



Solid waste workers and livelihood strategies in Greater Port-au-Prince, Haiti

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ABSTRACT

The solid waste management industry in Haiti is comprised of a formal and an informal sector. Many basic activities in the solid waste management sector are being carried out within the context of profound poverty, which exposes the failure of the socioeconomic and political system to provide sufficient job opportunities for the urban population. This paper examines the involvement of workers in the solid waste management industry in Greater Port-au-Prince and the implications for livelihood strategies. The findings revealed that the Greater Port-au-Prince solid waste management system is very inclusive with respect to age, while highly segregated with regard to gender. In terms of earning capacity, the results showed that workers hired by the State agencies were the most economically vulnerable group as more than 50% of them fell below the official nominal minimum wage. This paper calls for better salary scales and work compensation for the solid waste workers.

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1. Introduction

The issue of solid waste management is of utmost importance in both developed and developing countries. Solid waste management is comprised of a morass of problems that display the inability of humanity and technology to control the undesirable effects of the urbanisation process, industrialisation and socioeconomic development. Refuse management remains one of the most conspicuous and challenging environmental problems facing most urban communities around the world. This situation threatens the survival of urban residents through communicable diseases and undermines all efforts to sustain the urban environment and beautify the metropolitan centres.

In Greater Port-au-Prince, Haiti's major urban centre, the inefficiency of the solid waste management system represents a major threat to public health and a key obstacle to effective environmental management. The current solid waste management system is not integrated; it is characterised by a high level of institutional instability, poor governance, limited human and financial resources, and improper solid waste pre-disposal practices by the urban communities. The challenge has been exacerbated by rapid and uncontrolled urbanisation, political instability, social upheaval and the continuing variations in waste composition as a result of radical changes in residents' consumption patterns and lifestyles.

The solid waste management problem is ubiquitous in Haiti and several low-income countries. Many basic activities in the solid waste management system are being carried out within the con-

text of profound urban poverty, which exposes the failure of the socioeconomic and political system to provide sufficient job opportunities for the urban residents. The Greater Port-au-Prince waste management industry provides a vivid observational laboratory for investigating and examining poverty as it relates to a section of the urban population who earns a livelihood from the waste stream. This paper intends to evaluate the active participation of the workers in solid waste management and the implications for livelihood strategies.

2. The study area

Haiti is by no means the poorest country in the Caribbean region. Although the Human Poverty Index (HPI-1) has slightly decreased from 31.8 in 2000 to 31.5 in 2007, the poverty headcount index revealed that 55% of Haiti's population survived on less than US \$1.25 a day between 2000 and 2007 (UNDP, 2009). With a Gross Domestic Product (GDP) per capita of US \$1155.00, the Republic of Haiti ranks 149th out of 182 countries in the 2009 Human Development Report. A Haitian citizen is expected to live 61 years at birth, as 42% of Haiti's population does not have access to improved water source (UNDP, 2009).

The Greater Port-au-Prince Area is the largest urban agglomeration of the Republic of Haiti. It is located in the West County and comprises seven municipalities and two main dump sites to dispose of waste (Figs. 1–3). Approximately 2500,000 people reside in Greater Port-au-Prince (IHSI, 2007). The annual population growth rate is about 5%, which is mainly due to rural migration, a consequence of continued deterioration of livelihoods in Haiti's rural areas.

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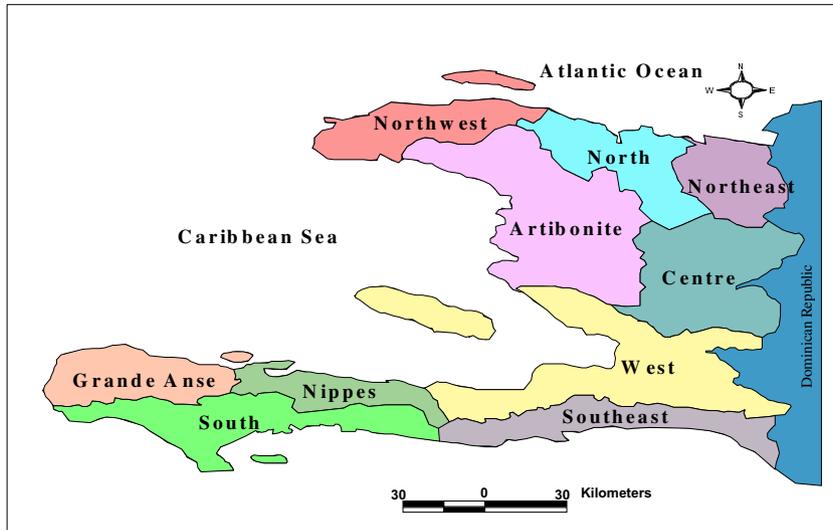


Fig. 1. The Administrative Divisions of Haiti.

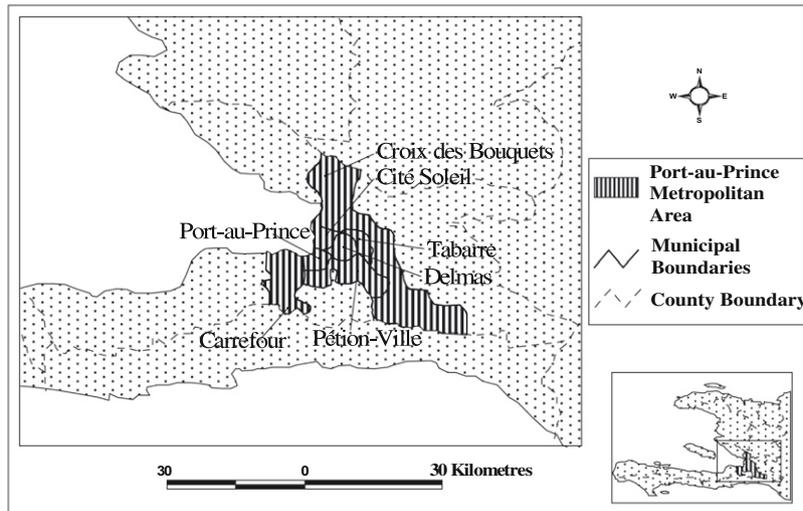


Fig. 2. The Port-au-Prince Metropolitan Area and its municipalities.

