Solid Waste Management in Ghana: Willingness-to-Pay for Improved Services.

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Abstract

Recent rapid urbanization and changing lifestyles have created serious environmental problems in most cities in the developing world, especially in the area of solid waste management and financing. This study analyzes the factors that influence households' willingness-to-pay for improved solid waste management. Using a stratified random sampling technique, a total of 920 households were selected for the study and then a logit model-based contingent valuation method was employed to estimate their willingness-to-pay for improved service. The results indicated that all the variables but the household size had significant influence on respondents' willingness-to-pay. It also revealed a potentially large market segment of households in the low-income areas prepared to pay for improved service, which is yet to be tapped into. The study opined that with proper policies, the exploitation of this potential market can help disburden the authorities' total municipal budget. It thus calls for policy interventions through the use of the socio-economic characteristics to draw comprehensive market segments for waste collection instead of the current zoning patterns which failed to take cognizance of intra-zonal differentials.

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Introduction

In many countries, recent rapid urbanization has led to some fundamental socio-economic changes, often at a high social and environmental cost. The concentration of people and business activities in specific areas has led to an increase in solid waste generated, the collection and disposal of which poses serious environmental problems around peoples' homes (McGranahan, 1993). The Greater Accra Metropolitan Assembly's (GAMA) condition is no different from these global trends. The problem is further compounded by poor infrastructural facilities, especially in the low-income areas, where almost 70% of the urban population who account for 60% of the total waste generated, live (Oteng-Ababio, 2007).

In Ghana, the Local Government Act (Act 462) has made the various district assemblies (in possible private sector partnership), responsible for managing waste and sanitation (MLGRD, 1999). Unfortunately, most assemblies have under-performed in this direction, primarily due to financial constraints. Currently, about 50% of most assemblies' recurrent budget (plus government subvention) is spent on waste collection and transportation, with little focus on its treatment and proper disposal (World Bank website, undated). In spite of devoting such a large portion of their income to waste collection, most still remain heavily indebted to their private sector collaborators. Accra Metropolitan Assembly's indebtedness to private contractors, for example, was GH¢7.5 million (USD$5.9 million) at the end of 2008 (Oteng-Ababio 2010a). This situation does not only affect service sustainability but also contributes to the incidence of unabated flooding, pollution, and potential outbreak of epidemics, (Rahji and Olonutoba, 2009), and calls for proper cost recovery policies.

Studies (UN-Habitat, 2009; Rahji and Olonutoba, 2009) have revealed that cities fund their solid waste management services from a range of sources including government grants, internally generated revenue, specific waste levies and user-fee charges. Some recently identified (but yet to be exploited) sources include carbon financing, which is a potential revenue source if projects are designed to reduce emissions of methane, carbon dioxide or other greenhouse gases, and the extended producer responsibility (EPR) mechanism, which is a means of transferring to producers some part of the environmental cost of the end-of-life management of their products (UN-Habitat, 2009). These sources are not

mutually exclusive, but cities use a combination of them, such as funding capital expenditures with donor or central government funds while paying operating costs from user fees.

The challenges faced by city authorities in funding solid waste management (SWM) include residents' unwillingness-to-pay (WTP) for improved services. However, unlike other utilities (e.g. electricity) whose services can be withdrawn should the customer default in payment, the same cannot be said of waste services, least of all in situations where people may choose to make private legal and illegal arrangements to get rid of waste at the expense of public health. In GAMA, it is becoming increasingly difficult for the authorities to meet the growing demand for improved SWM services, especially in the low-income areas, due to financial constraints. Not even the involvement of the private sector in solid waste collection by the city authorities since 1999, ostensibly to help internalize the inherent externalities, has helped abate the process. There appears to be structurally endemic failings in the governance of the public-private partnership at all levels (Oteng-Ababio, 2007). While the authorities (who are to pay for the work done) in most cases lack the capacity to honour their financial obligations, the contractors cannot also adhere to the stipulated waste collection periods due to non-payment for services rendered. Meanwhile, residents are also reluctant to pay for poor services. (Oteng-Ababio, 2010b) A vicious cycle emerges, leading to poor sanitation, hence the motivation for this study.

The major objective of this study was to identify and analyse the factors that influence households' WTP or otherwise for improved SWM in GAMA. This is captured in four sub-sections, beginning with a brief introduction, followed by a discussion on the materials and methods used in the study. The discussion of the main findings follows while the concluding section looks at policy implications.

