World Journal of Engineering Research and Technology
WJERT
www.wjert.org
SJIF Impact Factor: 3.419

THE FACTORS THAT AFFECTING ON SOLID WASTE GENERATION IN ZALINGY TOWN – CENTRAL DARFUR STATE – SUDAN 2015

Belal Abdallah A. Adam*, Dawria Adam[1], Ahmed M. Hussein[2], Isam eldein Awdalla Abdelrhman[3]

*Assistant Professor, Shendi University, Faculty of Public Health, Environmental Health Department, Shendi , Sudan

[1]Assistant Professor, Shendi University, Faculty of Public Health, Public Health Department, Shendi, Sudan.

[2]Senior Lecturer, Shendi University, Faculty of Public Health, Public Health Department, Shendi, Sudan.

[3]Public Health Officer, Ministry of Health, Central Darfur State, Zalingy- Sudan.

Article Received on 24/09/2016 **Article Revised on 14/10/2016** **Article Accepted on 03/11/2016**

***Corresponding Author**
Dr. Belal Abdallah A. Adam
Assistant Professor, Shendi University, Faculty of Public Health, Environmental Health Department, Shendi , Sudan.

ABSTRACT

Developing countries face serious environmental challenges concerning solid waste management due to rapid urban development The increasing population and improved standard of living in cities and urban areas have led to the generation of varied categories of wastes. Due to urbanization, population growth, industrialization, and economic growth, a trend of increase in municipal solid waste (MSW) generation has been recorded worldwide in major cities. The Research aimed to assess the solid waste management in Zalingy and to identify the factors that influencing the solid waste production. After determined of sample size then (100 person) were selected randomly by using a questionnaire which designed according to objectives of this study, then obtained data were analyzed by using SPSS & Excel programmes, the main results of this study are: 69% of study population their educational level is mediam and secondary while just 15% of them university education, 51% of population have family size in rang[4-6] persons and 28% of them have less than 5 persons,

also the study revealed that there are decrease in personal income where as 35% of people their monthly income is just 500 Sudanese pound, research found that 96.6% of study population not pay fees for solid waste management and 93% of people said that there are no strength of solid waste management policies, laws and enforcement. Finally according to results the study recommended that: establish effective solid waste management programme and support it with regulations and laws, increase environmental education or awareness about solid waste in study area and local governmental and none governmental sectors should be support solid waste management porgramme.

Keywords: waste management, disposal, technology, generation, collection, Zalingy Town.

I. INTRODUCTION.

Solid wastes could be defined as non-liquid and nongaseous products of human activities, regarded as being useless. It could take the forms of refuse, garbage and sludge (Leton and Omotosho, 2004)

Cities in developing countries, being among the fast growing cities in the world are faced with the problem of solid waste generation. The implication is serious when a country is growing rapidly and the wastes are not efficiently managed. Waste generation scenario in Zalingy has been of great concern both globally and locally. Of the different categories of wastes being generated, solid wastes had posed a hydra-headed problem beyond the cope of various solid waste management systems (Geoffrey, 2005)

solid waste management has become a global problem particularly in the developing countries of the world (Ramachandra et al., 2003, Tchobaanoglous et al., 1993). The majority of human activities inevitably result in the generation of waste due to the improper utilization of energy and resources. According to European Protection Act (1990), "waste is any substance, which constitutes scrap materials or any effluent or other unwanted surplus substances arising from the application of a process, or any substance or article, which requires to be disposed off as being broken, worn out, contaminated or otherwise spoiled." Although solid waste does not include human excreta but it may have some hazardous material as its subset (Ramachandra, 2009). Solid wastes are dangerous in nature since they accumulate and contaminate the ground and surface water and are toxic and breeding grounds for insects and fly which in turn are the sources of several diseases. Further, percolation of leachate to ground water sources may cause severe health problems if used for drinking water

purposes (Tchobaanoglous et al., 1993, Anjaneyulu., 2005, Anand et al., 2005, Beigl et al., 2009). As such, environmental friendly methods for management of municipal solid waste management have become a global challenge in face of competition with limited resources, rapidly increasing population, urbanization and worldwide industrialization (Katiyar et al., 2013).

