



## Studies on the Solid Waste Collection by Rag Pickers at Greater Hyderabad Municipal Corporation, India

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### Abstract

*Waste was an unavoidable by-product of human activities. Economic development, urbanization and improved living standards in cities contribute to increase in the quantity and complexity of generated solid waste. If accumulated, it leads to degradation of urban environment, stresses natural resources and leads to health problems. Solid waste management has become a major environmental issue in India. Waste management, however, remains a major challenge for any society, since all natural processes generate waste. Rag pickers play an important, but usually unrecognised role in the waste management system of Indian cities. They collect garbage in search of recyclable items that can be sold to scrap merchant like paper, plastic, tin...ect. This activity require no skills and is a source of income for a growing number of urban poor people. The present paper intends to present a vulnerability study of the rag pickers of Greater Hyderabad Municipal Corporation (GHMC) with focus on the socio-economic and occupational health aspects. The paper makes use of a database, parenting to the socio-economic profile of the rag pickers including the working conditions, and their problems and expectations. This information has been developed through literature review, questionnaire survey and open-ended interviews conducted to generate data on rag pickers in GHMC.*

**Keywords:** Rag pickers, self - employment, waste collection, health risks, public attitude,

### Introduction

Rag picking is probably one of the most dangerous and dehumanizing activity in India. Child rag pickers are working in filthy environments, surrounded by crows or dogs under any weather conditions and have to search through hazardous waste without gloves or shoes. They often eat the filthy food remnants they find in the garbage bins or in the dumping ground. Using the dumping ground as a playing field the children run the risk to come upon needles, syringes, used condoms, saline bottles, soiled gloves and other hospital wastes as well as ample of plastic and iron items. They suffer from many diseases, such as respiratory problems, worms, anaemia, fever and other problems which include cuts, rashes, dog bites<sup>1</sup>. On a global level, approximately two-thirds of a kilogram of waste per person per day was generated. Yet, the difference between high and low income countries was considerable, especially in terms of composition. As economic prosperity increases, the amount of solid waste produced consists mostly of luxury waste such as paper, cardboard, plastic and heavier organic materials. On the other hand, waste densities and moisture contents are much higher in developing countries. In addition, the hazardous content was quite high in developing countries since the regulatory and enforcement system to control such waste disposal are usually non-existent or not operating. This was a particular problem with waste from hospitals located within the city area, which is often found mixed with municipal waste in

open dumps and landfills<sup>2</sup>. These differences mean that waste management systems in each region require distinct approaches. For example, as the waste content in developing countries was highly organic and susceptible to rapid decay, the emphasis of the SWM process in these countries should be on the collection process. Studies have shown that expensive collection trucks and compactors developed and used in industrialized countries are difficult to operate and maintain, and are unsuitable for narrow lanes, the high traffic density and the nature of waste in developing countries.

Besides compostable waste, the household solid waste consists of hazardous materials resulted from items like tube lights, dry battery cells used in radio and torch etc, nail polish remover, blades, sprays and other miscellaneous items. There was no specific methodology suggested or adopted for collection and disposal of household hazardous waste generated in Indian family. All activities in SWM involve risk, either to the worker directly involved or to the nearby residents. Risks occur at every step in the process, from the point where residents handle wastes in the home for collection or recycling, to the point of ultimate disposal. Health risks from the wastes are caused by many factors, including; the nature of waste as it decomposes, the handling of waste; the processing of wastes; the disposal of wastes. The rag pickers live in rows of huts a little away from the dumping yard. Their life begins and ends only and only in an atmosphere surrounded by garbage and stench. The GHMC

garbage dumping yard located in Jawahar Nagar on the city outskirts in Shamirpet Mandal near Kapra municipality, Hyderabad. Children with sacks on their shoulder near garbage bins and dumps are a common sight. But one finds not only children, but people of all age groups at the vicinity of the city's biggest dumping yard at Jawahar nagar, sifting through the garbage to earn a living. Hailing from Kurnool, Mahabubnagar, they moved to city when their survival as farm laborers became difficult. For few people it was only the source of livelihood. Ironically, with no system to segregate the solid waste, the rag pickers numbering around 250 do their bit for the environment by picking up recyclable solid waste dumped at the site shown in (figure 1). They walk all day in the 340 acres dump yard sifting through the sludge and waste, for milk packets, plastic bottles, metal caps, zippers, cartons, glass bottles etc. According to GHMC officials at the site, the rag pickers collect close to 60 per cent of plastic and metal from various points in the city<sup>3</sup>.

According to Mallamma Rag Picker of Jawahar Nagar Dump Site, each one of them collects about 40 kg of waste per day. Every kilogram of discarded milk sachets or plastic earns them about 10 rupees whereas metal objects like zippers or cans get them 50 rupees per kilogram. "Earlier, it used to take us at least three days to collect a kilogram of metal, but nowadays, they collect close to 10 kg of metal per person per day," said saidulu, another rag picker. The recovery of metals like gold, platinum, copper and lead uses caustic soda and concentrated acids, rag pickers dip their hands in poisonous chemicals for long hours. They were also exposed to fumes of highly concentrated acid. Safety gear such as gloves, face masks and ventilation fans are virtually unheard of, and rag pickers many of them children often have little idea of what they are handling. All the workers we surveyed were unaware of the dangers they were exposed to. They were all illiterate and desperate for employment, their choice is clear either die of hunger or of metal poisoning. In the streets of any large city in India, small groups of women (and sometimes children) around garbage skips, going through them and collecting scraps of paper, tin, plastic, and cloth. Sometimes many of them have burnt their fingers while trying to collect metal from the burning garbage. As they are migrants with no white ration cards, they have no other option but to pay up the attenders at government hospitals before we get to meet the doctors. The dump yard depends on 250 rag-pickers who forage waste for plastics, metals, broken glass and other non-biodegradable materials. They don't even have access to drinking water. Rain or shine, for these rag pickers, garbage continues as their source of living till a concrete solid waste management plan is in place along with a rehabilitation plan<sup>1</sup>. They work, eat, sleep and spend every moment of their lives in its vicinity. From five-year-old child to elders, all members of the families move in the yard from morning to evening. They collect waste plastic, iron scrap and glass bottles, sifting the mountains of litter dumped there and sell to commission agents. These wastes were responsible for occupational health risks to workers and health risks to residents and workers. In developing countries, a significant portion of the waste pickers found at

