



Knowledge, Perception and Attitude of common People towards Solid Waste Management-A case study of Lahore, Pakistan

Ali Haider, Aleem Amber, Shahid Ammara, Khan Saleem Mahrukh and Butt Aisha

The Urban Unit, Urban Sector Planning and Management Services Unit (USPMSU) (Pvt) Ltd. 5th Floor, Office No.3, Shaheen Complex, Egerton Road, Lahore, PAKISTAN

Available online at: www.isca.in, www.isca.me

Received 2nd January 2015, revised 17th February 2015, accepted 16th March 2015

Abstract

From the past few decades, Solid Waste Management (SWM) has emerged out as a serious matter of global concern because rapid increase in population and overexploitation of non-renewable resources generated huge piles of waste materials that are far beyond the carrying capacity of the earth and posing serious threats to environment and health. However, it is always challenging to combat the rising amount of solid waste issue before assessing the awareness status of the people. Therefore, the present study was conducted to assess the attitudes, perception and awareness status regarding SWM practices of the people of Lahore. SWM is essential for sustainable development hence required intensive research nowadays. Respondents of three different income levels (high, middle and low) of Lahore City were analyzed through questionnaire survey, conducted through door to door and face to face interviews, of 300 households. The survey revealed that contemporary SWM practices have been improved but still unsatisfactory. Source separation and recycling were hardly practiced and people habitually sweep their places while throwing the waste components in the streets or nearby plots. The three income levels contributed about 564kg/day of solid waste, among which low income areas contributed 171kg/day, middle income areas 194kg/day and higher income areas 199kg/day and the quantity of waste increased as the number of family members increased. Generally the composition of solid waste includes fruits and vegetables 65.2%, plastic 20.2%, paper 10.9%, glass 0.3%, textile 3.3% and others 0.1% respectively. Although, 78.5% people were willing to pay for recycling, HIA generated more waste and more satisfied than others, however, trend of reuse of old items and waste collection varied from higher to lower income level.

Keywords: Solid waste management, sustainable development, source separation, recycling, Lahore.

Introduction

Solid waste a term used internationally to describe the useless and unwanted products in the solid state arising from domestic, trade, commercial, agriculture, industrial, mining activities and from public services as well¹. Municipal solid waste consists of organic (fruits and vegetables) and inorganic (plastic, paper, glass etc) which do not include any of medical, industrial, radioactive and agriculture wastes. However in Asia, not just waste of households and human excreta but agricultural, industrial and hospital waste collectively called as the municipal solid waste². Hence, waste originated from Asian cities is considered more hazardous as compared to European countries³. Solid Waste Management (SWM) is usually regarded as major environmental issues particularly in larger cities, however until now its generation is unavoidable and highly neglected in most developing countries as it was not a big issue earlier, but now it turned out to be a great problem and widely known concept to municipal authorities throughout the world^{4,5}. Similarly, the bad consumption patterns of people, high-living standards, resource exploitation and institutional structure are amongst the major problems regarding waste management moreover causing serious threats towards health and environment that need to be managed efficiently and effectively from industrial to domestic sectors⁶.

Integrated Solid Waste Management (ISWM) would be recommended as the most effective way to manage solid waste issues⁷. Developed countries have plenty of success stories as they implement their projects quite handsomely by using different waste management techniques like separation, composting and recycling⁸. Contrary to this, developing countries struggled to copy those projects without making meaningful efforts and to modifying these projects according to their state requirements since having fewer resources, education, skills, finances and technical expertise to meet the needs⁹.

Pakistan has a population over 160 million including 35% living in cities that contribute more than 55,000 tons/day solid waste. The major practices of SWM comprised on primary and secondary collection of solid waste only. However, by using these waste collection means, only 60% of generated waste is collected and out of this approximately 90% is disposed off in open spaces. The remaining uncollected waste is thrown in empty plots, alongside of streets and roads where it accumulates over time and outbreak various diseases as well as destroys the aesthetic beauty of the nature¹⁰. The most significant problems in Pakistan regarding SWM comprise of various components such as; lack of implementation of plan, law and its enforcement, reliable facts and figures, adequate research,

technical and financial complications¹¹. The Lahore city which comprises an area of about 1,772 square kilometers, have 3000 open dumps, generated more than 57,000 tons of solid waste with 0.84kg/capita/day generation rate¹². It was observed that most of the solid waste generated was compostable, consisted of fruit and vegetable, food waste, and plant waste (leaves, grass etc) and no major change occurs among different income levels.

The present study was thus designed to determine composition and quantity of the waste being produced in the three areas (lower, middle and higher income) of Lahore. Moreover, association of socio-economic factors such as gender, age, marital status, income, education, number of family members with the attitude, behavior and perception of people regarding waste management were also determined. The data produced by this research will surely be helpful for Government in planning of SWM.