Waste Generation by Region

Waste generation varies as a function of affluence, however, regional and country variations can be significant, as can generation rates within the same city. Throughout the report, when Africa is mentioned as a region, we refer to Sub-Saharan Africa. Data are particularly lacking for Sub-Saharan Africa. Waste generation in sub-Saharan Africa is approximately 62 million tonnes per year. Per capita waste generation is generally low in this region, but spans a wide range, from 0.09 to 3.0 kg per person per day, with an average of 0.65 kg/capita/day. The countries with the highest per capita rates are islands, likely due to waste generated by the tourism industry, and a more complete accounting of all wastes generated. The annual waste generation in East Asia and the Pacific Region is approximately 270 million tones per year.

In Eastern and Central Asia, the waste generated per year is at least 93 million tonnes. Eight countries in this region have no available data on waste generation in the literature. The per capita waste generation ranges from 0.29 to 2.1 kg per person per day, with an average of 1.1 kg/capita/day.

Latin America and the Caribbean has the most comprehensive and consistent data (e.g. PAHO's Regional Evaluation of Solid Waste Management, 2005). The total amount of waste generated per year in this region is 160 million tonnes, with per capita values ranging from 0.1 to 14 kg/capita/ day, and an average of 1.1 kg/capita/day. Similar to the high per capita waste generation rates on islands in Africa, the largest per capita solid waste generation rates are found in the islands of the Caribbean.

In the Middle East and North Africa, solid waste generation is 63 million tonnes per year. Per capita waste generation is 0.16 to 5.7 kg per person per day, and has an average of 1.1 kg/capita/day (UNEP, 2010).

Factors affecting solid waste generation

Several factors influence the solid waste generation

Lack of advanced technology, facility for separation at source, strength of solid waste management policy and enforcement, environmental education and awareness and income status of individuals among others, are factors affecting solid waste scenario.(Abel 2009) showed that education, income and social status are important factors influencing per capita solid waste generation. . Age, location, occupation and amount charged for waste collection are determinant factors for using public waste collection services in Ibadan (Ajani, 2007). The quantity and categories of solid waste generation also varies with socio-economic groups in which the high and middle groups take the lion share (Sridhar et al., 1985).

the effect of gender, age and educational status on solid waste management and reasons for not using an appropriate waste collection service (WCS) in traditional cities. Age, educational status, and amount charged for waste collection services had been identified as factors influencing solid waste management in highly populated cities (Ajani, 2007).

The knowledge of the current status of waste disposal options and level of awareness of solid waste management will help the government and sectors involved in waste management to take action to establish and reinforce appropriate waste collection and disposal option and environmental education and awareness on waste management Sridhar et al., 1985).

2. METHODOLOGY

studyarea

This descriptive crosssectional study was conducted in Zalingei, Central Darfur staste in order to assess the management of solid waste. Zalingy Town located in the middle of Central Darfur , bordered from east by Sweeteners Jebel Marra, and local Azoum from west side, from south by part of local and Wadi Saleh and from north by Saraf Umra, this area characterized by local semi-desert climate.3

sample size

100 persons were drtermined and simple random sample was uesed to apply this study.

Data Collection

questionnaire was designed and faced to residents of Zanlingy Town to collect information about solid waste management according to target of this study. Also, interview and personal

observation were employed. observatiosn and notes administration had been tahen about Environmental Health Activities in Zalingei and environmental sanitation operations in this city.

Data Analysis

Obtained Data was analyzed by a computer through the program (SPSS) and execl programe. Then presented in tables and figures.

3. RESULTS

The quantity and rate of solid waste generation in the various places of Zalingy Town depends on the population, level of industrialization, socio-economic status of the citizens and the kinds of commercial activities being predominant.

