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Informal waste management system in Nigeria and barriers to an inclusive modern waste management system: A review

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SUMMARY

Objectives: To explore the activities of the informal waste management sector in Nigeria, and barriers to integrating them in an inclusive waste management system.
Study design: Literature review.
Methods: A literature review was undertaken to evaluate the informal waste management system and formal waste management system in Nigeria and other developing countries with similar settings. Nine databases were searched and 34 studies met the following inclusion criteria: evaluation of the role of informal waste collectors, recycling and solid waste management in developing countries.
Results: Most of the evaluated studies (97%, $n = 33$) acknowledged the significant environmental and socio-economic roles played by the informal waste collectors and scavengers in developing countries. The studies identified the following as barriers to inclusive waste management in Nigeria: repressive policy, unhygienic waste collection methods, lack of evidence to support activity, and low quality and quantity of secondary materials.
Conclusions: Scavengers and other groups of informal recyclers see waste as a source of income and livelihood, whilst the general public see it as an aesthetic problem and see the people engaged in resource recovery as a social nuisance. Integrating their informal services with the formal waste management system is a potential tool to empower these people to increase their skills in resource recovery and improve their working and living conditions. Inclusive waste management is a process, and observable changes are taking place in some developing countries where waste pickers and informal waste collectors have become environmental agents. A major limitation to the integration of informal waste collectors and scavengers is the social acceptance of their activity as a viable source of income, and of themselves as environmental agents in the sustainability of virgin resources.

Introduction

Nigeria has an annual urban growth rate of 3.78% and a population of 162 million people.[1,2] The average amount of waste generated is 0.49 kg/capita/day.[3] Waste generation is increasing globally, partly due to accelerated production and consumption rates.[4] The amount of waste that is generated in Nigeria is beyond the capacity of the environment and the control of the municipal waste management authority. The inability of the municipal waste management authority to

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function is exacerbated by poor urban planning, inadequately formulated policies, urbanization and lack of the necessary resources to provide the services that will translate into an effective waste management system.[5–9] This has promoted the proliferation of open air dumps with a greater risk to public health, the environment and the quality of life.[6] Municipal solid waste management in Nigeria is the primary responsibility of state and local government agencies, and is referred to as the 'formal waste management system' (FWMS). The 'informal waste management system' (IWMS) refers to the unregulated and unregistered activities of people involved in waste collection, disposal and recycling. The 'inclusive waste management system' as used in this context refers to complementing the activities of the IWMS and the FWMS in a mutually beneficial relationship; that is, a waste management system inclusive of the informal waste sector (IWS) for environmental sustainability and alleviation of poverty.[10] In Nigeria, the FWMS consists of government and private registered agencies involved in waste collection, transportation and disposal of waste, while the IWMS comprises the unregistered and unregulated activities of waste collection, sorting and re-use carried out by individuals, families, groups or small enterprises.[7,8] The IWS includes street waste pickers, scavengers, door-to-door waste collectors and itinerant waste buyers.[11]

Currently in Nigeria, recycling is mainly carried out informal waste collectors (IWCs), the majority of whom are operating in urban areas. However, their role has not been recognized by the environmental agencies.[8,12] Informal recycling involves manual sorting of mixed waste for recyclables at dumpsites, open dumps, street bins and from waste collector carts.[8,13,14] In major Nigerian cities, the activities of IWCs are controversial and illegal because of the unhygienic method of waste separation and indiscriminate street dumping of unwanted waste.[8] This method of operation not only poses occupational risks for informal waste recyclers but also results in sourcing low-quality recovered materials.[15,16]

The health concerns and needs of IWCs and recyclers receive very little public or media attention, and their health matter are rarely considered in waste management policies.[16] There are few, if any, studies by public health professionals arguing for the social and economic integration of the services of informal waste recyclers within the solid waste management in the country. The public health importance of this informal initiative should lay emphasis on ways to improve their working conditions, reducing the associated occupational health risk and poor perceptions of the general public. Informal waste workers themselves appear to be more concerned about economic survival and unaware of the dangers of their working conditions. Their attention is geared towards collection of sufficient materials to provide for their daily needs, and they are often powerless to seek an improvement in their working conditions.[7,13,16] Official recognition and acceptance of their activity will enable them to work in an economically secure environment, and also ensure maximum resourcing and recovery of materials from dumpsites and landfills.[16] It will also help to achieve three of the millennium development goals: poverty alleviation, job creation and environmental sustainability.[17]

