



St. Paul's Hospital Millennium Medical College

Department of Public Health

**Assessment of Magnitude of Occupational Injury and Associated
Factors among Solid Waste Collectors in Nifas Silk Lafto Sub
City, Addis Ababa, Ethiopia**

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Information sheet

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Acronyms and abbreviations

AA: Addis Ababa

AOR: Adjusted Odds Ratio

AWD: Acute Watery Diarrhea

COR: Crud Odds Ratio

GDP: Gross Domestic Product

ILO: International Labor Organization

MSE: Small Scale Enterprises

MSW: Municipal Solid Waste

NGO: None Governmental Organization

PPE: Personal Protective Equipment

SPSS: Statistical Package for Social Science

WHO: World Health Organization

WRI: Work Related Injury

Abstract

Background: Occupational injury is any physical injury conditions sustained on a worker in connection with the performance of his or her work. The collection of household waste is a hard job, which requires repeated heavy physical activity such as the manual lifting and handling of heavy bins. As developing countries continue to grow economically, urbanization and the challenge of solid waste management come to be headache to the government. Solid waste in Addis Ababa (AA) city is collected manually which requires repeated heavy physical activities such as lifting, carrying, pulling, and pushing. The aim of this study was to assess the magnitude of occupational injuries and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2017.

Methods: A cross-sectional study design was conducted from October 22/2017 to December 8/2017 G.C. The data was collected through interview guided structured questionnaire and observation check list by trained data collectors from a total of 268 participants with the response rate of 98.2% after pretesting of 27 questionnaires by using simple random sampling technique. Descriptive statistics was done for most variables in the study using statistical parameters; bivariate and multivariable analysis was done by using SPSS. Based on AOR and P-value <0.05 strength of association and statistical significance was tested.

Result: In this study, the annual magnitude of at least one occupational injury among solid waste workers was 29.5%. Of these, 83.8% of them were visited health facility to receive health care. The independent predictors of at least one occupational injury were: working more than 8 hours per day(AOR: 8.345, 95%CI: (3.029,22.993), P-value=0.000), not trained on occupational health and safety (AOR: 14.093, 95%CI: (4.733,41.958), P-value=0.000), alcohol drinking (AOR: 55.917, 95%CI: (15.780,198.147), P-value=0.000), sleeping disturbance related to the job (AOR: 5.596, 95%CI: (1.851,16.916), P-value=0.002), and not satisfied on the level of payment (AOR: 2.877, 95%CI: (1.231,6.722), P-value=0.015)

Conclusion: The magnitude of occupational injuries among house to house solid waste collection workers in Nifas Silk Lafto sub city is lower than other similar studies conducted in Ethiopia. Minimizing working hours, providing job specific training regarding occupational health and safety and supplying quality personal protective equipment are interventions expected to cope with the problem.

Key words: Occupational injuries, house hold solid waste collectors

1. Introduction

1.1. Background

Occupational injury is any physical injury conditions sustained on a worker in connection with the performance of his or her work. It causes a major public health problem and is a source of substantial human and economic cost in both developed and developing countries. The International Labor Organization (ILO) estimates that 270 million occupational accidents and diseases occur each year globally(1). Municipal solid waste (MSW) handling and disposal is a growing environmental and public health concern. The collection of household waste is a hard job, which requires repeated heavy physical activity such as the manual lifting and handling of heavy bins. As developing countries continue to grow economically, urbanization and the challenge of solid waste management come to be headache to the government. Municipal solid waste is a recognized environmental and health challenge but also an economic resource on which thousands of individuals base (depend) a living through picking, re-using and recycling(2).

Solid waste collectors collect refuses in all climate conditions; they may have contact with sharp objects, pull and push heavy containers, and lift heavier loads, often to higher loading locations. Occupational accidents are very frequent among solid waste collection workers. Risk factor could be combination of technical factors (poor design of equipment), high working time, and muscle fatigue due to high work load. Musculoskeletal problems are also common among solid waste collection workers(3). A study conducted in India by *Chavan BL et al* showed that, due to lack of proper system and plan, solid waste collection workers are more vulnerable to inhale the accumulated refuse fumes, or develop infectious diseases due to direct contact with long accumulated refuses. They are also more prone to have vehicle accidents during transportation due to the long travel(4).

Solid waste collectors are exposed to occupational health related problems from waste materials and physical effort they exert in waste handling. Such occupational risks include contamination with toxic materials, bottles with chemical residues, metal containers with pesticide residues, sharps and other infectious wastes from hospitals and batteries containing heavy metals. The risk levels are still very high in developing countries because of poor public health practice. In low-income countries, solid waste collectors have low socio-economic status such as poverty, lack of education, poor housing conditions and poor nutrition. Commonly observed health problems among this working group include: respiratory

symptoms, irritation of the skin, nose and eyes, gastrointestinal problems, fatigue, headaches, psychological problems, allergies, musculoskeletal and dermal injuries(5).

Protection of workers from occupational hazards depends on availability and proper utilization of protective equipment, which in low and middle income countries is in short supply with very limited monitoring of their utilization. Protection of human health and the environment is one of the major challenges facing developing as well as developed countries of the world. The original aim of regulating waste disposal is to reduce the introduction of polluting substances into the atmosphere since protection of the environment is a major challenge facing developing countries such as Ethiopia. Solid waste in Addis Ababa (AA) city is collected manually which requires repeated heavy physical activities such as lifting, carrying, pulling, and pushing (6).

The impact of solid waste on health is varied and may depend on numerous factors including the nature of the waste, duration of exposure, the population exposed, and availability of prevention and mitigation interventions. The impacts may range from mild psychological effects to severe morbidity, disability or death(7). Waste collection is the most challenging work as Ethiopian working culture is concerned. Such house to house collection of solid wastes is the newly income generating activity formulated by some initiated groups of the community by support of Ethiopian government and as the sub set by Addis Ababa City Administration Government which is part of work opportunity creation policy.

1.2. Statement of the problem

According to World Health Organization/International Labor Organization (WHO/ILO) 2010 report 2.3 million deaths and 4% annual Gross Domestic Product (GDP) loss globally are related to occupation(8). Lung diseases, hearing loss, loss of body parts, heat exhaustion, and skin infection are among the common work related potential health risks. Solid waste generation and urbanization are intimately (closely) related and therefore it is important to briefly reflect on the urbanization phenomenon in the health effect on residents. In 1950, about 30% of the world's population lived in urban areas. It is currently estimated that by 2050, about 66% of the world's population will be living in urban areas(9).

The system of municipal solid waste collection in the developing countries continues to be mostly manual and involves a labor-intensive system. At source, the waste discharged for collection is rarely segregated in plastic or metal containers and covered with lid. The waste is left on unprotected containers even open grounds that require moving by hand, or left in an open cartons or baskets that

require to be picked up manually. In other case, the waste awaiting to be collected is open to insects, rodent vectors and scavenging animals. These unsegregated wastes may contain hazardous waste materials (defined as toxic, inflammatory, reactive, explosive or infectious and containing batteries, electronic sludge, paint and its solvent, pesticides and infectious medical waste) that predisposes waste collectors to be in direct contact with them and make them prone to significantly more adverse occupational injury and health risks than their equivalents in developed countries(10).

The leading type of injury reported by the workers was cut / punctures (38.6%). However, because of the nature of the job, higher numbers of workers were affected by a combination of two or more injuries (27.3%). The highest numbers of solid waste collectors (22.7%) were injured on their hand followed by leg (21.8%) injury. From workers who had hand injury, 50% were reported injury on two or more hand parts. The most common causes were sharp or slender pointed objects (23.7%), lifting/pushing/puling of heavy waste storage containers (12%), dust or particulate matters (10.4%). Age and educational status were the significant socio-demographic determinants of work related injury. The older workers were more injured than younger ones. Workers aged >30 years were 1.834 times more likely to be injured than workers aged < 30 years(14).

A study conducted by *Mesfin Kote et al* in Addis Ababa on health care waste showed that wastes either from public or private hospitals did not segregated (separated) according to their type (15) which implies that house to house solid waste collectors will be endangered at the time of collection. According to the study conducted on *Knowledge, Attitude and Practice among solid waste collectors in Addis Ababa* by *Gebremedhin et al* showed that, even though around 74% of solid waste collector had the knowledge on the importance of personal protective equipment (PPE), only around 37% were practice these materials (PPE) during their routine work(16) which may imply still occupational injury related to solid waste collection needs further investigation.

As my observation, in Nifas Silk Lafto sub city, the solid waste collectors are carrying the containers to long distance, they collect wastes by their bare hand, and they wear their routine shoes during waste collection time. Therefore, assessment of occupational injury and associated factors among micro and small scale solid waste collectors is expected to be conducted in Nifas Silk Lafto sub city.

