30" and 5°30" north latitude and 7°30" and 8°30" east longitude. The elevation above sea level is 45m. Uyo is located in the equatorial zone, which has wet and dry seasons. The most notable attribute of the equatorial environment according to Peter et al. (2002), is its year-round temperature consistency. The mean monthly temperature of Uyo is 27ºC with very little variation and relative humidity of 75 – 90%. Rainfall begins about March and finishes around September, with a brief dry spell in August known as "the August break" (Udoh & Sobulo, 2010)

Research Design

The descriptive survey design was used in this study. This design was adopted for this study because it seeks to identify risks which waste management officials encounter in Uyo Metropolis of Akwa Ibom State. Ojo (2014) pointed out that surveys are the best technique for obtaining the necessary data from people through the use of questionnaires. According to Osuala (2001), the survey design is the design suitable for collection of data based on the opinion of people.

Sources of Data

The data for this study was sourced from both primary and secondary sources. The primary source of data was through the use of questionnaires, key informant interviews, photography, informal discussion and field observations. The other source of information was from secondary sources such as unpublished data and published articles, books, dissertation, and journal articles.

Population of the Study

The target population for this study consists of waste management officials/workers (irrespective of age and gender), employed by the Akwa Ibom State Protection and Waste Management Agency. Every field staff of the agency stands an equal chance of being selected for the study.

Sample and Sampling Technique

A multi- stage random sampling technique was used in selecting the appropriate sample for the study. In the first stage, Uyo Metropolis was divided into five sub areas based on the five major roads from the centre of the city namely Oron, Abak, Aka, Barracks and Ikot Ekpene roads. In the second stage, five (5) dumpsites were randomly selected in each of the five sub areas giving

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a total of twenty-five (25) dumpsites for the study. The survey questionnaires were distributed to the respondents at various dumpsites. The purpose of the study was explained to the workers and asked if they were willing to answer the questionnaire. A total of four (4) respondents were sampled at each dumpsite giving a total of one hundred respondents for the study. The last stage was selection of twenty (20) workers at the permanent waste dumpsite for the study giving a total of one hundred and twenty respondents for the final analysis. Administration of the questionnaires was done within one-month period so as to cover the study area.

Instrumentation for Data Collection

Data was collected after written permission was approved by the municipal waste manager. Before data collection, the researcher briefed the participants to explain the purpose of the study and to request for permission to conduct the study. Thereafter, willing participants were given the opportunity to choose a convenient time and dates for the interviews between December 2024 and January 2025. Respondents were interviewed using a structured questionnaire prepared by the researcher. The questionnaire involved two parts; the first part contained information on the demographic characteristics of the respondents including gender, age, types of housing, religion, educational level, and nature of tasks carried out in the team. Part two contained information on types of risk entered and safety measures available for them in the agency. The majority of the questions in the questionnaire were closed-ended while a few were open-ended. The close-ended questions would be asked with the view to permit vivid comparison of responses while the open-ended question aimed at allowing participants to supply information which was not captured by the response categories.

Validity of the Instrument

The test-retest technique was used to estimate the reliability of the questionnaires. Ten respondents each were selected from each dumpsite outside the study area and given the questionnaires to fill and another set of questionnaires was given to them to fill after two weeks. This is to ensure that their responses show an appreciable degree of consistency. The reliability test of the data was carried out using Cronbach's Alpha aided by statistical packages for social science (SPSS) version 25.

Techniques of Data Analysis

Both descriptive and inferential statistics were used for data analysis. Analyses in this study were done using simple descriptive statistics. Prior to the multivariate analysis, data was given general descriptive statistical treatments using mean, standard variation, and percentages of frequency distribution.