Materials and Methods.

Description of the Study Area

The study area, GAMA, falls within the Greater Accra Region and includes three separate administrative districts of the Accra Metropolitan Assembly (AMA), Tema Municipal Assembly (TMA) and Ga District

Assembly (GDA), which have become one urbanized area and the largest urban agglomeration in Ghana. The region remains the most densely populated in Ghana since 1960, with population density increasing from 151.1 in 1960 to about 896 persons/km^2 in 2000 against the national average of about 79 (GSS, 2005). Table 1 shows the trend of population growth in GAMA. Significantly, the area exhibited a very high growth rate, registering 4.6% in 2000 as against a national average of 2.1%. However, the area is not wholly planned since physical planning was introduced after most parts had independently developed. Accordingly, most low-income areas of AMA have sprawled into TMA and GDA and these areas are mostly characterized by low educational levels and poor infrastructure (Konadu Agyemang, 2001; Laryea-Adjei, 2000).

Table 1: Trend of Population Growth in GAMA

AREA	Population				Growth Rate		
	1960	1970	1984	2000	1960-70	1970-84	1984-2000
AMA	388,396	636,661	969,195	1,658,937	5.1	3.1	3.4
TMA	27,127	102,431	190,917	506,400	14.2	4.5	6.1
GDA	33,907	66,336	136,358	550,468	6.9	5.3	8.7
GAMA	449,430	804,834	1,296,470	2,715,805	6	4	4.6

Source: Ghana population census reports, 1960, 1970, 1984, 2000.

*NB: The last population census in Ghana was held in 2000.

In terms of SWM, the area has a long history dating back to 1898 when the Accra City Council was established and charged with responsibility for this task. By 1970, the council had introduced two systems of waste collection: the house-to-house system in the then high-income areas which attracted user fees and the fee-free communal collection system in the low-income areas. Due to insufficient finances, un-cleared depots became part of the urban environment features (AMA, 1995).

To reverse this trend, a Waste Management Department (WMD) was established in AMA in 1985. "Economic rates" (which aimed at full cost

recovery) were charged for services in the high-income areas while a policy of cross-subsidization was adopted in the low-income areas, where a revenue levy policy (i.e. a fixed amount of GHc 0.30 (USD$ 0.30) per house per year[1], attached to the property rate bill) was implemented in 1986. Before long, most property owners objected to this mechanism on the grounds that they did not enjoy direct services as exemplified in high-income areas. Thereafter, a pay-as-you-dump (PAYD) concept was instituted in 1993 whereby residents were expected to pay GHc 0.02 per dump at a communal container site. Records at WMD indicated that the policy yielded a total of GHc 4,600.00 by the end of 1994, the greatest assistance ever realized from SWM operations (AMA/WMD, 1996). Despite this 'huge' revenue potential, the policy was abandoned because it was seen as being at the expense of severe environmental degradation and public health as some residents, including children, used to dump waste into drains and open spaces.

Currently, these two institutional arrangements (i.e. house-to-house and communal container collection) persist for waste collection in the study area, run by both the public and private sectors. The house-to-house system still operates in the planned high-income areas with good infrastructure and accessibility and attracts user fees. All the stakeholders involved have some appreciable level of service satisfaction. In contrast, the fee-free communal collection system remains predominantly in the low-income, unplanned and poorly accessible areas. In principle, all stakeholders are dissatisfied with this system, primarily because services remain very poor due mainly to financial constraints.

Data collection

The study area was divided into low, medium and high-income areas based on the area's socio-economic characteristics (Benneh et al. 1993). A multi-staged, stratified sampling technique was then employed to select 25 research localities as the sampling frame. Within the localities, a systematic random sampling was employed to administer a structured questionnaire on 920 heads of households, accounting for about 4% of the total population in GAMA. Where the head was a male, a conscious effort was made to involve the women who, traditionally, are responsible for

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[1] In 2007, when data was collected, US$1 = Ghe 0.99; this rate is used throughout the study.

environmental sanitation in GAMA. This technique was adopted because results from an earlier reconnaissance survey had revealed that the formal SWM arrangement in a particular locality largely remains uniform. The population of an area informed the choice of the number of respondents. Fundamentally, the primary data collected captured respondents' socio-economic and demographic characteristics as well as their willingness-to-pay (WTP) for improved services.

