FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS AMONG HOUSEHOLD WASTE COLLECTORS IN KINONDONI MUNICIPALITY, DAR ES SALAAM, TANZANIA

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Degree of Master of Science in Public Health

Muhimbili University of Health and Allied Sciences

October 2024

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCESSCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCE

DEPARTMENT OF PUBLIC HEALTH

TITLE: FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS AMONG HOUSEHOLD WASTE COLLECTORS IN KINONDONI MUNICIPALITY, DAR ES SALAAM, TANZANIA

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HD/MUH/T.650/2023

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A Dissertation Submitted in Fulfillment of the Requirement for the Degree Of Masters Of Public Health

Muhimbili University of Health and Allied Sciences

October, 2024

CERTIFICATON

The undersigned certifies that she has read and with this recommends for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled **"FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS AMONG HOUSEHOLD WASTE COLLECTORS IN KINONDONI MUNICIPALITY, DAR ES SALAAM, TANZANIA**" in (partial) fulfillment of the requirement for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

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Date

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ACKNOWLEDGMENT

I want to sincerely thank my supervisor, Prof. Simon Mamuya and my co-supervisor, Dr. Hussein Mohamed, for their important advice, encouragement, and mentoring during my research project. Their knowledge, commitment, and support have been crucial in determining the course and improving the caliber of my study. Their unwavering dedication to excellence and their readiness to share their knowledge and thoughts with me are truly appreciated. Without their direction, this research study would not have been feasible, and I am grateful that I got the chance to work in their direction.

DEDICATION

This work is dedicated to my beloved parents Mr Wilson Joseph Karumuna and Adelina Pancras, their endless love and care have been a constant source of inspiration for me. Their sacrifices and dedication to ensuring my success have not gone unnoticed. Additionally, I dedicate this work to my research assistants, Ms. Oliva Minja and Mr. Charles Opanga, because of their willingness to help me in any way they can to support me with data collection and analysis. I sincerely appreciate the love, care, and support that each of them has shown me during this journey.

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ABBREVIATION

CBO	Community Base Organization
HW	Household waste
MSD	Musculoskeletal disorders
SW	Solid waste
WHO	World Health Organization
ESM	Environmental Science and Management

DEFINITION OF COMMON TERMS

SOLID WASTE refers to any kind of rubbish, refuse, junk, or discarded material, these are divided into groups depending on the location of the waste (1)

HOUSEHOLD WASTE these are disposed of materials or garbage produced by homes. The household waste can also be called domestic waste or residential garbage(2)

HOUSEHOLD WASTE COLLECTORS these are individuals who collect waste by moving from house to house to collect waste directly from household, and then load into the trucks for transportation to the designated waste disposal(3).

MUSCULOSKELETAL DISORDER is defined by the existence of discomfort, incapacity, or ongoing pain in the tendons, muscles, joints, and other soft tissues(4).

ABSTRACT

Background:

Household waste collectors play a crucial role in maintaining waste management in our environment, but their activities involve a variety of health hazards. In developing countries like Tanzania, the collection of waste is done manually which requires heavy physical activities. Among different occupational health hazards, musculoskeletal disorders are common among the household waste collectors. The study hypothesizes that various factors, including gender, working hours, and awareness of proper lifting techniques, contribute to the prevalence of MSDs among waste collectors in Tanzania.

Objective

To determine the factors associated with musculoskeletal disorders among household waste collectors in in Kinondoni Municipality at Dar es salaam, Tanzania.

Material and Methods

A cross-sectional study was carried out where 138 household waste collectors were selected from the multi cluster random sampling. The study used a structured questionnaire and observation checklist. And prevalence of Musculoskeletal disorders was obtained from Calculating the percentage of the respondents with musculoskeletal disorders by determining the total number of the household waste collectors surveyed and calculating the percentage of the respondents who reported musculoskeletal disorder based on the identified criteria Data were analyzed using the statistical package for the social sciences (SPSS) version26 to identify factors contributing to musculoskeletal disorders among household waste collectors. This applied chi square and bivariate logistics regression for data analysis

Results

The study found a high prevalence of musculoskeletal disorders (71.0%) among participants, with significant associations observed between MSDs and factors such as gender (p=0.008), working hours (p=0.001), awareness of risks related to improper lifting

(p=0.011), and knowledge of preventive exercises (p=0.001). Pain was reported in various regions, with notable percentages experiencing discomfort in the neck, shoulders, and lower back.

Conclusion

The study highlights the high prevalence of musculoskeletal disorders among household waste collectors. Where there is the necessity for implementing preventive measures, including training on proper lifting techniques, regular health monitoring, and wellness initiatives. Recommendations for waste collectors include wellness initiatives, work breaks, and rotational schedules, promoting collaboration among stakeholders for a safer work environment.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Musculoskeletal health refers to the functionality of the locomotion system, which consists of intact muscles, bones, joints, and adjoining connective tissues. The musculoskeletal system is affected by 150 distinct illnesses and conditions (5). Musculoskeletal disorders (MSD) are a serious and clear risk that is a costly work problem. They are defined as the presence of discomfort and ongoing pain that affect the tendons, muscles, joints, and other soft tissues. The symptoms are brought on by or made worse by uncomfortable or forceful body positions (6).

Musculoskeletal disorders (MSDs) are a significant public health concern, particularly among workers in physically demanding occupations such as household waste collection. The ergonomic and socio-economic factors contributing to MSDs among waste collectors are complex and multifaceted. Understanding these factors is crucial for developing effective interventions to prevent and manage MSDs in this occupational group (5)

Globally it is estimated that 1.71 billion people have musculoskeletal conditions including the household waste collectors. In Tanzania the prevalence of occupational injuries among the waste collectors is 40.9% (7), and the estimation of Sub Saharan prevalence of the musculoskeletal disorder among waste collectors is 43.7%. Musculoskeletal conditions significantly limit mobility and dexterity, leading to early retirement from work, lower levels of well-being and reduced ability to participate in society and different activities. Because of population growth and ageing, the number of people living with musculoskeletal conditions and associated functional limitations among the group of household waste is rapidly increasing (8).

The burden of MSDs at Global Level is more prone to developing MSDs due to the nature of their work. Workers in industries such as construction, agriculture, healthcare,

manufacturing, waste collectors and transportation are often at higher risk of developing musculoskeletal disorders due to repetitive movements, heavy lifting, awkward postures, and prolonged standing or sitting (8).

In Tanzania as whole, waste collectors, construction workers, healthcare professionals, and informal sector workers are among the groups commonly reported to suffer from musculoskeletal disorders. The prevalence of MSDs in Tanzania may also be influenced by factors such as ergonomic conditions, access to healthcare services, and occupational safety practices (7).

Despite the essential role of waste collectors in managing household waste and promoting public health, they rarely discussed the specific working conditions and socio-demographic factors contributing to MSDs in this occupational group. This knowledge gap hinders the development of targeted interventions and policies to improve the health and well-being of waste collectors in the region. In Tanzania solid waste is collected manually and collection of household waste is also a job that requires repeated heavy physical activity. MSDs is one of the major problem for the household waste collectors where estimates shows that MSDs contributes to about 40% of all the cost towards the treatment of work related injuries (9).

Various waste management policies and guidelines have been formed to overcome these challenges from the environmental policy management of the 2021 which talks about the provision of specific policy guidance with the provision of related issues of waste management system, promotion of technology investment for waste management and providing awareness on the impacts of the municipal waste with the increase of human resource, technical and financial support in the management of waste management (10).

Environmental management act of 2004 aim control and manage sanitation it also discuss the waste management and wellbeing of the waste collectors where the local authorities are designate the transfer stations which serves as collection centers for solid waste disposal and carry out the environmental and health impact assessment for the wellbeing of the waste collectors (11).

Understanding the concept factors influencing MSDs among waste collectors is essential for developing effective strategies to prevent and manage these occupational health challenges. By conducting research focused on the working conditions and socio-demographic factors specific, valuable insights can be gained to inform evidence-based interventions and policies tailored to the needs of waste collectors in this region(12). Furthermore, addressing the occupational health concerns of waste collectors supports broader efforts to promote sustainable and healthy working environments, contributing to the overall well-being of the community.

1.2 Problem Statement

Household waste collectors in Tanzania are at a significant risk of developing musculoskeletal disorders (MSDs) due to the physically demanding nature of their work. The prevalence of occupational injuries among these workers reported at 40.9% (7).

Key factors contributing to this risk include heavy lifting of garbage loads, repetitive packing, unnatural postures, and prolonged working hours, all of which lead to physical strain and potential long-term damage. The impact of MSDs on the health and well-being of waste collectors is profound, adversely affecting their productivity, increasing healthcare costs, and diminishing their overall quality of life.

While existing studies have documented the prevalence of MSDs among waste collectors(13) and assessed related occupational injuries(6), and some studies focused on adverse health effects among household waste collectors(14) there is a lack of comprehensive research focusing on the specific contributing factors to MSDs within this population. This gap in literature is concerning, as it hinders the development of targeted interventions to mitigate the risks associated with these disorders. Therefore, this study aims to systematically identify the factors contributing to musculoskeletal disorders among household waste collectors in Tanzania, with the goal of informing effective interventions and improving their working conditions.

1.3 Conceptual Framework

The conceptual framework (Figure 1) summarizes how dependent variables are affected by independent variables. In addition, it indicates the linkage and interlinkages between independent variables.