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RESULTS AND DISCUSSION

Demographic information of the respondents

Table 1 shows the demographic characteristics of the respondents. Male had the highest population among the respondents accounting for 68.6 % of the 118 respondents while female accounted for the remaining 31.4%. The highest marital status of the respondent was married with 57.6 % followed by single respondents with 28.8 % while divorce was the least with 3.4 %. Age distribution of the respondents showed that the majority (47.5 %) of the respondents were between 31-40 years followed by 41-50 years with 22.9 % of the respondents while the least age class was above 50 years with 9.3 %. There was no teenager among the waste management officials/workers reflecting the nature of the job. This may suggest that waste management work is not cherished among the teenagers because of the public rate of the job. At the same time, it is not also a job for old people. Education level of the respondents showed that the majority of them (52.5 %) had secondary education followed by primary education with 26.3 % while tertiary education had the least (2.5 %). There were also cases of no formal education among the field workers. Areas of operation of the respondents showed that the majority of the respondents (43.2 %) were laborers followed by equipment operators with 28.8 % while mechanics had the least (6.8 %). Their work duration shows that the majority of them have worked for 6-10 years (47.5 %) followed by 1 - 5 years with 27.1 % while the least duration was below 1 year. The high work duration of the majority of the respondents indicates that their experience level in the work is high. Hence, they have adequate knowledge to answer waste related questions.

Table 1: Demographic characteristics of the respondents

Item	Frequency	Percentage	Highest class
Male	81	68.6	Male
Female	37	31.4	
	118	**100**	
Marital status			
Single	34	28.8	
Married	68	57.6	Married
Divorced	4	3.4	
Windowed	12	10.2	
	118	**100**	
Age (years)			
<20	-	-	
20 -30	24	20.3	
31- 40	56	47.5	31- 40
41-50	27	22.9	
Above 50	11	9.3	
	118	**100**	
Education Level			
Primary School	31	26.3	
Secondary School	62	52.5	Secondary School

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Tertiary Institution	3	2.5	
No Formal Education	22	18.6	
	118	100.0	
Area of operation			
Driver/helper	25	21.2	
Laborers	51	43.2	Laborers
Mechanics	8	6.8	
Equipment operator	**34**	28.8	
	118	**100**	
Work Duration (Year)			
Below 1	8	6.8	
1-5 yrs	32	27.1	
6-10 years	56	47.5	6-10 years
> 10 years	22	18.6	
	118	**100**	

Types of wastes evacuated by waste workers in Uyo metropolis

Table 2 shows the type of waste evacuated by the respondents in the study area. Majority of the respondents (100 %) said most of the wastes evacuated in the area is food wastes and nylon followed by plastic waste with 96.6 % to textile with 75.4 % and wood/tree parts while papers, metal as well as bottles/glasses occupied least proportions with 12.7, 17.8 and 36.4 % respectively. The study has shown that waste generated in Uyo metropolis is dominated by biodegradable waste in the form of food as well as long-term biodegradable (incinerable) wastes such as paper, textiles and leather products. It is important to note that biodegradability is a vital biological characteristic of the organic component of waste. Therefore, wastes with low lignin content such as food wastes are more biodegradable than those with high lignin content such as paper, wood and plastic that are dominant in the area. Establishing biodegradability of waste is essential because the majority of environmental and health problems associated with waste generated in the enterprises are caused by the biodegradable components. This assertion confirms findings of Chernova and Shapovalova (2011); Robson *et al.* (2005) and Schwarzeneggar *et al.* (2004) regarding the impacts of biodegradability of waste on human health and the environment.

The non-biodegradable waste fraction includes metals, plastics, and cloth and leather. Metals occupying a very small proportion of the waste can be attributed to the nature of activities that is carried out within the metropolis and the recyclable activity due to the informal practices of waste reduction, reuse, and recycling with the involvement of rag pickers, itinerant buyers, and dealers of recyclables.

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Table 2: Types of solid wastes disposed in the study area

Type of wastes	Frequency	Percentage
Food wastes	118	100.0
Papers	79	66.9
Bottle/Glasses	43	36.4
Plastics	114	96.6
Textile	89	75.4
Nylon	118	100.0
Metals	21	17.8
Leathers	68	57.6
Wood	15	12.7
Others	109	92.4