Respondents' WTP for improved services was captured through households' interviews using the bidding game (i.e. iteratively decreasing the initial amount until an offer is accepted by the respondents). Based on the average monthly charges during the time of the study, the initial bid for participating in the envisaged improved services in the low, middle and high-income areas were GH¢1.0, GH¢5.0 and Gh¢ 6.0. A range of monthly tariffs were operationlised depending on whether a household has a positive WTP or not. Should the household refuse to accept the bid offered, the head is then asked to state the amount he/she was willing to pay for the desired service.

Data Analysis

The field data were manually entered into a computer and these were analyzed with the Social Package of Social Sciences 16 (SPSS). The study uses cross tabulations, graph, the logistic regression model and other statistical tests to analyze the emerging trends from the field studies. The specifications of the model were adapted from the works of Henemanns (1989); Park et al (1991); Gregory (2000); Louis (2000); Rahji et al (2002) and Rahji and Olonutoba (2009).

The Logit Model

The study anticipated that a rational household in a poorly serviced area will be willing to pay a price for improved services that will eventually lead to improved environmental and health status while irrational households will not. The logit model has in most cases been adopted in such studies to assess the effects of the independent variables on the probability of the respondents' WTP (Afroz et al., 2007). In deriving the logit model, the probability that a household with a particular socio-economic characteristic (x) will pay an amount (y) for improved SWM can be represented as:

$$p(x) = e^{\left(\begin{array}{c} y \\ \underline{x} \end{array}\right)}$$
where - $??x??$.

This can be written as:

$$p(x) = \frac{1}{1 + e^{-z_i}}$$
Where; $Z_i = \beta_1 + \beta_2 x_i$ -------- (1)

This implies that $1 - p(x)$ is the probability that a household will not pay for improved SWM if it is exposed to particular socio-economic condition. This can be summed up as:

$$1 - p(x) = \frac{1}{1 + e^{z_i}}$$
Where; $Z_i = \beta_1 + \beta_2 x_i$ ----------- (2)

The linear regression model cannot estimate the parameters in Z in this case but the ratio of the probability that a household pays for improved service to the probability that it will not pay can be used to achieve an estimate of the parameters in Z. This is the odd ratio and it is denoted as:

$$1 - p(x) = \frac{1 + e^{z_i}}{1 + e^{-z_i}}$$
Where: $Z_i = \beta_1 + \beta_2 x_i$ -------- (3)

The natural Log of the odd ratio is the logit model, which is an estimate of Z_i. This is denoted as:

$$Z_i = \ln \frac{p(x)}{1 - p(x)}$$
Where; $Z_i = \beta_1 + \beta_2 x_i$ ----------- (4)

The odd ratio for the various independent variables was calculated alongside their level of significance using the SPSS software. The logit model relating to respondents' WTP for improved service (dependent variable) to the set of

the socio-economic variables (independent variables) can be simplified as:

$$\text{Log} \ \frac{p(x)}{1-p(x)} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 - \beta_3 x_3 + \ldots + \beta_n x_n - e; \quad n = 8$$

Where:

$p(x)$ = the condition that a household with particular socio-economic variables will pay for improved service.

$1-p(x)$ = the condition that a household with particular socio-economic variables will not pay for improved service

β_1 = constant

$\beta_2 \ \beta_n$ = co-efficients

$x_1 \ x_n$ = socio-economic variables

e = error term

As the concept of value is subjective, it means that households' WTP for improved SWM will be subjected to a number of independent variables, including income, gender, the level of education and the occupation of heads of household. It will also depend on the type of service provider, the type and status of tenancy and the size of the household. These independent variables were chosen based on household variables that have been reported in the literature (Whittington et al., 1990; 1996; Altaf et al., 1993; Mani et al., 1997; Zerah, 1997) and those that could be measured within the scope of this study. A positive WTP was dummied as one, otherwise zero (i.e. Yes = 1, No = 0). It was anticipated that smaller households, higher income households and those serviced by the private sector would display positive WTP for improved services. Similarly, the better-educated household heads, women and those living in owner-occupied premises and employed in the formal sector would

also display better WTP. Indeed, Asenso-Okyere and Asante (2003) noted a positive relationship between the attainment of higher education and the price households are willing to pay for environmental services due to their better understanding of the advantages of disease control.

