

# A Review of Scavenging as a Means of Environmental Management.

Igwe, P.U.; Anaje, E.C.; Onyegbu, C.U.; Ezechilue, F.B.; Nwatu, M.T.,

Department of Environmental Management, Chukwuemeka Odumegwu Ojukwu University, P.M.B. 02, Uli, Anambra State, Nigeria

**Abstract**— *Scavenging as a solid waste management option helps in the reduction of quantum of wastes at dumpsites and expands the life span of landfills. The objective of this paper is to conduct a review of previous works on scavenging as a means of environmental management. The method used is a review of academic/journal articles, internet materials, conference papers and publicly available materials on scavenging as a means of environmental management. Previous authors had a unity of opinion that scavengers recover reusable and recyclables materials (eg. plastics, papers, scraps metals, aluminium) which serve as sources of income for livelihoods. Recommendations of the study includes: (1) safety awareness and health education should be provided to reduce the occupational hazards the scavengers are exposed to in the course of their scavenging activities; (2) people should be made to see scavengers as partners in progress in environmental management which is a collective enterprise; and (3) grants should be given to scavengers to encourage them expand their business considering the role they play in waste management.*

**Keywords**— *Environmental Management, Review, Recycling, Scavenging, Sustainability, Waste Management.*

## I. INTRODUCTION

Wastes are things considered as unfit, unwanted and discarded due to economic reasons or ignorance of alternative technologies to re-use them (Adeyemi, 2001). He also opined that waste management is considered as one of the most serious environmental problems facing the world today. In both developed and developing countries, population growth, and production and consumer patterns have increased the rates of solid waste production, creating serious constraints to improvement of human environmental and health conditions (Ojeda, Armijo and Ramirez, 2002).

International Labour Organisation (2004) defined scavenging as manual sorting and picking of recyclable/reusable materials from mixed wastes at legal and illegal landfills, dumpsites, street bins and piles, transfer points, as well as waste collection trucks. Okoye

(2010) defined scavenger as a person who picks up recyclable/reusable materials from mixed solid wastes stream whenever it may be temporally accessible or disposed of or further use and/or processing. A waste scavenger is a person who salvages reusable or recyclable materials to sell or for personal consumption (Ebenezer, 2014). Scavenging from the waste stream is an important economic activity that provides income for over 15 million people worldwide, most of whom are in cities in developing countries, and it has a financial impact of several billions of US dollars every year (Medina, 2010). According to him, scavenging is an example of sustainable development, emphasising that scavenging activity enhances environmental protection by increasing the amount of waste collected, reused and recycled, resulting in high indicators for energy saving, pollution prevention and pollution reduction, as well as extending the useful life of landfills. He further said that scavenging is relevant to economic growth, as it reduces the cost of raw materials for local enterprises.

In the view of Adewole (2009), scavengers are normally part of the socio-economic structure; their displacement from a disposal site can have many direct and indirect consequences. He also opined that unsupervised and uncontrolled scavenging is detrimental to the health and safety of the scavenger as well as personnel operating the facility. Scavenging is common occurrence in the third world countries, because of high unemployment, widespread poverty and lack of a safety net for the poor (Medina, 2001). According to Ackeman (2005), scavenging provides a spontaneous labour incentive solution, becoming an alternative means of achieving an integral solid waste management system.

The programme to reduce and segregate waste at source led to the conflict of interest between government and scavengers (Ejares, Palar, Kristiana, Aguilar and Erian, 2014). They also opined that waste segregation offers an advantageous step for solid waste management programme but is detrimental to the informal sectors due to reduced volume of waste that reached the dumpsite. Waste recycling in many low-income countries is driven by the informal sector, often with minimal input from state institutions (Ezeah, Clive, Paul, Mbeng and

Nzeadibe, 2014). In general, informal recycling refers to the waste recycling activities of scavengers and other groups and recycling companies involved in the recovery, processing/transformation and trading on materials recovered from waste (Wilson, Velis and Cheesam, 2006; Nzeadibe and Iwuoba, 2008; Wilson, Araba, Chinwah and Cheesam, 2009).

