

Knowledge on occupational health hazard and safety practices among the municipal solid waste handler

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Abstract

Background: All over the world nearly 860,000 people are injured every day and 2.3 million deaths occur annually due to occupational accidents and work-related diseases. There are limited studies that specifically determine the knowledge of waste handlers on occupational health problems and associated factors of occupational health problems and injuries in waste handlers in context of Nepal. Therefore, this study aimed to assess the knowledge of waste handlers on occupational health and safety practices and its association with utilization of PPEs along with the condition of occupational health problems and injuries and factors associated with them among the waste handlers of Kathmandu Metropolitan City.

Methods: A descriptive cross-sectional survey was conducted among selected 355 solid waste collectors by using semi-structured questionnaire and observation checklist, which was completed from March 2016 to May 2016. The data was entered into SPSS 20 version for analysis and a chi-square test was performed to see the presence of the association between the dependent and selected independent variables.

Results: Among total respondents (355) surveyed 51.5% had got knowledge on occupational health hazard, 16.1 % had got the knowledge to prevent from work-related health risks, 29% had got knowledge about PPEs and 31.5% had got knowledge about PPEs utilization. About 45.8% of the study participants had practices of the utilization of PPEs. Majority of the respondents i.e. 63.7% reported that they were suffering from occupational health problems. The evidence of the occupational health injuries was found to be low i.e. 25.4%. Similarly, variables which had significant influence on the occupational health problems were knowledge on occupational health hazard ($p=0.016$), work experience ($p=0.021$), health checkup ($p=0.042$) and for the occupational health injuries were monthly income($p=0.036$), knowledge to prevent from health risk ($p=0.001$), gender ($p=0.02$), and knowledge of occupational health hazard

($p=0.011$), work experience ($p= 0.025$), work type ($p=0.001$), knowledge on PPEs ($p=0.034$) and knowledge on work-related health risks($p= 0.027$).

Conclusion: Based on this study, its recommended to improve occupational health and safety practices. Awareness programs need to be focused to increase the knowledge on Occupational health hazards and safety practices to improve the utilization of PPEs..

Keywords: *Nepal, Occupational health issues, Personal Protection Equipment's (PPEs), Waste Handlers*

Introduction

Occupational health risks occur at every step in the process, from the point of collection at homes, during transportation and at the sites of recycling or disposal. Municipal solid waste workers are exposed to occupational health and accident risks related to the content of the materials they handled, emissions from those materials, and the equipment's being used. Several studies have reported that municipal solid waste workers have got the high risk to occupational health hazards¹.The important morbidity that has been commonly observed among workers are respiratory diseases, eye diseases, dermatological problems, nail infections, musculoskeletal morbidities and water-borne diseases²⁻⁴. The common health problem investigated among this working group includes respiratory symptoms, irritation of the skin, nose, and eyes, gastrointestinal problems, fatigue, headache, allergies, musculoskeletal and injury, risks such as strains to sprains, confusions, fractures, and lacerations⁵.

The overall objective of this study is to assess the knowledge of occupation health hazard and safety practice among waste handler in Kathmandu metropolitan city.

Materials and Methods

Study Area

Kathmandu district is one of the three districts located in Kathmandu Valley, which itself is located in the hills of Bagmati Zone, Central Development Region, Nepal. The total population of the district is 1,744,240 out of which 913,001 are male and 831,239 female in 436,355 households. Average family size is 4.0 in 2011 (CBS, 2011).

Methods

Study Design

The descriptive cross-sectional study was conducted to assess environmental health hazards in working area and occupational injury among municipal solid waste management workers of Kathmandu Metropolitan City.

Sampling Technique

Study Population

The study was conducted among the solid waste collectors of Kathmandu Metropolitan City (KMC) who were involved in managing the street waste.

Sample size estimation

The study sample size was determined by single population proportion formula. Based on the study conducted among municipal solid waste management workers in Gondar town and Bahir Dar City, northwest Ethiopia on occupational injury and associated factors, the sample size for this study, 63.9% was used. Therefore, at 95% confidence interval and 5% margin of error, the sample size was calculated below. 355 waste handlers were chosen for the study.

The simple random sampling method was adopted for the selection of the respondents. Among the 1000 waste handlers of Kathmandu Metropolitan City, 355 waste handlers were chosen through the lottery method. In this method, each waste handlers of the Kathmandu Metropolitan City were assigned by a number, after which numbers were selected at random.