Methodology

Study area: The Lahore city comprises of an area about 1,772 square kilometers and population of almost 6.5 million. About 57,000 tons of solid waste is generated with 0.84kg/capita/day generation rate¹¹ is used for study purpose.

Surveying questionnaire: A survey was devised to examine residential behaviors and attitudes towards waste management, particularly in three income levels of Lahore city. A semi-structured questionnaire included respondent's socioeconomic status, their consumption patterns, knowledge, perception and attitude regarding waste and its management was used to conduct the survey. The data was collected through face-to-face interviews from the respondents who were more than 18 years old by *Simple Random Sampling*. For checking the accuracy and precision of the questionnaire, a pilot study was conducted in three different areas of Lahore City. After pre-testing and necessary modifications the questionnaire was administered to a sample of 300 individuals calculated by using Taro method.

$$n = N / 1 + N (e)^2$$

Where: n = size of the sample, N = total population of selected areas, e = accepted margin of error in the estimates,

As the total population (N) was 1,63,086, margin of error (e) was taken 6% and size was calculated as 3, 00.

Statistical Analysis: Descriptive statistics (mean, mode, median, standard deviation, frequency, cross tabs, Pearson Chi-square) were applied for data analysis by using Statistical Package for Social Sciences (SPSS v.16).

Results and Discussion

Residential Survey: Survey was based on door to door and face to face interviews from three different locations of Lahore

representing low, middle and high income areas. There were 69.5% males and 30.4% females respondents during the survey.

Socio-economic Factors: Socio-economic Factors (i.e. gender, age, marital status, education, income, family members, rooms etc.) played a significant role in determining the waste generated quality and quantity by each household. The results of the present study revealed that almost 81.1% of the respondents lie in the age span of 20-40 years. And 60.6% of them were married the people having educational level equivalent or above matriculation represented 79.1%. Business was an important source of income as it represented 41.4% whereas 15.9% were associated with government job. Almost 42.1% respondent had income >50,000/month whereas only 10.9% had income <10,000/- month. Average family size was 4.09 while 75.6 respondents had 5 or more family members. There were 75.4% of respondents had 3 or >3 rooms.

Waste generation and disposal: The waste samples from different households were collected in order to assess the amount and form of waste generated by each household on regular basis. The survey revealed that the three selected locations contributed 564kg/day of solid waste; among which LIA generated 171kg/day, MIA 194kg/day and HIA 199kg/day. Most commonly used products by these households were in the form of fruits and vegetables, plastic wrapping food, canned and frozen fruits and others. Street littering behavior was most commonly observed and social economic factors (i.e. gender, age, marital status, education, income, family members etc.) had great influence on littering behavior. However, the percentage amount of generated waste by an average household generally varied depending on geography of the area as well as the economic status of the residence and is shown in figure-1 (a, b, c).

Association between the quantity of the solid waste and socio-economic factors: Pearson Chi-square was applied to identify the association between waste generation and socio-economic status of respondents. The results showed that number of family members and amount of solid waste generated were positively correlated because as the number of family members increased meanwhile the generated amount of waste increased as well. The p-value of waste (0.256) showed that no association was found between education and amount of generated waste. Although, it was generally anticipated that a well-educated family generate low amount of waste on daily basis. Conversely, results obtained showed totally opposite trend in these study areas as the amount of waste generation in HIA is quiet high as compared to MIA and LIA.

Causes and awareness of people regarding Solid waste issue: The residences of Lahore city offered more attention to their personal issues (such as crime, energy crisis, un-employment and security issues etc.) rather on solid waste management issue.