Important role of scavenging is the fact that it represents an income-generating activity for the poorest in the developing world (Moreno-Sanchez, Maldonado, and Sheldon, 2003). They also stated that recovery of materials from solid wastes, if organized properly, can generate a livelihood for unskilled workers in a developing country environment. Although poverty is an important factor that causes people to become scavengers, it is not the only one. In times of war or severe economic crises, scavenging reappears with particular intensity (Medina, 2001). The problem of waste can be linked to the fact that the population is on the increase and rates of consumption by various individuals increase by the day, which on the other hand has led to an increase in the amount of wastes generated (Elenwo, 2015). However, scavenging helps in reducing the quantum of wastes that goes to or remains at dumpsites/landfills. This paper is focused on a review of works on scavenging as a means of environmental management.

### **1.1 Statement of the Problem**

The problem under investigation is scavenging as a means of environmental management. Scavenging has been one of the major economic activities of the local and marginalised people in developing and developed countries. It is a source of employment and income to the labour force of some people. However, the poor environmental conditions of scavengers at each dumpsite have attracted the concern of researchers such as scientists, environmental managers and other environmental regulatory agencies.

Nas and Jaffe (2004) reported that in India, scavengers are often untouchable and not simply the lowest in caste system, but essentially outside it. According to them, they are seen as being the lowest of the low, relegated to dirty work such as scavenging because of their caste. According to Anierobi and Efobi (2013) who conducted a study on waste pickers and urban solid waste management system in Nigerian cities, sustainable environmental management efforts in Nigeria should seek to embrace the informal sector operators (scavengers or waste pickers) and incorporate them into the organizational structure of solid waste management system of our urban centres, here in Nigeria, where they are hitherto neglected. Therefore, this study is focused on a review of scavenging as a means of environmental management.

### **1.2 Objective**

The objective of this paper is to conduct a literature review of scavenging as a means of environmental management.

## **II. CONCEPTUAL FRAMEWORK: SUSTAINABLE WASTE MANAGEMENT**

This study is based on the concept of sustainable waste management. According to De Montfort University Leicester (2012), sustainable waste management can be defined as using material resources efficiently to cut down on the amount of waste produced, and where waste is generated, dealing with it in a way that actively contributes to the economic, social and environmental goals of sustainable development, managing waste is not only how we dispose garbage in landfill, or how much we recycle or what we recycle, but it is also how we do not create waste to start with.

Focus of sustainable waste management in the period 2001–2010 is clear evidence of reducing of greenhouse gas (GHG) as a result of implemented sustainability criteria and an upward shift in the waste management hierarchy (European Environment Agency, 2013; Karagiannidis, Kontogianni, and Logothetis, 2013). Sustainable development requires viable answers following economic, social, and environmental criteria. Therefore, sustainable waste management has a central role in sustainable development (Cucchiella, D'Adamo, and Gastaldi, 2014). In the context of sustainable waste management, scavenging should be carried out such that wastes do not litter the environment or endanger the public and also their own health.

## **III. METHOD**

This research made use of a review of academic articles, journals, textbooks, internet materials; thesis both published and unpublished on scavenging as means of environmental management. The researcher gathered 31 materials for this research but selected 10 that are more relevant to scavenging as a means of environmental management for the review.

## **IV. LITERATURE REVIEW**

Solid waste management presented great challenges in Rio de Janeiro and there was a lot to do in order to integrate scavengers in recycling system (Tirato-Soto and Zamberlan, 2013). They further estimated that in the city there were around five thousand scavengers and although they have an important role in diverting solid waste from landfills, most of them live in poverty. According to Ejareset *al* (2014) research on socio-demographic profile of scavenging households in Umapad dumpsite, Philippines, waste segregation offers an advantageous

step for solid waste management program but is detrimental to these informal sectors due to reduced volume of waste that reached the dump site.