1.3. Significance of the study

Solid waste collection workers are less protected in all efforts of refuse collection. Neither pre-employment nor periodical medical checkups are inaccessible to this group of workers. A number of researches have been conducted on solid waste management related issues. These researches, however, have focused on the associated challenges of solid waste collection. To the knowledge of the researcher, researches so far done on solid waste collector's injuries and associated factors in the area were not sufficient. The fact that this segment of the society is doing the very difficult and risky task of the sub city, there is a need to conduct a research to assess the occupational related injuries and associated factors in doing their routine task. This would create a greater impact especially when these working groups are seen in the front position in the sub city's sanitation administration office. This study will have a meaningful significance for the researcher himself. As a beginner researcher, it enables to advance his knowledge, skill and value spectrum in conducting public health research, and also let him to know more in the area of the poorest community in which the researcher has much happy to conduct researches in the area by the future.

This study is also vital in terms of clearly showing the existing knowledge gaps in the area of solid waste collector unions. The study has also relevance for occupational health and safety practice in Addis Ababa since it clearly will highlight what will be expected and key public health intervention areas of occupational health and safety to upgrade the conditions of the solid waste collectors. Finally, the study can serve as the basis upon which various specific studies on solid waste collector issues can be made and functions as a foot step for further research. The results of this study contribute something in the effort to solid waste management related issues in the sub city.

2. Literature review

2.1. Magnitude

Cities are at the connection of a further threat to the environment, namely the production of an increasing quantity and complexity of wastes. The estimated quantity of Municipal Solid Waste (MSW) generated worldwide is 1.7 – 1.9 billion metric tons(17). Work-related injuries (WRIs) and illnesses are multifactorial and remain major problems of public health magnitude requiring the attention of all stakeholders(18). In many cases, municipal wastes are not well managed in developing countries, as cities and municipalities cannot cope with the accelerated pace of waste production. Waste collection rates are often lower than 70 percent in low-income countries. More than 50 per cent of the collected waste is often disposed of through uncontrolled landfilling and about 15 percent is processed through unsafe and informal recycling(19).

The International Labor Organization (ILO) estimates that 270 million occupational accidents and diseases occur each year. ILO estimates that each year, around 2.3 million workers die as a result of occupational accidents and work-related diseases and fatal occupational accidents are about 0.35 million every year and fatal work-related diseases are around 1.95 million per year(20). The number of occupational accidents and diseases are increasing in many developing countries. It has been estimated that over 120 million industrial accidents with over 200,000 fatalities occur each year in these nations. This is the area which has 80% of the world's labor force. Sub-Saharan Africa appears to have the greatest rate per worker of occupational injuries followed by Asia(21).

In Sub-Saharan Africa countries, slightly more than 54, 000 fatal occupational accidents happen annually. Approximately 42 million work-related accidents took place that causes at least 3 days absence from work. The fatality rate of the region is 21 per 100,000 workers and the accident rate per 100,000 workers is 160,000. In Ethiopia, over 5,596 fatal occupational accidents happen annually. Approximately 4,270,815 work-related accidents took place that causes at least 3 days absence from work. The accident rate per 100,000 workers is 16,426 and the fatality rate is 21.5 per 100,000 workers (22).

Severe, functionally limiting back pain is common; 70–85% of all people experience back pain at some point in their lives. Low-back disorders are more expensive for employers than any other type of injury. Workers involved in solid waste industry are constantly subjected to specific occupational injuries and

the injury rate is higher than other industrial occupations. Thus, solid waste collection is considered as the highest risk for injuries and illnesses among the occupations due to ergonomics risk factors. Specifically, lifting and dumping tasks can be thought to compound the risks from posture when it is also performed(23).

2.2. Factors

2.2.1. Socio-demographic factors

Most Researchers showed that Socio-demographic factors like age, educational status, working hours and working experience were factors related to the occurrence, severity, and types of injury In many third world countries, municipal solid waste (MSW) collection is done manually and household waste removal is work that requires physical strength in lifting bulky waste containers, and common complaints among refuse collectors are increased risk of musculoskeletal disorders, the lower back the most affected body region. Other frequently affected areas are shoulders, knees, and neck(24). Refuse workers often lack training, tools and information in order to perform their work in the best healthy and safe manner. In addition to these, routine medical checkup program for all solid waste collectors should be mandatory to keep them in good health condition(25).

The exposure to certain physically related injuries and musculoskeletal disorders such as puncture wounds, laceration, serious cuts, dislocation, body pain and fatigue associated with the refuse collectors not using personal protective equipment and carrying heavy materials affects the health status of workers and consequently reduces the manpower, increases cost of collection and is a possible cause of death(26)

A study conducted by *Çakit E.* about the *physical demands of solid waste collection tasks*, suggested that municipal solid waste management is a risky and life-threatening activity for populations residing near landfills and waste incinerators, for municipal waste workers and for informal waste recyclers. Major health problems of populations residing near landfills and incinerators are cancer, low birth weight, congenital anomalies and Down's syndrome and for municipal waste workers and recyclers the health problems are musculoskeletal disorders, injuries, respiratory, gastro-intestinal and skin conditions(27).

A study done by *Pieter M, et al on Urban management and solid waste issues in Africa* have reported high levels of heavy metals in municipal waste disposal sites. Most waste disposal sites in developing

countries are poorly sited, constructed and managed despite handling hazardous waste from industries and medical facilities. Doubtfully, at the heart of the problems of solid waste management are the absence of adequate policies, enabling legislation and an environmentally stimulated and enlightened public(28).

2.2.2. Behavioral factors

Solid waste collectors with the behavior of alcohol drinking, satisfaction on the level of payment, satisfaction on their job and sleeping disorder were the behavioral factors related to occupational injury. Municipal solid waste management has been associated with various adverse health problems for waste workers which entail respiratory problems, musculoskeletal disorders, injuries, nail infection and inflammation. A study conducted in India on solid waste collection by rag pickers said that, they collect the waste from houses, shops, markets, hospitals, commercial establishments and industries. Sixty five percent (65%) of the rag pickers spent 5-8 hrs in a day for the collection of waste(29).

The study conducted by *Spaargaren G. et al* on urban settings of East Africa showed that centralized waste management system has evolved into the current management mixtures that include decentralized as well as the involvement of the private sector. The storage, collection, transportation and final treatment/disposal of wastes are reported to have become a major problem in urban centers. The composition of wastes generated by the East African urban centers is mainly decomposable organic materials based on the urban community consumption that generates much kitchen wastes, compound wastes and floor sweepings. This calls for efficient collection system to avoid health, aesthetics and environmental impacts. The global trend of increased use of electrical and electronic goods is also evident in East African urban centers where E-waste is becoming a significant threat to the environment and human health(30).

Waste sources are households` (residential), commercial premises, markets, institutions, industries and health care facilities. Residential areas or households are the major contributor of wastes followed by markets and commercial areas respectively. Waste quantity increases with population increase. Densely populated urban zones (e.g. Slums) have low income households with waste generation estimated between 0.22 and 0.3kg/cap/day. Solid waste generation by the higher income households is estimated between 0.66 and 0.9 kg/cap/day on average. Overall waste generation rate for East African urban centers vary on average between 0.26 (low income) and 0.78 (high income) kg/cap/day. Similar waste generation rates have been reported for developing countries of other regions of the world(30).

2.2.3. Availability and utilization of personal protective equipment

Workers prior to start of new assignments should receive adequate training and information enabling them to understand the hazards of work and to protect their health from ambient factors that may present. The effectiveness and efficiency of solid waste management depends on the willingness and active participation of community members, since the waste is generated mainly from local community. Decaying organic materials pose great public health risks, serving as breeding grounds for disease vectors. Waste handlers and waste pickers are especially vulnerable and may also become vectors, contracting and transmitting diseases when human or animal excreta or medical wastes are in the waste stream. Risks of poisoning, cancer, birth defects, and other disorders are also high(31).

Ethiopia, like all developing nations in East Africa, currently faces waste management challenges related to over-accumulation on open land, water pollution, and overall public nuisances such as pests, diseases, and odors (32). A recent study on the history of municipal solid waste in Addis Ababa concluded that waste production has increased by 3.79% annually. In 2010, Addis Ababa generated an estimated 0.4kg/capita of waste per day, with more than 200,000 metric tons collected each year. Addis Ababa city started its solid waste management some four decades back but currently the service cannot meet the changing demands. The social waste collection service is unsatisfactory, and scenes of scattered waste are common in most part of the city(32).

According to the existing policy, solid wastes are collected by the government employees, private companies based on contractual agreements and Micro and Small Enterprise. However, the principle, stating that the waste producers are subject to put their wastes into different containers based on specific type of wastes, is not practiced in the city. Primary collection of solid waste is done by micro and small enterprises having formal agreement to collect from households and dump them in designated containers. There are about 750 micro and small enterprises organized to pre-collect waste from household. They use door-to-door method to collect and dumped in another container to be picked by secondary collectors, the sub-city and private companies, and then dumped at the City's landfill(33).