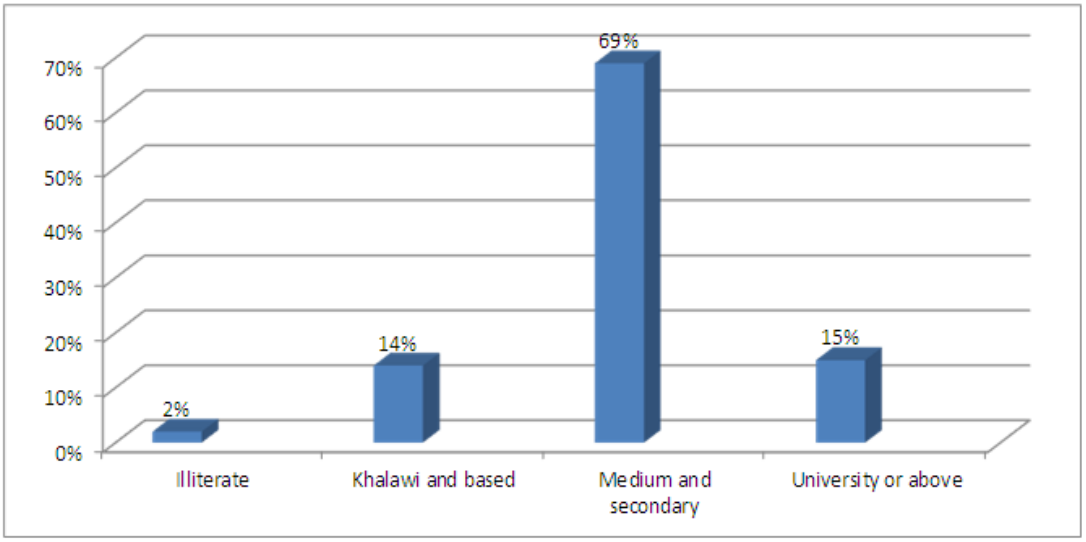

Figure (1): Educational level of population.

The above figure shows that 14%, 69% and 15% of population group their educational levels are Khalwa/ basic, medium/ secondary and university respectively.

Table(1) family size of The population.

family size/ person	Frequency	Percentage%
Less 5	28	28%
6-10	51	51%
More than 10	21	21%
Total	100	100%

The above table shows that 51% of people have have family size in range[6-10] and 28% of them have family size less than 5 person.

Table (2): monthly income of study population per Sudanese pound.

income	frequency	Percentage %
Less than 500 SDG	35	35%
500-1000 SDG	32	32%
1000-2000 SDG	29	29%
> 2000 SDG	4	4%
Total	100	100%

The above table shows that 35% of population their monthly income less 500 SDG and 32% of them their income range 500-1000SDG.

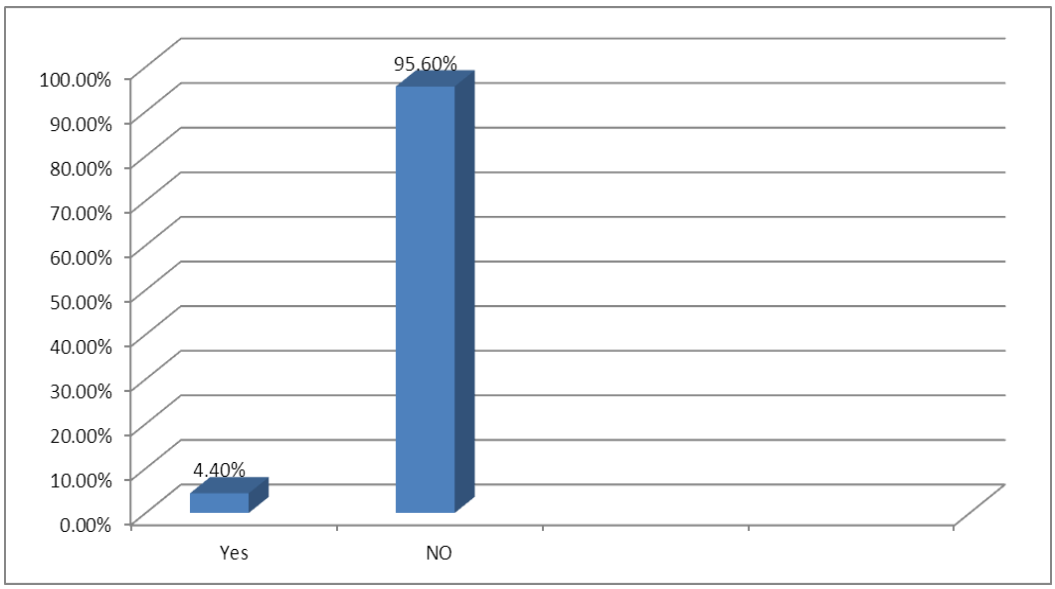

Figure (2): monthly subscription of population in solid waste programme.

The above figure shows that 95.60% of population are not pay monthly fees for solid waste while just 4.40 % are contributing monthly in solid waste programme.