In the opinion of Martin (2012), e-waste scavenging as a livelihood strategy in Accra can be seen as a direct response to rapid urbanization, neo-liberal globalization, and a lack of formal job opportunities. Asibor and Edjere (2017), in their assessment of the activities of scavengers and their economic impacts in waste recovery in Warri Metropolis, Delta State Nigeria concluded that the activities of scavengers reduced the volume of waste municipal authorities had to grapple with, and if well managed might form the cornerstone to the solution of waste management in Nigeria if effectively integrated. Santa (2014) studied disease and health condition of scavengers in Bangladesh and opined that scavengers were working and spending most of their working hours at the dumpsite, little attention and resources were allocated for their occupational health and safety.

Navarrete-Hernandez (2015), in his study on scavenging revisited: supporting scavengers in Santiago de Chile, opined that a range of supporting policies were required to increase scavengers' sustainable performance and reduce the negative externalities of the activity. In the opinion of Ebenezer (2014), in his study on scavenging for wealth or death and exploring the health risk associated with waste scavenging in Kumasi, Ghana, asserted that a more plausible potential means to alleviate the dangers associated with waste scavenging was by implementing simple and cost-effective safety procedures. His research suggested that the Thailand safety model can be replicated in Ghana as a starting point.

Pandey (2004) carried out a study on occupational health of scavengers in Kathmandu, Nepal and noted that the scavengers of all places were seriously suffering from different types of health problems. He further opined that frequencies of physical injuries are so high to most of scavengers of each place and they got some types of injuries more than 4 times in a week. In the view of Elenwo (2015), in his assessment of the activities of scavengers in Obio/Akpor Local Government Area, Rivers State, Nigeria, the activities of scavengers created employment and also assisted in the cleanliness of the environment. According to him, the educational attainment of the scavengers revealed that 59.8% did not have any formal education which is why they carried out the activities without recourse to safety and their health was at risk.

Marello and Helwege (2014) studied solid waste management and social inclusion of waste pickers in Latin America and concluded that municipalities in the region have responded to scavengers activism by embracing the opportunities that inclusion can offer a means of income for the poor that do not drain city budgets, and an inexpensive way to green the city is by increasing recycling and reducing litter. Moreno-Sanchez *et al* (2003) investigated role of scavengers in dynamic model of solid waste disposal and recycling in developing countries and opined that the optimal subsidy to scavengers under perfect competition must equal the tax on households that use and discard commodities. According to them, this means that the optimal set of tools implies a transfer from consumers (households) to recyclers due to the recycling activity reducing the negative externality caused by the landfill depletion.

Olufayo and Omotosho (2007), in their research on waste scavenging as a means of livelihood in southwestern Nigeria, stated that the need to survive due to the economic problem has forced some of the citizens to devise scavenging as a means of livelihood. In their view, scavengers go from one place to the other, picking waste that can be recycled. According to them, they were often found in the streets, at open dumps or landfill areas while some of them even went as far as visiting homes to request for used items. According to Anierobi and Efobi (2013) who conducted a study on waste pickers and urban solid waste management system in Nigerian cities, sustainable environmental management efforts in Nigeria should seek to embrace the informal sector operators (scavengers or waste pickers) and incorporate them into the organizational structure of solid waste management system of our urban centres, here in Nigeria, where they are hitherto neglected. They further opined that these would ensure cost effectiveness and efficiency, enhance re-use, and encourage recycling and reduction techniques for sustainable waste management while still ensuring the health and operational wellbeing and equipment of the operators. Aboagye-Larbi, Acheampong, Kyei and Caboo (2014), in their study on the potential health hazards associated with waste scavenging in Ghana, opined that waste scavenging among youth in the study area arises mainly due to poverty and the existence of waste dumps on one hand. Scavenging as an informal activity has also employed a number of youths in Tema metropolis. According to them, the average monthly income earned by a scavenger in Tema, was found to be above the minimum wage paid by Ghana government.

