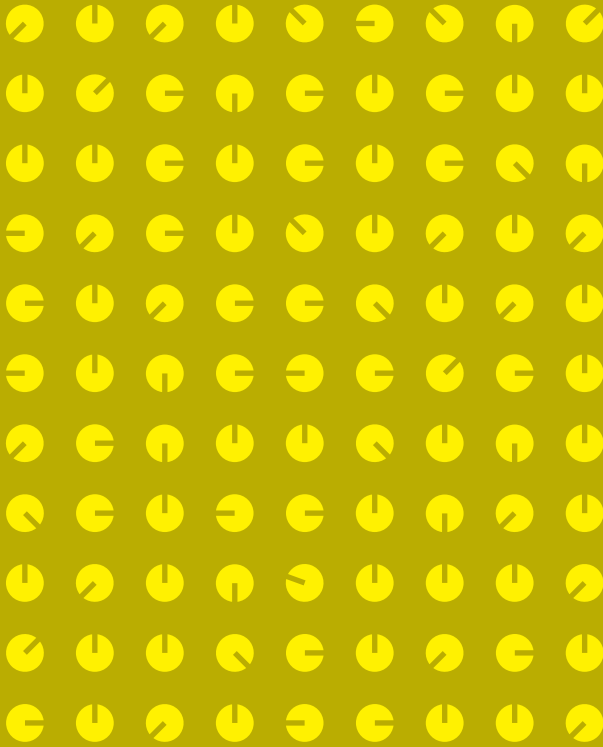


# HEALTH STATUS AND OCCUPATIONAL RISKS IN INFORMAL WASTE WORKERS IN NEPAL

RESULTS FROM A CROSS-SECTIONAL STUDY  
CONDUCTED IN THE KATHMANDU VALLEY



SCIENTIFIC REPORT





“TOWARDS ENHANCED WASTE WORKER’S HEALTH  
IN THE KATHMANDU VALLEY”

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SCIENTIFIC REPORT

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## DESIGN AND IMPLEMENTATION OF THE STUDY

This study was designed by the School of Health and Related Research, University of Sheffield, in collaboration with PHASE Nepal and Médecins du Monde France. It was implemented by PHASE Nepal.

## FUNDING

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The University Of Sheffield.

## ACKNOWLEDGEMENTS

More than 10 years has passed and much has changed since we thought PHASE Nepal should implement a health care programme for poor people living in different parts of the Kathmandu Valley. Reflecting back over the situation then, priorities have evolved, time has slipped and actors have changed, but the situation of access to health care for the urban poor remains a challenge. Médecins du Monde (MdM) funding to conduct this research and to start an intervention to build the capacities of the informal waste workers, increase their access to health care and facilitate their recognition has enabled PHASE Nepal to start this work. I would like to thank the following people whose help has been instrumental to make this project a reality.

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Dr Jiban Karki (PhD)  
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## ABBREVIATIONS

CI	Confidence Interval
HIV	Human Immunodeficiency Virus
IQR	Inter-Quartile Range
IWW	Informal Waste Worker
MdM	Médecins du Monde
NGO	Non Governmental Organization
PHQ	Patient Health Questionnaire
PPE	Personal Protective Equipment
SD	Standard Deviation
SPSS	Statistical Package for Social Science

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# 1. EXECUTIVE SUMMARY



Solid waste management is a major environmental and public health issue in Nepal, in particular in the Kathmandu Valley where 620 tonnes of solid wastes are produced daily. The municipalities are responsible for waste management, but they have not implemented robust waste management systems thus far. This has led to an increase in informal waste workers (IWWs), i.e. people who work in waste recovery activity outside any official framework. These workers face significant occupational health risks (e.g. cuts, bites, infections, effects of chemical exposure). In Nepal, data is scarce regarding this population and their health risks.

In this context, Médecins du Monde has initiated a project with three main objectives: (i) to strengthen the waste workers' individual and collective capacity to respond to their health needs; (ii) to improve accessibility and quality of health care for waste workers and their families; and (iii) to improve the involvement and level of recognition of environmental health issues and the informal waste sector by the relevant stakeholders. In the context of this latter objective, a research study was conducted to characterise the health status and occupational risks of IWWs in the Kathmandu valley. This report presents the results of this study, as well as some recommendations based on the findings.

A cross-sectional survey of IWWs was conducted in the Kathmandu valley and at the main landfill site, Sisdoile, in the adjacent Nuwakot District. A convenience sample of adult IWWs recruited at their workplace were surveyed. After obtaining written informed consent, nine local enumerators conducted face-to-face individual interviews with participants, using a bespoke standardised demographic health assessment questionnaire. All of the interviews were conducted in Nepali or Hindi. Interviews were carried out in November - December 2017. Prior ethical approval was obtained from the Nepal Health Research Council. The collected survey data were subsequently analysed using Statistical Package for Social Science (SPSS).

In total, 1278 IWWs participated in the survey and were included in the analysis. The great majority (95%) were surveyed in the Kathmandu Valley. Almost half of them (48%) were of Indian origin, most were male (78%) and their literacy level was low (50% were illiterate). A third of respondents (33%) reported that they had been ill in the previous three months and respiratory ailments were common. Four out of 10 participants were smokers and 42% consumed alcohol. Most respondents (62%) reported having government health services in their area, but the vaccination coverage of participants and of children living with them was low. Most of them did not know their infectious disease status (for HIV, hepatitis B and hepatitis C) and the uptake of antenatal care for female IWWs was poor. More than a quarter of the IWWs (27%) had some evidence of depression. They worked long hours, mostly every day, and had low earnings and little social protection. The risk of infection is high; more than a third (38%) reported handling medical waste. Two thirds (66%) had been injured at work in the past 12 months, with the most common reported injury being cuts.

Compared with the Nepali population, they had lower literacy levels as well as higher prevalence of smoking and of alcohol consumption. Their children had lower rates of vaccination uptake and female waste workers had poorer uptake of antenatal care. Study participants of Indian origin seemed to have specific challenges, with a poorer healthcare access and less involvement in group co-operatives compared to Nepali IWWs.

In terms of risk perception, the majority (73%) of the participants considered waste work as a risky job. More than two-thirds (68%) admitted to not using any form of personal protective equipment (PPE) (e.g. facemasks, gloves) but more than half (52%) reported using other means of protection (such as their own clothing). This highlights a potential issue of accessibility, practicality and affordability of PPE for this population subgroup. Multivariate analysis

showed that males, older IWWs and those of Indian origin were less likely to use PPE. There were positive associations between receipt of information on occupational risks, risk perception and PPE use that indicate the importance of information provision on occupational risks and how this improves risk perception, which is associated with increased PPE use.

This study highlights the vulnerability of IWWs and suggest the need for better protection of this population. Consequently, the following recommendations are proposed:

#### **1. Health promotion, as well as Information, Education and Communication (IEC) activities:**

- Increase health promotion activities in relation to health protection, hygiene practices, as well as sexual and reproductive health in the IWW communities;
- Provide robust information on occupational health risks to the IWW communities.

#### **2. Healthcare access**

- Improve the uptake and coverage of routine childhood vaccinations within IWW communities;
- Improve the uptake of vaccinations against occupational risks for IWWs (i.e. for tetanus and hepatitis B);
- Improve access to HIV, hepatitis B and hepatitis C testing for this population;
- Understand any barriers to healthcare access for Indian IWWs.

#### **3. Community mobilisation**

- Support community mobilisation activities in order to increase the IWWs ability to address the various health concerns as well as access to social protections;
- Support advocacy activities with regards to improving the healthcare access rights for migrant Indian waste workers.

#### **4. Knowledge production**

- Better understand the attitudes of IWWs regarding health as well as the expectations and access to the health system;
- Better understand the attitudes, beliefs and practices of IWWs with regards to PPE use, in order to increase the level of protection;
- Conduct further qualitative research work to understand the factors that affect IWWs behaviour in relation to how they protect themselves from risks, what factors may lead to behaviour change and to explore community-based solutions that will increase the level of protection - a focus on IWWs of Indian origin might provide data to better understand the specific challenges in this subgroup;
- Identify the enablers of PPE use and potential barriers such as cost, practicality and usability.

# 1. BACKGROUND

Médecins du Monde (MdM) is introducing a programme of interventions to improve the health and safety of informal waste workers (IWW) in the Kathmandu Valley in Nepal. They have commissioned research from PHASE Nepal, a local NGO, to both deliver the intervention and to conduct relevant research to support the programme. MdM have consulted the School of Health and Related Research (SchARR) at the University of Sheffield, to provide technical academic assistance and advice for this research.



## 2. INTRODUCTION

Solid waste management is a major environmental and public health issue in Nepal (Pokhrel and Viraraghavan, 2005). Significant urbanisation has taken place in the last decade and this increase in population density places a strain on natural resources and increases waste generation. The Kathmandu Valley produces the highest amount of solid waste in Nepal, approximately 620 tonnes per day (Asian Development Bank, 2013). The Government of Nepal enacted the Solid Waste Management Act in 2011 and this places a duty on municipalities to have a solid waste management system that keeps urban centres clean. However, municipalities face a shortage of financial and human resources, as well as technical and managerial skills to effectively manage solid waste (Asian Development Bank, 2013).

The lack of robust waste management systems over decades has led to an increase in informal waste workers (IWWs), i.e. people who work in waste recovery activity (collection, segregation, sale) outside official, legal and institutional frameworks (Yoshida, 1994). The estimated number of informal waste workers in the Kathmandu valley is between 7,000 and 15,000 (Dangi and Johns, 2006; PRISM, 2014). Estimates are not very accurate because it is a mobile population not limited to a defined geographical area. In addition, informal activities are per definition difficult to estimate (Linzner and Lange, 2013). The Himalayan Climate Initiative (2014) reports a figure of 15,539 primary waste workers - workers for whom waste work is the main source of income and this figure includes both formal and informal waste workers - working in 151 locations inside the Kathmandu Valley and Kathmandu Metropolitan City managed landfill site (Sisdole).

Globally, many countries face the same situation as Nepal, with informal waste workers making a significant contribution to waste management. The exact number of informal waste workers worldwide is unknown, but estimates reported in the literature range from 12.5 to 56 million (Linzner and Lange, 2013); in

resource-limited countries, the number is estimated to be 15 million (Medina, 2008; Binion and Gutberlet, 2012). Informal waste workers are an important part of the waste management system, achieving recycling rates of 20-50% (Wilson *et al.*, 2009). Yet, their contribution is not valued by society, as reflected by the names sometimes used to describe them, like 'ragpicker' or 'scavenger' (Linzner and Lange, 2013) and the absence of any legal status. However, changing public perception of informal waste workers is recognised as a challenge, as is the balance between improving waste management systems and protecting the livelihoods of the urban poor. This highlights the importance of designing public policy in which the integration of the informal waste workers within the formal sector is considered (Wilson, Velis and Cheeseman, 2006).

The main occupational and environmental health risks from solid waste management in resource-limited countries - such as increased risks of injuries, disease and pollution - is recognised as a public health concern (Cointreau, 2006). Studies of informal waste workers have been undertaken in many countries, including in Brazil, the Philippines, Argentina and India. A systematic review of the effect of handling waste on the wellbeing of informal waste workers highlights chemical hazards, infection, musculoskeletal damage, mechanical trauma, emotional vulnerabilities, and environmental contamination as the main health risks (Binion and Gutberlet, 2012). Other studies highlight the main occupational risks experienced by waste workers as risks of cuts, bites, infections, as well as the effects of chemical exposure (Thirarattanasunthon, Siriwong, Borjan, *et al.*, 2012; Cardozo and Moreira, 2015).

In Southeast Asia, the sociodemographic characteristics, understanding of risks and use of personal protective equipment (PPE) has been studied among waste workers, mostly in India and Thailand. It has been reported that Indian waste workers are predominantly male (except in the informal sector), of younger age, with lower



literacy rates and low daily earnings (Ravindra, Kaur and Mor, 2016). This study reported lower use of PPE and awareness of risks in informal waste workers compared to waste workers in the formal sector. The profile of Thai informal waste workers is slightly different with almost equal proportions of male and female workers, an average age of 41 years, little education and low earnings (Thirarattanasunthon, Siriwong, Borjan, *et al.*, 2012). Another study highlighted the effectiveness of a Health Risk Reduction Behaviours Model in decreasing the healthcare costs of IWWs and improving their knowledge, attitudes and practices (such as increased use of PPE) (Thirarattanasunthon, Siriwong, Robson, *et al.*, 2012). Many studies recommend the use of health education and promotion to encourage behaviour change and reduce risks. However, the direct link between health education and behaviour change among waste workers is not clear (Rajamanikam *et al.*, 2014), suggesting that other health determinants may play a role and that initiatives other than health education are needed for this population with low literacy and socioeconomic status.

In Nepal, IWWs are among the poorest communities in the Kathmandu Valley. In addition to their occupational exposure, poor hygiene practices and compromised living conditions make them vulnerable to ill-health (PRISM, 2014). However, the full extent of their occupational risks has not been documented, nor has their perceived health status, access to health services and risk perception been characterised. A lack of robust up to date health data on IWWs makes it difficult to develop appropriate health policy for IWWs.

To address this gap, this study aimed to characterise the health status and occupational risks of informal waste workers in the Kathmandu valley. A more detailed understanding of this population group will help identify their health needs, serving as a benchmark and basis to conduct tailored activities and to identify specific challenges for this group. In addition, it provides

the information required to inform local policy makers of the health needs of a marginalised population making a significant but largely unrecognised contribution to waste management and cleaner cities.

### **3. AIM AND OBJECTIVES**

The aim of the study was to characterise the health status and occupational risks of informal waste workers in the Kathmandu valley.

The study objectives were:

- To describe the sociodemographic characteristics of informal waste workers (including gender, caste/ethnicity, nationality, literacy, income levels);
- To describe the perceived general health of IWWs;
- To measure the prevalence of mental ill health (depressive symptoms) and substance use (tobacco, drugs and alcohol);
- To measure the prevalence of disability in IWWs and their caring responsibilities;
- To measure the prevalence of common physical health problems reported (including common occupational ailments associated with waste work);
- To describe the reproductive health status of IWWs who are females of childbearing age;
- To assess their access to health services and social security measures;
- To describe the working profile of IWWs;
- To assess the extent of their awareness of the risks of waste work and gauge the level of use of personal protective equipment.



## 4. **METHODOLOGY**

#### 4.1 STUDY DESIGN

The study design was a cross-sectional survey of informal waste workers in the Kathmandu valley and Nuwakot.

#### 4.2 STUDY AREA AND RESPONDENTS

The survey was conducted in the areas of Shanti Nagar and Teku in the Kathmandu Valley and Sisdole in Nuwakot. These areas were selected due to their high concentration of waste collection, processing sites and dumpsites. Due to the inherent difficulties of identifying and recruiting IWWs through random sampling in the community, convenience sampling was used. This involved 'snowballing' where respondents were asked to help identify further IWWs. Study respondents were directly approached and invited to participate on the waste site and snowballing was used to identify more respondents working on the waste sites. A written informed consent was obtained from respondents and assurance with regard to data confidentiality was provided. Participation was entirely voluntary and no incentive was given for participation.

