A Study on the collection of

Waste PET Bottles

in the Kathmandu Valley

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November, 2014

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Supported by:

ACKNOWLEDEGMENT

On behalf of Development Inn Pvt Ltd Nepal, the study team would like to articulate its heartfelt acknowledgement to Himalayan Climate Initiative (HCI) for providing the opportunity to undertake this study titled A Study on the Collection of Waste PET Bottles in the Kathmandu Valley'. This is a part of the initiative 'Greening Kathmandu – establishing a legal, responsible and environment-friendly PET bottle recollection system', undertaken by Coca Cola, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), Ganesha Ecosphere and the HCI as partners. Special gratitude goes to the teams of the HCI and GIZ Nepal for their continuous support and guidance throughout the course of this study.

We would like to express our gratitude to a wide range of individuals who supported in carrying out this study. We are grateful to personnel from different organisations for generously providing us information that was pivotal in developing links within the study. We are grateful to the team of the FNCCI Nepal, the Kathmandu Metropolitan City, the Lalitpur Sub-Metropolitan City, the municipalities of Kirtipur, Bhaktapur, and Thimi from the Kathmandu Valley, as well as the municipality of Dhangadhi from outside the Kathmandu Valley for offering us support and providing information for this study. We express our deepest appreciation to all the enumerators for their hard work and timely completion of individual interviews in the study areas. The team is also indebted to all the survey respondents, KII informants and FGD participants for their patience, cooperation and valuable time in sharing their insights and experiences. Special thanks go to all the scrap owners for their kind cooperation in providing us with necessary information and support during the study.

The Study Team
Development Inn Pvt Ltd
November 2014

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GLOSSARY

- **Polyethylene terephthalate (PET):** Reusable waste plastic bottles (for example, mineral water, Coca-Cola, Pepsi bottles, etc.).
- **Waste workers (WWs):** Waste workers are classified into two broad categories for the purpose of this study.
    - Primary waste workers (PWWs): PWWs are those individuals or a group of individuals who work in the field of waste collection, waste separation, waste rickshaw pulling, sweeping, and waste carrying. PWWs are either formally paid by organisations such as the municipalities and private solid waste management agencies, or they are paid on a daily wage basis. They may also pick up waste and sell individually to scrap dealers. The PWWs are guided by 'livelihood motive' - they intend to conduct their livelihoods using the income generated from being a PWW.
    - Secondary waste workers (SWWs): SWWs are those individuals or group of individuals or organisations that work in the field of solid waste management, particularly in the management of waste PET bottles. SWWs are guided by a 'business or profit making motive'. For the purpose of the study, the SWWs comprise of scrap owners/dealers, bailers and mediators.
        - Scrap owners/dealers: They operate business (registered or unregistered) whereby PWWs sell their reusable products (waste PET bottles along with other waste forms).
        - Bailers: They operate business (registered or unregistered) whereby scrap owners/dealers sell their waste PET bottles for pressing ('bailing'). Upon pressing the waste PET bottles, the waste PET bottles are stacked in bundles ready to be transported to India via mediators for recycling purposes.
        - Mediators: Individuals or a group of individuals who are engaged in the process of transporting pressed bundles of waste PET bottles from bailers through the Indian border to the recycling unit.
- **Child Labourers:** Individuals who work as PWWs and are below the age of 16 years.

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ACRONYMS

ACAP	Annapurna Conservation Area Project
B.S.	Bikram Sambat
CBO	Community-based organisations
CIUD	Centre for Integrated Urban Development
FGD	Focus group discussion
FY	Fiscal year
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmBH
GoN	Government of Nepal
HCI	Himalayan Climate Initiative
I/NGO	International/Non-Government Organisation
ILO	International Labour Organisation
IRs	Indian rupees
Kg	Kilogram
KII	Key informant interview
KMC	Kathmandu Metropolitan City
MICS	Multiple indicator cluster surveys
MP	Metropolitan
MPC	Metropolitan city
NGOFEC	Non-government Organisations' Federation for Environment Conservation
NRRGEA	Nepal Reuse and Recyclable Goods Entrepreneurs Association
NRs.	Nepali rupees
PET	Polyethylene terephthalate
PRISM	Poverty Reduction of Informal Workers in Solid Waste Management
PWWs	Primary waste workers
RPET	Recycled polyethylene terephthalate
SASAJA	Samyukta Safai Jagaran
SMPC	Sub-metropolitan city
SPSS	Statistical package for social sciences
SWM	Solid waste management
SWW	Secondary waste workers
SWMA	Solid Waste Management Association
SWMTSC	Solid Waste Management and Technical Support Centre
UN	United Nations
VDC	Village Development Committees

EXECUTIVE SUMMARY

The Kathmandu Valley with five municipalities (Kathmandu, Lalitpur, Kirtipur, Bhaktapur and Madhyapur Thimi) produces the highest amount of solid waste in Nepal amounting to approximately 620 tons per day. This comprises of 19% of plastic waste consisting of polyethylene bags, plastic wrappers, mineral water, and soft drink bottles, also known as PET (polyethylene terephthalate) bottles (ADB, 2013). One of the crucial components of plastic waste is the PET bottles. Consumers dispose the PET bottles after use but these bottles potentially have a high value as a resource, i.e. they can be recycled into raw materials, which can then be used for manufacturing textiles, carpets and other industrial products. As a result, PET bottles, due to their potential for high monetary return, are readily picked by waste pickers, which are then sold to waste collectors. These waste pickers or primary waste workers (PWWs), whose earnings fluctuates with the market, are sparsely organised.

The role of waste workers (WWs) in the waste management of the Kathmandu Valley cannot be undermined. It is estimated that around 10,000 to 15,000 waste pickers and 700 to 800 *kabadis* (scrap dealers/owners) are engaged as PWWs and secondary waste workers (SWWs), respectively, in the Kathmandu Valley (PRISM, 2014). A study on informal waste management suggests that it is only by understanding, acknowledging, and incorporating informal waste workers into new ways of delivering improved services that sustainable solutions may be found with regards to increasing levels of resource recovery and a more safe and sound livelihood (Nas and Jaffe, 2004; Rouse, 2004; Scheinberg et al., 2006).

Against this backdrop, this study was conducted in the aforementioned five municipalities of the Kathmandu Valley as well as in Okharpauwa of Nuwakot district with the objective to gauge the present socio-economic conditions of the PWWs in order to better understand their underlying issues. Furthermore, in order to be able to exploit the opportunities in terms of recycling waste PET bottles, a thorough market analysis of market supply, market size of the waste PET bottles and pricing policies, etc. was conducted. The study has used both quantitative and qualitative information. Respondents were identified and selected using snowball and convenience sampling techniques. Qualitative information was collected through both person-specific and group-focused interactions by using rapid assessment techniques such as focus group discussions (FGDs), key informant interviews (KIIs), and case studies.

The major findings of the study are as follows:

- **There are a total of 15,539 PWWs in the Kathmandu Valley.** From the 151 locations inside the Kathmandu Valley that were visited for the purpose of this study, it was found that there were a total of 15,539 individuals working as PWWs inside the five municipalities of the Kathmandu Valley, and Okharpauwa, Nuwakot.
- **Socio-Economic Characteristics of the PWWs.**
    - 87.4% of the PWWs were males.
    - 56% of the PWWs were involved in waste collection, followed by waste separation (27%).
    - No females were found to be working as rickshaw pullers and drivers.
    - 56% of the PWWs belonged to Madhesi ethnicity, followed by Janajaati (22.7%), and Bhramin/Chhetri (13%).
    - A total of 35% of the sampled PWWs were of the Indian nationality.
    - Majority of the PWWs were Hindu (91%), followed by Buddhist (5%), Muslim (3%), and Christians (1%).
    - 63% of the PWWs were married, followed by unmarried (34.5%), widow/widower (2%), and divorced (1%).
    - More than one-third of the sample populations were illiterate, 14.5% were literate, 30.7% had attended primary school, 12.4% had attended lower secondary school, and 6.5% had attended secondary school.
    - Compared to males, a higher number of females were illiterate.
    - A total of 73% of childbearing households had children between the ages of 5-17 years (potential school-going children), and almost all households at present are sending their children to either government schools (71%), or private/boarding schools (27%), or other schools such as Muslim teaching centres (2%).
    - The major source of income was waste collection (85%) while very little contribution was seen from other sources: agriculture (5%), labour/daily wages (5%), business (2%), foreign employment (1%) and services (1%).

- The average monthly income of a PWW was estimated to be NRs. 10,109.
- Only one-fifth of the PWWs had attended trainings related to waste management; and less than 15% were affiliated to organised groups such as saving and credit cooperatives.

- **Incidence of Child Labour**
  - The number of child PWWs was 93 (15% of the sample population).
  - There were 39 children below the age of 14 (6% of the sample population).
  - 91 were male and 2 were female.
  - 25% were found to be illiterate, 7% were literate, 47% had attended primary education (Grades 1 to 5), 17% had attended lower-secondary education (Grades 6 to 8), and the remaining 4% had attended secondary education (Grades 9-10).
  - Furthermore, 61 % of the 93 child PWWs said that they had experienced some form of illness in the last 30 days while 51% of them had experienced some form of injury.
  - 66% cited poverty as the major reason for these child PWWs to be working in this field while 19% cited having 'run away from home(s)' as another reason; 9% said 'loss of parents', 2% said 'easy job', 2% 'historical occupation' and the remaining 2% cited 'no alternative' as the reasons for working as a PWW.
  - No specific organisation that worked particularly for the welfare of a child PWW was found. Despite the existence of laws, policies and regulations prohibiting child labour in the field of SWM, there are children who work as PWWs.

- **0.38 ton of waste PET bottles get lost when transported from PWWs to bailers every day**. In a single day, PWWs collect 17.58 ton of waste PET bottles. If we are to compare the total number of waste PET bottles that were collected by PWWs per day (17.58 ton) with the total supply per day of waste PET Bottles by all the bailers in the Kathmandu Valley (17.2 ton), we find that the figures do not match. Therefore, 0.38 ton of waste PET bottles seems to get lost as we move along the value chain from PWWs to bailers.

- **The potential locations for PET bottles consumption and collection outside of the Kathmandu Valley were identified as Dhangadi, Biratnagar, Narayanghat,**

Nepalgunj, Birgunj, Pokhara, Butwal, Birtamod, Lahan, Janakpur, Banepa, Beshisahar, Damauli, Lekhnath, Sauraha, Manakamana, Munglin, Namche, Lukla, Nagarkot, Nayapul, and Chisapani (Karnali).

- **Waste PET Bottles' Market Information: Supply and Seasonal Variation in Supply**
    - There has been an increase in the supply of waste PET bottles through the last three years at the rate of 5.1% per annum.
    - Jestha (summer season) saw maximum supply while months of Asar (summer/monsoon) and Ashwin (festival season) also recorded high supply values. The minimum supply of waste PET bottles was mostly recorded in the month of Poush (winter season). Supply was found to be the lowest in the month of Magh (winter season).
    - The average price of waste PET bottles was NRs. 25/kg. The price ranged from NRs. 10 to NRs. 50 per kg.
- **At present, PWWs receive NRs. 22/kg from the scrap dealers, who sell to the bailer operators at NRs 32/kg, and finally the bottles reach India to be sold for NRs. 58/kg.**
- **Organisational Structure of WWs.** The organisational structure of WWs – both PWWs and SWWs – in Nepal is quite informal in nature, except for those working in respective municipalities. Also, municipality workers are only involved in waste sweeping, collection and transfer whereas private WWs are involved in sorting and recycling. Three major levels exist in Kathmandu, namely the NGOs, government organisations and private organisations.

Some **recommendations** for Himalayan Climate Initiative (HCI) to consider are as follows:

- Uniformity in the rates at which the PWWs are paid by different players for their services is important because it can help to instil fairness in the SWM system in Kathmandu Valley. In this respect, the HCI (and its partners) can play a pioneering role in promoting the cause of PWWs or in lobbying to the concerned authorities of the government to establish a policy/law that helps to establish a healthy, uniform rate for the PWWs.
- The government needs to design a policy framework that takes into account the unique nature of waste PET bottles and one that will also bring PWWs under a formal institutional

mechanism. This will increase the visibility and thus the prestige of the WWs. Such workers should be treated with dignity and respect as they carry out a very important task. In order for this to happen, proper coordination between the government, NGOs, private organisations, civil societies, the recycling industry and the WWs is paramount if the management of waste PET bottles is to be effective. The HCI can play a pivotal role in this process.

- While no organisation in particular were found to be solely dedicated to child PWWs within the Valley, a concerned agency such as the HCI ought to report to the concerned authority any infringement related to unlawful use of children in labour so that initiatives to eradicate child labour in SWM can be mobilised at a larger scale in Nepal.
- The HCI could collaborate with other agencies that work for prevention of child labour in general and in the process initiate a project that could help these child PWWs through provision of education facilities or safety equipment to be used during work.
- It is recommended that PWWs get better access to trainings on waste handling, occupational safety and health, and entrepreneurship.
- The HCI as an organisation can help the PWWs as well as SWWs to escape the social stigma attached with the occupation of being a WW. It can do so by organising awareness campaigns not only in Kathmandu Valley but also in major cities across Nepal.
- It was found that 0.38 ton of waste PET bottles is lost or wasted along the value chain on a daily basis in the Kathmandu Valley which is a matter of big concern from a cost/profit perspective as well as from an environmental viewpoint. In this regard, it is recommended that the HCI conduct a study in the future in order to gauge and understand the reason(s) behind such loss and discrepancy.

1. INTRODUCTION

1.1 Study Background

Solid waste management (SWM) is one of the most crucial environmental issues in cities of most of the developing countries, including Nepal. The Kathmandu Valley, with five municipalities, namely Kathmandu, Lalitpur, Kirtipur, Bhaktapur and Madhyapur Thimi, produces the highest amount of total solid waste in Nepal amounting to approximately 620 tons per day. This includes 19% of plastic waste consisting of polyethylene bags, plastic wrappers, mineral water and soft drink bottles also known as PET (polyethylene terephthalate) bottles (ADB, 2013). The increasing quantities of solid waste in cities in Nepal can be attributed to rapid population growth, lack of awareness, unplanned and unmanaged urbanisation (or urban sprawl), and rural-urban migration. Although the Government of Nepal (GoN) enacted the Solid Waste Management Act in 2011, which also encourages active involvement of local bodies, private sectors, community-based organisations (CBOs) and non-government organisations (NGOs) in SWM, poor management practices by municipalities have made effective and efficient SWM a difficult objective to achieve.

Municipalities and other formal and informal organisations collect solid waste in the Kathmandu Valley. As noted earlier, out of the total solid waste generated within the Kathmandu Valley, 19% are plastic waste. One of the crucial components of plastic waste is the PET bottles. Consumers dispose the PET bottles after use but potentially have a high value as a resource, i.e. it can be recycled into raw materials, which can then be used for manufacturing textiles, carpets and other industrial products. As a result, PET bottles, due to potential of high monetary return, are readily picked by waste pickers, which are then sold to waste collectors. These waste pickers or Primary Waste Workers (PWWs) are sparsely organised with their earnings fluctuating with the market.

The role of waste workers (WWs) in informal waste management of the Kathmandu Valley cannot be undermined. It is estimated that around 10,000 to 15,000 waste pickers as PWWs and 700 to 800 *kabadis* (scrap dealers/owners) as secondary waste workers (SWWs) are engaged in the Kathmandu Valley (PRISM, 2014). Although PWWs play a vital role in dealing with the waste generated in the Valley, the profession unfortunately harbours negative stigma. PWWs are among the poorest in the

Kathmandu Valley. They dwell in squalors, mostly on the riverbanks. Poor hygiene practices and compromised living conditions make them vulnerable to various life-threatening diseases. Furthermore, PWWs are often exploited socially and economically. They find it hard to fight this exploitation due to a range of factors, including their lack of bargaining power, illiteracy, lack of market information, and lack of skills and technology.

A study on informal waste management suggests that, it is only by understanding, acknowledging, and incorporating informal waste workers into new ways of delivering improved services that sustainable solutions may be found with regards to increasing levels of resource recovery and a more safe and sound livelihood (Nas and Jaffe, 2004; Rouse, 2004; Scheinberg et al., 2006). Delivering improved waste services can only be achieved when genuine partnerships and alliances are formed. These alliances have been very instrumental in improving livelihoods of waste pickers in several studies of many developing countries (Cointreau, 2006; Cour, 2004; Lapid, 1999; WIEGO, 2012).

Against this backdrop, it is desirable that a study be conducted to gauge the present socio-economic conditions of the PWWs in order to better understand their underlying issues. Furthermore, in order to be able to exploit the opportunities in terms of recycling waste PET bottles, a thorough market analysis addressing issues such as market size of the waste PET bottles and pricing policies is equally appropriate.

1.2 Study Objectives

The overarching objective of the study is to better understand the issues of PWWs and the market size of the waste PET bottles within the Kathmandu Valley. In other words, the study aims to examine the issues of PWWs and conduct a market analysis of the waste PET bottles. The broad objectives of the study are to:

a) find out the number of PWWs and also examine the incidence of child labour among them in the Kathmandu Valley (number of children involved in waste picking, their working conditions, and reasons for getting involved);
b) assess the current socio-economic status of the PWWs disaggregated by gender in the Kathmandu Valley;
c) find out the market price of the waste PET bottle (both for the PWWs and SWWs); and
d) approximate the total volume of the waste PET bottles generated.

Specifically, the study seeks to answer the following questions:

i. What is the current number, income, and socio-economic status of PWWs disaggregated by gender and social dimensions (*marginalised castes and ethnic/religious groups*)?
ii. What is the market size/potential for waste PET bottles, namely: what is the current supply, demand, supply-demand gap as it applies for waste PET bottles? What will the market size/potential look like for the next 5-10 years?
iii. What is the current price for waste PET bottles? What is the price fluctuation trend during the year? What will the price projection look like for the next 5-10 years?
iv. How does the flow of waste PET bottles in the market or *value-chain* look like? Who are the main actors *(formal and informal)*? Which are the main sources/areas for waste PET bottles? Where is the main market *(customers)*?
v. How are PWWs organised, i.e. how does the organisational structure look like? What are the different layers/groups? How are the revenues distributed along this structure?
vi. Which are the potential areas within Nepal for waste PET bottle collection?

1.3 Study Areas

The study was conducted at five municipalities of the Kathmandu Valley: Kathmandu Metropolitan City; Lalitpur Sub-Metropolitan City; Bhaktapur Municipality; Madhyapur Thimi Municipality; and Kirtipur Municipality. In addition, Okharpauwa, which is located in Nuwakot district, was also included as a study site as this location acts as the hub area for solid waste dumping for the Kathmandu Valley and a significant portion of PWWs are active in this area.

The study area has been depicted in *Figure 1*.

Figure 1. Study Areas

1.4 Study Approach

The study has used both quantitative and qualitative information. The qualitative approach was employed for the purpose of getting the perspectives and feelings of the stakeholders, and the respondents. The quantitative component provides statistical data on the actual numbers of PWWs within the study area, and describes them and the waste PET bottles sector in terms of work, demand/supply, prices, and the related manifestations. Respondents were identified and selected using snowball and convenience sampling techniques. The qualitative information was collected by using both person-specific and group-focused interactions by using rapid assessment techniques such as focus group discussions (FGDs), key informant interviews (KIIs), and case studies.

1.5 Study Framework

A variety of activities were included in the process of the study, which can be broadly divided into three sequential phases *(as shown in Figure 2)*. The first consisted of the preparatory phase in which the study team members were consulted and relevant literatures, project documents, and progress reports were acquired and studied. Then after, the study goal and objectives were defined; the key issues were prioritised; and key questions for study were identified. The methods and tools for information collection were agreed upon with the HCI team and a detailed action plan was prepared.

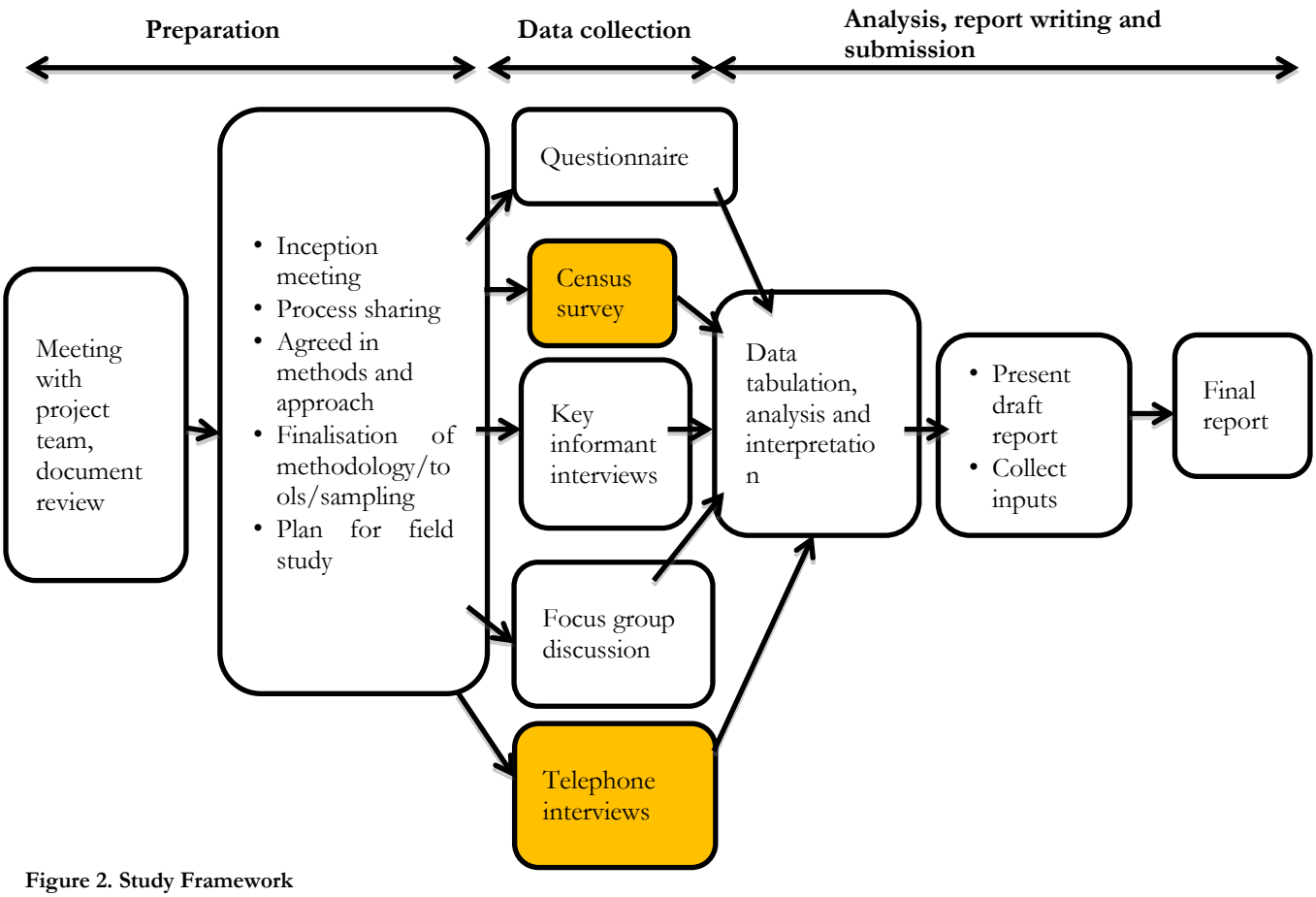


Figure 2. Study Framework

In the second phase, the team conducted field study and all the activities as planned were carried out. Different information collection methods were chosen to maximise participation of stakeholders, PWWs and beneficiaries. With the support of partner organisations, the study team carried out interactions, meetings, interviews, FGDs and observations in the study areas. Specific person-to-person and telephone interviews were conducted with project staffs as well. Finally, the collected information was analysed.

1.6 Methodology

The study was carried out in close consultation with the HCI with the aim of achieving the aforesaid study objectives. It was carried out in twelve steps after the signing of the contract between the concerned parties as shown in Figure 3. The steps shown in Figure 3 are a direct result of the study framework followed for the purpose of this study.