Occupational hazards affecting waste workers in the study area

Table 3 shows that the majority (67.8 %) of the waste workers in the study area have shown risk of muscular-skeletal disorders due to lifting and carrying of heavy loads and pushing pushcart. Also, 88.1 % of them encountered biological agents from handling organic waste, contaminated materials, and working in contaminated environments. Furthermore, 82.2 % had contact with hazardous substances in the course of working with mixed waste. The finding also showed that 96.6 % of the respondents suffered mechanical hazards due to unintentional contact with sharp items and working near moving parts of machinery/vehicles. All of them (100 %) suffered UV/IR radiation by working directly in the sun while 75.4 % had psychological burden in working with waste and disrespect of society. Cases like noise/machinery interruption by working near heavily frequent roads and in the vicinity of loud vehicles are not common in the study area as this was only the opinion of 35.6 % of the respondents. Also, vibration arising from pushing vehicles on uneven ground as well as electrical risks from taking waste in the workshops was not common. The finding has confirmed that the repetition of similar movements of hands and arms when grabbing and disposing waste containers causes joint problems as also observed by Yang *et al*., 2001; Cimino (2005) and Poulsen and Midtgard (1996) in their studies.

Table 3: Occupational hazards affecting waste workers in the informal enterprises

Hazard	Task	Frequency	Percentage
Muscular-skeletal disorders	Lifting and carrying heavy loads and pushing pushcart	80	67.8
Biological agents	Handling of organic waste, handling contaminated materials, and working in contaminated environment (mould, dirt)	104	88.1
Hazardous substances	Working with mixed waste	97	82.2

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Mechanical hazards	Unintentional contact with sharp items and working near moving parts of machinery/vehicles	114	96.6
Noise/machinery	Working near heavily frequent roads and in the vicinity of loud vehicles (enterprise workshops such as carpentry, metal work, and engineering)	42	35.6
Vibration	Pushing vehicles on uneven ground	21	17.8
UV/IR radiation	Working in the sun	118	100.0
Electrical risks	Taking waste from workshops	29	24.6
Psychological burden	Working with waste and disrespect of society	89	75.4

Categories and impact of hazards identified by the respondents

Table 4 shows categories of risks associated with waste management in the study area. These include biological risk, physical risks, chemical risks, ergonomic risks, psychological risks and safety risks. Impact of biological risk include cases of diseases like Hepatitis B, Cholera, Diarrhoea, Respiratory diseases, Nasal irritation and Eye irritation. However, the occurrence of these diseases varies among the respondents. For instance, Hepatitis B was often for only 4.2 % of the respondents, not often for 9.3 %, rarely for 3.4 % and never experienced by 83.1 %. Cholera was often to 19.5 % of the workers, not often for 39 %, rarely for 21.2 % and never experienced by 20.3 %. Diarrhoea occurred often to 16.9 %, not often to 56.8 %, rarely to 26.3 % and nobody denied its existence. Similarly, respiratory diseases occurred often to 5.1 % of the respondents, not often to 13.6 %, rarely to 22 % and never affecting 59.3 % of them. Their opinion also reveals that nasal irritation was often experienced by 15.3 %, not often experienced by 36.4 %, rarely experienced by 6.8 % and never experienced by 41.5 %. Eye irritation occurred often to 27.1 %, not often to 19.5 %, rarely to 23.7 % and never occurred to 29.7 % only. Among physical hazard includes hearing loss, high temperatures in working environments causing dizziness and insect bites. Hearing loss was not common as 93.2 % never experienced it, high temperatures in working environments causing dizziness occurred often to 32.2 %, not often to 43.2 %, rarely to 18.6 % but never occurred to 5.9 % only. Insect bites occurred often to 39.8 %, not often to 53.4 %, rarely to 6.8 % and none escape the risk of insect bite. Ergonomic risk comprised impact like musculoskeletal injuries (body pains) and long-term back pains and eventually strokes. From the finding, 22 % of the respondents often encountered musculoskeletal injuries, 40.7 % said not often, 26.3 % encountered it rarely while 11 % never encounter it. Also, nobody often encountered long-term back pains and eventually strokes, 6.8 % said not often, 10.2 % said rarely while 83.1 % never encountered it. For safety risk, no respondent often suffers limb loss from compactor hydraulics, 2.6 % said not often, 4.2 % said it rarely occurred while 93.2 % said it never occurred. Again, 22 % often had burning at dumpsites after explosion of pressurized containers like aerosols and so forth, 57.6 % said burn is not often, 9.3 % said it rarely occurs while 11 % said burn never occurs. Furthermore, chemical risks like cancers from carcinogens were not common among waste workers as 97.5 % of the respondents said it never occurs. Also, disorders to the central nervous system (CNS)

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never occur among the waste workers as well as possible lung, kidney, or liver damage as a result of working on waste management.