#### 4.3 INCLUSION CRITERIA

Male and female informal waste workers declaring being 18 years or over were included in the study.

#### 4.4 SAMPLE SIZE

The number of informal waste workers in the Kathmandu valley has been reported to be between 7,000 and 15,000 (Dangi and Johns, 2006; PRISM, 2014). However, it is a mobile population that is not limited to a defined geographical area. Based on the available information, we used a

population estimate of 7,000 IWWs for the total population size of this group in the Kathmandu Valley. Assuming a 10% non-response rate, it was calculated that a sample size of 614 was needed to allow a 4% level of precision with the anticipated prevalence of possible determinant variables of 50% and with a confidence level of 95%. As this is a non-probability sampling method, the approach to mitigate selection bias was to double the sample size (Atkinson and Flint 2001). Therefore, the target sample size for this study was at least 1228 IWWs.

#### 4.5 MEASUREMENT TOOL

A bespoke standardised demographic health assessment questionnaire was devised for this survey in order to capture the sociodemographic and health indicators of interest (see Appendix 1). It consisted of several components of interest, including sociodemographic, general health, reproductive health, occupational health and other indicators. Internationally validated assessment tools were used for relevant components when available, such as AUDIT C for alcohol screening, Washington Disability Screening Questions, and the modified PHQ-9 depression screening questionnaire validated for Nepal (Kohrt *et al.*, 2016). The Nepalese translation of the questionnaire was prepared by the PHASE Nepal research team and checked by the MdM research collaborators. Initial pre-testing of the questionnaire was carried out on IWWs to check for clarity or errors, and to ensure it was fit for purpose.

#### 4.6 DATA COLLECTION

Nine local enumerators conversant in the local languages were recruited and trained to administer the survey questionnaire by PHASE Nepal. This involved a two-day training programme run by research staff at PHASE Nepal. The enumerators were divided into two teams who were then

deployed to the target survey areas. Data was collected from mid-November 2017 to mid-December 2017.

Face-to-face individual interviews with participants were conducted by enumerators, at the waste sites, using paper copies of the survey questionnaire. These survey interviews were carried out in Nepali or Hindi and were undertaken in a confidential manner. Participants were ensured verbally of anonymity and confidentiality in respect of the data provided.

#### 4.7 DATA MANAGEMENT

The questionnaires were collected from the enumerators on a weekly basis by the research coordinator who assessed and monitored the quality of the collected information. They were double-checked before entry onto an Excel database. Data entry was undertaken by trained staff and further double-checked by the research team. Only the research team had access to the data. The questionnaire database was anonymised once all data was entered.

#### 4.8 DATA ANALYSIS

Researchers at the University of Sheffield undertook the statistical analysis. Data was imported from Excel to Statistical Package for Social Science (SPSS). Descriptive statistics were presented using frequency and percentages. Logistic regression was used to examine associations between the binary dependent variable non-use of PPE and independent variables such as gender, age, education, country of origin and risk perception. The variables to be examined were pre-determined by the research team based on the available academic literature on this topic and experience of working in this setting. Crude odds ratios were calculated for each variable in a univariate analysis. Adjusted odds

ratios were calculated after controlling for all other variables in a multivariate model. A p-value of <0.05 was considered statistically significant.

#### 4.9 ETHICS

Ethical approval was obtained from the Nepal Health Research Council (Reg. No.: 388/217) in October 2017.

## 5. RESULTS

## 5.1 RESPONDENTS

In total, 1280 informal waste workers participated in the questionnaire. Two withdrew during participation and therefore their data was deleted, resulting in entries for 1278 IWWs. Although non-response rates were not collected, the enumerators reported that most of the IWWs approached agreed to participate in the survey. All respondents were surveyed in Province no.3 (Central) with the majority (95%) in the Kathmandu Valley and 5% in Nuwakot (Sisdole landfill sites) (Table 1 and Figure 1). Of note, only a small number of IWWs work on the Sisdole landfill sites in the Nuwakot area (estimated to be around 200 IWWs), explaining the low sample size in Nuwakot. Bhaktapur site was latterly added, in order to achieve the target sample size.

**Table 1** Districts where IWWs were surveyed (n=1278)

District	n	%
Kathmandu	1138	89.0
Lalitpur	65	5.1
Nuwakot	64	5.0
Bhaktapur	11	0.9
<b>Total</b>	<b>1278</b>	<b>100</b>

**Figure 1** Illustration of districts surveyed



## 5.2 SOCIODEMOGRAPHIC CHARACTERISTICS

The sociodemographic characteristics of IWWs are presented in Table 2.

### Nationality, age and gender

51.9% were Nepalese and 48.0% Indian, thus showing the very high percentage of Indians among IWWs. Almost 80% were male. The results show a young workforce with 75.1% of the participants between 18 and 39 years. The age distribution of the male and female IWWs is fairly similar, except for the youngest and oldest age ranges (Figure 2). The majority (77.5%) of respondents were married, but only 36.7% live with their family and 38.9% live alone, suggesting that a fair number of workers live away from their families.

### Literacy

Over half of the sample (51.3%) received no education, and only 49.5% can read and write (35.7% completely and 13.8% with difficulty).

### Caste and religion

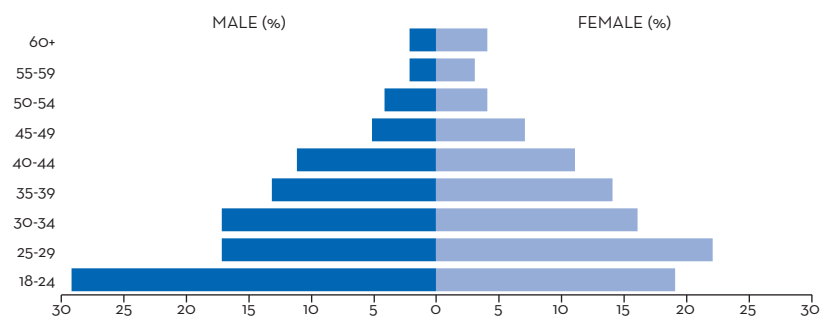
The main religion is Hindu (88.9%) and the main caste other madeshi (40.6%).



**Table 2** Sociodemographic characteristics of IWWs (n=1278)

	n	%		n	%
<b>Country of Birth</b>			<b>Education</b>		
Nepal	663	51.9	<i>Highest Educational Grade</i>		
India	614	48.0	No education	656	51.3
Missing	1	0.1	Primary	259	20.3
<b>Gender</b>			Secondary	242	18.9
Male	1007	78.8	Informal Class	89	7.0
Female	258	20.2	Higher Secondary	22	1.7
Missing	13	1.0	Higher Education	10	0.8
<b>Age</b>			<i>Literacy</i>		
18-24	346	27.1	Illiterate	644	50.4
25-29	233	18.2	Can read and write	456	35.7
30-34	208	16.3	Can read and write with difficulty	177	13.8
35-39	172	13.5	Missing	1	0.1
40-44	139	10.9	<b>Religion</b>		
45-49	69	5.4	Hindu	1136	88.9
50-54	53	4.1	Muslim	55	4.3
55-59	26	2.0	Buddhist	52	4.1
60+	30	2.4	Christian	29	2.3
Missing	2	0.2	Other	1	0.1
<b>Marital Status</b>			Prefer not to say	2	0.2
Married	991	77.5	Missing	3	0.2
Single	242	18.9	<b>Caste</b>		
Divorced/Separated	8	0.6	Other Madeshi	519	40.6
Widowed	33	2.6	Hill Janajati	136	10.6
Missing	0.3	0.2	Muslim	39	3.1
<b>Family Living Arrangements</b>			Brahmin/Chhetri	38	3.0
Living Alone	497	38.9	Terai Janajati	36	2.9
Nuclear Family	469	36.7	Hill Dalit	12	0.9
Living with others (not family)	110	8.6	Terai Dalit	9	0.7
Extended Family	87	6.8	Other	266	20.8
Other**	113	8.8	Prefer not to say	197	15.4
Missing	2	0.2	Missing	26	2.0

\*\* Answers were: Other family members and friends/in a group.

**Figure 2** Population pyramid of male and female IWWs

**Table 3** District/State of birth of IWWs (n=1278)

District of Birth (Nepali Respondents)		
Nepal District	n	%
Rauthat	287	43.6
Sarlahi	68	10.3
Rasuwa	44	6.7
Kavrepalanchowk	31	4.7
Kathmandu	28	4.2
Nuwakot	25	3.8
Dhading	22	3.3
Bara	21	3.2
Mahottari	15	2.3
Makwanpur	12	1.8
Lalitpur	10	1.5
Other*	96	14.6
<b>Total</b>	<b>659</b>	<b>100.0</b>

State of Birth (Indian Respondents)		
Indian State	n	%
Bihar	538	88.2
Punjab	29	4.8
Andhra Pradesh	12	1.9
Other	42	6.8
<b>Total</b>	<b>610</b>	<b>100.0</b>

\*31 other districts of origin

**Table 4** General health characteristics (n=1278)

	n	%
<b>Ill in the last three months</b>		
Yes	420	32.9
No	846	66.2
Can't Remember	6	0.5
Missing	6	0.5
<b>Frequency of Illness in the last 3 months (n=420)</b>		
1-3	320	76.2
4-10	77	18.3
Greater than 10	3	0.7
Missing	20	4.7
<b>Symptoms in the last 3 months (n = 1211<sup>^</sup> and 5242 responses) *</b>		
Runny nose and frequently sneezing	847	69.9
Cough	717	59.2
Headache	590	48.7
Tiredness	533	44.0
Fever	469	38.7
Pain in arms and/or legs	412	34.0
Backache	307	35.4
Lower Back Pain	249	20.6
Abdominal Pain	175	14.5
Shortness of Breath	149	12.3
Diarrhoea	129	10.7
Itching	121	10.0
Dizziness	114	9.4
Muscle Pain/Stiffness/Weakness	95	7.8
Numbness in any part of the body	76	6.3
Painful, red or watery eyes	66	5.5
Injuries (e.g. cuts and bruises)	53	4.4
Nausea/Vomiting	43	3.6
Swelling of any part of the body	37	3.1
Skin rashes	26	2.1
Heavy Menstrual Bleeding	26	2.1
Burns	8	0.7
Other**	139	11.5
(No response)	(67)	-

\*May answer more than one response.

\*\* Other included arthritis, asthma, chest pain, mental.

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details).

### Nationality and district of birth

The district/state of birth of participants are presented in Table 3. The Nepali IWWs came from many different districts (42 districts cited) but the majority originated from districts within Province 3. The vast majority of Indian IWWs (88.2%) were from the north eastern state of Bihar, which has an extensive land border with Nepal. 4.8% were from the north western state of Punjab and 1.9% from the eastern state of Andhra Pradesh.

### 5.3 GENERAL HEALTH

The health status of IWWs is presented in Table 4. A third of respondents (420/1278) reported they had been ill in the previous three months. Of those, three-quarters had been ill 1-3 times and 19% four or more times.

The commonest symptoms reported were respiratory - runny nose and frequently sneezing (69.9%) as well as cough (59.2%). The reason for respiratory symptoms predominating is uncertain as there are several possible explanations such as the fact that the study was undertaken in the winter months of November and December when respiratory infections are more common, or it could be the consequence of outdoor air pollution and/or indoor air pollution from the use of biomass fuel or smoking.

Nearly half of respondents (48.7%) reported having suffered headaches in the past 3 months. Musculo-skeletal symptoms such as tiredness (44.0%), backache (35.4%), lower back pain (20.6%), arm and/or leg pains (34.0%) were also common. This is not surprising in view of the physical nature of their occupation. More than a third of respondents (38.7%) had fever in the preceding 3 months, the causes of which could potentially be infective in nature.



**Table 5** Tobacco, drugs and alcohol use (n=1278)

	n	%
<b>Smoking status</b>		
Smoker	515	40.3
Non-smoker	761	59.5
Missing	2	0.2
<b>Number of Cigarettes smoked per day (n = 515)</b>		
Not daily	5	1.0
Less than 10	297	57.7
11-20	192	37.3
21-40	13	2.5
More than 40	0	0
Missing	8	1.5
<b>Frequency of chewing tobacco/Khaini per day</b>		
Don't chew tobacco/Khaini	682	53.4
Less than 5 times	290	22.7
6-10	207	16.2
11-20	60	4.7
More than 20	7	0.5
Missing	32	2.5
<b>Recreational Drugs User</b>		
Yes	35	2.7
No	1222	95.6
Missing	21	1.6
<b>Which Drugs (n = 32^ and 40 responses) *</b>		
Cannabis	31	96.9
Glue sniffing	3	9.4
Heroin	1	3.1
Cocaine	1	3.1
Prescription Drugs	1	3.1
Morphine	1	3.1
Other**	2	6.3
(No response)	(3)	-

	n	%
<b>Frequency of Drug Use (n=35)</b>		
Once a month	12	34.3
2-4 times a month	6	17.1
2-3 times a week	2	5.7
4 or more times a week	3	8.6
Daily	6	17.1
Other	1	2.8
Missing	5	14.3
<b>Drink Alcohol</b>		
Yes	531	41.5
No	745	58.3
Missing	2	0.2
<b>Frequency of alcohol consumption (n=531)</b>		
Monthly or less	73	13.7
2-4 times a month	135	25.4
2-3 times a week	87	16.4
4 or more times a week	37	7.0
Daily	197	31.7
Missing	2	0.4
<b>Number of standard drinks taken on a typical day (n = 531)</b>		
1 or 2 drinks	414	77.9
3 or 4 drinks	96	18.1
5 or 6 drinks	16	3.0
7 to 9 drinks	2	0.4
10 or more drinks	3	0.6

\*May answer more than one response.

\*\* Other drugs used are TT Brown Sugar.

^Indicates that not all expected sample responded (see no response row for details).

## 5.4 TOBACCO, DRUGS AND ALCOHOL

The use of tobacco, drugs and alcohol by the study participants is described in Table 5. There was a high prevalence of smoking with 40.3% of respondents reporting smoking. Most were not heavy smokers with the majority (58.7%) either not smoking daily or smoking less than 10 cigarettes a day. 44.1% declared chewing tobacco or *khaini* and 2.7% used recreational drugs (cannabis being the main drug used). 41.5% of the sample reported drinking alcohol. Of those, 37.1% drink daily with most (78%) having 1-2 drinks on a typical day.

Figure 3 highlights the gender differences in smoking, alcohol and drug use, all of which were more prevalent in men than in women. The difference in prevalence between men and women for smoking and alcohol use was statistically significant ( $p < 0.001$ ). The difference in prevalence for recreational drug use was not statistically significant ( $p = 0.097$ ), but this may be due to low numbers.

## 5.5 HEALTHCARE ACCESS AND UTILISATION

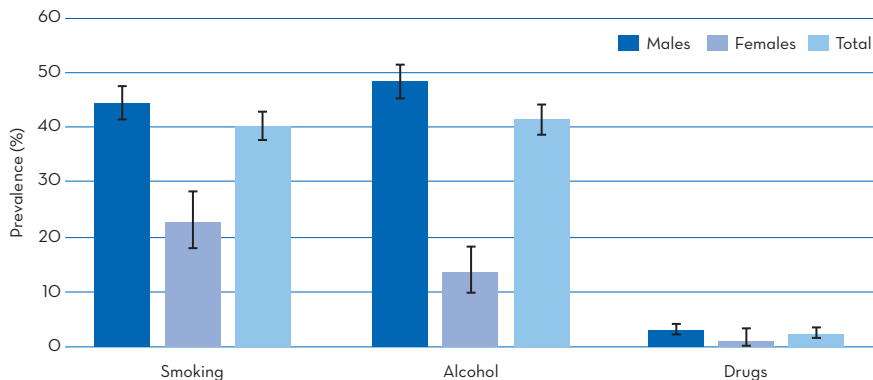
Access and use of healthcare services is presented in Table 6.