Table 1: Summary of Characteristics of some of the Studies that described Scavenging as a Means of Environmental Management.

S/N	Author(s)	Topic of Research	Method(s)	Result(s)	Recommendation(s)	Conclusion(s)
1	Asibor and Edjere(2017)	Assessment of the Activities of Scavengers and their Economic Impacts in Waste Recovery in Warri Metropolis, Delta State Nigeria	questionnaire, and oral interviews	Scavengers have an important role in the informal solid waste management especially in terms of waste reduction, minimization and material recovery.	Put policies and laws in place by the respective tiers of government to encourage scavenging.	Both illiterates and educated citizens were involved in scavenging.
2	Martin (2012)	When Necessity Begets Ingenuity: E-Waste Scavenging As a Livelihood Strategy in Accra, Ghana.	Questionnaire and in-depth interviews, participant observation	An average e-waste collector at Agboghloshie earned a monthly gross income of about US \$380 whilst those engaged in metal recovery earn about US \$460.	There is need for policies to be based on empirically ascertained data to help regulate and integrate the practice into the formal sector.	It is clear from these findings that there is the need for well-coordinated and deliberate technical and non-technical integration of the formal and informal sectors.
3	Olufayo and Omotosho(2007)	Waste Scavenging as a Means of Livelihood in Southwestern Nigeria	Questionnaire and in-depth interview	Scavengers have not been able to improve in the trade because of the non-chalant attitude of the government towards their activities.	They suggested that awareness program should be set-up to change the attitude of people in relation to scavenging.	Scavenging, has contributed to social problem to the society, though it still earned a decent means of livelihood and it was useful in recycling business.
4	Anierobi and Efobi (2013)	Waste Pickers and Urban Solid Waste Management System in Nigerian Cities: Between Sustainable	Questionnaire and in-depth interview	The result of a survey in the cities of Awka and Onitsha revealed that informal operators in the cities expressed willingness to	That existing environmental management laws in the country be reviewed so as to evolve a public sector reform that would foster an effective integration and partnership with the	The informal sector operators expressed a high willingness to participate in the solid waste management system of their environment in Nigerian cities.

		Policy Gap and Survivalist Strategy		participate in the formal solid waste management.	informal sector	
5	Elenwo(2015)	Assessment of the Activities of Scavengers in Obio/Akpor Local Government ,Rivers State, Nigeria	Questionnaire	The result showed that activities of scavengers created employment and also assisted in the cleanliness of the environment.	Promulgation of a law by the government to encourage scavengers protection and remuneration so as to make it attractive to the youth.	There are relationship between waste and wealth in relation to scrap metal scavenging. It can generate wealth to the public and government.
6	Pandey (2004)	A Study on Occupational Health Problems of Sweepers and Scavengers of Kathmandu, Nepal.	Questionnaire, field observation and interview	About 24% scavengers of Teku are suffering from amebiasis more than 13 times in a year.	Efforts made for better management of hazardous hospital waste are to be practised.	To work as sweepers or scavengers is beyond their control and is often their only choice.
7	Navarrete-Hernandez (2015)	Scavenging Revisited: Supporting Scavengers in Santiago De Chile.	In-depth interview	Result showed that there is no single waste-picker school of thought that can provide a full explanation of the cause, dynamics, or evolution of waste-picker activity.	A range of supporting policies is required to increase waste-pickers' sustainable performance and reduce the negative externalities of the activity.	An existing urban theory does not accurately describe the complex reality of waste-pickers' activities, but that an integrated approach is in fact needed.
8	Moreno-Sanchez, Maldonado and Sheldon (2003)	The Role of Scavengers in a Dynamic Model of Solid-Waste Disposal and Recycling in Developing Countries.	Observation	The result showed that the set of optimal policies increases the lifespan of the landfill in about three years, which represents a 20% gain of empty space for the 20-year period.	Efficiency in economy requires the implementation of a set of policies working simultaneously rather than a single policy: a consumption tax per unit of recyclable good consumed and discarded.	The activity is not only a source of jobs for many people in a precarious economic condition, but it also generates a positive environmental externality on natural resource use and on landfill lifespan.