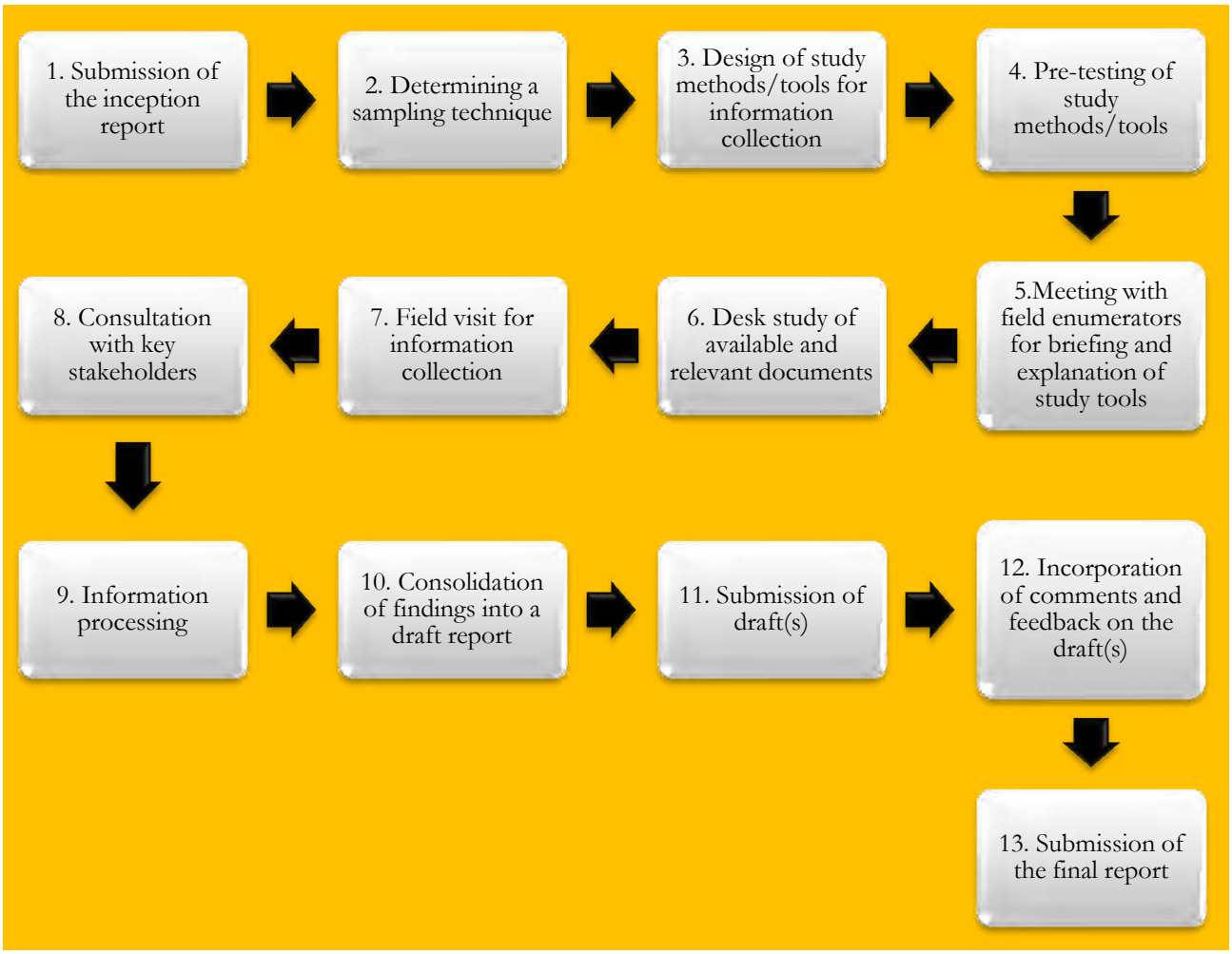


Figure 3. Step-by-Step Guideline for Carrying out the Study[1]

In each of the municipalities, the potential areas for PWWs' availability and scrap owners'/dealers' locations within the Kathmandu Valley were identified. Ten locations from Kathmandu municipality (Kapan, Sinamangal, Teku, Old Baneshwor, Chahabil, Jorpati, Bouddha, Hyumat, Balkhu and Koteshwor), five from Lalitpur municipality (Satdobato, Sundarighat, Sankhamul, Nakkhu, and Sanepa), three from Bhaktapur municipality (Suryabinayak, Jagati, and Kamalbinayak), three from Madhyapur Thimi municipality (Old Thimi, New Thimi, Pepsicola), and one from Kirtipur municipality (Kirtipur bazaar) were identified. These locations were selected because they acted as the hub or central point for PWWs' availability. The enumerators were directed to visit the periphery of these locations to conduct interviews. Enumerators were directed to interview in these locations depending on the availability of PWWs *(convenience sampling)*.

[1] Please see *Annex B* for the detailed description of the steps in Figure 3.

The tools used for the purpose of this study have been depicted in Figure 4.

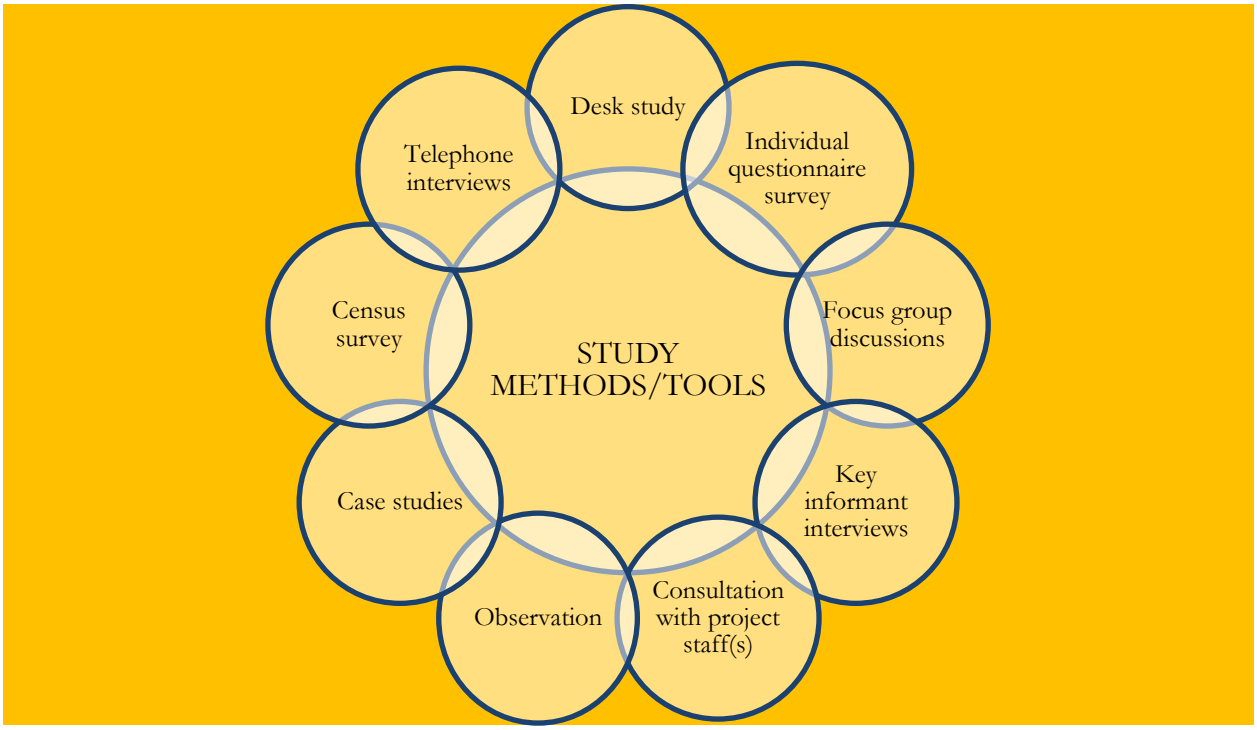


Figure 4. Study Methods/Tools Used for the Study

These have been briefly explained below:

a. *Desk Study of Available and Relevant Documents:* Reports, project documents, log-frame matrices, leaflets, publications and other sources of secondary information relevant for the purpose of this study were thoroughly reviewed. This step was carried out throughout the process of the study.

b. *Individual Questionnaire Survey*: A questionnaire survey covering 629 PWWs was conducted in the selected study area(s) using a standardised and pre-tested questionnaire[2] tailor-made for this study.

c. *Observation during field visit(s):* Information which was not possible to be gathered either through interviews or through the FGDs were collected through observation by using checklists during the field visit. Observation checklists were developed to aid information collection concerning issues such as cleanliness, use of basic safety kits and general living conditions of the PWWs (household, water, sanitation, etc.).

[2] Please see *Annex C* for the Individual PWW Questionnaire in English.

d. *Case Studies:* Five cases that stood out during the field visits – cases involving (i) a PWW who was engaged in multiple waste collection activities, (ii) a child PWW, (iii) a bailer operator, (iv) an 80-year-old physically challenged PWW, and (v) a scrap owner/dealer who used to work as a PWW in the past – have been presented in this study. The first case study helps to provide a better understanding about a PWW's socio-economic condition in general and the struggles that she faces in her everyday life. The second case study provides an insight into the issues surrounding child labour and PWWs. The third case involving a bailer operator helps to shed a clear light regarding the seasonal variations in demand/supply and price fluctuations and the overall value chain involving the PET bottles in the Kathmandu Valley. The fourth case study tells a story about an elderly PWW who works as a PWW despite physical challenges faced by her. The fifth case study involving a scrap owner/dealer tells a story about how a PWW with the help of training from an institution evolved from being a PWW to a scrap owner/dealer at present.

e. *Census Survey*[3]*:* The Census survey was used as a study tool in order to help provide a more holistic and realistic representation of PWWs with regard to the waste PET bottles scenario within the study areas and to the players involved in it. The census survey was conducted in order to help extract more information with regard to the number of PWWs, their gender distribution, and incidence of child labour and also the number and names of scrap owners in the study areas. A total of 151 clusters were visited by the team to conduct this census survey.

f. *Focus Group Discussions (FGDs*[4]*)*: At least one FGD was conducted in each municipality and at Okharpauwa among a group of PWWs (with group size ranging from 5 to 15 individuals). The team conducted a total of 20 FGDs.

g. *Key Informant Interviews (KIIs*[5]*)*: 30 semi-structured KIIs were carried out with selected representatives from the Waste Pickers Organisation *(Samyukta Safai Jagaran, SASAJA* for short), Solid Waste Management and Technical Support Centre (SWMTSC), Nepal Reuse and Recyclable Goods Entrepreneurs Association (NRRGEA), project and partner staffs, a solid waste collector private company, final

[3] Please see *Annex D* for the flowchart/sheet that was used to collect information using the census survey.
[4] Please see *Annex E* for the list of FGDs conducted and the locations where they were conducted.
[5] Please see *Annex F* for the list of individuals contacted for KIIs and telephone interviews (contact details).

product producers and users, municipality officials, and other relevant personnel. Moreover, because key informants in some cases were located outside of the Kathmandu Valley, they were contacted via telephone.

h. *Consultation with Project Staff(s):* Consultations were made with project staff(s) with regard to the study on a need basis.

1.7 Data Analysis and Quality Assurance

Both qualitative as well as quantitative data were analysed. Qualitative findings were primarily analysed using content and domain analysis, and conclusions were drawn about the outputs and outcomes of the project. The field notes/recordings were transcribed into text. Quantitative analysis was done using SPSS 20.0 and Microsoft Excel 2010.

Efforts were made to improve the validity and reliability of the study. The enumerators were adequately trained for data collection (*Step 4, see Figure 3*). The questionnaire was pre-tested before its administration (*Step 3*). Enumerators were closely supervised during data collection (*Step 6*). The filled-in questionnaires were checked and edited each day by the study team. Any error in data collection was recorded and the enumerators were informed of the errors and improvement measures were suggested. The data quality control included randomly checking the questionnaire for internal consistency, filtering errors, appropriate coding of non-response and missing values, out-of-range values, and other logical checks and balances.

1.8 Scope of the Study

The study aimed to understand the socio-economic conditions of the PWWs. The definition of PWWs for the purpose of this study included individuals or a group of individuals who worked in the field of waste collection, waste separation, waste rickshaw pulling, waste sweeping, and waste carrying. In addition, the study intended to analyse the waste PET bottles scenario (their demand, supply, prices, seasonal fluctuations in their quantities and prices) within the Kathmandu Valley and at Okharpauwa of Nuwakot district. Therefore, the findings of this study may not be representative of Nepal as a whole.

2. REVIEW OF LITERATURE

2.1 Existing Solid Waste Management System in Nepal

As urbanisation continues to take place, the management of solid waste has become a major public health and environmental concern in urban areas of many developing countries, including Nepal. In recent years, solid waste has become a major environmental problem in Kathmandu and other urban areas of Nepal. A recent ADB publication (ADB, 2013) summarised the state of solid waste management in 58 municipalities in Nepal. Although this study did not mention waste PET bottles, it is worthwhile to cite a few significant findings relevant to our purpose here. The findings suggest that municipalities need to radically improve management practices to reduce, reuse, and recycle waste. The study reported an average per capita household waste generation rate of 170 grams; equivalent to about 1435 tons/day and 524,000 tons/year for 58 municipalities of the country. For the KMC, it was estimated to be 232 g/capita/day. The composition of the waste was mostly organic (66%), followed by plastics (12%), and paper and paper products (9%).

2.2 Waste PET Bottles' Market in the Indian Context

In recent years, the concern for recycled PET (RPET) has escalated in India. PET bottles, which form the major market of PET packaging resin (94%), are the most important from the point of recycling. More than 90% of PET is consumed in food packaging with drinks/beverages forming almost 80% of the food packaging segment. Since drinks and beverages are consumed mostly in residential houses, railway stations, restaurants, entertainment venues, airports and other public places, the importance of organised collection and recycling of post-consumer PET bottles needs to be over emphasised (Ken, 2014).

It has been witnessed that the recycling of PET has been widely growing in India, notably during the last couple of years. Besides the markets for bottle-to-bottle recycling, more and more of PET is being used in the manufacturing of fibres, PET sheets and PET straps. The Indian RPET industry includes recycled PET staple fibre, recycled PET straps, and recycled PET sheets/films. Compared to fiscal year (FY) 2012, the recycled PET market revenues have increased in the FY 2013, largely due to the growing demand for PET flakes as well as surge in the production of

fibres and sheets. The market revenues, as a result, escalated in the successive year by growing at an annual rate of 29.9%, relative to FY 2013 (Ken, 2014).

The value added in the waste trade chain from the small recyclable dealers' level to large recyclable dealers' level depends on the recycling potential of the material, its ease of availability and the demand in the market. In this regard, the highest value addition occurs for PET bottles, which have a long life and are readily recyclable and reusable. The price of waste PET bottles at small recyclable dealer was IRs. 1.75 per kg. It was IRs. 2.25-2.50 per kg at medium recyclable dealer, and IRs. 3.75-4 per kg at large recyclable dealer. Thus, the total value addition in this process accounted for 121% making waste PET bottles an attractive option for the Indian recyclable units. Moreover, the mean price at medium recyclable dealer for waste PET bottles was found to be IRs. 2.375 per kg; the amount traded per day was 30.36 kg and the profit earned per day amounted to IRs. 72.105 (Agarwal et al., 2004).

The recycling PET industry in India has been largely dominated by the PET staple fibre segment which contributed massive share in the overall revenues of the recycling industry during FY 2014. The staple fibre segment has traditionally dominated the recycling PET industry both in terms of production volume and revenue. In terms of revenues, polyester sheet has been the second largest market of the recycled PET industry during FY 2014. The recycling PET industry in the future is anticipated to follow the same momentum by growing at a sizeable rate during the period, from FY 2014 to FY 2019 (Ken, 2014).

2.3 Child Labour Scenario in Nepal

Child labour is a widespread phenomenon in Nepal, and one that has not declined despite the existence of laws that prohibit burdensome forms of child labour and the constant efforts of many governmental, non-governmental and international organisations to protect children's rights. The incidence of child labour in Nepal is relatively high compared with other countries in South Asia[6]. According to data from the Multiple Indicator Cluster Surveys (MICS) and other national surveys, Nepal has 34% of its children between the age of 5 and 14 who are involved in child labour, compared with 12% in the South Asia region as a whole.

[6]State of the World's Children 2011, based on data from MICS, DHS, and other national surveys, 2003-2008.

In terms of gender, there are more female than male child labourers, and the situation is worse in rural than urban areas. A comparison over the years of child labour force participation rate across gender and residence is shown in Table 1 below:

Table 1: Child Labour Force Participation Rates (%) over the Years in Nepal

Year	Total	Male	Female	Area of Residence	
				Urban	Rural
1996[7]	41.7	36.1	47.6	23.0	43.4
2004[8]	32.0	30.2	32.5	12.4	33.9
2008[9]	33.9	30.2	37.8	14.4	36.7
2010[10]	44.0	41.0	48.0	31.0	46.0

2.3.1 Legislation, Legal Framework and Policies Against Child Labour in Nepal

The Government of Nepal's signing of the UN Child's Rights Convention in 1990 was a major step towards prohibiting children's economic exploitation. The GoN further demonstrated its commitment to the elimination of child labour by ratifying two important ILO Conventions on Minimum Age No. 138 (in 2003) and on Worst Forms of Child Labour No. 182 (in 2004). Following internationally made commitments, the establishment of the Children's Act (1992), the Child Labour Prohibition and Regulation Act (2000) and the Kamaiya Labour (Prohibition) Act (2002) provide ample legal grounds for initiating effective actions against child labour. Table 2 highlights some of these international conventions and national legislations that Nepal implements in its efforts to prohibit child labour.

Table 2. Legislation, Legal Framework and Policies Against Child Labour in Nepal

SN.	Legislation/Legal Framework/Policies	Description	International or National Convention(s)
1.	*The Convention on the Rights of the Child (1989)*	• Article 1 recognises everyone under 18 years of age as *children* who have all the rights in this Convention.	International

[7]Central Department of Population Studies, Tribhuvan University. (1997). Child Labour Situation In Nepal p.34. Retrieved 18 November 2014.

[8]Government of Nepal, Central Bureau of Statistics, National Planning Commission Secretariat. (2004). Nepal Living Standard Survey 2003/04 Statistical Report Volume II p.53. Retrieved 18 November 2014.

[9]Government of Nepal, Central Bureau of Statistics, National Planning Commission Secretariat. (2009). Nepal Labour Force Survey 2008 Statistical Report p. 135. Retrieved 18 November 2014.

[10] Government of Nepal, Central Bureau of Statistics/the United Nations Children's Fund. (2011). Findings from the Multiple Indicator Cluster Survey 2010 in the Mid-and Far-Western Regions, Nepal p.14. Retrieved 18 November 2014.

		• Outlines the fundamental rights of children, including the right to be protected against economic exploitation and harmful work, from all forms of sexual exploitation and abuse, and from physical or mental violence, as well as ensures that children will not be separated from their families against their will.	
2.	*The ILO Minimum Age For Employment Convention No. 138*	• Prohibits economic activities performed by children below the age of 13 (12 in developing countries) and sets the minimum age for admission to employment at 15 (14 in developing countries) which is equivalent to the age of compulsory schooling. • Gives specific exemption and allows the children between 12-14 years old (for countries that specify a minimum age of 14) to work in case of Light work (which is less than 14 hours per week) that does not intervene with compulsory schooling or harm child's health and development. • The convention allows for regular work (less than 43 hours per week) and non-hazardous work for children between 15-18 years. In situation where children are 16 years and provided with full provision of protection and adequate vocational training from a competent authority, the ILO Convention permits the non-hazardous employment or work by children of that age.	International
3.	*The ILO Worst Forms of Child Labour Convention No. 182*	• Complements ILO Convention No. 138 and determines that no child can be engaged in any form of slavery or practices similar to slavery, such as trafficking of children, debt bondage, forced or compulsory labour, offering or procuring children for illicit activities for prostitution, and pornography, including forced or compulsory recruitment for use in armed conflict. • Stipulates that ratifying member states must determine hazardous child labour which, by nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children.	International
4.	*The Children's Act, 1992*	• As per the Act, a child is defined as someone below the age of 16 years.	National

		• Ensures to protect the rights and interest of children and their physical, mental and intellectual development and prohibits a child below 14 years to engage in any kind of labour work.	
5.	*The Child Labour (Prohibition and Regulation) Act, 2000*	• Regulates hours of work for children aged between 14 to 16 years (not more than 36 hours per week) and prohibits employment of children younger than 16 years of age into ***hazardous work***. • Annexure 3 (2) (d) has this provision: *"Occupation or work declared as* ***hazardous*** *for child labour*: Cigarette, bidi making, carpet weaving & dyeing, wool cleaning, textile weaving/washing/dyeing/embroidering, leather processing, cement manufacturing and packing, match, explosive and other firing material manufacturing and selling, beer, alcohol and other alcoholic drinks, soap manufacturing, bitumen manufacturing, pulp & paper manufacturing, slit/pencil manufacturing, pesticide formulation, lubrication oil manufacturing, **waste collection/processing**/electroplating, photo processing, rubber, synthetic, plastic, glass, mercury related work." • Prohibits engagement of children below the age of 14 years in any kind of employment/labour work. • Specifies that no child can be engaged in work against his/her will by way of persuasion, misrepresentation or by subjecting him/her to any influence or fear or threat or coercion or by any means; stipulates that offenders will be liable to a punishment of imprisonment of one year in maximum or a fine of fifty thousand rupees.	National
6.	*The Kamaiya Labour Prohibition Act, 2002*	• Prohibits bonded (child) labour; makes provisions for freeing bonded (child) labourers and cancelling debt flowing from such arrangements.	National

Other legal provisions restricting child labour and trafficking in the country include: the Citizen Rights Act, 1955; the Begging Prohibition Act, 1962; the Prison Act, 1962; the Common Law Code,

1963; the Public Offence and Punishment Act, 1970; the Foreign Employment Act, 1985; the Trafficking Control Act, 1986, and the Drug Trafficking (Control) Act.

Finally, the Self-Governance Act, 1997 makes important provisions for decentralised action for children and against child labour. For instance, much of the power for protecting girl children has devolved to the Village Development Committees (VDCs), which are obliged to give priority to development projects that directly benefit children.

3. RESULTS

This chapter summarises the results that were obtained after processing and analysing the data collected by the use of aforementioned study methods/tools.

3.1 Characteristics of the Sampled PWWs in the Kathmandu Valley

3.1.1 Number of PWWs

The study team visited a total of 151 clusters to prepare an inventory of PWWs within the Kathmandu Valley. A total of 6,017 PWWs and 419 SWWs (399 scrap dealers and 18 bailers) were found within those clusters. This resulted in an average of 15.1 PWWs per scrap dealer. According to a recent report (PRISM, 2014), a total of 800 scrap dealers were documented in the Valley. Finally, the calculation resulted in 12,064 PWWs associated with scrap dealers (*Table 3*). The overall estimation of the PWWs is tabulated in Table 4. The total number of PWWs associated with scrap dealers, waste management institutions, and municipalities were estimated to be 15,539.

Table 3. Estimation of PWWs in Scrap Dealers in the Kathmandu Valley

S.N.	Particulars	Number
1.	Number of PWWs from our Census *(Census survey)*	6,017
2.	Number of clusters visited	151
3.	Number of scrap dealers covered in the cluster	399
4.	Average number of waste workers per scrap dealer	15.08
5.	Estimated maximum number of scrap dealers in the Kathmandu Valley (PRISM, 2014)	800
Total number of PWWs associated with scrap dealers in the **Kathmandu Valley *(15.08*800)***		**12,064**

Table 4. Overall Estimation of PWWs in the Kathmandu Valley

SN.	Source(s)	Number of individuals	Remarks
1	Total number of PWWs associated with scrap dealers in the Kathmandu Valley	12,064	Table 1
2	Number of PWWs associated to different waste management institutions	2,000	NGO-FEC
3	Number of PWWs in the Municipalities of the Kathmandu Valley	1,087	Municipality offices
Sub-total		**15,151**	

4	Unaccounted in the field survey (10% of heading 1)	1,206	Seasonal mobility
Total		**16,357**	
5	Estimation error in the field survey (5% of total)	818	Double counting
Grand total		**15,539**	

3.1.2 Categories of PWWs

Majority of the respondents were involved in waste collection (56%), followed by waste separation (27%), rickshaw pulling (10%), and waste carrying (6%). The remaining one per cent of the respondents were drivers *(Figure 5)*. When disaggregated by gender within these categories, 66% males were involved in waste separation activity; 95% males were involved in waste collection; no females were found working as rickshaw pullers and drivers; and 92% males were working in the category of waste carrying.