1. **DEPENDENT VARIABLE**

Musculoskeletal Disorders among the household waste collectors

2. I**NDEPENDENT VARIABLE**

Socio demographic factors

Socio demographic factors are likely to impact the like hood of developing of MSDs

- Age
- Sex
- Education level
- Duration of employment as a waste collector

Working condition

Working conditions refer to the working environment in which a person works that is influenced by different factors such as physical aspects, working hours. The presence of working conditions can influence the occurrence of MSDs among the household waste collectors. They consist of

- physical aspects such as Lifting techniques
- Working Hours
- Posture used during the waste collection (static posture)
- How many times the waste collection activity is repeated (Repetitive movements)

Level of knowledge

Level of knowledge Based on the MSDs prevention and management is associated with the prevalence of the MSDs among the household waste collectors it consists of;

- knowledge of musculoskeletal disorders
- Training received on ergonomics and occupational health
- Understanding the proper waste collection technique
- Knowledge of the risk factors associated with MSDs

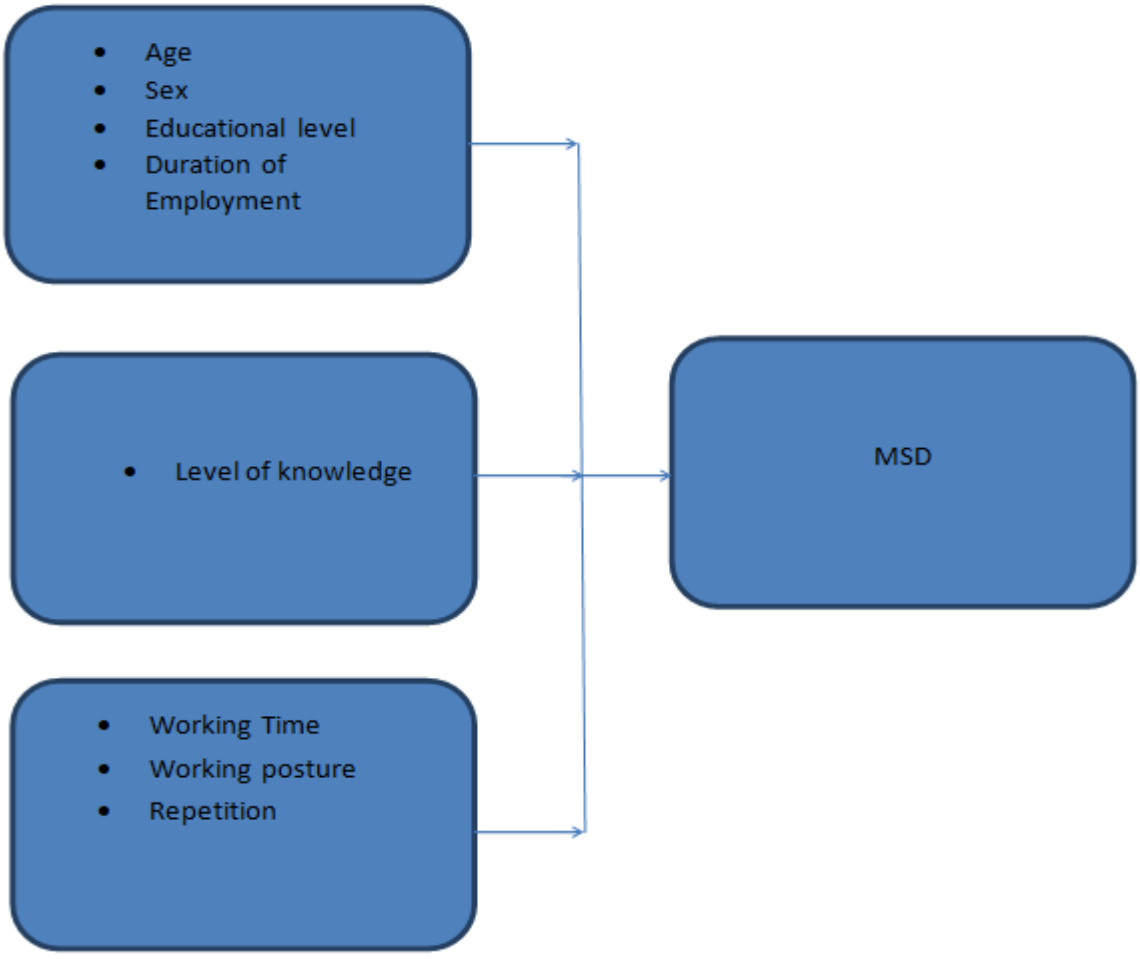


Figure 1. Interconnection between variables (adapted from cause-and-effect model by Cathy et al 2020)

1.4 Rationale

By addressing the research gap in understanding the ergonomic and socio-demographic factors contributing to MSDs among household waste collectors, this study aims to provide valuable insights that can inform the development of targeted interventions and policies to improve the health and well-being of waste collectors. Furthermore, the findings of this research can contribute to the broader body of knowledge on occupational health and safety, with potential implications for other physically demanding occupations. Ultimately, this research has the potential to make a meaningful impact on the lives of waste collectors and contribute to promoting a safer and healthier work environment for this vulnerable occupational group.

The government, non-governmental Community Base Organizations (CBOs), cleaning companies, agencies, authorities, and policymakers may use the study's recommendations to inform the creation of policies and the implementation of laws that will enhance the health and safety of solid waste collectors.

1.5 RESEARCH HYPOTHESIS:

There is a significant association between factors such as working conditions, duration of employment, lack of training and awareness and musculoskeletal disorders among household waste collectors.

Also testing for the prevalence of musculoskeletal disorders among household waste collectors

1.6 RESEARCH QUESTIONS

1.6.1 Main research questions

What are the factors associated with musculoskeletal disorders among household waste collectors in Kinondoni Municipality at Dar es Salaam, Tanzania?

1.6.2 Specific research questions

1) What is the prevalence of musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam?

2) What are the workings conditions contributing to the musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam?
3) What is the level of knowledge about musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam?

1.7 RESEARCH OBJECTIVES

1.7.1 Main objective

To determine the factors associated with musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam.

1.7.2 Specific Research Objectives

1) To determine the prevalence of musculoskeletal disorders among waste collectors in Kinondoni Municipality in Dar es Salaam.
2) To determine the working conditions contributing to the musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam.
3) To determine the level of knowledge about musculoskeletal disorders among household waste collectors in Kinondoni Municipality in Dar es Salaam.

CHAPTER TWO

2.0 LITERATURE REVIEW

Waste collection is a physically demanding task that is associated with multiple musculoskeletal disorders. There are several risk factors that affect the health and safety of household waste collectors, which involve the frequent lifting of heavy loads and long working durations (8).

Musculoskeletal disorders are one of the significant health concerns among household waste; hence, understanding these factors that contribute to the disorder is necessary for developing preventive measures and interventions to safeguard the health and wellbeing of household waste collectors.

Dar es Salaam was chosen as the case study due to its status as Tanzania's largest city and economic hub, which generates substantial waste and creates high demand for waste collection services. With 47.8% of waste collectors experiencing occupational injuries, there is a pressing need for research on their health and safety. The city's diverse working conditions, influenced by urban infrastructure and socio-economic factors, provide a valuable context for examining the risk of musculoskeletal disorders (MSDs). The study's findings can inform local government policies to enhance working conditions and reduce health risks, potentially benefiting other urban areas in Tanzania.

2.1 The Prevalence of MSDs among Waste Collectors

The prevalence of MSDs among the waste collectors can vary depending on the location and the specific work condition. The study conducted in Ethiopia reported that there was a high prevalence of MSDs from occupational injuries among the waste collectors of 34.3%, but a higher prevalence was found in the studies conducted in Addis Ababa and north-west Ethiopia, which showed a higher prevalence of 43.7% and 63.9%, respectively (15).

However, there remains a notable gap in the literature regarding the specific contributing factors to MSDs among household waste collectors, particularly in the context of Tanzania.

This study aims to fill this gap by systematically identifying anthe factors that contribute to MSDs among household waste collectors, providing a clearer understanding of the issue and informing targeted interventions.

From the study, there is a higher prevalence of MSDs among the waste collectors, especially the household waste collectors, as according to the study, the 12-month prevalence that was conducted among the waste collectors was higher among the waste pickers with 79%, which was compared to the prevalence in controls of 55%. This study found higher neck pain, lower back pain, knee pain, upper back pain, and these are the most affected areas by MSDs. From this study, similar patterns were observed in the 12-month prevalence of MSDs, which prevented normal activities inside and outside the house. The study also explained that lower back pain increases with age and duration of work (17). From the study, it showed that the overall prevalence of the MSDs among waste collectors was high, reaching approximately 90%, and the patterns with the most prevalence were the hand/wrist with a prevalence of 42%, the shoulder with a prevalence of 41%, and the lower back with a prevalence of 38%. The study highlighted that the waste collectors engaged most in manual waste collection activities that were the causes of the Musculoskeletal Disorder (16).

2.2 Working Condition Contributing to MSDs among Waste Collectors

Working conditions involve the finding of an ideal fit between the people and the work they do, and the applied technology makes sure that they are designed according to the user, the working environment, and the task (7).

The working conditions are important as they can go a long way towards protecting the employees from work-related injuries or ill health, and the implementation of ergonomic principles can also improve productivity, health, and the working environment for employees.

Several working condition factors are among the potential contributors that can cause MSDs among household waste collectors; these involve

Awkward Posture

Poor workstation setup can lead to awkward posture, causing musculoskeletal disorders in household waste collectors. This discomfort affects the back, shoulders, neck, and wrists, causing muscle cramps and swollen joints. This affects their finances and productivity. To minimize MSDs, promoting posture and optimizing movement strategies is crucial (17).

Repetitive motions

The study showed that repetitive motions that occur in the wrist, arm, back neck and knees are cause due to the repeating the same motion causing fatigue in the muscles and joint and this cause the decrease of the productive and income which result to health problems like musculoskeletal disorders (18).

Lifting Techniques

From the study, it showed that improper lifting techniques, which involve twisting or bending at the waist, as well as waste collectors having to bend their backs with the wrong posture when they are lifting the garbage, which places excessive stress on the spine, leading to acute and cumulative musculoskeletal injuries (21, 22), have highlighted the importance of proper lifting mechanics and the adoption of ergonomic body postures to reduce the risk of MSDs.

2.3 The Level of Knowledge about Musculoskeletal Disorders Related to Waste Collection Activities

From the study, the general knowledge of the musculoskeletal disorder among the waste collectors is poor, as people are not knowledgeable of the musculoskeletal disorders that occur due to their daily activities. It also showed that the health and regulatory framework within the regions are more likely to impact their general awareness and tolerance for poor working conditions as the resources that are available are deemed unacceptable, hence poor understanding and working conditions (19).

