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RESEARCH ARTICLE

Livelihood of Independent Waste Pickers (*Tokai*) at Dhaka City in Bangladesh: Does it Incidental Choice of them?

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Abstract: The study reveals the status of waste pickers, their livelihood asset profile and the vulnerability due to climatic and anthropogenic factors. It considered the independent waste pickers of Dhaka City, known as *Tokai*, who collect waste, especially recyclable and reusable materials. Using semi-structured interviews and personal histories, two groups of participants were explored qualitatively: independent waste pickers and other stakeholders. Waste-picking is sometimes the first source of income for persons displaced to Dhaka as a result of human and non-human changes. While most were homeless sheltering anywhere they could, they made a valuable contribution to the recycling industry and to improving environment and ensuring others' well-being, filling a gap left by councils failing to collect the waste produced daily by residents and industry. However, their efforts are largely unrecognized, and their labour stigmatized. Consequently, they have far less access to health, education, credit and utilities. Moreover, poverty and lack of family guidance may make them vulnerable to pursuing involvement in ill-advised political activism. The study concludes that the government and others need to shape a policy that takes into account the livelihood and survival needs of waste pickers and strive to ensure the provision of decent work within this sector and recognition of their societal contribution.

1. Introduction

The term' waste picker' was adopted at the First World Conference of Waste Pickers in Bogota, Colombia, in 2008 to facilitate global networking (Bonner 2008; Dias 2012). There are two broad types of waste pickers. The first type is those who are listed and work under the city council and are private entities that are engaged on a fixed salary to collect waste from homes and dustbins and leave the waste at the relevant dump site. The second type of waste pickers are those who collect waste, especially recyclable wastes, from streets, dustbins, bus and rail stations, river terminals, over bridges and flyovers, and also from dump sites as independent pickers and sell such waste to local wholesalers as raw materials for the recycling and manufacturing industry (Fig. 1). These independent waste pickers (mostly the children of those who are homeless or living in slums) are locally known as *Tokai* or *Pothokoli (*buds on the street) in the Bangladeshi city. A brief survey of research studies reveals that attention has begun to be shown to the first type of waste pickers, those who are employed by the city corporation or private organisations; however, the second type of waste pickers, independent pickers, are completely deprived of attention because of the transitory and informal nature of their work. Therefore, this second type of waste pickers was the target (and thus the subject) of our study, even though they are not recognised by many city councils.

There is a huge number of independent waste pickers around the world, especially in the developing and less developed countries, gathering, arranging, and selling recyclable materials that another person has discarded in the city (Rouse and Ali 2001; Ullah 2008; Uddin and Gutberlet 2018). It is increasingly recognised that waste pickers are contributing to the circular economy, to general wellbeing and security, and to ecological sustainability (Asim et al. 2012; Maksud 2017). They frequently experience low economic wellbeing, deplorable living and working conditions, and receive little help from non-government organisations (Medina 2008; Maksud 2010; Gutberlet and Baeder 2008; Mapa et al. 2019). Waste pickers collect waste from waste containers, the streets more generally, from dumps and landfill sites, and offer recyclables to brokers or organisations to secure their livelihoods (Anschütz et al. 2004; Zia et al. 2008; Maksud 2017).

Dhaka is a densely populated megacity (Sajib and Moniruzzaman 2021) with a degree of air pollution (Islam and Chowdhury 2021). Waste is a component in the lives of any town or city, and so it is with Dhaka. Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC) oversee waste administration but have restricted

assets, which mean they are unable to successfully rid the City of all the waste produced day by day (Kazi 1999; Ullah 2008). Both city bodies openly admit that their waste handling systems can't adapt to the task of taking care of the enormous volumes of waste products delivered by the consistently increasing numbers of city occupants and their increasing waste production, and that only 40% to half of the waste being created is actually being collected (Mitra 2016; Yasmin and Rahman 2017). The city corporations of Dhaka have estimated that out of 3500 tons solid waste produced daily, they are able to collect and dispose of via dumping just 1800 tons. In addition, 900 tons go to creating terraces and to land filling; street sides and open space receive 400 tons; while independent waste pickers collect 300 tons as recyclable materials; and 100 tons are reused at the point of generation (Bahauddin and Uddin 2012; Yasmin and Rahman 2017).

Tokai or Pothokoli in Dhaka work throughout the city to gather or 'pick' important waste from the roads and lanes, from shared road dumps and from landfill dump destinations used by city council (Rouse and Ali 2001; Ullah 2008; Maksud 2010). Their job reduces the quantity of recyclable waste and the dirtiness of streets, public places, bus stops, river terminals, railway stations, parks, and playgrounds. They help to shrink the waste at dump sites and reintroduce recyclable materials as valuable components into the manufacturing chain (Rouse and Ali 2001; Mitra 2016; Maksud 2017). Moreover, waste pickers by reason of the nature of their occupation improve the physical environment of the City and thereby increase the general wellbeing of those who dwell there (Kazi 1999; Uddin and Gutberlet 2018). There is no official measure of the number waste pickers of Dhaka megacity; however, it is estimated that there are 120,000 urban poor who fill the role of waste pickers in Dhaka City (Ullah 2008; Maksud 2010, 2017). Waste pickers are small scale, typically experienced, and part of the casual, urban self-employed sector (Hayami et al. 2006).

In two respects the waste pickers add value to city life. First, they improve the quality of city living by making the city cleaner. Secondly, they source the crude materials for those businesses requiring recyclable materials to operate (Rouse and Ali 2001; Ullah 2008). While hundreds of thousands of pickers collect waste, morning to night, with a bag on their chest (Ullah 2008; Maksud 2010) in an attempt to earning an income to support themselves and/or families and making the contribution outlined above, nevertheless, waste picking is problematised as messy, debasing work and the lowest conceivable employment (Dias 2016; Mitra 2016). Dealing with waste has always been a low status occupation in most societies and often can involve stigmatisation for workers. Descriptions such as 'debasing', 'contaminating', 'dirty' that also typify waste pickers as unfortunate casualties can further contribute to their suffering and low payment that fails to recognise their contribution to society but merely makes their lives even more difficult. It further contributes to accusations of an absence of pride, lack of security and access to formal work; absence of power, rights, or appropriate pay rates (Gunn 1992; Anschütz et al. 2004; Anschütz and Scheinberg 2005). Most of the waste pickers live beneath the extreme poverty line.