Methods

The search strategy was performed using standard and network approaches to source the literature. This involved the use of electronic sources and follow-up from reference lists.[18] In total, 29 articles were retrieved from the following databases: Global Health, MEDLINE, ScienceDirect, SAGE Journals, Springer Link, Business Source Complete, Academic Search Complete, Wiley Interscience and CINAHL. Business Source Complete was included because of the economic activities of IWCs. Grey literature by waste organizations was also searched, and five publications were retrieved from UN Habitat, GTZ and Ashgate Publishers. Six key words were identified for the literature search: waste pickers, scavengers, informal waste sector, informal waste recyclers, integrated waste management and solid waste management in developing countries. The search terms were therefore a combination of the key words using the Boolean logic of 'AND, OR'. The journal articles sourced evaluated at least one of the key words or was in relation to informal waste activities in developing countries. Literature was drawn from articles published from 1999 to 2010.

Results

Most IWCs and recyclers are found in developing countries. Hence, most evidence of informal activities is also from developing countries.[10]

Most of the studies (Table 1) evaluating the role of the IWMS and the FWMS in developing countries also argued for the integration of both systems, based on the socio-economic and environmental contribution of the IWMS activities in solid waste management, as well as concern for the working and living conditions of informal waste workers. Four factors were identified as barriers to integrated waste management in Nigeria: unhygienic method of operation; repressive public policy and negative public perception; lack of organization; and low quantity and quality of recyclables. These factors are similar to those reported for informal waste workers in other developing countries in Asia and Latin America (Table 1).

Barriers to an integrated waste management system

Unhygienic method of operation

Most activities of IWCs have been associated with unhygienic methods of operation and risk to public health; hence, it is a challenge to convince policy makers and the formal waste authorities to adopt a more positive outlook despite the contributions of the IWS.[19] The health concerns surrounding the sorting of waste are legitimate because IWCs seldom work with protective devices, which is one of the reasons why the FWMS finds them incompatible with modern waste management.[13] Recyclables collected from dumpsites are easily contaminated, and hand sorting of mixed waste is carried out in a dirty manner and often associated with cuts and infections from wounds.[11,14,16] Lack of access to appropriate equipment has been cited as one of the reasons for the unhygienic methods of operation.[13]

Table 1 – Summary of literature review.

Source	Study location	Focus of study	Informal waste sector in Inclusive waste management	Barrier identified to an inclusive waste management
Adeyemi, Olorunfemi and Adewoye 2001	Nigeria	Informal resource recovery	Yes	NE
Adewole 2009	Nigeria	Formal waste management	Yes	a
Afon 2007	Nigeria	Formal and informal waste management system	Yes	a
Agunwamba 2003	Nigeria	Informal resource recovery	Yes	a, b ,c
Gutberlet 2008	Latin America	Informal resource recovery and social development	Yes	a, b
Gutberlet and Baeder 2008	Brazil	Occupational health effect associated with informal resource recovery	Yes	a, b, d
Gutberlet 2010	Brazil	Inclusive waste management	Yes	b
Imam, Wilson and Cheeseman 2007	Nigeria	Solid waste management	Yes	a, b
Ahmed and Ali 2004	Developing countries	Partnership in solid waste management	Yes	NE
Fahmi 2005	Egypt	Privatization of SWM and its impact on waste collectors	Yes	a, b
Medina 2005	Mexico	Informal refuse collection	Yes	b, c
Nas and Jaffe 2004	Developing countries	Informal waste management systems	Yes	b
Nzeadibe 2009	Nigeria	Informal resource recovery in urban SWM	Yes	a, b
Ogwueleka 2009	Nigeria	Urban solid waste management	Yes	a, b
Ojeda-Benitez, Armijo-De Vega and Ramrez-Bareto 2002	Mexico	Formal and informal resource recovery	Yes	a, b
Rogerson 2001	Developing countries	Entrepreneurial activities of the informal waste sector	Yes	a, b
Bolaane and Gwebu 2004	Botswana	Scavenging activities	Yes	a, b
Sarkar 2006	India	Socio-economic and occupational health effect of scavengers' activities	Yes	b
Scheinberg and Anschutz 2005	Developing countries	Inclusive waste management	Yes	a, b
Sembiring and Nitivattananon 2009	India	Informal resource recovery	Yes	a, b
Scheinberg and Anschutz 2005	Developing countries	Informal resource recovery in modern urban SWM	Yes	a, b
Snel 1999	India	Integrating the informal and formal waste sector	Yes	a, b
Ugwuh 2009	Nigeria	Solid waste management	NE	NE
Spies 2005	Developing countries	Partnership in resource recovery	Yes	a, b
Syeda, Nawaz and Majeed 2008	India	Informal resource recovery	Yes	NE
Tremblay, Guberlet, Peredo 2010	Canada	Informal resource recovery	Yes	b
Wilson, Velis , Cheeseman 2006	Developing countries	Informal waste recycling	Yes	a, b
Wilson, Araba, Chinwah, Cheeseman 2009	China, India, Nigeria Pakistan, Phillipines	Informal waste sector	Yes	a, b, c, d
Zia, Devadas, Shukla 2009	India	Informal waste recycling	Yes	a, c
GTZ 2008	India	Integrating informal waste recyclers	Yes	b
GTZ 2010	Brazil, Egypt and India	IWS integration	Yes	a, b
UN Habitat 2010	Developing and developed countries	Informal waste sector in SWM	Yes	a, b, c
GTZ 2010	Developing countries	Economic activities of the IWS	Yes	b, d