A study titled as *Private sector participation in solid waste collection in Addis Ababa* showed that Micro-enterprises took over waste collection from the public sector and the households, and improved primary waste collection coverage from about 89 tons per day in 2002 to 121 tons per day in 2008

(36% improvement)(34). Similar study conducted in Bahir Dar on solid waste management showed that the city's solid waste management system is not growing as the current urbanization activities which means it is not serving all residents of the city properly. Residents are suffering from different types of health problems like respiratory problems, diarrheal diseases, and aesthetically there are unpleasant areas due to improper solid waste collection and management(35).

2.3. Conceptual frame work



Figure 1: Conceptual frame work of the study of prevalence and associated factors of occupational injuries among micro & small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, 2017 (Adapted from Osman, 2007)

3. Objectives

3.1. General objective

To assess the magnitude of occupational injuries and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2017.

3.2. Specific objectives

- ❖ To assess magnitude of occupational injuries of solid waste collectors.
- ❖ To assess utilization of personal protective equipment of solid waste collectors.
- ❖ To assess the associated factors for occupational injuries of solid waste collectors

4. Methods

4.1. Study area

This study was conducted in Nifas Silk Lafto sub city, Addis Ababa; from October 22 2017 to December 8 2017 G.C. Addis Ababa is the capital of Ethiopia and Africa has been divided in to ten sub cities. Nifas Silk Lafto Sub City is one of the ten administrative sub cities of Addis Ababa City administration since 1998 G.C. It has 13 Woredas with their authorized administration and the total population of 395,206. Boundaries of the sub city are: North-with Kirkos sub city, East – with Bole Sub city, South – Oromia region and West – with Oromia. The administration of Nifas Silk Sub City covers 58.216 square kilometers. The Sub City has 9 functional governmental health centers, 158 private health facilities, and four holy water sites. Among 158 private health facilities, 32 lower clinics, 17 dental clinics, 92 medium clinics, and 17 specialty clinics. In the sub city administration area there are no NGO health institutions, and has no governmental and private hospital. In Nifas Silk Lafto sub city there are 90 micro and small enterprises in home to home solid waste collection with 921 their members (*Nifas Silk Lafto sub city Sanitation Administration office, 2017*). The number of enterprises and their members differs according to the size of Woreda.

4.2. Study period

From October 22, 2017 to December 8, 2017 G.C

4.3. Study design

A cross-sectional study design was conducted.

4.4. Source population

Total populations of micro and small scale enterprise of solid waste collectors in Nifas Silk Lafto sub city.

4.5. Study population

Those of the actual participants randomly selected from the source population.

4.6. Inclusion criteria

Those of individuals volunteer to participate, present at the time of data collection, have a minimum of one year work experience on solid waste collection were included in the study.

4.7. Exclusion criteria

Those of participants who can fulfill inclusion criteria were included in the study.

4.8. Sample size determination

The actual sample size for the study was determined by using the formula for single population proportion by assuming 5% marginal error and 95% confidence interval ($\alpha=0.05$) and:

- ❖ For the 1st specific objective = 63.90% (14),
- ❖ For the 2nd specific objective = 23.70% (14),
- ❖ For the 3rd specific objective = 31.90% (14), Then I took the largest sample size among the three calculations to increase the precision and power of the study.

For the 1st specific objective

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.639 \times 0.361) / (0.05)^2 = 354$$

None response rate = 10% = $354 \times 0.1 = 35$  $35 + 354 = 389$

Finite population formula if the total population is <10,000

$$nf = \frac{n_0}{1 + \frac{n_0}{N}} = nf = \frac{389}{1 + \frac{389}{921}} = 273, \text{ where:}$$

n = the required sample size

z = the value of the standard normal curve score corresponding to the given confidence interval = 1.96

P = prevalence of occupational injury among solid waste collectors from previous studies = 63.9%.

d = the permissible margin of error (the required precision) = 5%

n₀ = initial sample size = 389

N = Total population for which to make inference = 921

nf = final sample size for population of <10,000 = 273

For the 2nd objective

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.237 \times 0.763) / (0.05)^2 = 278$$

None response rate = 10% = $278 \times 0.1 = 28$  $28 + 278 = 306$

$$nf = \frac{n_0}{1 + \frac{n_0}{N}} = nf = \frac{306}{1 + \frac{306}{921}} = 230$$

For the 3rd objective

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.386 \times 0.681) / (0.05)^2 = 334$$

None response rate = 10% = $334 \times 0.1 = 33$  $33 + 334 = 367$

$$nf = \frac{n_0}{1 + \frac{n_0}{N}} = nf = \frac{367}{1 + \frac{367}{921}} = 262$$

The largest sample size among the three calculations was 273. Therefore, I took the total sample size for the study as 273.

4.9. Sampling method

To get representative population for the survey, a simple random sampling technique was used. To make it representative, samples were taken from all Woredas of the sub city proportional to their size.

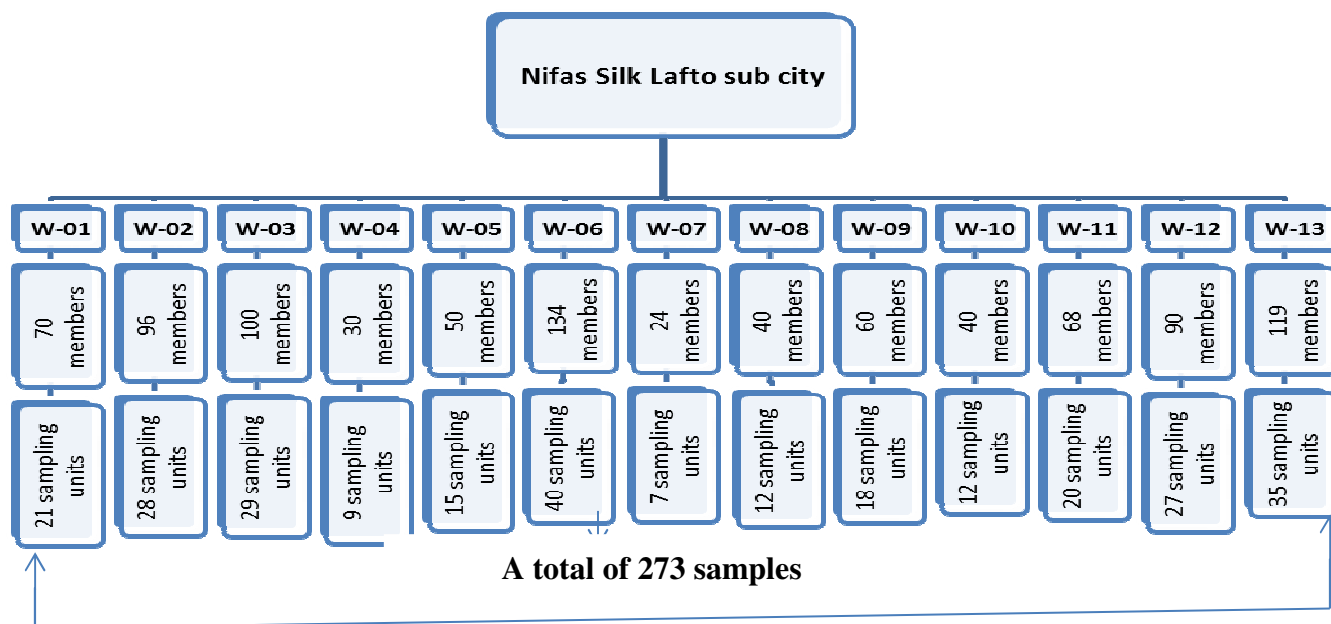


Figure 2: Flow of sampling procedures according to proportional to size.

4.10. Study Variables

4.10.1. Dependent variables

Occupational injuries

4.10.2. Independent variables

Age, sex, educational status, marital status, utilization of personal protective equipment, behavioral/personal variables

4.11. Data collection tools and procedures

Data was collected by face to face interview using pre-tested structured questionnaire developed based on the related published studies with certain modification and observation check list from October 22/2017 to December 8/2017. The questionnaire composed of four parts: socio demographic, injury characteristics, personal protective equipment availability and utilization and behavioral or personal variables.

4.12. Operational definitions

Injury: The reported work related physical damage to body tissues caused by any type of solid waste, fall, or exhausting during their house to house solid waste collection in the last one year prior to this data collection(5).

Job and payment satisfaction: It is a subjective response of study participants about their job and payment as it is pleasurable for them(5).

Micro and Small scale Enterprise (MSE): Small scale unions that are organized by government to collect waste from households to specific site that is accessible for transportation to final disposal site(5).

Well dressed: If the workers are wearing protective devices properly on the right body parts for that particular PPE while they are on duty at the time of observation(5).

Alcohol drinking, Cigarette smoking and Chat chewing: The participants' subjective responses whether they do or not the action during interview of data collection(6)

Sleeping disorder: Participants' subjective response about their sleeping pattern during data collection(6)

4.13. Data quality control

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period to maintain the quality of data. Four trained degree holder health professional data collectors and one supervisor were participated during data collection period. The questionnaire was developed in English Prior to the actual data collection and then translated to Amharic version to make conversation easy with the respondents and also re-translated to English to check for consistency. Twenty seven questionnaires were pre-tested at adjacent sub city (out of study area) and comments were added immediately after pre-test.