Data Collection tools and Techniques

Data was collected from the participant by interview method with help of structured questionnaire and observation checklist was developed to measure the knowledge and practices of solid waste handlers and associated factors on occupational health risks. The questionnaire and observation checklist was prepared in English language and then translated to Nepali language and made up of various sections to collect the data and to ensure the consistency finally the Nepali also translated back to English.

Ethical considerations

An ethical clearance and official letter was obtained from the department of environmental science of Tribhuvan University. A formal letter was written to ask permission with Kathmandu Metropolitan solid waste management office

Results

A total of 354 waste collectors of Kathmandu Metropolitan City (KMC) were studied to determine the knowledge of occupational health hazard and use of safety measures and factors associated with them along with occupational health problems and injuries.

Socio-demographic information

From the total respondent's majority of respondents were female 61.4% (218) followed by male respondent 38.6% (137). This study shows that about 85.6% (304) of respondents who were engaged in waste handling were relatively advantaged Janajatis groups i.e. 85.6% (304). Majority of respondents fall into the age group of 41-50 years 48.5% (172) followed by age group of 31-40 40.3%(142).

Results related to the education level of the respondent shows that about 77.5% (275) of the respondents were illiterate, 18.9% (67) had got an informal education, 3.4%(12) has got a primary education and only 0.3%(1) has got the secondary education. Similarly, results related to monthly income of the respondent shows that majority of respondents 92.4% (328) has got monthly income > 18500.

Personal history

About 40.6% (144) of the total waste handler had the present history of alcohol consumption. Among them, about 1.7% (6) of the waste handler consumes alcohol during their working period. Similarly, about 20.3% (72) of the waste handler were current smokers and among them about 6.2% (22) of the waste handler smoke during their working hours. About 9.9% (35) of the waste handler had a tobacco chewing habit and among them, 5.9% (21) of waste handler had the practice of chewing tobacco during the working period.

Occupational history

It includes the factors like type of worker, nature of employment, training before joining the job, work experience, type of waste collected, waste collected per day and methods of collecting waste. Among the respondents surveyed 74.3% (264) of respondent were sweepers, 5.7% (20) were loaders and 20 % (71) were collectors (table 1). Majority of the respondents have got the work experience > 20 years i.e. 60 % (213).

Only 2.3% (8) of the waste collectors received the training before they were employed and other 97.7% (347) did not get any type of training before joining the job. All of the 355 waste collectors collected the street waste in the same container. Around 76.3% (270) of the waste collectors collected the waste <3 ton per day whereas 3.7% (84) collected the waste >3 ton per day (table 1).

Table 1: Occupational history of respondents

Variables	Frequency(N=355)	Percentage (%)
Type of worker		
Collectors	71	20
Loaders	20	5.7
Sweeper	264	74.3
Nature of employment		
Permanent	355	100%
Training/ orientation		
Yes	8	2.3
No	347	97.7
Job Satisfaction		
Yes	355	100.0
Types of waste collected		
Street waste	355	100
Waste collected per day		
<3 ton	270	76.3
>3 ton	84	23.7
Waste collection		
Same container	355	100
Work experience		
< 20 years	142	40
>20 years	213	60

Knowledge of occupational health hazards and safety practices

About 51.5% (184) of the respondents reported that they have got knowledge on occupational health hazard when they were asked to mention the types of occupational health hazards then respondents answered as dust 27.2% (183), sharp metal 20.5% (138), bad smell 19.3% (130), Noise 14.7% (99), sharp glass 11.6% (78), heat 5.7% (38) and light 0.9% (6)

Majority of respondents i.e. 83.9% (298) responded that they don't have the knowledge to prevent themselves from work-related health risks. Among those having the knowledge to prevent from work-related risks i.e. 57(16.1%) reported that wearing gloves, mask, apron, and boots while working as a means of preventing methods of occupational health risks

About 71% (272) of the waste collectors doesn't know about PPEs and the rest 29% (103) knew about PPEs. Those respondents who knew about PPEs mentioned types of PPEs as gloves 31.7% (122), masks 31.7% (122), boot 27.5% (100) and others 9.1% (35) like office dress. However, the majority of respondent i.e. 68.5% (243) lacks the knowledge on the utilization of PPEs only 112(31.5%) have got the knowledge on the utilization of PPEs

Availability and practices of PPEs

Our findings showed that only 45.8% (163) respondents used PPEs like gloves 32.7% (88), masks 47% (167) and boot 3.1% (11) during the working period (fig 7). According to the direct observation made during this study among 355 solid waste handlers; only 16.9% (34) of them were using gloves during a survey. Regarding facemask utilization was 37.8% (76), 4.48% (9) solid waste handlers were using boots at the time of observation.