In all instances, independent waste pickers are the inhabitants of streets, bus stops, rail stations, parks, river terminals, under bridges or flyovers, and in slums in the Dhaka City. They have low status in the public arena and some of them are involved with minor misdeeds (Rouse and Ali 2001; Hartmann 2018). They are disregarded generally as far as access to services provided by city councils and other government organisations (Ullah 2008; Mitra 2016). From morning to night, they gather waste to provide their family with a subsistence standard of living while overlooking the possible risks to their own wellbeing (Asim et al. 2012; Bahauddin and Uddin 2012; Mitra 2016). They gather recyclable materials while employing no health and safety measures such as masks or gloves (Hayami et al. 2006; Ullah 2008; Hartmann 2018). For that, they face a many sort of medical issues (for example, those caused by chemical contamination, accumulation of particulate matter in their lungs etc. as well as cuts from contact with sharp objects and fractured bones from falls and subsequent infections). Moreover, they do not get any significant recognition or support from government and non-governmental institutions (Maksud 2010; Mitra 2016). Hence, despite the role they obviously play, they are not listed as waste pickers under the city council.

Reflecting the country's rural to urban internal migration that characterises development in all countries, the waste pickers in Dhaka City come from other districts of Bangladesh (Maksud 2017). Some push and pull factors are responsible for their relocation in urban area. The 'bait' of the possibility of a better future in the city and opportunity for work are attracting (or 'pull') factors while natural calamities, exploitation by members of the rural elite, elected representatives and political activists, and loan repayment difficulties are the 'push' factors that encourage (or force) movement from countryside to urban areas (Rouse and Ali 2001; Wilson et al. 2006; Bahauddin and Uddin 2012).

There is, however, a growing recognition that waste pickers contribute to the circular economy (Medina 2008; Asim et al. 2012; Uddin and Gutberlet 2018). A fair amount of research work has been done on the contribution of waste pickers in the informal economy (Gutberlet and Baeder 2008; Medina 2008; Uddin and Gutberlet 2018; Wilson et al. 2006). However, there is a lack of research regarding the status of living of independent waste pickers (*Tokai or Pothokoli*) and how their livelihood is becoming vulnerable. Most of the *Tokai* are homeless and their migration to city is frequently the result of climate change impact (Parvin & Begum 2018) and social-political disturbance. In urban areas, the independent waste pickers are vulnerable socially, politically and economically as well as to further climate change impacts (Uddin et al. 2020). They have very few assets to cope with this social-climatic vulnerability. More information is needed in regard to the actual situation of their living and livelihoods as well as their route to becoming a waste picker and the way they operate as a waste picker. Therefore, the aim of this research is to assess the livelihood status of independent waste-pickers in Dhaka City who are highly affected by natural disasters and anthropogenic climate change and other anthropogenic challenges (such as population pressure).

Conceptual framework: the Sustainable Livelihood Approach (SLA)

The study adopts livelihood assets from the sustainable livelihood framework as an analytical model to describe the livelihood status of the waste pickers. The Sustainable Livelihood Approach (SLA) was developed at the beginning of the 1990s by international development organisations such as DFID, OXFAM, UNDP, CARE etc. which were working in the global south (Carney 1998; Scoones 1998; Hai and Smyth 2012). The purpose of the SLA was to reduce poverty by designing effective policy and development interventions in less developed countries (Allison 2005). In the beginning, the approach was designed for reducing rural poverty, but the concept was also used in urban poverty contexts, and not only in the global south but also in the global north (Scoones 1998; Uddin and Gutberlet 2018). According to Moser (1998), the approach seeks 'to identify what [people] have rather than what they do not have' and '[to] strengthen people's own inventive solutions, rather than substitute for, block or undermine them' (Moser 1998, p. 1). The reason for the rapid development from concept to approach is an explanation of policy-oriented livelihood frameworks which describe and analyse the pressures, forces, and effects of all types of activities linked to the local situation of livelihood practices. Moreover, SLA offered a clear vision of an integrative approach with the ability to understand rural development (Chambers and Conway 1992; Solesbury 2003; DFID 1999).

Different organisations developed SLA to implement their own development activities. However, all of them adopt Chambers and Conway's (1992) definition of livelihood. According to Chamber and Conway (1992, p. 1): 'A livelihood comprises people, their capabilities, and their means of living including food, income, and assets. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations.' The main advantage of SLA as a methodological approach is its flexibility to understand livelihood status and livelihood patterns, and to discover alternative livelihood strategies. In addition, SLA helps to identify the strengths and weaknesses of existing activities and policies. In accordance with SLA, Ellis defined livelihood (2000, p.10) thus: 'A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household.' Besides the many benefits of SLA, it also has some weaknesses. The uses of SLA are diverse and flexibly adaptable to many settings, but it is not a completely new idea that can be described as revolutionary for development research and cooperation (Kollmair and Gamper 2002; GLOPP 2008). In addition, it also lacks a guideline on the basis for classifying individuals as 'poor'. Moreover, a capacity gap exists in local organisations regarding their ability to carry out the type of analytical research integral to adopting the sustainable livelihoods approach to development.

Although the sustainable livelihoods approach has a number of weaknesses to be remedied (Serrat 2017), it can be implemented successfully worldwide to address the livelihoods of the poor, women, and people living within disaster-prone areas etc. (Elasha et al. 2005; Kemp-Benedict et al. 2009; Pandey et al. 2017; Zhao et al. 2019) and as well as Bangladesh (Ahmed 2009; Rahman & Li 2018). Therefore, the present study has adopted the five capital or assets (**Fig. 2**) of SLA framework by DFID to assess the livelihood status of waste pickers of Dhaka City. The livelihood definition can be operationalised to the urban context of independent waste pickers where waste is the prime resource for livelihood security. SLA can provide a broad idea of the livelihood dynamic and strategy. The use of SLA for the present study is to discern an accurate picture of the total livelihood capital (including human, physical, natural, social and financial capital) of waste pickers in the urban context through the adoption of a qualitative research design. Moreover, it helps to describe livelihood vulnerability to climatic and socio-political shocks as well as possible livelihood strategies for future. In addition, the challenges to building a sustainable livelihood for independent waste pickers are also identified.

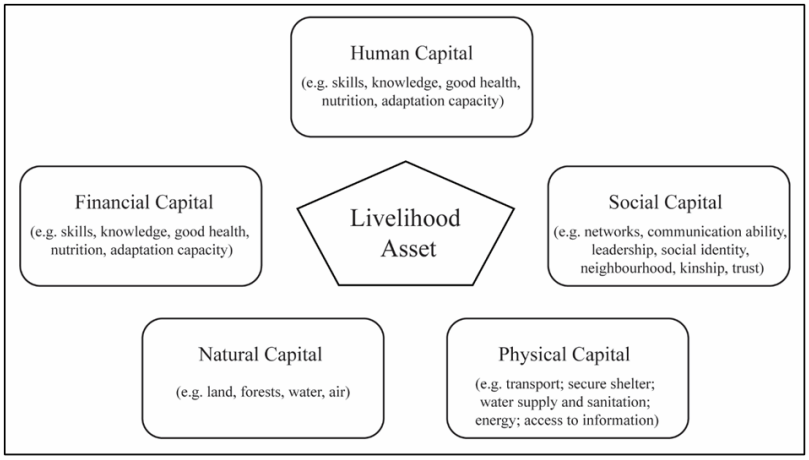
The asset pentagon stays at the heart of the livelihood framework, 'among' the vulnerability context. The Pentagon represents the people's assets visually and displays the inter -relationships between the various assets (DFID 1999). The accessibility to livelihood assets or capital for waste pickers have been assessed considering the five types of livelihoods

Figure 1. Schematic diagram of informal recycling services

Table 1. Asset score definitions

Definition	Score
For "Low access" to specific type of asset	= score would be from "0" to "3"
For "Medium" access to specific type of asset	= score would be from "4" to "6", and
For "High" access to specific type of asset	= score would be from "7" to "10"

Figure 2. Livelihood assets in sustainable livelihood framework (Adapted from DFID, 1999)



assets (human, physical, natural, social and financial assets or capital) that are mentioned in SLA.