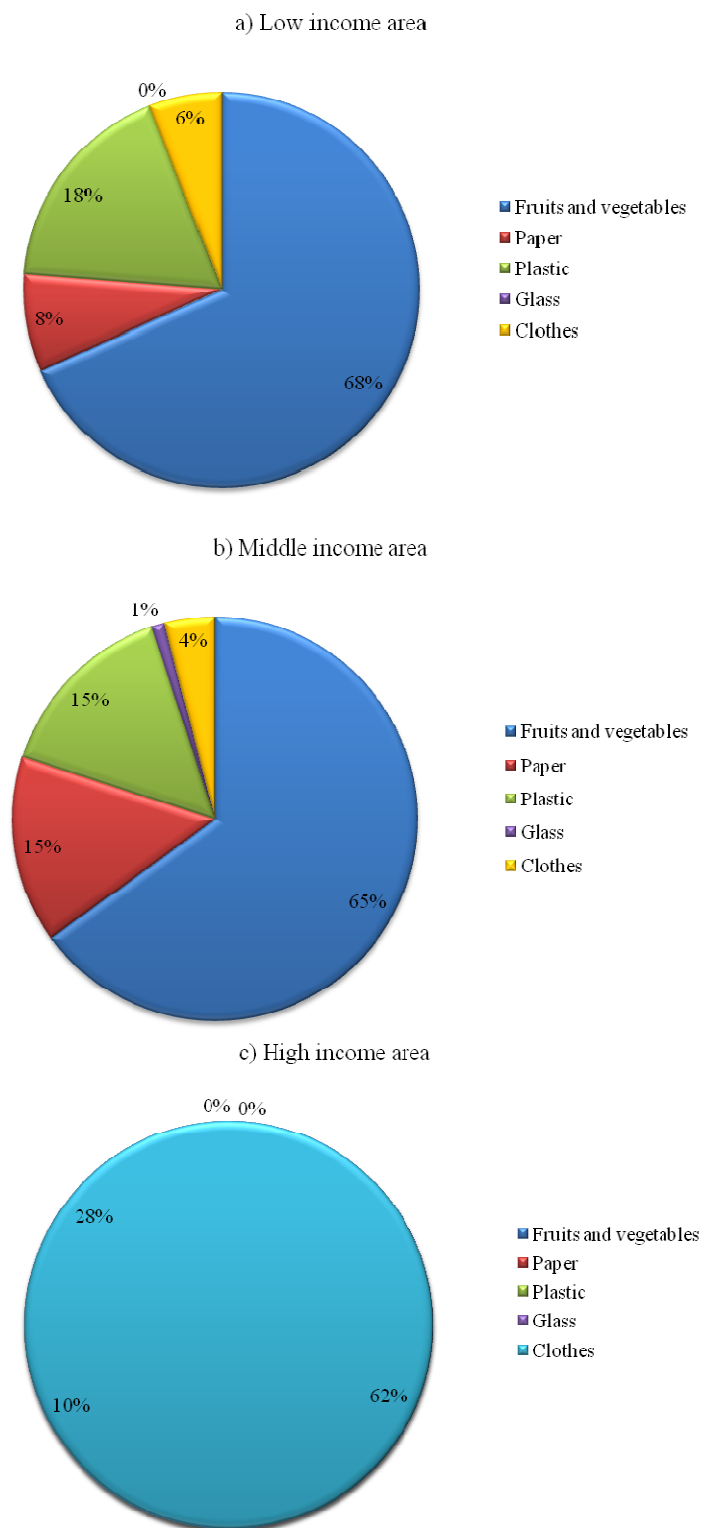


Figure-1

Commonly generated waste forms with respect to respondent's income level a) Low income area, b) Middle income area and c) High income area

There were many open dumps in the city in the form of roads, streets, vacant plots, outside and near containers because people despite of throwing waste into the container placed on the roads. Batool and Chaudary⁵ had observed the same trend in Data Ganjh Bakhsh town, Lahore. However, education played significant role in enhancing the awareness level of the people about the health risks associated with improper handling of waste and respondents of HIA responds towards SWM practices preferably than LIA and MIA. Anyhow, the general trend of waste collection and its anticipated causes were quite different in three income areas and are depicted in figure-2.

Attitudes of people with respect to Waste Storage and segregation: Survey narrated that people had sufficient knowledge about waste segregation practices, however, the general trend varied among all the three income groups of the respondents. P-value=0.026 showed that trend of collection in different containers decreased from higher to lower income area as shown in figure-3. Sharholy *et al.*⁶ also studied the household waste segregation practices and observed that in High Income Areas, people had greater concern about waste characterization and on source segregation.

Attitudes of people with respect to Placement and collection of Solid Waste: People had different attitudes regarding placement of waste outside of their houses in different containers and boxes etc as shown in figure-4. The dues for waste collection paid by the respondent also varied in three income levels because the high income areas are more developed and have effective cleaning and waste management mechanism. It was found that in LIA, 75.2% people paid less than 150Rs/month. In MIA, 95% people paid ≤150Rs monthly while in HIA 53.5% respondents paid ≥150Rs monthly.

Attitude of respondent regarding Reuse of Old items: It was observed that nowadays people are becoming more concerned about pollution caused due to usage of plastic bags and its degradation than in the past, but, still they were using plastic bags for shopping. The current study was also depicted the same results that 85.1% of the respondents use plastic bags for carrying shopping materials, 11.6% people have cotton bags taken from their market whereas only 1.3% people used to bring reusable cotton bags from their homes. There was no concept of reusing of old items or reusable products and the trend of reusing old items found to be decreased by increase of income as depicted in figure-5. For HIA (p-value=0.00) illustrated that majority of the people were not willing to use old items whereas, for LIA (p-value= 0.092) and MIA (p-value= 0.166), it was observed that people belonging to these areas were somewhat well-known about the benefits of reusing old items.

