

# **Socio-economic aspects of solid waste recovery and recycling in Bangladesh: A case study of Khulna city**

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## **Abstract**

Over the last couple of decades, there has been a growing recognition of involvement of informal sector to ensure economic, social and environmental benefits from municipal solid waste management (MSWM). As the demand of recyclable products is increasing day by day in order to save resource and energy, informal waste pickers/scavengers play an important role in the waste recycling process. On the other hand, informal waste recovery and recycling is particularly important for the cities in developing countries, where public authorities are financially and technically incapable of handling the major portion solid wastes. Like other cities of developing countries, Bangladeshi cities often collect only 40% to 50% of waste generated, with open dumping the only disposal method available. Up to 2% of urban population in the metropolitan cities of Bangladesh depend on informal waste picking from the dumping sites, roadside, lowland, canals, drains or house premises to earn their livelihood. Waste recovery and recycling are carried out by underprivileged people, that's why social and health issues are now considered as the integral part of the solid waste management in the cities of developing countries and urge to develop a social planning dimension within the framework. This article tries to focus on the type of inorganic waste collected by the scavengers, their socio-economic status and the informal recycle chain of the waste (collected by the scavengers) to be recycled.

**Keywords:** Municipal Solid Waste, Scavenging, Waste Picking, Informal Sector, Recovery and Recycling

## **Introduction**

Solid wastes management and recycling is one of the major environmental problems faced by the city authorities in developing countries. In Bangladesh, the urban population have been increasing at a very steep rate, about 6% and is concentrated mostly in six major cities, where nearly 13% of total population and 55 to 60% of total urban population are living. Management of these steeply increasing vast quantities of solid wastes is a very complex process indeed. Due to severe financial constraints, absence of appropriate technology, lack of people's awareness,

motivation and participation, ineffective legislation and law enforcement to protect the environment, the whole system is becoming a threat to city dwellers, planners and other stakeholders (Alamgir et al. 2007). Like other cities of developing countries, Bangladeshi cities often collect only 40% to 50% of waste generated, with open dumping the only disposal method available (Wilson et al. 2006). Insufficient collection, uncontrolled street collection points and improper disposal in open dumps allow refuse to be readily available for informal waste recycling through scavenging/waste picking. This type of waste picking is generally carried out by the poor and marginalized social groups (scavengers/waste picker, locally called '*tokai*') who involve into it for income generation and some even for daily livelihoods. Although no reliable statistics available on this activity, Medina (2000) reported that up to 2% of Asian and Latin America's urban population depend on waste picking to earn their livelihood (cited by Wilson et al. 2006). In fact, formal waste recycling system is still not fully functional in low income cities and thus this disadvantaged group play the primary role in the informal or extensive recycling process. As waste recovery and recycling are carried out by underprivileged people, social and health issues are now considered as the integral part of the solid waste management in the cities of developing countries and urge to develop a social planning dimension within the framework (Furedy 1990; Rahman et al. 2005; Jabbar et al. 2008). This article tries to focus on the type of inorganic waste collected by the scavengers, their socio-economic status and the informal recycle chain of the waste (collected by the scavengers) to be recycled. It is based on the study findings carried out in Khulna, the third largest city of Bangladesh.

### **Characteristics of Municipal Solid Wastes in Bangladesh**

The domestic wastes (mostly inorganic) comprise about 80% of total generated wastes in major cities (Rahman et al. 2005). Mainly clinical and some industrial wastes are inorganic hazardous wastes. Waste pickers are generally involved in recovery of inorganic wastes for recycling. Table 1 shows the generation of municipal solid wastes (MSW) in six major cities of Bangladesh as recorded in 2005 (Alamgir et al. 2005).

**Table 1. Generation of MSW in six major cities of Bangladesh**

MSW Generation	Dhaka	Chittagong	Khulna	Rajshahi	Barisal	Sylhet
Population (Millions)	11	3.65	1.5	0.45	0.40	0.50
MSW generation (tons/day)	5340	1315	520	170	130	215
MSW generation rate (kg/capita/day)	0.485	0.360	0.346	0.378	0.325	0.430

Source: Alamgir et al. 2007

There is insignificant variation of composition and management of MSW in these major cities of Bangladesh. This paper particularly discusses the case of Khulna city (Figure 1) which is based on the findings of the questionnaire survey carried out with scavengers and other stakeholders in the resource recovery and recycling chain.