open dumps are children and pregnant women. Confounding this image is the reality that residents around solid waste disposal sites include infants, young children, women, child - bearing age and seniors. Children are particularly vulnerable to toxins because they ingest more water, food and air per unit of body weight; their metabolic pathways are less developed to detoxify and excrete toxins; and any disruption during their growth years can easily disrupt development of their organ, nervous, immune, endocrine and reproductive systems. In many developing countries, waste pickers find their livelihood through sorting and recycling of secondary materials. They have high occupational health risks including risk from contact with human fecal matter, paper that may have become saturated with toxic materials, bottles with chemical residues, metal containers with residue pesticide and solvents, needles and bandages from hospitals etc. The most commonly experienced diseases among waste pickers are Tuberculosis, Bronchitis, Asthma, Pneumonia, Dysentery, Parasites and Malnutrition<sup>4</sup>. The recycling of urban solid waste in India, similar to other developing countries, takes place partly with the involvement of an unorganized sector consisting of waste pickers (rag pickers), and scrap and waste traders, all together assisting in translocating waste to processing factories. The waste collectors are those who quite simply pick the waste up from the sources of the generation or dumping sites and transmit to the traders. The term rags or recyclable materials that can be sold for money, their main duty is to collect the waste. The materials gathered from dumping sites, street comers and residential areas are plastics, bottles, cardboard, paper, tin, aluminum and iron<sup>5</sup>. Waste pickers are commonly found engaged at the solid waste transfer points and open dumps in developing countries. The Greater Hyderabad Municipal Corporation introduced door - to door collection of waste to rag pickers is not only secured their livelihoods but has also meant a shorter working day for the same income (four hours in the morning), and a much cleaner work environment. Rag pickers formed as union and struggling for their rights, there are always new challenges and battles to be fought to improve the lot of rag pickers, but the progress made in twenty years is truly remarkable. Probably the one of the most potent symbols of the change is that the children of the rag pickers have now been through school, rather than following their mothers to the workplace, and are being employed as the community organizers and the providers of the necessary institutional support that such a large operation requires. Despite the health hazards involved, they make their livelihood through collection indirectly contributing to resource recovery and also serving the fundamental role in the recycling process and in reducing waste at source. Several studies on the involvement of waste pickers in waste collection and disposal, their status based on educational, social, economic and health aspects have been published from India and abroad<sup>6-9</sup>. The waste pickers involved in waste collection and disposal constituted an informal and unorganized sector where occupational health hazards were least attended and therefore, focus was also given in discussing the health problems of these rag pickers.

The present paper intends to present a vulnerability study of the rag pickers of Greater Hyderabad Municipal Corporation (GHMC) with focus on the socio-economic and occupational health aspects. The paper makes use of a database, parenting to the socio-economic profile of the rag pickers including the working conditions, and their problems and expectations. This information has been developed through literature review, questionnaire survey and open-ended interviews conducted to generate data on rag pickers in GHMC.

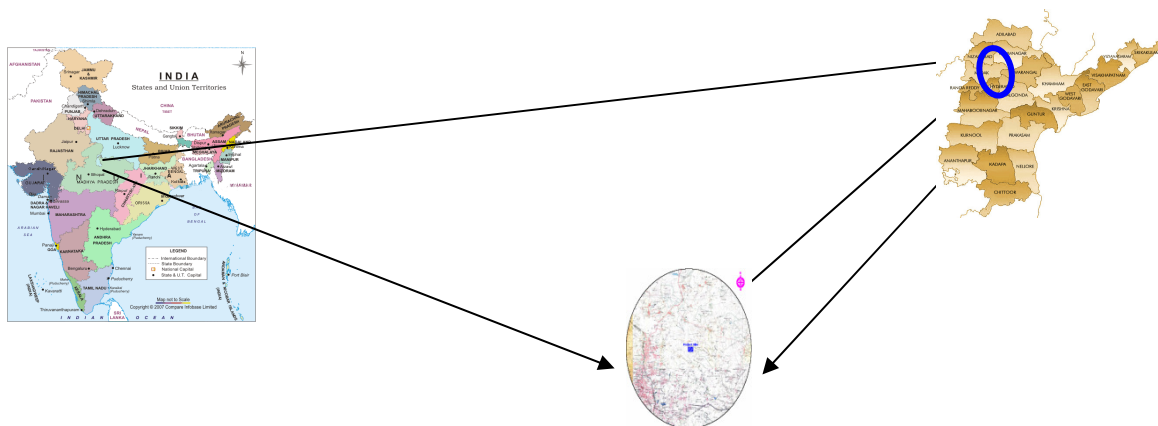
### Methodology

**Study Area:** An Integrated Municipal Solid Waste Management Scheme is proposed at the existing Jawaharnagar Dump Site, Dommaiguda Village, Keesara Mandal, Ranga Reddy District of Andhra Pradesh (A.P). The area of the proposed for the facility is around 351 acres (142 Hectares). The site is 35 km away from Hyderabad city, 10.5 km away from the