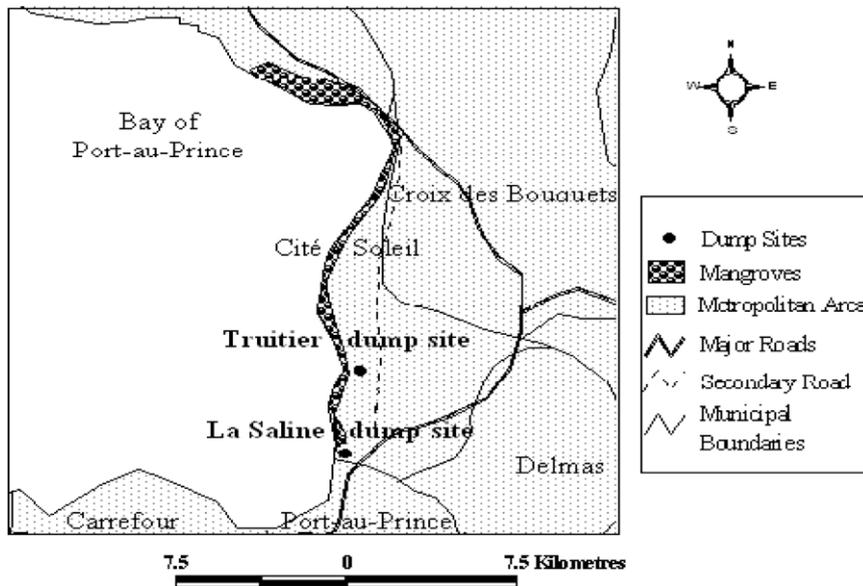


Fig. 3. The location of the two main dump sites.

3. The solid waste management industry in the Greater Port-au-Prince Area

The Service Métropolitain de Collecte des Résidus Solides (SMCRS) or Metropolitan Solid Waste Collection Service was established in 1981 by Haiti's government to collect and hygienically dispose of solid waste generated in the Greater Port-au-Prince Area. The agency was shut down twice and placed under the supervision of several Government Ministries over the last two decades. The SMCRS completely relies upon the central government to fund its operations. Since April 2004, solid waste collection and transportation has been largely financed by international donor agencies, which funded 95% of the studies conducted on waste management in Haiti (Noel, 1999). Ironically, while the Greater Port-au-Prince Area continues to experience high urban growth rate (about 5%) and significant changes in the composition of the waste stream due to exotic lifestyles and globalisation, the waste management system is both non-integrated and inefficient.

3.1. Solid waste production

Waste production per person in Greater Port-au-Prince is situated between 0.5 and 0.7 kg (Adam, 2000). Solid waste projection for the Greater Port-au-Prince Area was made by Water and Sanitation for Health (WASH) in the early 1990s (Table 1). More recent data did not show any significant increase of solid waste generation in Greater Port-au-Prince. The annual waste production was estimated to be 589,000 tonnes, which roughly represented 1614 tonnes per day (ICF, 2004). These data have been called into question by Noel (2007) and Bras et al. (2009) who stressed the impacts of population growth and the fact that Port-au-Prince is the political and financial capital of the Republic of Haiti. With a population near 2500,000 inhabitants and a daily per capita waste generation of 0.7 kg, solid waste production in the Greater Port-au-Prince Area can be projected between 1700 and 1750 tonnes per day. However, a recent study on waste generation and characteristics carried out in Cape Haitian, Haiti's second largest urban centre, had found more than 50% decrease in average per capita waste generation from 0.6 to 0.21 kg/capita/day (Philippe and Culot, 2009).

3.2. Solid waste composition

There have been few studies on solid waste composition in Greater Port-au-Prince. Table 2 presents the composition of the waste stream by the Cooperative Housing Foundation for 1989 (Bras et al., 2009). The biodegradable components of the waste were estimated to be 70% in 1995 (Germain, 1995). However, one may expect significant changes in waste composition in the Metropolitan Area of Port-au-Prince when considering the findings on waste composition in Cape Haitian, Haiti's second largest urban agglomeration (Table 3). One may then anticipate a reduction in organic waste and a significant increase in plastics and other inorganic matters.

Table 1
Daily estimate of solid waste production in Greater Port-au-Prince. Sources: WASH (1991), Holly (1999) and ICF (2004).

Year	1991	1992	1993	1994	1995	1996	2003
Waste production in tonnes	1152	1241	1388	1441	1554	1600	1614

Table 2
Solid waste composition in Greater Port-au-Prince for 1989. Source: Bras et al. (2009).

Waste composition	%
Organic matter	75
Sand and coal	8
Paper and cardboard	3
Glass	2
Metal	3
Plastic	7
Other	2
Total	100

Table 3
Solid waste composition in Cape Haitian in 2008. Source: Philippe and Culot (2009).

Waste composition	%
Organic matter	65.5
Paper and cardboard	9.0
Glass	5.8
Metal	2.6
Plastic	9.2
Other	7.9
Total	100

3.3. Solid waste collection

Solid waste collection appears to be very inefficient in Greater Port-au-Prince. Since there has been no projection or estimation of solid waste production after 1996, it is scientifically impossible to accurately indicate the proportion of waste collected. Data in Table 4 reveal that the waste collection rate did not exceed 50% throughout the selected years for which data were available. This situation threatened both the integrity of the ecosystem and the health of the urban residents.