There is less knowledge among the illiterate waste collectors about the potential hazards and health impacts related to the collection methods. The education level is a significant factor that contributes to the low knowledge of MSDs among waste collectors. The routine workplace health promotion needs to be activated and conducted for the welfare of this waste collector population as more cases of MSDs Is increasing to the waste collectors, including the neck and back pain (23).

From the study, it showed there was little knowledge on the relationship between the waste collection activities and the rates of musculoskeletal disorders among the waste collectors; hence, it addressed the safety method to use in the waste collection that involved the use of wheel bins to offer a better outcome and minimize the MSDs compared to other methods such as the use of sacks; hence, the study contributed invaluable insights for the waste collection companies and local authorities (24).

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 Study and design issues

Quantitative cross-sectional study design was used to examine the factors affecting the musculoskeletal disorder that include socio demographic factors that consist of age, sex and their duration or length of employment and the working conditions factors that consist of physical aspects such as lifting technique, the posture used during waste collection and repetition of the waste collection contributing to MSDs among household waste collectors, and the working hours. And the prevalence which will be determined from the sample size of the number of MSDs cases to the total sample size of the targeted population.

3.2 Study population

Participants in the study are household waste collectors who are more than eighteen years old

3.2.1 1nclusion and exclusion criteria

All household waste collectors aged above eighteen years old in Kinondoni Municipal were included in the study. That were obtained from Kinondoni Municipality, whereby all household waste collectors who were severely ill those who were absent during data collection, also household waste collectors who did not agree to participate in the study were excluded.

3.3 Study area

Dar es Salaam, Tanzania's largest city and the sixth-largest city in East Africa with a population of 7,404,689, is a major economic hub with diverse cultures and traditional markets. Its Kinondoni Municipality faces challenges in waste management, potentially contributing to musculoskeletal disorders, emphasizing the need for understanding these factors.

The study was conducted in Kinondoni Municipal**.** The area of Kinondoni consists of 531km^2 with a population of 982,328 people whereas males are 474,825 and females 507,503from the national census 2022(19). Kinondoni municipality is chosen because of

the high number of household waste collectors employees suffering from musculoskeletal pain.

3.4 Sampling strategy

Kinondoni Municipality has a high population density, leading to increased household waste generation, which results in higher workloads and exposure to risk factors for musculoskeletal disorders among waste collectors. Kinondoni Municipality offers a diverse range of waste collection practices that provide a more comprehensive understanding of the factors contributing to musculoskeletal disorders**.**

3.5 Sample size and estimation

The estimated sample size N is computed using a finite formula

$$n = \frac{Z^2 P (100-P)}{e^2}$$

n= estimated sample size

Z= percentage point of the normal distribution corresponding to the level of significance <5%,

Z= 1.96

e= margin of error

P = 43.7(6)

$$n = \frac{(1.96)2 \times 43.7 \times (100-43.7)}{5^2}$$

n=309

The total sample size estimation is 309

For finite sample size n/ [1+ {(n-1)/pop}]

309 / [1+ {(309-1)/250}]

138

3.6 Data collection technique and tool

The tool that was involved in the collection of information was questionnaire with structured questions and an observation checklist for identification of the working condition risk factors and observation of the waste collectors work practices in Kinondoni municipality Dar es Salaam Tanzania

The data collection tool was pre-tested for five days before actual data collection where 10 random samples of waste collectors were selected from Kigamboni Municipality Dar es Salaam, Tanzania and conducted a pilot test of the questionnaire and observation checklist that helped to identify the gaps or issues with the questions or checklist items.

Random Selection of Clusters: Clusters were randomly chosen to ensure diverse representation. **Participant Selection:** Household waste collectors within selected clusters were randomly selected. **Pilot Testing:** The data collection tools (questionnaire and observation checklist) were pre-tested with 10 waste collectors from Kigamboni Municipality to identify any gaps or issues.

The data collected involved

- Socio-demographic factors that involve age, gender, education and work experience
- The working practice conditions that involved the task performed, the working hours, the lifting technique and the ergonomic risks.
- The knowledge about the factors contributing to musculoskeletal disorders among the household waste collectors
- The musculoskeletal symptoms data that involves the pain location, how severe the pain is and the duration of the pain

The approaches used were visual aids and non-verbal communication techniques during data collection. The visual aids used included pictures, diagrams, and symbols to help convey information and elicit responses from participants.

3.7 Sampling process

Multistage Cluster random sampling was used to obtain representative household waste collectors for this research. According to the WHO distribution model(20), 25% of 20 wards to be sampled which consisted of 5 wards. The Sampling involved 3 stages of multi cluster random sampling.

First stage, Identification of the 20 wards in Kinondoni municipality and selection of the 5 wards to represent different geographical areas within the municipality

Second stage, selection of 5 wards from Kinondoni Municipality basing on the WHO distribution model

Random Selection of Households: From this list, households were randomly selected to participate in the study. This ensured a representative sample of waste collectors from different areas within the municipality. The selected areas were Makumbusho, Bunju, Mbweni, Ununio and Mikocheni.

Third stage, Household selection of the household waste collectors to participate in the study.

Informed Consent: Household waste collectors aged over 18 who were present during the data collection were approached. After explaining the study's purpose and obtaining informed consent, they were invited to participate.

Exclusions: Collectors who were absent during data collection, or unwilling to participate, were excluded from the study.

3.8 Data analysis

After the questionnaires were filled out by household waste collectors, the data was entered into SPSS version 26 for analysis. Statistical analyses were conducted using SPSS version 26, with the chi-square test and bivariate regression analysis being utilized. In this analysis, associations with a p-value of less than 0.05 were considered statistically significant. Descriptive statistics were computed to summarize socio-demographic factors (age, gender, work experience), level of knowledge and working conditions. Frequencies and percentages were calculated for categorical variables.

Chi-Square Test was used for the Purpose of examining the associations between categorical variables, such as the relationship between working conditions and the

prevalence of musculoskeletal disorders. A p-value of less than 0.05 was considered statistically significant.

Bivariate Regression Analysis was used for the Purpose To explore the relationship between independent variables that are socio-demographic factors, knowledge about MSDs, working conditions and the dependent variable (presence of MSDs). Bivariate regression analysis was performed to determine how well the independent variables predicted the likelihood of experiencing MSDs. The results were presented in terms of odds ratios (ORs) with 95% confidence intervals (CIs) to indicate the strength and direction of the associations.

3.9 Variables

3.9.1 Dependent Variable

Musculoskeletal disorders

3.9.2 Independent Variables

Social demographic factors

Working condition factors

Level of knowledge about MSDs

Musculoskeletal Disorders (MSDs) refer to a group of conditions that affect the muscles, bones, tendons, ligaments, and nerves. These disorders can cause pain, discomfort, and functional impairment, and they often arise from repetitive strain, awkward postures, or prolonged static positions.

Knowledge of MSDs

Understanding MSDs involves recognizing their causes, symptoms, and risk factors:

1. Causes: MSDs can result from a combination of ergonomic and personal factors. Activities that involve repetitive motion, heavy lifting, or sustained awkward postures are common contributors.

2. Symptoms: Symptoms often include pain, stiffness, swelling, and reduced range of motion. These can range from mild to severe and may become chronic if not addressed.

3. Risk Factors: Factors that increase the likelihood of developing MSDs include:

Ergonomic Factors

Ergonomics is the science of designing workspaces, tools, and tasks to fit the user's needs, thereby minimizing discomfort and risk of injury. Key ergonomic factors include:

1. Tool and Equipment Use: Tools should be designed to minimize force and awkward postures. For example, using tools can help reduce wrist strain.
2. Posture: Encouraging neutral body postures can help prevent MSDs. Training in proper lifting techniques and posture during work can significantly reduce risk.
3. Task Variation: Encouraging breaks and task rotation can prevent overuse injuries by allowing different muscle groups to rest.

Table 1 shows how to measure the variables

Objective	**Variables**	**Type**	**How to measure**
1) To determine the prevalence of musculoskeletal disorders among waste collector	MSDs	Dependent variables	Percentage of presence from the pain location, severity and duration of the pain.
1) To determine the working conditions contributing to the musculoskeletal disorders among household waste collectors`	Working condition	Independent variables	Percentage based on their work posture (standing, sitting, bending, and all the three postures
To determine the level of knowledge about musculoskeletal disorders among household waste collectors	Level of knowledge	Independent variables	Percentage based on the understanding of musculoskeletal disorders among household waste collectors

3.10 MEASUREMENT CRITERIA

THE WORKING CONDITION FACTORS

1) Percentage of the distribution of respondents based on the period of their work
2) Percentage of the distribution of respondents based on the type of work (collection, transfer, two or more jobs)
3) Percentage based on their work posture (standing, sitting, bending, and all three postures)

MSDs RELATED INFORMATION

1) The percentage of respondents based on the presence of MSDs from the pain location severity and duration of the pain.
2) The percentage of the respondents based on their pattern of pain, duration of pain
3) To determine the prevalence of musculoskeletal disorders among waste collectors

   Data collection, data will be collected on the musculoskeletal disorders among household waste collectors through questionnaires about the pain location, severity, duration and patterns of pain experienced by household waste collectors.

   Identifying the respondents with musculoskeletal pain based on the criteria such as pain location, severity and duration (22).

   Calculating the percentage of the respondents with musculoskeletal disorders by determining the total number of the household waste collectors surveyed and calculating the percentage of the respondents who reported musculoskeletal disorder based on the identified criteria where the percentage will represent the prevalence.

3.11 Validity and Reliability

The validity of the study was censured by using validated questionnaires and well-designed research methods to accurately capture the factors contributing to the MSDs among household waste collectors. Reliability was achieved through consistent data collection methods and rigorous analysis to ensure the findings are dependable.

3.12 Data Management

The questionnaires collected were checked manually for completeness and accuracy before being entered into the computer. Data quality was ensured by the careful entry of data into the computer for cleaning and analysis using SPSS version 26. Data was securely stored in a password-protected electronic database, with access restricted to authorized personnel. Data safety and security were ensured through personal identifiers, data encryption, and regular monitoring. Access was limited to the authorized research team members. Any incomplete data entries or outliers were carefully documented, and a predetermined threshold of no more than 5% of incomplete data was accepted in the final analysis to maintain the accuracy and credibility of the study results. Frequencies were produced from categorical variables**,** and differences between proportions were examined using the chi square test.