Among the non-users of PPEs i.e. 52.8% (187), 13.6% (48) about of them were failed to use because they didn't have PPEs, 11(3.1%) lack of knowledge, 22.0% (78) because of discomfort, 1.1% (4) negligence, and 14.1% (50) to save time. Among the users of PPEs, 45.8% (163) and who utilizes PPEs sometime 1.4% (5) majority of respondents said that they buy PPEs by themselves 62.3% (105) and only a few respondents 37.7% (63) said that PPEs are provided by the government.

Only 85.3% (303) solid waste collectors had a history of tetanus toxoid vaccination and 71.5% (254) had a history of hepatitis vaccination after engaged to this work. The remaining 14.7% (52) didn't have tetanus toxoid vaccination and 28.5% (101) didn't have hepatitis vaccination. The reasons cited by workers for not taking vaccine were; 51.32% (58) because of lack of knowledge, 15.05% (17) had no access to the vaccine, and 33.63% (38) because of negligence (fig 8). 81.1% (286) were found visiting the hospital in case of their health issues.

Personal Hygiene

The study participants were inquired about their personal hygiene. Accordingly, 62.7% (223) waste handlers were washing their hands with soap after duty and 343 (96.6%) changed

their working cloth after work. About 11.0% (40) workers reported that they washed their working cloth daily after the work, 8.8% (32) said that they took shower daily after work and 0.3%(1) of the respondents reported that they were eating in the work place. None of the respondents were found sharing their clothes with their colleagues

Occupational health problems and injuries

Among the 355 respondent majority of the respondents, i.e. 63.7% (226) reported that they were suffering from occupational health problems(fig 10).Among the 226 respondents, majority of respondents reported that they were suffering from the muscular-skeletal problems 54% (191), Allergies 15.5% (55), Respiratory problems 13.8% (48), others 11.9% (43) like a headache and Gastrointestinal problems 5.75 % (13) (fig 10).

Majority of sweeper's respondents reported i.e. 16.6 % reported about the allergies and 14.01% reported about a headache. Similarly, 60 % of loaders reported about gastrointestinal problems and 65 % reported about the muscular-skeletal problems.

Among the 355 respondents surveyed 74.6% (264) reported that they were not suffering from any type of occupational health injuries whereas 25.4% (90) were suffering.

Among the 90 respondents who were suffering from occupational injuries majority of were collectors i.e.45.55 %(41) followed by sweepers 40% (36) and loaders 14.44 %(13).Respondents who were not using the PPEs were found suffering from occupational health injuries i.e. 57% (52)

Association of knowledge on occupational health hazard and safety practices with PPEs utilization

Chi-square results shows that there is significant relation between knowledge about occupational health hazard ($p = 0.015$, $p \leq 0.05$), knowledge on health risks related to the work ($p = 0.021$, $p \leq 0.05$), knowledge to prevent from work-related risks ($p = 0.033$, $p \leq 0.05$), knowledge on PPEs ($p = 0.016$, $p \leq 0.05$) and knowledge on utilization of PPEs ($p= 0.007$, $p \leq 0.05$) with PPEs utilization (table 2).

Table 2: Association of knowledge on occupational health hazard and safety practices with PPEs utilization

Variable	χ^2	d.f	p-value
Knowledge to prevent from work-related risks	6.804	2	0.033*
Knowledge on PPEs	8.276	2	0.016*
Knowledge on utilization of PPEs	9.863	2	0.007*
Knowledge about occupation health hazard	8.425	2	0.015*
Knowledge of health risk related to work	7.764	2	0.021*

Note: * means significant ($p \leq 0.05$ = significant)

Association of physical injuries while working with different variables

For determining the association of physical injuries while working with variables chi-square test was performed. Chi-square results shows that there is no any significant relation between educational status ($p= 0.723$, $p \leq 0.05$), utilization of PPEs ($p= 0.817$, $p \leq 0.05$), alcohol consumption during the work ($p= 0.654$, $p \leq 0.05$) and training/orientation ($p= 0.106$, $p \leq 0.05$) with physical injuries (table 4). Whereas, Chi-square results also shows that there is significant relation between gender ($p= 0.02$, $p \leq 0.05$), monthly income ($p= 0.036$, $p \leq 0.05$), work experience ($p= 0.025$, $p \leq 0.05$) and work type ($p= 0.001$, $p \leq 0.05$) with physical injuries (table 4).