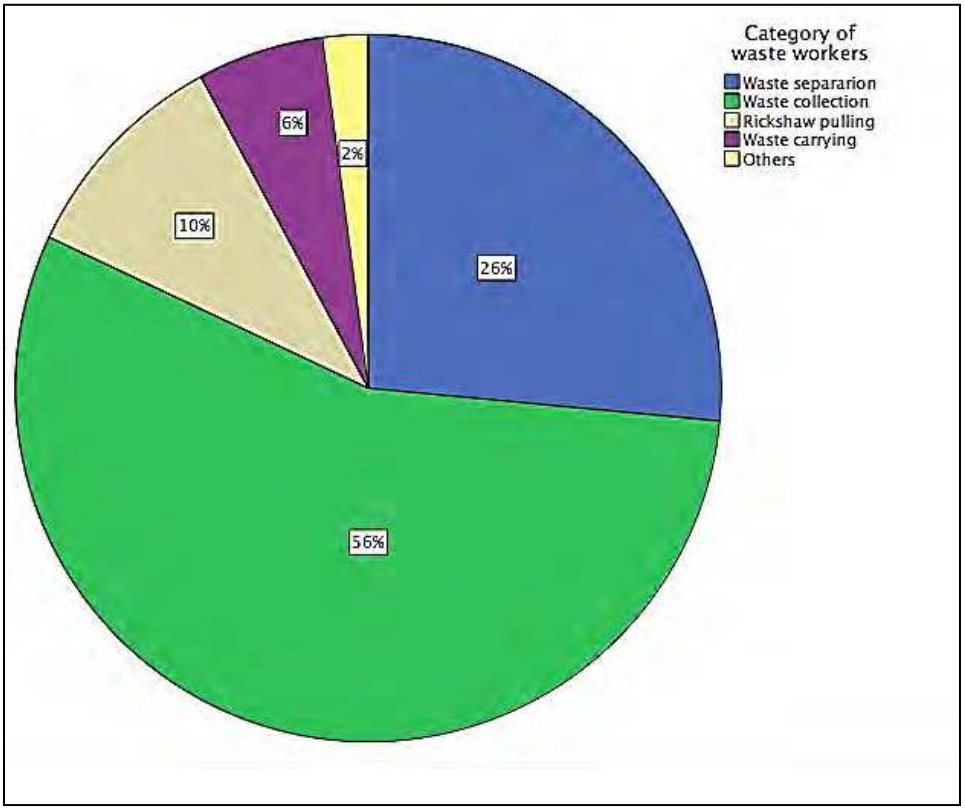


Figure 5. Categories of PWWs

CASE STUDY I: A MOTHER, A WIFE, AN ENTREPRENEUR AND A WASTE WORKER

"I don't do this because I like playing with waste. I do this so that I can earn some money for my family and send my son to school." – Nirmala Ghale, 39-year-old PWW

Nirmala Ghale, 39 years of age, is originally from Nuwakot district but came to Kathmandu with her husband about 13 years ago in search of a better future. Nirmala has been working as a PWW for more than a decade, and in the process, she has worked as a waste collector as well as a waste separator. When asked why she started to work as a PWW, she said, "I had no other skills and thus picking up garbage from streets was the only thing I could do for money. It was especially hard because I and my husband didn't know anyone in Kathmandu when we first came here."

Nirmala said that she has to work to earn a living for herself and more importantly for her 11-year-old son. She said that her husband is an alcoholic and therefore she carries the family's responsibility on her shoulders alone. When asked what motivates her, she replied: "I don't do this because I like playing with waste. I do this so that I can earn some money for my family and send my son to school."

Nirmala works as a PWW only during the mornings, usually until 12 noon. She is a vegetable vendor during the evening. She makes almost one-third of her total income from selling vegetables while the rest of her income is from her work as a PWW. She has no formal education and training. Although Nirmala tries her best to not listen to and be affected by what others say about PWWs in our society, she wishes that others respected her work in the society because without PWWs like her, as she put it, "Kathmandu would be an even dirtier place to live!" She hopes that the concerned authority would conduct some kind of an awareness program for the general public and teach them to treat PWWs with respect and not shower them with insults.

3.1.3 Distribution by District and Gender

Out of the total of 629 PWWs who were interviewed for the study, 87.4% were males. By district, 358 males, and 51 females were from Kathmandu; 123 males and 28 females were from Lalitpur; and 69 males were from Bhaktapur district. There were zero females interviewed in the Bhaktapur district *(Table 5)*.

Table 5. Number of Male and Female PWWs Sampled in the Three Districts

Gender	Total	Kathmandu		Lalitpur		Bhaktapur	
		Number	*%*	*Number*	*%*	*Number*	*%*
Male	550 (87.4%)	358	87.5	123	81.5	69	100
Female	79 (12.6%)	51	12.5	28	18.5	0	0
Total	**629 (100%)**	**409**	**100**	**151**	**100**	**69**	**100**

3.1.4 Distribution by Age Group

The average age of the sample population was 28 years (SD ±11.4) with minimum age of 9 years and maximum of 80 years old. There were a total of 93 (15%) PWWs under 16 years of age; 530 (84%) workers in between 17 to 60 years of age; and 6 (1%) workers above 60 years of age. It showed that a significant number of children under the age of 16 (15% of total sample) are also involved in this occupation whereas those older than 60 years are very few. By district, it was found that among those who were below 16 years of age, 65 were working as PWWs in Kathmandu, 19 in Lalitpur and 9 in Bhaktapur. The age group of sampled PWWs disaggregated by district and gender are depicted in *Table 6*.

Table 6. PWWs Disaggregated by Age Group and District

Age Group	Kathmandu				Lalitpur				Bhaktapur			
	Male		Female		Male		Female		Male		Female	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
16 and Below	64	17.9	1	2.0	18	14.6	1	3.6	9	13.0	0	0
Age 17 – 60	292	81.6	49	96.1	105	85.4	25	89.3	59	85.5	0	0
More than 60	2	0.6	1	2.0	0	0.0	2	7.1	1	1.4	0	0
Total	**358**	**100**	**51**	**100**	**123**	**100**	**28**	**100**	**69**	**100.0**	**0**	**0**

3.1.5 Distribution by Ethnicity

Table 7 shows distribution of the sampled PWW population by ethnic groups in each surveyed district. Majority of the sampled population (56%) belonged to Madhesi, followed by Janajaati (22.7%) and 13% of the PWWs were Brahmin/Chhetri. There were a total of 4% each of Dalits and those belonging to *Other* ethnic group. From this table, it can be observed that the Madhesi people (people from Terai region and Indian nationals) dominate the waste collection scenario in the Kathmandu Valley. A total of 35% of the sampled PWWs were of Indian nationality.

District-wise *(Table 7)*, majority of the PWWs in the Kathmandu and Lalitpur districts were Madhesi (48%) followed by Janajaati (26.4%) and Brahmin/Chhetri (15%). However, in Bhaktapur, minimal presence of Brahmin/Chhetri (7%) and Janajaati (1.4%) was found. Furthermore, there was no presence of the Dalits and *Other* ethnic groups as PWWs in Bhaktapur. The PWWs in Bhaktapur district was solely dominated by Madhesi people (91%).

Table 7. PWWs Disaggregated by Ethnic Group and District

Ethnic group	Sample population	Kathmandu		Lalitpur		Bhaktapur	
		Number	*%*	*Number*	*%*	*Number*	*%*
Brahmin/Chhetri	82 (13%)	61	14.9	16	10.6	5	7.2
Janjaati	143 (22.7%)	108	26.4	34	22.5	1	1.4
Madhesi	352 (56%)	196	47.9	93	61.6	63	91.3
Dalit	26 (4%)	21	5.1	5	3.3	0	0
Others	26 (4%)	23	5.6	3	2.0	0	0
Total	**629 (100%)**	**409**	**100**	**151**	**100**	**69**	**100**

3.1.6 Distribution by Nationality and Religion

Nearly two-thirds of the PWWs who were sampled for this study were Nepali, and they dominated the Kathmandu (69%) and Lalitpur (68%) districts. However, in the Bhaktapur district, the majority were Indian nationals (65%) *(Table 8)*. Most of the respondents were Hindu by religion (91%), followed by Buddhists (5%), Muslims (3%), and Christians (1%).

Table 8. PWWs Disaggregated by Nationality and Religion

Variables		Total	District					
			Kathmandu		Lalitpur		Bhaktapur	
			Number	*%*	*Number*	*%*	*Number*	*%*
Nationality	Indian	222 (35%)	128	31.3	49	32.5	45	65.2
	Nepali	407 (65%)	281	68.7	102	67.5	24	34.8
	Total	**629 (100%)**	**409**	**100**	**151**	**100**	**69**	**100**
Religion	Buddhist	29 (5%)	29	7.1	0	0	0	0
	Christian	6 (1%)	2	0.5	4	2.6	0	0
	Hindu	573 (91%)	364	89.0	140	92.7	69	100
	Muslim	21 (3%)	14	3.4	7	4.6	0	0
	Total	**629 (100%)**	**409**	**100**	**151**	**100**	**69**	**100**

3.2 Incidence of Child Labour among PWWs

As noted in *Table 6*, the number of PWWs below 16 years of age was 93 (15% of the sample population). There were 39 children below the age of 14 (6% of the sample population).

Ninety-one were males and 2 were females. In terms of nationality, 44 were Indian while the remaining 49 were Nepali. The following were some of the major findings concerning child PWWs:

- **Educational Status:** Out of 93 children, 25% were found to be illiterate, 7% were literate, 47% had attended primary education (Grades 1 to 5), 17% had attended lower-secondary education (Grades 6 to 8), and the remaining 4% had attended secondary education (Grades 9-10).
- **Health (Illness and Injuries):** 61 % of the 93 child PWWs said that they had experienced some form of illness in the last 30 days while 51% of them had experienced some form of injury.
- **Treatment Costs and Support:** 67% of the 93 child PWWs sought treatment for their illnesses and injuries. The average expenses incurred for the treatment of their illnesses and injuries ranged from a minimum of NRs. 30 to a maximum sum of NRs. 12,000, at an average sum of NRs. 1,032. As for payment for the treatment of their illnesses and injuries, 54% said that they incurred the treatment expenses on their own (*self*); 12% said that their families and friends helped them in the payment; 29% said that the expenses were incurred by their scrap owners/dealers, and the remaining 5 % reported that they were supported by I/NGOs.
- **Reasons for working as a PWW:** When asked about reasons as to why these children were working as PWWs, 66% cited poverty as the major reason. 19% cited 'having run away from home(s)' as another reason while 9% said 'loss of parents', 2% said 'easy job', 2% 'historical occupation' and the remaining 2% cited 'no alternative' as the reasons for working as a PWW.
- **Usage of safety measures during work:** When asked if these 93 child PWWs used safety measures while working, only 28% said that they did. However, when observed by the enumerators during survey, it was found that only 68% of them were wearing masks and 19% were wearing gloves.

CASE STUDY II: A 16-YEAR-OLD CHILD PRIMARY WASTE WORKER

"The time has passed away for me to go back to school, read books and make assignments. Why would I go to school when I am making enough money for myself?" – Ajay Tamang, 16-year-old PWW

Ajay Tamang, aged 16, has been working as a PWW at Okharpauwa since 2011, i.e. since he was 13 years old. Originally from Dhading district, Ajay currently lives with his parents who operate a retailer shop. He works as a PWW for at least four days per week. When asked why he is working as a PWW, he said, "It is easy work. It is convenient for me too as I live not too far away from here and I earn enough money by doing this."

Wearing half-torn jeans and smoking a cigarette, Ajay said he started working as a PWW because his parents didn't make enough money to sustain a proper livelihood for him and his three younger siblings. Ajay left school when he was in Grade 4 because of not being able to pay school fees. When asked if he would go back to school if he is supported, he said, "Absolutely not. The time has passed away for me to go back to school, read books and make assignments. Why would I go to school when I am making enough money for myself?"

When asked about his future plans, Ajay said that he has two plans, in case one of them doesn't work out. Plan A is to go for a job overseas. However, he is unsure if he will be able to afford the costs involved in going abroad. Plan B is to attend an entrepreneurship training course on waste management (training like one of his uncles attended) and operate his own scrap business in Kathmandu.

For someone so young and who has had to physically work so hard from such an early age, Ajay seems optimistic and hopeful about his future.

3.3 Socio-Economic Condition of the PWWs

3.3.1 Educational Status

Table 9 shows the educational status of the sample population. More than one-third of the sample population was illiterate, 14.5% were literate, 30.7% attended primary school, 12.4% attended lower secondary school, and 6.5% attended secondary school. A very few number of PWWs (2%) in the

sample population had attended higher secondary education or above. By gender, compared to the male counterpart, females were more illiterate as seen in *Table 7*. More than half of the sampled female PWWs were illiterate whereas nearly 32% of males were illiterate.

Out of 629 PWWs interviewed, only 27 individuals (4.3%) at present were attending schools and the rest were not. Out of 27 school-going PWWs, 14 individuals were in primary grade, four were in lower secondary, six were in secondary, and remaining three were in higher secondary levels. A small number of PWWs (2% of total) attended informal/adult education classes as well.

Table 9. Educational Status of the PWWs Disaggregated by Gender

Educational status	**Male**		**Female**		**Total**	
	Number	*%*	*Number*	*%*	*Number*	*%*
Illiterate	174	31.6	40	50.6	214	34.0
Literate	81	14.7	10	12.7	91	14.5
Primary (grade 1 to 5)	175	31.8	18	22.8	193	30.7
Lower Secondary (grade 6 to 8)	73	13.3	5	6.3	78	12.4
Secondary (grade 9-10)	37	6.7	4	5.1	41	6.5
Higher Secondary or above	10	1.8	2	2.5	12	1.9
Total	**550**	**100**	**79**	**100**	**629**	**100**

3.3.2 Family Size and Marital Status

The number of members in a PWW's household ranged from 1 to 21, with an average of 5.6 (SD ±2.98). A total of 22% of respondents reported that other members of their household also work as PWW. Most of the respondents were married (63%), followed by unmarried (34.5%), widowed (2%), and divorced (1%).

A total of 365 respondents (58%) had their own children. The average number of children was three (ranging from 1 to 12) per family. Among these, number of sons ranged from one to six (average of two); and daughters ranged from one to seven (average of two).

A total of 73% of childbearing households had children between the ages of 5-17 years (potential school going children), and almost all households at present were sending their children to government schools (71%), private/boarding schools (27%) or other schools such as Muslim teaching centres (2%). Only 10% of the childbearing households are receiving external assistance for child education *(Figure 6)*.

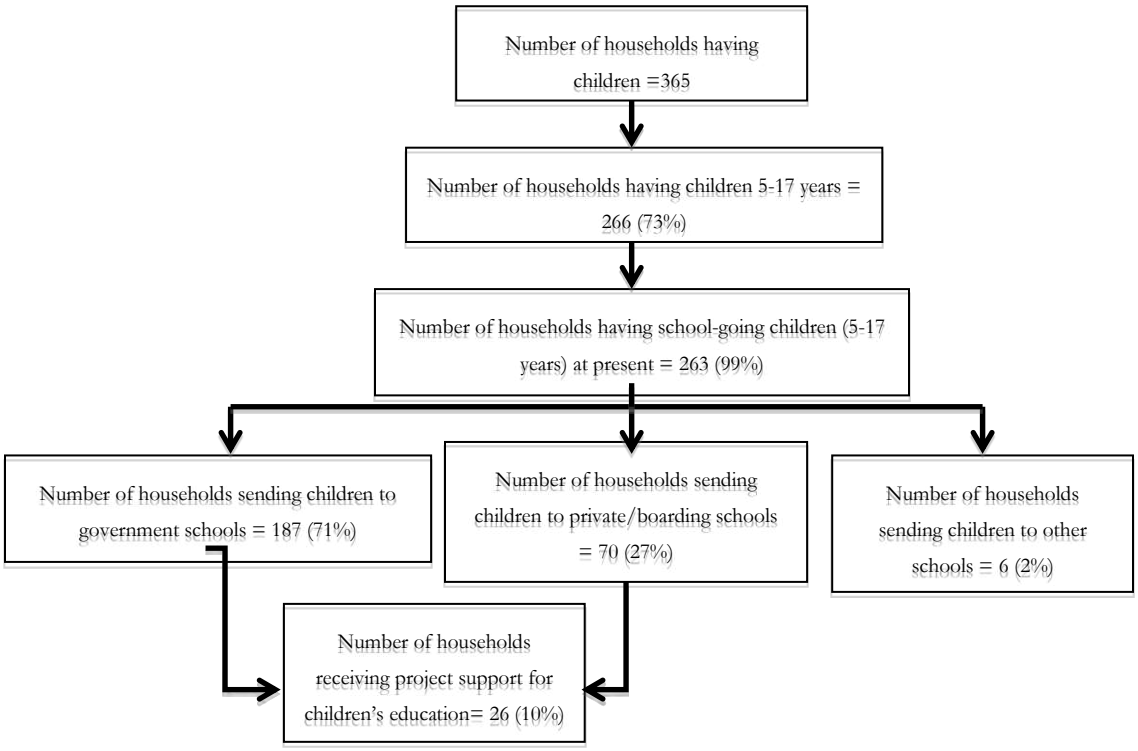


Figure 6. Childbearing Households and their Present Educational Status

3.3.3 Source(s) of Drinking Water and Cooking Fuel

The major source of drinking water for the sample population was piped water (43%) followed by other various sources such as tankers and jars (21%). Of the respondents, 20% used tube-wells while 9% used open wells for drinking water purposes *(Figure 7)*. Only 7% used covered wells as source of drinking water.

Meanwhile, the main source of fuel for cooking was petroleum gas (44%) followed by firewood (27.5%) and kerosene (26.2%) *(Figure 8)*. The other sources of fuel used for cooking purposes were charcoal (0.5%) and animal dung (0.3%) while the remaining 1.4% of the total respondents were directly dependent on nearby hotels – which meant they did not cook by themselves.

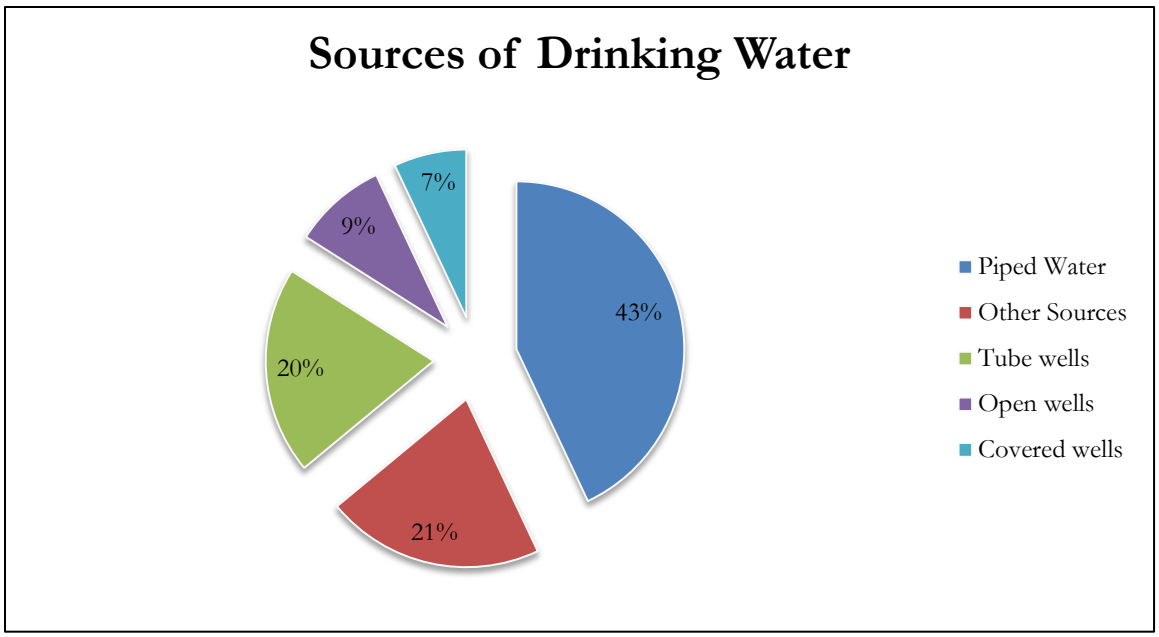


Figure 7. Main Sources of Drinking Water

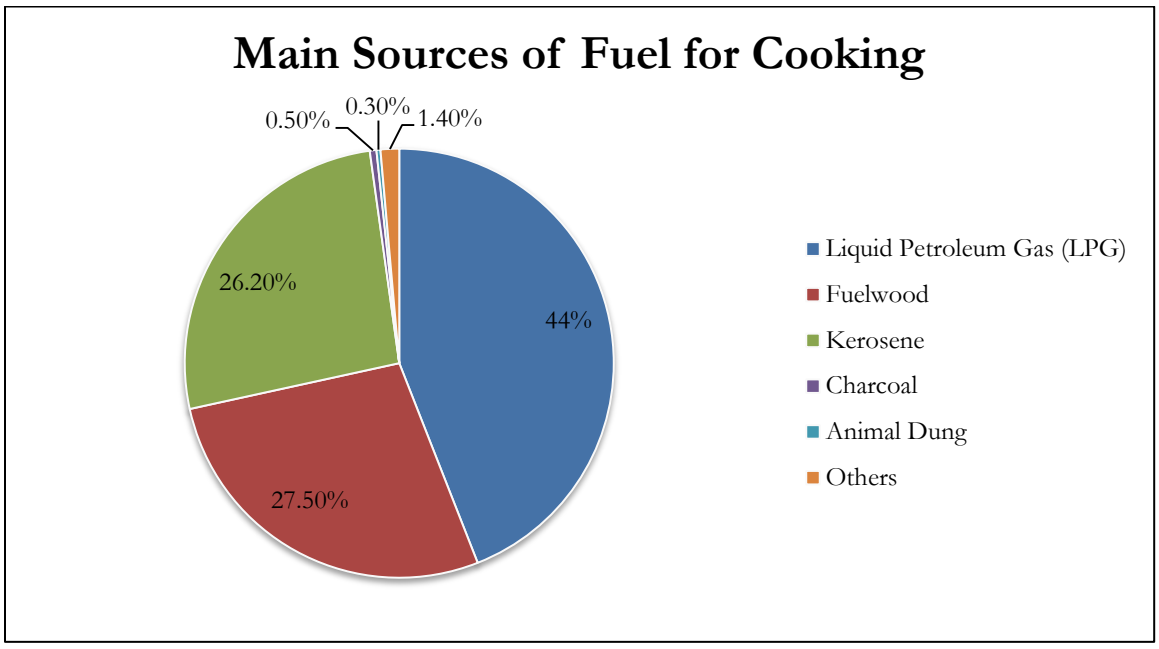


Figure 8. Main Sources of Fuel for Cooking

3.3.4 Income Sources

It was found that the major source of income of the surveyed respondents was from waste collection (85%) while very little contribution was seen from other sources: agriculture (5%), labour/daily wages (5%), business (2%), foreign employment (1%) and service (1%) *(Figure 9)*.

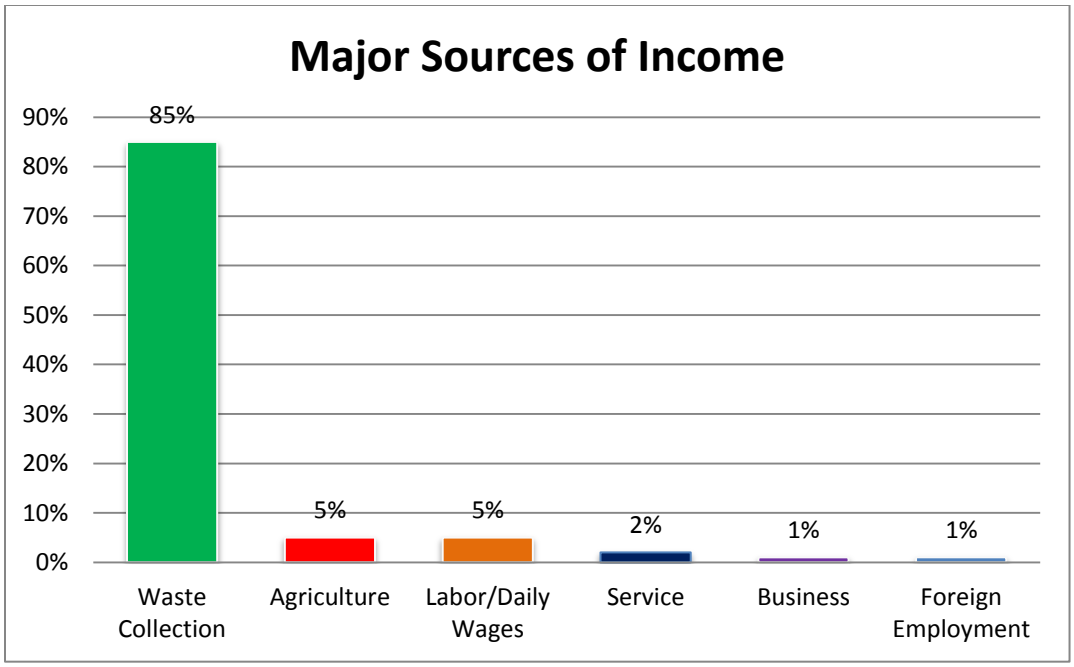


Figure 9. Main Sources of Income

3.3.4.1 Average Income by PWW Categories

The average daily income of a PWW was estimated to be NRs. 369 with average working days of 27.3 per month *(Table 10)*. This accounts to an average income of NRs. 10,109 per month and an annual income of NRs. 121,312. Compared to other PWWs, the rickshaw pullers have the highest income (NRs. 11,581 per month). The lowest income was that of drivers (NRs. 10,269 per month).