This means that the responses elicited from households were categorized and according to McKelvey & Zavoina (1975) and Winship & Mare (1984), linear regression models provide misleading results when used to regress nominal and categorical variables. They also noted that logistic regression is a better estimator for qualitative variables and requires fewer associations compared to multiple regressions, and thus is a very popular technique in health related fields (Leech et. al., 2005). The model is however deficient in capturing the hierarchy of the interrelationship between the dependent and independent variables. In addition, it has the potential of producing misleading results due to the hypothetical context within which households are asked to value the gains associated with the prospective intervention (see Brookshire and Crooker, 1981).

Results and Discussion

Socio-economic characteristics of the respondents

The socio-economic characteristics of respondents in GAMA were grouped together and discussed along the broad research zones. As stated, this was based on the assumption that the zones significantly exhibit similar characteristics. Table 2 is the descriptive statistics of the socio-economic characteristics of respondents. The male-female distribution in the sample was 58% against 42% in low-income areas; 51% and 49% in middle, and 69% against 31% in high-income areas.

Table 2: Descriptive statistics of socio-economic characteristics of respondents

Item	Low-income areas Number of Respondents (%)		Middle-income areas Number of Respondents (%)		High-income areas Number of Respondents (%)	
Sex						
Male	144	58.3	83	50.9	62	68.9
Female	103	41.7	80	49.1	28	31.1
Total	247	100	163	100	90	100
Religion						
Christian	180	72.9	118	72.4	60	66.7
Moslem	59	23.9	35	21.5	30	33.3
Traditionalist	5	2.0	1	0.6		-
No Religion	3	1.2	9	55		-
Total	247	100	163	100	90	100
Education						
No Formal Education	17	6.7	10	6.2	1	1.1
Primary/J.H.S	92	37.2	30	18.4	3	3.3
S.H.S/Technical	59	23.6	45	27.6	20	22.2
Post S.H.S/Poly	62	25.1	40	24.5	18	20.1
University	17	12.4	38	23.3	48	53.3
Total	247	100	163	100	90	100

Source: Field Data, 2007. * JHS means Junior High School; SHS means Senior High School

The analysis of the data from the survey revealed that the average age of the sample was just under 41 years and ranged from 17 to 79. In this survey, 73% of the respondents were Christians while 24% were Muslims. The majority of the respondents had higher education: 24% (SHS/Technical); 25% (Post SHS/Poly) 12% (University degree); and 7% had no formal education. The high proportion of higher education respondents may be attributed to the fact that Accra is the most urbanized center in Ghana and the highest waste generation area. Studies have established a positive relation between income and waste generation (Nilanthi et al., 2007), so it can be assumed that most of

the respondents were relatively higher income earners. From the study, 52% respondents were self-employed while 32% were in public and civil service. Of the remainder. 4% were either retired persons or disabled. On the average, the monthly household income of the respondents was GH¢142.00 (US$ 142.37).

Respondents' Desired Improvement in Solid Waste Collection
Table 3 shows respondents' desired improvement in waste collection practices in the study area. In the low-income areas, about 59% of respondents agreed to the continuous use of the container system while the rest called for at least once-a-week house-to-house services, though technically, the available infrastructure in such areas can hardly support such a system. In the middle-income areas, only 3% endorsed the fee-free communal container system while about 93% in the high-income areas called for twice-a-week, instead of the current once-a-week house-to-house services. Significantly, there are enough indications to suggest that most residents in GAMA are craving for improved waste collection services in their respective neighbourhoods. The problem, however, is whether they are willing to pay for such desired improvements.

Table 3: Percentage of households and their desired improvement in SWC services (in %).

Classification	Daily (HH)*	1x Week (HH)	2xWeek (HH)	Daily (CCC)**	Total
Low Income	0.4	27.6	13.3	58.7	100
Mid. Income	0.0	52.5	44.5	3.0	100
High Income	6.7	0.0	93.3	0.0	100
Total AMA	1.4	32.6	42.0	25.8	100

Source: Field data, 2005. *HH means house-to-house. **CCC means communal container collection.

Respondents' willingness-to-pay for improved services.