3.4. The formal solid waste sector

The formal solid waste sector in the Metropolitan Area of Port-au-Prince consists of the State agencies (SMCRS and municipal refuse collection services or divisions) and the private companies (Fig. 4). According to Cointreau-Levine (1994: 73), "there are roughly 2000 solid waste workers for every 1 million urban residents, a low of 1000 per million residents in some Latin America cities". In Kingston, Jamaica, it has been estimated that there were 14 solid waste workers for every 10,000 people (Kiswani, 2002). As a result of the politicisation of solid waste management in Greater Port-au-Prince, the State authorities refused to indicate the number of workers hired by the SMCRS and the municipal divisions to sweep and gather solid waste in the streets, collect and transport refuse to the dump sites. Indeed, solid waste management is customarily used within the Haitian context to provide employment for political supporters. Even the private companies were unwilling to indicate the number of workers they contracted for garbage collection and transportation. When considering the low level of environmental awareness and education in Haiti (Noel, 1999, 2007), between 2500 and 3000 workers would have been sufficient to provide waste management services for the 2500,000 people living in Greater Port-au-Prince. During the field-

Table 4
Percentage of refuse collected for some years in Greater Port-au-Prince. Sources: CHF (1993, 1996), Guerrier-Archange (1997) and MDE (1999).

Years	1976	1990	1991	1993	1994	1995	1997
Percentage (%)	38	25	14	30	30	30	42

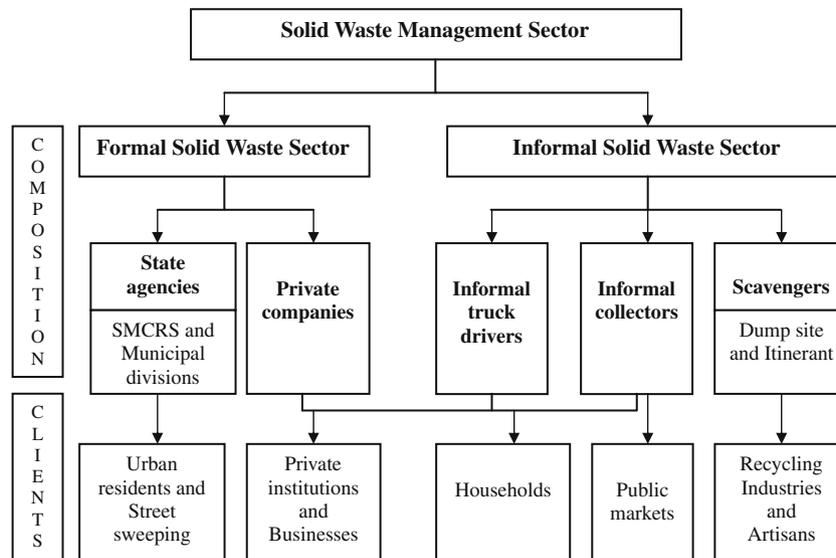


Fig. 4. The solid waste management sector of the Greater Port-au-Prince Area.

work it was observed that more than 4000 workers were engaged by the SMCRS and the seven municipalities as street cleaners, solid waste gatherers and collectors, drivers, dump site workers and managers.

3.5. The informal solid waste sector

The informal solid waste sector is composed of workers who provide solid waste collection services for several private institutions and upper and middle-income households or practice scavenging activities on the dump sites (Fig. 4). The informal solid waste sector involves a part of the urban population in solid waste management. It is a phenomenon that only exists in developing countries. The informal solid waste sector has arisen in the Metropolitan Area of Port-au-Prince as a result of the failure of the formal solid waste sector to provide adequate waste collection and transportation services for the urban population. It is also important to note the establishment of scavenging by the urban poor as their survival activity and livelihood strategy that helps them reduce the impacts of poverty on their households. Similar to other economic activities, the informal waste sector “is mainly guided by market forces” (Beukering and Gupta, 2000: 11). Between 150 and 200 scavengers recovered recyclables on the dump sites. The survival of the informal solid waste sector, without any favourable policy framework, reinforces the fact that the current solid waste management system is not integrated, hence does not promote many aspects of sustainable development and environmental sustainability. The informal solid waste sector is a plausible evidence of the multiple manifestations of extreme poverty which prevail in Haiti’s urban areas in the solid waste management system.

Although it remains difficult to quantify the contribution of the informal solid waste sector in terms of the amount of refuse collected and recovered, several studies revealed that it may be comprised of between 10% and 50% depending on the efficiency of the formal solid waste sector and the socioeconomic development of the country. For instance, in Cairo (Egypt), it was reported that “more than half of the waste is collected by the informal workers” (Lardino and Klundert, 1993: 14). In 1997, it was estimated that the Zabaleen communities (Egypt) collected more than 3000 tonnes of solid waste every day, out of which 85% was recycled directly through micro-enterprises that they owned (Fahmi, 2005). In Mexico City (Mexico) and in Karachi (Pakistan), it was found that

the informal sector reduced the municipal waste by 10% (Bartone et al., 1991; Ali et al., 1993). In Bangalore (India), it was argued that 15% of the municipal solid waste going to the dump site was recovered by the informal sector (Baud and Schenck, 1994).

4. Methodology

The main objective of this paper is to evaluate the active participation of the workers in solid waste management in Greater Port-au-Prince and the implications for livelihood strategies. It was decided to utilise both qualitative and quantitative methods to collect the empirical data. Since the study was designed within the quantitative methodological framework as the dominant research paradigm, qualitative instruments (observations and semi-structured interviews) were used to complement the empirical data that were gleaned through the use of quantitative research technique (survey questionnaires). Qualitative data provided contextual meanings and deepened the interpretation and analysis of tables and figures that were created through the use of statistical techniques. In-depth information and primary data gathered through semi-structured interviews were subject to content analysis. These insights provided a better understanding of the struggle of the workers to earn a livelihood and the severity of the solid waste management problem in the Metropolitan Area of Port-au-Prince, Haiti.

As a result of the difficulties to create a sample frame in order to give an equal chance to each solid waste worker to be randomly selected, it was decided to choose the interviewees on site (workplace) after exhaustive observations regarding the size of each group of workers, tasks they performed, gender difference, setting and patterns of work. When considering the explorative nature of the study and the heterogeneity of the target population, stratified and systematic sampling procedures were used to select the respondents from the State agencies, the private companies and the scavengers. Snowball sampling or referral method was employed to identify the interviewees among the informal garbage collectors and truck drivers.

A total of 390 solid waste workers were interviewed. This sample comprised workers from each activity of the waste management system from street cleaning to waste disposal. Table 5 present the sample size of each category of solid waste workers. This sample is not statistically representative of the number of

Table 5
Distribution of the sample population by category of workers.