Table 10. Average Daily, Monthly and Annual Incomes of the PWWs

PWW Categories		Income (NRs/day)	Working days per month	Monthly Income (NRs/month)	Annual Income (NRs/year)
Waste separation (n = 165)	Mean	376.1	27.6	10,471.5	125,658.2
	Std. Deviation	210.5	3.3	6,441.4	77,297.1
Waste collection (n = 346)	Mean	355.4	27.2	9,675.1	116,100.9
	Std. Deviation	169.8	4.2	4,795.0	57,539.7
Rickshaw pulling (n = 63)	Mean	434.6	26.5	11,580.7	138,967.7
	Std. Deviation	186.4	4.1	5,789.1	69,469.2
Waste carrying (n = 36)	Mean	356.3	27.2	9,994.4	119,933.3
	Std. Deviation	168.8	4.5	5,268.4	63,221.0
Others (drivers) (n = 13)	Mean	353.9	28.9	10,269.2	123,230.8
	Std. Deviation	134.6	2.2	4,181.4	50,176.6
Total (N = 623)	Mean	369.0	27.3	10,109.3	121,311.5
	Std. Deviation	183.5	3.9	5,414.1	64,968.7

When the incomes were segregated into three categories (Annual income: NRs<60,000; between NRs. 60,000 to 120,000; and NRs. 120,000 and above), it was observed that 11% of the respondents

had an annual income below NRs. 60,000; 53% of the respondents had annual income in between NRs. 60,000 to 120,000; and 36% of the respondents had annual income above NRs. 120,000 *(Table 11)*.

Table 11. Annual Income Segregation

Income Class	**%**
Annual income <NRs. 60,000	11
Annual income NRs. 60,000 to 120,000	53
Annual income >NRs. 120,000	36
Total	**100**

3.4 Volume of PET Bottles Collection

3.4.1 Within the Kathmandu Valley

The average amount of PET bottles collected per individual from the sample population was calculated to be around 86 kg/month[11]. The highest average collection per individual was observed in Kathmandu (92 kg/month), followed by Bhaktapur (79 kg/month), and Lalitpur (73 kg/month). For the calculation of total annual PET collection, monthly collection values were multiplied by 12; however, PET collection differs by seasons – so the final calculation has taken care of it. It was estimated that for the sample population, the estimated annual PET bottle collection by an individual amounts to 906 kg/year = 75.5 kg/month = 2.5 kg/day *(Table 12)*.

Table 12. Volume of PET Bottles in the Three Districts of the **Kathmandu Valley**

Name of the district		**PET bottles collection (kg/day)**	**PET bottles collection (kg/month)**	**PET bottles collection (kg/year)$^{+}$**
Kathmandu (n = 359)	Mean	3.36	91.81	1101.69
	Std. Deviation	2.221	64.342	772.101
Lalitpur (n = 120)	Mean	2.65	73.46	881.50
	Std. Deviation	2.675	77.361	928.327
Bhaktapur (n = 64)	Mean	2.78	79.20	950.44
	Std. Deviation	2.669	81.577	978.926
Total (N = 543)	Mean	3.13	86.27	1035.20
	Std. Deviation	2.399	69.889	838.671

[11] The daily collection was multiplied by the number of working days in a month for this calculation.

[+]For this calculation we assumed that collection of PET bottles does not differ by months; hence, the monthly values are simply multiplied by 12. However, it does vary in reality. While estimating mineral bottles consumption in the valley, we observed 30% less consumption in the winter season's five months (November to March). Thus, while calculating final figure of the PET collection, we assumed no changes in the PET collection during summer (because the field survey was conducted in summer months), and 30% less in the winter months.

PET collection (April – Oct) = *86.27*7* = *604 kg*

PET collection (Nov – Mar) = *86.27*5*0.7* = *302 kg*

Annual PET collection = *906 kg*

Therefore, for the sample population, the estimated annual PET bottle collection by an individual amounts to 906 kg/year = 75.5 kg/month = 2.5 kg/day.

The individual collection figure estimated above was used to calculate the final volume of PET bottles. The potential collection of total PET bottles in the Kathmandu Valley was estimated to be 17.58 tons/day, which is equivalent to 530.92 ton/month or 6,371.0 ton/year *(Table 13)*.

Table 13. Potential PET Bottle Market in the Kathmandu Valley

SN	Description	Unit	Value	Remarks
1.	Number of potential PWWs for PET collection	Number	7,032	Assumed only 50% of those workers who worked for SWWs.
2.	PET bottles collection by PWWs in the valley	Ton/day	17.58	This is a robust estimation.
		Ton/month	530.92	
		Ton/year	6,371.0	

However, at present the HCI field office has been receiving PET bottles at 5.97 tons/months or nearly 200 kg/day only *(Table 14)*.

Table 14. PET Bottles Collection at the HCI Field Office During Study Period

SN.	PET sources	Collection (kg/month)
1.	Corporate offices (hotels, restaurants, futsal, multiplex)	1,354.5
2.	SWW (Scrap owner)	4,565.6
3.	PWWs	46
	Total	**5,966.1**

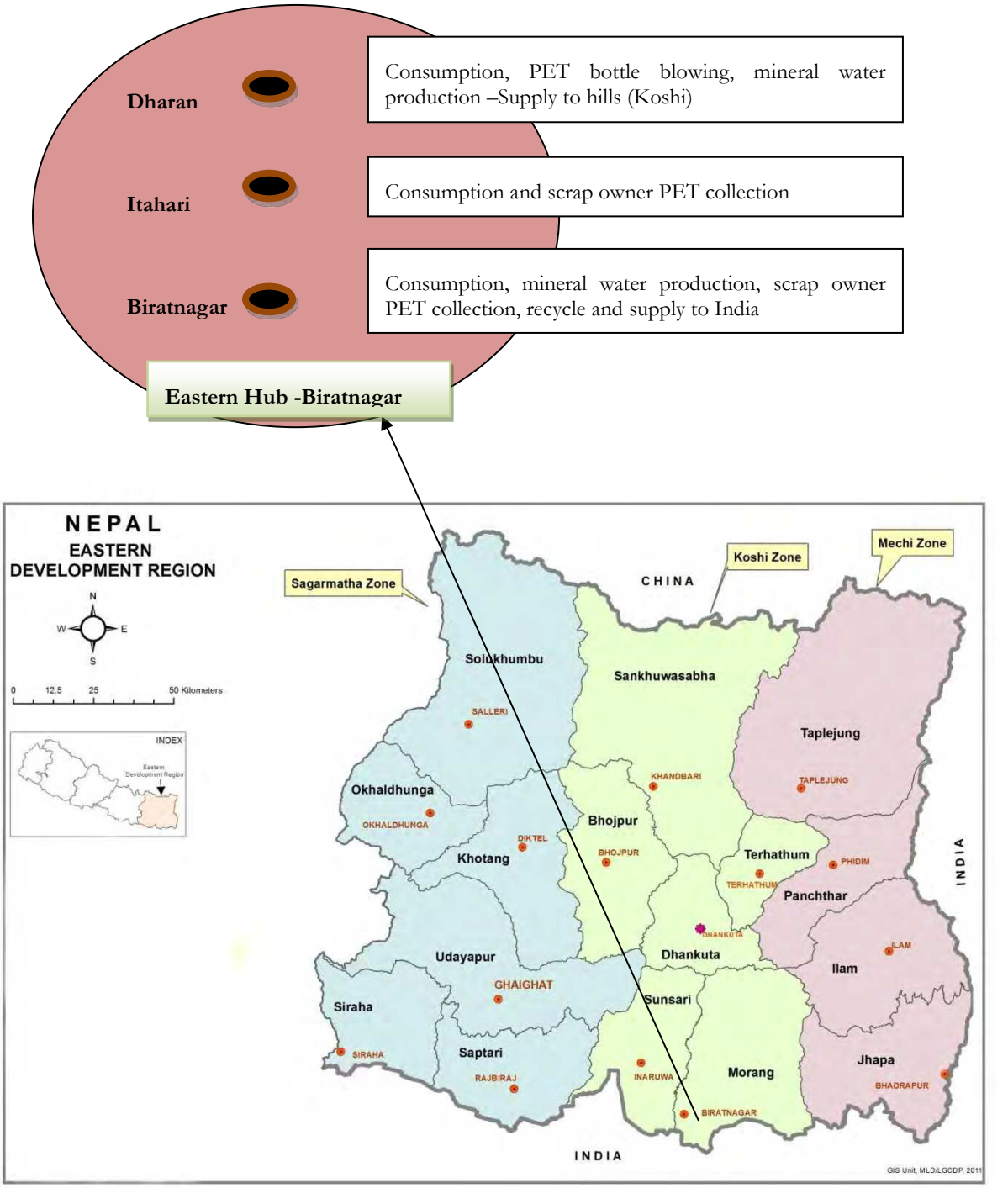
Source: HCI, PET Field Office, Peepalbot, Chappal Karkhana, Kathmandu. Phone: +977-1-4017200

3.4.2 Outside the Kathmandu Valley

Based on phone interviews with key informants, the following locations based on different development regions were identified as potential sources for the production and consumption of

PET bottles outside the Kathmandu valley. However, further intensive research is required to obtain the accurate data on the potential of used PET bottles recollection.

The figures[12] below show the potential locations within Nepal for waste PET bottles recollection.



[12] All these figures are labeled under one name - ***Figure 10 -*** for the convenience of the readers.

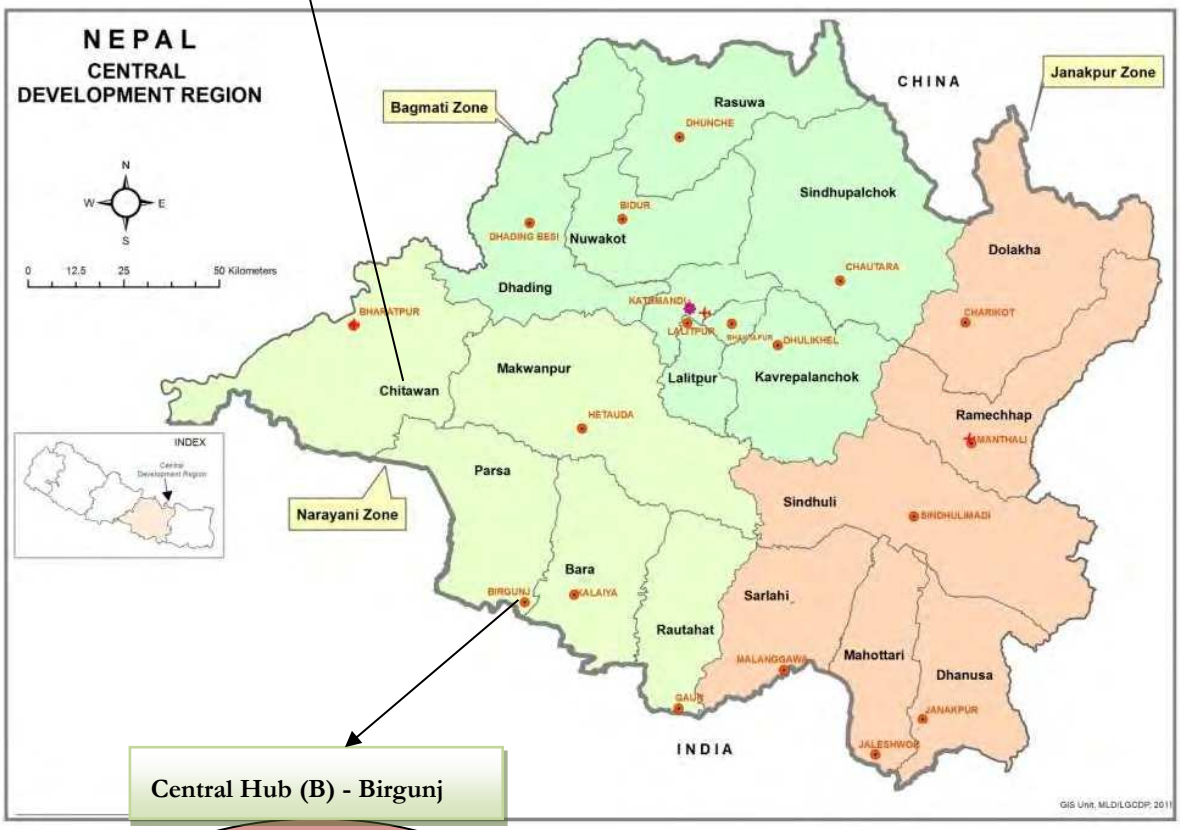
Central Hub (A) – Narayanghat

KTM-NGT road

Consumption – restaurants /hotel/grocery – more than 500, cable cars, 500+ public bus

Narayanghat/Bharatpur

Consumption, PET bottle blowing, Terai Bottlers Limited (CocaCola), mineral water production and scrap owners, PET bottles collection



Central Hub (B) - Birgunj

Hetauda

Consumption and mineral water production, PET blowing

Birganj

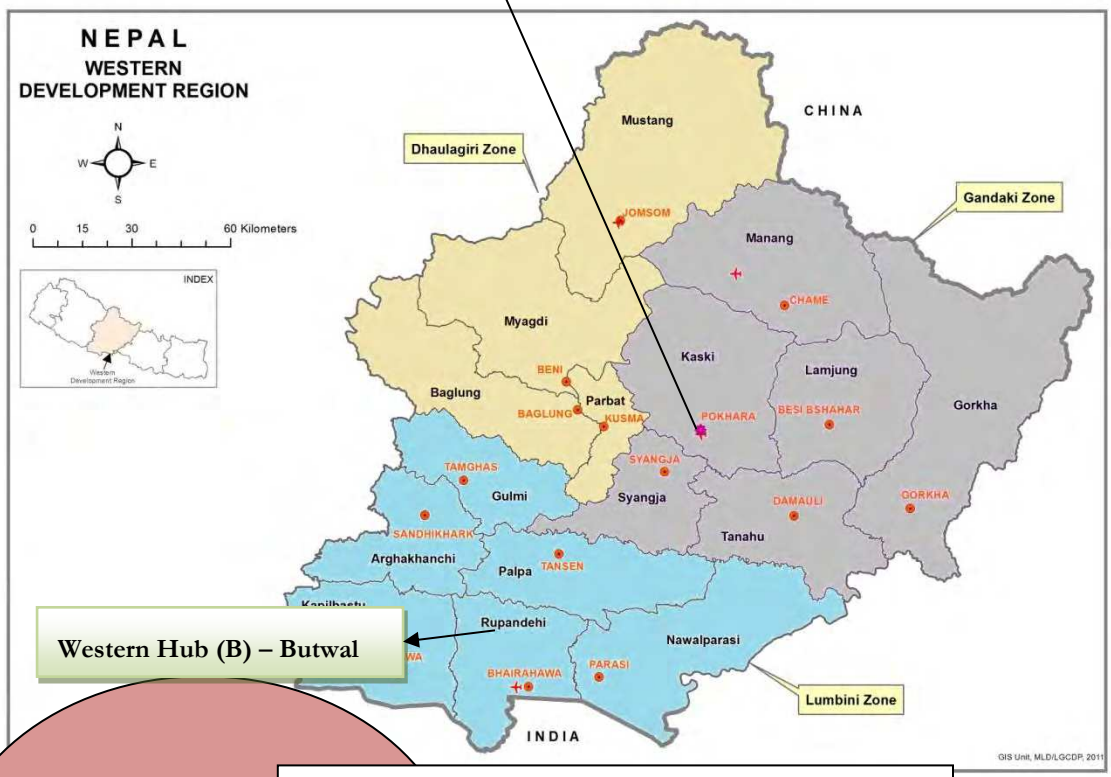
Consumption, Mineral water production, PET blowing, scrap owner PET collection, and supply to India

Baglung — Consumption, mineral water production – supply to ACAP area

Sarangkot — Consumption

Pokhara — Consumption, PET bottle blowing, recycling plant, mineral water production and scrap owner PET

Western Hub (A) – Pokhara



Western Hub (B) – Butwal

Butwal — Consumption, mineral water production and supply to hill areas (Palpa, Gulmi and others), recycle, PET bottle blowing

Bhairahawa — Consumption, mineral water production and PET bottles collection, PET bottles supply to India

Dang

Consumption and mineral water production- supply to hill areas (Rapti)

Surkhet

Consumption and mineral water – supply to hill areas (Bheri and Karnali)

Nepalgunj

Consumption, mineral water production, scrap owner PET bottles collection, and supply to India

Mid Western Hub - Nepalgunj

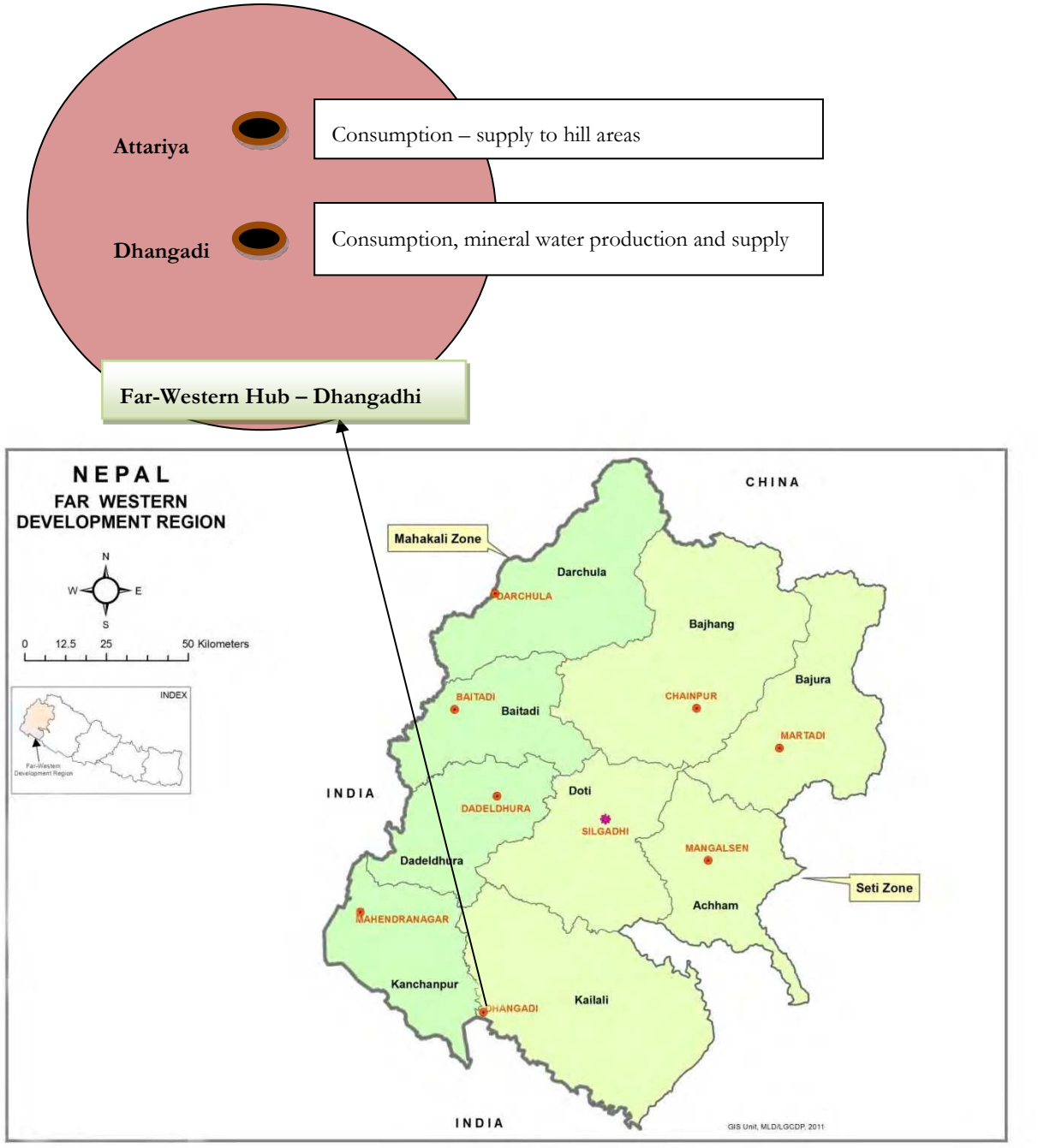


Figure 10. Potential Locations Outside of the Kathmandu Valley for Waste PET Bottles Recollection

Through KIIs - telephone interviews with the key informants - and by visiting the three-day 'Plastic Expo 2014'[13] and meeting with representatives of several companies dealing with PET bottles, it was determined that some of the other potential locations for PET bottles consumption in Nepal were

[13] This was an event which was held in Kathmandu and was organized by the Plast Nepal Foundation from November 14-16, 2014.

Birtamod, Lahan, Janakpur, Banepa, Beshisahar, Damauli, Lekhnath, Sauraha, Manakamana, Munglin, Namche, Lukla, Nagarkot, Nayapul, and Chisapani (Karnali).

3.5 Market Price of Waste PET Bottles

A total of 366 PWWs (58%) of the sample population collect waste PET bottles and sell them to SWWs. It was found that the average price of PET bottles that the sample population was receiving was NRs. 25/kg. It ranged from a minimum of NRs. 10/kg to as high as NRs. 50/kg. Furthermore, 65% of the 366 PWWs were selling PET bottles at prices between NRs. 20 to 29 per kg whereas 8% of them were selling at prices below NRs. 20/kg. Only 27% of them were found to be selling PET bottles at prices above NRs. 29/kg *(Table 15)*. Also, it was estimated that 71% of the PWWs sold PET bottles below the average price of NRs 25/kg.

However, if other institutions approach them for purchasing PET bottles, their willingness to sell waste PET bottles gave a different scenario. More than three-fourth of the respondents were willing to sell at NRs 35/kg; whereas 15% were willing to sell between NRs. 36 to 45; and the rest 7% were demanding higher than NRs. 45/kg *(Figure 11)*.

Table 15. Total Volume of PET Bottles Selling at Different Price Category

PET price category	%
<Rs 20/kg	8%
Rs 20-29/kg	65%
>Rs 29/kg	27%

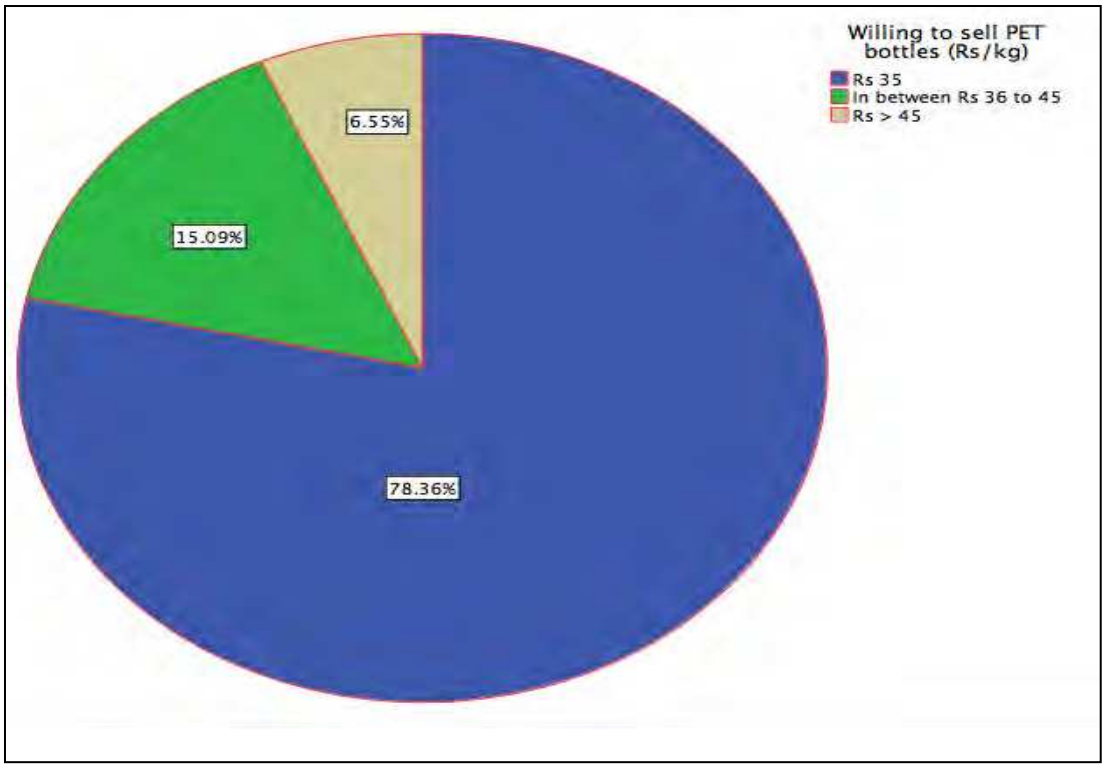


Figure 11. Willingness to Sell PET Bottles

3.6 Current Market Supply, Prices, Seasonal Variation and Future Projection of Waste PET Bottles

3.6.1 Definitions of Market Demand, Supply, Demand Price and Supply Price

For the purpose of this study, demand, supply, demand price and supply price were defined as follows:

- Supply: Supply is defined as the quantity of waste PET bottles that is collected by PWWs and is delivered (supplied) to SWWs.
- Demand: The definition of demand is twofold. From a scrap owner's/dealer's perspective, demand is the quantity of waste PET bottles that is delivered to bailers for further processing or pressing purposes. From a bailer's perspective, demand is defined as the quantity of waste PET bottles that has been pressed or bailed using a bailing machine and has been stacked in cubical forms, ready to be transported to recycling units in India. In a nutshell, the demand for waste PET bottles from Nepal is India-driven.
- Supply Price: It is the price that is paid by SWWs to individual PWWs for delivering waste PET bottles.
- Demand Price: It is the price at which waste PET bottles are either (i) sold by SWWs, *or* (ii) sold by bailers to mediators or recycling units located in India *(minus commission charges)*.