state Highway connecting Hyderabad- Nagpur in West direction from the boundary of the project site. The map showing general location of the site with respect to India and A.P and the 10 km radius topographical map around the proposed project and the site layout map of the proposed project was given in 2. Longitude & latitudes of jawahar nagar was  $+17^{\circ} 30' 14.18''$ ,  $+78^{\circ} 34' 4.94''$ . The GHMC garbage dumping yard located in Jawahar Nagar on the city outskirts in Shamirpet Mandal near Kapra municipality, Hyderabad, India. The snow ball method intended to gather information on the role of rag pickers in waste reduction, and to find out their socio - economic status, health and hygienic problems was followed<sup>10</sup>. The survey was conducted among waste pickers in the corporation area during September - December, 2009. For this a structured interview schedule was devised. One hundred and fifty out a total of about 950 rag pickers involved in the activity were randomly selected and interviewed.



**Figure-1**  
Unhygienic conditions: Rag-pickers picking up the garbage at Jawaharnagar dumping yard



**Figure-2**  
Location of the site

**Problems Encountered in Data Collection:** At the initial stage of the survey, the rag pickers were not co-operating with researcher for answering to the queries. Gathering reliable information was also difficult since most of the rag pickers were illiterates. They were reluctant to speak on their income and other personal details.

## Results and Discussion

**Collection of Waste:** Rag pickers collect the waste from houses, shops, markets, hospitals, commercial establishments and industries. Collection of waste is an important step in the solid waste management. In the investigation it was found that 42% of the rag pickers are collected the waste from residential areas; 30% collected from Market and commercial areas; 15% of them collected from hospitals; 10% of rag pickers collected from railway stations and 3% of rag pickers collected the waste from offices and educational institutions.

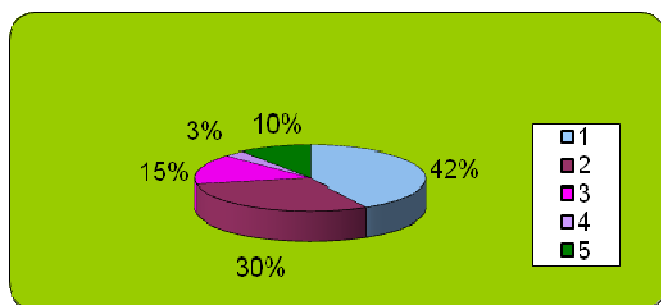


Figure-3

Response of Rag Pickers on Questionnaire Collection of Waste

**Number of Hours spent for the collection of waste in a Day:** Rag pickers have to spend some time in the collection of waste from different sources. Spending time on waste collection depends on the quantity of waste generated. In the study it was found that majority (65%) of the rag pickers spending 5-8 hrs in a day for the collection of waste; 28% of the rag pickers spending more than 8 hrs and 7% spending more than 8 hrs a day and 7% spending less than 5 hrs in a day.

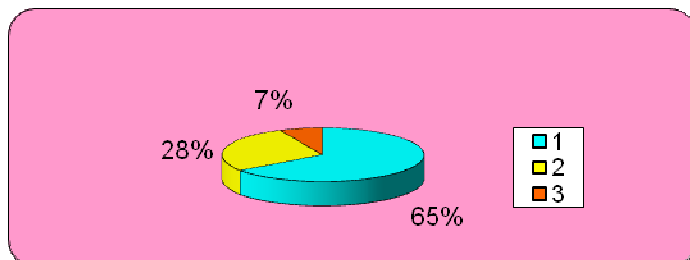


Figure-4

Number of Hours spent for the collection of waste in a day

**Type of Vehicle used for Waste Collection:** Rag pickers used different types of vehicles to collect the waste. It is revealed that 57% of rag pickers were not using any vehicle for waste

collection; 20% using tri cycle; 15% using bicycle and 8% using motor cycle.

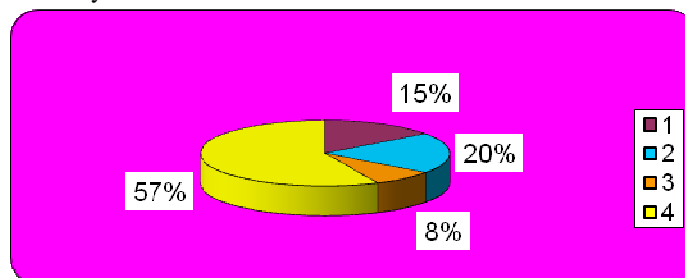


Figure-5

Type of Vehicle used for Waste Collection

**Collection of Waste Singly or in Group:** Rag pickers are collected the waste singly and in group. In the present study it was noted that majority (85%) of rag pickers collecting the waste singly; 9% of them collecting in group of 2; 3% of them collecting the waste group of 3 and 3% are collecting group of 4. This pointed out the reluctance of pickers to co-operate and share the earnings.