Category of solid waste workers	Male	Female	Total	Percentage of total
State agencies	168	76	244	63
Private companies	46		46	12
Informal solid waste collectors	40	1	41	10
Informal solid waste truck drivers	3		3	1
Scavengers	38	18	56	14
Total	295	95	390	100

workers involved in waste management in the Greater Port-au-Prince Area. As discussed above, these critical data were not supplied despite several meetings between the researcher and the solid waste managers from both the State agencies and private companies. Female workers accounted for 24% of the interviewees, while male workers amounted to 76%. The formal sector (State agencies and private companies) amounted to 74%, whereas the informal solid waste sector (scavengers, informal garbage collectors and truck drivers) represented 26% of the sample.

5. Workers' participation in solid waste management

5.1. Demographic characteristics

Solid waste management is an activity which involves several tasks that can be best performed by strong and able-bodied people. The integration of technological solutions in order to increase the efficiency of the collection, transportation and disposal systems has not completely substituted the inputs of the able-bodied worker. For example, in both Industrialised and Third World countries, solid waste collectors are asked to lift and load heavy household garbage bins from 1 to 5 tonnes of refuse before emptying them into solid waste trucks (Tchobanoglous et al., 1993; Cointreau-Levine, 1994; Kiswani, 2002). In the Greater Port-au-Prince Area, where the solid waste management system is still in the early stages of development, strong workers are even more indispensable to complete the multiple tasks that will ensure the reliability and the effectiveness of the system.

The concept of physical efficiency or strength was used to analyse the issues of age and gender within the solid waste management sector in Greater Port-au-Prince. Women were not recruited by the private companies that only need workers to drive, load and unload garbage trucks, while they represented 31% of the workers that were interviewed among those hired by the State agencies. Women also formed 32% of the workers who were involved in scavenging activities. Senior officers at the level of the private companies related the non recruitment of women by their organisations to the issue of physical strength. They pointed out that their companies were not involved in sweeping and gathering activities which seemed to fit female solid waste workers. By contrast, the solid waste authorities at the level of the State agencies argued that the inclusion of females in solid waste management has been beneficial to the sector. For instance, they stated that female workers brought their expertise in sweeping activities in which they were more efficient than male workers. Secondly, unlike male workers, who often found an excuse for lateness, female workers constantly reported to work on time and stayed at work until the end of their work schedules. In addition, they indicated that some activities such as supervising, weighing solid waste volumes at the Truittier dump site could just as well be performed by women.

As a result of the informal waste sector, children between 9 and 14 years old are involved in waste collection and recovery in Greater Port-au-Prince. Several Caribbean studies from Haiti, Jamaica

Table 6
Distribution of the sample population by age group and category of workers.

Age of the workers	State agencies	Private companies	Informal solid waste collectors	Scavengers	Informal solid waste truck drivers
9–14			12	20	
15–19	1		2	14	
20–24	2	11		16	
25–29	7	13	15	9	
30–34	11	20	7	5	
35–39	14	28	27	14	34
40–44	18	17	5	11	
45–49	16	9	15	4	33
50–54	13		7	7	33
55–59	8	2	5		
60–64	4		5		
65 and over	6				
Total (%)	100	100	100	100	100

and Trinidad and Tobago confirmed the presence of children in solid waste management where there is a vibrant informal recycling sector (Noel, 1999, 2001, 2007; Seeloch, 2001; Ffrench, 2003; Owens, 2003; Toby, 2003). Children represented 5% of the sample population and were self-employed either as informal solid waste collectors or scavengers. The empirical data further revealed that most of the middle-aged and ageing workers (40–65 years old and over) worked for the State agencies, while those who were younger (39 years old or less) were mostly employed by the private companies or self-employed as informal solid waste collectors or scavengers (Table 6). Similar conclusions were found in other studies conducted in St. Vincent and in Jamaica with regard to workers hired by the state-owned agency where most of them were in the older age group (Lockhart, 2001; Kiswani, 2002).

The workers' age issue was raised with the solid waste managers at the State agencies during the course of the semi-structured interviews. The solid waste authorities argued that the origin of this problem lies in the refusal of young people, although unemployed and illiterate, to participate in solid waste collection services, because they are afraid of being called 'garbage men' by their peers or society at large. Secondly, they pointed out the issue of low remuneration that is associated with jobs in the formal solid waste sector when compared to other activities in the Haitian informal economy which bring higher incomes. Thirdly, they stated that the adult workers were more submissive and devoted to their work than the young ones who were primarily motivated by immediate economic advantages. They also stressed that older workers were unlikely to go on strike when they were not paid on time, as it is customary in the Greater Port-au-Prince solid waste management system. Indeed, most of the respondents hired by the State agencies were complaining during the interviews about the irregularity of wage payments. Several of them had not received their wages for many months. This issue is of great importance in Haiti as all the municipalities, although legally and financially autonomous, rely on the central government to help them meet their financial obligations.

The issue of workers' age was also raised with some senior officers in the private companies. They argued that the recruitment of workers for solid waste collection services was essentially linked to the issue of efficiency of the delivery service, as they could not afford to lose customers as a result of poor services in such a competitive market. They assumed that younger persons were more physically fit to quickly lift and unload heavy garbage bags than older individuals. Secondly, they stated that young workers were primarily attracted by higher wages and overtime that were available in the private companies in comparison with the State

agencies, which paid low salaries with no compensation for overtime. In addition, they indicated that the workers were also fully aware that there would be no delay in the payment of salaries after the two weeks of work being completed.

5.2. Level of education of the respondents

The level of education of workers is generally seen as an indicator of the type of activity in which they are involved or performed in the market economy. It is commonly accepted that the level of schooling of garbage workers in developing countries is low because solid waste management remains a manual and labour-intensive job. The empirical data revealed that illiteracy characterised the solid waste workers in Greater Port-au-Prince. More than 45% of the respondents from both gender (male and female) were illiterate. This was in line with the national adult illiteracy rate near 40% (UNDP, 2009). However, a moderate proportion of male workers had reached primary and secondary school levels, whereas the females had notably improved their level of education by attending the literacy or remedial learning centres established by the Government of Haiti to fill the country's unacceptable education gap. The chi-square test confirmed that there was no significant gender difference with regard to educational achievements among the respondents ($\chi^2 = 6.275$ and $P = 0.09$).