3.13 Ethical considerations

Request of ethical clearance and approval from the institution review board of Muhimbili University of health and Allied Sciences (MUHAS), further permission to conduct the study were obtained from the Municipal of Waste Management officer and then distributed to solid waste collector companies for information and cooperation. The participants were informed about the purpose of the study and its importance in improving their health and safety at workplaces. Confidentiality was granted for the information collected from the waste collection companies and the study participants that even their employers will not be able to assess it. A Written informed consent to participate in the study will also be obtained. The research findings will be disseminated through various channels, including academic journals, conferences, and stakeholders, to broaden their reach and influence policymaking or interventions. The study aims to enhance waste collectors' health and wellbeing by providing insights on occupational health and safety, promoting a safer work environment. This study ensures minimal to no risk for participants, with anonymized responses and ethical standards upheld, ensuring confidentiality and privacy. Confidentiality of participants' information and identities was strictly maintained

throughout the study. Data collected was anonymized and stored securely in password-protected databases accessible only to authorized personnel.

3.14 Study limitations and mitigation

Due to uncooperative participants limited data collection hence providing more information on study objectives and rationale can overcome this.

The study findings may not be applicable to a wider population due to limitations on its scope hence further studies in different areas to be adapted

CHAPTER FOUR

4.0 RESULTS

4.1 SOCIAL DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

From the study, the participants involved were 138(100%) household waste collectors and all the 138 distributed questionnaires were filled and returned, giving a response rate of 100%. Most respondents are in the age range of 30.5, accounting for 70.1% of the total sample size. The age group of 20.5 makes up 16.1%, while those aged 36-45 make up 13.9%. Among the respondents, males represent the majority at 87.0%, while females account for 13.0%. The data shows that respondents have 1-5 years of experience, making up 54.3% of the sample size. Those with 6-10 years of experience and over 10 years of experience each make up 25.4% and 10.1% respectively. A large percentage of respondents (50.7%) report having no formal education, while 33.3% have primary education and 14.5% have secondary education. Only a small proportion (1.4%) have attended college or university.

Table 2: Social Demographic characteristics of respondents (N=138)

Characteristic	**n**	**(%)**
Age (Years)		
16-25	22	16.1
26-35	96	70.1
36-45	20	13.9
Sex		
Male	120	87.0
Female	18	13.0
Years of experience		
<1 year	14	10.1
1-5 years	75	54.3
6-10 years	35	25.4
>10 years	14	10.1
Education level		
Primary education	46	33.3
Secondary education	20	14.5
College/University	2	1.4
No education	70	50.7

4.2 THE PREVALENCE OF THE MSDs AMONG WASTE COLLECTORS

According to the study findings, the prevalence of musculoskeletal disorders among the waste collectors is 71.0%, these agreed to have experienced musculoskeletal disorders. Figure 2shows the distribution of study participant's response to the question that asked about the experience of musculoskeletal disorders as the result of their work.

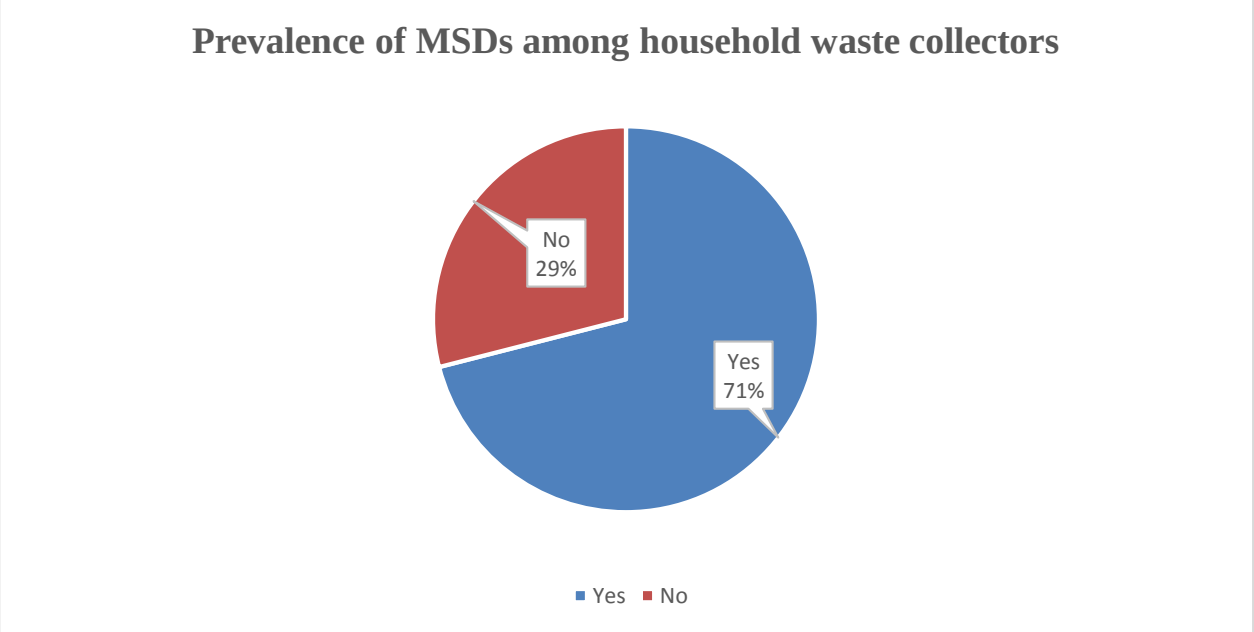


Figure 2: Prevalence of Musculoskeletal Disorders among Household Waste Collectors in Kinondoni Municipality, Dar Es Salaam.

4.3 WORKING CONDITIONS OF HOUSEHOLD WASTE COLLECTORS CONTRIBUTING TO MUSCULOSKELETAL SYSTEM

The distribution of the respondents from the type of work assigned showed that 29.7% were dealing with only collection of waste, 24.6% were transferring waste, and 44.2% were assigned to two or more jobs respectively. The respondents also had multiple working postures which showed 40.6% were maintaining standing, 2.9% maintained sitting, 2.9% maintained bending and 40.6% maintained all the postures. Also, the study revealed that only (7.2%) of the study participants often experience discomfort and pain in their muscles or joints during waste collection activities. The working conditions of the study participants contributing to musculoskeletal disorders among the study participants (Table 3)

Table 3: Working conditions contributing to musculoskeletal disorders among household waste collectors

Working conditions	n	(%)
Type of work assigned primary		
Collector	41	29.7
Transfer	34	24.6
Two or more activities	61	44.2
All	2	1.4
Working posture		
Standing	56	40.6
Sitting	4	2.9
Bending	4	2.9
All three postures	56	40.6
Two postures	18	13
Yes	76	55.1
No	62	44.9
Duration of working (hours per day)		
8 and less	43	31.1
More than 8	95	68.8
Use of tools to aid waste collection		
Yes	89	64.5
No	49	35.5
Experiencing discomfort or pain		
Rarely	80	58.0
Occasionally	48	34.8
Often	10	7.2

4.4 LEVEL OF KNOWLEDGE AMONG RESPONDENTS ABOUT MUSCULOSKELETAL DISORDERS

The study findings show that 54 participants (39.2%) demonstrated a high level of knowledge, scoring between 6 and 7, 53 participants (38.4%) exhibited a moderate level of knowledge, with scores ranging from 3 to 5 while 31 participants (22.5%) had a low level of knowledge, scoring between 1 and 2. The questionnaires comprise of 7 Yes/No questions on the level of knowledge part. Each affirmative response (yes) was awarded 1 point, while negative responses (no) received 0 points. And the aggregate score for each participant was classified into three distinct categories: Low knowledge (scores 1-2), Moderate knowledge (scores 3-5), and High knowledge (scores 6-7).

Most of the respondents (50.7%) were not aware of musculoskeletal disorders and about 49.3% of the respondents were aware of musculoskeletal disorders. Awareness of Potential Risks Due to Lifting Heavy Loads, the majority of 81.9% are aware of the potential risks associated with lifting heavy loads while 18.1% were not aware of the risks associated with lifting heavy loads. Only 47.8% of the respondents have received education or information on preventing MSDs. Over half of the respondents (53.6%) are aware of exercises that can help prevent MSDs. A lower percentage (32.6%) of respondents have attended training or workshops specifically focused on MSDs. Most respondents (97.8%) express a need for more education on MSDs. The level of knowledge among respondents about MSDs is shown in Table 4

Table 4: Overall distribution of knowledge levels about MSDs among respondents

Knowledge level	Score Range	N	%
High	6-7	54	39.2
Moderate	3-5	53	38.4
Low	1-2	31	22.5
Total		**138**	**100**

Table 5: Level of knowledge among respondents about musculoskeletal disorders

Level of knowledge	n	%
How often have you heard of MSDs		
Very often	19	13.8
Somewhat often	63	45.7
Not often	56	40.6
Aware of MSDs		
Yes	68	49.3
No	70	50.7
Aware of potential risks due to lifting heavy loads		
Yes	113	81.9
No	25	18.1
Received education on preventing MSDs		
Yes	66	47.8
No	72	52.2
Aware of exercises to prevent MSDs		
Yes	74	53.6
No	64	46.4
Attended training or workshop on MSDs		
Yes	45	32.6
No	93	67.4
Need for more education on MSDs		
Yes	135	97.8
No	3	2.2

4.5 MSDs INFORMATION RELATED

Pain patterns among study participants

The study findings show that most of the respondents suffer from shoulder pain (70, 19.6%) followed by wrist joint pains (69, 19.3%) while only a few of them (22, 6.1%) suffer from knee joint pain. Table 6 shows the pain patterns of household waste collectors.