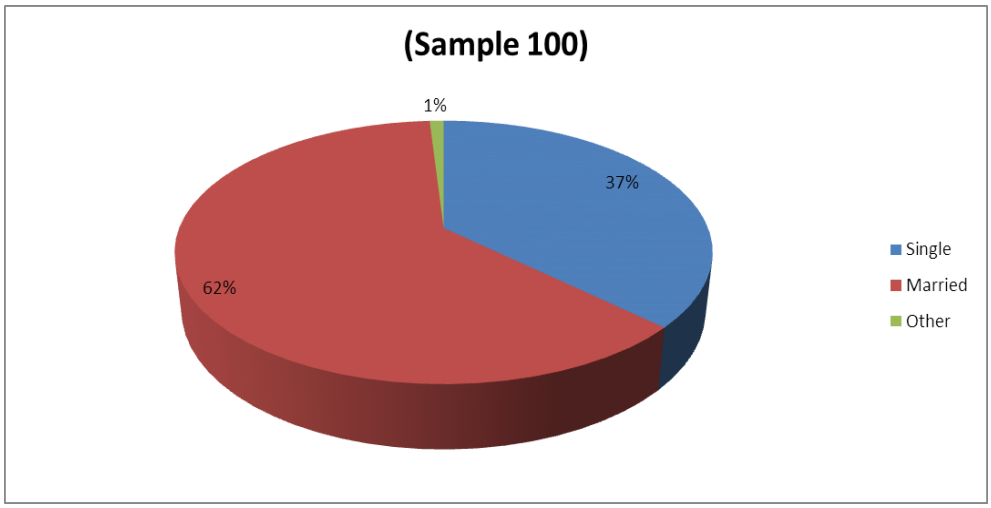

Figure (3): Social status of the population.

The above figure shows that 62% and 37% of study population are married and single respectively.

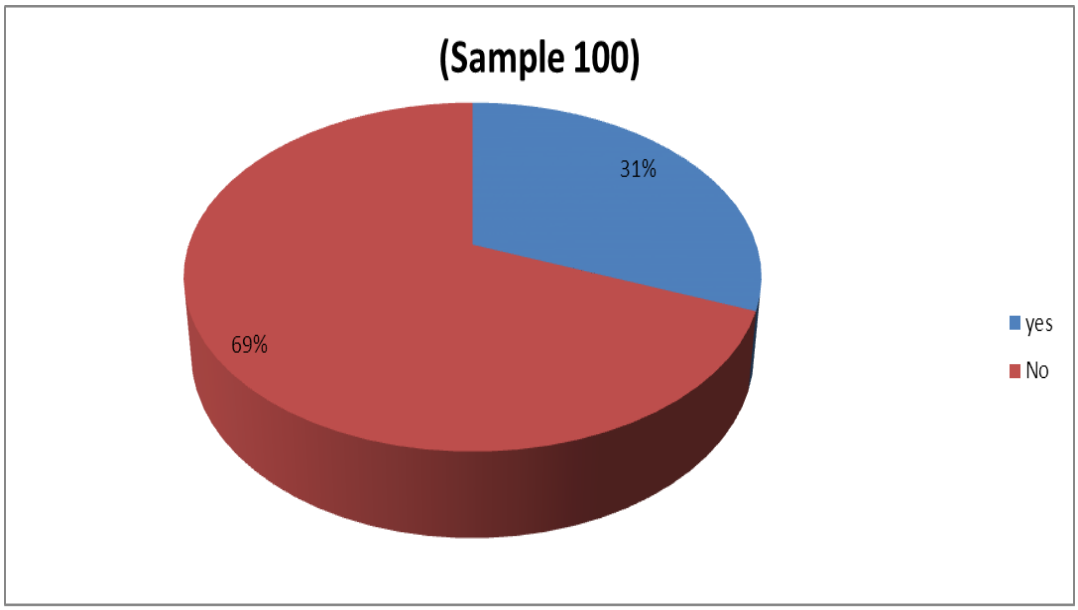

Figure (4): presence of solid waste collection system.

The above figure shows that 69% of study population said that there is no solid waste management system while 31% of them said that it found.