<u>Assumption:</u> Since it is assumed that the bailers send (supply) their pressed waste PET bottles to recycling unit(s) in India, the determination of the demand of waste PET bottles would require a detailed economic analysis and an overall assessment of the Indian PET market. This is beyond the scope of the current study. Therefore, the following sections provide information only about the supply situation in the study areas, not demand. However, Figure 14 calculates the demand price based on information on supply prices that were collected from bailers.

3.6.2 Current Supply of Waste PET Bottles

For the purpose of understanding the current supply situation of waste PET bottles in Kathmandu Valley, the study team visited a total of 6 major bailers situated in the valley to collect additional information regarding the supply and prices of waste PET bottles for the years 2069 (2012/2013), 2070 (2013/14) and 2071 B.S (2014/15 A.D). The findings are shown in *Table 16*.

Table 16. Average Supply per Month of Waste PET Bottles (in ton) over the Years

S.N.	Supply/Month (in ton)			Name of the Bailer
	Years (B.S)			
	2069	2070	2071	
1.	20	19	20	Pradip Sah (Bailer), Madhyapur Thimi
2.	12	10	12	Om Prakash Chaudhary
3.	6	7	30	Jitendra Chaudhary
4.	7	9	10	Binod Sah
5.	6	23	27	Amlesh Thakurai
6.	27	30	30	Binod Bangali, Teku
Average supply per month (in ton)	**15.6**	**19.6**	**25.8**	

It was found that there was an increase in the supply of waste PET bottles through the last three years as it can be seen in Table 16. In the current year of 2071 B.S, the average supply per month of waste PET bottles was found to be 25.8 tons. When this data is plotted using a trend line, it was found that the supply has been increasing at a rate of 5.1% (*slope of the line*[14]). This has been depicted in Figure 12.

[14] The trend line is assumed to be linear in nature and of the equation of the form y = mx+c, where m is the slope of the line. The slope 'm' represents the rate of change of supply over the years.

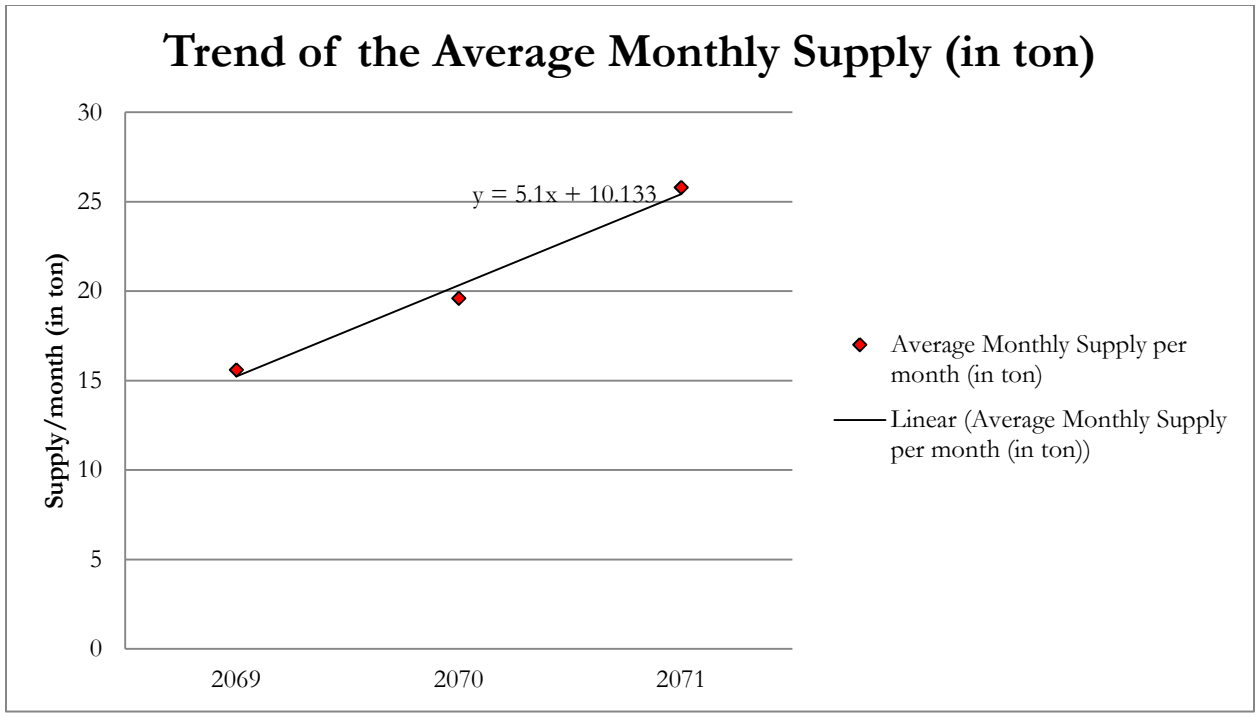


Figure 42. Trend of the Average Monthly Supply (in ton)

3.6.3 PET Bottle Supply Situation in the Kathmandu Valley

Table 17 shows the waste PET bottles' supply situation in the Kathmandu Valley. These figures were calculated for the year 2071 B.S. upon visiting 6 leading bailers in the Kathmandu Valley.

Table 17. PET Bottle Market Situation in the Kathmandu Valley in 2071 BS

Particulars		Supply Quantity
Per Bailer	Supply/month of waste PET Bottles (in ton)	25.8
	Supply/day of waste PET Bottles (in ton)	0.86
Total	Total Number of bailers	20
	Total Supply/day of waste PET Bottles for all bailers	17200 kg or 17.2 tons
	Total Supply/month of waste PET Bottles for all bailers	516000 kg or 516 tons
	Total Supply/year of waste PET Bottles for all bailers	6192000 kg or 6192 tons

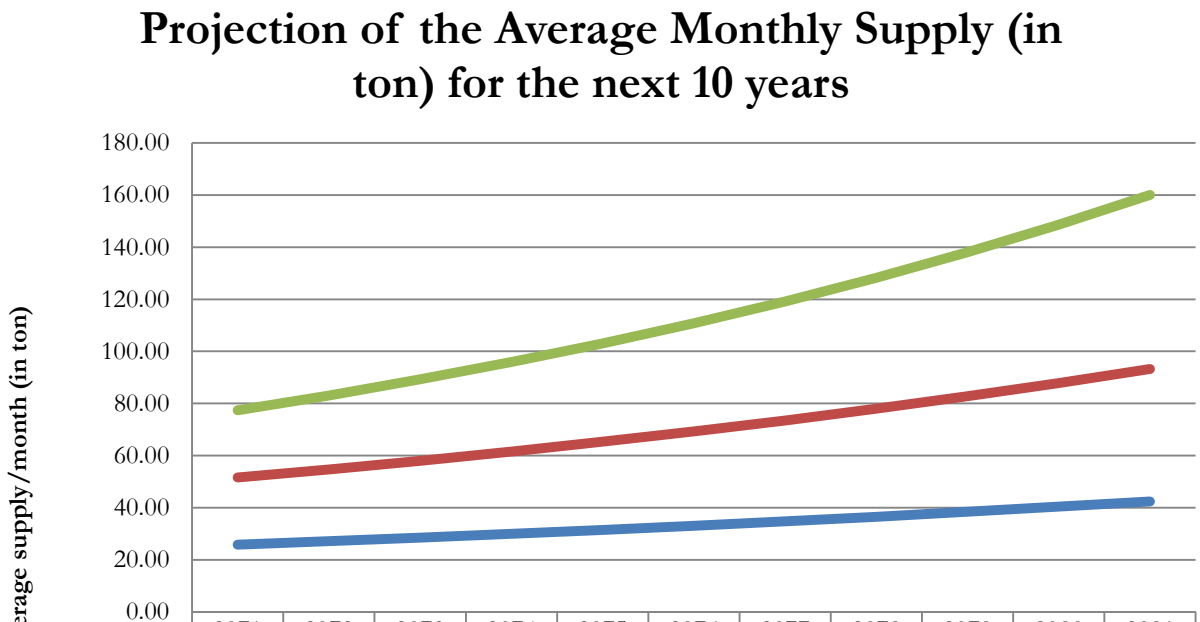
If we are to compare the total number of waste PET bottles that were collected by PWWs per day (17.58 ton) (*Table 13*) with the total supply per day of waste PET Bottles by all the bailers in the Kathmandu Valley (17.2 ton) *(Table 17)*, we find that the figures do not match. Therefore, 0.38 ton of waste PET bottles seems to get lost as we move along the value chain from PWWs to bailers.

3.6.4 Seasonal Variation in Supply of Waste PET Bottles

If we are to focus on seasonal variations in terms of demand and supply of waste PET bottles[15], it was found that the supply was maximum during Jestha (summer season) while months of Asar (summer/monsoon) and Ashwin (festival season) also recorded high supply values. The minimum supply of waste PET bottles was mostly recorded in the month of Poush (winter season) while supply was also found to be the lowest in the month of Magh (winter season).

3.6.5 Market Size Projection of Waste PET Bottles for the Next 10 Years

For future projection of the market size and prices of waste PET bottles, the study team considered three different scenarios. Firstly, it was assumed that the total average values pertaining to the supply of waste PET bottles would increase over the next 10 years at a rate of the slope of the trend line, 5.1%. For the second scenario, a 7% increment assumption was made and finally a 10% increment assumption was also considered. These are depicted in *Figure 13*.



	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081
At 10%	25.80	28.38	31.22	34.34	37.77	41.55	45.71	50.28	55.30	60.84	66.92
At 7%	25.80	27.61	29.54	31.61	33.82	36.19	38.72	41.43	44.33	47.43	50.75
At 5.10%	25.80	27.12	28.50	29.95	31.48	33.09	34.77	36.55	38.41	40.37	42.43

Figure 13. Projection of the Average Monthly Supply (in ton) for the Next 10 Years

[15] Please refer to *Table A* in *Annex H*.

3.7 Market Actors and Waste PET bottles

Based on key informant interviews, focus group discussions, and field observations, the prices of the waste PET bottles at different stages of the value chain were determined during the study period *(Figure 14)* and compared with the existing HCI market mechanism *(Figure 15)*.

Figure 14 shows the different players that are involved in different stages of the waste PET bottles in the Kathmandu Valley - from collection by PWWs from different sources (households, institutions, hotels, etc.) to transportation to India. Firstly, the PWWs pick up waste PET bottles. These PWWs either sell those bottles to scrap owners/dealers (at NRs. 22/kg) or directly to bailers (at NRs. 25-30/kg). When these waste PET bottles reach the bailers, the bailers pay NRs. 30-32/kg. It can be noticed here that there is a significant increment in the price of the waste PET bottles already. It costs the scrap owners around NRs. 22/kg when they buy from PWWs but they sell those waste PET bottles to bailers at around NRs. 25-30/kg.

The bailers clean, sort and press the bottles. This leads to the bailer incurring an approximate charge worth NRs. 13/kg in total making the price of the pressed waste PET bottles NRs. 45/kg at least.

Now the bailer has two options: (a) to transport the pressed bottles to India on its own, or (b) to ask a mediator to take the bottles to India *(the dotted line in Figure 14)*. If the bailer chooses option (b), the bailer will be paid NRs. 45/kg by the mediator and any extra costs incurred in taking the bottles to India, including commissions at the border, is borne by the mediator itself. However, if the bailer chooses option (a), it will have to incur additional charges which normally include transportation charges and commissions at either side of the border and normally amounts to approximately NRs. 11/kg. Hence in sum, a bailer incurs a total cost worth NRs. 24/kg after acquiring waste PET bottles from PWWs or scrap dealers/owners until dropping them in India. In case the bailer chooses option (a), the price at which the pressed waste PET bottles are sold is approximately NRs. 58/kg, after including the profit margin.

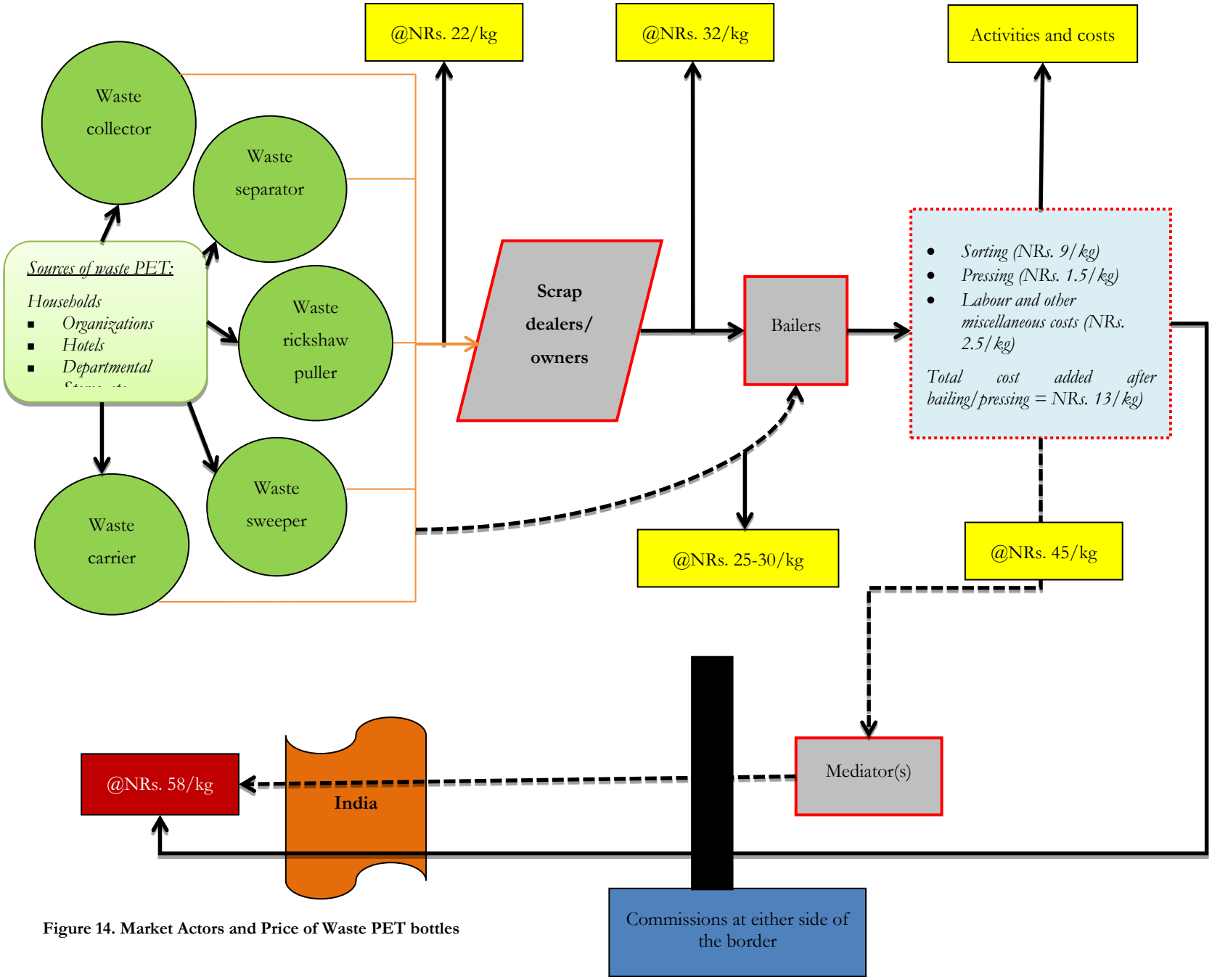


Figure 14. Market Actors and Price of Waste PET bottles

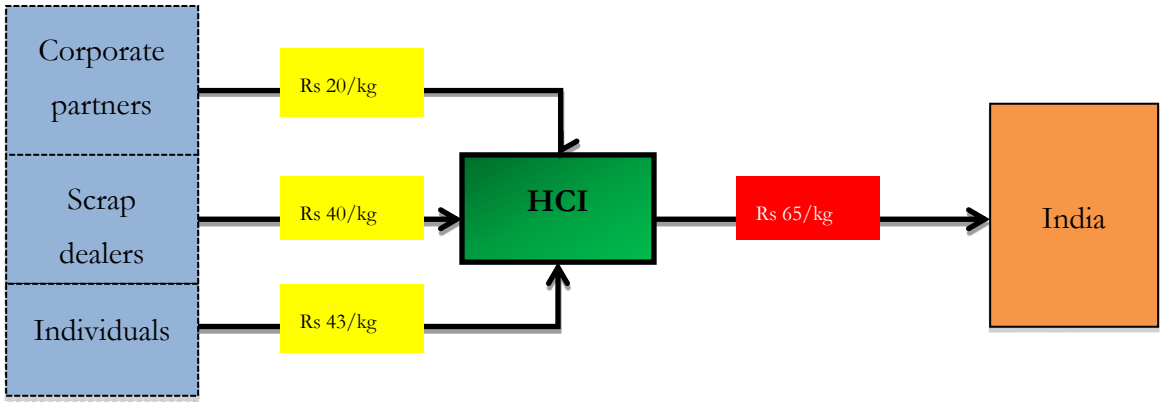


Figure 15. Existing HCI Market Mechanism (Source: HCI)

As shown in *Figure 15*, at present, the HCI collects waste PET bottles from corporate offices (e.g., hotels, restaurants, multiplex, and futsal) at Rs 20/kg; scrap dealers at Rs 40/kg; and individuals at Rs 43/kg.

CASE STUDY III: SEASONAL VARIATION IN THE DEMAND, SUPPLY AND PRICES OF WASTE PET BOTTLES IN THE KATHMANDU VALLEY

"A number of players and factors determine the waste PET bottles market in Kathmandu valley." – Pradeep Sah, 41-year-old bailer

Pradeep Sah, aged 41, is the owner of a bailing centre called 'New Omkar Plastic Bottle and Carton Processing Centre Private Limited', located at Madhyapur Thimi municipality. When the team reached at his bailing centre, he was directing his PWWs to load a truck full of pressed waste PET bottles. Asked if he could explain how the waste PET bottles' market scenario looks like, he said, "A number of players and factors determine the waste PET bottles market in the Kathmandu Valley." When asked about seasonal variation in the demand and supply of waste PET bottles, Sah said that the quantity of waste PET bottles in the market was maximum during summer (Jestha/May-June) and during festivals of Dashain and Tihar (Ashwin/September-October). The minimum supply occurred during winter (Poush/December-January). He shared numbers on demand and supply of waste PET bottles for the year of 2071 B.S. These numbers are as follows:

Months/2071 B.S.	Supply Price (NRs./Kg)	Demand Price (NRs./Kg)
Baisakh	50-52	60
Jestha	52	60
Asar	30-40	35
Shrawan	40	35
Bhadra	30-35	30
Ashwin	25-28	30
Kartik	25	45

Pradeep Sah is engaged in the business of taking his pressed waste PET bottles to India on his own. On market actors or players in the waste PET bottles in the Kathmandu Valley, he said, "First the *feriyas* (waste collectors) collect waste PET and sell them to scrap owners at an average price of NRs. 22-25 per kg. We as bailers sometimes buy directly from those *feriyas* (PWWs) but mostly, we buy from *kabad* (scrap owners/dealers) at the rate of NRs. 32-35 per kg. After that we press the bottles and stack them, ready to be transported to India." On costs incurred, Sah said, "We incur a total cost of about NRs. 24 per kg until the waste PET bottles reach the recycling units in India - these costs include sorting costs, transportation cost, labour charge, commission paid at the Nepal- India borders and other miscellaneous costs. There are bailers within the Kathmandu Valley who do not take their pressed waste PET bottles on their own. There are mediators who come and transport these bottles to India."

3.8 Occupational Safety

A total of 52% of the respondents mentioned that they did not use any safety measures while at work and the rest 48% mentioned that they used safety measures while working. Among the respondents who claimed to be using safety measures at work, it was observed that only 62% of them were using safety measures such as masks, gloves, and safety jackets at the time of interview.

While interviewing, it was observed that only 30% of the 629 sample populations were wearing safety measures *(Table 18)*. The use of masks was observed in the 25% of the sampled population whereas use of gloves and safety jackets was very minimal.

Table 18. Field Observation of the Adoption of Safety Measures

Safety measures	Number	%
Masks	157	25.0
Gloves	25	4.0
Bright reflective vests	1	0.2
Others (safety jackets)	4	0.6
Total	**187**	**29.7**

3.9 Access to Institutions

A small number of respondents (14%) were affiliated to formal organised groups such as saving and credits cooperatives *(Figure 16)*. A total of 32% of those surveyed had taken some form of a loan from an institution. Most of the loans were drawn from scrap owners (46%), followed by friends (30%). There were a few individuals who had taken loans from formal institutions such as banks and cooperatives *(Figure 17)*.