Table 6: Pain patterns of household waste collectors

Pain pattern	n	%
Neck pain	56	15.6
Shoulder pain	70	19.6
Elbow joint pain	37	10.3
Wrist joint pain	69	19.3
Upper back pain	57	15.9
Lower back pain	47	13.1
Knee joint pain	22	6.1

Source: Field data 2024

4.6 FACTORS ASSOCIATED WITH MSDs

4.6.1 Association between Demographic Characteristics, Working Conditions, Level of Knowledge and Experience of Musculoskeletal Disorders among Household Waste Collectors

Associations between the collected variables and experiences of musculoskeletal disorders were analyzed using chi-square tests to determine statistical significance, with a focus on a 5% significance level. This allowed for the identification of which demographic and working condition factors were significantly related to the prevalence of MSDs. Gender, age, use of tools and equipment to aid waste collection, potential risks associated with improper lifting and carrying of heavy loads and awareness of exercises or stretches that can prevent musculoskeletal disorders can be used to predict experiences of musculoskeletal disorders among household waste collectors in Kinondoni municipality, Dar es Salaam, Tanzania. There was a significant association at 5% significance level

between musculoskeletal disorders experience among household waste collectors and Gender, working hours, potential risks associated with improper lifting and carrying of heavy loads and awareness of exercises or stretches(χ^2 = 7.099, p=**.008**), (χ^2 = 16.003, p= **.001**), (χ^2 = 6.532, **p=.011**) and (χ^2 = 10.350, **p= .001**) respectively while age was not statistically significant (<p,.05) to musculoskeletal disorders experience (χ^2 = 2.949, p = **.229**) Table 7

Table 7: Association between demographic characteristics, working conditions, level of knowledge and occurrence of musculoskeletal disorders among household waste collectors

Category	χ^2	**Df**	**p-value**
Gender	7.099	1	0.008
Age	2.949	2	0.229
Education level	32.267	3	0.001
Years of experience	3.748	3	0.290
Proper training on lifting and carrying techniques	36.292	1	0.001
Working hours	16.003	1	0.001
Discomfort/pain in muscles or joints	23.995	2	0.001
How often have you heard about MSDs	21.989	2	0.001
Aware of MSDs	19.314	1	0.001
Potential risks with improper lifting of heavy loads	6.532	1	0.011
Received education on MSDs	40.1501	1	0.001
Exercises/stretches to prevent MSDs	10.350	1	0.001
Attended workshop on MSDs	26.893	1	0.001
Need for more education	1.252	1	0.263

4.6.2 Relationship between Working Conditions and the Experience of Musculoskeletal Disorders among Household Waste Collectors.

Factors with p-values below 0.05 and confidence intervals that do not include 1 are considered statistically significant associations with the experience of musculoskeletal disorders among household waste collectors. The study findings have revealed that the use of specific equipment or tools like trolleys and lifting aids in aiding waste collection and the working posture during waste collection were statistically significantly associated ($p < 0.05$) with musculoskeletal disorders experience among household waste collectors. Study findings also revealed that the type of work assigned primary in waste collection was 1.577 more likely leading to musculoskeletal disorders (Table 8)

Table 8: A bivariable Relationship between Working Conditions and Experience of Musculoskeletal Disorders among Household Waste Collectors.

Working condition	OR (95%CI)	p-value
Use of specific equipment or tools like trolleys or lifting aid	0.184(0.045-0.750)	0.018
Type of work assigned primary in waste collection	1.577(0.780-3.191)	0.205
Working posture during waste collection	0.321(0.208-0.495)	0.001

4.7 OBSERVATION RESULTS FOR AWKWARD POSTURE AND REPETITIVE MOVEMENT OF HOUSEHOLD WASTE COLLECTORS:

A total of 70 household waste collectors were observed for awkward posture and repetitive movements during waste collection. The most common awkward posture observed was bending at the waist while lifting waste, with 95.7%. Twisting the body to reach for waste was observed 23(32.9%) times during the observation. Repetitive movements such as repeatedly bending to pick up waste and lifting waste above shoulder were observed in 54(77.1%) and 40(57.1%) instances respectively (Table 9)

Table 9: Observation Checklist for Awkward Posture and Repetitive Movement of Household Waste Collectors

Observation category	Description	n	%
Awkward Posture	Bending at the waist while lifting waste	47	67.1%
	Twisting the body to reach for waste	23	32.9%
Repetitive Movement	Repeatedly bending to pick up waste	38	54.3%
	Lifting waste above shoulder repeatedly	32	45.7%

PRESENTED BELOW IS THE PICTURE TAKEN WITH PERMISSION FROM THE HOUSEHOLD WORKERS TO SHOW THE REPITITIVE MOTION OF LIFTING WASTE ABOVE THE SHOULDER



Figure 3: Household waste collector Lifting waste above shoulder repeatedly

CHAPTER FIVE

5.0 DISCUSSIONS

5.1 Overview

This study identifies critical factors contributing to musculoskeletal disorders (MSDs) among household waste collectors, highlighting the significant impact of repetitive tasks, heavy lifting, awkward postures, and prolonged standing.

5.2 The prevalence of the MSDS among waste collectors

In the study of a total of 98 workers, 71.0% of the household waste collectors studied reported to have experienced musculoskeletal disorders. The prevalence rate was comparatively greater than the reported prevalence in related studies in most African countries like Addis Ababa with a prevalence of 43.7% (21). Indicating the comparable burden of musculoskeletal injuries in this occupation group of household waste collectors. Moreover, a review indicated an 83.3% prevalence which was higher than the study (22) identified waste collection as a high-risk occupation for musculoskeletal disorders due to ergonomic stressors and physical demands

5.2.1 The prevalence rate of the study from India was comparable with a 70% prevalence rate as compared to the study with 71.0% and the study from India reported that they had trouble with musculoskeletal pain with one or more of the defined body regions(9)From the study findings, the prevalence of shoulder pain was 19.6%, Shoulder pain was the most commonly reported pain pattern among the study participants, which could be attributed to the repetitive lifting, carrying, and reaching motions involved in waste collection activities. Household waste collectors often must lift heavy loads overhead or perform tasks that strain the shoulder muscles, leading to a higher prevalence of shoulder pain. The prevalence rate from the study in Thailand of shoulder pain was high at 55.6% and was significantly associated with lifting of heavy containers or objects. (23)

5.2.2 The wrist joint prevalence was (19.3%) from the study finding, the high prevalence of wrist joint pain can be associated with the manual handling of waste bins and bags, which require repetitive gripping and twisting motions. Constantly using the hands and wrists to handle heavy objects can lead to strain and discomfort in the wrist joints over time.

5.2.3 Elbow joint pain with a prevalence of 10.3% may result from the repeated extension and flexion movements required during waste collection activities. Constantly using the arms to lift push, or pull objects can strain the elbow joints and surrounding muscles, contributing to the reported pain patterns

5.2.4 Lower back pain with a prevalence of 13.1% from the study is a common issue among waste collectors due to the bending and lifting involved in their daily tasks. Improper lifting techniques, combined with the heavy and irregular loads they handle, can put significant stress on the lower back, leading to pain and discomfort. The study conducted in Harare district Zimbabwe showed 68.4% had stiffness and lower back pain and this was due to their nature which involved repetitive lifting, bending and twisting motions (24)

5.2.5 knee joint While knee joint pain was reported by a smaller percentage of 6.1%, it can still be a significant concern. Knee pain may arise from the repetitive squatting, kneeling, or lifting activities performed during waste collection, which can strain the knee joints and surrounding structures (25) conducted a study and found 6.1% of the municipal solid waste collectors were affected by knee pain and this was due to repetitive motions

5.3 Working conditions contributing to musculoskeletal disorders among household waste collectors

The working conditions of the study participants contributing to musculoskeletal disorders among the household waste collectors involved the work that was assigned during the waste collection which involved 29.7%, where the percentage of waste collectors assigned solely to the collection of wastes is significant but not the majority. Those assigned to primary collection duties were focused on interacting with waste bins, and carrying and

loading collected trash, which can involve repetitive motions and physical exertion. This group may benefit from training on proper lifting techniques and ergonomic practices to prevent musculoskeletal strain. From the study conducted in Malaysia, the waste collectors that were responsible for the collection of waste had different risks of getting MSDs where with low risk was 11.4%, medium risk at 44.5% and high risk at 42.2% this showed a significant association with job assigned and the work assigned (26).

5.3.1 Transfer Also, the work assigned during collection included Transfer (24.6%), Waste collectors assigned to transfer waste were responsible for moving collected waste to vehicles. This task involved tasks such as lifting and loading heavy garbage bags or containers, potentially increasing the risk of musculoskeletal injuries. Proper training and the use of equipment like trolleys or lifting aids may help reduce strain in this group.

5.3.2 collection and transfer other household waste collectors were doing both collection and transfer, Two or More Activities (44.2%). A significant portion of respondents are assigned to multiple tasks, indicating a diverse range of responsibilities that may include both collection and transfer duties and other related activities. Engaging in different tasks can expose workers to various physical demands, requiring flexibility in posture and movement. Adequate rest breaks and rotation of tasks may help prevent overuse injuries. From the study conducted in Dhaka city, the waste collectors that were assigned to both activities were half the sample with 53.9%. This was due to the nature of the work that involved the workers to engage in both activities (22).

5.3.3 Proper training is crucial in preventing musculoskeletal disorders among waste collectors. From the study finding the percentage of respondents who received proper training is relatively high, which is positive with the percentage of 55.1%. Adequate training can help workers understand correct lifting techniques, ergonomics, and overall safety practices, reducing the risk of injuries and discomfort.

5.3.4 Tools to aid waste collection. Most respondents (64.5%) from the study findings reported using tools to aid waste collection. Using tools such as trolleys, lifting aids, or ergonomic equipment can help reduce the physical strain on the body and minimize the risk

of musculoskeletal injuries. It is encouraging that a significant percentage of workers utilize such tools.

While most respondents reported experiencing discomfort or pain rarely (58.0%), it is still concerning that a notable percentage reported occasional (34.8%) or frequent pain (7.2%) during waste collection activities. This emphasizes the importance of ongoing monitoring, ergonomic interventions, and support for workers to address and prevent musculoskeletal issues.

