

Days away from Work Injury and Associated Factors among Waste Collectors in Mekelle City, Northern Ethiopia: A Cross Sectional Study

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Abstract

Background: In its nature, solid waste management is a labour intensive industry, which exposes workers to numerous occupational hazards. This study was aimed to investigate the magnitude of days away from work injuries and associated factors among organized waste collectors in Mekelle city, Northern Ethiopia.

Method: A questionnaire and observation checklist based cross-sectional study design was employed from June 1 to 30, 2017. Data was analysed using SPSS for windows 20.0. Descriptive statistics and logistic regression methods were used to describe the study population and assess the association between dependent and independent variables, respectively.

Result: From the total of 279 waste collectors involved as a study participant, ten percent(10%) of them reported at least one day away from work injuries during the last twelve months. Female were 96% less likely to be injured as compared to male (AOR = 0.04, 95%CI: 0.008 -0.204). Being married is 87% less likely to be injured as compared to being a single (AOR = 0.130 95% CI: 0.027-0.621). The odds of injury were 4.5 times higher among those who do not use personal protective equipment as compared to their counterparts (AOR = 4.514 95%CI: 1.684-12.095). Waste collectors, who had less than 1000 Birr income, were 3 times more likely to be injured than waste collectors who had greater than 1001 Birr per month income (AOR = 3.008 95%CI: 1.081 - 8.371).

Conclusion: Days away from work injury among waste collectors is a public health problem and has an impact on the economic and social well-being of workers. Therefore, strengthening the provision of personal protective devices and insuring its utilization is highly recommended.

Background

Occupational injury is a major problem in many economic sectors and affects large numbers of workers(1–4). About 30–50% of the worker's working place is unsafe and the majority proportion of the global workforce has no access to occupational health services which contributes to the prevalence of work related injury(5, 6). International labor organization (ILO) estimated that globally, 320,580 fatal injuries taken place due to occupational exposure(7).

Besides its public health impact, occupation injury has an socio-medical and socio-economic developmental problem due to lost working days, long term disabilities, reduced work ability and capacity due to partial disabilities, premature retirement from work and deaths(2, 3, 7). Owing to occupational injury, it is estimated that each year more than six million workers are absent four or more days from their workplace(8). In sub-Saharan Africa, more than 42 million of work-related accidents cause at least three days' absence from work (9). Study done in Zambia reported from 4998 (8.1%) study participants, 60.5% of them reported having stayed away from work as a result work related injury (10).

The economic cost of work related illness, injuries and death is massive at individual, enterprise, national and global levels. Roughly more than 4% of global GNP every year losses is estimated due to compensation, lost working time, interruption of production, training and retraining, medical expenses, and so on (9, 11). Comparing to developed nations, the economic burden will be worst for developing countries as 70% of the world working population live in (11).

In urban solid waste industry, waste is collected, transported and managed manually, which will expose waste workers to a number of occupational hazards(8, 12–17). Several studies depicted that working as a waste collector is associated with a high risk of occupational injuries(15, 18–25).

Most of accidents in waste management setting are related to the implementation of safety measures (16, 26, 27), working condition(2, 22, 28), environmental factors(29, 30), personal factor(8, 30, 31), organizational factor(29). In solid waste workers, accident hazards originate from a variety of causes. Previous study points out those waste workers are mainly exposed to injuries from sharp objects such as glasses, scrap metals, bones, syringes, nails, spikes, and thorns(28).

Though occupational injury has profound health and economy impact, it remains neglected in developing countries, where only 5–10% of the workers have access to occupational health services (11) and occupational health research doesn't recognize the social and political context of work relations and lack political commitment to translate scientific findings into effective policies (1). As the result, information on occupational injury is not well organized, evaluated and monitored at any work setting.

In Ethiopia, there few studies done on occupational injuries(8, 22, 32), However, these occupational injury doesn't clearly indicate severity which can be indicated by the loss of workdays due to injury. More specifically, there is no comprehensive study on occupational health hazards among small scale organized micro enterprise in Mekelle city where there are a number of workers engaged in the collection of solid waste.