By contrast, the empirical results demonstrated that there was a significant difference between sector of activity (formal and informal) and educational achievements ($\chi^2 = 10.215$ and $P = 0.017$). Similar findings were obtained between educational achievements and workers' groups ($\chi^2 = 25.160$, $P = 0.003$). These results showed the dynamic between and within the groups of workers as well as sector of activity (formal and informal). There were higher levels of illiteracy among the informal solid waste collectors and truck drivers as well as the scavengers than among workers who were employed by the State agencies or private companies. It seems that the State agencies and private companies had a minimum education requirement when hiring workers. The scavengers and their colleagues in the private companies had a higher proportion of workers who attended primary and vocational schools.

5.3. Job descriptions

The solid waste workers interviewed in Greater Port-au-Prince performed various tasks. Based on the solid waste sector in which they were involved and in relation to gender, workers were assigned particular jobs or participated in specific survival activities from which they earned their living and simultaneously contributed to environmental protection (Table 7 and Fig. 5). For example, most of the female workers were asked to sweep the streets and gather solid waste with brooms and shovels. This type of assignment may have been related to the issue of the physical demands

Table 7

Distribution of the workers in the sample population according to job descriptions by gender.

Job descriptions	Male (%)	Female (%)
Supervising other workers	10	7
Sweeping streets and gathering waste with brooms	4	57
Gathering solid waste with shovels	10	12
Gathering and collecting solid waste with shovels	10	3
Cleaning up canals with shovels	7	
Collecting solid waste	38	1
Transporting solid waste to dump sites	6	
Managing dump sites	1	
Controlling and measuring solid waste quantity on dump sites	1	1
Salvaging solid waste	13	19
Total (count and %)	(295) 100	(95) 100

of the other solid waste management activities such as waste collection and transportation.

Table 7 also showed that male workers mostly dominated the tasks that required high levels of physical strength or were socially expected to be completed by men. They also controlled most of the managerial positions in the formal solid waste sector. There was no weighbridge to assess the volume of waste entering the dump sites. The dump site workers only estimated the volume of waste based on the size of the trucks rather than the load they carried to the dump sites. Truck drivers were directed to specific locations to unload their trucks. With regard to processing activities, clay was randomly provided to cover solid waste scattered, and the bulldozers were occasionally operational due to lack of maintenance.

According to the solid waste managers, the predominance of male workers in the solid waste management sector of the Greater Port-au-Prince Area is historical and cultural. They stated that women were intentionally refused entry in the solid waste management system because some of the above activities were perceived as strenuous and inappropriate for female workers. They argued that sweeping activities, in which most of the female workers were involved, resulted from irresponsible environmental behaviours of the urban residents and vendors who disposed of their waste in the main streets and gullies. They stressed that the main streets of downtown Port-au-Prince and those of the other municipalities had few vendors selling goods two decades ago. They pointed out that the vendors were also forced to collect solid waste which resulted from packaging or paid an informal collector to dispose of it at a specific collection point. They explained that the sweeping of the main streets now become essential in order to reduce health risks and keep these business areas clean, a situation which led to the recruitment of female workers to help carry out this task.



Fig. 5. Sweepers and garbage collectors at work in downtown Port-au-Prince.

5.4. Work schedules

Solid waste management is an intensive, but also flexible, activity in the Greater Port-au-Prince Area. Several workers enjoyed a great level of flexibility with regard to the tasks they were asked to execute. This seemed to be a characteristic of the State agencies only. Workers who were employed by the private companies appeared to have fixed work schedules. Nonetheless, those who were interviewed stated that after the daily official 8 h of work, the companies paid them for the extra time they spent in driving, loading and unloading the trucks. This situation was different among the workers hired by the State agencies as they received no payment for extra time spent at work. This is similar to that of the solid waste workers employed by the National Solid Waste Management Authority in Kingston, Jamaica (Kiswani, 2002). In the Port-au-Prince Metropolitan Area, solid waste workers worked from 2 to 9 h per day. The female workers were more flexible than their male counterparts. In all the categories, they did not exceed 6 h of labour each day. Even the female scavengers did not exceed that. Further, it was surprising to find that although only women worked between 2 and 6 h per day, a significant proportion of the respondents were on duty on Sundays. This may be due to the particular nature of the tasks assigned to most of the female workers, such as sweeping and cleaning up the streets, which needed to be performed on a daily basis.

Responding to the issue of work schedules in the solid waste management sector, senior officers in the private companies emphasised that there could be no flexibility in the work schedules of their solid waste workers because they had to ensure the reliability and the quality of the services that they provided for their clients, whereby they maintained a higher system of accountability to the customers. For instance, they pointed out that they had to accommodate many private institutions (industries, supermarkets and restaurants) which required solid waste collection after 4 o'clock.

By contrast, the authorities at the State agencies were reluctant to elaborate on that issue, which seemed to relate to the politicisation of the Greater Port-au-Prince solid waste management system. The current flexibility appeared to have resulted from splitting a

job of 8 h between two persons (4 h each), while one person would have been sufficient to carry it out. For instance, the solid waste managers could not reconcile the flexibility of the solid waste workers to the continued inefficiency of garbage collection in the Greater Port-au-Prince Area. Indeed, most of the workers interviewed, especially those who worked for less than 8 h, explained that they were willing to work more hours if the authorities asked and consented to pay them more money. They stressed that they worked according to the demands and the requirements of their employers.

5.5. Length of employment or work experience

Most of the respondents had only a short work experience. Indeed, whether they were engaged by the State agencies and private companies (formal sector) or self-employed in the informal solid waste sector, a substantial proportion of the workers entered the Greater Port-au-Prince solid waste management system over the last 9 years (Fig. 6). More than 40% of the informal workers had been involved in solid waste management for less than 5 years, while less than 39% of the formal workers fell into that category. By contrast, a small percentage of the respondents had work experience of more than 20 years. The empirical data also revealed that no informal solid waste worker had exceeded 24 years of participation in this economic activity.