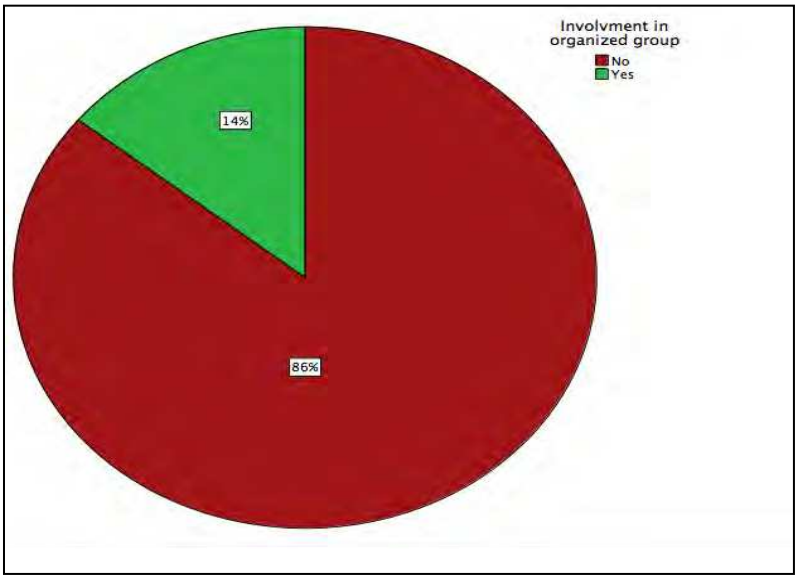


Figure 16. Involvement in Organised Group(s)

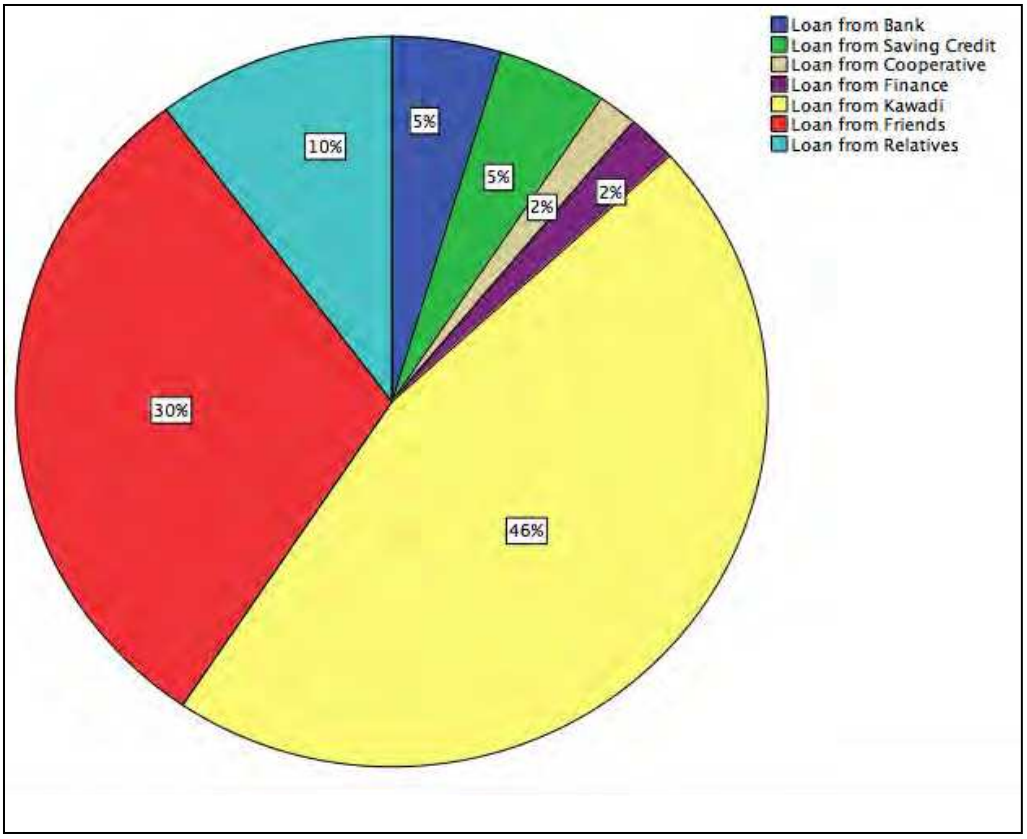


Figure 17. Sources of Loan for the PWWs

3.10 Training on Waste Management

Nearly one-fifth of the workers (121 individuals) had attended trainings related to waste management *(Table 18)*. Among these, 35% had attended waste separation trainings; the same percentage had engaged in waste collection trainings; 19% in waste recycling and the remaining 12% had attended waste reuse trainings *(Figure 18)*.

Table 19. Involvement in Waste-related Training

Response	Number	%
No	508	80.8
Yes	121	19.2
Total	**629**	**100.0**

Figure 18. Types of Training on Waste Management Attended by PWWs

These trainings were provided by the PRISM project (78%) and Kawadi (scrap) owners (13%). There were minimum numbers of trainings provided by either of the municipalities (7%) or I/NGOs (2%) *(Table 19)*.

Table 20. Institutions Providing Waste Related Trainings

Institution (s)	**%**
PRISM Project	78.4
Other I/NGO	1.7
Municipality	6.9
SWWs (Kawadi (scrap) owners)	12.9

CASE STUDY IV: FROM A RICKSHAW PULLER TO A SUCCESSFUL SCRAP OWNER/DEALER

"I have almost quadrupled my earnings now and I have about sixteen waste workers working for me AT my scrap." – Pannalal Podar, 35-year-old scrap owner/dealer

"I used to earn about NRs. 500 per day a few years ago by selling reusable products I collected by pulling my rickshaw. However, the scenario is no more the same. I have almost quadrupled my earnings now and I have about sixteen PWWs working for me at my scrap currently", said a proud and confident Pannalal Podar, the 35-year-old scrap owner at Teku, Kathmandu. He is a permanent resident of Bihar, India and has been currently living with his wife and daughter at Teku.

Upon inquiry, Pannalal said that the entrepreneurship training along with technical and financial assistance provided by PRISM project were the prominent cause for his profound transformation from an ordinary rickshaw puller to a successful owner of a scrap named 'Rickshawchalak Puna Prayogiya Bastu Sankalan Tatha Kharid Bikri Kendra.' Approximately 100-150 kg of mixed reusable products are collected at the scrap on a daily basis, out of which around 20-30 kg is comprised of waste PET bottles.

The story of Pannalal Podar is inspiring and encouraging. It depicts that with appropriate training on entrepreneurship and enhancement of PWWs' occupation-related skills, improvement in their living conditions is practically achievable.

3.11 Occupational Illness and Injury

In this study, illness and injury of the PWWs over the past 30 days and the associated working days lost because of illness and injury has been documented. Over the past 30 days, 55% of the respondents experienced a short-term illness such as fever (67% of the sick respondents), skin problems (11%), chest pain (21%), headache (55%), diarrhoea (22%), back pain (26%), muscle pain

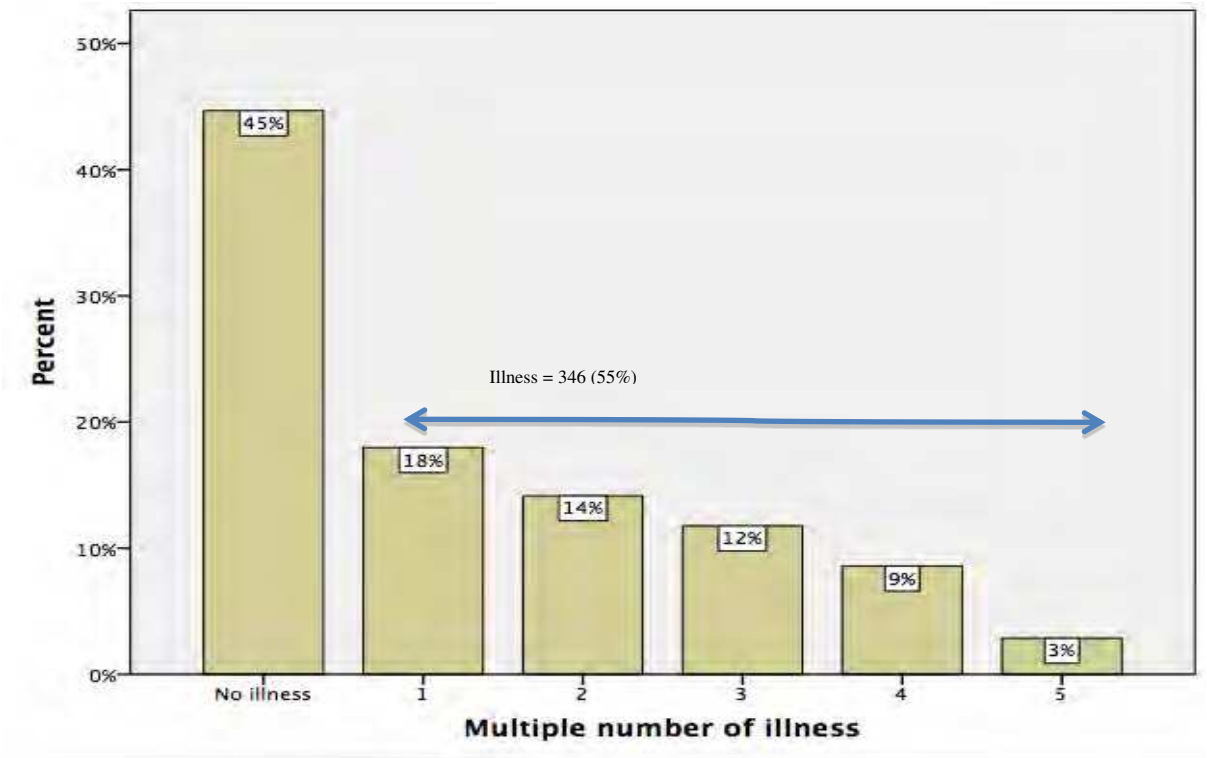


Figure 19. Frequency of Illness

(13%), and eye irritation (8%). A total of 45% of the total sample population did not experience any kind of short-term illness over the past 30 days. The rest 55% of individuals felt sick. However, it was found that a PWW could experience multiple illnesses at the same time or within the 30-day period. A total of 18% of the total respondents had only one illness; 14% had two illnesses, 12% had three illnesses, 9% had four, and the remaining 3% had five illnesses *(Figure 19)*.

Similarly, physical injuries such as a fall, accident(s), cuts, attack by domestic animals, and violence were also documented for the sample population. A total of 57% of the respondents did not have any kind of injury over the past 30 days. However, the remaining individuals (43%) either had one (38%), or two (5%) or three (1%) injuries over the past 30 days. The cut injury was the most common to many individuals *(Figure 20)*.

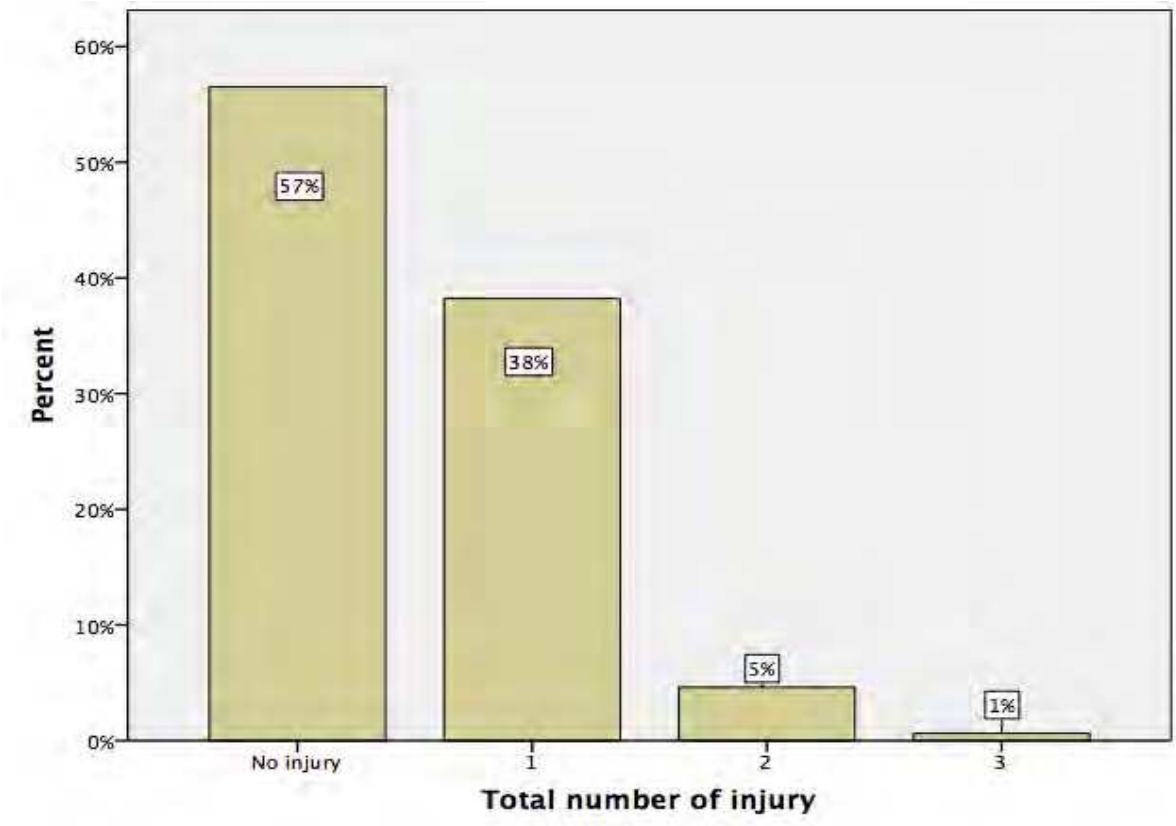


Figure 20. Frequency of Injury

3.11.1 Medical Expenses Associated to Illness and Injury

A total of 37% of the all the respondents sought some form of medical help for their injuries and illness. Most of them consulted with nearby pharmacies (48%); some visited nearby private clinics (20%), and private and government hospitals *(Figure 21)*. Because of illness and/or injury, an individual had to spend out-of-pocket expenditure - as low as NRs. 25 to as high as NRs. 25,000 - an average of NRs. 1,311 (Std. deviation ±2689) per month for medical expenses.

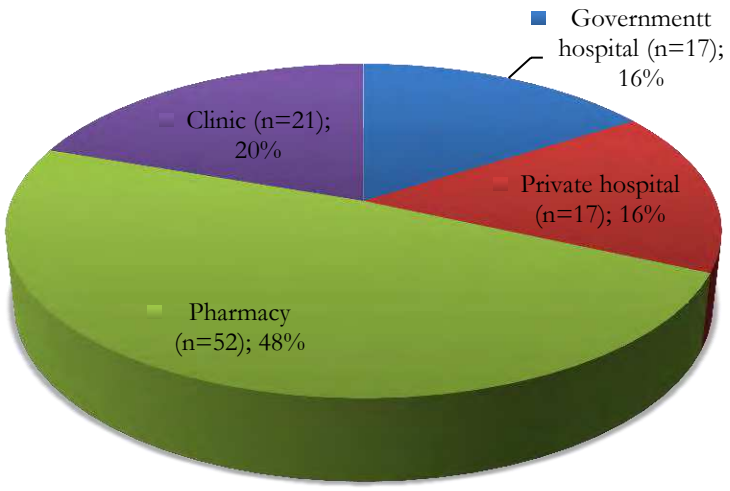


Figure 21. Percentage of PWWs Visitng Health Care Facilities for Treatment

Among those who sought medical help, 72% of them spent up to NRs. 1,000/month; 20% spent in between NRs. 1,000 and 4,000/month, and remaining 8% spent more than NRs. 4,000/month *(Figure 22)*.

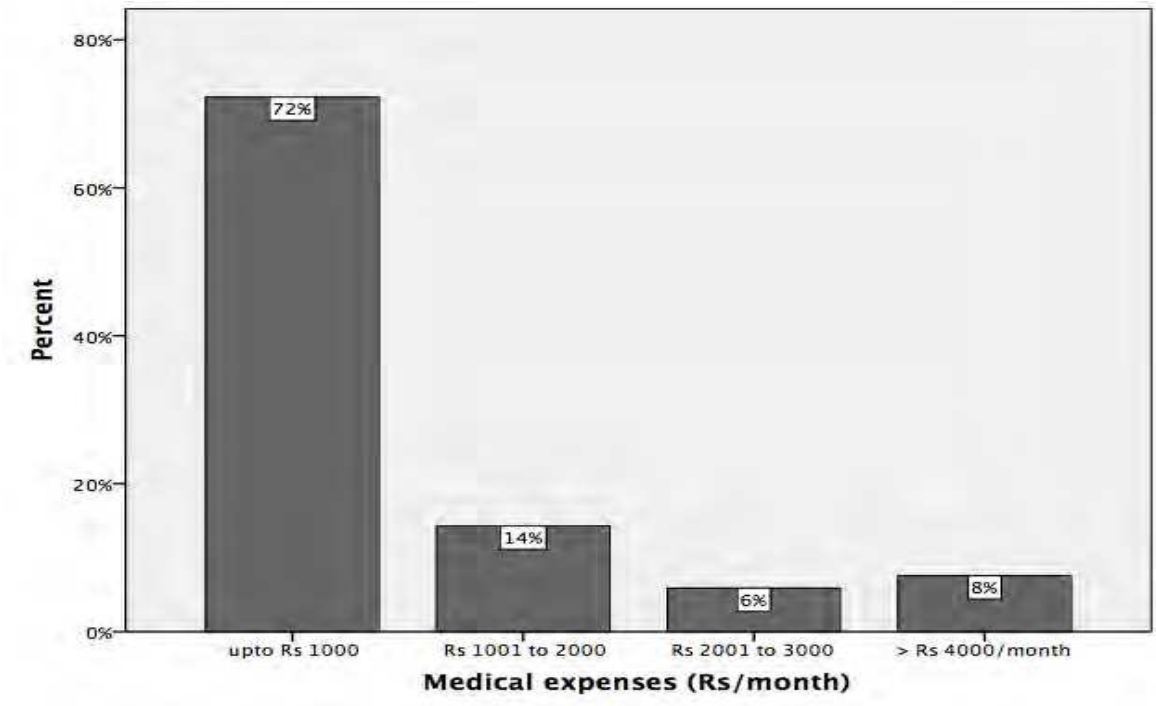


Figure 22. Frequency of Medical Expenses by Cost Category

The medical expenditure associated with illnesses and injuries was mostly borne by PWWs themselves (82%) *(Figure 22)*. The average medical expense for these illnesses and injuries amounted to NRs. 1,128 for the past 30 days. However, a few of them (12%) received monetary help from Kawadi owners (an average sum worth NRs. 1,744) *(Figure 23)*. Occasionally, family members or friends (5%) also paid the medical bills (amounting to an average of NRs. 2,444). A very few individuals were lucky to receive monetary help from I/NGOs (1%); however, the monetary contribution from this sector was the highest (an average of NRs. 6,350). It seems that in case of a serious illness/injury, the PWWs approach I/NGOs for medical assistance and support.

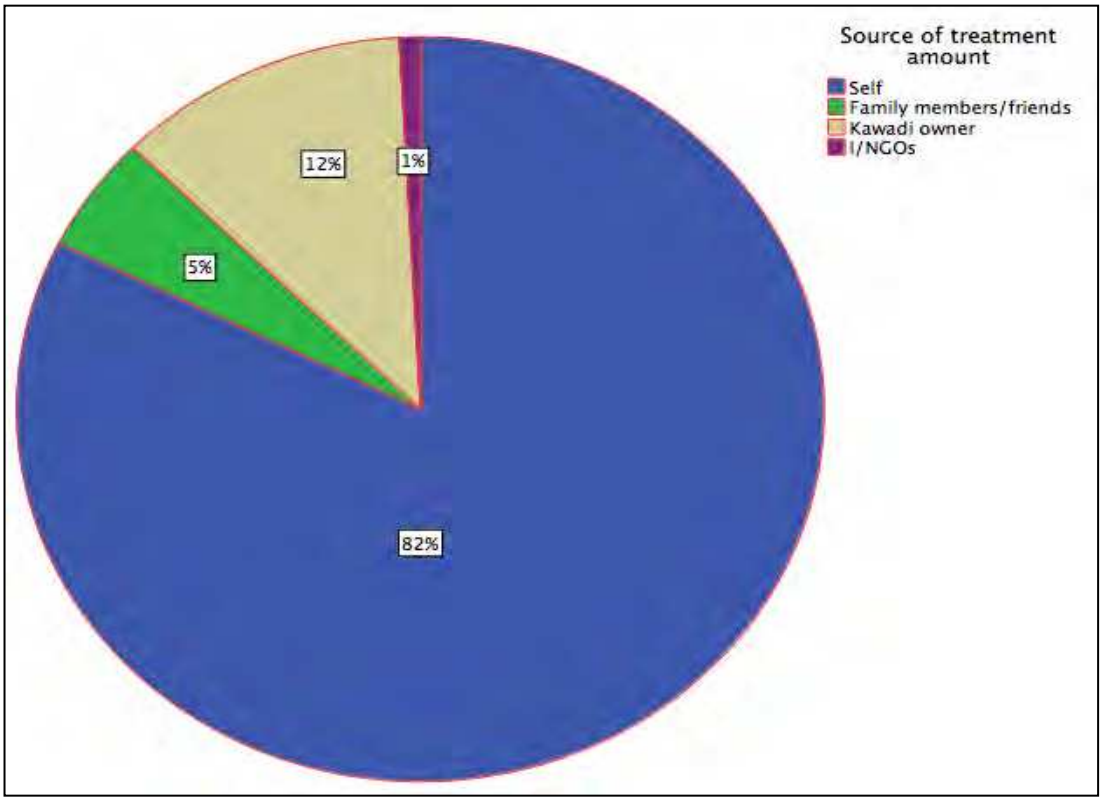


Figure 23. Amount of Medical Expenses Borne by Different Sources

Also, because of sickness and/or injury, a total of 290 (46% of the total sample) individuals were absent at least a day in their work in the last 30 days. Among these absentees, 78% lost 'less than a week' working days/month; 18% lost '1-2 weeks'/month, and remaining 4% lost the whole month.

Ironically, very few individuals (3%) were participants in the informal health insurance programmes. They have limited numbers of social protections. In Teku, it was observed that an individual contributes NRs. 10/month on 'health safety fund' for health safety. This was observed in those individuals who were associated with a 'waste management cooperative'. The cooperative bears an amount of maximum NRs. 2,000 per individual, if required. The PWWs associated with the cooperative were satisfied with the incentive. As a result, replication of such practice in other areas could benefit PWWs.

CASE STUDY V: PARALYSED, 80-YEAR-OLD, BUT STILL WORKING AS A WASTE WORKER

"I get paralysed if I stay idle. Therefore, I have to work despite my physical disability." – Mithai Kumari, 80-year-old PWW

Mithai Kumari, an 80-year-old lady, originally from Sindhupalchowk district and currently residing at Jawalakhel, Lalitpur adopted the occupation of a PWW because of poverty. She has spent about two decades working as a PWW and has an ambition to build a house of her own in the land she owns at Jawalakhel. She works as a waste collector and collects reusable products (PET bottles, papers, cartons, metals, etc.) up to 20 kg per day.

An interesting thing to note is that the right symmetrical half of her body is paralysed and when the question was raised concerning her physical fitness, her reply was astounding: "I get paralysed if I stay idle. Therefore, I have to work despite my physical disability."

She also reported that she has fallen unconscious at many occasions during work hours. Furthermore, when a query was made regarding her treatment, she replied, "I go to the traditional healer to cure my sickness."

In addition to that, she also mentioned that she has never visited a doctor for the treatment because she cannot afford such treatment. Moreover, her belief and faith in the traditional healer seemed to be stronger than in a doctor. If an intervention is made and she is persuaded to seek a better treatment in a hospital, the latter part of her retired life could pass serenely, despite her desire to work even at this age.

3.12 Organisational Structure of WWs in the Kathmandu Valley

The organisational structure of WWs – both PWWs and SWWs – in Nepal is quite informal in nature, except for those working in respective municipalities. Also, municipality workers are only involved in waste sweeping, collection and transfer whereas private WWs are involved in sorting and recycling. This means that salaries and health benefits are not guaranteed by the government or any social sector organisation. Majority of them are not properly trained in sorting waste or a hygienic method of collecting waste. They are not given proper uniforms or any protection equipment,

although some minor efforts towards this end have been made by some NGOs and governmental agencies.

The organisational structure of the WWs in the Kathmandu Valley can be described in terms of where the WWs are affiliated to, if any. In this respect, three major levels exist in Kathmandu, and these are depicted in length in *Figure 24*.

- There are two types of non-government organisations (NGOs) that are engaged in the management of waste PET bottles in the Kathmandu Valley. One is from the WWs themselves (for example. SASAJA) and another one is an NGO that operates from outsider support, such as the HCI, Centre for Integrated Urban Development (CIUD), and SWMTSC. Other examples include Solid Waste Management Association (SWMA) and Non-Government Organisations Federation for Environment Conservation (NGOFEC Nepal).
- At the governmental level, WWs are affiliated to the metropolitan cities (MPCs)/ sub-metropolitan cities (SMPCs)/ metropolitan (MPs).
- In the private sector, there are a few diversifications. Some are collecting dry waste and some are collecting all types of waste. Those who are collecting all types of waste, they charge households a certain sum of money per month and after segregating the waste thus collected, they themselves manage to take the waste to the landfill site.