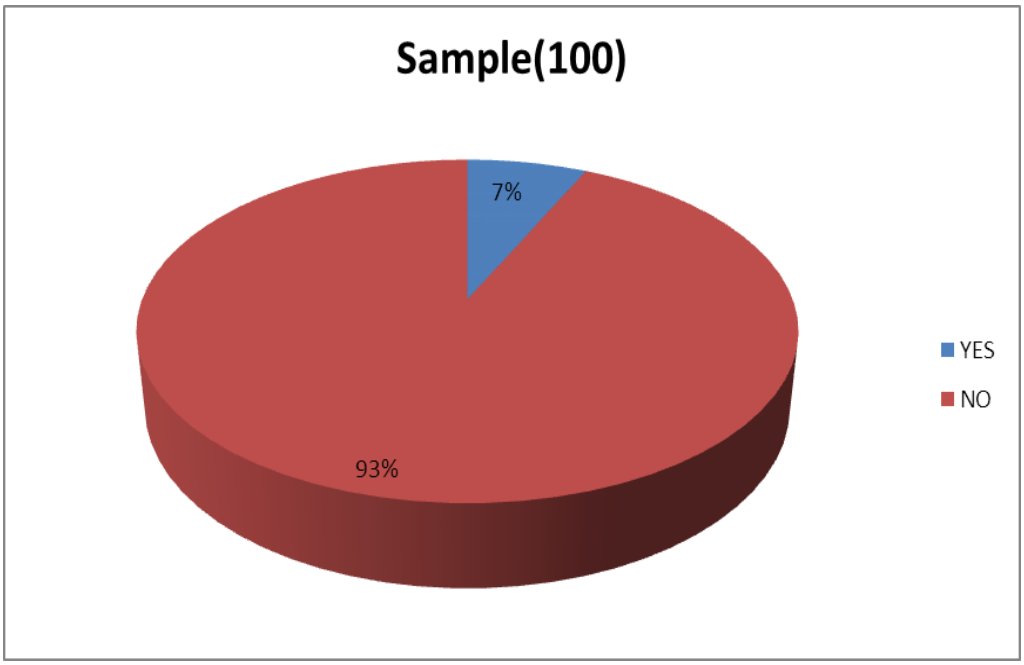

Figure (5): presence of health education about solid waste programme.

The above figure shows that 93%of people said that there is no awareness about solid waste while just 7% of them said it found.

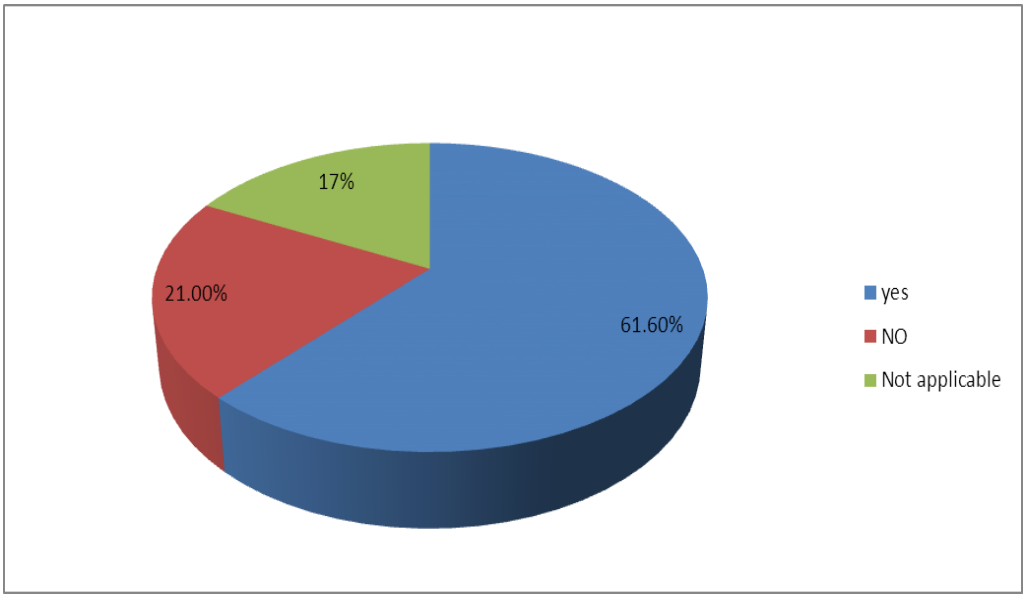

Figure (6): effectiveness of law of solid waste management.

The above figure shows that 61.6% of study population said that the current law is effective, while 21% of them said that it not effective.