SMW, solid waste management; IWS, informal waste sector; NE, not evaluated; a, unhygienic methods of operation; b, repressive public policy and negative public perception; c, low quantity and quality of recyclables; d, lack of supporting evidence.

Repressive public policy and negative public perception

A major difficulty towards the integration of the IWMS with the FWMS is social acceptance of the activities of IWCs (Table 1). Many cities view the activities of IWCs as shameful, a social problem and a public nuisance that should be banned.[7,20–23] The prevailing official response to IWCs in Nigeria is that of neglect and collusion, with cases of confiscation of collection carts by officials despite their awareness of the contributions of IWCs to urban waste management.[8,13] In extreme cases, IWCs have been accused of theft, and residents have expressed concern over the safety of their property when patronizing their services.[7,12] Municipal waste officers are yet to recognize the economic benefits of informal recycling.[9] The activity of informal waste recyclers is not seen as resource recovery but a job for the lowest economic class.[11,15,21] This view is further hampered by the perceived tax-evasive nature of their occupation because their activities are not formally registered with the waste management authority.[7,13]

Low quantity and quality of recyclables

The quantity and quality of recycled waste are influenced by the method of waste collection and sorting. It is true that informal recyclers have the expertise to identify wastes with potential value[12,24]; however, their unhygienic methods of operation remove the potential to achieve relatively high recycling rates and quality of materials.[25] The majority of informal waste recyclers have limited formal education, and will require organization and training in resource recovery using environmentally-friendly methods to build up their recycling rate.[8,11,12] In addition, the lack of incentives and limited market for recyclables reduces the potential for improved recycling rates.[8,13] Public participation rates in Nigeria are estimated to be 20–40%, which is relatively low in comparison with rates in Europe.[11] Consequently, co-operation is needed between the public, the IWMS and the FWMS for recycling rates to increase.[8,11]

Lack of supporting evidence

Limited data are available on the numbers and activities of the IWS in most studies. Most data are estimates and are only indicative.[9,11,26] Furthermore, there are limited studies on the economic value of their activities to further argue for their integration into the FWMS (Table 1). Although the quantity of waste that is diverted is relatively unknown,[25] an economic evaluation study indicated a potential landfill avoidance cost of 79.5%, and 78% in savings if informal recyclers were included in an integrated recycling programme.[13] In addition, the results of an economic evaluation study in Lahore, Pakistan indicated that activity of the IWS generates $4.5 million annually by recycling 21.2% of all recyclable waste, and has the capacity to generate $8.8 million annually if the IWS is adopted as an industry.[27]