Table 3: Association of physical injuries with different variables

Variable	χ^2	d.f	p-value
Gender	5.395	1	0.02*
Education status	1.294	3	0.732
Monthly Income	6.659	2	0.036*
Work experience	5.024	1	0.025*

Work type	75.130	2	0.001*
Alcohol consumption during the work	0.201	1	0.654
Training /Orientation	2.607	1	0.106
Utilization of PPEs	1.209	2	0.546

Note: * means significant ($p \leq 0.05$ = significant)

Chi-square results shows that there is no any significant relation between knowledge on utilization of PPEs ($p= 0.141$, $p \leq 0.05$) with physical injuries but there is significant relation between knowledge about occupational health hazard ($p= 0.011$, $p \leq 0.05$), knowledge on work-related health risks ($p= 0.027$, $p \leq 0.05$), knowledge to prevent from health risks related to the work ($p= 0.001$, $p \leq 0.05$) and knowledge on PPEs ($p= 0.034$, $p \leq 0.05$) with physical injuries (table 4).

Table 4: Association of physical injuries with knowledge in occupational health hazards and safety practices

Variables	χ^2	d.f	p-value
Knowledge of occupation health hazard	6.389	1	0.011*
Knowledge of work-related health risks	4.922	1	0.027*
Knowledge to prevent from work-related risks	12.290	1	0.001*
Knowledge about PPEs	4.496	1	0.034*
Knowledge on PPEs utilization	2.166	1	0.141

Note: * means significant ($p \leq 0.05$ = significant)

Association of occupational health diseases with other factors

Chi-square results shows that there is no any significant relation between gender ($p= 0.102$, $p \leq 0.05$), educational status($p= 0.311$, $p \leq 0.05$) alcohol consumption during the work ($p= 0.873$, $p \leq 0.05$), use of tobacco during the working period ($p= 0.529$, $p \leq 0.05$), smoking during working period ($p= 0.168$, $p \leq 0.05$) and training/orientation ($p= 0.496$, $p \leq 0.05$) with presence

of occupational health diseases but there is presence of significant relation between work experience ($p= 0.021$, $p \leq 0.05$), health checkup ($p= 0.042$, $p \leq 0.05$) and knowledge on occupational health hazard ($p= 0.016$, $p \leq 0.05$) with presence of occupational health diseases(table 5).

Table 5: Association of occupational health diseases with other factors

Variables	χ^2	d.f	p-value
Gender	2.676	1	0.102
Educational status	3.578	3	0.311
Work Experience	3.580	1	0.05*
Health Checkup	8.718	3	0.032*
Utilization of PPES	1.529	3	0.465
Smoking during the working period	1.905	1	0.168
Use of Tobacco during the working period	0.397	1	0.529
Alcohol consumption during the working period	0.025	1	0.873

Note: * means significant ($p \leq 0.05$ = significant)

Chi-square results show that there is no any significant relation between knowledge on PPEs ($p= 0.55$, $p \leq 0.05$), knowledge on work-related health risks ($p= 0.117$, $p \leq 0.05$), knowledge to prevent from work-related health risks ($p= 0.415$, $p \leq 0.05$), and knowledge on utilization of PPEs ($p= 0.75$, $p \leq 0.05$) with presence of occupational health diseases but there is presence of significant relation between knowledge on occupational health hazard ($p= 0.016$, $p \leq 0.05$) with presence of occupational health diseases (table 6).

Table 6: Association of occupation health diseases with knowledge on occupational health hazard and safety practices

Variables	χ^2	d.f	p-value
Knowledge of occupation health hazard	5.754	1	0.016*
Knowledge about PPEs	0.349	1	0.55
Knowledge of health risk related to work	2.453	1	0.117
Knowledge to prevent from work-related risks	0.665	1	0.415
Training/ Orientation	0.463	1	0.496
Knowledge on Utilization of PPEs	0.095	1	0.75

Note: * means significant ($p \leq 0.05$ = significant)

Discussion

In this study majority of female (61%) were found to be involved in this sector than male (39%). Among the total number of respondent surveyed majority of respondents (77.7%) were found to be illiterate. The reasons for presence of more female respondents which was comparatively higher than other studies those either with no or small number of female workers in this sector^{8,9} and low literacy rate, might be due to the low level education demand in this field for employment and relatively advanced janajati (Newar community) minority group.