6. The implications for livelihood strategies

6.1. Earning capacity of the workers

There seems to be enormous variation in the incomes earned by the solid waste workers. The informal solid waste collectors and truck drivers were the least economically vulnerable groups among the respondents. As Table 8 shows, most of the workers hired by the State agencies (66% males and 63% females) received incomes that did not exceed 2137 gourdes monthly or US \$50 (at an average rate of US \$1 to 42.74 gourdes, the rate during the 4 months of the fieldwork). In other words, less than 40% of them

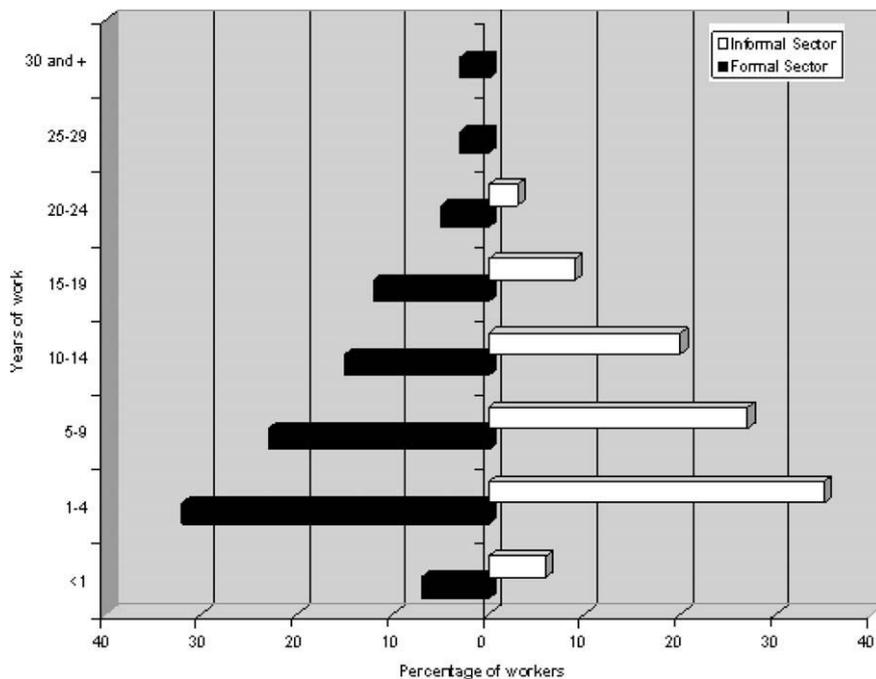


Fig. 6. Distribution of the workers in the sample population according to length of employment by solid waste sector.

Table 8

Distribution of the workers in the sample population according to monthly salary received by workers' group and gender.

Declared incomes per month in US \$	State agencies		Private companies	Informal collectors		Informal truck drivers	Scavengers	
	Male %	Female %	Male %	Male %	Female %	Male %	Male %	Female %
1–25	22	25					3	
26–50	46	38		7	100		16	
51–75	26	37	74	33			13	33
76–100	1			15			34	11
101–125	2		17	18		33	24	
126–150	2		9	15			5	
151–175	1			10				
176–200				2		34		
201>						33		
Not reported							5	56
Total	100	100	100	100	100	100	100	100

earned an income in excess of US \$51, which is the starting point of the monthly earning of the majority of solid waste workers in the four remaining groups. The empirical data also revealed that the informal solid waste workers returned home with higher incomes than their colleagues in the formal sector.

Gender was another factor that was related to significant discrepancies among the solid waste workers in respect of earnings. Female workers who were involved in the informal solid waste sector appeared to take home better incomes than their counterparts in the formal sector although 56% of them did not declare their income. These were female scavengers who collected food stuffs to feed animals, especially pigs and goats.

The wage issue was discussed with the solid waste managers in the formal sector. Senior officers in the private companies referred to the legislation regarding the daily nominal minimum wage that took effect in June 2003. They stated that they paid their employees more than twice the current value of the daily Haitian minimum wage (70 gourdes or US \$1.64).¹ They added that overtime accumulated by workers was paid separately. By contrast, solid waste managers at the level of the State agencies were not willing to discuss the wage issue although they recognised that the solid waste workers were mostly underpaid. Indeed, the empirical data revealed that 55% of workers hired by the State agencies fell below the official nominal minimum wage (1680 gourdes or US \$39.36 monthly). They argued that the SMCRS and the municipalities paid the workers what they could afford because these institutions were under severe budgetary constraints as the central government failed to provide them with sufficient funds. They stressed that they could not take the decision to increase the wage of the workers while they could not even pay them on time. In other words, not only were the workers underpaid, but they also had to wait, sometimes for several months, before receiving their meagre remuneration.

Some of the workers engaged by the State agencies were complaining about various unjustified salary scales that existed among them. For example, solid waste workers employed by the SMCRS (central government) received higher salaries than those hired by some municipalities, while they performed the same job or task and under similar conditions. The researcher discovered analogous problems between the municipalities where some paid their workers higher wages than others for carrying out the same assignment. The solid waste managers argued that this problem was related to varied budget lines and the politicisation of the solid waste management sector in the Metropolitan Area of Port-au-Prince. For in-

stance, while the annual budget of the SMCRS came directly from the national budget as a central government agency, the municipal budgets largely derived from the budget of the Ministry of Interior and Local Government. In Haiti, there are more than 130 municipalities. What is more, whilst the budget of the SMCRS is only dedicated to solid waste management in Greater Port-au-Prince, the municipal budgets were set to pay for sweeping streets and gathering solid waste as well as any other indispensable municipal services.

Further, as a result of flexible work schedules that exist in the Greater Port-au-Prince solid waste management system and probably due to economic hardships, more than one third of the interviewees (145 or 37%) were involved in other economic activities. Thirty-seven or 49% of the female workers hired by the State agencies had increased their incomes by using the remaining hours of the day in other money-making activities. Unlike the very few male scavengers who were engaged in other earning activities, seventy-nine or 47% of the male workers employed by the State agencies participated in such activities. Surprisingly, informal solid waste collectors who had been involved in other economic activities outnumbered those who had not.