9	Ebenezer (2014)	Scavenging for Wealth or Death? Exploring the Health Risk Associated With Waste Scavenging in Kumasi, Ghana.	In-depth interview and focus group discussions	Results showed how scavengers are exposed daily to a myriad life threatening health problems as they shift for recyclable products.	Given the significance of waste scavenging, both as a livelihood activity and a waste management strategy, it is important that their health and wellbeing are safeguarded.	The reality from this study is that as waste scavengers scavenge for wealth, they are also exposed to a myriad of health problems.
10	Ejares, Paler, Kristiana, Aguilar and Erian(2014)	Socio-Demographic Profile of Scavenging Households in Umapad Dumpsite, Mandaue City Cebu, Philippines.	Face to face interview and questionnaire.	The result showed that there were approximately 300-400 households who primarily relied on Umapad dump site to earn a living	A comprehensive environmental and socio-economic policy should be planned to identify the needs of the scavengers and address the interest of both parties.	The condition of the scavenging households of Umapad is not unique.

Source: Researchers' design, 2018

## V. RESULTS AND DISCUSSION

Table 1 indicates the summary of the characteristics of some of the studies by previous authors on scavenging as a means of environmental management. The topics were concerned with scavenging activities as strategies to reduce the quantum of wastes in landfills or dumpsites. The researchers (egEjares, Paler, Kristiana, Aguilar and Erian, 2014) made use of standard methods for conducting the research including literature review of materials relevant to scavenging as a means of environmental management, field observation, interview and questionnaire. From the results of the studies, it is understood that scavengers have an important role in the informal solid waste management especially in terms of waste reduction, minimization and material recovery (Asibor and Edjare, 2017).

Previous authors agreed that scavenging helps in the recovery of valuable resources that would otherwise be disposed as wastes, the reduction of problematic materials entering a landfill and the subsequent adverse effects that they have upon landfill operation and performance, for instance whole tyres, toxic materials and the reduction of the quantities of materials destined for land disposal in order to conserve resources, such as land, water and air quality (Adewole, 2009). Some of the authors suggested that given the significant of waste scavenging, both as a livelihood activity and waste management strategy, it is

important that their health and wellbeing are safeguarded. Others were of the opinion that scavenging activities helped in increasing the lifespan of landfills and saving of empty space which is a plus for environmental management.

## VI. RECOMMENDATIONS

The following recommendations are made to enhance waste scavenging activities as a means of environmental management:

1. Safety awareness and health education should be provided to reduce the occupational hazards the scavengers are exposed to in the course of their scavenging activities.
2. People should be made to see scavengers as partners in progress of environmental management which is a collective enterprise.
3. Grants should be given to scavengers to encourage them expand their businesses considering the role they play in waste management.
4. Creation of awareness among youths that scavenging is a big business to be explored given the income of scavengers whose source of livelihood now depends on the business.

## VII. CONCLUSION

The activities of scavengers are very important in the pursuit of sustainable waste management and indeed environmental management. They also help in reducing poverty which is one of the factors influencing environmental problems. From the review and based on the results, the study concludes that scavenging is a veritable instrument for environmental management because the activities of scavengers do not only reduce the use of virgin materials when wastes are collected for reuse and recycling which conserve natural resources, but it alleviates poverty by improving the well-being of scavengers.