### **Figure 1: Location of Khulna city in Bangladesh**

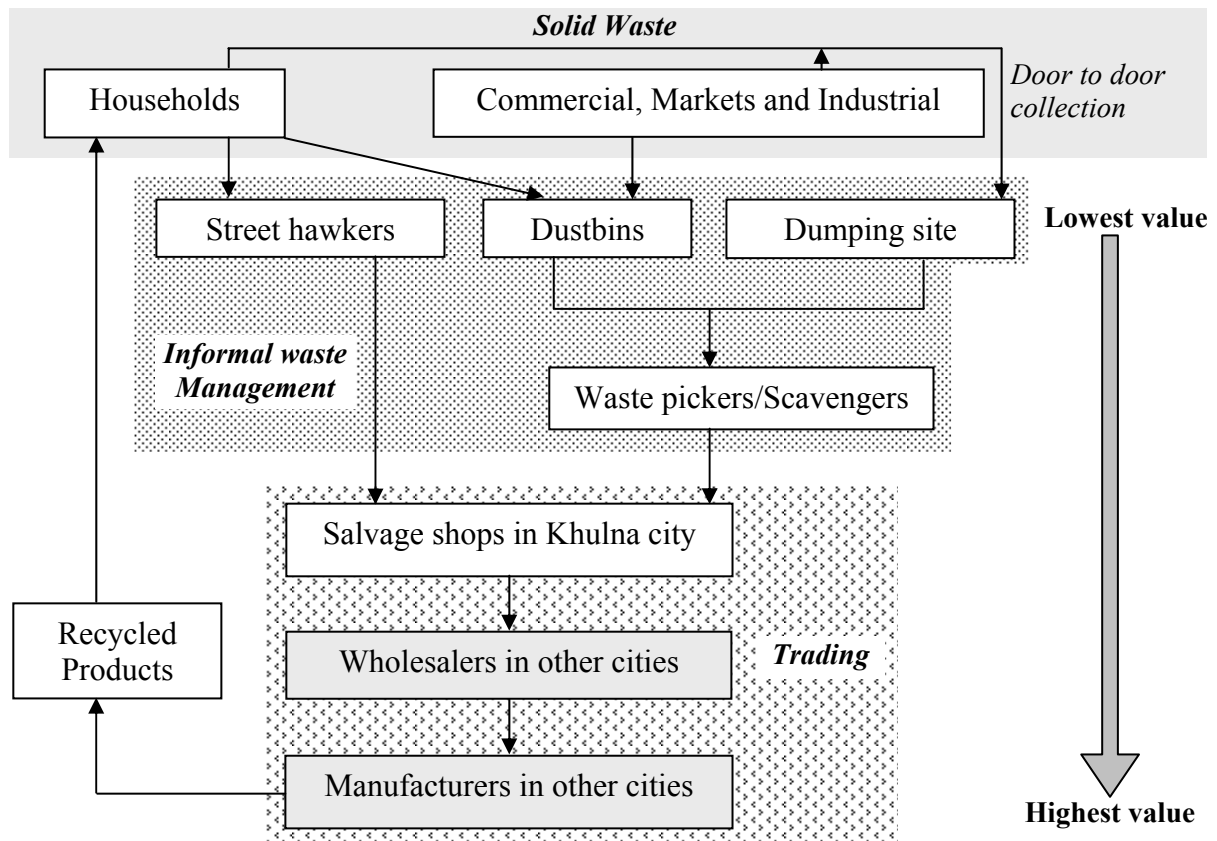
Previous studies show that 79% of the MSW in Bangladeshi cities are generated from the residential households and 16% are from commercial areas. Among the residents, about 60% gives their daily wastes to the waste collector (formal service) or dumps into the bin provided by the city authority (Alamgir et al. 2005; Rahman et al. 2005; Jabbar et al. 2008). The remaining 40% is either thrown into roadside, lowland, canals, drains or house premises. As with many major cities in developing countries, Khulna is also experiencing huge problems in dealing with the solid waste generated in the city everyday. It is estimated that 520 tons of solid waste is generated in Khulna city everyday (0.346 kg/capita/day) and only 40 percent of the generated waste is collected daily by Khulna City Corporation (KCC) (Alamgir et al. 2005) and reaches the municipal disposal sites. The wastes composition include: 90% organic, 6% Inorganic Non-