Table 4: Categories of risks associated with waste management in the study area

Hazards	Impact	Often	Not Often	Rarely	Never	Total
Biological	Hepatitis B	5 (4.2)	11 (9.3)	4 (3.4)	98 (83.1)	118 (100)
	Cholera	23 (19.5)	46 (39.0)	25 (21.2)	24 (20.3)	118 (100.0)
	Diarrhoea	20 (16.9)	67 (56.8)	31 (26.3)	0 (0)	118 (100)
	Respiratory diseases	6 (5.1)	16 (13.6)	26 (22.0)	70 (59.3)	118 (100)
	Nasal irritation	18 (15.3)	43 (36.4)	8 (6.8)	49 (41.5)	118 (100)
	Eye irritation	32 (27.1)	23 (19.5)	28 (23.7)	35 (29.7)	118 (100)
Physical	Hearing loss	0 (0)	2 (1.7)	6 (5.1)	110 (93.2)	118 (100)
	High temperatures in working environments causing dizziness	38 (32.2)	51 (43,2)	22 (18.6)	7 (5.9)	118 (100)
	Insect bites	47 (39.8)	63 (53.4)	8 (6.8)	0 (0)	118 (100)
Ergonomic	Musculoskeletal injuries (Body Pains)	26 (22.0)	48 (40.7)	31 (26.3)	13 (11.0)	118 (100)
	Long-term back pains and eventually strokes	0 (0)	8 (6.8)	12 (10.2)	98 (83.1)	118 (100)
Safety	Limb loss from compactor hydraulics	0 (0)	3 (2.6)	5 (4.2)	110 (93.2)	118 (100)
	Acidic corrosion	8 (6.8)	10 (8.5)	14 (11.9)	86 (72.9)	118 (100)
	Burning at dumpsites after explosion of pressurized containers like aerosols and so forth	26 (22.0)	68 (57.6)	11 (9.3)	13 (11.0)	118 (100)
Chemical	Cancers from carcinogens	0 (0)	0 (0)	3 (2.5)	115 (97.5)	118 (100)
	Disorders to the central nervous system (CNS)	0 (0)	0 (0)	0	118 (100)	118 (100)
	Possible lung, kidney, or liver damage	0 (0)	0 (0)	0	118 (100)	118 (100)

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Mechanical hazards among workers and their risk factor

Mechanical hazards presented in Table 5 shows that 73.7 % of waste workers suffered cut on hand, finger, thumb, or foot caused by broken glass or sharp objects. Also, 45.8 % suffered sprained ankle or wrist caused by improper lifting or throwing technique or running and disembarking from a vehicle. Eye injury affected 56.8 % of the respondents and this was attributed to dust, liquid, chemicals, or smoke. Shoulder injury was a hazard affecting 19.5 % which means that it was not a common hazard among the workers. Knee injury was not also a common hazard as was accepted by 6.8 % of the respondents only. Scratch on leg or finger from dog, rat, scorpion, or snake bites was not also common. Sharp back pain caused by excessive effort in lifting was experienced by 27.1 % of the respondents while trunk injury caused by run over by truck was not common among the respondents. The result revealed that the common mechanical hazards affecting waste management workers in Uyo metropolis include cuts from sharp items (razor blades, glass cutlets, and metal pieces) and eye injury.

Table 5: Mechanical hazard among workers and their risk factor

Risk factor	Cause	Yes	No	Total
Cut on hand, finger, thumb, or foot	Broken glass or sharp objects	87 (73.7)	31 (26.3)	118 (100)
Sprained ankle or wrist	Improper lifting or throwing technique or running and disembarking from vehicle	54 (45.8)	64 (54.2)	118 (100)
Eye injury	Dust, liquid, chemicals, or smoke	67 (56.8)	51 (43.2)	118 (100)
Shoulder injury	Contact collision	23 (19.5)	95 (80.5)	118 (100)
Knee injury	Contact collision, slip, or fall	8 (6.8)	110 (93.2)	118 (100)
Scratch on leg or finger	Dog, rat, scorpion, or snake bites	0 (0)	118 (100)	118 (100)
Sharp back pain	Excessive effort in lifting	32 (27.1)	86 (72.9)	118 (100)
Trunk injury	Run over by truck	0 (0)	118 (100)	118 (100)