### Health facility access

Most respondents (61.7%) reported having government health services in their area, and most (81.1%) declared having access to a 'health facility' within a 30-minute walk. It is important to acknowledge that participants may have interpreted 'health facility' in a general meaning. The type of health facility or service most accessed by respondents when ill were private medicine shop/pharmacy (45.3%), followed by government hospital (35.6%). This may be in relation with the minor nature of the main symptoms reported, e.g. runny nose and sneezing. This may also be due to the fact that you can easily and quickly buy cheap medicines at a pharmacy close to your place, compared with longer distance and waiting time in hospitals.

The majority of respondents (82.1%) declared being very satisfied with the health services used, health services being used here in a general meaning. As some respondents declared accessing different types of health facility or services, it was not possible to understand how their level

**Figure 3** Prevalence of smoking, alcohol and recreational drug use in male and female IWWs, with 95% CIs



**Table 6** Healthcare services - access and use (n=1278)

	n	%
<b>Government Health Services in Area</b>		
Yes	789	61.7
No	155	12.1
Don't know	332	26.0
Missing	2	0.2
<b>Type of health facility or service accessed when ill (n=1275<sup>^</sup> and 1843 responses) *</b>		
Private medicine shop/Pharmacy	578	45.3
Government Hospital	454	35.6
Private Clinic	384	30.1
Private Hospital	340	26.7
Nearby Government Clinic	60	4.7
Traditional Healer	9	0.7
Other	18	1.3
(No response)	3	-
<b>Access to health facility (walking distance)</b>		
Less than 30 minutes	1036	81.1
30-60 minutes	184	14.4
1-2 hours	28	2.2
More than 2 hours	11	0.9
Don't know	5	0.4
Missing	14	1.1
<b>Satisfaction with health services</b>		
Not at all satisfied	38	3.0
Slightly satisfied	61	4.8
Moderately satisfied	99	7.7
Very satisfied	1049	82.1
Extremely satisfied	15	1.2
Missing	16	1.3
<b>Reason for dissatisfaction (n=155<sup>^</sup> and 180 responses) *</b>		
Cannot pay	59	38.1
Referred elsewhere for tests	30	19.4
Waiting time too long	29	18.7
Service not good	24	15.5
Sent elsewhere for medicines	24	15.4
Service providers behaved badly	3	1.9
Other	11	7.1
(No response)	49	-

	n	%
<b>Vaccination of co-habiting Children (n=823)</b>		
Yes	380	46.2
No	355	43.1
Don't know	45	5.5
Missing	43	5.2
<b>Healthcare facility for vaccinations (n = 380)</b>		
Government health post	154	40.5
Government Hospital	127	33.4
Health Camp	58	15.3
Private Clinic	37	9.7
Other	4	1.1
<b>Tetanus vaccine</b>		
Yes	598	46.8
No	655	51.3
Can't Remember	17	1.3
Missing	8	0.6
<b>Hepatitis B Vaccine</b>		
Yes	96	7.5
No	1146	89.7
Can't Remember	18	1.4
Missing	18	1.4
<b>HIV Test</b>		
Yes	75	5.9
No	1171	91.6
Can't Remember	22	1.7
Refuse to say	3	0.2
Missing	7	0.5
<b>Know HIV, Hep B and Hep C status (n=1268<sup>^</sup> and 1337 responses)*</b>		
Know HIV status	74	5.8
Know Hep B status	58	4.6
Know Hep C status	31	2.4
Do not know any	1174	92.6
(No response)	10	-

\*May answer more than one response.

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details).

~455 of sample did not have any children living with them.

of satisfaction may vary by type of health facility used. Their level of satisfaction may reflect a “general” feeling regarding health services, but it may also refer to the last health facility they went to, or to some specific type of health facility used. The commonest reason cited for dissatisfaction was inability to pay.

### Vaccination coverage and uptake of infectious disease tests

46.2% of respondents reported they had children living with them who had been vaccinated. Nepali IWWs had a higher childhood vaccination rate compared to Indian IWWs (54% and 42%, respectively), which may suggest difficulties in accessing vaccination services for the migrant population. With regards to vaccinations for the participants, less than half were vaccinated against tetanus (46.8%) and few had received hepatitis B vaccination (7.5%). Only 5.9% reported having ever been tested for HIV. The great majority of respondents (92.6%) did not know their hepatitis B, hepatitis C and HIV infection status. It may reflect a lack of knowledge of what is hepatitis B, hepatitis C and HIV among this population, as well as a lack of access to testing for these infections.

### 5.6 HEART-MIND PROBLEMS AND DEPRESSION LEVEL

Perceived heart-mind problems and depression level of respondents are presented in Table 7. A large proportion (41.1%) reported “heart-mind”<sup>1</sup> (emotional/mental health) problems in the previous 2 weeks and 10.7% reported that these problems affected their work or caring responsibilities.

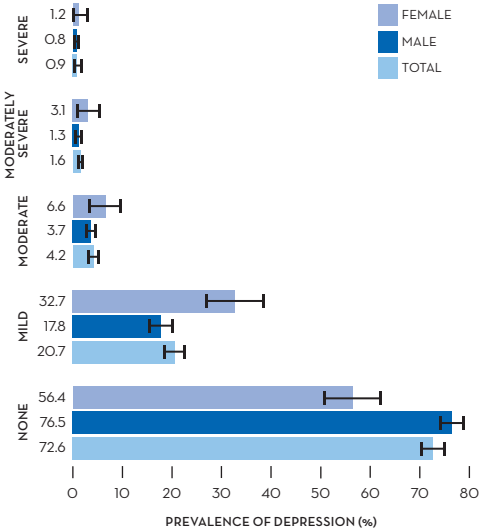
Respondents were asked questions from the Nepal Patient Health Questionnaire (PHQ-9). This is a multipurpose instrument for measuring the severity of depression and has been used in other low resource settings in Nepal (Kohrt *et al.*, 2016). The results show that 27.4% had some evidence of depression of varying severity: 20.7% mild, 4.2 % moderate, 1.6% moderately severe and 0.9% severe. The difference in prevalence between males and females is illustrated in Figure 4a – women had a higher prevalence of each grade of depression than men, and this is statistically significant for mild depression. Women also had a significantly higher prevalence of self-reported ‘heart-mind’ problems than men, as illustrated in Figure 4b ( $p < 0.001$ ).

**Table 7** Heart-mind problems and depression level (n=1278)

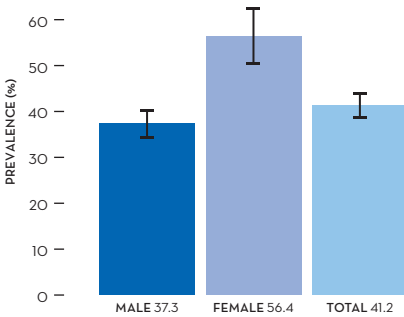
	n	%
<b>Heart-mind problems in the past 2 weeks</b>		
Yes	525	41.1
No	750	58.7
Missing	3	0.2
<b>Heart-mind problems affecting work or caring responsibilities</b>		
Yes	137	10.7
No	1137	89.0
Missing	4	0.3
<b>Nepal PHQ9 Depression score (see table in appendix)</b>		
0-4 None	927	72.6
5-9 Mild	264	20.7
10-14 Moderate	54	4.2
15-19 Moderately Severe	21	1.6
20-27 Severe	11	0.9

1. Heart-mind is a local idiom of distress used in Nepal and the term used in mental health studies in the region.

**Figure 4a** Prevalence of depression (PHQ9 questionnaire) in male and female IWWs, with 95% CIs



**Figure 4b** Mental health problems in the last 2 weeks (self-reported) in male and female IWWs, with 95% CIs



## 5.7 SEXUAL AND REPRODUCTIVE HEALTH

The results regarding sexual and reproductive health of the sample are presented in Table 8.

### Knowledge and prevention of sexually-transmitted infections

43.1% reported knowing how to prevent HIV and other sexually transmitted infections (STIs). This is self-declared and there was no further question to assess which method they might know. In any case, this level of knowledge seems quite low.

### Knowledge and use of contraception

72.7% of respondents declared knowing contraceptive methods. Of those in a sexual relationship, around half reported using some form of contraception (51.2%). Female sterilisation was the most frequently reported method (47.7%), followed by injectable contraceptives (26.9%) and condoms (10.5%).

### Abortion and pregnancy related care

3.5% of all females (n=258) reported having had an abortion in the last three years, and all of them were carried out in private health facilities (either private clinics or private hospitals).

18.5% of the female participants of childbearing age (18-44 years) (n=211) reported having given birth or been pregnant in the previous 3 years. With regards to antenatal care received in their last pregnancy, 35 out of 39 women (89.7%) reported having had an antenatal check-up. A third reported having had the recommended number of at least four antenatal checks during their pregnancy. Only 43.6% reported having had a post-natal check-up. However, the question related to 'pregnancy or given birth', and not all respondents may have given birth, so a part of them may therefore not have needed a whole antenatal follow-up as well as a postnatal check-up.



**Table 8** Sexual and reproductive health (n=1278)

	n	%
<b>Do you know the ways to prevent HIV and other STIs?</b>		
Yes	551	43.1
No	718	56.2
Missing	9	0.7
<b>Do you know about contraceptive methods?</b>		
Yes	929	72.7
No	344	26.9
Missing	5	0.4
<b>Using contraception (only asked to those in a sexual relationship) (n = 1209)</b>		
Yes	619	51.2
No	544	45.0
Don't know	46	3.8
<b>Contraceptive methods used (n=619 and 650 responses)*</b>		
Female Sterilisation	296	47.8
Injectable	167	26.9
Condom	65	10.5
Pills	51	8.2
Male Sterilisation	25	4.0
Intra-uterine Device	17	2.7
Implant	14	2.3
Rhythm method	8	1.4
Withdrawal	6	1.0
Other	1	0.2
<b>Pregnancy or given birth in the last 3 years (n = 211 all females of child bearing age, 18-44 years)</b>		
Yes	39	18.5
No	162	76.7
Missing	10	4.7

	n	%
<b>Pregnancy related questions (n=39)</b>		
<i>Antenatal checkup in last pregnancy</i>		
Yes	35	89.7
No	4	10.3
<i>Number of antenatal checkups in last pregnancy</i>		
1-3	21	53.8
4-8	14	35.9
Missing	4	10.2
<i>Postnatal checkup after birth</i>		
Yes	17	43.6
No	21	53.8
Can't Remember	1	2.6
<b>Abortion in the last 3 years (n = all females, 258)</b>		
Yes	9	3.5
No	225	87.2
Missing	24	9.3
<b>Abortion related questions (n=9)</b>		
<i>Number of abortions</i>		
1	4	44.4
2	3	33.3
3	1	11.1
Missing	1	11.1
<i>Treatment facility where abortion was done</i>		
Private Clinic	6	66.6
Private Hospital	3	33.3

\*May answer more than one response

**Table 9** Disabilities (n=1278)

	n	%
<b>Difficulties with vision</b>		
No - no difficulty	948	74.4
Yes - some difficulty	265	20.7
Yes - a lot of difficulty	62	4.9
Cannot do at all	1	0.1
Missing	2	0.2
<b>Difficulties with hearing</b>		
No - no difficulty	1159	90.7
Yes - some difficulty	103	8.1
Yes - a lot of difficulty	12	0.9
Cannot do at all	1	0.2
Missing	3	0.2
<b>Difficulties with walking/steps</b>		
No - no difficulty	1044	81.7
Yes - some difficulty	190	14.9
Yes - a lot of difficulty	39	3.1
Cannot do at all	3	0.2
Missing	2	0.2
<b>Difficulties with remembering/concentrating</b>		
No - no difficulty	1150	90.0
Yes - some difficulty	93	7.3
Yes - a lot of difficulty	29	2.3
Cannot do at all	3	0.2
Missing	3	0.2
<b>Difficulties with self-care</b>		
No - no difficulty	1227	96.0
Yes - some difficulty	43	3.4
Yes - a lot of difficulty	6	0.5
Missing	2	0.2
<b>Difficulties with communicating</b>		
No - no difficulty	1251	97.9
Yes - some difficulty	22	1.7
Yes - a lot of difficulty	1	0.1
Cannot do at all	1	0.1
Missing	3	0.2
<b>Caring for someone with a disability</b>		
Yes	58	4.5
No	1218	95.3
Missing	2	0.2
<b>Caring for someone with chronic health problems</b>		
Yes	42	3.3
No	1234	96.6
Missing	2	0.2

**Table 10** Social security (n=1278)

	n	%
<b>Member of any groups/co-operatives</b>		
Yes	146	11.4
No	1130	88.4
Missing	2	0.2
<b>Groups/co-operatives involved with (n=140^ and 143 responses) *</b>		
Co-operative	89	63.6
Saving or credit group	16	11.2
Community Groups	9	6.4
Mothers' Group	6	4.3
Local club	6	4.2
Other	17	11.9
(No response)	(6)	-
<b>Receiving social protections (n=1274^ of 1278 responses) *</b>		
None	1198	94.0
Health Insurance	15	1.2
Free education for kids	9	0.7
Accidental Insurance	4	0.3
Any emergency fund	2	0.2
Other~	50	3.9
(No response)	(4)	-

\*May answer more than one response

^Indicates that not all expected sample responded (see no response row for details)

~Life insurance, earthquake relief fund.

## 5.8 DISABILITY

Physical disabilities or impairments declared by the participants are presented in Table 9. Visual impairment was the commonest disability reported (25.5%). 9.2% of respondents had some hearing difficulties, 18.2% had difficulties walking, and 9.8% had difficulties concentrating. A small proportion reported having difficulties with self-care (3.9%) and 1.9% had communication problems.

## 5.9 SOCIAL SECURITY

Memberships of groups/co-operatives and receipt of social security amongst respondents are presented in Table 10. 11.4% are members of groups, co-operatives being the most common response (63.6%). A large proportion of respondents (94%) do not receive any social protections, and health and accident insurance coverage were very low (1.2% and 0.3% respectively).

## 5.10 EMPLOYMENT AND FINANCIAL SITUATION

The employment and financial status of respondents are described in Table 11. Most respondents were involved in more than one form of waste recovery activity. The most frequent forms reported were waste collection (72.1%), sorting (71%) and dealing (34.9%).

27.9% had other family members working as waste workers. Among participants having answered the questions regarding the spouse and children working as a waste worker (357 and 359 respectively), 51.3% declared having a spouse working as a waste worker and 17.3% having children working as waste workers. Surprisingly, more than half of the participants did not answer to these two questions. The lack of response for the question related to children may reflect the fact that by law, children are required to attend school.