Willingness To Pay (WTP) for Recycling: Majority of the respondent showed positive attitude towards Willingness to Pay (WTP) for recycling of their waste products, as shown in figure-6, because people were informed that these practices are very

important in resource conservation, economic opportunities and reduction in waste disposal issues. Education had positive effect on WTP for recycling as (p-value=0.002) showed that well educated people were more aware from the benefits of

recycling. Therefore, well-educated public can ensure the success of WTP program implementation. Turan *et al.*¹² also revealed the importance of public participation and awareness for better management of waste.

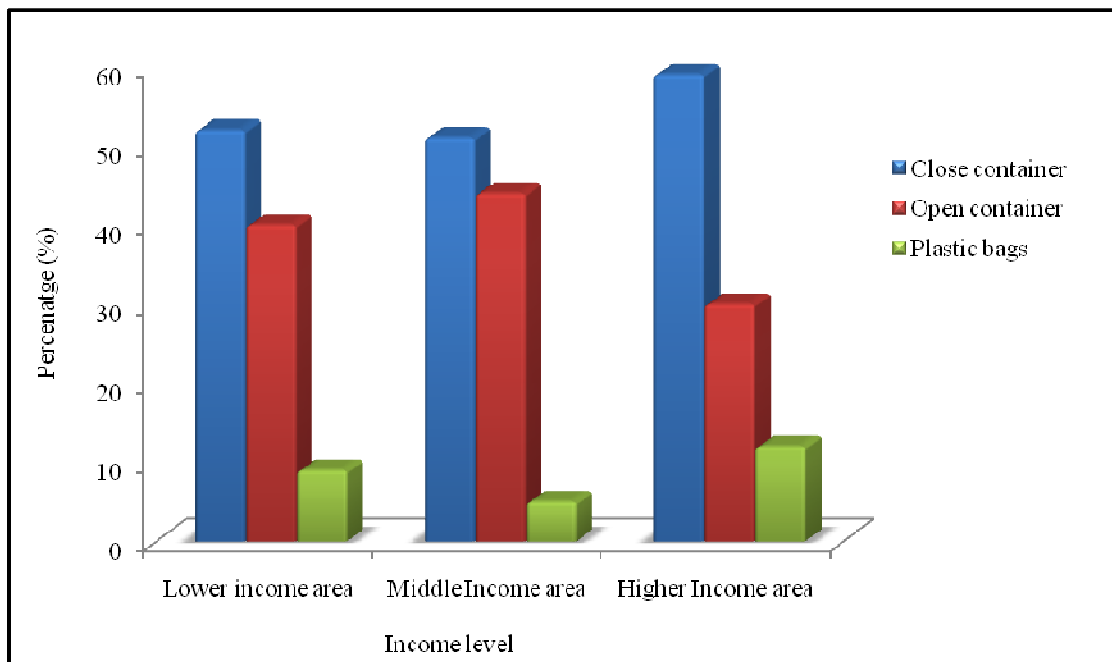


Figure-2
 Education of respondents with reason for causing of too much waste

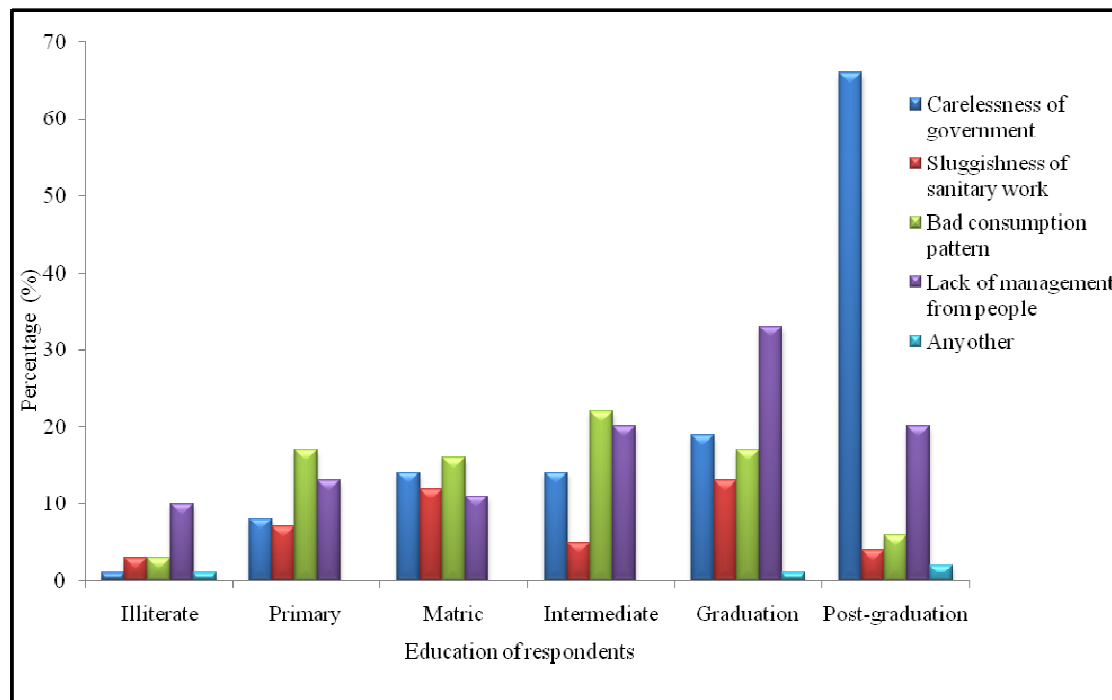


Figure-3
 Waste storage methods against income level of the respondents

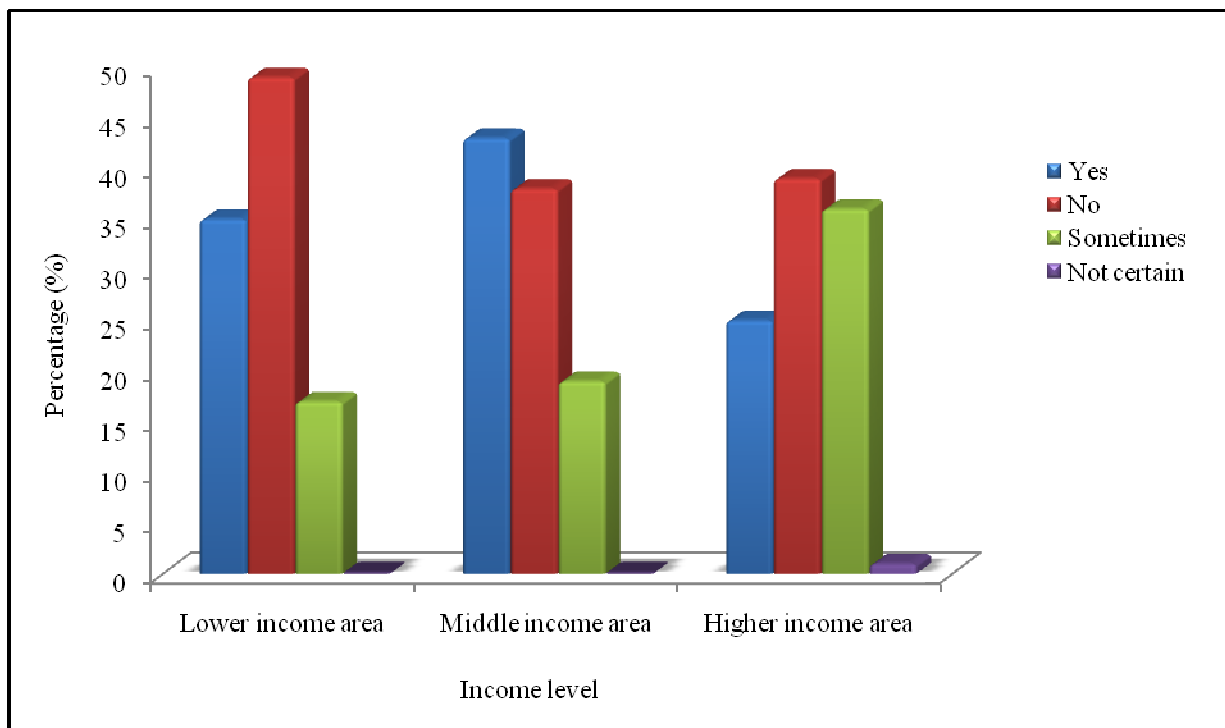


Figure-4
 Solid waste placement methods of respondents according to their Income level