Therefore, the study is aimed to investigate the magnitude of day away from work injury and associated factors among organized waste collectors in Mekelle city, Northern Ethiopia

Methods

Study Area and Design

Cross-sectional study design was used to determine prevalence day away from work injuries and associated factors in Mekelle City. Mekelle is located in northern Ethiopia (783 km away from Addis Ababa). The city is located between latitude of 13°32' north and longitude of 39°28' with a total population of 215,546 and an annual growth rate of 5.4% is among the fastest growing cities in Ethiopia. The daily solid waste generation rate is 0.22 kg/c/d. The municipality was able to collect only 33.4% of the total waste generated until recently. Currently, the solid waste collection system in the city is based on

door to door collection of micro and small scale enterprises. In general, there are eight waste micro and small enterprises engaged in solid waste management.

Population

The study population for this study was all waste collectors engaged in solid waste collection of the city. Individual waste collectors who have a minimum of 12 months' work experience were included as study participants.

Sample Size Determination

All the waste collectors available during data collection period were taken. Henceforth, 279 individuals were involved as study participants in this study.

Data Collection Procedures and Quality Control

Structured questionnaire and observational checklist were used to collect data related to socio-demographic characteristics, occupational injury, previous occupational history and illness, smoking history, type and use of personal protective devices, training about occupational health and safety of the waste collectors.

The questionnaire was first prepared in English and translated into local language. The consistence of language translation was checked by translated back into English. Pre-test was done on 5% of the questionnaire out of the study site before data collection to check the validity. Half day training was given for data collectors and supervisors on data collection process and techniques, the purpose of the study, content and application of questionnaires. The whole data collection process was monitored and corrective measures were taken by supervisors through continuous supervision.

Operational Definition

Injury

Work related physical damage to body tissues as the result of exposure to occupational hazards.

Days-away-from-work injuries

The self-reported injuries that cause workers absent from work at least one day beyond the day of the event in the last twelve months prior the data collection.

Micro and Small Enterprise

Small scale unions that are organized by the government and involved in waste management activities.

Statistical Analysis

The collected data were entered to SPSS version 20.0 for analysis. Descriptive statistics like frequency distribution, mean, graphs were computed to explain the study population in relation to relevant variables. An association between dependent and independent variables was presented using odds ratios and 95% confidence intervals. Both Bivariate and multiple logistic regressions were used to test the association between the outcome and independent variables. Variables which had association at $P < 0.2$ during the bivariate analysis were a candidate to multiple logistic regressions.

Result

Socio-demographic Characteristics

A total of 279 waste collectors were participated in this study. Female waste collectors account 69% of the respondents. The mean age of the respondents was 33.70 (± 12.245) years. Almost 63% of the respondents completed primary school. Almost, 93% of respondents were not permanently employed. The majority (68.8%) of the respondents were street sweepers. Regarding income, 63% of the respondents have a monthly income ranged from 500 to 1000 Ethiopian Birr.

Work Environment and Worker's Occupational Behavior

The majority (82%) of the respondents had five and less than five years' experience and worked eight and less than eight hours per day. Out of the 279 respondents, 93.5% of them reported their workplace was not regularly supervised. Presence of hazard was observed in 82.8% of the study participant's work place. About 31% of the respondents reported that no safety training was given during their employment time. Among the respondents, 65% of them were used at least one type of personal protective equipment. Glove (64.2%), face mask (18.3%) and boot (33.7%) were the commonly used type of personal equipment by the respondents. Absence of personal protective equipment (25.8%) was the main reasons reported for not using personal protective equipment. [Table 2].....insert here

Substance Use

In the last twelve months, about 89(31.9%) and 185(66.3%) of the respondents had a history of alcohol and coffee consumption respectively. However, around 98% of the respondents never had a history of smoking and "Khat" consumption.

Work Related Injury

Of the 279 respondents, 29 (10.4%) respondents were reported at least one day away from work injury in the last twelve months. Leg and hand were the most reported injured body part of the waste collectors.

Regarding the type of injuries, out of the respondents who had an occupational injury in the last twelve months, eighteen respondents reported abrasion type of injury, two respondents reported fracture type of injury, one respondent reported cut type of injury and one respondent reported puncture type of injury. Waste collection (11 respondents), and Loading and unloading (10 respondents) were the major activities performed during injury time of solid waste collectors.

Table 3 shows the distribution of occupational injuries in season and days. More injuries were occurring during winter (70%). Tuesday and Monday were the days that more injuries are occurring as it is reported by 9 and 8 respondents, respectively. Fifteen and ten respondents reported the injury were happening in the morning and at noon, respectively.