#### ACKNOWLEDGEMENTS

We appreciate the grace and empowerment of God Almighty who has been our source of strength from beginning to completion of this work. We also commend the effort of the relations, friends and well-wishers of the authors who contributed both financially and otherwise for making this review a success. Our gratitude extends to the Vice chancellor and the entire stakeholders of Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State, Nigeria for providing a platform for the study of Environmental Management. To all the lecturers, head of department and dean of the Environmental Sciences, we appreciate their collective efforts in making sure that the goal of environmental management is achieved in the institution. We are highly indebted to the chief author, Mr. Igwe, P.U. for his tireless effort towards an extensive research on the materials used for the review. We cannot fail to commend and appreciate the works of various authors used for the review. Finally, we thank the entire students of Environmental Management especially her final year students for their support throughout the review.

#### REFERENCES

- [1] Aboagye-Larbi, H., Acheampong, M., Kyei, S. and Caboo, D.(2014). The Potential Health Hazards Associated with Waste Scavenging in Ghana: A Case Study of Three Selected Dumpsites in Tema Metropolis. *International Journal of Environmental Science and Toxicology*, 2(10):199-209.
- [2] Ackerman, F. (2005). Material Flows for a Sustainable City. *International Review for Environmental Strategies*, 5 (2): 499 – 510.
- [3] Adewole, A.T. (2009). Waste Management towards Sustainable Development in Nigeria: A Case Study of Lagos State. *International NGO Journal*, 4 (4):173-179.
- [4] Adeyemi, A.O. (2001). Waste Scavenging in Third World Cities: A Case Study in Ilorin City. Inaugural Lecture, University of Ilorin, Ilorin, Kwara State, Nigeria.
- [5] Anierobi, C.M., and Efobi, K.O. (2013). Waste Pickers and Urban Solid Waste Management System in Nigerian Cities: Between Sustainable Policy Gap and Survivalist Strategy. *Journal of Science, Engineering and Technology*, 20(1):82-95.
- [6] Asibor, I., and Edjere, O. (2017). Assessment of the Activities of Scavengers and their Economic Impacts on Waste Recovery in Warri Metropolis, Delta State Nigeria. *International Research Journal of Public and Environmental Health*, 4(2):22-29.
- [7] Cucchiella, F., D'Adamo, I., and Gastaldi, M. (2014). Sustainable Management of Waste-to-Energy Facilities. *Renew. Sustain. Energy Rev.*, 33:719–728.
- [8] De Monfort University Leicester. (2012). Sustainable Waste/Sustainable Waste Management. Accessed at:<https://torinobyvegwordpress.com/2012/11/19/sustainable-waste-sustainable-waste-management>, 20-11-2017.
- [9] Ebenezer, O.S. (2014). Scavenging for Wealth or Death? Exploring the Health Risk Associated with Waste Scavenging in Kumasi, Ghana. *Journal of Geography*, 6(14); 63 – 80.
- [10] Ejares, J. A., Paler, M., Kristina O., Aguilar, M., and Erian L.(2014). Socio-Demographic Profile of Scavenging Households in Umapad Dumpsite, Mandaue City Cebu, Philippines. *Journal of Sustainable Development Studies*, 6(1):175-192.
- [11] Elenwo, E.I. (2015). Assessment of the Activities of Scavengers in Obio/Akpor Local Government Areas Rivers State, Nigeria. *Journal of Environmental Protection*, 6:272-280.
- [12] European Environment Agency (EEA) (2013). *Managing Municipal Solid Waste—A Review of Achievements in 32 European Countries*. Copenhagen, Denmark.
- [13] Ezeah, C., Clive, L.R., Paul, S.P., Mbeng, O.L., and Nzeadibe, T.C. (2014). Evaluation of Public Health Impacts of Waste Scavenging in Abuja Nigeria, Using Q Methodology. Accessed at:<https://www.researchgate.net/publication/235418470>, 22-10-2017.
- [14] International Labour Organization (ILO) (2004). *Addressing the Exploitation of Children in Scavenging (Waste Picking): A Thematic Evaluation on Action on Child Labour*, Geneva, p. 61.
- [15] Karagiannidis, A., Kontogianni, S., and Logothetis, D. (2013). Classification and Categorization of Treatment Methods for Ash Generated by Municipal Solid Waste Incineration: A Case for the 2 Greater