4.14. Data Analysis

Data entry was done by using EPI INFO7 and analysis was done by using SPSS statistical software. Descriptive statistics of the collected data was done for most variables in the study using statistical parameters: percentages, means and standard deviations. Bivariate analysis was used to check which variables were associated with the dependent variables individually. Variables found to have association with the dependent variables in bivariate analysis (P-value <0.2) were analyzed by multivariable logistic regression for controlling the possible effect of confounders and finally the variables which have significant association were identified based on the AOR, with 95%CI.

4.15. Ethical consideration

The study was carried out after getting permission from the Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College and Addis Ababa Regional Health Bureau. Informed verbal consent was obtained from each waste collection enterprise and study participants to conduct the study. Confidentiality was granted for information collected from each waste collection enterprises and study participants. Participants' involvement in the study was on voluntary basis; participants who were unwilling to participate in the study and those who wish to quit their participation at any stage were informed to do so without any restriction. Each respondent was informed about the objective of the study and privacy during interview was ensured.

4.16. Dissemination of results

A finding of the study was communicated to St. Paul's Hospital Millennium Medical College, Addis Ababa Regional Health Bureau and Nifas Silk Lafto sub city Sanitation Administration office.

5. Result

5.1. Socio-demographic characteristics of respondents

Two hundred sixty eight house to house solid waste collectors participated in the study with 98.2% response rate. The majority of respondents 171 (63.8%) were females. The median and mean age of respondents was 32 and 32.54 year respectively with the standard deviation of ± 8.34 . Minimum and maximum ages of the respondents were 19 and 68 respectively. The monthly income for the survey respondents ranges from 900 to 3,000 birr. Two hundred fifty (91.6%) of the respondents were working through six days per week. One hundred seventy one (63.8%) of study participants were working above 8 hours per a day (See Table 1)

Table 1: Socio_demographic characteristics of respondents, Nifas Silk Lafto sub city solid waste collectors, January/2018

Variables	Frequency	Percentage
Sex		
Male	97	36.2%
Female	171	63.8%
Marital status		
Married	201	75.0%
Single	39	14.6%
Divorced /separated	17	6.3%
Widowed	11	4.1%
Educational status		
Illiterate	119	44.4%
Primary school (1-8 grades)	126	47.0%
Secondary school (9-12 grades)	23	8.6%
Working hours per day		
>8 hours	97	36.2%
≥ 8 hours	171	63.8%
Working days per week		
≥ 5 days	22	8.2%
≥ 6 days	246	91.8%
Work experience		
<3years	123	45.9%
3-5years	56	20.9%
≥ 6 years	89	33.2%
Family size		
≥ 2	32	11.9%
3 to 4	154	57.5%
≥ 5	82	30.6%
Monthly income		
1,500-2,000	11	4.1%
>2000	257	95.9%

5.2. Work related injury characteristics

5.2.1. Occurrence of injury in the last one year

Out of 268 house hold solid waste collectors who had direct waste contact, 79 (29.5%) of the respondents were injured in the last twelve months. Therefore, the overall magnitude of work related injury was 29.5 per year. Of the 79 workers who were injured in the last one year, 58(72.5%) workers experienced work related injury once, 19(23.8%) experienced twice and 3(3.8%) experienced greater than or equal to three times. Moreover, 17(6.3%) workers had injury in the last one month prior to the data collection.

5.2.2. Injury by type

The leading type of injury reported by the house hold solid waste collectors was sharp and needle injury 52(65.8%) followed by poison or acid splash 17(21.3%). Nineteen (23.8%) solid waste collectors were affected by more than one injury (See Figure 1).

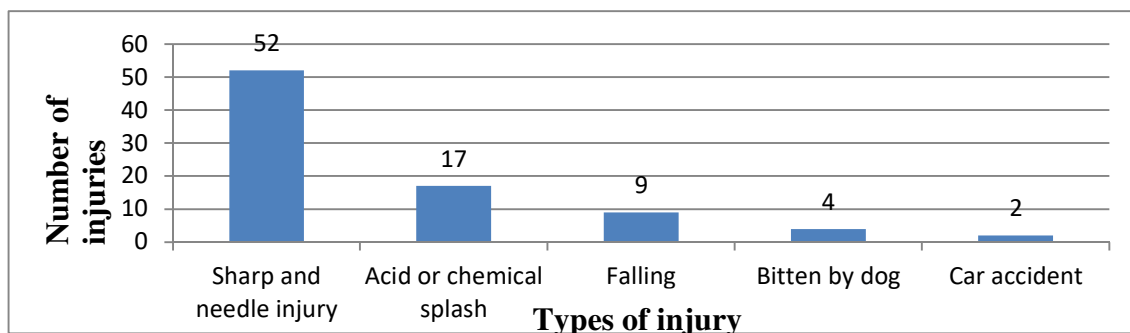


Figure 3: Types of injury to house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

5.2.3. Affected body parts

The highest number of workers 49 (62.0%) were injured on their hand followed by leg 33(41.7%) injury (See Figure 2). From workers who had hand injury, 35(71.4%) workers reported injury on two or more hand parts.

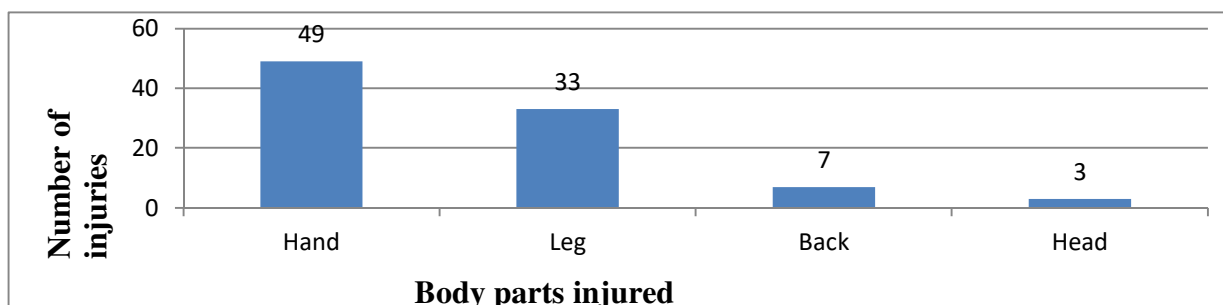


Figure 4: Body parts injured to house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

5.2.4. Severity of injury

Of the 79 house hold solid waste collectors who had injury in the last one year, 42(53.2%) workers were lost from greater than or equal to ten working days due to injury. Similarly, 32(40.0%) workers lost less than ten working days. Only 73 (26.7%) study participants were vaccinated for infectious diseases like tetanus that are risk for solid waste collectors (See Table 2).

Table 2: Frequency distribution of occupational injuries among micro and small scale solid waste collectors in Nifas Silk Lafto sub city, January/2018

Variables	Frequency	Percentage
Injury in the last one year		
Yes	79	29.5%
No	189	70.5%
Injury in the last one month		
Yes	17	6.3%
No	251	93.7%
Seek medical care (among injured workers)		
Yes	64	81.1%
No	15	18.9%
Body parts injured		
Hand injury	49	17.9%
Leg injury	33	12.1%
Head injury	3	1.1%
Back injury	7	2.6%
Fingers	39	14.3%
Toe/feet	12	4.4%
Lower arm/elbow	8	2.9%
Lower leg	20	7.3%
Types of injury		
Car accident	2	0.7%
Sharp and needle injury	52	19.4%
Dislocation	4	1.5%
Poison or acid splash	17	6.2%
Bitten by dog	4	1.5%
Falling injury/Collision	9	3.3%
Number of injuries in the last one year		
Once	57	21.3%
Twice	18	6.7%
≥Three times	4	1.5%
Working days lost due to injury		
None	6	7.6%
< 10 days	31	39.2%
≥ 10 days	42	53.2%
Vaccinated for tetanus toxoid		
Yes	72	26.9%
No	196	73.1%

5.3. Utilization of personal protective equipment

Out of 268 respondents, 142 (53.0%) used some kinds of personal protective equipment (PPE) while they are on duty and the rest 126 (47.0%) were non users of PPE. The most used personal protective equipment was gown, 83 (58.5%) followed by hand glove 10 (7.0%). The main reasons for none users were no access, because they purchase these personal protective for themselves and discomfort during work time (See Table 3). Among injured workers, 58(73.4%) were exposed for injuries while they were on duty of transferring/emptying wastes from household's container to the large dust bin, 14(17.7%) were exposed during picking openly disposed wastes from the ground with bare hand and others 7(8.9%) were exposed during lifting/carrying dust bins.

5.4. Behavioral characteristics of respondents

Fifty three (19.4%) were not satisfied on their current job and 146 (53.5%) were not satisfied on the level of payment. Thirty two (11.7%) house hold solid waste collectors encountered sleeping disturbance. Twenty respondents (7.3%), 45 (16.5%) and 5 (1.8%) respondents practiced chat chewing, alcohol drinking and cigarette smoking respectively (See Table 3).