Factors Associated with Occupational Injury

Of all the variables entered in the final multivariable model fitted for occupational injuries: sex, marital status, personal protective equipment utilization and income were remained significant after adjusting for other independent factors. Female were 96% less likely to be injured as compared to male (AOR = 0.04, 95%CI: 0.008–0.204). Being married is 87% less likely to be injured as compared to being a single (AOR = 0.130 95% CI: 0.027–0.621). The odds of DAFW injury were 4.5 times higher among those who do not use personal protective equipment as compared to their counterparts (AOR = 4.514 95%CI: 1.684–12.095). Waste collectors, who had less than 1000 Birr income, were 3 times more likely to be injured than waste collectors who had greater than 1001 Birr per month income (AOR = 3.008 95%CI: 1.081–8.371).

Discussion

The magnitude of days away from work injury in this study was found to be 10.4%, which is relatively lower compared to other previous studies (8, 22, 33, 34). Besides our study excluded injury that doesn't cause lost in workdays, the discrepancy might be due to the difference in environmental condition, waste collection and segregation practices, and the utilization of personal protective equipment by waste collectors.

All most all the waste pickers involved in this study had experienced an injury that made them at least one day away from their work. This is probably due to the nature of the work and manually picking important materials from unsegregated wastes without personal protective equipment, which is common practice in most of low income countries (15, 35, 36).

Manually collecting, picking and transporting of un-segregated wastes that contains sharp objects such as tin, broken glass, bones, metal and other building materials can cause abrasion(15, 16, 31, 37, 38). In study done in Addis Ababa (8), abrasion was reported as major type of injury among waste collectors. Similarly, in our study abrasion was the common type of injury reported.

In waste collection activities, legs and hands are commonly injured body parts(31, 39–42). This is due to the reason that manual loading, uploading and picking of wastes without wearing appropriate glove and shoes increase the probability of a cut, bruises and ruptures(42, 43). Our result is comparable with other studies(8, 33).

This study found injury is less likely to occur in female as compared to male. This study is supported by a study done on South Korea(30) and Tanzania(31). This is attributed to the job category of respondents as more women were involved in street sweeping. With respect to the marital status, being married is less likely to be injured as compared to being a single. This finding is contrary to the finding of a study done in

Tanzania(31), where married solid waste collectors were more injured than single solid waste collectors. Based on the result, the explanation for this finding could be the married waste collectors have extra family responsibility and then they can take care of themselves.

The occurrence of occupational injuries is significantly associated with monthly salary of the workers(44). This finding is in agreement with a study conducted in Ethiopia (8, 34). This finding is not surprising, as individuals with higher salary have a better chance to buy and properly use personal protective equipment, if they are not provided by the organization.

Availability and utilization of personal protective equipment is one of the determinate of occupational injuries in any work setting(8, 18, 34, 44). Proper utilization of personal protective equipment such as heavy duty glove and boots will prevent a work related injury. In this study, day away from work injury is significantly associated with utilization of personal protective equipment.

Female waste collectors were higher than male waste collectors (street sweeping) in our study. This finding is supported by other studies in other part of Ethiopia (8, 22). The reason for this might be improving the livelihood of women is the priority issue in developing countries and subsequently, this work sector is an emerging and categorized as one of small scale enterprises in which females can involve easily and actively due the nature of the work and the societal role expectations assigned to the different genders (45, 46).

Self-reported data unsupported by clinical investigation were collected, which is considered as a limitation of this study. Hence, a further study on occupational injury supported by clinical investigation is necessary. Yet, despite this limitation, this study puts its significance on the magnitude of days away from work injury which indirectly indicate the severity of the injury and economical implication of the waste collectors.

Conclusion

In conclusion, this study confirms that day away from work injury among waste collectors is a public health problem and might have an economic and social well-being impact on the workers. Thus, priority has to be given to take an immediate measure. PPE utilization and monthly salary are the main determinant factors for days away from work injuries in small scale organized waste collectors. Therefore, strengthening the existing occupational health and safety services in general, and the provision of personal protective devices and ensuring its utilization in particular, are highly recommended.

Acronyms And Abbreviations

DAFWI: Days Away from Work Injury; ILO: International Labor Organization; GNP: Gross National Product; PPE: Personal Protective Equipment; SPSS: Statistical Package for Social Science; SME: Small Scale Enterprises; WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from Mekelle University Ethical approval committee. Letter of permission was secured from Mekelle city municipality office and a written consent was obtained from each respondent by informing the purpose and significance of the survey.