Only 45.8% of waste handler's exhibited safe occupational health practices in this study which could be due to poor training facilities and also low educational level of the solid waste collectors⁵. Majority of respondents in this study had hand washing habit with soap after waste collection (62.7%) to other study conducted like 78.6% in Adidas Ababa⁵. All of the respondents (100%) reported that they don't share their working clothes with their colleagues due to uneasiness which was comparatively better to other study conducted 30% in Adidas Ababa⁵.

The condition of use of PPEs was found to be poor among the waste workers of Kathmandu Metropolitan City (KMC). Among total number of survey respondents, 45.8% of respondents were only found to be using PPEs. Among the reasons cited by respondents the reason like discomfort (22.0%), negligence (1.1%), and lack of knowledge (3.1%) and to save time (14.1%) indicates that respondents were less aware of importance of PPEs utilization to protect them from the work-related hazard. Chi-square test results also shows that there is an association between the knowledge on Occupational health hazards and safety practices with the utilization of PPEs which reveals that the poor practice of utilization of PPE could be due to poor knowledge on Occupational health hazard and safety practices.

Hepatitis B virus (HBV) is likely to be more prevalent in certain populations and occupational groups, such as municipal solid waste workers (MSWWs)¹¹. In this study 302(85.3%) solid waste collectors had tetanus toxoid which was comparatively better 49 (12.1%) in other studies conducted in solid waste collectors in Addis Ababa⁵ and Hepatitis vaccine 253(71.5%) solid waste collectors had vaccine after engaged to this work. Very few respondents 52 (14.7%) were not taking TT vaccine and 101(28.5%) were not taking hepatitis vaccine.

Among total respondents surveyed, majority (92.1%) reported that that they don't know how to prevent themselves from work-related health risks, 65.5% of the waste collectors don't know about PPEs and 68.4% reported they don't know how to use PPEs which indicates that respondents had poor knowledge regarding occupational health hazards and safety practices so very few workers were found to be using PPEs. Chance of vulnerability to occupational health injuries decreases with increase in years of experience and monthly income because more the experience in related job field due to development of better job performance and better salaries mean better chances of spending money for better treatment¹². In this study majority of respondents (60%) have got work experience greater than 20 years and 92.4% have got salary more than NPR 18,500 which might have improved their job performance and chance of better treatment due to which 25.4% were found to be less exposed to work-related injury which was lower than other studies 34.3 % in Amara region of Northwest Ethiopia¹³ and 43.7% in Addis Ababa City⁶.

Among the 90 respondents majority 41(45.55%) of the collectors and 13(14.45%) loaders reported they were suffering from injuries like cut by sharp instruments on their hand or leg and fracture of hand. This might be due to the reasons that collectors and loaders used their feet to

push spade into the pile of garbage and sometimes they wiped waste to put it in spade using feet or hand^{3,13} and were found not using any PPEs to complete this task due to which the probability of injuries was high among them. Similarly, sweepers 36(40%) reported that they had been suffering from different types of occupational injuries like cuts and wound by sharp metals, glasses, the thorn of plants.

Respondents who were not using the PPEs were found suffering from occupational health injuries i.e. 57% which indicates that use of PPEs during the working hour is only one of the way to prevent the occupational injuries which indicates that the awareness on the use of PPEs and strict use of PPEs by workers during working period will help to reduce the chance of suffering from the occupational injuries. Chi-square test shows that variables like monthly income ($p=0.036$, $p \leq 0.05$), gender ($p=0.02$, $p \leq 0.05$), work experience ($p=0.025$, $p \leq 0.05$), type of worker ($p=0.001$, $p \leq 0.05$), knowledge about occupational health hazard ($p=0.011$, $p \leq 0.05$), knowledge on work related health risks ($p=0.027$, $p \leq 0.05$), knowledge to prevent from health risks related to the work ($p=0.001$, $p \leq 0.05$) and knowledge on PPEs ($p=0.034$, $p \leq 0.05$) were the most important predictors of the occupational health injuries. So, these predictors should be taken into consideration while determining and improving the status of occupational injuries among the waste workers of Kathmandu Metropolitan City (KMC).