No quantitative data have been collected for the representation of an asset pentagon. The present calculation of livelihood assets for a pentagon is part of a quantitative representation of qualitative data, and has been developed based on the participants' responses regarding their accessibility to different assets. The participants were asked to scale their accessibility to different assets from a value of '0' (least access) to a maximum of '10' (maximum access) for each type of asset (Table1). The centre point of the pentagon, where the lines meet, represents zero access to assets while the outer perimeter represents maximum access to assets. Finally, the scores of the assets are plotted in the pentagon's shape chart for developing a comparative overview of the asset composition of the respective livelihood group in each respective area.

2. Materials and methods

Research context

The research was conducted in five different places under the Dhaka South City Corporation. Of the two municipal corporations in Dhaka mega city, Dhaka South City Corporation (DSCC) is the outcome of the Local Government (City Corporation) Amendment Bill 2011 that was passed in the parliament of Bangladesh, with the President giving his assent to the legislation. Under this Act, former Dhaka city was divided into two—Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC). DSCC consists of 57 wards (**Fig. 3**) with elected representatives (18 new wards have been declared but no election has yet taken place). DSCC covers the entire old Dhaka, including the major suburbs of Wari, Bangsal, Sutrapur, Dhaka Kotwali, Jatrabari, Motijheel, Malibagh, Maghbazar, Shahbag, New Market, Khilgaon, Kamrangichar, Dhanmondi, Azimpurm and Gendaria. After the consultation with dealers, wholesalers, and NGO activists, five areas were chosen purposively from five zones of DSCC for this research. These are Dhanmondi (New Market), Khilgaon, Lalbagh, Motijheel, and Sutrapur. These areas have been chosen as they contain different slums, water terminals, railway stations, flyovers, pedestrian overbridges and parks, which are where waste pickers remain concentrated. These are also chosen to make the findings representative of the spatial variation of waste pickers' livelihood status in Dhaka.

Empirical data collection and analysis

The empirical data was collected using a qualitative research design. From the human geography point of view, qualitative research helps to gather information on the emotions, attitudes, behaviours, knowledge and perceptions. A semi-structured interview was applied for collecting data for baseline information like socio-demographic, economic, livelihood assets status etc. It was also used for the collection of in-depth information about waste pickers' livelihood activities, vulnerability, and strategies for alternative livelihoods. In addition, a life history provided further insights on why and how a person becomes a waste picker and their livelihood histories. All the interviews and life histories were recorded through note taking manually during fieldwork time. The verbal consent was taken before conducting interview and taking life histories. After recorded the interview conversation by note taking, data were translated for analysis through Atlas-ti software. Finally, qualitative data presents information in a descriptive manner.

Semi-structured interview

The purpose of the semi-structured interview was to get in-depth information about the livelihood assets of independent waste pickers. Moreover, it provides information regarding health hazards, and the engagement and relation of informal waste pickers to other stakeholders in the recycling chain. It also helps to collect information about the contribution of waste pickers to the recycling industry, implementation of existing policies, present problems, and initiatives taken to reduce their livelihood