5.4 Level of knowledge about musculoskeletal disorders among household waste collectors

From the study approximately half of the respondents (49.3%) were aware of musculoskeletal disorders, while the remaining 50.7% were not. This indicated a significant gap in basic awareness about musculoskeletal disorder among the household waste knowing that only about half of the respondents were aware of MSDs indicates a need for broader public health campaigns and educational efforts to increase awareness. Lack of awareness can lead to delayed recognition of symptoms, delayed treatment seeking, and potentially worsened outcomes for individuals with MSDs. (a conceptual model of fitness to work). From the study conducted in India showed that the waste collectors had little knowledge on the health hazards such has MSDs in their work place(9).

5.4.1 Potential risks associated with lifting heavy loads from the majority (81.9%) of respondents were Knowledgeable of the potential risks associated with lifting heavy loads. This high knowledge suggests that certain specific risks, like those from heavy lifting, are well recognized among the respondents. The high awareness of risks associated with lifting heavy loads suggests that targeted interventions focusing on other causes of MSDs (such as repetitive motions or poor ergonomics) may be necessary to broaden understanding of comprehensive risk factors.

5.4.2 Receiving education or information Only 47.8% of respondents reported receiving education or information on preventing MSDs. This finding highlights a notable gap in proactive education efforts aimed at reducing the incidence of these disorders through

preventive measures. -The low percentage of respondents who have received education or attended workshops on MSDs highlights a critical area for improvement in public health strategies. Enhancing education on prevention techniques and early intervention could potentially reduce the incidence and severity of MSDs.

5.4.3 Aware of exercises that can help prevent MSDs More than half (53.6%) of the respondents were aware of exercises that can help prevent MSDs. This indicates some level of knowledge regarding preventive actions, A smaller proportion (32.6%) of respondents attended training or workshops specifically focused on MSDs and This suggested that structured educational initiatives targeting MSD prevention are less accessible or less prioritized among the household waste collectors. Overwhelmingly, 97.8% of respondents expressed a need for more education on MSDs. This strong demand underscores the awareness among respondents of their lack of knowledge and the importance they place on receiving further education to mitigate MSD risks.

The most common demand for more education reflects an opportunity for healthcare providers, policymakers, and educators to address this gap through targeted educational programs. Such programs can empower individuals with knowledge of early symptoms, ergonomic practices, and lifestyle modifications that can prevent or mitigate MSDs.

Hence understanding the level of knowledge among respondents about musculoskeletal disorders not only identifies current gaps but also informs the development of targeted interventions to enhance awareness, prevention, and management of MSDs. This approach is essential for improving public health outcomes related to musculoskeletal health and reducing the burden of these disorders on individuals and healthcare systems.

5.5 Factors associated with musculoskeletal disorders occurrence

There was a significant association between gender and the experience of musculoskeletal disorders among waste collectors ($\chi 2 = 7.099$, $p = 0.008$). In this study, being male or female influenced the likelihood of experiencing MSDs, with a higher proportion of one gender reporting MSDs compared to the other.

5.5.1 The use of tools and equipment to aid waste collection showed a significant association with MSDs experience ($\chi2 = 16.003$, $p = 0.000$). Utilizing trolleys, lifting aids, or other equipment can impact the risk of developing MSDs among waste collectors by reducing manual handling tasks and strain on the body.

5.5.2 Awareness of potential risks associated with improper lifting of heavy loads ($\chi2 = 6.532$, $p = 0.011$) and knowledge of exercises or stretches to prevent MSDs ($\chi2 = 10.350$, $p = 0.001$) were significantly associated with MSDs experience. Understanding the risks involved in lifting heavy loads improperly and being aware of preventive exercises can influence the occurrence of MSDs among waste collectors.

5.5.3 Use of specific equipment or tools the study found a statistically significant association between the use of specific equipment or tools like trolleys or lifting aids and the experience of MSDs (OR = 0.184, 95% CI: 0.045-0.750, p = 0.018). Using appropriate equipment reduces the physical strain on waste collectors and lowers the risk of developing MSDs.

5.5.4 The working posture during waste collection was significantly associated with MSDs experience (OR = 0.321, 95% CI: 0.208-0.495, p = 0.000). Maintaining proper posture while handling waste can help prevent musculoskeletal injuries and promote overall musculoskeletal health among waste collectors.

By considering these associations and relationships, it is evident that factors such as gender use of tools and equipment, awareness of risks and preventive measures, and working conditions like posture and equipment usage play crucial roles in influencing the occurrence of musculoskeletal disorders among household waste collectors. Implementing appropriate training, ergonomic interventions, and promoting awareness about safe work practices can help reduce the incidence of MSDs in this occupational group. In comparison to our study, the finding from Dhaka city showed statistically no significant relationship between the age group and MSDs with (p=0.167). (22)

5.6 Working conditions contributing to musculoskeletal disorder among household waste collectors

Workplace observation

Observation inspection that was done from different fields of household waste collectors in Kinondoni municipality Dar es salaam Tanzania indicated that household waste collectors were in different awkward postures where the most prevalent awkward posture observed among waste collectors was bending at the waist while lifting waste (95.7%). This posture places significant strain on the lower back and spine, contributing to musculoskeletal strain and potential long-term injuries such as chronic back pain. Waste collectors frequently bend forward to grasp and lift waste loads, often without adequate ergonomic support or lifting aids, exacerbating the risk of injury. Bending at the waist increases the compressive load on the lumbar spine due to the force effect, leading to increased pressure (27). observed that this awkward posture such as bending while lifting different loads not only strains the lower back muscles but also compromises spinal alignment over time and also results in intradiscal pressure and may be injurious to spinal posture health. The high prevalence of this posture underscores the urgent need for ergonomic interventions such as the provision of lifting devices or training in proper lifting techniques to mitigate these risks.

Furthermore, Observations indicated that waste collectors frequently engaged in repeatedly bending to pick up waste (77.1%) and lifting waste above shoulder level (57.1%). These repetitive movements can lead to cumulative trauma disorders affecting the upper extremities and shoulders; Repetitive bending exacerbates musculoskeletal strain by subjecting joints and soft tissues to repeated microtrauma, leading to inflammation and degenerative changes. Lifting waste above shoulder height adds additional strain on the shoulder joints, potentially leading to overuse injuries and chronic pain syndromes. These repetitive tasks are compounded by the varied and unpredictable nature of waste collection tasks, further increasing the risk of injury due to the lack of standardized ergonomic practices. The workers that perform different repetitive movements are at high risk of

developing disorders and this is due to the strain of tendons which reduce the time of recovery that is between the movements (27).

From the observation of this study, there was a high prevalence of awkward postures and repetitive movements among household waste collectors highlighting significant occupational health risks associated with their daily activities of the household waste collectors. Addressing these challenges requires a multifaceted approach involving ergonomic redesign, comprehensive training, provision of ergonomic aids, and regulatory measures to protect worker health and safety. By implementing these interventions, stakeholders can effectively mitigate the incidence of musculoskeletal disorders among waste collectors, promoting a safer and healthier working environment.

5.7 Study strength and limitation

5.7.1 Strength

- The research focused on an important and relevant topic of musculoskeletal disorders among household waste collectors, this is a critical occupational health issue that requires attention.
- The study identified several significant factors such as Gender, long working hours, awareness of the risks and working conditions that are associated with the experience of MSDs. This provides valuable insights into the interventions and preventive measures.
- As there is no published data on the prevalence of MSDs in household waste collectors in Tanzania, the results of the study can provide some information

5.7.2 Limitation

- The study was an 8-month cross-sectional study, hence the possibility of misreporting of the events was high, a longitudinal study design is recommended to provide more insights into a causal relationship between variables over time.
- Some workers decided to withhold some critical information which affected the study outcome.
- The study focused on specific factors related to MSDs among waste collectors in Kinondoni municipality, which may limit the generalization of the findings to other

settings or populations. A broader scope could increase the applicability of the results

- The sample size may not be large enough to provide statistically significant results, limiting the reliability of findings and the ability to generalize to the broader population of waste collectors.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study reveals several factors associated with musculoskeletal disorders (MSDs) among household waste collectors, highlighting the significant impact of repetitive tasks, heavy lifting, awkward postures, and prolonged standing on their musculoskeletal health. The physically demanding nature of their work, combined with poor ergonomic conditions and insufficient training and resources, poses serious risks to their overall well-being.

Key insights from the research suggest several actions to improve conditions for waste collectors. First, there is an urgent need for safety regulations and better resource allocation for ergonomic tools. Comprehensive training programs should be implemented to equip workers with safe handling practices. Additionally, addressing issues such as inadequate breaks, limited access to equipment, and insufficient social support is crucial in reducing the risk of MSDs.

The study encourages collaboration among stakeholders and the establishment of monitoring systems to evaluate the effectiveness of safety measures over time. By prioritizing employee health and safety, implementing ergonomic solutions, and providing adequate support, the risk of MSDs can be effectively mitigated. Overall, this research serves as a roadmap for creating safer work environments and enhancing the well-being of household waste collectors.

6.2 Recommendations

1. Providing comprehensive education to employees regarding the significance of employing correct lifting techniques, maintaining proper posture, and recognizing early symptoms of musculoskeletal disorders (MSDs) can effectively empower them to prevent work-related injuries proactively.
2. Implementation of regular health monitoring and surveillance programs can play a pivotal role in identifying initial indicators of MSDs, thus enabling timely intervention to impede their progression.

3. Introduction of wellness initiatives, encompassing physical conditioning exercises, stretching regimen, and facilitation of access to healthcare services for timely intervention, can significantly contribute to the overall well-being of employees.
4. Advocating and facilitating regular work breaks is essential in mitigating the potential for fatigue.
5. Implementing Rotational Work Schedules, rotating sssssjob tasks among waste collectors to vary their movements and reduce prolonged exposure to repetitive tasks. This can help prevent overuse injuries and alleviate musculoskeletal strain.

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8.0 APPENDICES

8.1 APPENDIX I: CONSENT/ ASSENT FORMS:

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DEPARTMENT OF PUBLIC HEALTH

ID NO…….

Consent to participate in the study.

Greetings! My name……..student/research assistant from MUHAS, I am a university student pursuing a Master's degree in Public Health at Muhimbili University of Health and Allied Sciences. On behalf of the Muhimbili University of Health and Allied Sciences (MUHAS). I serve as a principal investigator focused on determining the factors associated with musculoskeletal disorders among household waste collectors.