Consent for publication

The funder has no role in making a decision for publication

Availability of data and material

The dataset contains confidential injury related data which should not be shared publicly, according to the journal ethical policy. Therefore, the data sets used and/or analysed during the current study are available from the corresponding author and can be shared on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Author's contribution

MB conceived and designed the study, performed analysis and interpretation of data. MB and BM participated in data collection and drafted the first manuscript; YA and AA did the data entry and critical review of the subsequent draft of the manuscript. All authors read and approved the final version of the manuscript for publication to Archives of Environmental and Occupational Health Journal.

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Tables

Table1: Socio-demographic characteristics of waste collectors in Mekelle city, June, 2017

Variable	Category	Frequency	Percent
Sex of Respondents	Female	194	69.5
	Male	85	30.5
Age of Respondents	18-25	90	32.3
	26 - 35	79	28.3
	36 - 45	71	25.4
	> 45	39	14
Religion of Respondents	Orthodox	265	95
	Muslim	10	3.6
	Catholic	2	0.7
	Protestant	2	0.7
Educational Status of Respondents	Primary school (1-8)	178	63.8
	Secondary School (9 -12)	80	28.7
	Certificate and above	2	0.7
	Can read and write	19	6.8
Marital Status	Single	101	36.2
	Married	92	33
	Divorced	65	23.3
	Widowed	21	7.5
Employment Pattern	Permanent	21	7.5
	Temporary	258	92.5
Job Category	Street sweeper	192	68.8
	Waste collectors	87	31.2
Income of Respondents	< 500	74	26.5
	500 - 1000	176	63.1
	1001 - 1500	29	10.4

Table 2: Occupational behaviour and work environment of waste collectors in Mekelle city, June, 2017

Variable	Category	Frequency	Percentage
Working Experience	5 and less than 5years	231	82.8
	Greater than 5 yeas	48	17.2
Working Hours	8 and less than 8 hours	230	82.4
	Greater than 8 hours	49	17.6
Regular supervision of work place	Yes	18	6.5
	No	261	93.5
Presence of hazard	Yes	231	82.8
	No	48	17.2
Had safety training	Yes	89	31.9
	No	190	68.1
PPE Utilization	Yes	182	65.2
	No	97	34.8
Job satisfaction	Yes	171	61.3
	No	108	38.7
Type of PPE used	Glove	179	64.2
	Face Mask	51	18.3
	Boot	93	33.7
	Other	92	33
Reason for not using PPE	I do not have	9	3.2
	No provision	72	25.8
	It doesn't need always	9	3.2

Table 3: Season, day and time of Injury among waste collectors in Mekelle city, June, 2017

Variable	Category	Frequency
Day of Injury	Monday	8
	Tuesday	9
	Wednesday	1
	Thursday	2
	Friday	1
	Saturday	1
	Sunday	1
	Don't remember	4
	Total	27
Time of Injury	Morning	15
	Noon	10
	Afternoon	1
	Evening	1
	Total	27

Table 4: Factors associated with occupational injuries among municipal solid waste collectors in Mekelle City, June, 2017

Variable	Category	Occupational Injury		COR(95%CI)	AOR(95%CI)
		Yes	No		
Sex	Male	24	61	1	1
	Female	5	189	14.872(5.439 - 40.662)	0.04(0.008 - 0.204)**
Age	18 - 30 years	24	112	7.500(1.719 - 32.720)	0.774(0.052 - 11.563)
	31 - 40 years	3	68	1.544(0.250 - 9.531)	2.070(0.205 - 20.945)
	Above 41years	2	78	1	1
Marital Status	Single	23	78	1	1
	Married	3	89	0.114(0.033 - 0.395)	0.130(0.027- 0.621)**
	Divorced	2	63	0.108(0.024 - 0.474)	0.666(0.082 - 5.405)
	Widowed	1	20	0.170(0.022 - 1.332)	1.201(0.092 - 15.611)
Job category	Street Sweepers	6	186	1	1
	Waste Collectors	23	64	11.141(4.342 - 28.586)	1.289(0.145 - 11.469)
Job satisfaction	Satisfied	12	159	1	1
	Not satisfied	17	91	2.475(1.132 - 5.414)	1.288(0.451 - 3.682)
PPE Utilization	Yes	13	173	1	1
	No	16	77	2.765(1.268 - 6.030)	4.514(1.684 - 12.095)**
Income	Less than 1000	19	110	2.418(1.081 - 5.411)	3.008(1.081 - 8.371)**
	1001 and above	10	140	1	1
Working Hours	<= 8 Hours	20	210	1	1
	> 8 Hours	9	40	2.362(1.003 - 5.562)*	1.279(0.456 - 3.590)
Alcohol Drinking	Yes	12	77	1.586(0.722 - 3.481)	1.724(0.607- 4.892)
	No	17	174	1	1