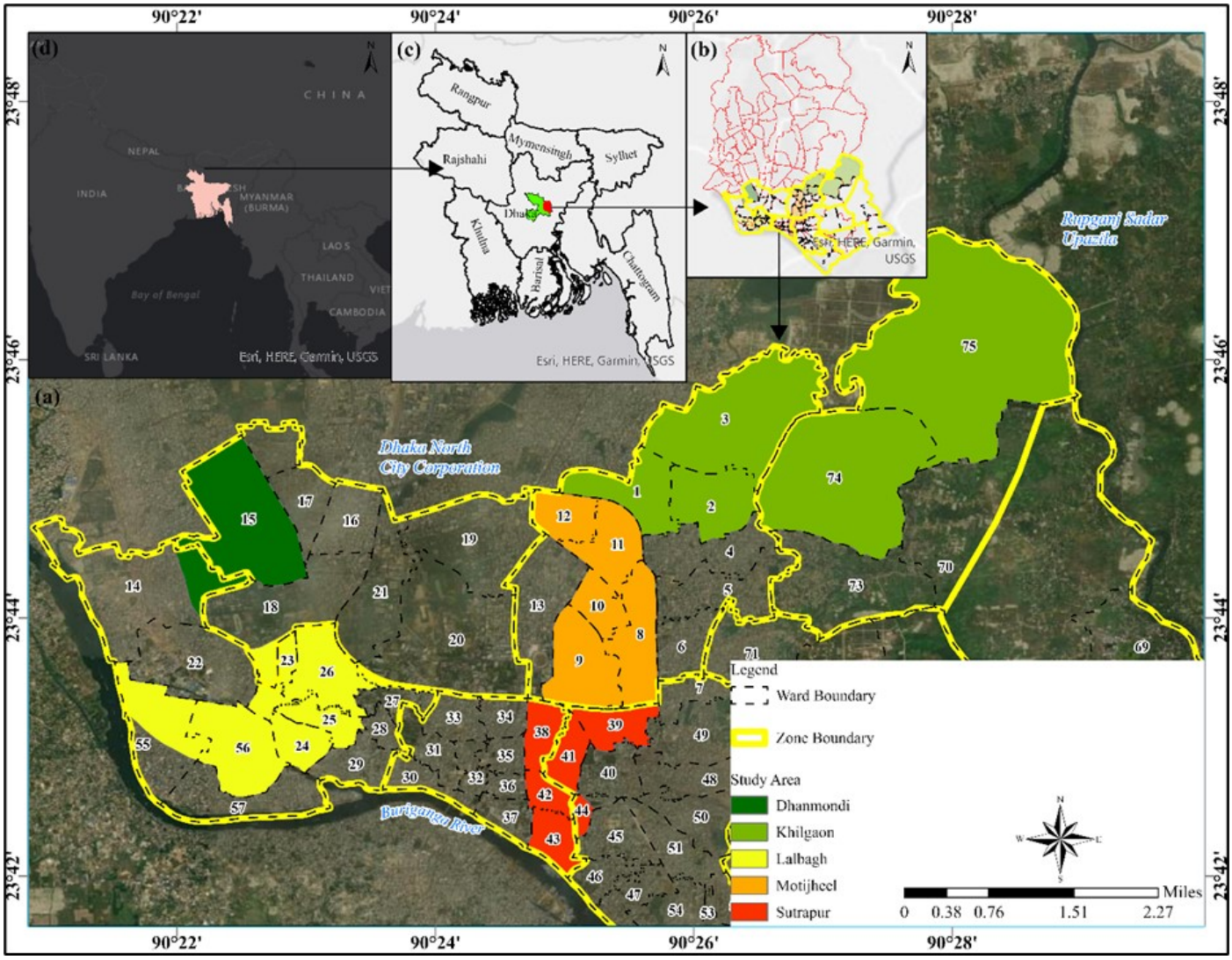


Figure 3. In the map (a) showing the administrative boundary of DSCC (Dhaka South City Corporation) with ward boundary (Dotted black color) and zone boundary (Yellow color) respectively. Dhaka South City Corporation comprises ten zones, which are divided into 75 wards. It shares land boundaries with Dhaka north city corporation (DNCC) to the north, Rupganj Sadar Upazila to the east, Keraniganj Sadar Upazila to the west, and Naraynganj Sadar Upazila to the south. The map (b) illustrates the location of DNCC in the Dhaka city map. The map (c) denotes the position of Dhaka city (Red polygon) within the Dhaka district (Green polygon) with divisional boundary. Lastly, the (d) map illustrates Bangladesh's location (light pink color) in the world. To the west, north, and east, it shares land borders with India, Mynamar to the south-east, and Bay of Bengal to the south. [Note: Upazila (administrative level boundary-3), district (administrative level boundary-2) and Division (administrative level boundary -1)].

vulnerability and information on how to recognise the waste picker's contribution. A semi-structured open ended interview guide was formulated for interviews with the subjects. Two types of participants were chosen for this research: first, members of the subject livelihood group—the independent waste pickers; and secondly, different stakeholders who were chosen as key informants (See table 2).

The selection of members of the livelihood group for interview followed the 'snow-ball' method as most of the informal waste pickers do not have a permanent residence. A total 20 interviews were conducted in Dhaka South City. In addition, a total of 8 key informants were interviewed from the chain of informal recycling services. They comprised 2 persons from wholesalers; 2 from dealers; 2 officials of Dhaka South City Corporation's waste management department; 2 persons selected from among social workers who were involved in the betterment of waste pickers. The respondents as key informants were chosen through simple random sampling. The interviews were semi-structured in nature and each interview was approximately 30–40 minutes in length.

Life history

A life history provides information about a whole past life enabling a clear visualisation of the story being told from the participant's memories (Liamputtong 2011). In collecting the life history, a researcher spends a long time with a single respondent. The use of the terms' life history' and 'oral history' can sometimes be confused (Safier 1977) but clear differences exist between them in terms of scope and emphasis (Choudhury 2015). In the case of a life history, the scope is much broader and emphasis is on the whole lifespan, while for oral history, the emphasis is on the mode of collection ('oral') and on particular past events and the scope is narrower (Liamputtong 2011; Choudhury 2015). The

Table 2. Data collection techniques, participants and purpose (n=33)

Instruments	Participants	Purpose
Semi-structured interview (total 28 interviews were conducted)	20 interviews were undertaken with informal waste pickers from different age and places. Eight other interview participants were taken from following groups: (i) two from informal recycling services; (ii) two from wholesalers; (iii) Two from dealers; (iv) two from officials of DSCC; and (v) two from NGO activist.	To collect data about the way waste pickers contributing for informal recycling industry and what's the status of waste pickers in terms of livelihood capital.
Life history (Five life histories were conducted)	Waste pickers	Using life histories, the history behind being a waste picker and socio-cultural and economic flow in their life.

method adopted to collect the life history for this research was semi-structured in nature. A total of five participants were considered for life history and their consent obtained prior to life history interview. The main reason for using the life history method for this study was to gather information about the waste pickers' livelihood history, and the causes and consequences of becoming a waste picker (such as environmental shocks), cultural agency, social power dynamics and institutional influences. The life history participants were chosen from both the interview participants and from suggestions made by participants.

4. Results and Disscusion

Waste picking has been a common initial source of income for new migrants to Dhaka City. It is popular since it takes minimal knowledge, few skills, and no financial resources. Many pickers, on the other hand, continue to pick for many years after they arrive. However, waste picking isn't only a job for newcomers. It's also an incidental choice, the product of lacking other options. Nevertheless, it is not the only option of pickers; sometimes, they undertake two or more activities. The children sometimes pick part-time, and only to support the subsistence of their family. Some pickers, especially those who are mid-aged, pick in order to manage their expenditure for food as well as alcohol or drugs. Some women pick waste in addition to their main activity as a domestic worker. Some pickers undertake many paid activities when not picking, including rickshaw repair, singing and begging. Some sell water, cigarettes, and ice-cream in the hot season. In the end, it is clear that their activities as pickers contribute to their individual and family livelihoods and, in addition, they make a good contribution in the informal circular economy as a source of raw materials. The results part has two sub-sections devoted to findings. The first section focuses on the contribution of waste pickers to informal economy of recycling industries. The second section considers the livelihood status and vulnerability of waste pickers.

The table 3 depict the socio-demographic characteristics include age, gender, education, daily average income and living place of the waster pickers. It shows that most of the waste picker's ages are below 25. Where 35% pickers are 18 years older or below and the other 40% are in the middle of the range of years 18-25. Because of the work nature of waste picking, pickers have to go to a variety of places which are remote as well as full of danger for a woman. By accepting this dangerous situation still, 25% of female community-engaged them in this work. Again in Bangladesh, climate migrants and poor people who do not have any permanent house came to the Dhaka city for better earnings. Due to high living cost, their children have grown up with extreme poverty, resultant very rarely access can happen in education. There can very hardly be seen a waste picker who completed at least primary education. Of the respondents, 35% and 10% of the waste pickers dropped out from class one to three (1 to 3) and class four to five (4 to 5) respectively. Moreover, 25% of the total respondent are illiterate and 30% can only do signatures/ write the name. Waste pickers went through all sorts of work to earn their wages to survive. Generally, people who have the least afford to survive do not engage in such a form of activity. The maximum and minimum daily income of the respondents is more than 150 BDT (1.77 USD) and less than 100 BDT (1.18 USD) respectively and 60% of the total participants can hardly manage a daily wage of 101-125 BDT (1.19 USD – 1.47 USD) which is very insufficient for living in Dhaka. Only 20% earn can earn more the 125-150 BDT (1.47 USD -1.77 USD). Also, severity can be understood by seeing the scenario that there are also 10% of people who cannot capable to earn 100 BDT (1.18 BDT) at all. Concerning the waste pickers living facility, their place of living is very unhealthy. The study shows that a major portion which is 70% of the total respondent has no own or parental place to live. As a consequence, most of them sleep in the railway station, bus stoppage, wharf, underpass, and overpass of roads.