Health effect of the hazards on the waste management workers in the study area

Table 6 shows the distribution of health complaints by the respondents. The respondents were also interviewed on healthy ergonomics complains, 36.4 % of them complained of very severe chronic back pain, 26.3 % said the pain was severe, 30.3 % said it was moderate while 16.9 % said they have never complained of any chronic back pain. Also, 23.7 % complained of chronic neck pain, 46.6 % said the neck pain was severe, 50.8 % said it was moderate while 7.6 % never complain of chronic neck pain. For Chronic shoulder pain, 9.3 % of the respondents had very severe complain, 50.8 % had severe complain, moderate complain was 31.4 % but 8.5 % never had complain. Repetitive strain injuries were very severe to 2.5 % of the respondents, severe complain to 10.2 % of them, moderate complain to 19.5 % and never a complain to 67.8 % of the respondents. Similarly, 11.9 % of them complain of very severe repetitive motion

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injuries, 17.8 % complained severely, 56.8 % complained moderately while 13.6 % never complain of such ailment. Sprained arms and knees was a very severe complain for 28.8 % of the respondents, severe and moderate complain for 19.5% respectively but never a complaint for 32.2 %. Exposure to dust was very severe to 20.3 %, severe to 29.7 %, moderate to 39.8 % but never occurred to 10.2 %. Eye injury was very severe among 19.5 % of the respondents, severe to 40.7 % of them, moderate complain to 35.6 % while 4.2 % never complain of it. Excessive heat was a very severe complain for 17.8 % of the respondents, severe complain to 39 % of them, moderate complain to 28.8 % but never complained by 14.4 %. Skin diseases was very severe among 34.7 % of the respondents, severe among 44.9 %, moderate among 16.9 % but never a complain to only 3.4 % of the respondents. Electric shock, excessive noise, allergic respiratory diseases and accidents in general were not common complain as none of them accepted to have ever complained about them in the study area. From the results, severe health complaints among the waste workers in the study area include chronic back pain, chronic neck pain, chronic shoulder pain, eye injury, excessive heat and skin diseases. These complaints are indications that waste workers are at risk in the study area.

Table 6: Distribution of health complaints (%) related to poor ergonomic practices

Health complaints	Very Severe	Severe	Moderate	Never
Chronic back pain	43 (36.4)	31 (26.3)	24 (20.3)	20 (16.9)
Chronic neck pain	28 (23.7)	55 (46.6)	26 (22.0)	9 (7.6)
Chronic shoulder pain	11 (9.3)	60 (50.8)	37 (31.4)	10 (8.5)
Repetitive strain injuries	3 (2.5)	12 (10.2)	23 (19.5)	80 (67.8)
Repetitive motion injuries	14 (11.9)	21 (17.8)	67 (56.8)	16 (13.6)
Sprained arms and knees	34 (28.8)	23 (19.5)	23 (19.5)	38 (32.2)
Exposure to dust	24 (20.3)	35 (29.7)	47 (39.8)	12 (10.2)
Electric shock	0 (0.0)	0 (0.0)	0 (0.0)	118 (100)
Eye injury	23 (19.5)	48 (40.7)	42 (35.6)	5 (4.2)
Excessive noise	0 (0.0)	0 (0.0)	0 (0.0)	118 (100)
Excessive heat	21 (17.8)	46 (39.0)	34 (28.8)	17 (14.4)
Skin diseases	41 (34.7)	53 (44.9)	20 (16.9)	4 (3.4)
Infectious diseases	11 (9.3)	34 (28.8)	38 (32.2)	35 (29.7)
Nerves/senses	6 (5.1)	21 (17.8)	8 (6.8)	83 (70.3)
Allergic respiratory diseases	0 (0.0)	0 (0.0)	0 (0.0)	118 (100)
Other respiratory diseases	9 (7.6)	12 (10.2)	13 (11.0)	84 (71.2)
Accidents in general	0 (0.0)	0 (0.0)	0 (0.0)	118 (100)
Chemical burn	4 (3.4)	15 (12.7)	28 (23.7)	71 (60.2)
Unknown type	8 (6.8)	43 (36.4)	48 (40.7)	19 (16.1)