Purpose of the study

It aims to determine the factors associated with musculoskeletal disorders among household waste collectors in Kinondoni Municipality.

Confidentiality

I assure you any information you provide will be kept highly confidential and will not be shared with anyone or anywhere except for those directly engaging in this study and for the fulfillment of this research purpose. The conversations will be anonymized and names will not be mentioned in any report or document, and if you would prefer to sit at a certain

location for the interview, we can work together to find a better place that will be good for you.

Requirement for participation

If you agree to participate in this study, you will be required to answer a series of questions that have been prepared for the study's objectives through interviewing and allow me to obtain the intended information.

Benefits

The study will provide valuable insights that can improve the health and wellbeing of waste collectors. Also the findings from the research can contribute awareness and broader knowledge on occupational health and safety with the potential implication for other physical demands with the promotion of the safer and health work environment for waste collectors.

Right to withdraw and alternatives

It is your choice whether to participate or not. Nothing will happen if you refuse to participate. If anyone has told you that you must participate, that is not true. If you will need to leave the conversation at any point, you are always allowed to leave even if you have signed the consent form.

Risk

Participants in this study face minimal to no risk. The questionnaire does not collect identifying information, ensuring confidentiality. All responses will be anonymized and used solely for research purposes. There are no physical risks, and participants can skip any questions they are uncomfortable answering. The research team will uphold ethical standards to protect participants throughout the study.

Whom to Contact: In case you have any questions concerning this study please contact Principal Investigator Vaileth Kemilembe Wilson Tel +255744366733. If you have any

questions about your rights as a participant, you may contact the Chairperson of the Research and Publications Committee, via MUHAS. P.O. Box 65001, Dar es Salaam-Tanzania, Tel +2552150302-6).

Do you want to ask me anything further before you decide whether or not to participate?

Certificate of Consent

Do you agree to participate in this study? YES/NO

I consent to participate in the academic research after reviewing the provided information, either by reading it myself or having it explained to me. I have had the chance to ask any questions I had, and they have been satisfactorily answered. My participation in this study is voluntary, and I agree to take part willingly.

Signature: _____ Date _____

8.2 KIAMBATANISHO II: FOMU YA MARIDHIANO

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DEPARTMENT OF PUBLIC HEALTH

UTMB NO……

Idhini ya Kushiriki kwenye Utafiti.

Salamu! Jina langu ni……
……...mwanafunzi/mtafiti msaidizi kutoka MUHAS, mimi ni mwanafunzi wa chuo kikuu anayesoma shahada ya Uzamili katika Afya ya Umma katika Chuo Kikuu cha Afya na

Sayansi za Sekta ya Afya Muhimbili. Kwa niaba ya Chuo Kikuu cha Afya na Sayansi za Sekta ya Afya Muhimbili (MUHAS) Kama mtafiti mkuu ninayejikita katika kuchunga utafiti wa mambo yanayohusiana na matatizo ya Misuli na mifupa kati ya watoza taka za kaya katika manispaa ya Kinondoni

Lengo la Utafiti

Inalenga kuamua mambo yanayohusiana na matatizo ya Misuli na mifupa kati ya watoza taka za kaya katika manispaa ya Kinondoni.

Usiri

Ninawasilisha maelezo yoyote unayoyatoa yatahifadhiwa kwa siri na hayatashirikiwa na mtu yeyote au popote isipokuwa kwa wale wanaohusika moja kwa moja katika utafiti huu na kwa kutimiza kusudi hili la utafiti. Mazungumzo yatatokwa na majina hayatajwa katika ripoti yoyote au hati, na kama ungependa kukaa mahali fulani kwa mahojiano, tunaweza kufanya kazi pamoja ili kupata nafasi nzuri ambayo itakuwa nzuri kwako.

Mahitaji ya ushiriki

Ikiwa unakubali kushiriki katika utafiti huu, utahitajika kujibu mfululizo wa maswali ambayo yamepangwa kwa malengo ya utafiti kupitia kuhoji na kuniruhusu kupata taarifa iliyopangwa.

Faida

Utafiti utatoa ufahamu muhimu ambao unaweza kuboresha afya na ustawi wa wazoa taka Pia matokeo kutoka kwa utafiti yanaweza kuchangia ufahamu na ujuzi mkubwa juu ya afya na usalama wa kazi na uwezekano wa mahitaji ya kimwili na kukuza mazingira salama na afya ya wafanyakazi kwa watoza taka.

Haki ya kuondoa na mbadala

Ni chaguo lako kama kushiriki au la. Hakuna kitu kitatokea ikiwa unakataa kushiriki. Ikiwa mtu amekuambia kuwa unapaswa kushiriki, sio kweli. Ikiwa unahitaji kuondoka mazungumzo wakati wowote, daima unaruhusiwa kuondoka hata kama umesaini fomu ya kibali.

Maswali haya hayakusanya taarifa ya kutambua, kuhakikisha usiri. Majibu yote yatawapanga na kutumika tu kwa madhumuni ya utafiti. Hakuna hatari za kimwili, na washiriki wanaweza kuruka maswali yoyote ambayo wana wasiwasi kujibu. Timu ya utafiti itasisitiza viwango vya maadili kulinda washiriki katika utafiti.

Ambao wa kuwasiliana:

Ikiwa una maswali yoyote kuhusu utafiti huu tafadhali wasiliana na Mtafiti Mkuu Vaileth Kemilembe Wilson Tel +255744366733.. Una maswali yoyote kuhusu haki zako kama mshiriki, unaweza kuwasiliana na Mwenyekiti wa Kamati ya Utafiti na Machapisho, kupitia MUHAS. P.O.BOX 65001, Dar es Salaam-Tanzania, Tel + 2552150302-6.

Unataka kuniuliza kitu chochote kabla ya kuamua kama au kushiriki?

Hati ya idhini

Je! Unakubali kushiriki katika utafiti huu? Ndiyo / Hapana

Nakubali kushiriki katika utafiti wa kitaaluma baada ya kuchunguza habari iliyotolewa, ama kwa kusoma mwenyewe au kuwa nielezee kwangu. Nimekuwa na nafasi ya kuuliza maswali yoyote niliyo nayo, na wamejibiwa kwa kuridhisha. Ushiriki wangu katika utafiti huu ni hiari, na nakubali kushiriki katika hiari.

Saini: _____ Tarehe _____

8.3 **Appendix III**: **English version of the questionnaire**

QUASTIONNARE

Below is a list of questions intended to collect information specifically for this purpose only and not otherwise? Please kindly respond on this questionnaire. Your responses will be kept highly confidential. **PLEASE DO NOT WRITE YOUR NAME.**

DEMOGRAPHIC FACTORS

1. **Personal information**

1. AGE
2. SEX:
3. Years of experience as a household waste collector
   a. Less than 1 year
   b. 1-5 years
   c. 6-10 years
   d. More than 10 years

4. Education level
   a. Primary school
   b. Secondary school
   c. College/university
   d. No education

Working condition **factors contributing to MSDs**

5. Are you provided with proper training on lifting and carrying techniques?
   a. Yes
   b. No
   c. Not sure
6. Do you use any specific equipment or tool to aid the waste collection like lifting aid or trolleys?
   a. Yes
   b. No

7. Do you experience any discomfort or pain in your muscles or joints during waste collection activities?

   a. Rarely
   b. Occasionally
   c. Often

d. Always

8. Have you experienced any musculoskeletal injuries or disorders as a result of your work?

a. Yes
b. No

9. If yes, what is the type of injury and the body part affected

Level of Knowledge about MSDs

10. How often have you heard about the term musculoskeletal disorders?

a. Very often
b. Somewhat often
c. Not often

11. Are you aware of what musculoskeletal disorders are?

a. Yes
b. No

12. Are you aware of the potential risks associated with improper lifting and carrying of heavy loads?

a. Yes
b. No
c. Unsure

13. Have you received any education or information on preventing musculoskeletal disorders in the workplace?

a. Yes
b. No

14. Have you ever experienced any pain or discomfort in your muscles or joints while working as a waste collector?

a. Yes
b. No

15. Are you aware of any exercises or stretches that can help prevent musculoskeletal disorders?

a. Yes
b. No

16 Have you attended any workshops or training sessions on musculoskeletal disorders?

a. Yes
b. No

17. Do you feel that there is a need for more education and awareness about musculoskeletal disorders in your workplace?

a. Yes
b. No

18. How effective do you think the current training and awareness programs are in preventing musculoskeletal disorders among waste collectors?

a. More effective
b. Moderately effective
c. Less effective

19. What type of work are you assigned primary in the waste collection activities

a. Collection
b. Transfer
c. Two or more activities

20. Which working posture do you maintain during your work in waste collection activities?

a. Standing
b. Sitting
c. Bending
d. All three postures

MSDs related information

21. Have you ever experienced musculoskeletal pain while working for the collection of waste?

a. Yes
b. No

22. If you have ever experienced musculoskeletal pain, what is your severity level?

a. Mild
b. Moderate
c. Severe

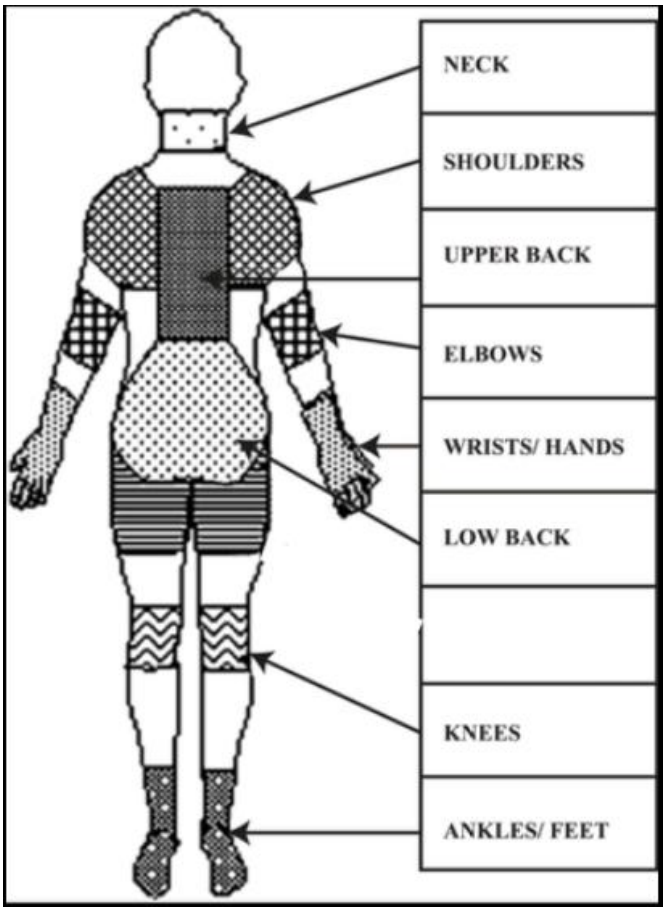
23. From the pain pattern, select the pattern that has experienced the musculoskeletal pain

a. Neck pain
b. Shoulder pain
c. Elbow joint pain
d. Wrist joint pain
e. Upper back pain
f. Lower back pain
g. Knee joint pain
h. Ankle joint pain