Table 3: Utilization of personal protective equipment and behavioral characteristics of respondents, in Nifas Silk Lafto sub city solid waste collectors, January/ 2018

Variables	Frequency	Percentage
Availability of PPE		
Yes	154	57.5%
No	114	42.5%
Using PPE on duty		
Yes	142	53.0%
No	126	47.0%
Actual use of PPE during data collection on observation		
Yes	112	41.8%
No	156	58.2%
Training on occupational health and safety before		
Yes	107	39.9%
No	161	60.1%
On job training on occupational health and safety		
Yes	144	53.7%
No	124	46.3%
Cigarette smoking		
Yes	6	2.2%
No	262	97.8%
Chat chewing		
Yes	21	7.8%
No	247	92.2%
Alcohol drinking		
Yes	44	16.4%
No	224	83.6%

Sleeping disorder		
Yes	31	11.6%
No	237	88.4%
Job satisfaction		
Yes	216	80.6%
No	52	19.4%
Satisfaction on current payment		
Yes	123	46.5%
No	145	53.5%

5.5. What was observed?

Out of 112 respondents wore personal protective equipment on observation, 82 (73.2%) wore only gown, 10 (8.9%) only hand glove, 7 (6.3%) gown, traditional hat and hand glove, 6 (5.4%) gown and traditional hat and 1 (0.9%) wore gown and hand glove (See Figure 3). None of respondents wore face mask and special shoes/boots at observation. Almost all house hold waste collectors walk long distance with heavy carry as long as 300m to 500m by estimation. All (100%) of dust bins or waste containers during data collection on observation had unsegregated wastes. All dust bins had plastics and plastic bottles. In addition broken glass, soil, ash, needle, blade, bad chemical containers and others were added to dust bins.

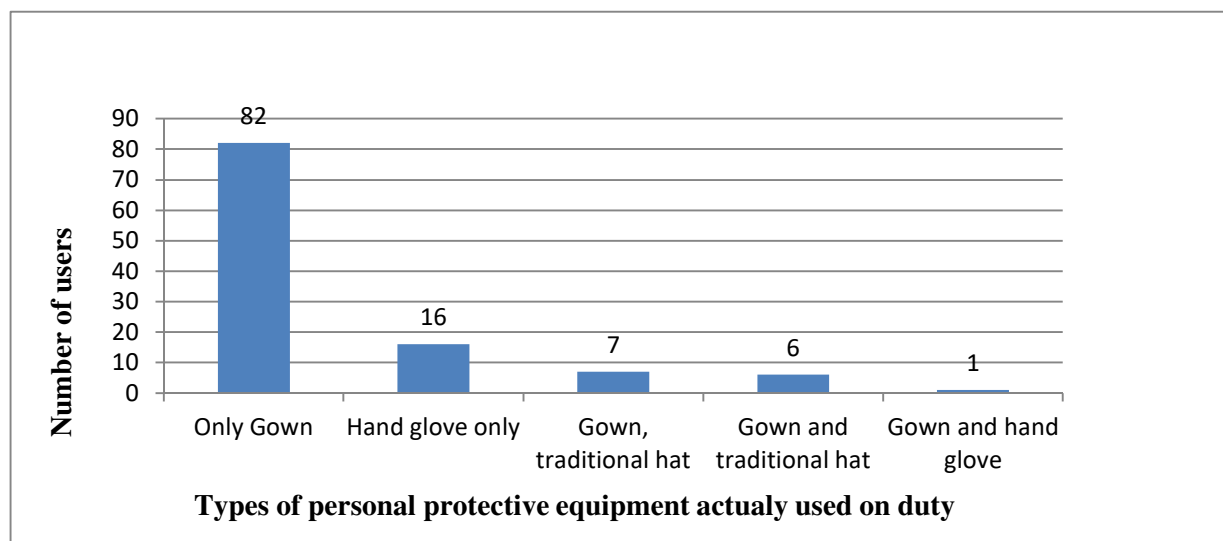


Figure 5: Types of personal protective equipment actually used by house hold solid waste collectors on observation during data collection, Nifas Silk Lafto sub city, January/2018



Photo 1: House hold solid waste collectors working by their bare hands, Nifas Silk Lafto sub city, January/2018



Photo 2: Unsegregated wastes, Nifas Silk Lafto sub city, January/2018



Photo 3: House hold Solid waste collectors carrying dust containers long distance from house to centrally collection point, Nifas Silk Lafto sub city, January/2018

5.6. Factors Associated with Occupational Injury

5.6.1. Bivariate analysis

The bivariate logistic analysis of socio_demographic characteristics with occupational injury shown that age, not being in marriage bond, being illiterates, having family size greater than or equal to three and working more than eight hours per day were significantly associated with physical injuries related to work. While sex and work experience were slightly significant. Monthly income and employment condition did not show significant association with occupational injury. Bivariate analysis result for personal protective equipment availability and utilization showed that training about solid waste collection and its side effects and how to protect themselves from occupational injury before the actual work and on operation were significantly associated while the rest were not associated with occupational injury. The bivariate analysis for personal and behavioral variables showed that job satisfaction, satisfaction on the level of payment, alcohol drinking and sleeping disorder were associated with occupational injury related to work. While the rest: cigarette smoking and chat chewing were not associated with occupational injury related to house hold solid waste collection (See Table 4).

Table 4: Bivariate analysis results on occupational injuries of house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

Variables	Injury status in the last one year		X ²	Significance	COR (95 % CI)	P-value
	Yes N (%)	No N (%)				
Sex			1.871	0.171	1.511 (0.882,2.589)	0.133*
Male	33(28.6)	63(68.4)				
Female ^{RG}	45(26.3)	126(73.7)				
Age	—	—	NA	NA	1.036(1.004,1.068)	0.027*
Marital status			10.159	0.017		0.030*
Married ^{RG}	68(33.8)	133(66.2)				
Single	4(10.3)	35(89.7)			0.224(0.076,0.655)	0.006
Divorced/separated/Widowed	7(17.6)	21(82.4)			0.419(0.116,1.509)	0.183
Educational status			12.151	0.002		0.003*
Illiterate	48(40.3)	71(59.7)			2.434(0.846,6.999)	0.099
Primary school (1-8)	26(20.6)	100(79.4)			0.936(0.318,2.758)	0.905
Secondary school (9-12) ^{RG}	5(21.7)	18(78.3)				
Family size			13.622	0.001		0.001*
Two ^{RG}	6(18.8)	26(81.2)				
Three to four	59(38.3)	95(61.7)			2.691(1.046,6.926)	0.040
Five and above	14(17.1)	68(82.9)			0.892(0.310,2.569)	0.833
Work experience			4.154	0.125		0.129*
<3years ^{RG}	30(24.4)	93(75.6)				
3-5years	22(39.3)	34(60.7)			2.006(0.1020,3.943)	0.044
≥6years	27(30.3)	62(69.7)			1.350(0.733,2.488)	0.336
Working hours per day			31.380	0.000		0.000*
≤8hrs ^{RG}	8(8.2)	89(91.8)				
>8hrs	71(41.5)	100(58.5)			7.899 (3.604,17.313)	
Working days per week			0.231	0.631		0.471
≤5days ^{RG}	5(22.7)	17(77.3)				
≥6days	74(30.1)	172(69.9)			1.463(0.520,0.4.113)	
Get training before			19.256	0.000		0.000*
Yes ^{RG}	15(14.0)	92(86.0)				
No	64(39.8)	97(60.2)			4.047(2.154,7.602)	
Get on job training			4.561	0.033		0.024*
Yes ^{RG}	34(23.6)	110(76.4)				
No	45(36.3)	79(63.7)			1.843(1.084,3.134)	
Cigarette smoking			0.540	0.463		0.496
Yes	1(16.7)	5(83.3)			0.472(0.054, 4.105)	
No ^{RG}	78(29.8)	184(70.2)				
Chat chewing			0.426	0.514		0.370
Yes	8(38.1)	13(61.9)			0.656 (0.261,1.650)	
No ^{RG}	71(28.7)	176(71.3)				
Alcohol drinking			66.394	0.000		0.000*
Yes	36(81.8)	8(18.2)			18.942(8.217,43.663)	
No ^{RG}	43(19.2)	181(80.8)				
Sleeping disorder			7.102	0.008		0.005*
Yes	16(51.6)	15(48.4)			2.946 (1.376,6.306)	
No ^{RG}	63(26.6)	174(73.4)				
Payment satisfaction			11.764	0.001		0.000*
Yes ^{RG}	23(18.1)	100(81.9)				
No	56(38.6)	89(61.4)			2.736 (1.558,4.805)	
Job satisfaction			4.372	0.037		0.025*
Yes ^{RG}	57(26.4)	159(73.6)				
No	22(42.3)	30(57.7)			2.046 (1.092, 3.833)	

Note: NA=Not Applicable, * = Significant variables on bivariate analysis

5.6.2. Multivariable analysis

In multivariable analysis, working more than 8 hours per day, training about occupational health and safety before actual work, alcohol drinking, sleeping disorder and satisfaction on the level of payment were significantly associated with occupational injury of house hold solid waste collection workers. The likelihood of occupational injury was found to be significantly higher (AOR = 8.345, 95 % CI (3.029, 22.993), P-value = 0.000)) among respondents of working more than 8hrs per day. Those of respondents drank to alcohol (AOR = 55.917, 95%CI: (15.780, 198.147), P-value = 0.000)) was significantly associated with occupational injury. The odds of occupational injury was 14.093 times (95%CI (4.733, 41.958), P-value=0.000) higher among those who reported no training about occupational health and safety before actual work as compared to having training. The odds of occupational injury was 5.596 times (95% CI, (1.851, 16.916), P-value = 0.002) higher among those who had sleeping disorder compared to normal sleeping pattern. Satisfaction on the level of payment (AOR = 2.877 (1.231, 6.722), P-value = 0.015) was also another variable that showed significant and positive association with work related occupational injuries to house hold solid waste collectors compared to those of satisfied individuals(See Table 5).