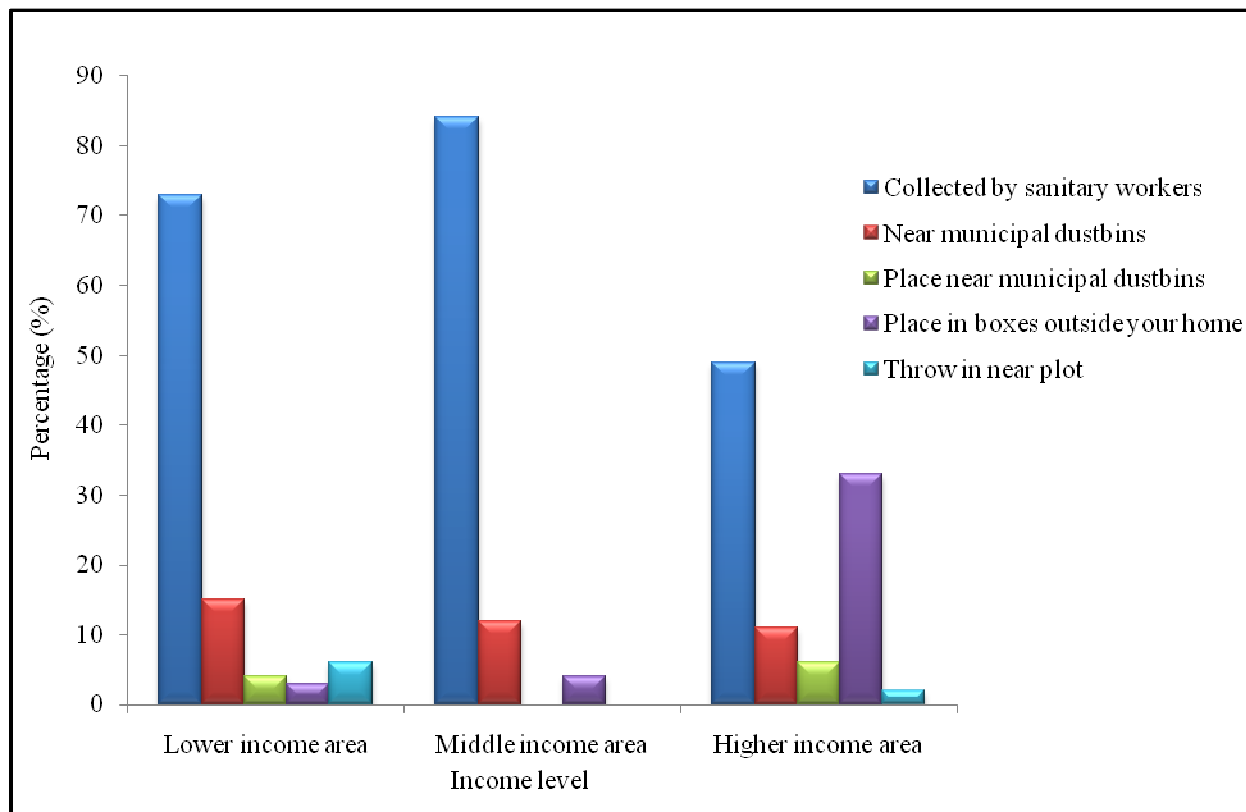


Figure-5
 Attitude of respondents towards reuse of old items against their Income level