24. How long have you experienced the musculoskeletal pain indicated above?

a. Less than one week
b. 1-4 weeks
c. months
d. More than 3 months

REFERAL IMAGE FOR MSDs PAIN PATTERN



8.4 KIAMBATANISHO IV: DODOSO
SWAHILI VERSION

Hapa chini ni orodha ya maswali yaliyokusudiwa kukusanya taarifa kwa lengo hili pekee na si vinginevyo. Tafadhali jibu kwenye seti hii ya maswali. Majibu yako yatahifadhiwa kwa usiri mkubwa. TAFADHALI USIANDIKE JINA LAKO.

DODOSO

TAARIFA BINAFSI

1. Umri

2. jinsia

3. Miaka yauzoefu kama wazoa taka za nyumbani

    a. Chini ya miaka 1

    b. Mwaka 1-5

    c. miaka 6-10

    d. Zaidi ya miaka 10

4. Ngazi ya elimu

    a. Shule ya msingi

    b. Shule ya sekondari

    c. Chuo Cha kati /chuo kikuu

    d. Amna elimu

Sababuyahali ya kazi inayochangia maumivu ya misuli na mifupa

5. Je, umepewa mafunzo mazuri juu ya mbinu za kuinuana kubeba ?

    a. Ndio

    b. Hapana

6. Je unatumia vifaa maalum au chombo cha kusaidia kukusanya ukusanyaji kama vile Kuinua Misaada au Trolleys

    a. Ndio

    b. Hapana

7. Je, unapata usumbufu wowote au maumivu katika misuli yako au viungo wakati wa shughuli za kukusanya taka?

a. Mara chache

b. Mara kwa mara

c. Mara nyingi

d. daima

8. Je! Umepata majeruhi yoyote au magonjwa kama ya matokeo ya kazi yako?

a. Ndiyo

b. Hapana

9. Ikiwa ndio, aina gani ya majeruhi uliyopata na sehemu gani ya mwili imeathirika.

Ngazi ya ujuzi kuhusu maumivu ya misuli na mifupa

10. Ni marangapi umesikia kuhusu matatizo ya maumivu ya misuli na mifupa ?

a. Sijasikia

b. Nimesikiamaranyingi

c. simaranyingi

11. Je, unajuzi wa shida za maumivu ya misuli na mifupa?

a. Ndiyo

b. Hapana

12. Je! Unajua hatari zinazohusiana na kuinua na kubeba mizigo mizito?

a. Ndiyo

b. Hapana

13. Je, umepata elimu yoyote au habari juu ya kuzuia matatizo ya maumivu ya misuli na mifupa mahali pa kazi?

a. Ndiyo

b. Hapana

14. Je! Umewahi kuona maumivu au usumbufu katika misuli au viungo vyako wakati unafanya kazi kama mzoa taka?

a. Ndiyo

b. Hapana

15. Je! Unajua mazoezi yoyote ambayo inaweza kusaidia kuzuia matatizo ya maumivu ya misuli na mifupa?

a. Ndiyo

b. Hapana

16 Je, umehudhuria karakana yoyote au vikao vya mafunzo juu ya matatiz oya maumivu ya misuli na mifupa?

a. Ndiyo

b. Hapana

17. Je! Unahisi kuwa kuna haja ya elimu Zaidi naufahamu kuhusu matatizoya maumivu ya misuli na mifupa mahali pa kazi yako?

a. Ndiyo

b. Hapana

18. Unafikiri ufanisi wa program za sasa na mipangoya ufahamu zinasaidia kuzuia matatizo ya maumivu ya misuli na mifupa kati ya wazoa taka?

a. Ndio inafaa

b. Hapana haifai

19. Ni aina gani ya kazi uliyopewa ya msingi katika kuzoa taka

a. Shughuli za kukusanya

b. Shughuli za kuhamisha taka

c. Shughuli mbili au zaidi

20. Ni mkao gani wakufanyakazi unaodumisha wakati wa kazi yako ya shughuli za kukusanya taka

a. Kusimama

b. Kuketi

c. Mikao yote mitatu

Habari zinazohusianana maumivu ya misuli na mifupa

21. Je umewahi kupata maumivu ya maumivu ya misuli na mifupa wakati unafanya kazi ya kukusanya taka

a. Ndio

b. Hapana

22. kama umeshawahi kupata maumivu ya maumivu ya misuli na mifupa hatua gani ya maumivu au kiwango cha ukalinikipi

a. Sio makali sana

b. Wastani

c. Makali

23. kutokana na miundo ya maumivu, chagua muundo amabo umepata maumivu ya maumivu ya misuli na mifupa

a. Maumivu ya shingo

b. Maumivu ya bega

c. Maumivu ya kiwiko

d. Maumivu ya kiuno

e. Maumivu ya mgongo wajuu

f. Maumivu ya mgongo wa chini

g. Maumivu ya magoti

24 Je umepata maumivu ya maumivu ya misuli na mifupa kwa muda gani hapo juu

a. Chini ya wiki moja

b. Wiki 1-4

c. Miezi 1-3

d. Zaidi ya miezi 3

8.5 APPENDIX V: ETHICAL CLEARANCE

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/2316 Date: 07/06/2024

MUHAS-REC-06-2024-2316
VAILETH KEMILEMBE WILSON
SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS AMONG HOUSEHOLD WASTE COLLECTORS IN KINONDONI MUNICIPALITY DAR ES SALAAM, TANZANIA

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

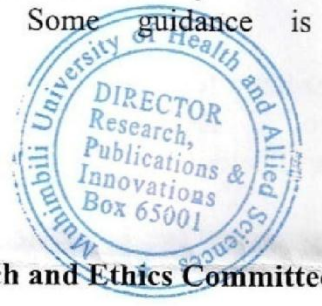
APPROVAL DATE: 07/06/2024
EXPIRATION DATE OF APPROVAL: 07/06/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this observational cross-sectional study is to To determine the factors associated with musculoskeletal disorders among household waste collectors in Kinondoni Municipality

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015716.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

8.6 PENDIX VI: INTRODUCTIO LETTER

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.650/2023 10th June, 2024

The Municipal Director,
Kinondoni Municipal Council
P.O. Box 31902,
DAR ES SALAAM

Re: INTRODUCTION LETTER VAILETH KEMILEMBE WILSON

We would like to inform you that the bearer of this letter is **Vaileth Kemilembe Wilson** with Reg. No. **HD/MUH/T.650/2023** is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing **MPH-Regular Track.**

As part of her studies, she will be doing an elective research titled: "**Factors Associated with Musculoskeletal Disorders Among Household Waste Collectors in Kinondoni Municipality Dar es Salaam, Tanzania".**

The research has been approved by the Chairman of University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c **Vaileth Kemilembe Wilson**

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

8.7 PENDIX VII: PERMISSION LETTER

JAMHURI YA MUUNGANO WA TANZANIA
Ofisi ya Rais
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA DAR ES SALAAM
Anwani ya Simu:
Simu: 2203156/58
Fa: +25522203213
Tovuti: www.dsm.go.tz
Barua Pepe: ras@dsm.go.tz
Unapojibu Tafadhali taja:

OFISI YA MKUU WA MKOA
3 Barabara ya Rashidi
Kawawa,
S. L. P. 5429,
12880 - DAR ES SALAAM.

11 Juni, 2024

Kumb. Na. EA.260/307/01B/145

Mkurugenzi wa Manispaa,
Manispaa ya Kinondoni,
DAR ES SALAAM.

YAH: UTAMBULISHO WA UTAFITI

Tafadhali husika na kichwa cha habari hapo juu.

2. Ofisi ya Mkuu wa Mkoa wa Dar es Salaam inautambulisha utafiti ujulikanao ***"Factors Associated with Musculoskeletal Disorders Among Household Waste Collectors in Kinondoni Municipality Dar es Salaam Tanzania"*** ikiwa ni sehemu ya kukamilisha Mafunzo ya Shahada ya Uzamili ya Vaileth Kemilembe Wilson ambaye ni Mwanafunzi katika Chuo Kikuu cha Sayansi na Afya Shirikishi Muhimbili.

3. Kibali cha kufanya utafiti huu kimetolewa na Chuo Kikuu cha Muhimbili (MUHAS-REC-06-2024-2316) ambacho kinaanzia tarehe 31/05/2024 hadi 31/05/2025. Utafiti huu umepangwa kufanyika katika Manispaa ya Kinondoni ndani ya Mkoa wa Dar es Salaam.

4. Kwa barua hii, namtambulisha kwako **Vaileth Kemilembe Wilson** ambaye ndio msimamizi mkuu wa utafiti huo ili aweze kufanya utafiti huu muhimu.

Nashukuru kwa ushirikiano.

Dkt. Mohamedi Mang'una
Kny; KATIBU TAWALA MKOA
DAR ES SALAAM

Nakala: Katibu Tawala Mkoa,
DAR ES SALAAM. – Aione katika jalada