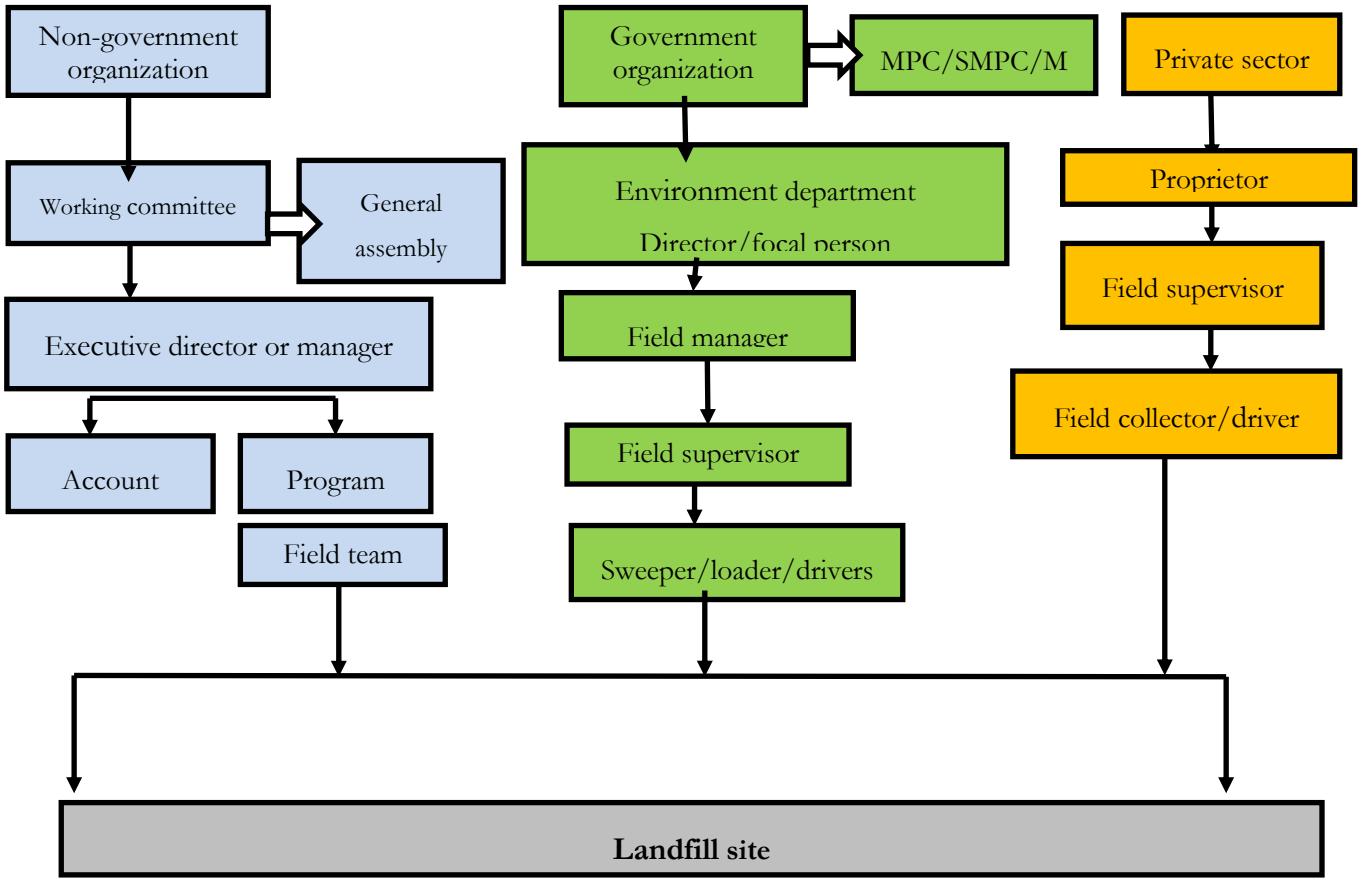


Figure 24. Organizational Structure of WWs in the Kathmandu Valley

4. SUMMARY AND RECOMMENDATIONS

4.1 Summary

4.1.1 Total Number of PWWs

The study team visited 151 locations inside the Kathmandu Valley to make an inventory of PWWs *(census survey)* that resulted in 6,017 PWWs linked to 399 scrap dealers at the time of study. However, this value is significantly less than the total WWs estimated inside the Valley. This is because, (i) the study team could not visit all possible areas due to time and economic constraints; (ii) this number did not account for the waste workers associated with municipalities, and private institutions working in waste management; and (iii) there might be seasonal mobility of the workers, which might have caused under-reporting. Considering all these factors, the study finally arrived at a robust number of PWWs working inside the Valley. The study estimates a total of 15,539 individuals working as PWWs inside the five municipalities of the Kathmandu Valley, and at Okharpauwa, Nuwakot.

4.1.2 Socio-Economic Status of the PWWs

A total of 629 PWWs (87.4% males) were interviewed in order to grasp a better understanding of their social and economic conditions. The survey was used to obtain information on PWWs' incomes, volumes of PET bottles collection, their price as well as the state of PWWs' occupational health, safety and medical expenses, and access to social protection schemes.

The result showed that most of the PWWs (56%) were involved in waste collection, followed by waste separation (27%). No females were found to be working as rickshaw puller and drivers. It showed that a significant number of children under the age of 16 (15% of total sample) were involved in the waste collection whereas those who were older than 60 years were very few (1%).

Majority of the sampled population (56%) belonged to Madhesi, followed by Janajaati (22.7%), and Bhramin/Chhetri (13%). A total of 35% of the sampled population were of Indian nationality. It was observed that the Madhesi people (people from Terai region and Indian national) dominated waste collection. Most of the respondents were Hindu (91%), followed by Buddhist (5%), Muslim (3%), and Christian (1%).

Most of the respondents were married (63%), followed by unmarried (34.5%), widow (2%), and divorced (1%). More than one-third of the sample populations were illiterate, 14.5% were literate, 30.7% had attended primary school, 12.4% had attended lower secondary school, and 6.5% had attended secondary school. Compared to males, females were more illiterate. A total of 365 respondents (58%) had their own children. A total of 73% of childbearing households had children between the ages of 5-17 years (potential school-going children), and almost all households at present are sending their children to either government schools (71%), or private/boarding schools (27%) or other schools such as Muslim teaching centres (2%).

The major source of income was waste collection (85%) while very little contribution was seen from other sources: agriculture (5%), labour/daily wages (5%), business (2%), foreign employment (1%) and service (1%). The average monthly income of a PWW was estimated to be NRs. 10,109.

4.1.3 Incidence of Child Labour

The number of PWWs below 16 years old was 93 (15% of the sample population). There were 39 children below the age of 14 (6% of the sample population). Ninety-one were male and 2 were female. In terms of nationality, 44 were Indian while the remaining 49 were Nepali.

In terms of their *educational status*, 25% were found to be illiterate, 7% were literate, 47% had attended primary education (Grades 1 to 5), 17% had attended lower-secondary education (Grades 6 to 8), and the remaining 4% had attended secondary education (Grades 9-10). Furthermore, 61 % of the 93 child PWWs said that they had experienced some form of illness in the last 30 days while 51% of them had experienced some form of injury. Of the 93 child PWWs, 67% sought treatment for their illnesses and injuries. The average expenses incurred for the treatment of their illnesses and injuries ranged from a minimum of NRs. 30 to a maximum sum of NRs. 12,000, at an average sum of NRs. 1,032. As for payment for the treatment of their illnesses and injuries, 54% said that they incurred the treatment expenses on their own (*self*); 12% said that their families and friends helped them in the payment; 29% said that the expenses were incurred by their scrap owners/dealers and the remaining 5 % were supported by I/NGOs. When asked if these 93 child PWWs used safety measures while working to avoid such illnesses and injuries, only 28% said that they did. However, when observed by the enumerators during survey, it was found that only 68% of them were wearing masks and 19% were wearing gloves.

When asked why these children were working as PWWs, 66% cited poverty as the major reason. Around 19% of the child PWWs cited 'having run away from home(s)' as another reason while 9% said 'loss of parents', 2% said 'easy job', 2% 'historical occupation' and the remaining 2% cited 'no alternative' as the reasons for working as a PWW.

During the study, we could not find any specific organisation that worked particularly for the welfare of a child PWW. However, there are laws, acts, regulations and stipulations – national as well as international (and legally binding) – that clearly define who child labourers are. Despite the existence of these laws and regulations, there are children who work as PWWs as our study showed.

4.1.4 Volume of PET Bottles Collection Inside and Outside the Kathmandu Valley

It was estimated that for the sample population of the PWWs, i.e. within the Kathmandu Valley, the annual PET bottle collection by an individual amounts to 906 kg/year = 75.5 kg/month = 2.5 kg/day. The potential collection of total PET bottles in the Kathmandu Valley was estimated to be 17.58 ton/day.

If we are to compare the total number of waste PET bottles that were collected by PWWs per day (17.58 ton) (*Table 13*) with the total supply per day of waste PET bottles by all the bailers in the Kathmandu Valley (17.2 ton) *(Table 17)*, we find that the figures do not match. Therefore, 0.38 ton of waste PET bottles seems to get lost as we move along the value chain from PWWs to bailers.

The potential locations for PET bottles consumption and collection were identified as Dhangadi, Biratnagar, Narayanghat, Nepalgunj, Birgunj, Pokhara, Butwal, Birtamod, Lahan, Janakpur, Banepa, Beshisahar, Damauli, Lekhnath, Sauraha, Manakamana, Munglin, Namche, Lukla, Nagarkot, Nayapul, and Chisapani (Karnali) *(See Figure 10)*.

4.1.5 Supply of Waste PET Bottles[16]

It was found that there was an increase in the supply of waste PET bottles through the last three years *(see Table 16)*. In the current year of 2071 B.S., the average supply per month of waste PET bottles by bailers was found to be 25.8 tons. When this data was plotted using a trend line, it was found that the supply has been increasing at a rate of 5.1% per annum.

[16] Please refer to *Annexes G and H*.

The mineral water bottles consumption in the Kathmandu Valley was estimated to be 11.46 ton/day. The other sources of PET bottles may include Coke and Pepsi, medicines, fruit juice, and alcoholic beverage, etc.; which were not considered in this study because of data unavailability.

4.1.6 Waste PET Bottles: Market and Seasonal Variation

Not all the PWWs were found to be working on PET bottles collection; only 58% of the total PWWs were involved in the collection of such bottles. The average price of waste PET bottles was NRs. 25/kg; that ranged from NRs. 10 to NRs. 50 per kg. A total of 71% of these workers sold waste PET bottles below the average price.

If we are to focus on seasonal variations in terms of demand and supply of waste PET bottles, it was found that Jestha (summer season) saw maximum supply while months of Asar (summer/monsoon) and Ashwin (festival season) also recorded high supply values. The minimum supply of waste PET bottles was mostly recorded in the month of Poush (winter season) while supply was also found to be the lowest in the month of Magh (winter season). *Figure 13* projected market supply at 5.1%, 7% and 10% increments for the next 10 years.

4.1.7 Market Actors and Organisational Structure of WWs

It was found that four actors were involved in PET bottles value chain before it crossed the Indian border: PWWs, SWWs (scrap dealers), bailing operators, and mediators *(Figure14)*. At present, PWWs receive NRs. 22/kg from the scrap dealers, who sell to the bailer operators at NRs 32/kg; and finally reach India, to be sold at NRs. 58/kg.

The organisational structure of WWs – both PWWs and SWWs – in Nepal is quite informal in nature, except for those working in respective municipalities. Also, municipality workers are only involved in waste sweeping, collection and transfer whereas private WWs are involved in sorting and recycling. The organisational structure of the WWs in the Kathmandu Valley can be described in terms of where the WWs are affiliated to, if any. In this respect, three major levels exist in Kathmandu, namely NGOs, government organisations, and private organisations *(Figure 24)*.

4.1.8 Access to Institutions

Only one-fifth of the PWWs had attended trainings related to waste management; and less than 15% were affiliated to organised groups such as saving and credit cooperatives.

4.1.9 Occupational Health, Safety, and Expenses

A total of 48% of the PWWs mentioned that they use safety measures (such as masks, gloves, safety jackets) while at work; however only 30% of the respondents were wearing safety items during interviewing.

In the 30 days prior to interview, 55% of the sample population suffered from short-term illness such as headache, fever, eye irritation, and pains. The physical injuries were also documented. A total of 43% PWWs suffered from either one (38%), or two (5%) or three (1%) injuries over the past 30 days. The cut injury was common to many individuals. Because of such illnesses and/or injuries, an individual had to spend an average amount of NRs. 1,311 per month for medical expenses. This expenditure was borne by PWWs themselves (82%).

The occupational health and safety of the PWWs appeared quite poor. Because of minimal use of safety equipment such as masks, gloves and vests; they are likely to be at high risk of illness and injury. Subsequently, these PWWs had to spend money in the form of medical expenses and also lost several working days, which are unaccounted by those offices that hire them. Only a few PWWs had access to health insurance and other social protection schemes. So awareness activities on the safety items, and health insurance for them could not only benefit their wellbeing but also help improve their work productivity.

4.2 Recommendations

1. Although the nature of work performed by PWWs is more or less the same, there is a widespread variation in the prices that are being paid by PWWs (for example, SWWs pay PWWs at a rate of NRs.20 to 30 per kg while the HCI pays NRs. 43 per kg). Uniformity in the rates at which the PWWs are paid by different players for their services is important because it can help to instil fairness in the SWM system in the Kathmandu Valley. This will not only positively impact the livelihoods of the PWWs but further has the potential to help in establishing the occupation of a WW as something that is not looked down upon by other members of the society. In this respect, the HCI and its partners can play a pioneering role in the lobbying or promoting of this cause to the concerned authorities at governmental level in order to establish a policy/law that establishes a healthy and uniform rate for the PWWs.
2. Almost all PWWs in the census survey were not associated with any formal institution. They work at their own will. The government needs to design a policy framework that takes into account the unique nature of waste PET bottles and one that will also bring PWWs under a

formal institutional mechanism. This will increase the visibility and thus the prestige of the WWs. Such workers should be treated with dignity and respect as they carry out a very important task. In order for this to happen and to make the management of waste PET bottles effective, proper coordination between the government, NGOs, private organisations, civil societies, the recycling industry and the WWs is paramount. The HCI can play a pivotal role in this process.

3. A significant number of children were found working as PWWs despite the provision of laws and regulations in the country. While no organisation in particular were found to be solely dedicated to child PWWs within the Valley, organizations working in this area, such as the HCI, ought to report this infringement to the concerned authority so that initiatives to eradicate child labour in SWM can be mobilised at a larger scale in Nepal. The HCI could collaborate with agencies that work for prevention of child labour in general and initiate a project that could help these child PWWs through provision of education facilities or safety equipment to be used during work.
4. As most of the PWWs solely depend on the existing occupation for their livelihood and have limited access to safety materials, it is recommended that these people be trained on waste handling, occupational safety and health, and entrepreneurship. Also these PWWs should be made aware of the safety equipment and its benefits to their health.
5. PWWs had to spent medical expenses and also lost valuable working days that are unaccounted for by those people who hire them. It is advised to take account of such costs as compensation while determining their wages. Alternatively, their affiliated institution, such as Samyukta Safai Jagaran (SASAJA), can initiate a 'health safety fund' to cover such expenses.
6. As most of the PWWs lamented over people's perception on their work as 'low-grade occupation' and often being referred to as 'khate', such perception should be eradicated. For this, all the residents of the Kathmandu Valley should be made aware of the contributions of the PWWs towards everyone by helping to maintain good health and a cleaner environment. The HCI, as an organisation, can help the PWWs as well as SWWs to escape the social stigma attached to the occupation of a WW by organising awareness campaigns not only in the Kathmandu Valley but also in major cities across Nepal.
7. It was found that there was a difference of 0.38 ton in the amount of waste PET bottles collected by PWWs/bailers per day in the Kathmandu Valley. In other words, 0.38 ton of

waste PET bottles is lost or wasted along the value chain on a daily basis, which is a matter of big concern from a cost/profit perspective as well as from an environmental viewpoint. In this regard, it is recommended that the HCI conduct a study in the future in order to gauge and understand the reason(s) behind such loss and discrepancy.

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APPENDIX

Annex A: Data on Market Supply of Waste PET Bottles in the Kathmandu Valley

S. N.	Years	Monthly Maximum PET Supply (in ton)	Monthly Minimum PET Supply (in ton)	Month with Maximum Supply	Month with Minimum Supply	Source of Information
1	2069	20	8	Ashwin	Magh	Pradip Sah (Bailer), Madhyapur Thimi
	2070	19	10	Jestha	Poush	
	2071	20	10	Ashwin	Poush	
2	2069	12	7	Ashwin	Poush	Om Prakash Chaudhary
	2070	10	8	Ashwin	Magh	
	2071	12	8	Ashwin	Poush	
3	2069	3	1.5	Jestha	Poush	Indra Bahadur Rai (Scrap owner), Chahabil
	2070	3.5	1.5	Jestha	Poush	
	2071	3	2	Jestha	Poush	
4	2069	2.5	1	Asar	Poush	Pannalal Podar (Scrap owner), Teku
	2070	2.75	1.5	Jestha	Magh	

	2071	3	1.05	Jestha	Poush	
5	2069	1.5	1.05	Jestha	Poush	Amit Jaiswal (Bailer), Teku
	2070	1.5	1.05	Ashwin	Magh	
	2071	1.7	1.11	Jestha	Poush	
6	2069	6	5	Jestha	Poush	Jitendra Chaudhary
	2070	7	5	Jestha	Poush	
	2071	30	15	Jestha	Poush	
7	2069	7	4	Jestha	Magh	Binod Sah
	2070	9	5	Asar	Magh	
	2071	10	6	Jestha	Poush	
8	2069	6	3	Jestha	Poush	Amlesh Thakurai
	2070	23	11	Jestha	Poush	
	2071	27	14	Jestha	Poush	
9	2069	27	19	Jestha	Poush	Binod Bangali, Teku
	2070	30	25	Asar	Poush	
	2071	30	24	Jestha	Poush	

Annex B: Step-by-Step Guideline for Carrying out the Study

The steps followed in carrying out the study are briefly described below:

i. **STEP 1: Submission of the Inception Report:** A report highlighting the study background, objectives of the study and methods to be used for the achievement of those objectives was submitted to the HCI. In addition, this Inception report provided information on the study team and work schedule to be implemented for carrying out the study.

ii. **STEP 2: Determining a Sampling Technique:** In each of the municipalities, the potential areas for PWW's availability and scrap owners'/dealers' locations within the Kathmandu Valley were identified. Ten locations from Kathmandu municipality (Kapan, Sinamangal, Teku, Old Baneshwor, Chahabil, Jorpati, Bouddha, Hyumat, Balkhu and Koteshwor), five from Lalitpur municipality (Satdobato, Sundarighat, Sankhamul, Nakkhu, and Sanepa), three from Bhaktapur municipality (Suryabinayak, Jagati, and Kamalbinayak), three from Madhyapur Thimi municipality (Old Thimi, New Thimi, Pepsicola) and one from Kirtipur municipality (Kirtipur bazaar) were identified. These locations were selected because they acted as the hub or central point for PWW's availability. The enumerators were directed to visit the periphery of these locations to conduct interviews. Enumerators were directed to interview in these locations, depending on the availability of PWWs *(convenience sampling)*.

iii. **STEP 3: Design of Study Methods/Tools for Information Collection:** Taking the objectives of the study into consideration, the study team in consultation with the HCI and GIZ, agreed on the usage of the study tools as depicted in Figure 4.

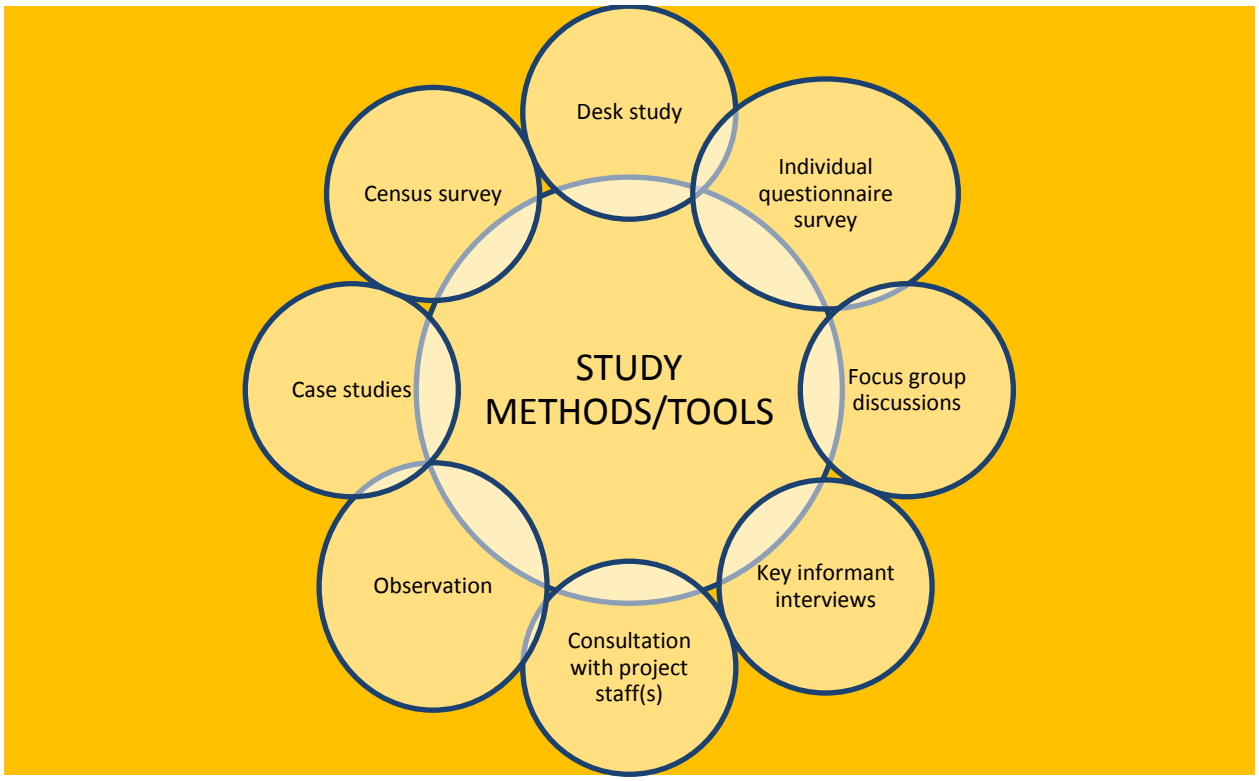


Figure: Study Methods/Tools used for the study

These study methods/tools have been described in the next steps.

iv. **STEP 4: Pre-testing of Study Methods/Tools:** For pre-testing of the study methods/tools, Teku was chosen by the study team as the location because of the easy availability of PWWs in this location. A meeting was also conducted with a bailer at Teku as a pre-test for a KII. A group of PWWs were asked to gather around and a mock FGD was conducted as well. The study tools – questionnaire and checklists – were adjusted after this pre-testing.

v. **STEP 5: Meeting with Field Enumerators for Briefing and Explanation of Study Tools:** A meeting was organised by the team with support from the HCI in order to give the field enumerators a clear idea about the study and the various study tools that were to be used during fieldwork by them for information collection. During the meeting, the questionnaire to be used for individual questionnaire survey was thoroughly explained. Furthermore, the team also gave the enumerators advice on what the *dos* and the *don'ts* are during fieldwork. The meeting concluded with division of teams, their responsibilities and study sites to be covered by a team of 2-3 individuals within the five municipalities of the Kathmandu Valley. The study team visited Okharpauwa and information was collected.

vi. **STEP 6: Desk Study of Available and Relevant Documents:** Reports, project documents, log-frame matrices, leaflets, publications and other sources of secondary information relevant to the purpose of this study were thoroughly reviewed. This step was carried out throughout the process of the study.

vii. **STEP 7: Field Visit for Information Collection:** The field enumerators, under the close supervision of at least one member of the study team, were delegated in different parts of the study areas for information collection. All the study methods/tools were used for the collection of primary information during field visits. These methods/tools included:

a. *Individual Questionnaire Survey*: A questionnaire survey covering 629 PWWs was conducted in the selected study area(s) using a standardised and pre-tested questionnaire tailor-made for this study.

b. *Observations from Field Visit(s):* Information that was not possible to be gathered either through interviews or through the FGDs was collected through observation by using checklists during the field visit. Observation checklists were developed to aid information collection concerning issues such as cleanliness, use of basic safety kits and general living conditions of the PWWs (household, water, sanitation, etc.).

c. *Case Studies:* Five cases that stood out during the field visits – cases involving (i) a PWW who was engaged in multiple waste collection activities, (ii) a child PWW, (iii) a bailer operator, (iv) an 80-year-old physically challenged PWW, and (v) a scrap owner/dealer who used to work as a PWW in the past – have been presented in this study. The first case study helps to provide a better understanding about a PWW's socio-economic condition in general and the struggles that she faces in her everyday life. The second case study provides an insight into the issues surrounding child labour and PWWs. The third case involving a bailer operator helps to shed a clear light regarding the seasonal variations in demand/supply and price fluctuations and the overall value chain involving the PET bottles in the Kathmandu Valley. The fourth case study tells a story about an elderly PWW who works as a PWW despite physical challenges faced by her. And, finally, the fifth case study involving a scrap owner/dealer tells a story about how a PWW, with the help of training from an institution, evolved from being a PWW to a scrap owner/dealer.

d. *Census Survey:* The census survey was a study tool that was used in order to help provide a more holistic and realistic representation of PWWs with regard to the waste PET bottles scenario within the study areas and the players involved in it. The census survey was conducted in order to help extract more information with regard to the number of PWWs, their gender distribution, and incidence of child labour as well as the number and names of scrap owners in the study areas.