Sociodemographic characteristics of IWCs and scavengers in Nigeria

Although data are lacking on the IWS population in Nigeria, the papers evaluated attempted to provide a sociodemographic profile of the sample population in their studies. The majority of people engaged in this entrepreneurial activity are young and unmarried.[7,24] However, one study reported an older age limit between 29 and 50 years for scavengers, and found that many were married; this may be an indication of the profitability of the occupation.[12] The IWS appears to be dominated by males with a limited number of females reported in some studies[7,12,24] and no females reported in others.[13,14] This may be due to the methods of waste collection and disposal, negative sociocultural view of scavenging as an occupation, gender prejudice or the rather antagonistic attitude of male waste pickers towards female waste pickers.[13] In addition, most informal waste workers have limited formal education.[13,14,24] In spite of their limited education, IWCs exhibit good knowledge of the types of waste to collect and sort, and possess skills in waste recovery as well as in locating markets and potential customers.[13,24]

Socio-economic and environmental role of IWCs and scavengers

IWCs exist alongside official and private registered agencies in some major cities in Nigeria, providing the service for a fee.[7,12] The continued operation of the IWS in developing countries indicates the willingness of low-income residents to pay for their services.[5,7] The IWS plays an important role in the collection and disposal of waste, as well as in sorting of recyclables that have been disposed of at landfills.[25] They are environmental agents in resource recovery and distribution.[16] Source separation and formal sector recycling are absent in Nigerian cities, and recycling is driven by scavengers and waste pickers.[3,12] It has been argued that informal waste workers are unregistered and unregulated, yet their activities are closely connected to the FWMS through the provision of cheap secondary raw materials.[23] They exist for a variety of reasons such as palliative to unemployment, lack of formal education to secure formal employment, industrial demand for recyclables, poor solid waste management and a lack of welfare policy for the poor; none of these factors are likely to disappear in the near future.[25,28] Another group of waste workers in the IWS are the itinerant waste buyers (IWBs); they purchase or exchange specific re-usable items for cash via door-to-door collection from households. Small IWBs often use the items obtained from households directly, while medium and larger IWBs deal with middlemen and recycling industries.[11] In one commercial city in Nigeria, 40% of artisans and small-scale industries receive 48% of their raw materials from scavengers.[12]

Despite the occupational health risks associated with informal waste collection and sorting, people still engage in this activity, probably because of the economic gains it offers that are palliative to unemployment.[7,12] IWCs are not necessarily the poorest of the urban poor, as some studies have indicated that they earn more than the minimum wage of most public employees in local settings.[13,14] The minimum wage for a week's work ranges from $22.5 to $47.[7,13,14] This supports the claim that the venture is profitable and the majority of workers engage in the activities because they are sustained economically by doing so.[13] Generally, the major materials recovered are plastics, ferrous and non-ferrous metals, bottles, plastics, papers and rubber materials. The quantity and quality of waste recovered is determined by the availability of a market for it; hence, the waste pickers have no incentive to salvage products with no market outlets.[13,14] The current recycling rate is relatively low but still significant[11]; informal waste recyclers have expressed the desire for facilities that will increase their effectiveness and efficiency, and motivate the public to

increase their participation.[14] In addition, they also expressed willingness to purchase recovered items from households.[24]

Discussion

There is a growing IWMS in Nigeria, and the methods and techniques could be refined and used to improve the state of solid waste management in the country. A positive change in the public's perception of IWCs and scavengers as environmental service providers is an important step to secure a healthy working environment for these workers.[10] One strategic approach to conserve virgin resources is the re-use and recycling of waste.[4] Consumption patterns and waste disposal rates are increasing globally, and are likely to become more intense with increasing growth in population and industrialization. Municipal budgets are inadequate to fund waste collection and disposal in a rapidly increasing population.[4] Hence, there is a need to partner with other stakeholders in solid waste management to protect the environment in the face of imminent industrialization. Although collaborating with the IWMS may be interpreted as acceptance of their activities that contravene existing environmental regulations, co-operation still remains a necessary tool for collaborative governance.[29] Nevertheless, upgrading public services reflects good governance, and modernization of urban solid waste management can become a mutually beneficial collaboration when the FWMS and the IWMS are actively involved.[30] Waste pickers can benefit from training on resource recovery and the need to use protective equipment such as gloves and footwear during manual sorting. In this way, manual sorting will become more efficient and effective.[29] The training of informal waste recyclers in India led to an increase in the quality and quantity of recyclables obtained during sorting, and minimized the occupational risk associated with unhygienic manual hand sorting.[29] In addition, in order to maximize cost-efficiency, IWCs could service low-income neighbourhoods while formal waste operators concentrated on service provision in other areas.[30]