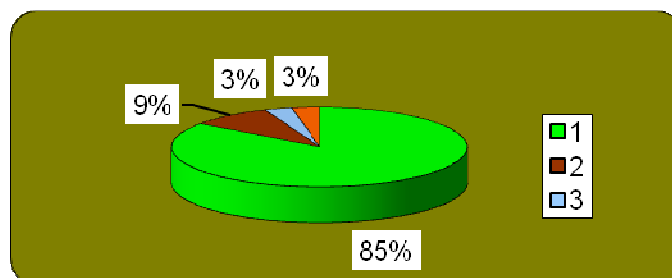


Figure-6

Collection of waste singly or in group

**Family Assistance:** Some times family members are assisted to rag pickers in the collection of waste. During the investigation it was found that 90% of the rag pickers were assisted by their family members whereas 10% of them were not assisted by their family members.

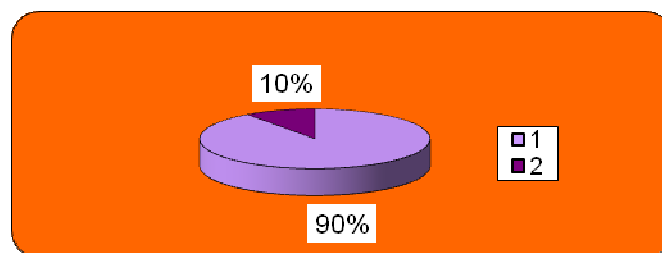
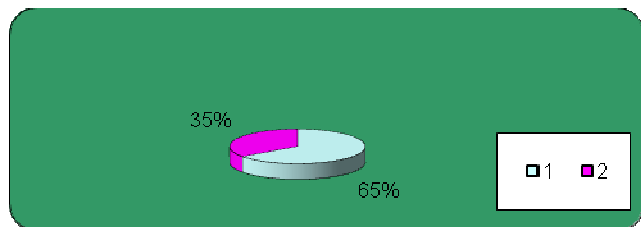


Figure-7

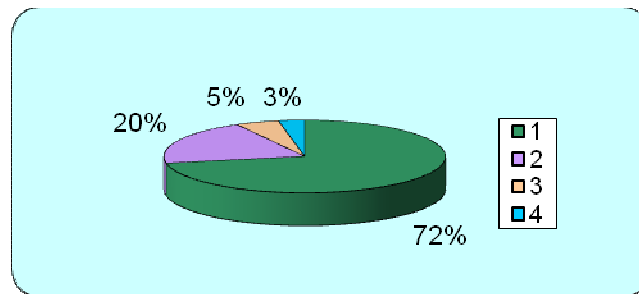
Family Assistance

**Nature of Work:** Rag pickers are worked on full-time and part-time basis. The survey result showed that 65% were full-time workers and 35% were part-time workers. A rag picker began his work as early as 4 am, in order not to miss the waste. Whenever the bag was full, they returned to the store or trade centre to sell these earnings.



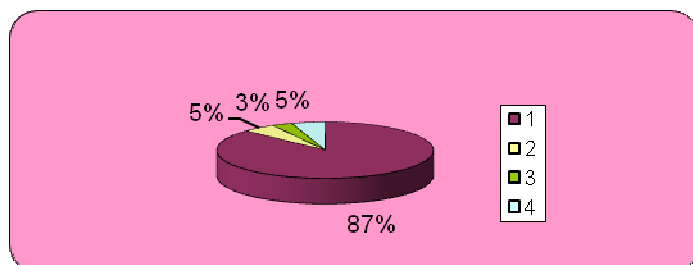
**Figure-8**  
 Nature of Work

**Days Preferred for Waste Collection:** Most of the rag pickers preferred to collect the waste on all days except Sundays and holidays. In the study it was cleared that a major percentage (87%) of the rag pickers roamed for collection on all days excluding working days and holidays whereas a minor group 5% preferred holidays; 5% to go on all days and 3% preferred to collect on Sundays and other public holidays.

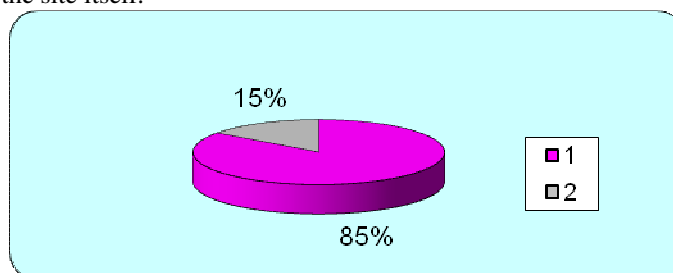


**Figure-11**  
 Quantity of Waste Collected

**Waste Segregation:** Segregation is an important aspect in solid waste management. Proper segregation of waste would lead to better options and opportunities for its scientific disposal. During the survey, it was revealed that 85% of the rag pickers collected waste materials without being segregated the site and remaining 15% of rag pickers segregated the waste materials at the site itself.



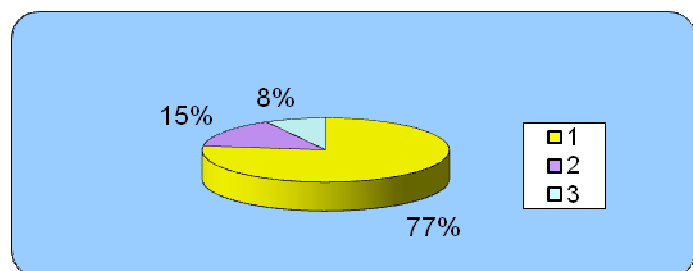
**Figure-9**  
 Days preferred for Waste Collection



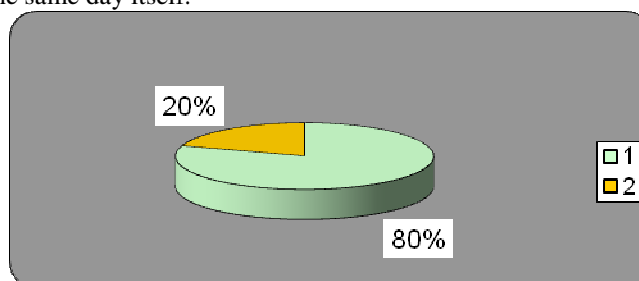
**Figure-12**  
 Waste Segregation

**Distances traveled for Waste Collection:** Rag pickers usually traveled a distance of 1 – 20 km for collection of waste. In the present study it was noted that majority of the rag pickers 77% traveled a distance between 1-5 km; 15% traveled a distance between 5 - 10km and 8% traveled a distance of above 10 kms to collect the waste.