   A total of 151 clusters were visited by the team to conduct this census survey.

viii. **STEP 8: Consultation with Key Stakeholders:** During this step of the study, the following study methods/tools were used:

   a. *Focus Group Discussions (FGDs)*: At least one FGD was conducted in each municipality and Okharpauwa, participated in by a group of PWWs (with group size ranging from 5 to 15 individuals). The team conducted a total of 20 FGDs.
   b. *Key Informant Interviews (KIIs)*: 30 semi-structured KIIs were carried out with selected representatives from the Waste Pickers Organisation *(Samyukta Safai Jagaran, SASAJA* for short), the Solid Waste Management and Technical Support Centre (SWMTSC), the Nepal Reuse and Recyclable Goods Entrepreneurs Association (NRRGEA), project and partner staffs, solid waste collector private company, final product producers and users, municipality officials, and other relevant personnel. Moreover, telephone was used to collect information from key informants located outside of the Kathmandu Valley.
   c. *Consultation with Project Staff(s):* Consultations were made with project staff(s) with regard to the study on a need basis.

ix. **STEP 9: Information Processing:** The quantitative and qualitative data thus collected from fieldwork was entered and processed using Statistical Package for Social Sciences (SPSS) version 20.0 and Microsoft Excel 2010. Useful tables and graphs were generated using these programs.

x. **STEP 10: Consolidation of Findings into a Draft Report:** The findings from the study were consolidated into a report format.

xi. **STEP 11: Submission of Draft(s):** Draft version(s) of the report were submitted to the HCI and GIZ for their feedback and comments.

xii. **STEP 12: Incorporation of Comments and Feedback on the Draft(s):** The comments and feedback received from the HCI and GIZ were incorporated to ensure that the objectives of the study were met.

xiii. **STEP 13: Submission of the Final Report:** Finally, a proofread report was submitted to the HCI.

Annex C: Individual Primary Waste Worker Survey Questionnaire

Study on Collection of Waste PET Bottles in the Kathmandu Valley

Questionnaire for IPWWs

Himalayan Climate Initiative/Development Inn

INFORMED CONSENT

Dear respondents: Namaste!!

My name is _____ and I am working with _____. We are conducting a survey to assess the socio-economic status of informal waste workers. We would appreciate your participation. The survey shall take about 40 minutes. The information you provide will be kept strictly confidential. Participation in this survey is voluntary and you can choose not to answer any individual question(s) or all of the questions. However, we hope that you will participate in this survey by providing correct and factual information.

Would you like to participate in this survey?

[ ] Yes → PROCEED

[ ] No → END

IDENTIFICATION AND GENERAL INTRODUCTION

Form number: _____ IPWW ID: _____

_____

Interviewer name _____

Date:_____(DD/MM/YY)

Municipality/VDC: _____

Name of cluster/address: _____

Name of respondent: _____ Caste/ Ethnicity: _____

Age: _____ Years Sex:

M	F

Nationality: _____ District of origin/birth: _____

Religion: _____

HH family size:_____

QN.	Questions and filter	Choices		Answer or code	Remarks
1.	**EDUCATION**				
1.1	Educational status	1. Illiterate 2. Literate 3. Primary (class 1 to 5) 4. Lower secondary (class 6 to 8) 5. Secondary (9 to 10) 6. Higher secondary or above			If ***Literate***, please write down the highest class attended: _____
1.2	Are you currently studying at an educational institution?	1. Yes 0. No			
1.2.1	If yes, at which grade/level?	1. Primary (class 1 to 5) 2. Lower secondary (class 6 to 8) 3. Secondary (9 to 10) 4. Higher secondary or above 88. Other……			*Go to QN 1.4*
1.3	Have you attended any informal/adult learning class(es)?	1 Yes 0 No			
1.4	What is your marital status?	1. Unmarried 2. Married 3. Widow 4. Divorced			*If **Unmarried**, go to QN 2.1*
1.5	Do you have children?	1. Yes 0. No	If **Yes**,		*If **No**, go to QN 2.1*

			Son _____ Daughter _____		
1.6	Do you have children of school-going age? (5 to 17 years)	1. Yes 0. No			*Go to QN 1.9*
1.7	Do any of your children go to school?	1. Yes 0. No			
1.7.1	If yes, which type of school?	1. Private/boarding 2. Community/public /government 88. Other……..			
1.8	Has your child been supported by project for education?	1. Yes 0. No			If **No**, go to QN 1.9
1.8.1	If yes, what kind of support?	……			
1.9	Any of the children from your family dropped school?	1.Yes 0. No			If **No**, go to QN 2.1
1.9.1	What were the reasons to drop school?	…..			

QN.	Questions and filter	Choices	Answer or code	Remarks
2.	**GENERAL AND SOCIO-ECONOMIC STATUS**			
2.1	Does your household have any of these amenities? ***(Multiple choices possible)***	1. TV 2. Radio 3. Mobile 4. Cycle 5. Waste collection tools		
2.2	Do you have latrine/toilet in your house?	1. Yes 0. No		
2.3	What is the main source of drinking water for your family?	1. Piped water supply (tap) 2. Covered well 3. Tube-well/hand pump 4. Open well 5. Stream/river 88. Others…….		
2.4	What is the main source of fuel for cooking in your household?	1. Firewood 2. Animal dung 3. Charcoal 4. Electricity 5. Kerosene 6. LPG Gas 7. No cooking at all 88. Other……		
2.5	What has been the single main source of income for your household in the past 12 months? ***(Single answer; probe for the one main source)***	1. Waste collection 2. Agriculture 3. Labour/daily wage 4. Service 5. Business 6. Foreign employment 88. Other…….		

2.6	What is the total annual income of your household *(including all sources)*?	**Income**	**Wage per day (NRs.)**		**Number of working days per month**	
			Income source 1	*Income source 2*	*Income source 1*	*Income source 2*
		Respondent (IPWW)				
		Other HH members:				
		1.				
		2.				
		3.				
2.7	Have you or your family taken loan from anybody or bank(s) or other financial institution(s)?	1. Yes 0. No			*If **No**, go to QN 3.1*	

QN.	Questions and filter	Choices	Answer or code	Remarks
2.7.1	If **Yes**, where did you take the loan from?	1. Bank 2. Saving/credit group 3. Cooperative 4. Finance company 5. Kawadi 6. Friends 7. Relatives 88. Other……..		
2.7.2	What is your reason for taking loan(s)?	…… ……		

3.	WORKING CONDITIONS AND WAGES			
3.1	For how long have you been working as IPWW?	…… *(months/years)*		***(Write 0 for less than 1 month)***
3.2	What is the main activity you perform as IPWW? *(Single answer)*	1. Waste separation 2. Waste collection 3. Rickshaw pulling 4. Waste carrying 5. Waste recycling 88. Other…….		
3.3	What did you do before working as IPWW?	1. Go to school/education 2. Household work 3. Labour/daily wage 4. Domestic worker 5. Farming/agriculture 6. Own business 88. Other…….		
3.4	What was the triggering factor/cause for you to get involved in this occupation? *(Single answer)*	1. Poverty 2. Easy job 3. Loss of parent(s) 4. Ran away from house 5. Historical occupation 6. No alternative 7. No reason 88. Other……		
3.5	Is any other member of your family/household also an IPWW?	1. Yes 0. No		
QN.	**Questions and filter**	**Answer or code**	**Remarks**	

3.6	What are the different kinds of wastes that you collect? ***(Multiple answers possible)***		**Waste types**	**Amount collected per day (**in*pieces or kg***)**	**Price at which the waste is sold to waste dealer (NRs.)/piece or kg**	
					3 years before	*Now*
		1	PET Bottles			
		2	Plastic bag			
		3	Paper			
		4	Aluminium			
		5	Glass			
		88	Other			
If the IPWW collects/deals with PET bottles, then continue accordingly; if they do not deal with PET bottles, skip to QN.3.7.						
3.6.1	Assume that a company/dealer offers you a new deal to sell only PET bottles. What would be the (acceptable) minimum selling price per kg for you?	1. _____NRs./kg				
3.6.2	Over the last 12 months, which three months were the best in terms of income earned from PET bottles?	1. _____Month 2. _____Month 3. _____Month				
3.6.3	Which three months were the worst in terms of income earned from PET bottles?	1. _____Month 2. _____Month 3. _____Month				

3.6.4	Is there an increase in the number of waste PET bottles and your income during Dashain and Tihar?	1. Yes 0. No		
3.6.5	Now, by focusing only on waste PET bottles, please tell me about the seasonal differences in your income.			

PET Bottles	Best month	Worst month	Festival month	Any remarks
PET bottles collection at different seasons (kg/day)				

QN.	Questions and filter	Choices	Answer or code	Remarks
3.7	Where do you sell the waste you collected?	2. Kawadi 3. Other (specify) _____		
3.8	Are you satisfied with the wage you are being paid?	1. Yes 0. No 99. Don't know		
3.9	Do you use safety equipments when at the workplace?	1. Yes 0. No		*If **No**, go to QN 3.13*
3.9.1	If ***Yes***, what type of safety equipments do you wear?	1. Mask 2. Gloves 3. Bright reflective vest 4. Others (specify) _____		
3.10	How often do you wear such equipments while you are working as IPWW?	1. Always 2. Most of the time 3. Sometime 4. Rarely 5. Never		

3.11	Did you get any safety equipments from the outsiders?	1. Yes 0. No		
3.12	*Which of these safety clothes/equipment is the respondent wearing during the interview?*	1. Mask 2. Gloves 3. Bright reflective vest 4. Other _____		
3.13	Are you satisfied with the work you are doing?	1. Yes 0. No		
3.13.1	If ***Yes***, why? If ***No***, why?	……		
4	**INVOLVEMENT IN GROUPS AND TRAININGS**			
4.1	Are you involved in any group?	1. Yes 0. No		
4.1.1	If ***Yes***, what does the group do? *(Activities of the group)*	1)…….. 2)…….. 3)…….. 4)……..		
4.2	Are you involved in any	1. Yes		*If **No**, go to*

	savings and credit group?	0. No		*QN 4.3*
4.2.1	If ***Yes***, how much money have you saved until now in the group?	…….. NRs		
QN.	**Questions and filter**	**Choices**	**Answer or code**	**Remarks**
4.3	Are you involved in small scale enterprises?	1. Yes 0. No		
4.3.1	If ***Yes***, what type of enterprise?	……		
4.4	Have you been involved in any type of waste related training(s)?	1. Yes 0. No		*If **No**, go to QN 5.1*
4.4.1	If yes, what type of training? *(Multiple responses possible)*	1. Waste separation 2. Waste collection 3. Waste recycling 4. Waste reuse 88. Other…….		
4.4.2	Who provided the training?	1. PRISM project 2. Other I/NGO 3. Municipality 4. Kawadi owner 88. Other……..		
4.5	Was the training useful?	1. Yes 0. No		
4.5.1	If ***Yes***, how the training was useful to you?	……		

	If ***No***, why it was not useful?	…… ……..		
5	**HEALTH**			
5.1	Have you suffered from any type of illness within the last 30 days?	1. Yes 0. No		
5.1.1	If ***Yes***, what type of illness? ***(Multiple answer possible)***	1. Fever 2. Skin disease 3. Chest pain 4. Headache 5. Diarrhoea 6. Back ache 7. Muscle pain 8. Eye injury/irritation 88. Other……		
5.2	Have you been injured in any form within the last 30 days?	1. Yes 0. No		*If **No**, go to QN 5.3*
5.2.1	If ***Yes***, kind of injury was it? ***(Multiple answer possible)***	1. Fall injury 2. Accident (e.g. traffic accident) 3. Cut injury 4. Attack from domestic animals (e.g. dog) 5. Violence 88. Other……..		
QN.	**Questions and filter**	**Choices**	**Answer or code**	**Remarks**
5.3	Did you seek any treatment for the illness/injury you experienced?	1. Yes 0. No		*If **No**, proceed to QN 5.4*
5.3.1	If ***Yes***, where did you go for your treatment?	1. Government hospital 2. Private hospital 3. Pharmacy (medical) shop 4. Private clinics 5. Traditional healer		

		88. Other…….		
5.3.2	How much have you spent on treatment of your illness/injury in the past 30 days?	NRs: _____		
5.3.3	If treated, who paid for the treatment?	1. Self 2. Family members/friends 3. Kawadi owner 4. Insurance 5. I/NGOs 88. Other…….		
5.4	Do you have a health care insurance?	1. Yes 0. No		*If **No**, go to QN 5.5*
5.4.1	If ***Yes***, who pays the Premium for the insurance?	1. Self 2. Kawadi owner 3. PRISM project 88. Other……..		
5.5	In the past 30 days, how much work did you miss due to some form of illness/injury?	1. Less than one week 2. One to two weeks 3. Two weeks to one month *If the respondent answers exact days, note down the number of days absent in work*_____		
5.6	Do you smoke?	1. Yes 0. No		
5.7	Do you drink alcoholic beverage(s)?	1. Yes 0. No		
6	**SOCIAL SECURITY AND RESPECT**			
6.1	Have you heard about social security? *(awareness about social*	1. Yes 0. No		*Explain about social security or*

	security)			*protection*
6.2	Do you receive any form of social protection?	1. Yes 0. No		*If **No**, go to QN 6.3*
6.2.1	If ***Yes***, what type of social protection do you receive or have received in the past?	1. Health insurance 2. Free education 3. ID card 4. Security/protective equipments 5. Cash support/small grant 88. Other…….		
QN.	**Questions and filter**	**Choices**	**Answer or code**	**Remarks**
6.3	Do you feel uneasy performing this work due to the (mis)behaviour of people?	1. Yes 0. No		*If **No**, proceed directly to the open-ended questions*
6.3.1	If ***Yes***, what are some of the common examples of ill-behaviour(s) that are directed towards you because you are an IPWW?	1. Being referred to as 'KHATE' or other swear words 2. Spitting 3. Being scolded and/or chased away 4. Exposed to domestic dogs 88. Other…….		

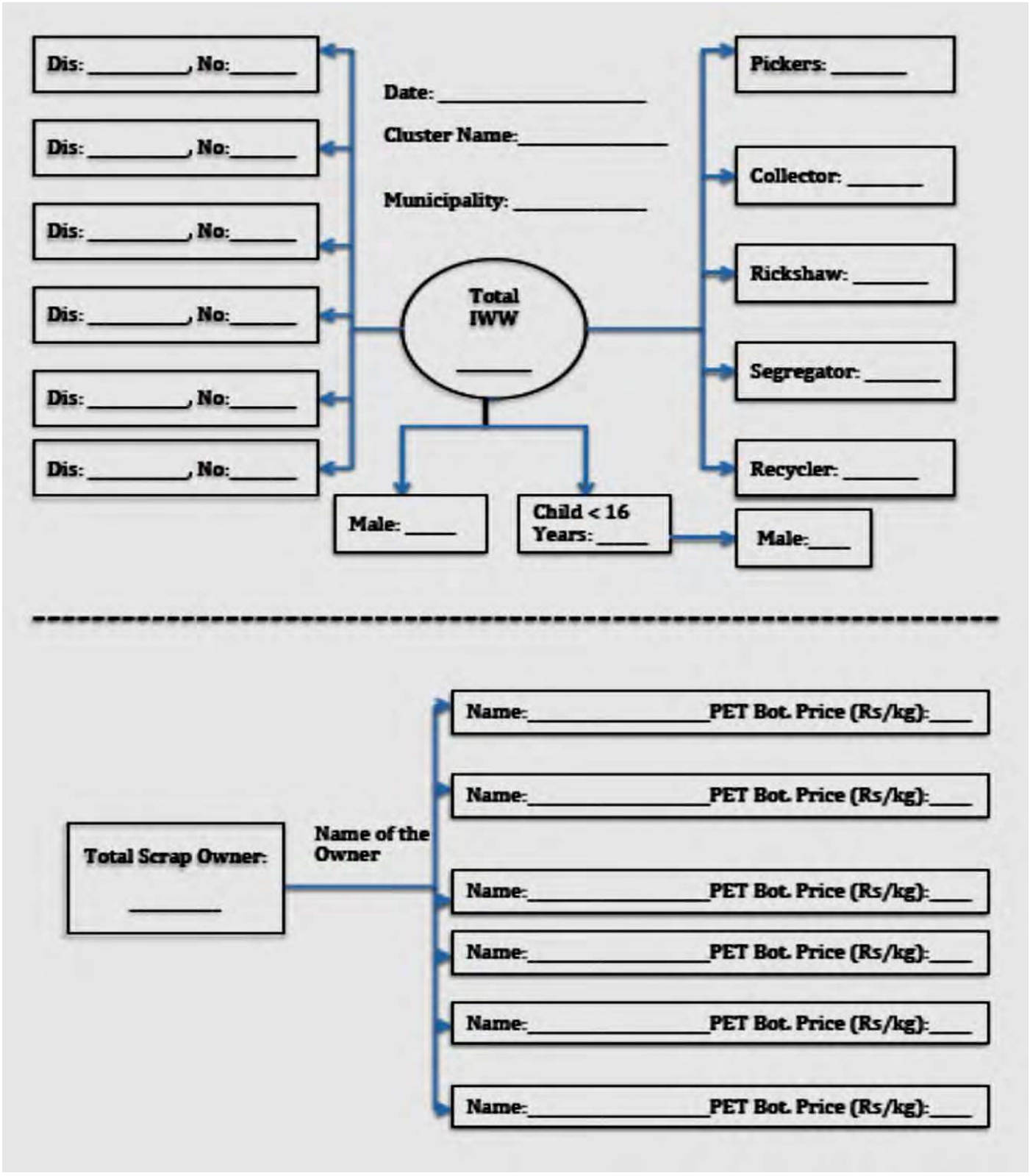
What type of support do you suggest/expect from future programs?

On education
On health

On social protection
On policy
On waste collection
On organisation/awareness

Others

Annex D: Population Census Survey Flowchart



Annex E: List of Participants in the FGDs

List of Focus Group Discussions Conducted						
S.N	**Focal Person**	**Address**	**Municipality**	**List of Participants**		
				Male	**Female**	**Total**
1	Birendra Sah	Imadole	Lalitpur	6	0	6
2	Dhanjit Das	Kharibot	Lalitpur	9	0	9
3	Sunil Kumar Shah Kalawar	Kusunti	Lalitpur	15	0	15
4	Bachhe Lal Sah	Sundarighat	Lalitpur	2	8	10
5	Hari Shrestha	Satdobato	Lalitpur	4	3	7
6	Mukh Lal Sah	Lukushi	Lalitpur	8	0	8
7	Rajan Shrestha	Koteshwor	Kathmandu	6	0	6
8	Bhim B Rai	Jadibuti	Kathmandu	3	3	6
9	Ram Shah	Mitrapark	Kathmandu	5	0	5
10	Sunil Podar	Shankamul	Lalitpur	7	5	12
11	Pramod Sah	Balkumari	Lalitpur	9	0	9
12	Om Prakash Chaudhary	Kalopool	Lalitpur	3	3	6
13	Tek Bahadur Rai	Sundarighat	Lalitpur	5	8	13
14	Shambu Yadav	Pepsicola	M.Thimi	8	0	8
15	Lakhindra Shah	Gatthaghar	M.Thimi	4	0	4
16	Rajesh Shah	Thimi	M.Thimi	7	1	8
17	Ravi Tamang	Suraj Kawad (Teku)	Kathmandu	2	7	9
18	Shyam Thakuri	SASAJA (Teku)	Kathmandu	4	4	8
19	Lallu Podar	Bhaktapur	Bhaktapur	6		6
20	Parang Lama	Kirtipur	Kirtipur	4	4	8
			Total	**117**	**46**	**163**

Annex F: List of Participants in the KIIs and Contact Details

List of KIIs Conducted				
S.N	**Focal Person**	**Institution**	**Address**	**Designation**
1	Pradeep Amatya	Lalitpur Sub-Metropolitan City	Kharibot	Environment Chief
2	Gyan Bahadur Tamang	Suraj Kawad Centre	Teku	Scrap Owner
3	Maya Tamang	SASAJA Cooperative	Teku	Treasurer
4	Shyam Thakuri	SASAJA	Teku	President
5	Raghu Tamang	Ekikrit Puna Prayogiya Bastu Sankalan Tatha Packaging Centre	Teku	Manager
6	Pannalal Podar	Rickshawchalak Puna Prayogiya Bastu Sankalan Tatha Kharid Bikri Kendra	Teku	Owner
7	Ek Raj Subedi	NEPCEMAC	Chappalkhar khana	
8	Rajesh	Scrap	Koteshwor	Owner
9	Pradip Shah	New Omkar Plastic Bottle Processing Centre	Thimi	Owner
10	Bishan K.C	Bhat-Bhateni Supermarket & Departmental Store		
11	Om Prakash Chaudhary	Bailing Company	Sanepa	Owner
12	Dinesh Sharma	Bhetghat Restaurant	Anamnagar	
13	Dhana Prasad Acharya	NGO-FEC/ECI	Ratopool	Secretary/President
14	Basu Upreti	SWMA	Teku	President
15	Amit Jaisawal	Shree Ganesh Scrap Collection Centre	Teku	Owner
16	Indra Bahadur Rai	Scrap	Chabahil	Owner
17	Subash Shrestha	Nepal Truck Container Professional Association	Thankot	
18	Sarkar Dip Shrestha	KMC/Landfill site	Okharpauwa	Landfill site in-charge
19	Birendra Sah	Scrap	Imadole	Owner
20	Sunil Kumar Jaisawal	Jai Hanuman Scrap Centre	Kusunti	Owner
21	Baburam Chaulagain	NEPCEMAC	Chappalkark hana	Branch Chief
22	Narshing Das	Kalopool Fohar Bywasthapan Samuha	Sanepa	Individual waste worker
23	Lallu Podar	Scrap	Bhelukhel	Owner
24	Ranjit Podar	Scrap	Deukhel	Owner

25	Rabin Man Shrestha	Kathmandu Metropolitan City	Teku	Head of Environment Department
26	Kripa Shrestha	Bottlers Nepal Limited	Balaju	Assist Manager-PAC
27	Prakash Sharma	International Labour Organisation	Kathmandu	Child Program-PC
28	Bharat Acharya	FNCCI/ PET	Kathmandu	President
29	Daniel Burgi	Himalayan life Plastic Pvt Ltd	Pokhara	General Manager
30	Keshav Giri	MM Plastic	Biratnagar	Profiteer

Annex G: Total Mineral Water waste PET Bottles Consumption in the Kathmandu Valley

SN.	Season	Months	Bottles No./day	Bottles No./month	Bottles No./year	Bottles Kg/year	Bottles ton/year
1	Summer (April - Oct)	7	250,000	7,500,000	90,000,000	2,432,432.432	2,432.43
2	Winter (Nov - March)	5	180,000	5,400,000	64,800,000	1,751,351.351	1,751.35
3	TOTAL	12					4,183.78
Source: Bharat Acharya, President, PET Products and Closure Manufacturer Association of Nepal, Kathmandu Phone: +9779851062478							

Annex H: PET Bottles' Sales Figures at Bhat-Bhateni Departmental Store

SN.	Months	No. of Months	Pet Bottles (in litre)	Rate (boxes)	Sale (No. of bottles)	Pet Bottles (kg)	Remarks
1	Dashain/Tihar	1	Coke (1.2 l)	500	6,000	222	Maximum sale month
			Pepsi (1.2 l)	400	4,800	178	
			Mineral waters (1 l)	500	6,000	150	
2	Nov-Feb (4 months)	4	Coke (1.2 l)	700	8,400	311	35% of the Dashain sale
			Pepsi (1.2 l)	560	6,720	249	
			Mineral waters (1 l)	700	8,400	210	
3	March – September	7	Coke (1.2 l)	1750	21,000	778	50% of the Dashain sale
			Pepsi (1.2 l)	1400	16,800	622	
			Mineral waters (1 l)	1750	21,000	525	
4	Annual sale	12	Coke (1.2 l)	2,950	35,400	1311	
			Pepsi (1.2 l)	2,360	28,320	1049	
			Mineral waters (1 l)	2,950	35,400	885	
5	Annual sale figure of PET bottles from Nexal Bhat-Bhateni Store				198,240	6,634	
6	Annual sale figure of PET bottles from other 7 Bhat-Bhateni Stores (30% of the Nexal Store x 7)					13,931	
7	Annual sale from eight Bhat-Bhateni stores					20,565	
	Source: Bishan KC, Grocery Manager, Bhat-Bhateni Store, Naxal; Phone: +9779801241409						

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