40.8% of respondents declared having some form of debts or loans. The most reported lender is a neighbour (66.4%) followed by scrap dealer (25%). 80.8% had savings kept at home.

58.8% are without work at some point during the year. The commonest reason given for this was due to home visits (57.9%), presumably back to their place of origin that they consider as their "homes". The median number of months without work is 2.

## 5.11 INFORMAL WASTE WORKER PROFILE

The profile of the participants as waste workers is described in Table 12. The median duration of work in this occupation was 7 years. The main reason given for working in this field was the lack of other available work (56.7%), but many also reported the fact that this was an 'easy job' (46.8%). This may refer to the fact that no qualifications are required for individuals to work as an IWW. The median number of hours worked per day was 8 hours and the median number of days worked per month was 30 days. More than two thirds of respondents said they work every day of the month.

The median weight of waste collected daily was 60kg. The main way of carrying the waste was via a bicycle (49.7%) but a large proportion of the respondents (40.1%) manually carry the waste. The main type of waste collected was plastic bottles (85.0%), papers (81.3%), glass (78.7%), iron (74.7%) and plastic bags (68.1%). Of note, 37.7% of respondents declared collecting medical waste.

Most waste was collected for selling (73.9%) and sorting (67%). The median income was around 500 NPR/day and participants declared a median saving of 300 NPR/day. Most participants (86.5%) said they were satisfied with their work. Many respondents (69.2%) were not sure how long they would continue in this work but 22.7% expected to do this work for many years.

**Table 11** Employment and Financial situation (n=1278)

	n	%
<b>Occupation (n = 1276<sup>^</sup> of 2422 responses)*</b>		
Waste Collection	920	72.1
Waste Sorting	906	71.0
Waste Dealing	445	34.9
Housewife/caring for family	31	2.4
Agriculture	17	1.3
Student	7	0.5
Business	4	0.3
Other**	92	7.2
(No response)	(2)	-
<b>Family members working as waste workers</b>		
Yes	356	27.9
No	912	71.4
Prefer not to say	6	0.5
Missing	4	0.3
<b>Spouse working as a waste worker (n=991, number of married respondents)</b>		
Yes - often/all the time	145	14.6
Yes - sometimes	38	3.8
No	174	17.6
Missing	634	63.9
<b>Children working as waste workers (n=823, number with children co-habiting)</b>		
Yes - often/all the time	35	4.3
Yes - sometimes	27	3.3
No	297	36.1
Missing	464	56.4
<b>Debts/Loans</b>		
Yes	521	40.8
No	747	58.5
Prefer not to say	7	0.5
Missing	3	0.2

	n	%
<b>Lenders (n = 512<sup>^</sup> of 568 responses) *</b>		
Neighbour	340	66.4
Scrap dealer	128	25.0
Co-operative	41	8.9
Bank	30	5.9
Other***	29	5.7
(No response)	(9)	-
<b>Savings deposited (n= 1273<sup>^</sup> of 1327 responses) *</b>		
Home	1029	80.8
Co-operative	67	5.3
Scrap dealers	49	3.8
Bank	48	3.8
Other	134	10.5
(No response)	(5)	-
<b>Periods of no work during the year</b>		
Yes	751	58.8
No	525	41.1
Missing	2	0.2
<b>Reason for no work (n=751)</b>		
Visiting Home	438	57.9
Sickness	129	17.2
Don't have another job	47	6.3
Fed up with the job	40	5.3
Other	91	12.2
Missing	6	0.8
<b>Duration of no work (n=751), months</b>		
0	93	12.4
1-3	541	72.0
4-6	95	12.6
> 6	18	2.4
Missing	4	0.5
Duration of no work (n=751), mean (SD)	2.2 (2.5)	
Duration of no work (n=751), median (IQR)	2 (1 - 3)	

\*May answer more than one response

\*\* Cleaning bottles, driving, loading, packing, washing glass, segregating, grinding paper

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details)

\*\*\*Boss, poverty alleviation fund, mothers group, insurance company, micro-finance.

Table 12 Informal waste worker profile (n=1278)

	n	%
<b>Duration as a waste worker</b>		
< 1 year	50	3.9
1-5 years	491	38.4
6-10 years	323	25.3
11-20 years	296	23.2
20 years	112	8.8
Missing	6	0.5
Duration as a waste worker, mean (SD)	9.1 (7.8)	
Duration as a waste worker, median (IQR)	7 (3-12)	
<b>Reason for working as a waste worker (n=1274* of 2113 responses) *</b>		
No other work available	722	56.7
Easy job/easy to earn money	596	46.8
No need for initial investment	239	18.8
Suggested by family and friends	209	16.4
Don't have own land for work	131	10.3
Family business	114	8.9
Independence	51	4.0
Near my home	17	1.3
Other	34	2.7
(No response)	(4)	-
<b>Hours worked per day</b>		
1-4	27	2.1
5-8	785	61.4
9 -12	441	34.5
>12	22	1.7
Missing	3	0.2
Hours worked per day, mean (SD)	8.5 (1.9)	
Hours worked per day, median (IQR)	8 (8-10)	
<b>Days worked per month</b>		
1-15	17	1.3
16-29	376	29.4
30	882	69.0
Missing	3	0.2
Days worked per month, mean (SD)	28.5 (2.9)	
Days worked per month, median (IQR)	30 (28-30)	
Amount of waste collected per day (kg), mean (SD)	133 (225)	
Amount of waste collected per day (kg), median (IQR)	60 (40-100)	
<b>Carriage of loads (n = 1266* of 1476 responses) *</b>		
Bicycle	629	49.7
Manually	508	40.1
Hire Vehicles	147	11.6
Push Cart	33	2.6
Other	159	12.6
(No response)	(12)	-

	n	%
<b>Type of waste collected (n=1275* of 7725 responses)*</b>		
Plastic Bottles	1084	85.0
Papers	1036	81.3
Glass	1003	78.7
Iron	953	74.7
Plastic Bags	868	68.1
Copper	710	55.7
Electronic Goods	608	47.7
Aluminium	589	46.2
Medical Waste	481	37.7
Cloth/fabric	296	23.2
Other	97	7.6
(No response)	(3)	-
<b>Purpose of waste collected (n=1262* of 2437 responses)*</b>		
Selling	933	73.9
Sorting	846	67.0
Collection only	440	34.9
Dismantling	104	8.2
Metals recovery	38	3.0
Re-use them	19	1.5
Burning	2	0.2
Other	55	4.4
(No response)	(16)	-
<b>Income from waste work (NPR/Day)</b>		
<500	424	33.2
500-1000	731	61.9
>1000	64	4.8
Missing	2	0.2
Income from waste work (NPR/Day), mean (SD)	595 (486)	
Income from waste work (NPR/Day), median (IQR)	500 (400-650)	
<b>Savings per day from waste work (NPR/Day)</b>		
<500	1047	81.9
500-1000	220	17.2
>1000	9	0.7
Missing	2	0.2
Savings per day from waste work (NPR/Day), mean (SD)	297 (348)	
Savings per day from waste work (NPR/Day), median (IQR)	300 (200-400)	
<b>Satisfied with work</b>		
Yes	1106	86.5
No	165	12.9
Missing	7	0.5
<b>View of how long they will continue in this work</b>		
A few weeks or months	19	1.5
A few years	73	5.7
Many years	290	22.7
Don't know	884	69.2
Missing	12	0.9

\*May answer more than one response.

\*Indicates that not all expected sample responded (see no response row for details).

**Table 13** Knowledge of health risks related to waste work (n=1278)

	n	%		n	%
<b>View waste work as a risky job</b>			<b>View on health risks of work (n=1275<sup>^</sup> of 2660 responses)*</b>		
Yes	927	72.5	Risk of Injury	1035	81.2
No	318	24.9	Bad for lungs/breathing problems	496	38.9
Don't know	30	2.3	Risk of infection	318	24.9
Missing	3	0.2	Headache	200	15.7
<b>View on how risky a job waste work is</b>			Mental stress	167	13.1
Very risky	526	41.2	Skin diseases	154	12.1
Somewhat risky	354	27.7	Bad for eyes	152	11.9
Neither risky nor safe	167	13.1	Other	32	2.5
Somehow safe	87	6.8	Don't know	106	8.3
Safe	65	5.1	(No response)	(3)	-
Very safe	59	4.6	<b>View on how to protect oneself from risks (n=1275<sup>^</sup> of 3173 responses)*</b>		
Missing	20	1.6	Using gloves	846	66.4
<b>Received information about the risks of waste work</b>			Wearing masks	763	59.8
Yes	880	68.9	Wearing safety boots	516	40.5
No	339	26.5	Washing hands before eating	320	25.1
Don't know	54	4.2	Drinking safe water	163	12.8
Missing	5	0.4	Changing clothes after work	156	12.2
<b>Source of Information (n=880 of 1174 responses)*</b>			Eating in clean and hygienic places	43	3.4
Experience	820	93.2	Other	46	3.6
Neighbours/family/friends	227	25.8	Don't know	320	25.1
School	80	9.1	(No response)	(3)	-
NGO	20	2.3			
INGO	16	1.8			
Government Organisation	2	0.2			
Co-operative	1	0.1			
Can't remember	5	0.6			
Other	3	0.3			

\*May answer more than one response.

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details).

## 5.12 KNOWLEDGE OF HEALTH RISKS RELATED TO WASTE WORK

Data on knowledge of health risks related to waste work are presented in Table 13. 72.5% perceived their work as risky with 41.2% describing it as very risky. 68.9% reported having received some information about the risks of their work. However, 93.2% cited experience as the main source of knowledge, followed by family, friends or neighbours (25.7%) and school (9.1%).

Respondents identified injury (81.2%), lungs/breathing problems (38.9%) and infections (24.9%) as the main occupational health risks. When asked how they would protect themselves, gloves (66.4%), facemasks (59.8%), safety boots (40.5%) and handwashing before eating (25.1%) were the commonest measures cited. A quarter of respondents said they did not know how to protect themselves.

## 5.13 PERSONAL PROTECTION

Results regarding personal protection of the respondents are presented in Table 14.

### Personal hygiene practices

47.5% said they always changed their clothes after work while 39.4% did not. The majority (72.9%) did not wash or shower daily (but it is unclear how many have access to a shower). Most respondents said they washed their hands before eating and after toilet use (96.2% and 92.7%, respectively). For those who did not wash their hands (n=45), the commonest reason given for not doing so was because they felt there was 'no need to wash' (42.2%).

### Drinking water source

The commonest source of drinking water reported at work and at home was purchased jar water (65.1% and 57.8%, respectively). Most respondents



**Table 14** Personal protection characteristics (n=1278)

	n	%
<b>Clothes changed after work</b>		
Yes, always	607	47.5
Sometimes	165	12.9
No	503	39.4
Missing	3	0.2
<b>Shower/clean after work</b>		
Immediately after work at the work place	36	2.8
After returning back home	125	9.8
Do not shower or clean every day	932	72.9
Other	177	13.8
Missing	8	0.6
<b>Wash hands with soap at critical times (n=1274<sup>^</sup> of 3312 responses)*</b>		
Before eating	1207	94.3
After toilet use	1181	92.7
After touching garbage/waste	484	38.0
Before preparing/cooking food	245	19.2
Before feeding others	93	7.3
After cleaning someone's faeces	81	6.4
None	16	1.3
Other	11	0.9
(No response)	(4)	-
<b>Hands washed before eating</b>		
Yes	19	42.2
No	16	35.6
Missing	4	8.9
<b>Reason for not washing hands before eating (n=45 of 49 responses)*</b>		
No need to wash	19	42.2
Not a habit	16	35.6
No water available	4	8.9
Eat with spoon	4	8.9
Other~	6	13.3
<b>Sources of drinking water at work place (n=1274<sup>^</sup> of 1314 responses)*</b>		
Buy Jar water	830	65.1
Public tap stand	211	16.6
Buy tanker water	148	11.6
Private supply	41	3.2
Well/Tube well	19	1.5
Spring water	17	1.3
Pipe water from river	4	0.3
Other	44	3.5
(No response)	(4)	-

	n	%
<b>Method of water purification at work (n=1274<sup>^</sup> of 1281 responses)*</b>		
None	1203	94.4
Filtration	43	3.4
Boiling	27	2.1
Chlorination	3	0.2
Other	5	0.4
(No response)	(4)	-
<b>Sources of drinking water at home (n=1274<sup>^</sup> of 1317 responses)*</b>		
Buy Jar water	736	57.8
Public tap stand	254	19.9
Buy tanker water	165	13.0
Private supply	66	5.2
Well/Tube well	38	3.0
Spring water	35	2.7
Pipe water from river	6	0.5
Other	17	1.3
(No response)	(4)	-
<b>Method of water purification at home (n=1275<sup>^</sup> of 1282 responses)*</b>		
None	1188	93.2
Boiling	47	3.7
Filtration	46	3.6
Chlorination	1	0.1
(No response)	(3)	-
<b>Type of toilet used at work place</b>		
No toilet use (in an open place)	129	10.1
Pit latrine with slab	1124	87.9
Composting toilet	4	0.3
Ventilated improved pit latrine	3	0.2
Flush/pour-flush latrine	1	0.1
Other	14	1.1
Missing	3	0.2
<b>Type of toilet used at home</b>		
No toilet use (in an open place)	40	3.1
Pit latrine with slab	1216	95.1
Ventilated improved pit latrine	15	1.2
Flush/pour-flush latrine	3	0.2
Composting toilet	0	0.0
Missing	4	0.3

\*May answer more than one response.

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details).

~Other responses were no soap, no money.



did not have their water purified prior to drinking either at home or at the workplace. Less than a quarter had access to either piped water or private water supply in the workplace or at home.

### Access to toilet facilities

A small proportion of respondents said they had no toilet facilities at work (10.1%) or at home (3.1%). If any toilet facilities were available, they were usually pit latrines (87.9% at work and 95.1% at home).

### Use of personal protective equipment (PPE)

PPE was defined as per the list of equipment in Table 15a. Frequency of users is presented in Table 15b. Participants were asked whether they used any of the listed materials. Those who responded 'sometimes', 'often', or 'always' to at least one item of PPE were classed as PPE users. PPE non-users were defined as those who answered 'never' or 'rarely' to wearing all items classed as PPE.

One-third (32.2%) of respondents declared using at least one item of the list and were classified as PPE users. Over two thirds of respondents (67.6%) declared never or rarely using any item of the list and were thus classified as PPE non-users. If PPE was used, facemasks were the most likely piece of protective equipment to be worn (18.3% used it sometimes, often or always) followed by gloves (16%).

More than half (52.2%) of the participants said they protected themselves with other means of protection, i.e. using their own clothing. 54% (465/864) of those not using PPE stated they used their own clothes as protection. A total of 876 respondents (68.5%) used some form of protection, whether PPE or their own clothing.

It is unclear as to what protection is conferred by their own clothing such as 'shoes', shawls, 'caps'. However, the results suggest that the majority of the participants are to a certain extent aware of the risks related to waste work and find their own solutions to protect themselves, raising the question of accessibility and affordability of PPE for IWWs.