In determining how much respondents are prepared to pay for their desired improvement, the study restricts itself to the broad research zones. Table 4 shows the distribution of monthly prices (ranging between zero and GH¢10.00) respondents in AMA are willing to pay for their desired improved service. Quite significantly, in the low-income areas 65% of the respondents accepted to pay the lowest price tag of GH¢1.00 a month for their desired services while 35% declined. When the price tag was increased to GH¢2.00, 56% signified their preparedness to pay but this dropped to only 8% at a GH¢5.00 price tag. In the middle and high-income areas, all the respondents (100%) were willing to pay GH¢5.00 and GH¢6.00, respectively. There is a clear indication that within each residential zone the percentage of those willing to pay for improved services decreases with increased price and this is significant for policy purposes.

Table 4: Percentage of households willing-to-pay for improved services at a particular price-AMA

Price Month (GH¢)	Low income Area (%)		Middle Income Area (%)		High Income Area (%)	
	Yes	No	Yes	No	Yes	No
1.00	64. 35.?	?	-	-	-	-
.00	56.2 43.8		-	-	-	-
5.00	8.6	91.4	100	0	-	-
6.00	-	-	19	81	100	0
8.00	-	-	1	99	78.8	2.2
10.00	-	-	-	-	13.3	86.7

Source: Field Data, 2007. NB: $1.00 = GH¢0.99 in 2007, assessed at http://www.ghanaweb.com/ *Estimation of the modal prices* .

Table 5 also summarizes monthly modal prices respondents are willing-to-pay in the various zones. As earlier stated, those who reported a WTP value greater than zero were treated as positive WTP and 92% of respondents in GAMA were in this category. It is important to state this is not a full cost recovery regime, but a self-compliance scenario where households put value on the service they enjoy. The 8% who reported a zero WTP were asked a follow-up question to establish the reasons for their decision and in most cases it was based on a perception that waste collection is the sole responsibility of the local authority. This perception, which was also fuelled by some rhetoric of political leaders, manifested mainly in the low-income, indigenous areas where residents have enjoyed fee-free services since time immemorial.

Table 5: Monthly modal fees respondents are willing to pay for improved SWC (GH¢)

Classification	AMA	TMA	GDA
Low Income	1.52 (0)	0.5 (0.4)	1.1(0)
Middle Income	5.22 (0)	3.0 (2.0)	4.4 (0)
High Income	7.8 (6.0)	4.0 (2.5)	4.5 (0)
Fringe	0 (0)	0.3 (0)	0.1 (0)

Source: Field Data, 2005. *NB. Current user fees are in brackets (in GH¢).*

The findings clearly show that the modal WTP value for respondents in the higher income areas was higher than it was for those in the lower income areas as residents are more satisfied with the services being provided. According to Kassim and Ali (2006), if households were satisfied with their services, they would be more motivated to pay their fees effectively. The generally low modal price observed in TMA and GDA as compared to studies elsewhere (Morrison et al; 1988; Jin et al, 2006; Altaf and Deshazo, 1996) pertains because while the current user fees in TMA are   low - GH¢0.4 (TMA/WMD, 2005), the services in GDA are currently free. Significantly, the fringe areas of TMA and GDA which are currently outside the official service coverage recorded modest modal fees of GH¢0.3 and GH¢0.1, respectively, and these have a lot of policy implications.

In principle, the stated WTP (modal price) can be used to calculate the total value (cost) of any service intended for improvement. The total benefit value of a specific improvement can be estimated by multiplying this average household value by the number of households in that category. This benefit can then be compared against the cost of achieving such an improvement to see its viability. This gives a fair insight of a cost-benefits analysis of any intended improvement plan and can be modelled as follows:

$$V = (Pm \times Hse \times L) - C;$$

Where:

> Pm = modal value households are willing to pay for improved service;

Hse = number of households in a locality;

L =   length of time under consideration;

C =   total cost of providing the desired improvement;

$V>$ = a positive viability.

$V<$ = a negative viability.

Assembly	Modal Value per household (GH¢)	Number of households*	Approximate monthly revenue (GH¢)
AMA	1.52	356,550	541,956
TMA	0.5	105,633	52,816.5
GDA	1.1	119,355	131,290.5

*Source: 2000 Population and Housing Census.

NB: $1.00 = GH¢0.99 in 2007, assessed at http://www.ghanaweb.com//

Factors influencing beneficiaries' willingness to pay for Improved SWM

The logit model was used to identify and unravel the factors influencing residents' WTP for improved services in GAMA at a 95% confidence level. The results are presented in Table 7. In this analysis, as in most contingent valuation method studies, valid zero WTP responses were dropped from the

data set. In the end, almost all coefficients, with the exception of the size of the household, were consistent with the expectant values. The findings show that for a given level of satisfaction, female heads of household are almost two times (1.8) as likely to be willing to pay for improved SWM as male heads (1.0). This is not surprising in an area where empirically, women are by tradition responsible for environmental management (Post, 1999; Oteng-Ababio, 2007). Traditionally, it is believed among most ethnic groups that if the tip of a used broom touches a boy, he is likely to become impotent; hence the boy child is made to distance himself from waste handling (Tsiboe, 2004).