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Safety packages and medical conditions available for waste management workers in the study area

There are various safety measures used by the respondents to prevent injuries in their work place and these include the use of Protective gears for waste handlers (100 %), appropriate internal transportation vehicle used (28.8 %), and safety warnings, proper storage facility before disposal (38.1 %) and use of incinerator (44.9%). Others include the use of protective clothing (82.2%), safety shoes (58.5 %), helmet (27.1%), safety gloves (58.5 %) and safety glasses (22 %). However, only protective gears for waste handlers, protective clothing and safety shoes were confirmed by the majority of the respondents. This implies that there are workers that do go to the field without appropriate gears and this could increase safety related injuries among the respondents. For instance, some of them do not use dust masks and respirators to deal with problems of high levels of dust and smoke. Oral interview revealed that some landfill workers and bin loaders complained that the material used to make the masks is not very effective since they are facing respiratory difficulties during the time of waste burning. Some of the masks do not fit to faces since they do not have room for adjustment; hence some workers would rather operate without masks, a move that may be detrimental to their health and most of the time most workers do not have the masks since they are usually in short supply. Hence, these workers are exposed to some risks. The safety interventions in the study area are not adequate due to the fact that waste collection is undertaken through labour intensive systems and hence workers experience high physical loads and inadequately stored waste. However, this also agrees with findings of Jerie (2016) who opined that in a low-tech waste management, occupational safety and health intervention is often equal with the supply of personal protective clothing. This has been proven to be one of the least effective measures due to the demand for correct application, infrequency of supply and inadequate materials.

Table 7: Safety equipment available for waste workers in the study area

SN	Safety Measures	Yes	No
1	Protective gears for waste handlers	118 (100)	0 (0.0)
2	Appropriate internal transportation vehicle used	34 (28.8)	84 (71.2)
3	Proper storage facility before disposal	45 (38.1)	73 (61.9)
4	Use of incinerator	53 (44.9)	65 (55.1)
5	Protective clothing	97 (82.2)	21 (17.8)
6	Safety Shoes	69 (58.5)	49 (41.5)
7	Helmet.	32 (27.1)	86 (72.9)
8	Safety gloves	69 (58.5)	49 (41.5)
9	Safety Harness	48 (40.7)	70 (59.3)
10	Safety Glasses/Goggles	26 (22.0)	92 (78.0)
11	Protective clothing	46 (39.0)	72 (61.0)

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Safety practices adopted by the respondents

Improving the occupational safety of waste workers is thus a crucial step to increase their social welfare. This can only be done in an efficient manner by firstly identifying the actual occupational risks associated with waste management activities. Table 8 shows the safety practices undertaken by the respondents themselves. All of them (100 %) often washed their hands after work, 75.4 % often changed their work clothes immediately after work, most of them (61.9 %) did not wash their work clothes every day after work while the majority of them (83.1 %) have received training regarding infection prevention. Furthermore, 66.1 % of the respondents have taken the hepatitis B virus vaccine, 75.4 % have taken the tetanus toxoid vaccine, while 89.8 % have used personal protective equipment while on duty. Also, 64.4 % disinfect/decontaminate reusable cleaning devices after each use, 75.4 % collected infectious medical waste from the service area but the majority (89.8 %) did not always transport medical waste separately in a segregated manner. However, 88.1 % always closed medical waste containers during transport while all of them cleaned their hands with alcohol after coming into contact with dirty surfaces.