**Table 15b** Frequency of PPE Use (n=1278)

	n	%
<b>Personal protective equipment used</b>		
PPE users	411	32.2
PPE non-users	864	67.6
Missing	3	0.2
<b>Other protections used</b>		
Yes**	667	52.2
No	611	47.8
<b>Use of any means of Protection (PPE or other)</b>		
Yes	876	68.5
No	399	31.2
Missing	3	0.2

\*\*Respondents stated shawls as masks, slippers, shoes, cap, jacket, handkerchief as masks.

**Table 15a** PPE equipment used (n=1278)

Personal Protective Equipment used	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)	Missing (%)
Glove	974 (76.2)	93 (7.3)	102 (8.0)	26 (2.0)	77 (6.0)	6 (0.5)
Apron	1243 (97.3)	10 (0.8)	6 (0.5)	3 (0.2)	5 (0.4)	11 (0.9)
Cap/Net	1172 (91.7)	9 (0.7)	35 (2.7)	8 (0.6)	47 (3.7)	7 (0.5)
Facemask	948 (74.2)	85 (6.7)	107 (8.4)	35 (2.7)	96 (7.5)	7 (0.5)
Glasses/Goggles	1261 (98.7)	1 (0.1)	4 (0.3)	1 (0.1)	1 (0.1)	10 (0.8)
Safety Boots	1212 (94.8)	7 (0.5)	16 (1.3)	8 (0.6)	29 (2.3)	6 (0.5)
Helmets	1267 (99.1)	1 (0.1)	0	0	1 (0.1)	9 (0.7)
Hi-visibility Jackets	1256 (98.3)	1 (0.1)	3 (0.2)	0	1 (0.1)	(1.3)

**Table 16** Physical Risks from waste work (n=1278)

	n	%
<b>Injured at work in the last 12 months (n=1275<sup>^</sup> of 1839 responses)*</b>		
No injury	432	33.9
Glass cut	567	44.5
Metal cut	562	44.1
Animal bite	86	6.7
Fall during waste work	53	4.2
Injuries from medical sharps	43	3.4
Hit by a truck/vehicle	21	1.6
Other	24	1.9
Can't remember	51	4.0
(No response)	(3)	-
<b>Number of times injured in past 12 months (n=846)</b>		
1-5	602	71.2
6-10	94	11.1
>10	64	7.6
Missing	86	10.2
Number of times injured in past 12 months, mean (SD)	5 (7.5)	
Number of times injured in past 12 months, median (IQR)	3 (2-5)	
<b>Length of time taken to treat injury (n=791<sup>^</sup> of 816 responses)*</b>		
As soon as possible	556	70.3
1-3 hours	179	22.6
4-7 hours	39	4.9
After 24 hours	16	2.0
Other	26	3.3
(No response)	(55)	-
<b>Type of first aid performed (n=806<sup>^</sup> of 1100 responses)*</b>		
Cloth/medical tape	644	79.9
Used medicine	320	39.7
Pressed with salt-water	12	1.5
Other	124	15.5
(No response)	(40)	-
<b>Experienced violence at work in the last 12 months (n=1274<sup>^</sup> of 1325 responses)*</b>		
None	940	73.8
Verbal abuse	331	26.0
Physical violence	49	3.8
Sexual Harassment	2	0.2
Rape	0	0.0
Other	3	0.2
(No response)	(4)	-

\*May answer more than one response.

<sup>^</sup>Indicates that not all expected sample responded (see no response row for details).

## 5.14 PHYSICAL RISKS OF WASTE WORK

Two-thirds of respondents stated that they had been injured at work in the past 12 months, with a median number of injuries of 3. The most common injury identified by respondents were glass cuts (44.5%) and metal cuts (44.1%). Injuries from medical waste were also reported by 3.4% of respondents. 70.3% of respondents said they sought treatment as soon as possible but a small proportion (2%) delayed seeking treatment by more than 24 hours. Most (73.8%) had not experienced violence in the workplace in the last 12 months, but a quarter (26.0%) did report having experienced some form of verbal abuse and 3.8% physical violence.

## 5.15 ANALYSIS OF PPE USE

Of the IWWs surveyed, a third (411/1278) used some form of PPE (e.g. facemasks, gloves - see list in Table 15a) and two-thirds (864/1278) never or rarely used PPE (see Table 15b).

The characteristics that may be associated with PPE use were examined using univariate and multivariate analysis, and are presented in Table 17. The characteristics examined included sex, age, country of origin, education level, risk perception, receipt of information in relation to occupational risks, and injury in the past 12 months. All odds ratios and p-values quoted below are from the multivariate analysis (adjusted odds ratios controlling for all other variables).

From this analysis, the following characteristics were found to be associated with non-use of PPE: male sex, being Indian, being 40 years or over, and a perception that waste work is not risky.

### Sex

Males had twice the odds of not using PPE compared to women (OR 2.19; p <0.001).

### Country of Origin

Indian IWWs had 1.35 odds of not using PPE compared to Nepali IWWs (OR 1.35;  $p=0.018$ ).

### Age

The likelihood of not using PPE increased with age: OR of 1.72 ( $p=0.005$ ) for those aged 40-54 years of age and 2.97 ( $p=0.007$ ) for IWWs over 55 years old.

As this variable could be confounded by duration as a waste worker, the model was re-run with the variable 'duration as a waste worker' instead of age and no difference was found.

### Education, Perception of Risks and Receipt of Information

The likelihood of not using PPE seemed to decrease with increasing education, but the tendency was not clear and the association was not found to be statistically significant.

The perception of risks in waste work was an important factor. The odds of not using PPE were 2.41 times higher in those who perceive their job as 'not risky' compared to those who see it as a 'risky' job, (OR 2.41 (1.73 - 3.33);  $p<0.001$ ).

The odds of not using PPE were 1.09 times higher in those who did not receive information compared to those who did, but this association was not statistically significant. However, it is important to note that 93.2% (820/880) selected 'experience' as their source of information with only 13.4% (118/880) selecting another information source (such as school, family/friends or government organisation).

### Injuries

There was no association found between history of injuries at work in the last 12 months and PPE use.



**Table 17** Associations between sex, age, country of origin, education, risk perception, receipt of information, injuries and Non-Use of PPE - univariate and multivariate analysis (n=1278)

Independent Variable	Dependent Variable		Univariate Analysis		Multivariate Analysis	
	PPE non-users (%) N=864 <sup>^</sup>	PPE users (%) N=411 <sup>^</sup>	Crude OR (95% CI)	P	Adjusted OR (95% CI)	P
<b>Sex</b>						
Female*	141 (17)	116 (28)				
Male	712 (83)	294 (72)	1.99 (1.51 - 2.64)	<0.001	2.19 (1.61 - 2.98)	<0.001
<b>Age</b>						
18-24 years*	223 (26)	122 (30)				
25-39 years	404 (47)	208 (51)	1.06 (0.81 - 1.40)	0.667	1.19 (0.88 - 1.60)	0.241
40-54	189 (22)	72 (17)	1.44 (1.01 - 2.04)	0.043	1.72 (1.18 - 2.52)	0.005
55+ years	47 (5)	9 (2)	2.86 (1.35 - 6.03)	0.006	2.97 (1.34 - 6.55)	0.007
<b>Country of Origin</b>						
Nepali*	420 (29)	242 (59)				
Indian	44 (51)	169 (41)	1.51 (1.19 - 1.92)	0.001	1.35 (1.05 - 1.74)	0.018
<b>Education</b>						
No education*	426 (50)	216 (53)				
Informal class	64 (7)	23 (6)	1.41 (0.85 - 2.34)	0.181	1.44 (0.85 - 2.43)	0.175
Primary	185 (22)	74 (18)	1.27 (0.93 - 1.74)	0.141	1.37 (0.97 - 1.93)	0.072
Secondary and Higher	178 (21)	96 (23)	0.94 (0.69 - 1.26)	0.684	0.94 (0.67 - 1.31)	0.709
<b>Risk perception</b>						
Risky job*	582 (69)	345 (85)				
Not a risky job	257 (31)	61 (15)	2.50 (1.83 - 3.41)	<0.001	2.41 (1.73 - 3.33)	<0.001
<b>Receipt of Information on Risks</b>						
Yes*	582 (67)	298 (72)				
No	280 (33)	113 (27)	1.27 (0.98 - 1.64)	0.072	1.09 (0.82 - 1.47)	0.544
<b>Injury at work in the last 12 months</b>						
No*	305 (35)	127 (31)				
Yes	559 (65)	284 (69)	0.82 (0.64 - 1.05)	0.121	1.11 (0.85 - 1.46)	0.436

\*Indicates Reference Category.

<sup>^</sup>Frequencies for separate categories may not add up to overall sample size due to missing values.

OR: Odds Ratio. CI: Confidence Interval.

## 5.16 ANALYSIS OF MEMBERSHIP OF CO-OPERATIVE GROUPS

IWW membership of co-operative groups was also analysed to examine for any sociodemographic characteristics associated with membership of a co-operative group (Table 18). 11.4% of respondents were members of a co-operative group. The characteristics significantly associated with membership of a co-operative group in the multivariate analysis were female sex, increasing age, increasing level of education and being of Nepali origin.

## 5.17 ANALYSIS OF RISK PERCEPTION

As presented in Table 13, 72.5% of respondents perceived their job as a 'risky job' and 24.9% perceived it as 'not a risky job'. As previously shown, risk perception was associated with PPE use (OR 2.41 of not using PPE in those who perceive their job as 'not risky') (see Table 17). As such, this variable is explored further in relation to sociodemographic characteristics as presented in Table 19.

**Table 18** Associations between sociodemographic characteristics and membership of a co-operative group - univariate analysis (n=1278)

Independent Variable	Dependent Variable		Univariate Analysis		Multivariate Analysis	
	Member of a Coop (%) N=146*	Not a member of a Coop (%) N=1264*	OR (95% CI)	p	Adjusted OR (95% CI)	p
<b>Sex</b>						
Female*	45 (31)	212 (19)				
Male	101 (69)	906 (81)	0.52 (0.36 - 0.77)	0.001	0.48 (0.31 - 0.74)	0.001
<b>Age</b>						
18-24 years*	26 (18)	319 (28)				
25-39 years	75 (51)	538 (48)	1.71 (1.07 - 2.73)	0.024	1.94 (1.18 - 3.17)	0.008
40-54	34 (23)	227 (20)	1.84 (1.07 - 3.15)	0.027	2.26 (1.26 - 4.04)	0.006
55+ years	11 (7)	45 (4)	2.99 (1.39 - 6.48)	0.005	3.92 (1.70 - 9.05)	0.001
<b>Country of Origin</b>						
Nepali*	111 (76)	551 (49)				
Indian	35 (24)	579 (51)	0.30 (0.20 - 0.45)	<0.001	0.34 (0.23 - 0.51)	<0.001
<b>Education</b>						
No education*		50 (35)	593(53)			
Informal class	19 (13)	68 (6)	3.31 (1.85 - 5.95)	<0.001	3.51 (1.89 - 6.52)	<0.001
Primary	23 (16)	236 (21)	1.16 (0.69 - 1.94)	0.582	1.62 (0.94 - 2.80)	0.086
Secondary and Higher	51 (36)	223 (20)	2.71 (1.78 - 4.13)	<0.001	4.36 (2.70 - 7.05)	<0.001

\*Indicates Reference Category

\*Frequencies for separate categories may not add up to overall sample size due to missing values.

**Table 19** Associations between sociodemographic characteristics and perception of work as a 'risky job' - univariate and multivariate analysis (n=1278)

Independent Variable	Dependent Variable		Univariate Analysis		Multivariate Analysis	
	Risky Job (%) N=927 <sup>^</sup>	Not a risky Job (%)	OR (95% CI)	P	OR (95% CI)	P
<b>Sex</b>						
Female*	174 (19)	70 (22)				
Male	747 (81)	242 (78)	1.24 (0.91 - 1.69)	0.175	1.12 (0.79-1.58)	0.497
<b>Age</b>						
18-24 years*	252 (27)	87 (27)				
25-39 years	464 (50)	140 (44)	1.14 (0.84 - 1.56)	0.392	1.07 (0.77 - 1.49)	0.669
40-54	183 (20)	69 (22)	0.92 (0.63 - 1.32)	0.640	0.85 (0.57 - 1.27)	0.427
55+ years	27 (3)	22 (7)	0.42 (0.23 -0.78)	0.006	0.37 (0.19 - 0.13)	0.003
<b>Country of Origin</b>						
Nepali*	494 (53)	159 (50)				
Indian	433 (47)	159 (50)	0.88 (0.68 - 1.13)	0.311	0.83 (0.64 - 1.09)	0.193
<b>Education</b>						
No education*	442 (48)	174(56)				
Informal class	62 (7)	25 (8)	0.98 (0.59 - 1.60)	0.925	0.87 (0.51 - 1.45)	0.608
Primary	208 (22)	48 (15)	1.71 (1.19 - 2.44)	0.004	1.37 (0.93 - 2.03)	0.111
Secondary and Higher	210 (23)	64 (21)	1.29 (0.93 - 1.78)	0.129	0.91 (0.63 - 1.31)	0.616
<b>Receipt of Information on Risks</b>						
Yes*	710 (77)	168 (53)				
No	215 (23)	150 (47)	0.34 (0.26 - 0.44)	<0.001	0.35 (0.26 - 0.47)	<0.001
<b>Injury at work in the last 12 months</b>						
No*	279 (30)	131 (41)				
Yes	648 (70)	187 (59)	1.63 (1.25- 2.12)	<0.001	0.76 (0.57 - 1.01)	0.064

<sup>^</sup>Frequencies for separate categories may not add up to overall sample size due to missing values.

Sociodemographic characteristics significantly associated with risk perception in the multivariate analysis are older age (55+ years) and having received information on the risks. Older people were less likely to consider their job risky compared to the younger population (OR 0.38;  $p = 0.004$ ). This is consistent with the results in relation to PPE use that highlight that older people are less likely to use PPE. Those who have not received information on the risks of their work had lower odds of perceiving their job as risky (OR 0.33;  $p < 0.001$ ). This highlights that receipt of information is an important factor in relation to risk perception.

### 5.18 ANALYSIS BY COUNTRY OF ORIGIN

As reported above, almost half of the participants were of Indian origin (48%, 614/1278). The majority (88%) were from Bihar state (see Table 3).

Further analysis was undertaken to look for any significant differences between Indians and Nepali IWWs, as presented in Table 20. There was a higher ratio of males to females for Indians compared to Nepali IWWs ( $p < 0.001$ ). There were no significant differences in relation to age or literacy. Of note, access to government hospitals was significantly different with 42% of Nepali compared with 29% of Indian IWWs accessing government health services ( $p < 0.001$ ), suggesting a poorer access to public hospitals for Indians IWWs.

Furthermore, we've seen previously that Indian IWWs had a lower rate of childhood vaccination compared to Nepali IWWs (42% and 54% respectively). They also used less PPE than Nepali IWWs (see Table 17), and less of them were involved in groups/co-operatives compared to Nepali IWWs. All these elements suggest that Indian IWWs may face specific challenges in terms of access to healthcare, social protection and rights.