**Sale of Collected Waste:** After segregated the recyclable materials from the waste, most of the rag pickers have the habit of selling the waste. In the investigation it was observed that 80% of waste collectors sold the collected waste materials on the same day itself.



**Figure-10**  
 Distances traveled for Waste Collection

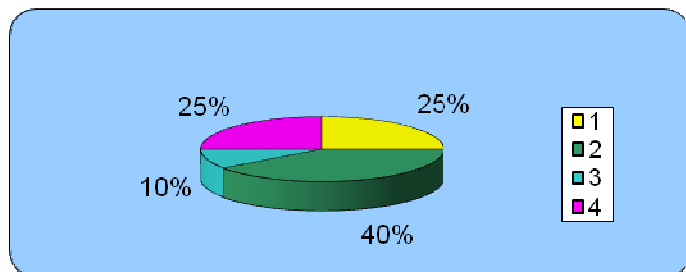


**Figure-13**  
 Sale of Collected Waste

**Quantity of Waste Collected:** Usually, the quantity of waste collected in a day depends on the number of hours spent for collection and number of houses covered. In the survey it was observed that only 3% collected more than 75 kg / day, 5% collected waste between 50 - 75 kg; 20% collected waste between 25 - 50 kg and 72% collected waste below 25 kg / day.

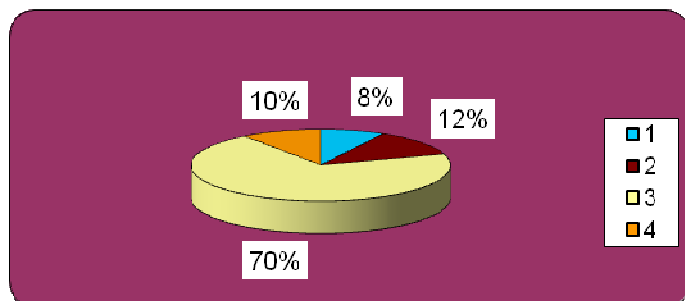
**Duration of Payment:** Rag pickers sold the waste on the payment basis. few rag pickers received the money on same day, few of them at the weekend, few at the month end etc. In the study we noted that 25% of the rag pickers received the cost of waste collected on the same day itself. However, 40% received money at the weekend and 10% received money at the end of the month and 25% of them received the money based on the quality / quantity of collection. Rag picking being their

livelihood most of them wanted to have the remuneration on same day.



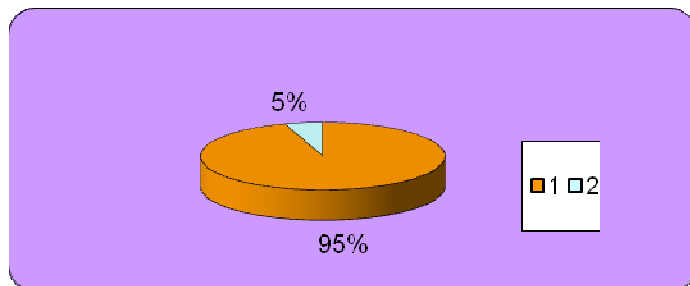
**Figure-14**  
**Duration of Payment**

**Monthly Income:** Due to collection and selling the waste, rag pickers are earning money. Majority 75% of the waste collectors earned Rs. 1000 - 1500 per month, 12% of the respondents earned Rs. 500 -1000, 10% earned a monthly income ranging more than 1500; 8% of them earned Rs. 200 - 500 per month.



**Figure-15**  
**Monthly Income**

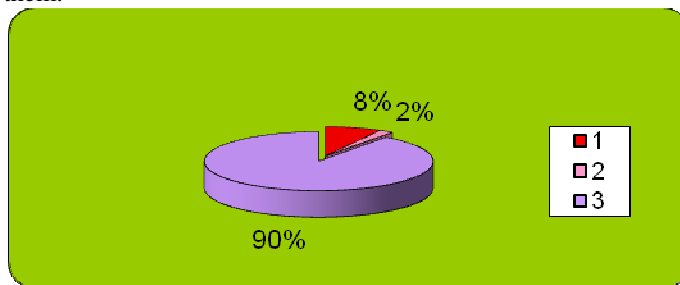
**Other Source of Income:** The majority (95%) of waste collectors, rag picking was the only source of income. However, 5% of rag pickers were persons retired from service and therefore, they were getting pension also.