Table 8: Safety practices adopted by the respondents

SN	Safety Practices	Yes	No	Total	%
1	Do you often wash your hands after work?	118 (100.0)	0 (0.0)	100.0	0.0
2	Do you often change your work clothes immediately after work?	89 (75.4)	29 (24.6)	75.4	24.6
3	Do you wash your work clothes every day after work?	45 (38.1)	73 (61.9)	38.1	61.9
4	Have you ever received training regarding infection prevention?	98 (83.1)	20 (16.9)	83.1	16.9
5	Have you taken the hepatitis B virus vaccine?	78 (66.1)	40 (33.9)	66.1	33.9
6	Have you taken the tetanus toxoid vaccine?	89 (75.4)	29 (10.2)	75.4	24.6
7	Do you use any personal protective equipment while you are on duty?	106 (89.8)	12 (10.2)	89.8	10.2
8	Do you disinfect/decontaminate reusable cleaning devices after each use?	76 (64.4)	42 (35.6)	64.4	35.6
9	Do you collect infectious medical waste from the service area?	89 (75.4)	29 (24.6)	0.0	100.0
10	Do you always separately transport medical waste in a segregated manner?	12 (10.2)	106 (89.8)	10.2	89.8
11	Do you always close medical waste containers during transport?	104 (88.1)	14 (11.9)	88.1	11.9
12	Do you clean your hands with alcohol after coming into contact with dirty surfaces?	118 (100.0)	0 (0.0)	100.0	0.0

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Constraints to waste management workers in Uyo Metropolis

Constraints identified by waste workers (Table 9) include insufficient funding with 86.44 % followed by inadequate capacity of waste managers and regulators with 54.24 % to lack of sufficient awareness of workers on the danger of some waste items with 94.92 %. Others include policies with 87.29 %, poor infrastructural maintenance (87.29 %), poor attitude of waste management workers (54.24 %), education (95.76 %) and poverty and corruption with 79.66 %. From the results, high ranking constraints identified by the respondents include insufficient funding, lack of sufficient awareness of workers on the danger of some waste items, policies and education while low ranking constraints include inadequate capacity of waste managers and regulators and poor attitude of waste management workers. This is in line with findings of Jerie (2016) who reported policies as a major constraint in waste management. According to him, lack of a comprehensive waste policy that is packaged to deal with safety, health, and environmental management issues has compromised effective solid waste management in the informal sector. For instance, in some policies, there is lack of consensus on what constitutes solid waste, its characteristics, and how the waste should be managed and this has resulted in the municipalities having no proper guidelines over the organization of sustainable waste management in the informal enterprises.

Table 9: Constraints faced by waste management workers in the study area

Item	Frequency	Percentage
Insufficient funding	102	86.44
Inadequate capacity of waste managers and regulators	64	54.24
Lack of sufficient awareness of workers on the danger of some waste items	112	94.92
Policies	103	87.29
Poor infrastructural maintenance	98	83.05
Poor attitude of waste management workers	64	54.24
Education	113	95.76
Poverty and corruption	94	79.66

CONCLUSION

Wastes in Uyo metropolis contain all kinds of items but major ones include food wastes, nylon, plastics, papers and metals. Their proportion however varies among types of waste item in the order: food wastes > nylon > plastics >others. Occupational hazards affecting waste workers in the study area include risk of musculoskeletal disorders due to lifting and carrying of heavy loads and pushing pushcart, biological agents from handling organic waste, contaminated materials, and working in contaminated environment, contact with hazardous substances in the course of working with mixed waste, mechanical hazards due to unintentional contact with sharp items and working near moving parts of machinery/vehicles, UV/IR radiation by working directly in the sun and psychological burden in working with waste and disrespected society. Common health risks associated with waste management in the study area include cholera,

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diarrhea, nasal irritation, eye irritation, high temperatures in working environments causing dizziness, insect bites and musculoskeletal injuries. Mechanical Hazards include cuts on hand, finger, thumb, or foot from broken glass or sharp objects and eye injury. Severe health complaints among the waste workers in the study area include chronic back pain, chronic neck pain, chronic shoulder pain, eye injury, excessive heat and skin diseases. These complaints are indications that waste management workers are at risk in the study area. Only protective gears for waste handlers, protective clothing and safety shoes were confirmed by the majority of the respondents as the only available safety equipment confirming that these workers are exposed to occupational risks and hazards. From the study, high ranking constraints identified by the respondents include insufficient funding, lack of sufficient awareness of workers on the danger of some waste items, policies and education while low ranking constraints include inadequate capacity of waste managers and regulators and poor attitude of waste management workers.

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