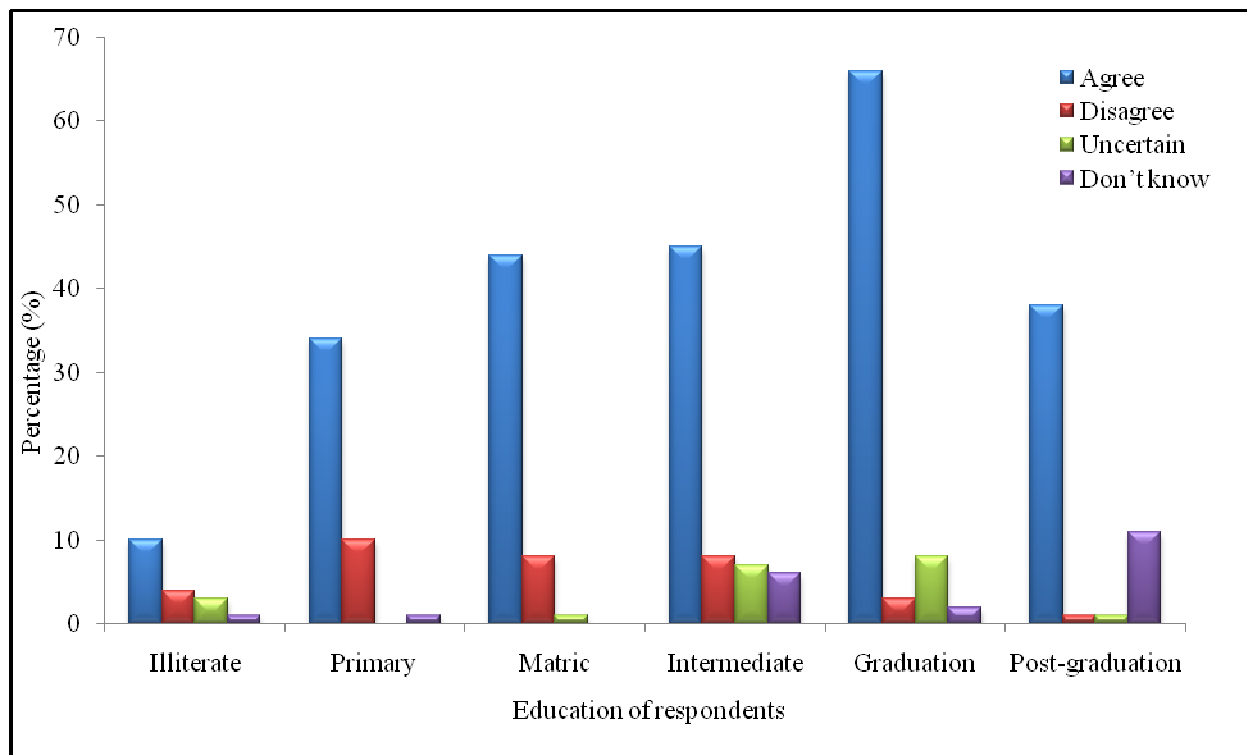


Figure-6
Education of the respondents with WTP for recycling

Perception about disposal of solid waste: (P-value=0.013) indicated that the perception of males and females about disposal of solid waste was not same as males were more concerned for segregation and recycling than females. Education though positively correlated with thinking of respondents about dumping and waste recycling practices (p-value=0.007) and it represented that 42.7% well educated people considered dumping as an illegal practice, 20.5% people believed dumping as an illegal act but there was no other way, whereas 30.8% people considered dumping a right or legal way. There were only 28.8% males and 13.9% females who considered dumping as an illegal and wrong practice and about 51.6% of male and female preferred segregation and recycling as the best disposal method as depicted in figure-7.

Satisfaction level of the respondents towards Solid Waste Management (SWM) Practices: It was observed from the survey that education of the respondents had no influence on the satisfaction level of the respondents regarding SWM practices (p-value= 0.242) and the satisfaction level with respect to income slightly varied from lower to higher income levels as shown in figure-8. Accumulatively, 50.7% of the respondents were satisfied with government regarding waste management practices (p-vale=0.003), 34.5% were not satisfied and 15.2% were uncertain. On the other hand, trend varies from higher to lower income areas as in LIA, 52.5% were satisfied from government and 41.6% were not satisfied. In MIA, 42% respondents were satisfied, 40% remained unsatisfied whereas

in HIA 57.4% people were satisfied, 20.8% were unsatisfied and 21.8% remained uncertain. The residents of HIA were found to be more satisfied with the government and local authorities regarding waste management practices because Government in these areas seem to be somewhat more active and provided dustbins, cotton or polyethylene bags. Secondly, newly build housing society's administrations collected waste properly and on regular basis. Also, these societies were fabricated with waste collection boxes.

Conclusion

The current study thus revealed that the attitude and participation of local community towards SWM is key component for the successful implementation of any Waste alleviation program and ISWM. Education about solid waste management should be commenced from school level in the form of paintings of cartoons that would be helpful to understand the issues effectively. Moreover, apart from discarding the valuable organic waste, it can be utilized as fertilizers or for the production of energy thus converting raw organic waste into black gold. Therefore, to promote sustainable development, the Government should take initiatives and should work in collaboration with other public and private sector as well as municipalities authorities for the implementation of segregation techniques that would be helpful for effective recycling. The current study will surely be helpful for Government in planning of SWM.