Waste pickers contribution to recycling industry and urban sustainability

The independent waste pickers are contributing in many forms to urban recycling industry as well as building urban sustainability. In most of the case, the city governance is unable to collect all the waste because of their poor efficiency, budget misuse, lack of commitment, even in some case the authority ignored some issue regarding waste management. Moreover, high population density and poor awareness of city dwellers accelerate the dirtiness of the Dhaka city. In this context, along with government and private sector waste collector, independent waste pickers of Dhaka city contribute a lot in collecting recyclable waste (e.g. paper, plastic, cardboard, metals), improving urban environment, making quality space for city dwellers and adding value to economy.

Table 3. Socio-demographic characteristics of waste picker participants

Parameters	Participants (%)	Parameters	Participants (%)
Age		Gender	
<18	35	Male	75
18–25	40	Female	25
26–35	15		
35+	10		
Educational status		Place of living	
Illiterate	25	Slum	30
Only can write name	30	Railway station, bus stoppage and wharf	25
Year one to three	35	Underpass and overpass of a road	30
Year four to five	10	Other	15
Daily average income (BDT)			
<100	10		
101-125	60		
125-150	20		
>150	10		

The first contribution of waste pickers in Dhaka city is that they provide the raw materials to recycling industry. By this way, they are the primary source of employment generation in different phase—wholesaler, dealer, recycling and manufacturing factory. Our result shows a waste picker can provide average 10-12kg of solid waste daily. Waste pickers sell their product to wholesaler, in some case sell to dealer directly. Wholesaler then shift the solid waste to dealer after sorting out them into different categories. After that, dealer handover the sorting solid waste to recycle industry to prepare raw material for manufacturing industry. Finally, manufacturing industry produce new product from solid waste. **Fig. 1** portray the chain of waste pickers contribution to economy through employment generation and new production of goods. So, waste pickers materials not only make profit for themselves, but also generate benefit for scarp shops, dealers, recycling company and manufacturing industries. A long chain of recycling economy significantly depends on waste pickers contribution.

From the findings, the second contribution waste pickers make is regarding environment includes reducing pollution, hinder the spread of disease, improve the city cleanliness. Along with providing valuable materials for recycle industry to be reused, picking solid materials also protect the environment from pollution that ensure healthy space for city dwellers. And, to get a quality city, city dwellers don't need to pay to waste pickers. However, it is also found from the responses of interview participants that waste pickers are not well aware of the contribution they make. One waste picker stated:

"I don't have much idea what benefit the city dwellers get from us, even may be people get benefit from our work. But I don't do this to only for their benefit, I do this work for food and survive".

Livelihood capital and vulnerability of waste pickers

Status of human capital

Human capital comprises the skills, knowledge, good health, nutrition, and adaptation capacity of persons. Most (80%) of the waste pickers interviewed were homeless. The homeless participants were living in various places, such as bus stations, footpaths, under bridges, at railway stations and so on, and rest were living in slums. Most of the homeless pickers were homeless as the result of natural disasters (e.g. cyclones, riverbank erosion, and flood) and various anthropogenic factors.

Pickers considered themselves to have no need of training or special skills to carry out their job. However, they ignored their own health and safety, some of them even did not feel that they were collecting waste in a risky manner. The reason for this was that most of them have no education; some of them had never attended any school. Our results show 60% of the total respondents are illiterate, 15% can only sign their names, and only 5% of the respondents completed sixth grade. Of the respondents, 20% had dropped out of school between grades two and five. The Government declared that it tries to ensure the enrolment of all children of primary school age in primary school; however, the informal recycler (or picker) does not attend school because they have no permanent living space. Even those who attempt to attend school could not obtain a favorable environment. There are various reasons for not attending or leaving school. One respondent stated:

'I am Foysal (pseudonym), a ten year boy living with my mother. We have no permanent place to live, so which school [can] I chose to go [to]? Moreover, if I attend the school, by following the regular time table then I have a chance of losing my earnings. Though … primary school is free, I have needed to spend money for education materials and uniform. Besides that, our work is considered … dirty

work so it is difficult for us to cope with other students because of their bad attitude. We need [a] special school.'

The waste pickers have no formal or informal training to collect the recyclable waste. In our study no waste pickers (100%) have training opportunities for semi-skilled jobs as they held back by the opportunity cost. Also, they are not aware that they need any training to do their job. Although they are less educated or illiterate, they know the price of various waste materials and know the place where the goods are best sold. One picker opined:

'I think there is no need for any training to collect waste. I just listened to one of my friends and spent one whole day to have a look what he collected, how he collected and where he sold the product. Without a minimum education, how can I know how to develop my skill through training? However, I know where to find the waste, [and] who [will] buy it.'

Our study shows that waste pickers are not recognised or even acknowledged by the society. There is no sanitation facilities owned by waste pickers who are homeless. They often use the public toilets, and where these do not exist, they use open places, such as parks and fields. Most of the pickers do not use any protection while collecting waste to protect themselves from any health hazards. As a result, they frequently face elevated risks for many different diseases. One child picker collecting waste from a big garbage bin expressed his feelings in terms of health risk:

'I am Moyna (pseudonym). Collecting recyclable waste from the garbage bin located under Gulistan flyover, it's very difficult to stand on the pile of garbage for hour after hour. I cut my hands often while sorting and sifting through the trash. I chose this job against my will because I have no other alternatives.'

There are some urban health care centers in every ward of Dhaka City and people can get free treatment for general diseases, such as fevers, colds, coughs and so on. However, waste pickers often face difficulties in obtaining treatment at these health facilities because they are treated as 'dirty' persons. Everybody feels that waste pickers are dirty because they remove the untidiness, the waste materials from various places in the city. Given their financial situation, they also would not be able to obtain medical treatment from private hospitals; while, due to lack of acknowledgement of their work and the low status it holds, they also face difficulties obtaining services from a government hospital.

Status of social capital

Social capital includes the social networks, communication ability, leadership, social identity, neighbourhood, kinship, trust and mutual understanding that help people in the pursuit of their livelihood as well as their everyday existence. Pickers live in the streets, railway stations, bus stations, under-overpasses, and in slums. Within these areas, three main sets of relations are known to exist which are relevant to waste pickers. The first is the family who, according to many pickers, are called upon before any others in times of difficulty. The second set of relationships is friends, and the third is those relationships that exist between pickers and their dealers. Most of the waste pickers comes to this profession because of their social and economic marginalisation. They are living in extreme poverty and most of the child waste pickers chose this work for their own survival and that of their family. However, due to a lack of acknowledgement of the contribution of their work (and their lack of permanent residential address), they are often deprived of government social services. Some NGOs try to highlight waste pickers' contribution to the economy and society more generally, and acknowledge them.