Hazardous waste and the remaining is Inorganic Hazardous waste (Rahman et al. 2005). According to the Draft Structure Plan of Khulna City (DSPKC), 28% of the households live below poverty line and informal sector consisting of this unprivileged group plays an important role in waste recovery and recycling of solid waste generated from this city (Swapan et al. 2007; Jabbar et al. 2008).

### **Stages of wastes recovery and recycling**

The KCC does not perform any kind of resource recovery activities. Wastes of some market value are being reclaimed or salvaged informally in three stages (Saad 2004) (Figure 2). In first stage, the housewives separate the refuse of higher market value such as papers, bottles, fresh containers, old cloths, and shoes and sell them to street hawkers (locally called '*feriwallas*'). The second stage of salvaging is carried out by

wastes pickers (mostly the children of slum dwellers). They collect the refuse and domestic waste of low market value from bins and sweeping accumulation centers. The items include broken glass, can, card board, waste paper, rag, plastics, metals and miscellaneous wastes discarded by households.



Note: Apart from bone and paper, all other retrieved materials are transported to industries located in other cities as raw materials for new products

**Figure 2: Informal waste recovery and recycling network in Khulna city**

The third stage of salvaging is done by the refuse pickers when fresh refuse is unloaded by municipal collection vehicles at the local disposal sites. The reclaimed material goes to the waste and old material shops through the street hawkers who purchase the old material directly from the homesteads and through refuse collectors who reclaim materials from bins and final disposal sites. The refuse dealers separate the materials in proper form and sell them to consumers as well as supply them to appropriate processing or remolding mills and factories. The processed material

recycled through market finally goes to users again. The cycle goes on as long as the waste has no economic or market value. Although recycling of solid waste is not included in the national environmental policy of Bangladesh, yet it has become a main source of income for several groups of the informal sector. The estimated number of scavenger of Khulna city is nearly 600, who are annually saving BDT 4,500,000 (US\$ 65,000) of KCC by removing 12.06 tons of solid waste (Enayetullah and Sinha 2000).

### **Involvement of Scavengers in Wastes Recovery and Recycling**

The study was carried out through an intensive field survey in Khulna city. A close ended questionnaire was used to interviewing 100 scavengers and 90 salvage shopkeepers. Participants were randomly selected from 600 target population [Where, normal variate ( $z$ ) = 1.65 value for 90% confidence interval with the desired error value = 0.08]. Individual interview covered the issues regarding the sources of wastes collected, types of wastes, purpose of collecting the wastes and other information pertaining to the social and demographic characteristics of the scavengers. Khulna city was divided into clusters for surveying the salvage shops. Efforts were also made to collect data from government, non-government and other relevant organizations.

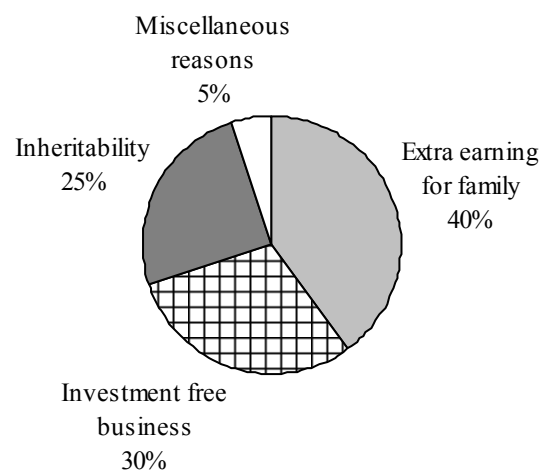
### **Demographic characteristics**

Scavengers act as the primary processor in recycling process of Khulna city who are found mostly in slums and squatter settlements. It is estimated that about 600 scavengers are working in KCC area. This figure was calculated based on the data provided by the local governments, NGOs, previous research reports, street hawkers and salvages shop operators. It was identified that majority of the waste scavengers represented the age group 8-10 years (64.4%), where male laborers are in high proportion (90%) than female laborers. Among the involved population, 80% were