- Metropolitan Regions of Greece. *Waste Management*, 33:363–372.
- [16] Marello, M., and Helwege, A. (2014). Solid Waste Management and Social Inclusion of Waste Pickers: Opportunities and Challenges. Accessed at: <http://www.bu.edu/pardee/files/2014/09/social-inclusion-working-paper.pdf>, p. 19.
- [17] Martin, O.A. (2012). When Necessity Begets Ingenuity: E-Waste Scavenging as a Livelihood Strategy in Accra, Ghana. *African Studies Quarterly*, 13:1-21.
- [18] Medina, M. (2001). Scavenging in America: Back to the Future? *Resources, Conservation and Recycling*, 31: 229-240.
- [19] Medina, M. (2010). *Scrap and Trade: Scavenging Myths*. United Nations University; Our world 2.0 [online] New York: UNU (Published 2010) Accessed at: <http://ourworld.unu.edu/en/scavenging-from-waste>, 20-10-2017.
- [20] Moreno-Sanchez, R., Maldonado, J.H., and Sheldon, I. (2003). The Role of Scavengers in a Dynamic Model of Solid-Waste Disposal and Recycling in Developing Countries. *Paper presented at the First Latin American and Caribbean Congress on Environmental and Resource Economics. Cartagena deIndia's, Colombia*, pp.1-8.
- [21] Nas, P.J.M., and Jaffe, R. (2004). Informal Waste Management: Shifting the Focus from Problem to Potential. *Environmental, Development and Sustainability*, 6:337-353.
- [22] Navarrete-Hernandes, P.J. (2015). Scavenging Revisited: Supporting Scavengers in Santiago de Chile. *Paper presented at the RC21 International Conference on The Ideal City: between myth and reality*, pp.1-7.
- [23] Nzeadibe, T.C., and Iwuoha, H.C. (2008). Informal Waste Recycling in Lagos, Nigeria. *Communications in Waste and Resource Management (CWRM)*, 9(1):24-30.
- [24] Ojeda, B., Armijo, C., and Ramirez, B. (2002). Formal and Informal Recovery of Recyclables in Mexicali, Mexico: *Handling Alternatives, Resources, Conservation and Recycling*, 34:273-288.
- [25] Okoye, A.C. (2010). Scavenging: A Latent Means of Environmental Sustainable Livelihood. *Celebration of Academic Excellence, Festschrift in Honour of professor L.N. Muoghalu, El 'Demark*, pp. 265-269.
- [26] Olufayo, O., and Omotosho, B.J. (2007). Waste Scavenging as a Means of Livelihood in South Western Nigeria. *Pakistan Journal of Social Sciences*, 4(1):142-146.
- [27] Pandey, R., (2004). Sweepers and Scavengers in third World Cities. Department of Human Geography, University of Oslo, pp.3-16.
- [28] Santa, M. (2014). Disease and Health Condition of Scavengers in Bangladesh. A Thesis Report Submitted To The Department Of Pharmacy, East West University, Bangladesh, In Partial Fulfilment of the Requirements for the Degree of M. Pharm on Clinical Pharmacy and Molecular Pharmacology, pp.1-69.
- [29] Tirado-Soto, M.M., and Zamberlan, F.L. (2013). Networks of Recyclable Material Waste-Picker's Cooperatives: An Alternative for the Solid Waste Management in the City of Rio De Janeiro. *Waste Management*, 33:1004–1012.
- [30] Wilson, D.C., Chinwah, K., Araba, O., and Cheeseman, C. (2009). Building the Recycling Rate through the Informal Sector. *International Journal of Integrated Waste Management, Science and Technology*, 29:629-635.
- [31] Wilson, D.C., Velis, C., and Cheeseman, C. (2006). Role of Informal Sector Recycling in Waste Management in Developing Countries. *Habitat International*, 30:797-808.