For occupational health problems the risk of the occupational health diseases increases with increase in work experience due to the long duration of exposure to the health hazard¹⁴. Majority of waste handlers of Kathmandu Metropolitan City (KMC) reported about the presence of occupational health problems because they have been exposed to the occupational health hazards for longer period of time having work experience greater than 20 years. A study found the different types of occupational health problems among the waste workers of Kathmandu Metropolitan City (KMC) like Allergies, Poisoning, Respiratory tract diseases and Gastro-Intestinal diseases³.

In Kathmandu Metropolitan City, majority of respondents (54%) were found suffering from muscular-skeletal problems. Like in our study other different study also reports the presence of muscular-skeletal problems as major occupational health problem among the workers like 90.8% in Kelantan¹ 61.3% in Nigeria¹⁵, 83.5% in German City¹⁶ and 90.8% in India¹⁶. The independent risk factors for musculoskeletal symptoms among Municipal Solid Waste (MSW) collectors might be the duration of employment; lifting, pulling; pushing/carrying loads, and

walking for long periods of time¹⁴. In this study majority of loaders (65%) reported about the musculoskeletal problems which were similar to the study conducted among the solid waste workers of Kathmandu Metropolitan City where majority of loaders were found suffering from such type of problems due to uploading waste manually in the trucks which can develop dislocations and physical ache to loaders³. Similarly, 54.1% of sweepers and 50.7% of collectors also reported about the musculoskeletal pain. This might be because apart from vehicles used to transport waste, waste handling equipment's were all manually operated including physical dragging, pushing and pulling of waste containers, wheelbarrows etc. and loading the waste. Workers were found working for 8 hr. /day in working days and 4 hr. /day in holidays that means they were not excused in holidays too from their work.

Collectors who ride on footplates on the backs of the waste collecting vehicles and along the street with sweepers are exposed to the street dust and smoke of vehicles and sweepers are exposed to street dust. This might be the reasons that majority of collector's respondents (14.08%) followed by 13.6 % of sweepers were found reporting about the respiratory diseases.

Allergic diseases are intense due to poor protective measures, lack of enough water for proper sanitation and personal hygiene³. Since there was good hygiene practices among workers of KMC which might have led to the less complaints regarding the skin allergies i.e. itchy and rashes(15.5%) than other study conducted like in Kelantan where majority of respondents reported dermatological symptoms (70.3%) (itchy and rashes)¹ and (51% skin rashes and 57% skin irritation) in KMC³. Hand washing practice is the single most important means of preventing the spread of infection¹⁷. In this study majority of respondents had hand washing habit with soap after waste collection and very few respondents i.e. 0.3% had got the food consuming practices during the working period which indicates that there might be less chance of spread of infection so there were fewer complaints regarding gastrointestinal problem (5.75%) than other study conducted like in Kelantan gastrointestinal problem (65.5%)¹.

Majority of sweeper's respondents reported i.e. 16.6 % reported about the allergies followed by 12.67% of collectors and 10% of loaders. A similar case was seen in the study conducted among the waste workers in Kathmandu Metropolitan City where the majority of collectors along with sweepers were experiencing irritation problem for long period of time in comparison to loaders³.

Spending longer durations to handle waste leads to the serious gastrointestinal problems, because of their exposure to a number of diseases vectors³ and direct skin contact of these waste matter stuffed with fungal spores, bacteria, viruses and parasitic ova that can cause the gastro-intestinal problems¹⁸. This might be reasons that majority of loaders (60%) reported about the gastrointestinal problems like gastric, dysentery, worm infection and vomiting. 4.5% of sweepers were found complaining about the gastrointestinal diseases like heartburn, gastric, vomiting, cholera similar as in the study conducted among the waste workers of Kathmandu Metropolitan City (KMC) where a majority of sweepers and loaders were found suffering from such type of gastrointestinal problems³.

The presence of health problem like a headache (11.9%) might be due to the long time exposure to the sunlight, traffic etc. Majority of sweeper's respondents reported about a headache followed by 15% of loaders and 0.04% of collectors. Chi-square results shows that work experience ($p=0.021$, $p\leq 0.05$) has got significant effect on occupational health risks which indicates that the risk of disease increases with increasing years of work as a solid waste worker¹⁴. Similarly other variables like Health Checkup ($p= 0.042$, $p \leq 0.05$) and knowledge on occupational health hazard ($p= 0.016$, $p \leq 0.05$) has also got the significant effect on occupational health risks.

Based on this study, it is recommended to improve occupational health and safety practices. Awareness programs need to be focused to increase the knowledge on Occupational health hazards and safety practices to improve the utilization of PPEs.

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