**Figure-16**  
**Other Source of Income**

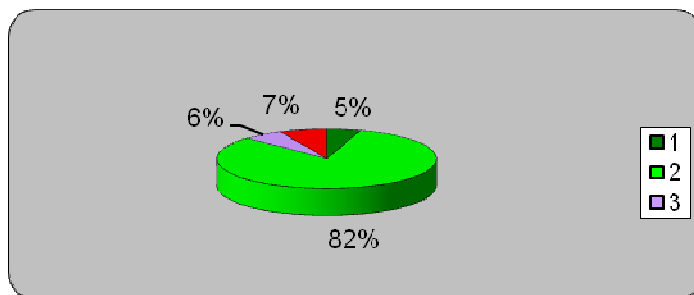
**Precautionary Measures:** Waste consists of hazardous and toxic materials. While collecting and segregating the waste rag – pickers should adopt precautionary measures. The survey showed that 90% of waste collectors did not adopt any precautionary measures, 2% used antiseptic lotions, 8% used hand gloves; one percent used both gloves and antiseptic lotion.

Lack of precautionary measures might produce health hazards to them.



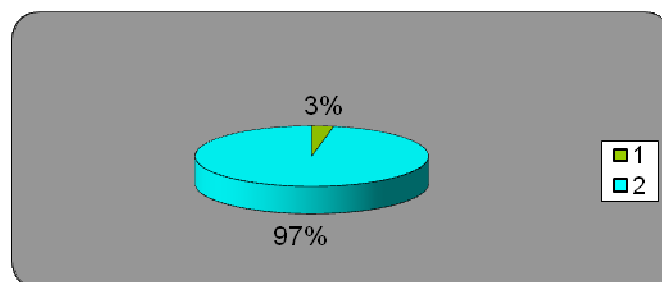
**Figure-17**  
**Precautionary Measures**

**Occupational Health Hazards:** In most of the cases, there is a chance of cause of health hazards to rag pickers. In the survey it was indicated that 82% had wounds or injuries; 6% had body pains; 5% had skin or lung diseases and 7% said that they were not faced any health problems. Lack of precautionary safety measures and lack of awareness regarding health were the main causes of health diseases. Rag pickers did not take care of their health because of ignorance and poverty.



**Figure-18**  
**Occupational Health Hazards**

**Job Satisfaction:** Job satisfaction is very important in any profession. During the survey we asked the rag pickers about the job satisfaction, 97% of the respondents were not satisfied with rag picking job because of the hardship involved in the long hours of work and poor remuneration; other (3%) however, expressed satisfaction.



**Figure-19**  
**Job Satisfaction**

**Job Selection:** One question asked to waste collectors was the reason for taking up this particular job. The answer of 94% of

collectors was that there was no other alternative available to them. But 4% showed a special interest towards this job and 1% of them were hereditary rag pickers. It was further understood from interviews that the reason for taking up the job was family circumstances mainly some of them were wanderers who later joined company with rag pickers.

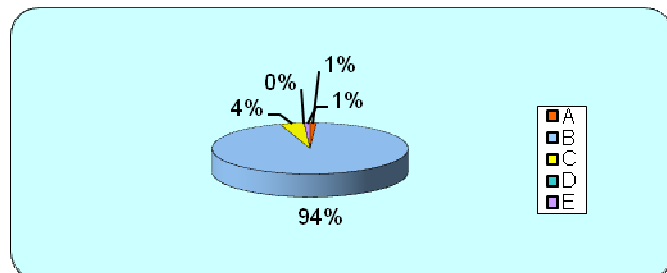


Figure-20  
 Job Selection

**Period of Service:** Once the rag picker entered and got adjusted to that environment, it is not easy to come out of from that service. In the present study it was cleared that 60% were working for 3 years in this field; 30% worked for 2 years; 8% for one year; 5% for one year and 5% worked for less than one year.

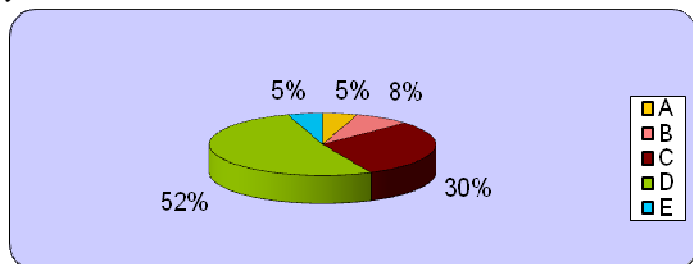


Figure-21  
 Period of Service

**Public Attitude:** During the survey we asked a question to the rag picker about the public attitude, 60% felt that they were looked upon with hatred, 35% felt a non-cordial attitude. Many people treated them as untouchables and made harassments. But 5% of respondents felt that the public had a cordial attitude towards them.