6.2. Coping strategies

Another way of measuring the overall household incomes of the respondents was to assess the contribution of other household members through their active participation in the labour market. Workers hired by the private companies received greater support from other household members than their colleagues in the State agencies and informal solid waste collectors and truck drivers. The scavengers were the most economically supported by other working household members. Informal solid waste collectors and truck drivers who made a better living than the other workers received greater economic support from their household members than those employed by the State agencies.

Many respondents argued that they were the only breadwinner in their households, a situation which prevented them from escaping misery and poverty as a result of their low wage and their family responsibilities. They explained that other members of their households were looking for jobs so that they might be able to increase their assets and improve their living conditions. By contrast, some respondents stated that their spouses or other household members were self-employed or involved in other economic activities, even if the wage was at times low. They stipulated that when they put everything together, they were in a better position to make ends meet and save a little for hard times.

In addition to economic support that the interviewees may have received from other working household members, they also

¹ A new official daily nominal minimum wage of 200 gourdes or US \$4.70 is expected to take effect in October 2009. There is no guarantee that it will be applied to workers hired by the State agencies.

employed other coping strategies. Table 9 summarises other sources of support from which the respondents benefitted. While some of them received help from various sources to increase their income, a great number, both males and females, seemed to rely solely upon their own efforts to provide extra in dire economic situations. Friends and remittances played an important role in decreasing the levels of economic deprivation of many of the workers interviewed in Greater Port-au-Prince. Haiti received US \$1222 billion from remittances in 2007, which accounted for more than 20% of its Gross Domestic Product (UNDP, 2009).

6.3. Health status of the workers

A direct consequence of the active participation of the workers in solid waste management which may significantly impact their livelihood strategies is their constant exposure to health risks and safety. Indeed, solid waste management activities are carried out under precarious and unacceptable sanitary conditions in the Metropolitan Area of Port-au-Prince. Environmental and occupational health and safety manual, if existed, is not strictly applied. In fact, a bill on Occupational Health and Safety has been tabled in Parliament for many years. In other words, there are no effective control mechanisms or legal provisions to enforce and ensure proper management of hazardous, chemical, biological and medical waste in Haiti. It is possible that these types of waste might be included in the waste flow collected and transported to the dump sites. The workers operating without proper safety gear do so at considerable risk to themselves. For example most of the workers hired by the state agencies indicated that they did not wear any protective material when performing their tasks (Table 10). Workers engaged by the private companies were less vulnerable to injuries as most of them wore protective gear (Table 11).

The issue of safety gear for the workers was raised with the solid waste managers during the semi-structured interviews. Senior officers in the private companies argued that they provided safety gear (gloves and nose protection materials) for their workers. However, they stressed that some solid waste workers failed to ask for new safety gear after using what was already given to them. They stated that they had numerous discussions with the workers regarding the wearing of safety equipment materials, as some health insurance providers kept complaining when reimbursing medical bills for injuries that could have been prevented if the procedures were rigidly carried out by the workers. Some respondents employed by the private companies confirmed the above information, although a few of them pointed out that the wearing of safety gear was not compulsory. They indicated that they felt more comfortable without using safety gear; they only needed to carry out their tasks carefully.

By contrast, the solid waste managers at the State agencies declared that they used to provide safety gear for their workers. However, they were unable to indicate when such a practice took place. They said that current budgetary constraints prevented them from supplying these materials which could protect and help reduce the

Table 9
Distribution of the workers in the sample population according to other sources of support by gender.

Other sources of support	Male	Female	Total	
	%	%	(Count)	%
None	65	35	(152)	100
Remittances	85	15	(82)	100
Family	72	28	(64)	100
Friends	88	12	(106)	100
Own business	33	67	(3)	100
Rearing animals	61	39	(64)	100
Lottery	76	24	(21)	100

Table 10
Distribution of the workers in the sample population according to use of protective gear by category of workers.

Categories of solid waste workers	Use of protective gear		Total	
	Yes	No	Count	%
	%	%		
State agencies	18.4	81.6	(244)	100
Private companies	69.6	30.4	(46)	“
Informal solid waste collectors	12.2	87.8	(41)	“
Informal solid waste truck drivers	66.7	33.3	(3)	“
Scavengers	51.8	48.2	(56)	“
			(390)	100

Table 11
Distribution of the workers in the sample population according to frequency of injuries by category of workers.

Category of workers	Never	Now and then	Occasionally	Often	More often	Total
	%	%	%	%	%	%
State agencies	30	59	3	5	2	100
Private companies	52	39	4		4	100
Informal solid waste collectors	20	71	2	2	5	100
Informal solid waste truck drivers	33	67				100
Scavengers	5	66	2	27		100

level of injuries among the solid waste workers. As a result, they pointed out that the unit leaders were advised to inform the workers to be careful when performing their respective tasks. Respondents hired by the State agencies who wore safety gear mentioned that they themselves bought their own gloves, nose protection gear and boots.

A gender analysis was carried out in order to examine the prevalence and severity of the illnesses and symptoms reported by the respondents. A scale was created with the four ordinal levels of the variables (never, occasionally, often, and very often). Level 1, which represents ‘never’ indicates no prevalence of diseases and illnesses, while level 2 which stands for ‘occasionally’ means low prevalence; level 3 (often) reveals moderate prevalence, whereas level 4 (very often) discloses high prevalence of diseases and illnesses among the solid waste workers interviewed. In other words, the closer the mean is to 1, the better is the health of the workers, whilst the closer it is to 4, the worse are the health conditions of the interviewees.