Table 5: Multivariable logistic regression analysis result on occupational injuries among micro and small scale enterprise solid waste collectors, Nifas Silk Lafto sub city, January/2018

Variables	Injury status in the last one year		AOR(95% CI)	P-value
	Yes N (%)	No N (%)		
Working hours per day ≤8hrs ^{RG} >8hrs	8(8.2) 71(41.5)	89(91.8) 100(58.5)	8.345(3.029,22.993)	0.000
Training before actual work Yes ^{RG} No	15(14.0) 64(39.8)	92(86.0) 97(60.2)	14.093(4.733,41.958)	0.000
Alcohol drinking Yes No ^{RG}	36(81.8) 43(19.2)	8(18.2) 181(80.8)	55.917(15.780,198.147)	0.000
Sleeping disorder Yes No ^{RG}	16(51.6) 63(26.6)	15(48.4) 174(73.4)	5.596(1.851,16.916)	0.002
Satisfaction on level of payment Yes ^{RG} No	23(18.1) 56(38.6)	100(81.9) 89(61.4)	2.877(1.231,6.722)	0.015

6. Discussion

This study was done to assess the magnitude of work related injury and associated factors in the last one year among house hold solid waste collection workers in Nifas Silk Lafto sub city, Addis Ababa.

In this study, the overall annual magnitude of work related injury was 29.5%. The one month cumulative incidence was 6.3%. A study conducted in Egypt during 2012 reported that 60.8% prevalence rate of one or more work related musculo-skeletal injuries (13). This may be justified as: no suitable and complete protective equipment given; their protective equipment could not serve to the intended purpose because they were not of good quality and most workers were not using them at work always; it was rare to find workers in their complete clothing at work opposing to the ideal situation; the type of waste and management systems.

This study has showed that hands 18%, fingers 14.3%, legs 12.1%, toe/feet 4.4%, and back 2.6% as the most commonly injured area of the body. A study conducted in Zimbabwe among solid waste management workers had showed that hands, fingers or foot 40%, legs 5%, back 5%. The discrepancy between hand, fingers and leg injury may be due to the utilization of personal protective equipment. In Zimbabwe, sharp objects and broken glasses were disposed haphazardly to dust bins and risk to cause occupational injury easily(36).

In this study, the most frequent causes of work related injury were sharp and needle objects (19.4%), poison or chemical splash (6.2%), and fall (2.6%). A study conducted in Gujarat, India during 2009 on occupational injury of door to door solid waste collectors showed that cutting injury was the leading (42%) cause of injury followed by repetitive motion (6.4%), puncture (4.3%) and fracture (2.6%) (10). Recycling sector injuries and worker safety bulletin, 2015 identified that lifting, pushing and pulling of waste bins were major causes for occupational injuries. The possible reasons in which sharps and needle objects were the common cause of injury for this study population are: The absence of safety training, especially on job training, limited use of personal protective devices while on duty and prolonged duration of working hours were major factors that contribute to the occurrence of injury (5). Sharps and broken objects were disposed together with the general waste (mixed waste/unsegregated waste); Even, workers that used hand gloves at the time of data collection were of poor quality; No continuous and frequent use of the personal protective equipment; The community used bag/bin is not puncture proved to store wastes so that the collectors became easily injured during handling.

This study showed that Workers who reported higher working hours per day (>8 hours) were more likely to report work related injury than their counterparts. A study conducted on occupational injury among industry workers in Ethiopia stated that workers who were engaged for more than 48 hours per week were more likely to develop injuries than who engaged for less than 48 hours. Fatal accidents usually occur to workers who could have had a long working time; the routine type of daily work may not require special experience or skill and those engaged in such routine activities for long period of time with poor working environment may sustain job dissatisfaction; workers stayed for long period of time may have had increased vulnerability of different injuries (37).

The occurrence of work related injury was also associated with health and safety training. Those workers who had not health and safety training were more likely to report work related injury than trained one. Because of lack of health and safety training towards danger of their occupation, 47.0% of workers did not use the personal protective equipment frequently at work. A study conducted in Northern parts of Ethiopia stated that those workers who had not health and safety training were 2.569 times more likely to report work related injury than trained one. The absence of safety training, especially on job training, limited use of personal protective devices while on duty and prolonged duration of working hours were major factors that contribute to the occurrence of injury. This is due to un-trained workers were not aware of the cause of injuries and their reduction and prevention methods, un-trained workers did not use the personal protective equipment frequently and correctly at work(14).

In this study Alcohol consumption was strongly and significantly associated variable with work related injury. A study conducted in Mumbai, India stated that heavy drinkers were more likely to be injured than non-drinkers(29). This was due to alcohol can impair judgmental and psychomotor skills, alcohol taken before work begins cause spillover effects, such as fatigue and hangovers, alcohol may be more likely to be engaged in other behaviors that increase the risk of injury.

The result of the study has shown that the occurrence of work-related injury is significantly and positively associated to sleeping disorder. Respondents with sleeping disorder had 5.633 times higher injury than who had normal sleeping pattern. This could explain that sleeping disorders affect the ability to maintain wakefulness, concentration, ability in assessing or watching the work environment and working conditions (25).

Satisfaction on the level of payment was also another statistically associated variable with work related injury of house hold solid waste collectors. In this study, those of respondents who were not satisfied on

the level of payment had 2.877 times more likely to develop than to their counterparts. A study conducted during 2016 in Ethiopia stated that those of individuals not satisfied on their level of payment were more likely to be injured than the satisfied ones. Not being satisfied on the level of payment may cause the emotional instability and may decrease motivational energy on work and became ignorant to protect themselves from injury(6).

7. Strengths and limitations

7.1. Limitations

- ❖ It did not identify the cause and effect relation sheep between the dependent and independent variables.
- ❖ There could be possibility of recall bias resulting in under or over reporting and misreporting of events.

8. Conclusion

Compared to other similar studies conducted in developed and developing countries, the magnitude of work related injury was 29.5% in the study area. Of the 79 house hold solid waste collectors who had injury in the last one year, 42(53.2%) workers were lost ≥ 10 working days due to injury. The commonest causes of injury were sharp and needle objects, poison or chemical splash and fall. Factors related to injury were working more than 8 hours per day, alcohol consumption, not having health and safety training, sleeping disorder and being not satisfied on the level of current payment. However, some factors proved to be more significant and more influential than others. Workers who worked more than 8 hours per day, alcohol drinkers, not trained about occupational health and safety before actual work, respondents who had sleeping disorder and not satisfied on their payment had significantly higher risks of Work-related injury compared to their counterparts.

9. Recommendations

- Nifas Silk Lafto sub city sanitation administration office: better to give occupational health and safety training to house hold solid waste collectors
- Better to support on personal protective equipment supply: Nifas Silk Lafto sub city sanitation administration office
- Better to minimize alcohol consumption: micro and small scale enterprise solid waste collectors
- Better to minimize working hours: micro and small scale enterprise solid waste collectors

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Annex 1: English Version questionnaire

Survey Questionnaire for micro and small scale enterprise solid waste collectors (MSE)

St. Paul's Hospital Millennium Medical College

Department of Public Health

Consent form

Introduction: Hello! My name is **Lijalem Getie**, a resident of the Department of Public Health Field Epidemiology Training Program at St. Paul's Hospital Millennium Medical College. I am now doing my master's thesis on the title "*Assessment of prevalence of occupational injury and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city.*" The purpose of this research is that to investigate the occupational injuries associated with micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, by identifying the gaps in the working environment, it is intended to suggest best possible recommendation for concerned bodies. You are randomly selected from those your union members, who were working under Nifas Silk Lafto sub-city's sanitation administration office. For questions that can be asked by the interviewer, you can give your answer according to your understanding.