Coffee Drinking	Yes	12	173	0.314(0.143 - 0.690)*	2.790 (0.870 - 8.946)
	No	17	77	1	1

* Significant at P< 0.05 for COR, ** Significant at P<0.05 for AOR. PPE = Personal protective Equipment , COR - Crude Odds Ratio, AOR - Adjusted Odds Ratio, CI - Confidence Interval, 1 - Reference

Figures

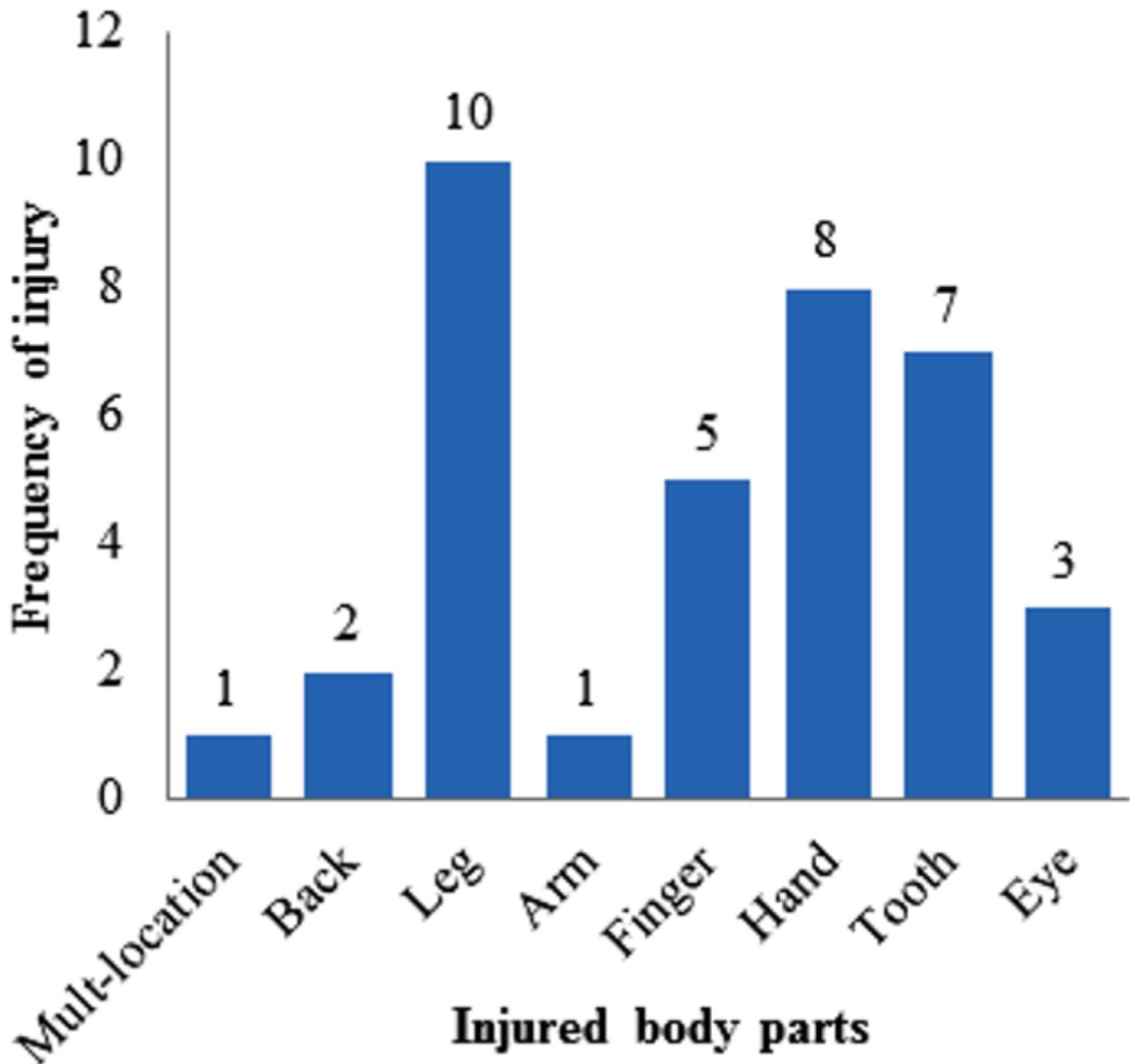


Figure 1

Injured body part of waste collectors in Mekelle City, 2017

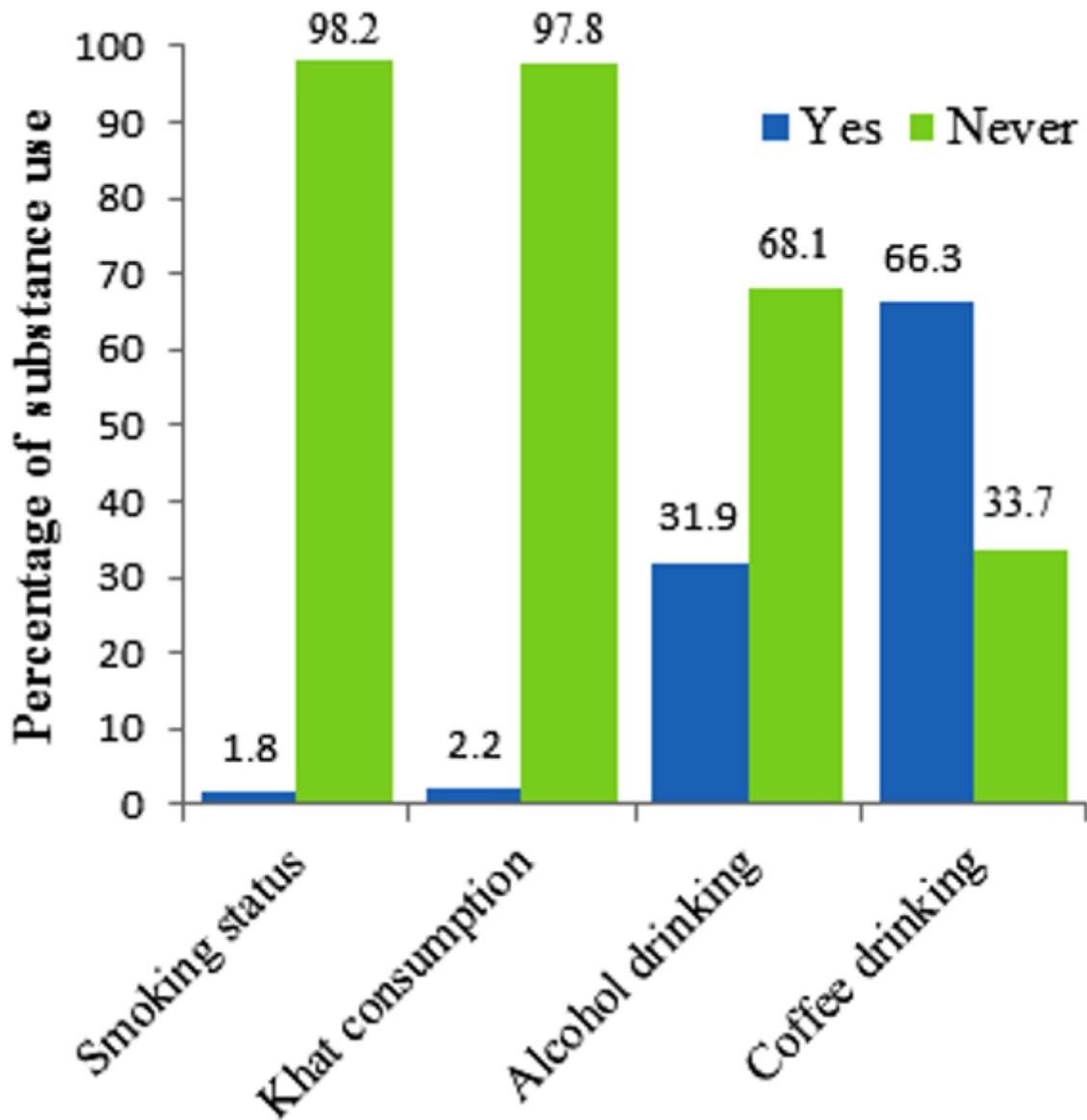


Figure 2

Substance use of waste collectors in Mekelle City, 2017

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