**Table 20** Differences in sex, age, literacy and access to healthcare for Nepali and Indian IWWs (n=1278)

Characteristic	Difference (%)		p
	Nepali (%) N=663*	Indian (%) N=614*	
<b>Sex</b>			
Female	166 (25)	92 (15)	
Male	494 (75)	513 (85)	<0.001
<b>Age</b>			
18-24 years	173 (26)	173 (28)	
25-39 years	307 (46)	306 (49)	0.129
40-54	150 (23)	111 (18)	
55+ years	33 (5)	23 (4)	
<b>Literacy</b>			
Literate	333 (50)	300(49)	
Illiterate	330 (50)	314 (51)	0.626
<b>Healthcare Access</b>			
Government Hospital accessed	278 (42)	176 (29)	
Government hospital not accessed	384 (58)	437 (71)	<0.001

\*Frequencies for separate categories may not add up to overall sample size due to missing values.





## 6. **DISCUSSION**

This survey highlights a vulnerable population working in a high-risk environment with very little protections, low vaccination rates for infectious diseases, low use of PPE and long working hours.

## SOCIODEMOGRAPHIC PROFILE

Our IWW sample, recruited in the Kathmandu Valley, was predominantly male (79%), married (78%), Hindu (89%) and below the age of 39 years (75%). Over a third of the participants (37%) lived with their spouse and children. Given that 78% were married, this suggests that many IWWs live away from their families.

The level of literacy was low in the sample (i.e. 50%), with no difference between Nepali and Indian IWWs. This is slightly lower than the Nepali population in general, which has a literacy rate of 57% (UNICEF, 2012). Among respondents, levels of formal education were low with 51% reporting having had no education, 20% educated to primary school level and 21% to secondary school level and higher.

The study participants were either of Indian (48%) or Nepali (52%) origin and many had periods of no work due to home visits (58%), which may be expected from a migrant population. IWWs work hard with a median of 30 working days per month, for low earnings at a median of 500 NPR/day. This is about US\$5 and seem to be slightly higher than earnings found among waste workers in India, which is between US\$0.3 and US\$4.6 per day (Linzner and Lange, 2013). This is substantially lower than the Nepali average daily earnings of 1910 NPR/day (*Nepal / 2017/18 Average Salary Survey*, 2018), but average daily earnings may not properly reflect the reality as it may hide big discrepancies between low and high salaries, so this comparison should be taken with caution. The median duration of work as a waste worker was 7 years. Most reported doing this work as there was no other work available (57%), suggesting a default choice for most

respondents. The majority of the participants carried their loads either by bicycle (50%) or manually (40%) with a median weight of 60kg of waste collected per day, which is slightly more than the median of 43kg in resource-limited countries in a recent review (Linzner and Lange, 2013).

The majority identified waste work as their main occupation (72% in collection, 71% in sorting and 35% in dealing). Many co-habit with other waste workers (87% live with 1-2 other waste workers). Many did not wish to answer questions regarding whether their spouse or children worked as waste workers, which may indicate some stigma to having close family members working in this field or because child labour is forbidden.

## GENERAL HEALTH

The prevalence of illness in the preceding three months was 33% (420/1278), of which 76% had been ill 1-3 times. The waste worker workforce is exposed to many occupational health risks in their working day, such as from solid waste, toxic fumes, physical exertion and air pollution. In our sample, 95% reported symptoms in the previous 3 months, the main symptoms reported being respiratory in nature, akin to other studies which cite respiratory symptoms as the most prevalent (Gutberlet and Baeder, 2008). This may be related to working outdoors, exposure to toxic particulate matter and also because the study was undertaken in the winter months. Similar to other studies (Gutberlet and Baeder, 2008), other reported symptoms were tiredness, backache and headache, which may be due to the physical exertion of their work. Fever was prevalent for 39% of respondents in the previous 3 months and this could be indicative of infection which is a known hazard for waste workers (Binion and Gutberlet, 2012).

The prevalence of physical disabilities appears to be low and it is difficult to compare the various disabilities surveyed as there is no comprehensive data on disability in Nepal. In participants, difficulties with vision were the most prevalent at 26%, which may be due to the nature of their work and exposure to dust and fumes. 4.5% of respondents care for someone with a disability and 3.3% care for someone with chronic ill health. This is perhaps a surprisingly low figure as the prevalence of disability is thought to be as high as 10% in the general population (Thapaliya, 2016). One possible explanation may be that, as most of the IWWs are migrant workers from within Nepal or from India, relatives with disabilities may have been left behind in the care of other family relations.

### HEART-MIND PROBLEMS, DEPRESSION LEVEL AND SUBSTANCE USE (TOBACCO, DRUGS AND ALCOHOL)

The prevalence of self-reported heart-mind problems was high (i.e. 41%). Estimates of depression based on the PHQ9 questionnaire suggest a prevalence of depression of around 27%. Self-reported heart-mind problems was significantly more prevalent in females (56%) compared to males (37%). The prevalence was also higher in women for all grades of depression, using the PHQ9, compared to males. This suggests that female IWWs suffer more from heart-mind problems and depression than males, which is consistent with what is described in the literature (WHO, 2000). In comparison, the prevalence of mental ill-health in the Nepal population was previously estimated to be 14% in 1984 using an epidemiological field survey (NHRC, 2018). More recent studies using the PHQ9 questionnaire estimate depression prevalence at 26% (Luitel *et al.*, 2013) and 21% (Lam *et al.*, 2017). Thus, it seems that the prevalence of depression in our IWW sample is similar to these estimates, if not a little higher.

Regarding substance use, smoking prevalence amongst IWWs in our sample was 40%, which is double that of the Nepali population at 20% (WHO, 2017). These differences can also be found when disaggregating by sex: a smoking prevalence of 44% for males was found in our sample vs 32% in the Nepali population, and 23% for females in our sample vs 9% for females in the Nepali population (WHO, 2017). Alcohol consumption also appears higher in male IWWs (48%) than the general population (40%), and quite similar for females (14% in our IWWs sample vs 16% in the Nepali population) (Lam *et al.*, 2017). Higher smoking and alcohol consumption may be explained by lower socioeconomic status which is a known risk factor for these health risk behaviours (Baumann *et al.*, 2007).

### REPRODUCTIVE HEALTH OF FEMALE IWWs

Women comprise 20% of our sample and 19% (39) of those of childbearing age had given birth in the previous 3 years. 90% of them had received an antenatal check-up during pregnancy, but only 36% received the recommended number of four antenatal checks during their last pregnancy, compared with 69% in the general population (NDHS, 2016). This highlights that further work is needed to understand why female IWWs have a poor access to antenatal care and to ensure women in this sector receive the recommended care during pregnancy. 56% did not have a postnatal check, which is similar to that found in the general population of 57% (NDHS, 2016). However, these findings should be interpreted with caution given the low numbers involved.

Within our sample, there was a high level of awareness of contraceptive methods (73%) but use was lower at 51%. This is quite similar with contraceptive use among married women in the Nepali general population of 53% (NDHS, 2016). Regarding the level of awareness of how to

prevent sexually transmitted infections (STIs), it was considerably lower in our sample (43%) than in the general population, where knowledge of condom use in preventing STIs is 72% in females and 92% in males (NDHS, 2016). However, the way of measuring awareness was quite different in both studies, and it would need further exploration. In any case, these results suggest that sexual health promotion activities highlighting awareness of STIs and contraceptive use should be conducted within the IWW communities.

## ACCESS TO HEALTH SERVICES AND SOCIAL SECURITY

Almost two thirds of the sample declared having government health services in their area (62%) and for 81%, they could reach a health facility within a 30-minute walk. This access may be due to the urban nature of the environment surveyed, as well as the general meaning used in the questionnaire (health facility including any facility in which health services may be delivered, like pharmacies). Also, of note is that Indians had significantly lower access than Nepali IWWs (29% vs. 42% respectively). Therefore, access rights to healthcare for Indian migrants warrants further investigation.

82% were very satisfied with health services. This satisfaction level may be reflective of various things: (i) it may reflect the level of satisfaction in relation to a specific type of health facility used (e.g. private healthcare, given that only 40% of respondents used government health services); (ii) as it was a broad question, it may also reflect a “general” feeling regarding health services; (iii) it may also refer to the last health facility used by the respondents; (iv) it may also be explained by potential low expectations from health facilities or low perceived needs in terms of health of this population. Thus, this would need further exploration. Of those who were not satisfied, the main reason for dissatisfaction was inability to

pay, suggesting a potential economic barrier to healthcare access for some respondents.

823 respondents had children living with them and 46% reported they had been vaccinated whilst 43% had not. This is much lower than the childhood vaccination rate in the general population of 78% (NDHS, 2016). As the majority of the sample were males, the level of knowledge regarding children’s vaccination, which is mainly managed by women in Nepal, may have been low. Nepali IWWs had a slightly higher childhood vaccination rate at 54% compared to Indian IWWs at 42%, which may reflect problems in accessing healthcare facilities for Indian children or specific challenges due to the instability of Indian IWWs during several months of the year. This highlights the need for promotion of the childhood vaccination programme to the IWW community. Health access rights may need to be explored for the Indian population, as they seem to have worse health indicators and poorer healthcare access.

The study participants had poor protections from infectious diseases with less than half having been vaccinated against tetanus, and far fewer yet against hepatitis B. Very few (6%) had been tested for HIV, and most (93%) respondents did not know their infectious disease status for hepatitis B, hepatitis C or HIV, despite potential risks in relation with their handling of waste. However, it needs to be acknowledged that access to these tests and barriers such as price need to be further understood and explored. In addition, whilst the literature is clear in relation to the theoretical risk of infection, there is a lack of studies in relation to infection prevalence among waste workers (Tooher *et al.*, 2005). Despite this lack of data, IWWs are at risk of infection and should thus have access to immunization when available or testing.

It is known that for IWWs, membership of co-operative groups can enable easier access to legal protection and healthcare (Medina, 2000). Therefore, it is an important finding from

an advocacy perspective that membership of any groups or co-operatives appears low in this population with only 11% reporting membership of a group, despite clear needs. However, no comparative figure could be found in the literature. The characteristics associated with being a member of a co-operative group are being female, Nepali, of older age and educated to secondary level or higher. These associations may help inform any community activities to promote group membership, in terms of which groups to engage.

The large majority of the sample (94%) did not receive any social protections. A report in this area acknowledges that social protection initiatives have weak coverage in Nepal and do not reach all poor and vulnerable individuals who require support (Upreti *et al.*, 2012). It would be worth exploring what protections (if any) this population is entitled to and promoting that with the communities.

## AWARENESS OF OCCUPATIONAL HEALTH RISKS AND USE OF PPE

The prevalence of injury in the previous 12 months was 66.1% and this is broadly similar to other studies in IWWs in Brazil (Fernandes Carvalho *et al.*, 2016) and formal waste workers in Ethiopia (Bogale, Kumie and Tefera, 2014), with prevalence of 82% and 43% respectively. It is notable that 71% of participants injured had between one and five injuries in a year. The risk and nature of mechanical trauma is as expected from the literature (Binion and Gutberlet, 2012). The main injuries reported were glass (45%) and metal cuts (44%). This highlights the potential risk of tetanus infection, and the need to improve tetanus vaccination in this group. Medical waste was collected by 38% of respondents. Worryingly, injuries from medical waste were reported by 3.4%. This indicates that 10% of those who collected medical waste suffered a sharps injury.





This highlights the need for vaccination of IWWs from blood-borne infectious diseases such as hepatitis B, and access to testing for HIV and hepatitis C. However, as previously stated, there may be barriers in terms of access and cost. There is limited evidence in this area, so this should be further explored. Furthermore, it highlights the need to strengthen the medical waste management system, as medical waste should be managed via specific channels.

Over two-thirds of respondents declared not using PPE and this is similar to other studies (Lavoie and Guertin, 2001; Bogale, Kumie and Tefera, 2014; Sridhar and Adejumo, 2014). If any PPE was used, facemasks (18%) and gloves (16%) were the most likely piece of protective equipment to be worn. However, it is unknown if these items met any quality criteria for PPE as this was not included in the questionnaire. 52.2% of respondents stated they used other types of protections and this included shawls or handkerchiefs as masks, caps, shoes and slippers. This highlights that IWWs are trying to find solutions by using their own clothes to protect themselves from dust and physical harm. The higher percentage use of 'other protections' compared to listed PPE suggests that if there was access to PPE, the level of use would be higher. There may be several barriers to formal PPE use such as access, cost, practicability and usability, which need to be explored.

The sample appeared to be knowledgeable that their work carries health risks, with 73% reporting their work as 'risky' and 41% considering it 'very risky'. The majority identified the main risk as injury (81%), followed by lungs/breathing problems (39%). Knowledge of risks is associated with PPE use with those who do not consider it a risky job having more than double the odds of not using PPE compared to those who do consider it a risky job (OR 2.41). This mirrors findings in similar studies; a study of e-waste workers in Nigeria (Ohajinwa *et al.*, 2017) and another among IWWs in Thailand (Thirarattanasunthon, Siriwong, Robson, *et al.*, 2012) highlight how knowledge of risks affects behaviour.

Our study did not show any association between non-use of PPE and prevalence of injury unlike other studies which have shown higher odds of injury in those not using PPE (Bogale, Kumie and Tefera, 2014).

Receipt of information seems to be an important factor in risk perception, with those who did not receive information having lower odds of perceiving their job as risky compared to those who had received information. However, it is important to note that the commonest information source cited was 'experience', which is very subjective. Therefore, whilst the results highlight the need to provide to IWWs good information in relation to occupational risks, it needs to be interpreted cautiously. Acknowledging this limitation, the results suggest that receipt of information could increase risk perception that in turn may increase PPE use.

## POLICY IMPLICATIONS

As the Kathmandu Municipal Council overcomes challenges in implementing the Solid Waste Management Act, it is essential to consider the contribution being made to waste management by the informal sector. Whilst an entirely formalised waste management system is the ultimate aim, it is important to consider how this could adversely affect the livelihoods of informal waste workers, unless consideration is given as to how they could be engaged in the formal waste management sector (Wilson, Velis and Cheeseman, 2006) or other employment avenues.

Recognizing the contribution made to society by waste workers and using this data to understand their main health and healthcare access needs could help to formulate a strategy to improve the health and working conditions of the waste workers in reducing health inequalities in the valley. This fits with the broad public health ambitions of the Nepal Health Sector Strategy

(Ministry of Health and Population, 2015), in particular as federalism progresses the handover of local health facilities to local government (Ministry of Health, 2018), enabling local progress.

## STRENGTHS AND LIMITATIONS OF THE STUDY

A limitation inherent in cross-sectional studies is that the design doesn't allow for determining causal links. The size of the survey limited the scope to further develop some of the topics. Some of the questions, due to how they were written and standardised may have been interpreted differently by participants (e.g. health-care access, receipt of information on risks and source of that information), leading to difficulties in interpreting the findings. The questionnaire was not translated into Hindi, rather the enumerators translated verbally when undertaking the questionnaire and this may have introduced interviewer bias. The legal framework for drugs in Nepal may have led to an under reporting of recreational drug use. Another limitation, as with any questionnaire, is recall bias. In particular, in this study whereby a large percentage of the population were male, they may be less likely to recall details of childhood vaccinations which tend to be led at least initially by mothers in the post-partum period.