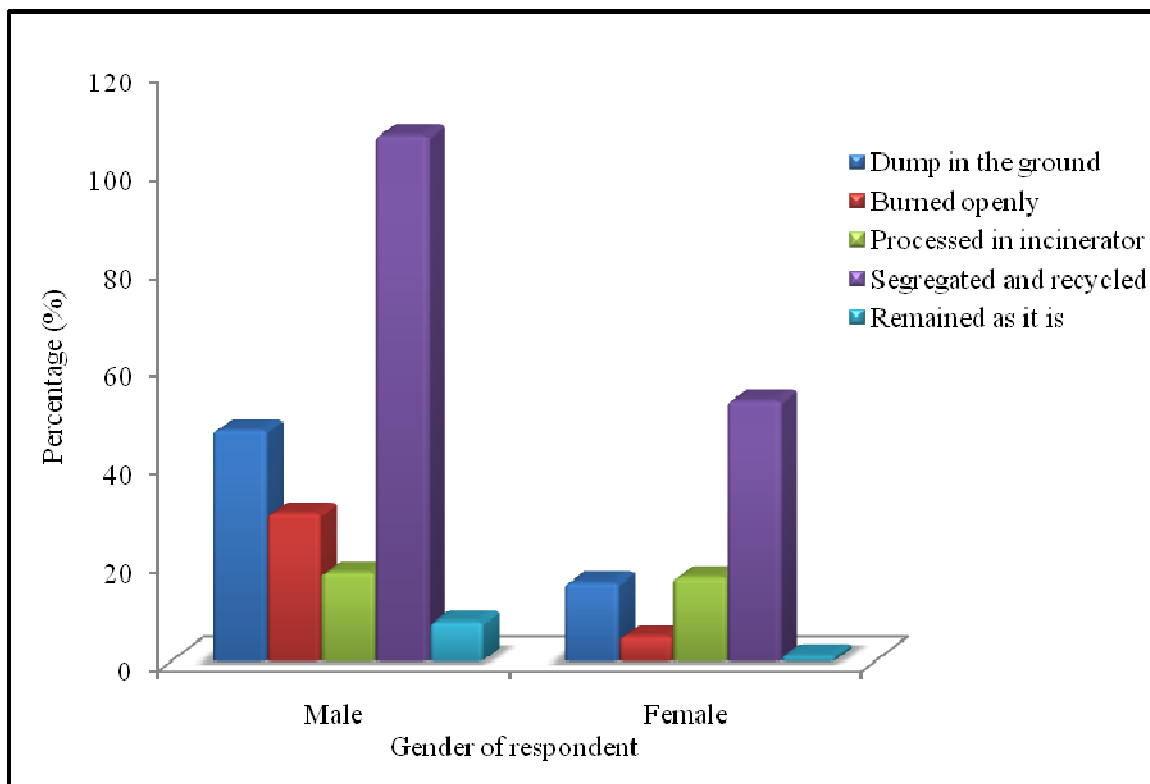


Figure-7
 General view of respondents towards best disposal methods

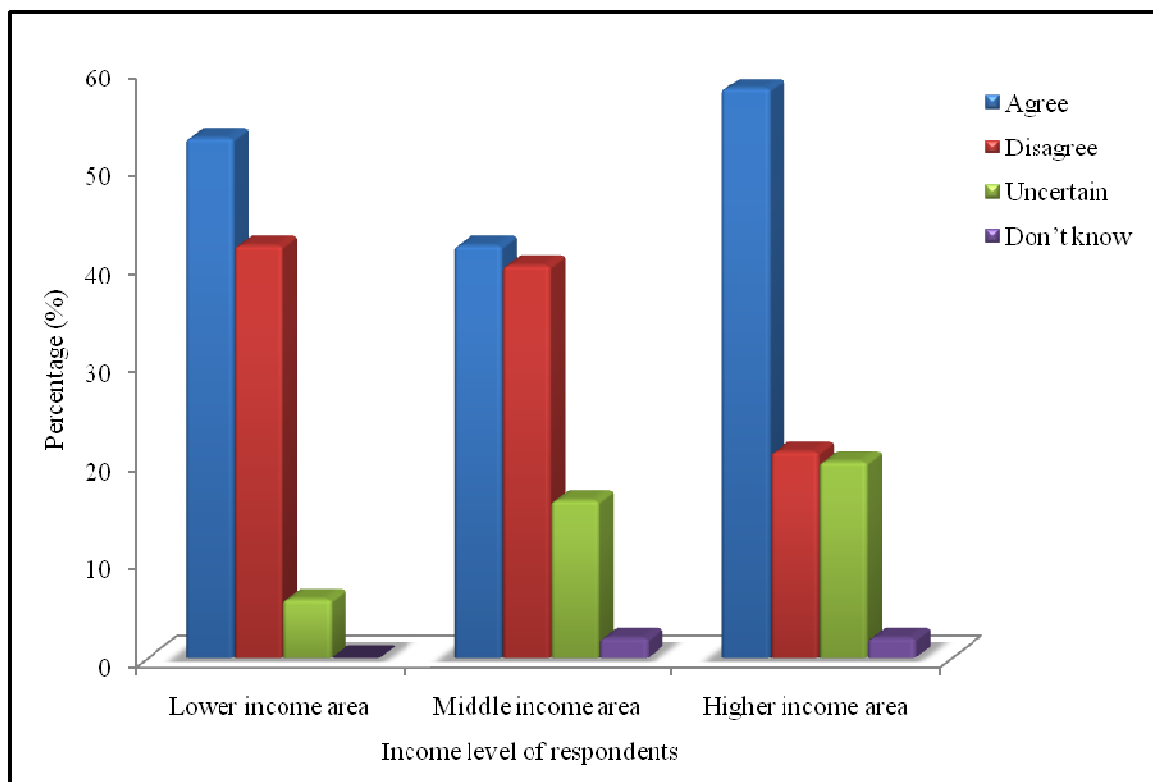


Figure-8
 Satisfaction level of respondents towards Solid waste management practices

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