Waste pickers use the relationship with family and friends and social networks to secure their livelihood from any kind of climatic and anthropogenic shocks and perturbations. Waste pickers receive support from their friends, their local 'dealer' or 'wholesaler', or depend on the income of the family head when they are in crisis. Those who are alone may starve for some time when there is no income. But many pickers in the study were found to obtain loans or financial help or other kind of support from their dealer or shop owners to whom they sold their waste. Shop owners and wholesalers acknowledged that they often credit pickers. Trust regulates the system, and 'interest' is paid in loyalty, not money. The business owners said they would give money to pickers for travel, medication, and other situations. Alternatively, valuable trash might be used to repay. This is a client/patron connection. The business owner has gained a monopoly over a picker, and the picker has avoided debt (Ullah 2008). Even so, to mitigate any quarrel among them they seek help from their wholesaler. Therefore, waste pickers always maintain a relation with their wholesaler. One wholesaler said:

'The relation between waste pickers and wholesaler is vice versa [mutual]. For that, we have a good relationship with them [for] several reasons. One, they need different types of assistance, including financial and social. Another reason is that without good relations with them, we could not able to achieve our daily supply to a manufacturing or recycling company. We need to track them and ensure our minimum supply of recyclable waste, otherwise we would not keep our commitments to industry. Therefore, we always try to solve the different problems of our suppliers.'

Social networking and relationships help people to cope with or withstand any kind of natural and anthropogenic shocks and perturbations. Waste pickers in Dhaka lack access to the formal infrastructure and services of the country, so their social networks constitute their 'safety nets'. Thus, many pickers work in pairs for social reasons and because they feel safer. Most of the surveyed waste-pickers (65%) work in pairs as they then have company as well as benefit from not working alone as, without anyone's help, it can be tough for them. The rest (35%) work alone. It was found that those who are living close together are more likely to be working together. and when they move from one place to another, they tend to move together. One interviewee opined:

'We are working with a group because it benefits us in several ways. One benefit is we can share our work and sometimes earn more. Another benefit is working in a group of 4 to 5 people builds a strong bond among our family that could help to protect us from outside invasion.'

The study tried to get the answer to the question about what they think about the ways to improve their social capital. The findings show that they expected a permanent place to live, special education, recognition of their work,

and training for seeking good work. Some of them were of the opinion that this needed to involve access to a social safety net program, potable water, health facilities and improved working conditions.

Status of physical capital

The components of physical capital include affordable transport; secure shelter and buildings; adequate water supply and sanitation; clean, affordable energy; and access to information as these are usually essential for sustainable livelihoods. Physical capital also includes manufactured goods (such as tools and equipment for production, technology) needed to support livelihoods. Our study has shown that the shelter pattern of waste pickers is very poor in slums and there is no question that those who are homeless required better shelter. The homeless waste pickers live in streets, parks, bus and railway stations, waterway terminals, on the stairs of shopping centers, schools and hospitals, seek shelter in abandoned structures, overpasses and so on. None of the participant waste pickers had any right of ownership to a residence place in Dhaka City. One respondent described:

'I am Sakib Khan (pseudonym), 11 year old boy migrated from coastal area. We lost everything due to a cyclone and [I] moved to Dhaka City 5 years ago with my mother. Currently I am living at the foot of a bridge [in the] Gulistan area. We four people are living here and working together. Before that, I was living in Sadarghat water terminal (wharf) at old Dhaka. My mother [was] living in a slum with my younger brother who is a 7 year old. Me and my mother try to send my brother to school.'

Waste pickers have only very limited access to electricity, water and sanitation. Those who are living in slums have to pay a small amount of money to get limited access to electricity, gas and water services. However, political leaders illegally manage most of these services for slum dwellers. Residents pay those leaders but often then that person may not convey the payment to the government, and so, despite payment, access may remain very limited. In contrast, those who are homeless could not pay for any of those services. They usually collect water from taps at parks and bus stations, or obtain water from tube wells and other open water sources. Water from these sources is not free from pollution and that brings different waterborne diseases. All the homeless waste pickers and their families used wood and leaves as the primary fuel for cooking. A significant number of slum dwelling waste pickers have access to gas or electric heater; however, as outlined above, political leaders manage these services illegally. In terms of sanitation, slum dwelling waste-pickers have access to a very poor sanitation system. Most of them have access to an enclosed pit toilet but too many are unhygienic and a few have access only to open toilets that may be protected by a sheet of polyethylene on one or two sides and is outside the slum dwelling or near sewerage lines). Moreover, those who are homeless are forced to use open spaces (especially parks and playgrounds, bus and railway stations, open drains, even sometimes the street) at night.

Status of natural capital

Natural capital includes the natural resource stocks that people can draw on for their livelihoods, including land, forests, water, air, and so on. Natural capital is the asset that translates least readily from the rural to the urban context. It is also the asset for which the Sustainable Livelihood Approach requires most modification to become relevant for waste pickers. Specific references to rural activities (e.g., farming and biodiversity) will not be relevant to pickers, but there are certain concepts which are also not relevant.

Waste pickers contribute to protecting the city environment from pollution by removing the waste from various places within the city. There is no way for them to access resources from natural sources like fishing, agriculture, collecting wood, honey harvesting, and so on, in the urban area. Human beings as individuals and collectively in workplaces and industry produce the recyclable and reusable materials that waste pickers collect. However, informal unlisted waste pickers are never paid to collect these materials from the city environment (and formal salaried waste pickers are only paid to collect from dustbins and homes). Hence, recyclable waste in the wider environment is considered the prime 'natural' asset for waste pickers in this research. However, although there is some competition to collect recyclable waste, there is a plenty of such capital (waste) available to waste pickers for a number of reasons. One cause is that the city corporations are unable to collect all of the waste due to their employee shortage and budget constraints. Secondly, there is a lack of awareness of the need to appropriately recycle waste or dispose of waste appropriately. Thirdly, there is a discrepancy between the amount of waste being discarded (much) and the number of bins available (few). The city dwellers are not very aware that they should throw their waste in the bin and there is a scarcity of bins in relation to the total amount of daily waste. Hence, waste tends to be discarded rather thoughtlessly. So, the pickers have access to this 'wealth' of 'abandoned' capital. Nevertheless, even after their efforts, other non-recyclable and non-reusable discarded waste remains. They have, however, significantly reduced the overall volume of waste.

Interviews found that the independent waste pickers faced different natural challenges in picking the waste materials. Most of them chose this occupation against their will. A good number of pickers migrated to the city due to natural calamities such as cyclones, riverbank erosion, floods and so on. In addition to that, those who are homeless face natural challenges such as heavy rain, cold [periods], hailstorms, northwesterly winds, and so on. Moreover, they face drinking water problems. Due to their living on the street and at bus stops they also encounter severe air pollution. As a result, it is difficult for vulnerable persons to survive in this environment that poses so many health hazards. One waste picker expressed:

'I am Sumon (pseudonym), a 15 years boy living in an over bridge at Motijheel CBD area. I am suffering from rain and cold wave during rainy season and winter. Rainwater makes my place wet and for that I could not sleep at night if it was raining. Moreover, during winter I suffered due to cold [periods] due to open place that bring flu and cough problems.'