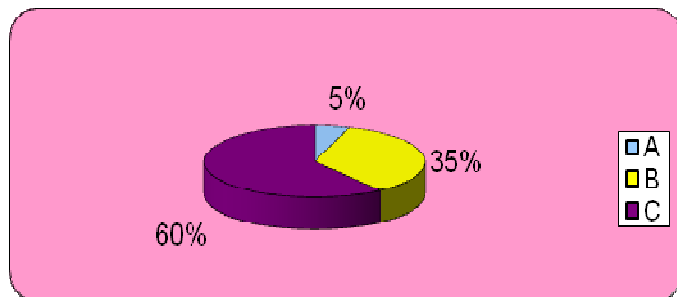


Figure-22  
 Public Attitude

**Discussion:** The survey conducted among the waste collectors of GHMC focusing on their socio-economic and health status, and involvement in waste recovery and recycling revealed their notable role played in waste management. In the corporation waste collectors belonging to both sex and almost all age groups have been found involved in scavenging work. At Itaoca, Brazil, the age groups of scavengers and their percentage were in the order of 14 to 17 years (11%), 18 to 30 years (25%), 31 to 45 years (35%) and 46 to 65 years (27%). It was also reported that 54% of them were men. However, metropolitan landfill in Rio - de - Janeiro, Brazil, the majority of the scavengers (43%) belonged to the age group 18-30 years and 77% of them were men<sup>11</sup>. In Delhi, 35% were found to be female workers and 65% males. In GHMC corporation, 74% of the rag pickers were males. Kumar S., Mondal A.N., Gaikwad S.A., Devotta S. and Singh R.N.,<sup>12</sup> reported that there were 3,965 children engaged in rag picking in the various urban settlements of Nepal, with the highest concentration being in Katmandu Valley. The present investigation showed that young, middle and old aged people were engaged in rag picking. Out of 150 rag pickers, 18% belonged to the age below 25 years, 70% to the age group 26 - 50 years whereas only 10% belonged to the age group 51-75 years. At Itaoca, Brazil the educational level of rag pickers, based on reading and writing, was 52% literate and 48% illiterate. The present study showed that rag pickers consisted of 52% literate people, out of which 15% were with pass in SSC or higher qualification.

In Delhi, most of the waste pickers were migrants from neighboring states. That is, 33% from West Bengal, 22% from Uttar Pradesh and 13% from Bihar<sup>8</sup>. In Jammu city also most of the rag pickers (81%) hailed from Bihar state. The rag pickers were distributed all over residential and commercial areas for their work. Studies of Menon R.V.G.J., Joseph M., Ambat B. and Vinod V.<sup>13</sup> showed that in Vadakara municipality, Kerala, 52% in their job at both residential and commercial areas whereas, 43% worked in residential and 10% in commercial areas. In Palakkad and Alappuzha, about 50% of rag pickers employed themselves in residential areas while 50% worked both in residential and commercial areas. The present study at GHMC Corporation identified that 89 rag pickers were active in residential areas and 71 in market and commercial areas out of 100 workers interviewed. Most of the waste collectors were reported to work for 5 - 8 hours daily. Menon R.V.G.J., Joseph M., Ambat B. and Vinod V.<sup>13</sup> found that 73% of rag pickers worked for a period of 5 - 8 hours daily and 21% more than 8 hours in Thiruvananthapuram district. Another study showed that 61% at vadakada, 51% at Palakkad and 27% at Trissur worked for 5 - 8 hours a day<sup>13</sup>. The present study also found that majority (55%) of rag pickers worked between 5-8 hours. Earlier Marques M. and Hogland W.<sup>8</sup> also reported that most of them were engaged in work for 5 - 8 hours at Delhi. However, in Itaoca, the majority of the waste collectors (77%) worked for more than 8 hours<sup>11</sup>. Workers belonging to all religions are known to be involved in waste collection. Studies by Marques M. and Hogland W.<sup>8</sup>, at Delhi showed that 52% of rag pickers

belonged to Muslim Community and 95 belonged to their communities; about 39% belonged to lower social strata. In GHMC corporation, 90% belonged to the Hindu religion, 7% Muslim and 3% Christian. Among Hindus, 70% belonged to the caste (OBC) of Andhra Pradesh. Indirectly the rag pickers have a minor but significant role not only in waste collection, transportation and disposal but also in bringing savings to the municipal corporation.

In Poland, the informal sector was managing about 15% of the total municipal solid waste reported that the informal sector was managing about 10 to 20 percent of the total municipal waste in developing countries. But they were also accused of being an obstacle for normal collection services, since they scattered the waste and made it uneasy for collection by the municipal workers. In Mexico, it was estimated to remove 105 and in Hong Kong 40% of the total municipal waste by the rag pickers<sup>14</sup>. Agdag O.N.<sup>15</sup> reported that in Turkey, the waste pickers collected almost 225 tonnes of waste generated in the city prior to its transportation, thereby saving a sum of Rs. 1100 USD per day for the municipal corporation. Recently Bhattarai R.C.<sup>16</sup> found that rag pickers collected 22,796 kg of waste daily and they helped the Katmandu municipality to save Rs. 60, 965 per day. Several hundreds of people are engaged in waste linked business throughout the country and elsewhere. The number of waste pickers in Madras city was around 8000 pickers were about 30,000 which was approximately 1% of the population. About 75000 people were managing their livelihood by segregating and collecting inorganic wastes in Hyderabad<sup>7</sup> and that in Delhi the number of rag pickers was about 80,000. In Thiruvannathapuram Corporation, there were 320 rag pickers engaged in collection of waste. In Mumbai alone these are about 320 rag pickers engaged waste pickers from different parts of India. Refsgaard K. and Magnussen K.<sup>17</sup> reported that in Cairo some 120,000 people probably secured employment in waste picking. In Beijing, China roughly 13,000 people were found employed in waste picking whereas rag picker community is Sri Lanka was said to be around 10,000. Ten years back, UNEP estimated that approximately 100,000 people were engaged in rag picking at dump sites in the Latin American region alone. In Kollam Corporation 400 rag pickers were found to be engaged in this job and the average waste collection by rag pickers ranged from 25 to 75 kg / person / day. The total wastes removed by them thus amounted to 10 to 30 tons per day. It was interesting to note the preference of waste collectors for specific items. Studies conducted by Menon R.V.G.J., Joseph M., Ambat B. and Vinod V.<sup>13</sup> in Trivandrum district showed that most of the rag pickers were all - rounder collecting more than 2 -3 types of materials like paper, scrap metal, can, plastic and bottle. But, there were a few specialist rag pickers also. A later study at Vadakara also showed that rag pickers did not prefer any items but collected all type of wastes. At Itasca landfill, the rag pickers were reported to collect all kinds of recyclable goods such as aluminum can, glass, cardboard and plastic. Only a small group (11%) looked for a specific material. Compared to other materials. The present, study in Kollam found that majority

of the rag pickers opted plastics and metals because of the easiness to sell them at better price but generally they collected every thing they could access. Another observation of the present study was that the rag pickers worked alone as single individual and not as groups. The rag pickers worked as groups in Trivandrum district. However, the study by the same authors at Vadakara and Palaghat found that majority of them worked alone without forming groups<sup>13</sup>.