A potential limitation of this study was the use of snowballing as a non-probability sampling method, which is subject to selection bias. However, IWWs are a hard-to-reach population and, as such, there are difficulties in applying a randomised sampling method to recruit respondents given the migrant/mobile nature of the IWW population. Therefore, as is common in studies of such populations, a snowballing method was used. In order to limit the impact of selection bias, a larger sample size was used as recommended by the literature (Atkinson, Rowland and Flint, 2001).

Another limitation of this study is that the great majority of participants came from Kathmandu valley. There would be a need to conduct other studies with participants coming from other districts, as the situations and realities of IWWs working in other districts might be completely different from the IWWs working in the Kathmandu valley.

A strength of the study is its large size. It is one of the largest studies of informal waste workers in the world and adds to the research in relation to health status and needs of waste workers in South Asia.



## 7. CONCLUSION



IWWs are amongst the poorest communities in Nepal. They are at risk of injury, infections and chronic conditions such as respiratory conditions and depression. Their access to personal protective equipment is poor and they try to find ad-hoc solutions using their own clothing to protect themselves. Their health indicators are poorer than the general population, and very few of them receive any social protections. The Indian community is very strongly represented in this sector, raising some specific challenges regarding healthcare access and rights. Many are not part of any co-operatives or groups, impeding mobilization and defence of their rights. Supporting community mobilization seems quite crucial for IWWs, in order to obtain a better recognition of their key role in cleaner cities, and for their inclusion in improved waste management systems.

Whilst working on this long term objective, it is important to protect the IWW workforce as best as possible. Based on this study findings, the following are recommended:

### 1. Health promotion as well as Information, Education and Communication (IEC) activities:

- Increase health promotion activities in relation to health protection, hygiene practices, as well as sexual and reproductive health in the IWW communities;
- Provide robust information on occupational health risks to the IWW communities.

### 2. Healthcare access

- Improve the uptake and coverage of routine childhood vaccinations within IWW communities;
- Improve the uptake of vaccinations against occupational risks for IWWs (i.e. for tetanus and hepatitis B);
- Improve access to HIV, hepatitis B and hepatitis C testing for this population;
- Understand any barriers to healthcare access for Indian IWWs.

### 3. Community mobilisation

- Support community mobilisation activities in order to increase the IWWs ability to address the various health concerns as well as access social protections;
- Support advocacy activities with regards to improving the healthcare access rights for migrant Indian waste workers.

### 4. Knowledge production

- Better understand the attitudes of IWWs regarding health as well as the expectations and access to the health system;
- Better understand the attitudes, beliefs and practices of IWWs with regards to PPE use, in order to increase the level of protection;
- Conduct further qualitative research work to understand the factors that affect IWWs behaviour in relation to how they protect themselves from risks, what factors may lead to behaviour change and to explore community-based solutions that will increase the level of protection- a focus on IWWs of Indian origin might provide data to better understand the specific challenges in this subgroup;
- Identify the enablers of PPE use and potential barriers such as cost, practicality and usability.

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# APPENDICES



## APPENDIX 1: QUESTIONNAIRE

### Survey of the Health Risks and Behaviours of Informal Waste Workers in the Kathmandu Valley, 2017

Namaskar,

My name is\_\_\_\_\_. I am working with PHASE Nepal. We are doing a survey to find out the health and safety needs and perception of people living in your area and especially people who are waste workers. Your help with this survey would really be appreciated. The survey will only take about 40-45 minutes to complete. The information you give is confidential and used for the purpose of research. Participation in this study is totally voluntary. You can decide not to answer any questions that you feel uncomfortable with and you can withdraw from the interview at any time if you wish. You will not be penalized in any way for not taking part. There is no payment for taking part. We hope that you will participate in this study.

Would you like to participate in this study?

Yes  (Agree to survey)

No  (Disagree. End survey)

Please sign your consent to take part here:

Please answer the following questions as fully and truthfully as you can.

#### PARTICIPANT IDENTIFICATION

**Respondent no:**

**District:**

**Metropolitan City/Municipality/Rural Municipality:**

**Ward No (Old):**

**Ward No (New):**

**Tole:**

**Name of Household head:**

**Name of Respondent:**

**Date:**

**Interview started at :**

**Interview finished at:**

**Interviewer's name:**

**Interview Result:** 1. Completed / 2. Incomplete / 3. Withdrawn / 4. Others (Please Specify)

SN	Questions	Coding categories	Coding	Notes
<b>SECTION A: SOCIO-DEMOGRAPHIC INFORMATION</b>				
1	Country of birth	Nepal	1	
		India	2	
		Not known	3	
		Prefer not to say	4	
		Other (please specify) .....	97	
2	Name of the district	.....	Free text	
3	Sex	Male	1	
		Female	2	
		Other (please specify).....	97	
4	Age	18-24 years	1	
		25-29 years	2	
		30-34 Years	3	
		35-39 years	4	
		40-44 years	5	
		45-49 years	6	
		50-54 years	7	
		55-59 years	8	
		60+ years	9	
5	Religion	Hindu	1	
		Buddhist	2	
		Muslim	3	
		Kirat	4	
		Christian	5	
		Prefer not to say/Do not know	86	
		Other (please specify).....	97	
6	Caste/ethnicity	Hill Dalit	1	
		Terai Dalit	2	
		Hill Janajati	3	
		Terai Janajati	4	
		Other Madeshi	5	
		Muslim	6	
		Brahmin/Chhetri	7	
		Prefer not to say/do not know	86	
		Other (please specify).....	97	
7	Family living arrangements	Living alone	1	
		Nuclear (husband, wife, children)	2	
		Extended (above + grandparents)	3	
		Living with others (not family members)	4	
		Other (please specify).....	97	

8	Type of accommodation	Own house	1	
		Rented house/room	2	
		Stay at the home of other family/ friends	3	
		Stay at the temporary shelter	4	
		Sleep at the landfill site/ work site	5	
		No fixed abode/homeless	6	
		Other (please specify).....	97	
9	Can you read and write?	Yes	1	If No, go to Q11
		Yes with difficulty	2	
		No	3	
10	What is the highest educational grade you completed?	Informal class	1	
		Primary (1-5 grade )	2	
		Secondary (6-10 grade)	3	
		Higher secondary (11-12 grade)	4	
		Higher education	5	
11	What is your current marital status?	Single/Never married	1	
		Married	2	
		Divorced/separated	3	
		Widow/Widower	4	
		Other (please specify).....	97	
12	How many people live in your house?	.....Male	1	
		.....Female	2	
		.....Other	3	
		.....Total	4	
13	Were you affected by the earthquake disaster? (tick all that apply)	Not affected	1	
		Personally injured	2	
		Home was damaged/destroyed	3	
		Family members injured/killed	4	
		Lost property	5	
		Lost livestock	6	
		Other (please specify)	97	
<b>SECTION B: GENERAL HEALTH SURVEY</b>				
1	Have you been ill in last 3 months?	Yes	1	If No, go to Q3
		No	2	
		Can't remember	3	
2	How many times have you been ill?	..... times	2 digits	

3	In the last three months did you have any of these symptoms? (multiple responses possible, tick all that apply)	Lower back pain	1	
		Muscles pain/ stiffness/ weakness	2	
		Shortness of breath	3	
		Cough	4	
		Runny nose and frequently sneezing	5	
		Headache	6	
		Fever	7	
		Itching	8	
		Skin rashes	9	
		Painful, red or watery eyes	10	
		Dizziness	11	
		Nausea/vomiting	12	
		Abdominal pain	13	
		Diarrhea (frequent loose stools)	14	
		Pain in arms and/or legs	15	
		Backache	16	
		Numbness in any part of body	17	
		Swelling of any body part	18	
		Injuries (e.g. cuts and bruises)	19	
		Burns	20	
		Tiredness	21	
Heavy menstrual bleeding	22			
Other (please specify).....	97			

**SECTION C: TOBACCO, DRUGS AND ALCOHOL**

1	Do you smoke?	Yes	1	If No, go to Q3
		No	2	
2	How many cigarettes do you smoke a day?	Not daily	1	
		Less than 10 cigarettes a day	2	
		11-20 a day	3	
		21-40 a day	4	
		More than 40 a day	5	
3	Do other people smoke in your house?	Yes	1	
		No	2	
4	How many times a day do you chew tobacco (or take Khaini)	Don't chew tobacco/use Khaini	1	
		Less than 5 times a day	2	
		6-10 times a day	3	
		11-20 times a day	4	
		More than 20 times a day	5	
5	Do other people in your house use chew tobacco or Khaini?	Yes	1	
		No	2	
6	Do you use recreational drugs?	Yes	1	If no, go to Q9
		No	2	

7	Which drugs do you use in last 4 weeks? (tick all that apply)	Cannabis/Marijuana/Ganja	1	
		Heroin	2	
		Cocaine	3	
		LSD ( Lysergic Acid Diethylamide)	4	
		Medical/Prescription drugs	5	
		Morphine	6	
		Glue sniffing	7	
		Other (please specify).....	97	
8	How often do you use the drugs?	Daily	1	
		once a month	2	
		2-4 times a month	3	
		2-3 times a week	4	
		4 or more times a week	5	
		Other (please specify).....	97	
<b>AUDIT C: Screening Questions</b>				
9	Do you drink?	Yes	1	If No, go to Section 4
		No	2	
10	How often do you have a drink containing alcohol?	Monthly or less	2	
		2-4 times a month	3	
		2-3 times a week	4	
		4 or more times a week	5	
		Daily	6	
11	How many standard drinks containing alcohol do you have on a typical day?	1 or 2 drinks	1	
		3 or 4 drinks	2	
		5 or 6 drinks	3	
		7 to 9 drinks	4	
		10 or more drinks	5	
12	How often do you have you had 6 or more drinks on a single occasion in the last year?	Never	1	
		Monthly or Less	2	
		Twice a month	3	
		Thrice a Wee	4	
		Daily	5	
		Other (please specify).....	97	
<b>SECTION D: HEALTH SERVICES</b>				
1	Are there any government health services in your area?	Yes	1	
		No	2	
		Don't know	3	
2	Where do you go for treatment when you are ill? (tick all that apply)	Nearby government clinic	1	
		Government hospital	2	
		Private hospital	3	
		Private clinic	4	
		Private medicine shop/pharmacy	5	
		Traditional healer	6	
		Other (please specify).....	97	
3	How long will it take to reach health facility (Walking distance)?	Less than 30 minutes	1	
		30-60 minutes	2	
		1-2 hours	3	
		More than 2 hours	4	
		Don't know	5	

4	Are you satisfied with the health services you received?	Not at all satisfied	1	If answered one of the last two options, then go to Q6
		Slightly satisfied	2	
		Moderately satisfied	3	
		Very satisfied	4	
		Extremely satisfied	5	
5	Why are you unhappy with the services you received? (tick all that apply)	Service was not good	1	
		Refer elsewhere for tests	2	
		Had to go elsewhere for medicines	3	
		Service providers behaved badly	4	
		Waiting time was too long for check up	5	
		Cannot pay for the services	6	
		Other (please specify).....	97	
6	If you have children living together, have they been vaccinated?	Yes	1	If No children, go to next section
		No	2	
		Don't know	3	
		No children	4	
7	Where did you take them for their vaccinations?	Government health post	1	
		Private clinic	2	
		Government hospital	3	
		Health Camp	4	
		Other (please specify).....	97	
8	Have you had tetanus vaccination?	Yes	1	
		No	2	
		Can't remember	3	
9	Have you had Hepatitis B vaccination?	Yes	1	
		No	2	
		Can't remember	3	
10	Have you ever had an HIV test?	Yes	1	
		No	2	
		Don't know/can't remember	3	
		Refuse to say	4	
11	Do you know your HIV, Hep B and Hep C Status?	Know about HIV status	1	
		Know about Hepatitis B status	2	
		Know about Hepatitis C status	3	
		Do not know about anything	4	

SECTION E: MENTAL HEALTH AND WELLBEING				
1	Have you had heart-mind problems in the past 2 weeks, for example thoughts playing in your heart-mind, sadness in your heart-mind, or worry in your heart-mind?	Yes No	1 2	
2	During the past 2 weeks, have you experienced problems in your work, taking care of yourself and your family, or in your relationships with other people because of the problems that we talked about heart-mind problems?	Yes No	1 2	
	<b>Nepal PHQ9 depression questions</b>	<b>Not at all (0)</b>	<b>Some-times (1)</b>	<b>Usually (2)</b>
3	During the past 2 weeks, compared to other people, how much have you felt that you are not able to be happy or do not enjoy doing work/ activities?			
4	During the past 2 weeks, how much have you felt frustrated, despairing or incapable of doing anything?			
5	During the past 2 weeks, how much have you had problems with your sleep, such as not being able to sleep properly and peacefully, or feeling sleepier than before?			
6	During the past 2 weeks, how much have you felt tired and lacking energy?			
7	During the past 2 weeks, how much have you lost your appetite or experienced increased appetite?			
8	During the past 2 weeks, how much have you blamed yourself for something or felt that you have let yourself or your family down? (For example, because of you, you and your family have lost respect in the society?)			
9	During the past 2 weeks, how much have you been having difficulty being able to focus or concentrate? (For example, not being able to concentrate while watching TV, reading a newspaper, cleaning, cooking, or working?)			
10	During the past 2 weeks, how much have people commented that you have been talking very softly, walking slowly, moving around needlessly or acting restless?			
11	During the past 2 weeks, how much have you had the feeling of hurting yourself, dying or committing suicide? (For example, cutting your hands, taking poison, jumping from some-where, and hitting your head against the wall?)			
	<b>TOTAL SCORE (Q3+4+5+6+7+8+9+10+11)</b>			

SECTION F: SEXUAL & REPRODUCTIVE HEALTH				
1	Do you know about contraceptive methods?	Yes	1	If No, go to Q5
		No	2	
2	Do you know the ways to prevent HIV and other sexually transmitted infections?	Yes	1	
		No	2	
3	If you are in a sexual relationship, are you or your partner using any methods to prevent pregnancy?	Yes	1	
		No	2	
		Don't know	3	
4	Which method are you (or your partner) using? (Don't prompt, tick all that apply)	Female sterilization	1	
		Male sterilization	2	
		Intrauterine device (IUD)	3	
		Injectable	4	
		Implant	5	
		Condom	6	
		Pills	7	
		Rhythm method	8	
		Withdrawal	9	
Other (please specify).....	97			
5	In the last 3 years have you been pregnant or given birth to a baby? (Only for Female)	Yes	1	If No, go to Q9
		No	2	
6	Did you have antenatal (ANC) checkup when pregnant last time? (Only for Female)	Yes	1	If No, go to Q8
		No	2	
		Can't remember	3	
7	How many times did you have ANC checkup when pregnant last time? (Only for Female)	.....times		
8	Did you have postnatal (PNC) checkup after birth? (Only for Female)	Yes	1	
		No	2	
		Can't remember	3	
9	Did you have any abortion during last three years? (Only for Female)	Yes	1	If No, go to next section
		No	2	
		Don't know	3	
10	If yes how many times?	.....times		
11	Where was the abortion done?	Government health facilities	1	
		Private hospitals	2	
		Private clinics	3	
		Others (Please Specify).....	97	
SECTION G: DISABILITY SCREENING				
1	Do you have difficulties with seeing (even if wearing glasses)?	No - no difficulty	1	
		Yes-some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	
2	Do you have difficulties with hearing (even with a hearing aid)?	No - no difficulty	1	
		Yes - some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	
3	Do you have difficulties with walking or climbing steps?	No - no difficulty	1	
		Yes - some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	