primary school going students but most of them were irregular in their school. The remaining scavengers were found illiterate or drop out pupils. In most cases, parents of the scavengers were unable to run their family which restrain the children from attending school and push them towards waste picking. Poor living conditions, limited access to facilities and infrastructure, no provision of urban services such as water supply and sewerage and absence of social safety networks are typical of scavenging communities (Wilson et al. 2006).

### **Wastes and work**

In the past, wastes recovery and sanitation works were performed by a particular social groups or traditional outcaste groups in Indian sub-continent. Today, it is not restricted to only those groups rather many poor people are engaged in this profession for extra earnings. Scavenging is not a favorable job for the scavengers. But so many children are engaged in this job. There are various reasons for choosing the job such as extra earning for their family, investment free business, inheritability, availability of the solid waste and so other factors.

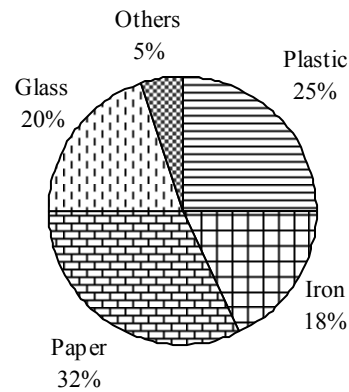


**Figure 3: Reasons for involving people in scavenging profession**

Figure 3 represents that about 40% of the scavengers engaged the occupation for extra earning. Among urban poor, most of the families cannot maintain their family with

the income of household head. That is why, other family members are forced to engage themselves to earn money in order to fulfill their basic need. Then about 20% scavenger choose the occupation for the investment free business, which primarily attracts unemployed poor people who can not afford investing in small scale business. A group of people inheritably take this profession whose forefathers were engaged in wastes recovery and sanitation works for a long time. Informal waste recovery sector accommodates a large number of poor communities and provide a steady, reliable supply of secondary raw materials for local manufacturing industry which can replace more expensive imported raw materials. This also stimulates the manufacture of low-cost, affordable products made from recycled materials (Haan et al. 1998; Scheinberg 2001; Wilson et al. 2006). Scavengers do not have any professional training for waste recovery and earn very low due to their lowest position in the trade hierarchy for recycled materials. They are often badly exploited and paid very low prices for the materials collected. In some cases, the pickers have to pay for the right to access the waste, and may also have to sell their materials to the same individual or organization. The scavengers work in cramped, unsanitary and health risk conditions. Despite the negative aspects, many people are engaged in waste recovery and selling for various reasons (Figure 3). Field survey shows that 47% of the respondents had been engaged in waste picking for more than one year.

Most of the scavengers regularly visit CBD areas, wholesale markets and waste dumping site located at the outskirts of Khulna city in order to collect inorganic wastes. The collection rate of individual respondent varies from 2 to 3 kg. of wastes per day. They mainly collect paper, plastic glass and iron materials. Figure 4 shows that more than 50% of the collected items constitute paper and plastic which are largely used for manufacturing of recyclable products.



**Figure 4: Type of wastes collected by the scavengers in Khulna city.**

The average monthly income of the scavengers is BDT 200 (USD 2) from selling of collected wastes to the salvage shops while 7% of the respondents earn more than double of the average amount. The income is highly correlated ( $r = 0.66$ ) with the number of working days per month and working hours in a day. According field survey, most of the respondents (46% of the total) work three days in a week and spend four hours in a day for wastes collection.

### **Health impacts of waste collection**

Scavengers suffer from serious occupational health risks. Because of manual handling and lack of protective clothing and equipment, they are undoubtedly exposed to various health risks (Wilson et al. 2006). Getting direct contact with toxic and infectious components, odour, polluted air and water are most common factors responsible for health risks. Table 2 discusses the risk factors associated with handling of solid wastes manually.