The study also shows that holding all other variables constant, occupants of owner-occupier premises (flats or bungalows) are almost one and a half times (1.4 and 1.8 respectively) more likely to pay for improved services than those living in rented properties, proxied by compound houses (1.0). This is also not unexpected in an area where user fees for most social services like refuse bills are registered and dispatched in the name of "landlords". In such circumstances, residents with insecure tenures or rampant change of occupancy, as in the case of low-income neighbourhoods, hardly enter into any direct legal contracts with service providers and thus have a lower motivation to pay.

Additionally, heads of households who are in formal employment are also more than one and half times (1.6) more likely to pay for improved services than those in the informal sector (1.0). The fact is that while those in formal employment get monthly incomes which incidentally coincide with the billing cycle of the service providers those in the informal sector, representing 52%, get daily wages and are most likely to have spent them when bills are submitted. As a policy option, the service providers may have to recognise this dichotomy and tailor their billing system to meet the needs and means of their heterogeneous beneficiaries.

Table 7: Results of Logistics Regression Analysis on Willingness to Pay for Solid Waste Collection in GAMA

Variable (x)	Logistic		Standard Error (e)	Odds ratio (z)	P-Value	Co-efficient (β)
Gender of Head of Household						
Male (RC)	1.000	Female	0.671	0.112	1.796	.000
Educational Level of head of household						
None (RC)	1.000	Primary	0.135	0.229	1.145	.537
		Secondary	0.779	0.187	2.158	.000
		Higher				
Tenure Status						
Compound (RC)	1.000	Flat	0.396	0.122	1.399	.006
		Bungalow	0.741	0.092	1.781	.000
Approximate Monthly Income						
About 500,000 (RC)	1.000	1,000,000	-0.078	0.258	0.925	.762
		2,000,000	-0.042	0.216	0.959	.847
		3,000,000	-0.011	0.213	0.981	.815
		4,000,000+	0.512	0.206	1.668	.013
Type of Service Provider						
Public (RC)	1.000	Private	0.614	0.276	1.847	.026
		CBO	0.412	0.162	1.510	.011
		Residents	0.323	0.166	1.281	.052
Type of Occupation						
Unemployed (RC)	1.000	Self employed	0.399	0.178	1.022	.225
		Public/ Civil Servant	0.496	0.171	1.641	.004
		Farmer/ Fisherman	0.520	0.166	0.982	.002
Household Size						
Over 10 (RC)	1.000	6-10	0.135	0.348	.997	.522
		1-5	0.214	0.219	1.131	.537
Constant			-2.814	0.216	0.047	.000

Footnote: RC refers to the reference category.

Source: Computed from Field Data- 2007.

The type of service provider also had very significant effects on residents' WTP. Those serviced by private service operators are almost two times (1.9) more likely to pay for SWM than their counterparts serviced by the public sector (1.0). The fact is that apart from generally being seen as inefficient, many beneficiaries of public delivered service see it as part of the government's legitimate social duty.

One interesting finding was the effect of the approximate monthly income of heads of households on their willingness-to-pay for improved services. This produces a statistically significant result only among those with an approximate income of about GH¢400 and above, who have slightly higher than one and a half chances (i.e. 1.7) of paying. Besides, there is no significant difference between those earning GH¢300 and those earning GH¢50, and this confirms earlier findings which indicated that those in the informal sector will find it difficult to meet their monthly bills until the authorities take their concerns into consideration. This is significant in an area where though the average monthly income appears relatively high (GH142.00), the study also showed a skewed distribution, with only 11% of the respondents accounting for 32% of the total monthly income.

The study further noted that there is not much difference between heads of households with primary education (1.2) and those with no formal education (1.0). However, those with a secondary or higher level of education are two times (2.2) more likely to pay than their uneducated counterparts (1.0). In this instance, it is reasonable to assume that the more educated invariably have a better income and attach a higher opportunity cost to time spent in remedying environmentally related negative externalities. The observed positive relationship between education and income generally recurs in most WTP studies (Jin *et al*; 2006; Danso *et al*., 2006; Basli *et al*., 2006; Caplan *et al*., 2002).