Independent waste pickers make a great contribution to building national assets by collecting recyclable materials in

the circular economy. Given the shortage of government capacity to recover the waste from various places in the city, independent waste pickers make the city clean and that contributes to a favourable environment for city dwellers. However, the waste pickers' contribution remains unacknowledged. They have no official recognition, in particular in regards to urban micro climate change and human influence on climate. We found that no government agencies, groups and communities or even manufacturing company would recognise their contribution and do something for them.

Status of financial capital

Financial capital comprises income savings (in whichever form), access to financial services, and regular inflows of money. Financial capital is essential for independent waste pickers in Dhaka City because nothing is free in every megacity. The cost of living of independent waste pickers is very low even for those who live in slums. As with most slum dwellers on the sub-continent, food takes most of their income. Most of the homeless waste pickers are living virtually free of cost in relation to housing; however, some of them need to pay a small amount to secure their place at a railway station, underpass, park etc. They pay this amount to local political leaders, police and others who allow them to shelter in these places. The value of this unauthorised rent depends on the quality of place. One waste picker stated:

'I have been living in Kamalapur railway station over the last six months. I have to pay 200 BDT per month to the legman of the local leaders and authority. Without paying money it is not possible to sleep at platforms and other secure places of the station.'

The pay depends on the time spent picking rubbish. The survey indicated that waste pickers earn between BDT 100–150 per day. A salary of BDT 150 or more is remarkable, especially while working up to 12 hours each day. The majority of young pickers' earnings go to their parents. Married women rubbish pickers must provide their earnings to their spouses. Independents frequently save a portion of their income to cover unexpected expenses such as illness or other crises. For garbage collectors, saving is a critical coping method. However, our findings imply that around 70% of the surveyed independent garbage pickers are unable to preserve money owing to everyday household needs. One third of those who could save money, saved their money with different persons such as dealers or wholesalers, or organisations such as NGOs run co-operatives; others saved by themselves. And the reasons for saving money were clearly supplied by pickers as for emergencies, treatment, food, and clothes. Reasons for failing to save were also supplied. One waste picker said:

'I give all of my income to mother, keeping a small [amount of] pocket money. My younger sister is attending primary school regularly and a good portion of our income [we] spend for her studies. For that reason, I could not save money.'

Independent waste pickers have very little option to obtain credit or a loan from different sources. Due to their lack of permanent residence, it very difficult for lenders to track them for repayment of loan. For that reason, waste pickers have very little access to credit facilities. However, due to some emergency they may need to borrow some money. Most such emergencies are due to illness or lack of food. In such circumstances, the main source of credit for waste pickers is their wholesaler although waste pickers also borrow money from other waste pickers. Wholesalers risk giving them a small amount of money because without independent waste pickers they could not maintain their supply of recycled materials to the manufacturing industry. They seek to build a good relationship with waste pickers and sometimes give a loan as an advance payment on goods the wholesaler will receive from the waste pickers. Some non-governmental organisations try to create small co-operatives of waste pickers. The aim of these co-operatives is to facilitate waste pickers being able to save money on a weekly or monthly basis and then extend a loan to the member in the event of an emergency. NGOs have some success stories with other disadvantaged groups; however, they failed in the case of independent waste pickers because of the homelessness characteristic of waste pickers. Without a minimum permanent address (as the street or impermanent slum dwelling does not suffice), it would not be possible to track the pickers for the collection of savings and repayment of any loan. However, the independent waste pickers interviewed related that they received clothes during winter and very often they get some food (free or at low cost) from different individuals, groups and communities. One of the independent waste pickers said:

'My name is Mukul (pseudonym) and I am 18 years old. I am living in the Sayedabad inter-district bus terminal. I once received food several times in a month from an NGO named *Bidda Nandon* by spending only 1 BDT. They provide good quality food like rice, chicken, vegetables for street or homeless people by taking only 1 BDT. Many of these people like me to take their food with them every day in Dhaka City".

The waste pickers are very vulnerable in terms of financial matters. Access to credit is extremely difficult for them. They are dependent and exploited by wholesalers. Though they can receive a loan from a wholesaler in the event of an emergency, they are then bound to sell their product to the particular wholesaler who had given them the loan. As a result, they would not then be able to bargain about the price.

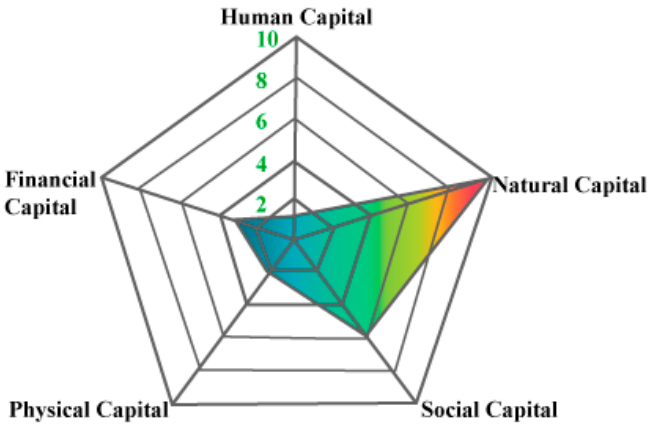


Figure 4. Asset pentagon shape shows the access of independent waste picker's to different assets.

The asset pentagon

The human capital of the waste pickers is very low as they are deprived of getting the education, information, technologies and training. The natural capital (waste) is indicated as the greatest waste pickers' asset. The status of financial assets of waste pickers are also quite poor as people in this category have a store of a low amount of savings and cash in their households.

The status of social assets of waste pickers (family, friends) is stronger than their own human or financial capital. Waste pickers ownership of physical assets is lower than the other types of assets. Most of the pickers' livelihood condition is very low as they live in slums or on the streets or similar. The comparative composition of the status of these five types of assets are presented in the spider web shaped pentagon (Fig 4).

5. Discussion

This research aims to reveal why people, especially adolescents chose waste picking and how they contribute to improving urban environment, accelerate urban economy, and to provide an in-depth understanding of the livelihood status of independent waste pickers. The finding reveals that waste picking is not their choice, but taken on incidentally because of insufficient alternative livelihoods. Waste pickers do such work as a new migrant from rural areas suffering from climate extremes, some are involved to support their family's subsistence, some pickers do it to afford alcohol or drugs, and some do it as their secondary and seasonal income. It is also found that, whatever the causes to take up waste picking activities, a useful contribution is made by them to the informal circular economy as well as to saving the environment.