Confidentiality and Consent: "I am going to ask you some very personal questions that some people find difficult to answer. Your answers are completely confidential. Your name and household members will not be written on this form, and will never be used in connection with any of the information you tell me. You do not have to answer any questions that you do not want to answer, and you may end this interview at any time you want to. However, your honest answers to these questions will help me for better understanding in the situations of the occupational injuries associated with solid waste collection to micro and small scale enterprises in Nifas Silk Lafto sub city. I pledge ethically to keep your response with the rules of confidentiality. Therefore, I would like to request for your cooperation to respond as per the demand of the question honestly & objectively. I would be thankful for your response.

S.N	Variables	Response options	Remark
1.	Socio-demographic information		
1.1.	Sex	• Male • Female	
1.2.	Age	_____ (in years)	
1.3.	Marital status?	• Married • Single • Divorced • Separated • Widowed	
1.4.	Educational status?	• Illiterate • Primary school (1-8 grades) • Secondary school (9-12 grades) • College certificate and above	
1.5.	Employment condition?	• Self-employment in association • Permanent • Contract	
1.6.	Do you have other job than solid waste collection?	• Yes • No	
1.7.	Family size?	• An individual alone • Two • Three to four • Five and above	
1.8.	Work experience as waste collector?	• <3 years • 3-5 years • >=6years	
1.9.	Working hours per day?	• <= 8hrs • >8hrs	

1.10.	Working days per week?	• ≤5 days per week • 6 days per week • 7 days per week	
1.11.	What is your monthly income in Ethiopian birr?	• 500-1000 birr • 1000-1500 birr • 1500-2000 birr • > 2000 birr	
2.	Work related injury characteristics		
2.1.	Did you face any type of injury in the past one year related to solid waste collection?	• Yes • No	
2.2.	If you say “yes” to Q 2.1., what type of injury was that?	• Bitten by dog • Sharp and needle injury • Poison or acid splash • Falling injury • Car accident • Burn • Dislocation	
2.3.	What was the cause of injury?	• Hit by falling objects • Falls • Lifting heavy objects • Splintering objects • Collision	
2.4.	If yes to Q2.1, when did face you injury?	• During emptying house hold’s dust bin • During picking openly distributed wastes • During carrying dust bins to the nearby large dust bin	
2.5.	Did you face any type of injury in the past one month related to solid waste	• Yes • No	

	collection?		
2.6.	If you say “yes” to Q 2.4., what type of injury was that?	• Bitten by dog • Sharp and needle injury • Poison or acid splash • Falling injury • Car accident • Burn • Dislocation	
2.7.	How many times were you injured in the past one year?	• Not at all • Once • Twice • More than two times	
2.8.	Which part (s) of your body was/were injured?	• Hand • Leg • Back • Head • Eye • Tooth	
2.9.	If you answered as “hand”, which part of your hand was injured?	• Elbow • Finger • Upper arm • Lower arm	
2.10.	If you answered as “leg”, which part of your leg was injured?	• Knee • Toe/feet • Upper leg • Lower leg	
2.11.	Working time lost due to injury in the past one year?	• <10days • >=10days	

2.12.	Did you seek medical care for those of injuries?	• Yes • No	
2.13.	If you say “yes” to Q 2.11., from where did you get medical care?	• Government health facilities • Private health facilities • Traditional healers • Religious remedies	
2.14.	Did you get admitted because of injuries?	• Yes • No	
2.15.	Did you get vaccinated for tetanus toxoid before your job?	• Yes • No	
3.	Personal protective equipment availability and utilization		
3.1.	Do you have personal protective equipment?	• Yes • No	
3.2.	If you say “yes” to Q 3.1., which type of equipment do you have?	• Hand glove • Eye goggle • Helmet • Traditional hat • Special shoe/boots • Face mask • Gowns	
3.3.	Did you use your personal protective equipment regularly during solid waste collection?	• Yes • No	
3.4.	If No to Q3.3, what is your reason?	• No PPE • Discomfort during work • I did not know the importance of PPE	
3.5.	If you say “yes” to Q 3.3., which types do you use regularly?	• Hand glove • Eye goggle	

		• Helmet • Traditional hat • Special shoe/butts • Face mask • Gowns	
3.6.	Did you get training on occupational health and safety before actual work on solid waste collection?	• Yes • No	
3.7.	Did you get on job training about occupational health and safety?	• Yes • No	
4.	Personal and behavioral variables		
4.1.	Did you smoke cigarette?	• Not at all • Irregularly • Frequently	
4.2.	Did you chew chat?	• Not at all • Irregularly • Frequently	
4.3.	Did you drink alcohol?	• Not at all • Irregularly • Frequently	
4.4.	Have you encountered sleeping disorder?	• Yes • No	
4.5.	Are you satisfied with your current job?	• Strongly agree • Agree • Disagree • Strongly disagree	
4.6.	Are you satisfied with your level of payment currently on this job?	• Yes • No	
4.7.	Did you practice eating or drinking at	• Yes	

	work place during solid waste collection?	No	
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Observation checklist for solid waste collectors

S.N	Questions	Yes	No
1	Do the waste collectors wear personal protective equipment?		
2	Which type of personal protective equipment do they wear?		
3	Is there any observable physical injury?		
4	Do the waste container bags (bins) have unsegregated wastes?		
5	Do the waste collectors walking long distance with heavy carry?		

Annex 2: Amharic version questionnaire

በቤት ለቤት የደረቅ ቆሻሻ ስብሰባ ላይ በጥቃቅንና አነስተኛ ለተደራጁ ሰራተኞች የተዘጋጀ የጥናት መጠይቅ

በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ

የህብረተሰብ ጤና ትምህርት ክፍል

መግቢያ: ጤና ይስጥልኝ ልጅዓለም ጌቱ እባላለሁ በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል የፊልድ ኢፒዲሞሎጂ ሬዚደንት ነኝ። በአሁን ሰዓት የመመረቂያ ፅሁፌን “Assessment of prevalence of occupational injury and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city.” በሚል ርዕስ በንፋስ ስልክ ላፍቶ ክፍለ ከተማ ውስጥ በሚገኙና በቤት ለቤት ደረቅ ቆሻሻ አሰባሰብ በጥቃቅንና አነስተኛ ኢንተርፕራይዞች ልማት በተደራጁ ሰራተኞች ላይ ትኩረት አድርጌ ጥናቴን በመስራት ላይ እገኛለሁ። የጥናቴም ዋና አላማ በክፍለ ከተማው ውስጥ በማህበራት ተደራጅተው ደረቅ ቆሻሻ በመሰብሰብ የሚተዳደሩ ግለሰቦች በስራቸው ምክንያት ሊከሰቱ የሚችሉ የሥራ ላይ ጉዳዮችን እና ከስራው ጋር ተያይዞ የሚያጋጥሙትን ችግሮች ለመዳሰስና ለሚመለከታቸው አካላትም በጥናቴ መሰረት የጥናቴን ውጤት በማሳየት ለችግሮቹ የመፍትሄ ሀሳብ ማቅረብ ነው። እርስዎ ከተደራጁበት ማህበር ውስጥ ይህን መረጃ እንዲሰጡኝ ተመርጠዋል። ስለሆነም ከዚህ ቀጥሎ ለተቀመጡት ጥያቄዎች በተረዱት ልክ ስምዎትን መግለፅ ሳያስፈልግ የመሰለዎትን ምላሽ እንዲሰጡኝ እጠይቃለሁ። የሚሰጡኝ ምላሽ ምስጢራዊነቱ የተጠበቀ መሆኑን እየገለፅኩ ለምጠይቀዎት ጥያቄ ለሚሰጡኝ ምላሽ እና ትብብር በቅድሚያ ምስጋናየን አቀርባለሁ።

ተ.ቁ	ጥያቄዎች	አማራጭ ምላሾች	ምርመራ
1.	ሥነ-ህዝባዊ መረጃዎች		
1.1.	ፆታ	- ወንድ - ሴት	
1.2.	እድሜ	_____ (በቁጥር)	
1.3.	የጋብቻ ሁኔታ	- ያገባ/ች - ያላገባ/ች	

		• የፈታ/ች • የተለያዩ • የሞተችበት/ባት	
1.4.	የትምህርት ደረጃ	• ያልተማረ/ች • የመጀመሪያ ደረጃ ትምህርት (1-8ኛ) • ሁለተኛ ደረጃ (9-12ኛ) • የኮሌጅ ምስክር ወረቀትና ከዚያ በላይ	
1.5.	የቅጥር ሁኔታ	• በግል በማህራት የተደራጁ • ቋሚ • ኮንትራት/ጊዜያዊ	
1.6.	ከዚህ ሥራ ውጭ ተጨማሪ ሥራ አለዎት?	• አለኝ • የለኝም	
1.7.	የቤተሰብዎ ብዛት ምን ያክል ነው?	• አንድ ግለሰብ ብቻ • ሁለትና ከዚያ በታች • ከሶስት እስከ አራት • አምስትና ከዚያ በላይ	
1.8.	ደረቅ ቆሻሻ በመሰብሰብ ሥራ ምን ያክል ጊዜ ሆነዎታል?	• ከሶስት ዓመት በታች • ከሶስት እስከ አምስት • ስድስትና ከዚያ በላይ	
1.9.	በቀን ምን ያክል ሰዓት ይሰራሉ?	• 8ሰዓትና ከዚያ በታች • ከ8ሰዓት በላይ	
1.10.	በሳምንት ምን ያክል ቀናት ይሰራሉ?	• 5ቀናትና ከዚያ በታች • 6ቀናት • 7ቀናት	
1.11.	ለዚህ ሥራ የሚከፈለዎት ወርሃዊ ገቢ ምን ያክል ነው?	• ከ500 እስከ 1000 ብር • ከ1000 እስከ 1500 ብር • ከ1500 እስከ 2000 ብር • ከ2000 ብር በላይ	