4	Do you have difficulties with remembering or concentrating?	No - no difficulty	1	
		Yes - some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	
5	Do you have difficulties with self-care, such as washing all over or dressing?	No - no difficulty	1	
		Yes - some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	
6	Do you have difficulties with communicating (using your usual language), e.g. understanding or being understood?	No - no difficulty	1	
		Yes - some difficulty	2	
		Yes - a lot of difficulty	3	
		Cannot do at all	4	
7	Do you look after someone with disability (like what we've just talked about)?	Yes	1	
		No	2	
8	Do you look after someone with chronic health problems?	Yes	1	
		No	2	
<b>SECTION H: SOCIAL SECURITY</b>				
1	Are you a member of any groups or co-operatives?	Yes	1	If No, go to Q3
		No	2	
2	What groups or co-operative are you involved with?	Co-operative	1	Please specify name of the group/co-operative
		Mothers' group	2	
		Community groups	3	
		Local club	4	
		Saving or credit group	5	
		Other (please specify).....	97	
3	Do you receive any of these social protections?	None	1	
		Health insurance	2	
		Free education for kids	3	
		Accidental insurance	4	
		Any emergency fund	5	
		Other (please specify).....	97	
<b>SECTION I : EMPLOYMENT &amp; FINANCIAL</b>				
1	What is your occupation? (multiple responses possible, tick all that apply)	Agriculture	1	
		Waste collection	2	
		Waste sorting	3	
		Waste dealer	4	
		Student	5	
		Business	6	
		Housewife/caring for family	7	
		Other (please specify).....	97	
2	Does anyone in your family work as a waste worker?	Yes	1	If no, go to Q 6 after filling up Q 3
		No	2	
		prefer not to say	3	

3	How many people in your family work as a waste worker?	.....Male	1	2 digits
		.....Female	2	
		.....Other	3	
		.....Total	4	
4	Does your spouse also work as a waste worker?	Yes -often/all the time	1	
		Yes -sometimes	2	
		No	3	
		prefer not to say	4	
5	Do any of your children work as waste workers?	Yes -often/all the time	1	
		Yes -sometimes	2	
		No	3	
		prefer not to say	4	
6	Do you have any debts or loans?	Yes	1	If No, go to Q 8
		No	2	
		prefer not to say	3	
7	If you have debts or loans, who are the lenders? (tick all that apply)	Neighbor/friend	1	
		Scrap dealers	2	
		Co-operative	3	
		Bank	4	
		Other (please specify).....	97	
8	If you have savings, where do you deposit your savings?	Keep at home	1	
		Scrap dealers	2	
		Bank	3	
		Co-operative	4	
		Other (please specify).....	97	
9	Are there times of the year that you do not have work?	Yes	1	If No, go to next section
		No	2	
10	What is it reason that you do not have work?	Due to Sickness	1	
		Don't have a other job	2	
		Fed up with this job	3	
		Other (please specify).....	97	
11	How long was it in a year?	..... months	2 digits	
		..... days		
<b>SECTION J: IWW PROFILE</b>				
1	How long have you worked as a WW?	.....years	2 digits	
		..... months		
2	What sort of waste work do you do? (tick all that apply)	Street Collection	1	
		Household collection	2	
		Collection at dumpsite	3	
		Segregation/Handling	4	
		Scrap Dealer	5	
		Transporting	6	
		Others please specify.....	97	

3	What waste do you collect? (tick all that apply)	Plastic bottles	1	
		Plastic bags	2	
		Papers	3	
		Aluminium	4	
		Medical waste	5	
		Electronic goods	6	
		Glass	7	
		Cloth/fabric	8	
		Copper	9	
		Iron	10	
		Other (please specify ).....	97	
4	Why do you work as a WW? (tick all that apply)	This is an easy job/easy to earn money	1	
		No need for any initial investment	2	
		Don't have own land for work	3	
		This is a family business	4	
		Work place is near to my house	5	
		Able to work independently	6	
		Suggested by family and friends	7	
		No other work available	8	
		Other (please specify).....	97	
5	How many hours do you work per day?	.....hrs/per day	2 digits	
6	How many days do you work per month?	.....days/ month	2 digits	
7	How do you carry loads?	Manually	1	
		Push Cart	2	
		Bicycle	3	
		Hire vehicles	4	
		Other Please specify.....	97	
8	What is your posture at work? (Multiple answer possible)	Sitting	1	
		Standing	2	
		Squatting	3	
		Flexion	4	
		Bending	5	
		Twisting	6	
		Other (specify).....	97	
9	How long do you work in the above mentioned posture?	Sitting hour.....	1	
		Standing hour.....	2	
		Squatting hour.....	3	
		Flexion hour.....	4	
		Bending hour.....	5	
		Twisting hour.....	6	
		Other (specify) hour.....	97	
10	Are you satisfied with this job?	Yes	1	
		No	2	
11	How much waste do you collect in a day?	..... kg/day	3 digits	
12	How long will you do this job?	Just for a few weeks or months	1	
		For a few years	2	
		For many years	3	
		Don't know	4	

13	What do you do with the waste you collect? (tick all that apply)	Sell them	1	
		Collection only	2	
		Sorting	3	
		Dismantling	4	
		Metals recovery	5	
		Burning	6	
		Re-use them	7	
		Other (please specify).....	97	
14	How much money do you earn per day from WW?	.....NPR/day	4 digits	
15	How much money do you save per day from WW?	..... NPR/day	4 digits	
<b>SECTION K: KNOWLEDGE OF HEALTH RISKS OF WASTE WORK</b>				
1	Do you think waste work is a risky job?	Yes	1	
		No	2	
		Don't know	3	
2	How risky is this job?	Very risky	1	
		Somewhat risky	2	
		Neither risky nor safe	3	
		Somehow safe	4	
		Safe	5	
		Very safe	6	
3	Have you ever received any information about the risks of waste work?	Yes	1	If No, go to Q5
		No	2	
		Don't know	3	
4	Where did you get that information from? (Tick all that apply)	School	1	
		Neighbors/family/friends	2	
		Government organization	3	
		INGO	4	
		NGO	5	
		Co-operative	6	
		Can't remember	7	
		Experience	8	
Other (please specify).....	97			
5	What do you think are the possible health risks of working as a WW? (do not prompt, tick all that apply)	Bad for lungs/causes breathing problems	1	
		Risk of injury	2	
		Risk of infection	3	
		Bad for eyes	4	
		Skin diseases	5	
		Headache	6	
		Mental stress	7	
		Don't know	8	
		Other (please specify).....	97	

6	How do you think you can protect yourself from the risks of waste work?(tick all that apply)	Use gloves	1	
		Wearing masks	2	
		Wearing safety boots	3	
		Washing hands before eating	4	
		Eating in clean & hygienic places	5	
		Drinking safe water	6	
		Changing your clothes after work	7	
		Don't know	8	
		Other (please specify).....	97	
<b>SECTION L : PERSONAL PROTECTION</b>				
1	Do you change your clothes immediately after work?	Yes, always	1	
		No	2	
		Sometimes	3	
2	Do you shower or clean your body after work?	Immediately after work at the work place	1	
		After returning back home	2	
		Do not shower or clean every day	3	
		Other (please specify).....	97	
3	Do you wash your hands with soap at critical timings? (Multiple response possible)	Before preparing/cooking food	1	
		Before eating	2	
		Before feeding others	3	
		After toilet use	4	
		After cleaning someone's faeces	5	
		After touching garbage/ waste	6	
		None	7	
		Other (please specify).....	97	
4	Do wash your hands before eating?	Yes	1	If yes, go to Q6
		No	2	
5	What are the reasons why you do not wash hands with soap water before meals?	No water available	1	
		No need to wash	2	
		Eat with spoon	3	
		Not my habit to wash hand	4	
		Other (please specify).....	97	
6	What are the sources of drinking water at work place?	Well/Tube well	1	
		Buy Jar water	2	
		Buy tanker water	3	
		Pipe water from river	4	
		Spring water	5	
		Public tap stand	6	
		Private supply	7	
		Other sources (please specify.....)	97	
7	What methods of purification do you use for drinking water at work place?	None	1	
		Boiling	2	
		Filtration	3	
		Chlorination	4	
		Other (please specify).....	97	

8	What are the sources of drinking water at home?	Well/Tube well						1	
		Buy Jar water						2	
		Buy tanker water						3	
		Pipe water from river						4	
		Spring water						5	
		Public tap stand						6	
		Private supply						7	
		Other sources (please specify).....						97	
9	What methods of purification do you use for drinking water at home?	None						1	
		Boiling						2	
		Filtration						3	
		Chlorination						4	
		Other (please specify.....)						97	
10	What types of toilet facility do you usually use at work place?	No toilet use (in an open place)						1	
		Flush/pour-flush latrine						2	
		Ventilated improved Pit (VIP) latrine						3	
		Pit latrine with slab						4	
		Composting toilet						5	
		Other (please specify).....						97	
11	What types of toilet facility do you have at home?	No toilet use (in an open place)						1	
		Flush/pour-flush latrine						2	
		Ventilated improved Pit (VIP) latrine						3	
		Pit latrine with slab						4	
		Composting toilet						5	
		Other (please specify).....						97	
12	What personal protective equipment (PPE) do you use for work? (tick all that apply)	None						1	If None go to next Section
		Frequency of PPE use	Never (1)	Rarely (2)	Some times(3)	Often (4)	Always (5)		
		a) Glove							
		b) Apron							
		c) Cap/Net							
		d) Facemask							
		e) Glasses/ Goggles							
		f) Safety Boots							
		g) Helmets							
	h) Hi-visibility jacket								
If other protection used, please specify	.....					97			

SECTION M : PHYSICAL RISK OF WASTE WORK				
1	In the last 12 months, have you experienced any injuries at work? (Multiple responses possible, tick all that apply)	No injury	1	If option 1 and 2, go to Q5
		Can't remember	2	
		Metal cut	3	
		Glass cut	4	
		Injuries from medical sharps	5	
		Hit by the truck/van or other vehicle	6	
		Fall during waste collection	7	
		Animal bite	8	
		Other (please specify).....	97	
2	How many times were you injured?	.....Times	2 digits	
3	If injured, how long did you take to treat the injury?	As soon as possible	1	
		1-3 hours	2	
		4-7 hours	3	
		After 24 hours	4	
		Other (please specify).....	97	
4	What kind of first aid did you performed for minor injury?	Put cloth/medical tape	1	
		Used medicine	2	
		Pressed with salt-water	3	
		Other (please specify).....	97	
5	Have you experienced any kind of violence at work in last 12 months? (Multiple responses possible, tick all that apply)	Not experienced any violence	1	
		Sexual harassment	2	
		Physical violence	3	
		Verbal abuse	4	
		Rape	5	
		Other (please specify).....	97	

End of questionnaires

Thank you very much for taking part and providing valuable information.

## APPENDIX 2: OTHER RESULTS

	n	%
<b>Affected by Earthquake*</b>		
Unaffected	1095	85.7
Personally Injured	32	2.5
Home Damaged	134	10.5
Family members injured/killed	20	1.6
Lost Property	32	2.5
Lost Livestock	14	1.1
Other	12	0.9
<b>Smokers in the house</b>		
Yes	343	26.8
No	928	72.6
Missing	7	0.5
<b>Other tobacco/Khaini users in the house</b>		
Yes	295	23.1
No	976	76.4
Missing	7	0.5
<b>Consumption of 6 or more drinks on a single occasion in the last year (n = 531)</b>		
Never	418	78.7
Monthly or less	48	9.0
Twice a month	22	4.2
Thrice a week	24	4.5
Daily	10	1.9
Other	8	1.5
Missing	1	0.2
<b>Family members working as waste workers</b>		
<i>Male</i>		
0	128	10.0
1-2	1045	81.8
3-5	38	3.0
>5	1	0.1
Missing	66	5.2
<i>Female</i>		
0	858	67.1
1-2	341	26.7
3-5	13	1.0
Missing	66	5.2
<i>Other</i>		
0	1204	94.2
1-2	8	0.6
Missing	66	5.2
<i>Total</i>		
0	67	5.2
1-2	1113	87.1
3-5	87	6.8
>5	11	0.9

	n	%
<b>Posture at work (n=1274^ of 3328 responses) *</b>		
Sitting	634	49.8
Standing	705	55.3
Squatting	833	65.4
Flexion	662	52.0
Bending	168	13.2
Twisting	153	12.0
Other	173	13.6
(No response)	(4)	-
<b>Length of time in posture (hours)</b>		
<i>Sitting</i>		
Sitting time, mean (SD)	1.7 (2.3)	
Sitting time, median (IQR)	1 (0-2)	
<i>Standing</i>		
Standing time, mean (SD)	2.2 (2.7)	
Standing time, median (IQR)	2 (0-3)	
<i>Squatting</i>		
Squatting time, mean (SD)	1.9 (1.9)	
Squatting time, median (IQR)	2 (0-3)	
<i>Flexion</i>		
Flexion time, mean (SD)	1.1 (1.5)	
Flexion time, median (IQR)	1 (0-2)	
<i>Bending</i>		
Bending time, mean (SD)	0.2 (0.7)	
Bending time, median (IQR)	0 (0-0)	
<i>Twisting</i>		
Twisting time, mean (SD)	0.4 (1.5)	
Twisting time, median (IQR)	0 (0-0)	



Nepal PHQ9 depression questions		Not at all (%)	Sometimes	Usually	Always
1	During the past 2 weeks, compared to other people, how much have you felt that you are not able to be happy or do not enjoy doing work/activities?	830 (65)	373 (29)	34 (3)	40 (3)
2	During the past 2 weeks, how much have you felt frustrated, despairing or incapable of doing anything?	708 (55)	442 (35)	86 (7)	41 (3)
3	During the past 2 weeks, how much have you had problems with your sleep, such as not being able to sleep properly and peacefully, or feeling sleepier than before?	639 (50)	425 (33)	157 (12)	56 (5)
4	During the past 2 weeks, how much have you felt tired and lacking energy?	560 (44)	433 (34)	197 (15)	87 (7)
5	During the past 2 weeks, how much have you lost your appetite or experienced increased appetite?	907 (71)	289 (23)	56 (4)	25 (2)
6	During the past 2 weeks, how much have you blamed yourself for something or felt that you have let yourself or your family down? (For example, because of you, have you and your family have lost respect in the society?)	1144 (90)	96 (7)	13 (1)	23 (2)
7	During the past 2 weeks, how much have you been having difficulty being able to focus or concentrate? (For example, not being able to concentrate while watching TV, reading a newspaper, cleaning, cooking, or working?)	1149 (90)	79 (6)	15 (1)	34 (3)
8	During the past 2 weeks, how much have people commented that you have been talking very softly, walking slowly, moving around needlessly or acting restless?	1223 (96)	43 (3)	8 (1)	3 (0.2)
9	During the past 2 weeks, how much have you had the feeling of hurting yourself, dying or committing suicide? (For example, cutting your hands, taking poison, jumping from some-where, and hitting your head against the wall?)	1237 (97)	32 (2)	4 (0.5)	4 (0.5)