4. DISCUSSION

The study showed that 62% of study population are married (figure 3) and 51% of these people their family size ranged from 6-10 persons (table 1) this is lead to generation more of solid waste at source. The study revealed that 35% of population their individual income is less than 500 Sudanese pound (table 2) this value is very poor so the majority of these population have no participation in solid waste system collection, whereas found 95.6 % were not pay fees for their solid waste while just 4.4% of study population are contributed in solid waste system and paid monthly fees (figure 2). The current study showed that most of targeted population their educational level is medium and secondary 69% (figure 1) this may affect on method of dealing with solid waste at source of production, also the present study revealed that there are weakness about solid waste management in deferent stages, whereas 93% of study population said no environmental education and awareness about dealing with solid waste (figure 5). The study showed that 61.6 % of study population said here are effective law and legislation for solid waste in study area (figure 6), but through this current study we observed that law and legislation that judge solid waste are very weak because spread of waste in any place and everybody can throw his solid waste upon any location without accountability and punishment. The current study revealed that 69% of study population said no regular collection system of solid waste, figure 4), this is may be the main

reason behind accumulation of solid waste in households, roads, markets and all places of human activities, also current study revealed that lack of advanced technology for solid waste management in study area increase the generation and accumulation of waste in zalingy Town.

5. CONCLUSION

The quantity and rate of solid waste generation in the various area in Zalingy Town depends on the population, level of industrialization, socio-economic status of the citizens and the kinds of commercial activities being predominant, also effectiveness of regulations and law that recognize solid waste management have great role in solid waste generation in Zalingy Town.

6. RECOMMENDATIONS

According to results of this study it is recommended that. establish effective solid waste management programme and support it with regulations and laws, increase environmental education or awareness about solid waste in study area and local governmental and nongovernmental sectors should be support solid waste management porgramme.

7. ACKNOWLEDGMENTS

The authors are would like to thank and grateful to all those who have helped and contributed in making this study a success.

8. REFERENCES

1. Abel, OA (2009). An analysis of solid waste generation in a traditional African city: the example of Ogbomoso, Nigeria. Environment and Urbanization, SAGE Journals, 19(2): 527-537.
2. Ajani, OI (2007). Determinants of an effective solid waste management in Ibadan Metropolis, Oyo state, Nigeria. Journal of Food, Agriculture and Environment, 6(1): 152-157.
3. Anand., Subhash (2005). “Solid Waste Generation and Management in Delhi: A Sustainable Approach” in Singh, J. (Ed.). Environment and Development, I.K. International Publisher, New Delhi, 621–639.
4. Anjaneyulu Y. (2005). “Introduction to Environmental Science, B.S. Publications, Hyderabad.

5. Beigl P., Lebersorger S. (2009) "Forecasting municipal solid waste generation for urban and rural regions," *XII International Waste Management and Landfill Symposium Sardinia, Italy.*
6. Geoffrey, IN (2005). The urban informal sector in Nigeria: towards economic development, environmental health, and social harmony.Global Urban Development Magazine., 1(1).
7. Igoni, AH; Ayotamuno, MJ; Ogaji, SOT; Probert, SD (2007). Municipal solid waste in Port Harcourt, Nigeria. Applied Energy, Elsevier., 84(6): 664-670.
8. Katiyar R.B., Suresh S., Sharma A.K. (2013) "Characterization of municipal solid waste generated by city of Bhopal, India, ICGSEE-2013." International conference on global scenario in Environment and Energy, 5(2): 623-628.
9. Leton, TG; Omotosho, O (2004). Landfill operations in the Niger delta region of Nigeria. Engineering Geology., 73(1-2): 171-177.
10. Ramachandra T V (2009) "Municipal Solid Waste Management." TERI Press, New Delhi.
11. Sridhar, MKC; Bammeke, AO; Omisakin, MA (1985). A study on the characteristics of refuse in Ibadan, Nigeria. Waste Management and research., 3(3): 191-201.
12. Tchobaanoglous, H., Theisen H., Samuel A. (1993) "Integrated Solid Waste Management, McGraw-Hill, Inc., New Delhi.
13. United Nations (2010) The Millennium Development Goals Report, United Nations Publications. World Bank Institute Resources Improving Municipal Solid Waste Management in India, http://dx.doi.org/10.1596/978-0-8213-7361.