**Table 2. Risk causing factors associated with handling solid wastes manually**

<b>Origin of risk factor</b>	<b>Examples of source of possible risk</b>
Composition of waste	Toxic, allergenic and infectious components including gases, dust, leachate, sharps, broken glass
Nature of organic decomposing waste	Gaseous emissions, bioaerosols, dust, leachate, and fine particle sizes; and their change in ability to cause a toxic, allergenic or infectious health response
Handling of waste	Working in traffic, shoveling, lifting, equipment vibrations, accidents
Processing of waste	Odor, noise, vibration, accidents, air and water emissions, residuals, explosions, fires
Disposal of wastes	Odor, noise, vibration, stability of waste piles, air and water emissions, explosions, fires

Source: Cointreau, undated cited in Wilson et al. 2006

Forty nine percent of the respondents were affected by diarrhoea. They reported that respiratory problems and skin diseases are common among the scavengers. Poor living condition also contributes in health problems and in many cases, it is difficult to distinguish between health implications of work and living conditions (Eerd 1996).

### **Wastes Processing in Salvage Shops**

As mentioned earlier, scavengers/waste pickers play the primary role in the market chain who sells the wastes to the salvage shops within the city. The salvage shops also buy recovered wastes from the street hawkers. These shops perform necessary processing works for sending them to manufacturing industries, which are mostly located in Dhaka region (the capital city of Bangladesh). It has been identified that 40% of the salvage shops in Khulna city perform cleaning and washing tasks. In

addition, few shops carry out resizing and compacting of collected materials. Again, processing tasks are done by under aged workers in an unhealthy environment.

### **Conclusion**

Over the last couple of decades, there has been a growing recognition of involvement of informal sector to ensure economic, social and environmental benefits from MSWM. In a micro-economic perspective, informal waste recovery have substantial economic benefit as it provides options for small business without capital expenditures. It minimizes the costing of large scale manufacturing industry and stimulates low-cost, affordable and eco-friendly products from recycled products (Wilson et al. 2006). The social aspects of the poor groups attached with the process are crucial for achieving sustainable outcome of MSWM. Though scavenging is an easy accessible employment for the urban poor but the occupation is associated with health risks. Unfortunately, the government policies in most of the developing countries are not supportive for the involvement of informal sector in solid waste management. The local government authority does not have any statistics on scavengers in Khulna city. This could be a professional business for the urban poor with the assistance from related organizations. Waste management authorities can intervene in the marketing of recyclable products to maximize profits through transportation support, occupation safety, promoting the use of recycled products. To enhance the efficiency and dignity in resource recovery works as well as other social aspects of solid waste management will require modes of co-operation in which governmental agencies, community-based organizations, voluntary groups and the general public can work together (Furedy 1990).

The scavenging community also suffers from limited access to urban facilities (e.g., water supply and sanitation) and social safety networks. As the demand of recyclable

products is increasing day by day in order to save resource and energy, scavengers play an important role in the wastes recycling process. On the other hand, informal waste recovery and recycling is particularly important for the cities in developing countries, where public authorities are financially and technically incapable of handling the major portion solid wastes. Realizing the significance of this sector, it is imperative to integrate informal work with the formal MSWM, to help them organize themselves and to add value to their recycled materials before selling them. This can be done by moving up the hierarchy of waste pickers in the waste recovery and recycling chain and to extract higher value from recovered materials. In addition, measures need to be taken to protect livelihoods while working to improve both the efficiency and the living and working conditions of those involved. (Wilson et al. 2006:870). Assaad (1996) suggests that to improve the social aspects of solid waste recovery and recycling, an in-depth understanding over the informal process is essential for the intermediary actors and institutions in bridging the institutional gap between state bureaucracies and informal social fields. Potential interventions include providing of specialized clothing and tools to the wastes pickers, organizing and capacity building to develop it as a small business, and increase public awareness to use recycled products (Ojeda-Benitez et al. 2002). Finally, cooperative action is also required among governmental agencies, community based organization, NGOs, voluntary groups and general public which can contribute in shaping of sustainable urban environment.

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