Increasing public participation in separation at source is necessary to increase the existing recycling rate.[29] This is because public awareness and attitudes to waste can affect waste segregation, collection frequency and recycling.[29] Itinerant waste buyers offer a form of incentive to households as they trade new goods for recyclables collected. Sometimes, they are given re-usable items by households or buy recyclables with cash, and this encourages waste segregation in participating households.[11,24,30] Although the majority of urban waste officers ignore or oppress IWCs, there is an ongoing recognition of waste pickers by the Government in Pune, India and in major cities in Latin America.[31,32] These cities have adopted a positive approach to integrating IWCs through various municipal-led initiatives involving registration of informal co-operatives, and allowing the IWCs access to waste generated in selected areas.[32]

The integration of IWCs could involve the registration and licensing of IWCs, scavengers and recyclers; the organization, training and formation of co-operatives; granting IWCs concessions to operate in areas inaccessible to formal waste management; or private partnerships with IWCs.

Registration and licensing of IWCs, scavengers and recyclers

Integration could proceed with the registration and licensing of informal waste operators in their respective local government areas at an affordable cost, given that they do not have access to loans or collateral security.[7] This will guarantee a certain level of economic security and access to landfill sites for increased resource recovery.[13] Their carts could be licensed with identification plates to prevent illegal dumping of waste, as well as dignifying their activity.[5] In addition, waste collected should be disposed of through transfer loading stations with payments made at the loading stations. This will help to regulate and restrict activities to specific local government areas. It is commendable that there is an ongoing formal recognition of scrap dealers in Lagos State, Nigeria. They now operate legally wearing a form of uniform, and push their carts in the communities.

Organization, training and formation of co-operatives

The operations of IWCs in Nigeria are haphazard and characterized by the waste of human resources that could be put to use more effectively with proper organization.[14] Encouraging organized informal recycling is an avenue for informal waste recyclers to escape socio-economic exclusion; it affords them a greater bargaining power for better prices of materials, increased income and improved working conditions.[5,9] Training waste pickers and scavengers will improve their technical and managerial techniques and source separation methods.[6] Other advantages of forming co-operatives include the ability to pool resources to purchase better equipment in resource recovery, and facilitating loans from the Government.[4,7]

Granting IWCs concessions to operate in areas inaccessible to formal waste management

Due to poor urban planning and the poor condition of roads in some Nigerian cities, IWCs could be granted concessions to serve land-locked areas that cannot be accessed by the trucks and tippers used by licensed private companies and the FWMS.[8,28] IWCs are more suited to collecting and sorting recyclables at source from these areas because of their manually operated transport.[12] Another viable option is for waste contractors to designate waste pickers to collect waste from specific areas, and to sort and deposit the non-recyclable content at collection points located at strategic places.[6] In this way, the waste pickers would be involved in the modernization process as environmental health agents.[33]

Private partnerships with informal waste collectors

The challenges faced by solid waste management are monumental due to the continued increase in population, increasing consumerism and growing urbanization.[28,34] However, companies offering door-to-door waste collection may pose a threat to the livelihood and development opportunities of IWCs, and may try to monopolize waste management in certain communities.[23,35] Private partnerships can be sustainable when they are made in collaboration with the IWMS and are based on sensible policies.[34]

Unsupervised informal waste activities have environmental and occupational health risks, but scavengers and IWCs make a socio-economic contribution to their communities.[36–38] These workers undertake these activities for various reasons, such as palliative to unemployment, lack of formal education to secure formal employment, industrial demand for recyclables, poor solid waste management and a lack of welfare policy for the poor; none of these factors are likely to disappear in the near future.[25,28]

There is a growing interest in waste management, particularly by private investors, following the discovery of the renewable resources in solid waste and the financial potential that can be derived from recycling.[5] Solid waste management consumes a considerable amount of the municipal budget, which is limited in most developing countries. Emphasis should be placed on increasing recycling rates as opposed to abolishing an informal activity that can be more effective in the presence of friendly policies that will be beneficial to all stakeholders in solid waste management. It is imperative, therefore, to strike a balance between the quality of the service and its cost-effectiveness.[35]

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