2.	ከሥራው ጋር ተያያዥነት ያላቸው ጉዳቶችና ፀባያቸው		
2.1.	ባለፈው አንድ ዓመት ውስጥ ማንኛውም አይነት የአካል ጉዳት ገጥመዎት ያውቃል?	• አዎ • አልገጠመኝም	
2.2.	መልስዎ “አዎ” ከሆነ ምን አይነት የአካል ጉዳት ነበር ያጋጠመዎት?	• የውሻ ንክሻ • በስለታማና መርፌ መጎዳት • በአሲድና መሰል መርዛማ ነገሮች መጎዳት • መውደቅ አደጋ • የመኪና አደጋ • ቃጠሎ • ወለምታ	
2.3.	ለአካል ጉዳቱ መንስኤው ምን ነበር?	• ከላይ የወደቀ እቃ • መውደቅ • ከባድ እቃ ማንሳት • የተሰበሰሩ ቁሳቁሶች • ግጭት	
2.4.	ለተራቁጥር 2.1. ምስዎ “አዎ” ከሆነ በምን ወቅት ነው ጉዳቱ የሚከሰተው?	• ከእቃ ወደ እቃ ለመገልበጥ በሚደረግ ሥራ • የወዳደቁ ቆሻሻዎችን በባዶ እጅ ለማንሳት በሚደረግ ሥራ • ቆሻሻውን ተሽክሞ ወደ ትልቁ ማጠራቀሚያ ሲኬድ በሚደረግ ሥራ	
2.5.	ባለፈው አንድ ወር ውስጥ ማንኛውም አይነት የአካል ጉዳት ገጥመዎት ያውቃል?	• አዎ • አልገጠመኝም	
2.6.	መልስዎ “አዎ” ከሆነ ምን አይነት የአካል ጉዳት ነበር ያጋጠመዎት?	• የውሻ ንክሻ • በስለታማና መርፌ መጎዳት • በአሲድና መሰል መርዛማ ነገሮች መጎዳት • መውደቅ አደጋ	

		• የመኪና አደጋ • ቃጠሎ • ወለምታ	
2.7.	ባለፈው አንድ ዓመት ውስጥ ስንት ጊዜ ጉዳት አጋጥመዎት ያውቃል?	• ምንም ጉዳት አላጋጠመኝም • አንድ ጊዜ • ሁለት ጊዜ • ከሁለት ጊዜ በላይ	
2.8.	የትኛው የአካል ክፍል ነበር ጉዳት የደረሰበት?	• እጅ • እግር • ጀርባ • እራስ • ዐይን • ጥርስ	
2.9.	መልስዎ “እጅ” ከሆነ የትኛው የእጅ ክፍል ነበር የተጎዳው?	• ክርን • ጣት • የላይኛው ክንድ • የታችኛው ክንድ	
2.10.	መልስዎ “እግር” ከሆነ የትኛው የእግር ክፍል ነበር የተጎዳው?	• ጉልበት • የእግር ጣት/ጫማ • የላይኛው የእግር ክፍል • የታችኛው የእግር ክፍል	
2.11.	በአካል ጉዳት ምክንያት የባከነው የሥራ ቀናት ምን ያክል ይሆናሉ?	• ከ10ቀናት በታች • 10ቀናትና ከዚያ በላይ	
2.12.	ለነዚህ የአካል ጉዳቶች ህክምና አግኝተዋል?	• አዎ • አላገኘሁም	
2.13.	መልስዎ “አዎ” ከሆነ ከየት ነበር ህክምናውን ያገኙት?	• ከመንግስት ጤና ተቋማት • ከግል ጤና ተቋማት • ከባህላዊ መድኃኒት ቤት	

		• ከሐይማኖት ተቋማት	
2.14.	በአካል ጉዳት ምክንያት በሆስፒታል ተኝተው ያውቃሉ?	• አዎ • አላውቅም	
2.15.	ለቴታነስ አምጭ ተህዋስ መከላከያ ክትባት ወስደው ያውቃሉ?	• አዎ • አላውቅም	
3.	የደህንነት መከላከያ መሳሪያዎችን በተመለከተ የሚጠየቁ ጥያቄዎች		
3.1.	የደህንነት መጠበቂያ መሳሪያዎች አለዎት?	• አዎ • የለኝም	
3.2.	መልስዎ “አዎ” ከሆነ ምን አይነት መሳሪያዎች/ቁሳቁሶች አለዎት?	• የእጅ ጓንት • የአይን ከላከያ ጉግል • የጭንቅላት መከላከያ ሄልሜት • ከሰሌን የተሰራ ባርኔጣ • የእግር መከላከያ ጫማ (ቡት) • የአፍና የአፍንጫ (የፊት) መከላከያ ማስክ • የደምብ ልብስ (ጋወን)	
3.3.	እነዚህን የደህንነት መከላከያ/መጠበቂያ ቁሳቁሶችን ሁልጊዜና በአግባቡ ይጠቀማሉ?	• እጠቀማለሁ • አልጠቀምም	
3.4.	መልስዎ “እጠቀማለሁ” ከሆነ የትኛውን አዘውትረው ይጠቀማሉ?	• የእጅ ጓንት • የአይን ከላከያ ጉግል • የጭንቅላት መከላከያ ሄልሜት • ከሰሌን የተሰራ ባርኔጣ • የእግር መከላከያ ጫማ (ቡት) • የአፍና የአፍንጫ (የፊት) መከላከያ ማስክ • የደምብ ልብስ (ጋወን)	
3.5.	የደረቅ ቆሻሻ መስብሰብ ሥራ ከመጀመሪያ ስለሥራው ደህንነትና ጤና ስልጠና አግኝተው ያውቃሉ?	• አዎ • አላገኘሁም	

3.6.	በሥራ ላይ እያሉ ስለሥራው ደህንነትና ጤና ስልጠና አግኝተው ያውቃሉ?	• አዎ • አላገኘሁም	
4.	ግላዊና ከግለሰብ ፀባይ ጋር የተገናኙ መጠይቆች		
4.1.	ሲጋራ ያጨሳሉ?	• በጭራሽ አላጨሰም • አልፎ አልፎ አጨሳለሁ • በቋሚነት አጨሳለሁ	
4.2.	ጫት ይቅማሉ (ይበላሉ)?	• በጭራሽ አልቅምም • አልፎ አልፎ እቅማለሁ • በቋሚነት እቅማለሁ	
4.3.	የአልኮል መጠጥ ይጠጣሉ?	• በጭራሽ አልጠጣም • አልፎ አልፎ እጠጣለሁ • በቋሚነት እጠጣለሁ	
4.4.	የእንቅልፍ ችግር አጋጥመዎት ያውቃል?	• አዎ • አጋጥሞኝ አያውቅም	
4.5.	በሥራዎት ላይ ደስተኛ ነዎት?	• አዎ • አይደለሁም	
4.6.	ለአሁን ሥራ በሚከፈለዎት ክፍያ ደስተኛ ነዎት?	• አዎ • አይደለሁም	
4.7.	በሥራ በታዎ ላይ ሆነው ምግብ ወይም መጠጥ ይጠቀማሉ?	• አዎ • አልጠቀምም	

በምልከታ የሚሞሉ መጠይቆች

ተ.ቁ	ጥያቄዎች	አዎ	የለም
1	ደረቅ ቆሻሻ ሰብሳቢዎች በሥራ ሰዓት የደህንነት መከላከያ ቁሳቁሶችን ለብሰዋል?		
2	የትኛውን አይነት የደህንነት መጠበቂያ ቁሳቁስ ለብሰዋል?		
3	በአይን የሚታይ የአካል ጉዳት አለ?		
4	የደረቅ ቆሻሻ ማጠራቀሚያ ቁሳቁሶች ውስጥ የተለያዩ አይነት ቆሻሻዎች ተቀላቅለዋል?		
5	ደረቅ ቆሻሻውን ተሽክመው ረጅም ርቀት ይጓዛሉ?		

Declaration

I the under signed, declare that it is my original work and has never been presented in this college or other university and also all the source materials have been used for this thesis have been properly acknowledged.

Name _____

Signature _____

Date of submission _____

Approval of advisors

This thesis has been submitted for examination with our approval as St. Paul's Hospital Millennium Medical College advisors.

Advisors' name

Sign

date

Hailemichael Bizuneh

Belayneh Leulseged