A close look at the empirical data in Table 12 revealed that symptoms and illnesses such as cold, boils, and rashes were not prevalent among the workers as their means were closer to 1 which indicated no prevalence. Only strain/sprain was moderately prevalent among the respondents as its mean ranged from 2.50 to 3. All the other symptoms or ailments had arithmetic means that fell closer to 2 (low prevalence). The empirical data showed that male workers suffered more from sprain/strain, itching eyes, boils and cold, while their female counterparts were more affected by symptoms and illnesses such as fever, headache, stomach problems, chest complaints, coughs, diarrhoea, skin irritation and rashes. However, it is possible that the female workers might be culturally more prone to discuss their health problems than their male colleagues. Further research is therefore needed to elucidate this issue. This could be carried out in the form of case studies that should be able to check the medical records of the solid waste workers over different periods of time rather than rely solely on their recollections.

Table 12

Distribution of the workers in the sample population according to the means of reported symptoms and illnesses by gender.

Dependent variables	Gender of the sample population	Mean	Std. deviation	N
Fever	Male	1.6508	.6469	295
	Female	1.6737	.6910	95
	Total	1.6564	.6571	390
Headache	Male	1.5797	.6386	295
	Female	1.6000	.5724	95
	Total	1.5846	.6224	390
Strain/sprain	Male	2.5898	.9098	295
	Female	2.5263	.9207	95
	Total	2.5744	.9117	390
Stomach problems	Male	1.7864	.7815	295
	Female	1.9579	.7844	95
	Total	1.8282	.7846	390
Chest complaints	Male	1.8407	.8680	295
	Female	1.9368	.9087	95
	Total	1.8641	.8779	390
Coughs	Male	1.9186	.7912	295
	Female	1.9895	.6763	95
	Total	1.9359	.7646	390
Cold	Male	1.1593	.5700	295
	Female	1.0632	.2847	95
	Total	1.1359	.5166	390
Diarrhoea	Male	1.5864	.6840	295
	Female	1.7053	.7127	95
	Total	1.6154	.6921	390
Skin irritation	Male	1.6305	.6769	295
	Female	1.6632	.5945	95
	Total	1.6385	.6572	390
Rashes	Male	1.3627	.6177	295
	Female	1.4211	.6776	95
	Total	1.3769	.6324	390
Itching eyes	Male	1.8610	.6883	295
	Female	1.7789	.6219	95
	Total	1.8410	.6729	390
Boils	Male	1.1729	.5538	295
	Female	1.1474	.4118	95
	Total	1.1667	.5224	390

6.4. The future of the workers in the solid waste management system

Since an important proportion of the respondents earned very little money from refuse management, and given that several of them were placed under stringent work schedules, one would presume that they would be eager to leave their occupations in the solid waste management sector in the future. Surprisingly, 59% of the workers stated their intention to remain involved in the provision of solid waste collection and disposal services as well as scavenging activities. By contrast, 41% of the interviewees argued that they planned to leave the Greater Port-au-Prince solid waste handling system. A chi-square test indicated that there was no significant gender difference among the garbage workers concerning their expressed desire to continue or end their involvement in the solid waste management sector of the Greater Port-au-Prince Area in the future ($\chi^2 = 0.002$ and $P = 0.961$).

Another way to analyse the expressed desire of the respondents to leave or not to leave their occupations in the Greater Port-au-Prince solid waste management system was to look into the distribution pattern of the respondents both between and within the five groups of workers interviewed. Table 13 presents the observed values. More than half of the workers (53%) hired by the State agencies argued that they intended to leave the solid waste management sector in the future against 16% of the scavengers. As stated above, the State agencies paid their workers so little that they were kept at the bottom of the economic ladder. However, the fu-

Table 13

Distribution of the workers in the sample population according to expressed desire to leave job in the future by category of workers.

Categories of the workers	Plan to leave job in the future		Total	
	Yes %	No %	Count	%
State agencies	53	47	(244)	100
Private companies	9	91	(46)	"
Informal solid waste collectors	46	54	(41)	"
Informal solid waste truck drivers	67	33	(3)	"
Scavengers	16	84	(56)	"
			(390)	100

ture of those who planned to leave their survival activity in the solid waste management system is not promising, as the Haitian economy is still stagnant with little prospect of significant growth. In other words, Haiti's economy is unable to offer job opportunities even to those who are willing to perform menial tasks. Surprisingly, a substantial proportion of the informal collectors and truck drivers expressed their desire to leave the solid waste management sector despite the fact that they were the two least economically vulnerable categories of workers interviewed.

There was no workers' organisation in the Greater Port-au-Prince solid waste management system. Therefore, the solid waste workers were unable to put pressure on the governmental authorities (SMCRS and municipalities) to improve their working conditions and set up better salary scales that might reflect the stringency and flexibility of their work schedules. Neither were the scavengers able to bargain for the construction of the recycling plant that has been promised by the Haitian Government since 1997. Toby (2003) found similar results in the Kingston Metropolitan Area of Jamaica, where the solid waste workers had no representative body to lobby on their behalf before the solid waste management authorities. Secondly, as a result of the distinctiveness of their survival activity and livelihood strategy, mutual support and social networks were more effective among the waste pickers than the other groups of respondents. However, there was no form of social networks among the informal solid waste collectors as each of them worked separately.

7. Conclusion and recommendations

The main objective of this paper was to analyse the involvement of workers in solid waste management in Greater Port-au-Prince and the implications for livelihood strategies. The findings revealed that the Greater Port-au-Prince solid waste management system is very inclusive with respect to age, while highly segregated with regard to gender. Children worked either as scavengers or self-employed as informal garbage collectors. Most of the young workers were hired by the private companies or involved in the informal waste sector as scavengers or refuse collectors. The level of education of the workers was very low. Male workers dominated the managerial positions, whereas female workers were hired by the State agencies to sweep and gather solid waste or self-employed as scavengers on the dump sites. The solid waste management industry provided a livelihood for many individuals in Greater Port-au-Prince, Haiti. In light of the financial straits experienced by most of the workers, this paper calls for the enactment of new policies that might improve the earning capacity and working conditions of the solid waste workers. These workers continued to reap few benefits from the multiple services they rendered to society, the aesthetics of the urban areas and the integrity of the environment. This paper advocates better salary scales and work compensation for the solid waste workers. The study urgently recommends the design of an efficient and integrated solid waste

management system that can bridge the gap in the provision of garbage collection services and promote waste recovery strategies (recycling and composting) in Greater Port-au-Prince.

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