It is found from the summarised findings that the livelihood capital of waste pickers is in a vulnerable situation, as there is only marginal access in some dimensions. In terms of human capital, most of the waste pickers are homeless, have fragile health, less educational access and have quite low skill levels (Navarrete-Hernández and Navarrete-Hernández 2018; Wilson et al. 2006). Two reasons are for their homeless status. First, most of the waste pickers are not homeless from their birth; they are homeless because of their moving to the city from rural Bangladesh as a result of their displacement by extreme climatic events such as floods, cyclones, riverbank erosion, and so on (Maksud 2017; Mediana 2008; Malak et al. 2021). Second, the anthropogenic factors such as separation of their parents, involvement with social crimes, social injustice, and so on have forced them to detach from family and friends, and the accommodation that may have accompanied their previous status (Mitra 2016). The lack of acknowledgement from the government and society regarding their work, their homelessness, absence of a guardian, and limited access to education and health, often no access in some cases (Huysman 1994) ensure that young waste pickers are growing up with few skills and this forces them to continue the waste picking job that required fewer or no skills.

In terms of social assets, waste pickers are more tied to friends and dealers, rather than family members in terms of kinship, trust and connectivity because of their floating or impermanent nature of their residency. Even so, waste pickers receive financial aid as a loan from the friends first, and from the dealers as a second option. However, priority was given to the family head or other family members when seeking any kind of advice in times of difficulty among those who are living in a slum and have a family. In terms of social security during waste collection, selling and living in their temporary residences, waste pickers usually maintain a strong relationship with their friends and dealers to protect them from any known and unknown critical social phenomena. For instance, they tend to work in pairs, even to move from one temporary residence to another together for safety and company. Due to the lack of proper guidance from parents and other guardians, waste pickers often are involved in various social crimes under the protection of evil people, musclemen, political leaders, and businessmen involved in the sale of illegal drugs (Maksud 2010; Rouse and Ali 2001). Both semi-structured interviews and life histories reveal that independent waste pickers are not acknowledged by the government, society, community and even individuals while the waste pickers who are working under the banner of the City Corporation and private organisations are starting to get some degree of recognition and can enjoy some social integration.

The natural assets usually refer to water, land, air, forest resources and other resources from the natural world that people use to achieve their livelihoods. Moreover, natural resources should come from natural sources. However, the farming based on land, the catching of fish from the water, the collection of wood from the forest are not relevant to the residents of the Dhaka megacity. Therefore, in the urban context and in the case of waste pickers, 'the recyclable waste', found across the landscape of town, city and waterway, is considered as a natural resource, and the reason for this is that waste pickers obtain this free from different sources (Gutberlet and Baeder 2008). The low capacity of the municipal authority to collect and manage waste, overpopulated in nature, and people's unwillingness to throw recyclable waste into a specific place are responsible for the abundance of waste in the street and open spaces of the city. This ensures access of waste pickers to these 'assets'. Despite this abundant natural capital, waste pickers' livelihood is affecting by natural phenomena such as heavy rain, heatwave, hailstorms, north westerly winds etc.

The livelihood assets are interlinked with one another in the process of livelihood achievement (Ellis 2000; Morse et al. 2009). So, the availability to one asset influences the accessibility to other assets. For instance, lack of land (and consequent homelessness) reduces access to physical capital such as housing, water, sanitation, energy, and so on. Homeless waste picker' access to these amenities is limited; they even use streets, market places, railway stations, bridges, underpasses, passenger sheds in the bus terminals, and parks as their housing. They use water from various unsafe sources and seek to use the public electricity at places of their shelter. The slum waste pickers access rental housing, and pay a muscleman and political leader for their utilities; however, the sources are not legal in most cases. Moreover, due to their involvement in so-called 'dirty work', they are deprived of health facilities, both government and private hospitals (Asim et al. 2012; Gutberlet and Baeder 2008; Hayami et al. 2006). Therefore,

waste pickers are frequently affected by different diseases that constrain their ability to earn their livelihood.

Despite the lower payment for housing, water, sanitation, energy (a small payment is made by those who live in a slum), waste pickers hold a poor and ultra-poor status: their low income and limited access to other assets are responsible for their living under the poverty line. A waste picker's average income is 80–100 BDT, and income above that amount is exceptional. They frequently would not have any savings after regular expenses. Consequently, waste pickers take a loan from dealers and friends when any emergencies arise. Moreover, when they take a loan from a dealer, they then have to sell their products to that dealer; this often deprives them of getting a fair price of their products.

Finally, the challenge before the waste pickers is to intervene in the development of waste related policies to ensure that their 'voice' is heard and that they have 'representation' in policy making that affects their lives. Government and others need to shape a policy that takes into account the livelihood and survival needs of informal workers (in this instance waste pickers) and which provides for decent work within this sector. For that, at first it would be needed for government and non-government agencies to recognise them and consider waste picking as a profession. Secondly, the acknowledgement of the waste picking profession should involve addressing the health and safety issues of waste pickers. Thirdly, an association of this type of waste pickers (independent) should be formed so that they are able to raise their voices and bargain to establish their rights. Fourthly, a formal training for waste pickers should be introduced (with health and safety training) that ensures access to jobs related to waste picking, in management, in the recycle and reuse sector, and easy access to financial credit for waste pickers.

6. Conclusion

The current paper reveals the asset profile of independent waste pickers who are vulnerable on different scales in the face of some climatic, social, economic and political factors. Most of them have no fixed address, living in various temporary urban places without any safety. The number of waste pickers is increasing as people continue to migrate from coastal and other rural areas to the city. They are not undertaking waste picking by choice, rather there is less opportunity for alternative livelihoods. They think that picking recyclable goods from streets, dustbins and dumping areas does not require any skill and experience, and that any newcomer can easily become a waste picker. However, due to lack of proper protection when searching reuse materials from garbage bin, streets and landfill sites, they are subject to different diseases as part of the health risks that they face daily. This situation is further exacerbated by their lack of access to health services, not just due to low income which precludes private hospitals or medical centers, but more generally from even government funded centers as people regard them as 'dirty' and homeless and in some instances refuse to treat them. However, the attitudes of those who should offer care is often enough to dissuade them from seeking assistance even when they need it.

This research has made a significant contribution in two ways, both for academia and the development sector. First, it opens up the discussion in academia about the waste pickers' life and livelihood and their contribution in the circular economy (and the valuable role played by waste pickers) in the developing and less developed urban context. It will contribute as a first-hand account of regarding waste pickers' lives and livelihoods, as well as the push and pull factors related to their adoption and maintenance of that means of income (and its implications for them), especially for those who do not work under any formal authority. Second, it addresses the contribution made by waste pickers to the liveability, sustainability and resilience of the city for city dwellers, and asks that some greater positive recognition be granted to them. Therefore, it will help the policy maker and development practitioner to design better development projects for implementation to build a sustainable livelihood for the waste pickers.

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