**Occupational Diseases:** A perusal of literature showed that a few studies on health problems of waste collectors (rag pickers) have been carried out within and outside country, recollecting situations similar to those of Kollam corporation. It is true that in developing countries, solid waste workers and waste pickers routinely touch the waste they collected and stepped on waste because they typically wore only sandals. Therefore, they are easily susceptible to various infectious diseases. A study on waste pickers working at Calcutta's Dhaka dump site showed that they had respiratory diseases, diarrhea, protozoa and helminthes infestation. Rag pickers in Kathmandu, Nepal had very poor health due to the consumption of unhygienic food and working in polluted environment and suffered from diarrhea, cold and scabies. They were highly exposed to tetanus and other infections caused from cuts by sharp metal pieces, broken glass and other solid wastes. Waste pickers were reported to have headache to have at many dump sites like that in Kathmandu and Bangkok. In 1990, Institute of Hygiene and University of Genoa conducted clinical examination on 1396 solid waste employees of Genoa, Italy. It indicated the probability of Hepatitis B Virus infection among them. Stool samples collected from solid waste pickers of India, Brazil, Bangkok and Manila have revealed widespread parasitic infection among them Tuberculosis, Bronchitis, Asthma, Pneumonia, Dysentery, Parasitic infections and Malnutrition were the most common diseases reported among waste pickers in Bangalore and New Delhi. Infection related infant mortality studies showed that 38% women workers had lost one child, 10% had lost 3 or more, the main causes being diarrhea, tetanus, small pox, Bronchitis and Viral infection<sup>18</sup>. At Bombay's open dump sites, of 95 landfill workers surveyed, 80% had eye problems, 73% had respiratory ailments, 51% had gastro intestinal ailments, 40% had skin infections or allergies and 22% had orthopedic ailments. Most workers complained of eye burning, diminished vision, redness, itching and watering. Clinical examination showed 27% having skin lesions, of which 30% were determined to be directly occupation.

Solid waste collectors in Denmark had a relatively high risk of occupational diseases and injuries when compared to Denmark's total work force. The highest relative risk was found from infectious diseases. Around 180 waste pickers at the Calcutta's open dumps were studied to find that 40% had chronic cough and 37% had Jaundice. The average quarterly incidence of Diarrhoea was 85%, fever was 72%, Cough and cold were 63%, besides eye soreness or redness occurred quarterly in 15% and skin ulcers in 29%<sup>19</sup>. Recently it was reported that health



hazards associated with rag picking were confusion, laceration, gastrointestinal problems, eye infections, lower back pain, skin disorders and malnutrition. Similar to the observations of previous investigations in different parts of the world, the present study revealed that 83% had skin diseases, 785 had wounds and scars on their body, 63% had body pain, 9% had pulmonary complaints and 3% had eye diseases. It was inferred that the naked contact of the workers with waste without observing safety measures such as use of glove or mask was accountable for the state of ill health among them. In this context the service rendered by the rag pickers need enlisting: The rag pickers played a part in solid waste management in their own way by channelizing the recyclable materials. They could reduce the expenditure of the corporation. As the rag pickers collected mostly materials like plastic and metals, the sorting of solid waste became easier to the municipal workers. Rag picking also provided livelihood to them and it was virtually a form of self - employment. But they were also nuisance for certain reasons: children were forced to undertake rag picking activity; as the rag picking was centered on recyclables, it led to spreading of waste dumps; some of them got involved in antisocial activities; and they some times encroached into the landfill sites and set fire to waste dumps. Considering the strength (400 people) of rag pickers active in the corporation and their potential to effectively dispose about 2.5 tones of solid waste / day, it is suggested that steps should be taken to improve the working condition of the rag pickers. The corporation shall register the rag pickers involved in work and issue health cards to them so as to enable them to get treatment from ESI hospitals<sup>20</sup>.

## Conclusion

Solid waste management issues represent major problems to the governments of developing nations. As poorer nations grow and develop, improvements in infrastructure and technology should help to overcome barriers to the safe disposal of urban waste. Environmental regulations, intelligently designed to protect the health and integrity of ecosystems and human populations, should be created and enforced now in order to prevent the need for costly remediation measures in the future. For solutions to be environmentally and economically sustainable, priorities need to be adjusted to give appropriate weight to the needs of all stakeholders in developing countries, including governments, affected landowners, and the rural and urban poor. Adopting an integrated approach using appropriate technology is a major component to ensuring that solid waste problems are addressed in a manner which provides for the greatest common benefit. Many children begin working as rag pickers at the young age of five or six years. Following Services to be provided for child rag pickers a. Raise the minimum age for entry into hazardous work from ages 16 to 18 and finalize the list of hazardous work .b. Legally define a child as any person under age 18 years so that all children are equally protected under the law. c. Establish a compulsory education age for children. d. Increase the number of labor inspectors responsible for child labor and devote more

resources to enforcement of child labor laws. e. Provide educational, prevocational, counseling, medical, recreation and entertainment activities.

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