The findings however show that household size did not have statistically significant effects on peoples' WTP as earlier anticipated. The results are however consistent with other studies (Jin et al., 2006; Othman, 2002). Although ironic, this could have resulted from some biases emanating from the data collection. For example, some respondents could have under-declared their household size just in case service providers needed to use a flat tariff rate based on household size, as was once the case in some middle-income areas when the policy started in the late 1990s. The result indicates that residents at GAMA have a positive WTP for improved services, and this is most welcome in the drive towards a sustainable SWM regime, as the proper harnessing of this potential will disburden the municipalities' total budgets.

Conclusion and some general policy implications

The study employed the contingent valuation method to estimate respondents' WTP for improved SWM service in GAMA. The sample was conducted within three broad research zones: low, middle and high-income areas.   The findings show that for a given level of service delivery satisfaction, residents in the low-income areas are willing to pay a modal value of GH¢1.52 in AMA, GH¢0.5 in TMA and GH¢1.1 in GDA. Although this may seem very low compared to results of other studies (Jin et al, 2006; Danso et al., 2006; Basli et al., 2006), it is nonetheless significant, compared to the fact that services are currently fee-free. A cost-benefit analysis based on the stated modal price for AMA revealed great potential even where the Assembly restricts itself to only the lowest modal value. Notwithstanding residents' willingness-to-pay more for improved SWM service (preferably through the private sector), there is a sense of entitlement and equity to free government services among some residents in the low-income areas, and this is pregnant with immense policy implications for financing SWM in the country.

As a key policy option, the city authorities and service providers can choose from a set of scenarios, which include different levels of attributes and WTP estimates for each attribute, to design an improved service project for GAMA. They can, for example, take advantage of the higher loyalty exhibited by female heads of households through the growing gender mainstream movements like Women Aglow and Abantu for Development, as well as religious and other social networks to improve cost recovery, especially in the low-income areas. This effort could be complemented by using the better-educated beneficiaries as utility promotion agents, given that they are people of some influence in their areas of residence. In addition, the authorities need to take into consideration the negative consequences of lack of contractual responsibilities for most tenants in the low-income areas and devise appropriate means of creating legal contracts or service agreements directly with service beneficiaries and making them directly responsible and liable for services provided.

Undoubtedly, any policy proposal for SWM must be comprehensive, integrated and incentive compatible without compromising on the health of the environment. The characteristics of the socio-economic variables used in the study may be used to draw comprehensive market segments instead of the

current zoning patterns which fail to take cognisance of intra-zonal differentials. The household income, education level and type of service provider variables had a positive and highly significant relationship with the WTP for improved services. The high-income, low-density areas can be served by the private sector, as they possess the economic power and value environmental quality. The lower income areas lack the economic power to purchase such public goods as environmental quality and therefore a policy of cross-subsidization should form the basis of any policy initiative. This will not only help service providers develop well-targeted promotional strategies that address the preferences and needs of each target group, but more importantly, make them more customer-focused.

Admittedly, beneficiaries of the fee-free communal container collection system were dissatisfied with the quality of the current services. This partly explained why their WTP was low. There is the need to improve services to guarantee social acceptability and participation, especially when residents have demonstrated their WTP for improved SWM (albeit not full cost recovery). There is also the need to institute an aggressive environmental campaign, especially in the low-income residential areas, to educate the residents to improve their waste disposal practices and help raise their awareness regarding environmental cleanliness.

At the other end of the spectrum, policy makers need to be aware that socio-economic characteristics and quality of waste collection services will influence respondents' WTP. Thus, to address the environmental health problems in the cities, there is the need to know the cost-benefit analysis for providing various service improvements. The government should also endeavour to build the capacity of local authorities that are weak and ineffective - and often undemocratic (Oteng-Ababio, 2010c; UNCHS, 1996; Stren et al., 1992), especially those who fail to involve all stakeholders in the decision-making process. It is the outcome of that process that largely determines what investments are made in infrastructure, which environmental problems receive priority and who benefits and who does not (Douglass, 1992). In situations where the concerns of the low-income groups are inhibited, most potential investments in infrastructure and services may end up serving only the few privileged middle- and upper-income groups.

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