

AMERICAN UNIVERSITY OF BEIRUT

FACTORS ASSOCIATED WITH PEOPLE'S WILLINGNESS
TO PAY FOR BETTER SOLID WASTE MANAGEMENT
SERVICES IN LEBANESE RURAL AREAS: THE CASE OF
JDEIDET GHAZIR

by
MARY JOUL ABED AL AHAD

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AN ABSTRACT OF THE PROJECT OF

Mary Joul Abed Al Ahad for Master of Science in Environmental Sciences
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Title: Factors Associated with People's Willingness to Pay for Better Solid Waste Management Services in Lebanese Rural areas: The Case of Jdeidet Ghazir

Along with political and social aspects, rapid, unplanned development in Lebanon have led to improper Municipal Solid Waste Management (MSWM), which resulted in a major solid waste crisis in 2015, where piles of garbage filled the streets of Lebanon. This crisis was also accompanied by a massive social movement, public protests, and led to more mistrust in the central government, which left some people asking for decentralization of the solid waste management and giving charge to municipalities rather than the government. Lebanese policy makers have doubted the willingness of Lebanese citizens to engage in and pay for an improved solid waste management project, especially in rural areas with middle to low income. In this project, the aim was to provide a case study in a rural area where people's willingness to pay for improved MSWM services is tested. In addition, the study explored the municipality's readiness to adopt decentralization as an approach for MSWM. In more details, this study examined the Willingness to Pay (WTP) for a hypothetically proposed integrated MSWM service (developed by the researcher) and its association with respondents' recycling/ composting awareness and practices, attitudes toward MSWM responsibility, socio-demographics, and political-economic factors in Jdeidet Ghazir, a village in the rural areas of Kesrouane Lebanon. The contingent valuation method was used to provide the evidence base for the financial feasibility and sustainability of adequate and improved MSWM in this village. Furthermore, the study aimed to investigate the municipality's willingness to support the implementation of an integrated MSWM service as a step toward decentralization of the local MSWM services.

A cross-sectional study design was employed to elicit respondents' WTP for the proposed MSWM service through a payment card contingent valuation questionnaire. Data was collected from 228 households through a structured face-to-face interview with any available adult member of the household present in the house at the time of the interview. The collected data was coded numerically and analyzed with the statistical software STATA. Multivariate logistic regression and multivariate Tobit model were used to examine the factors associated with respondents' WTP and maximum WTP amount, respectively.

The results showed that 79.39% of respondents are willing to pay for the proposed integrated MSWM service in Jdeidet Ghazir. The mean of the maximum WTP amount was 73,377.19 L.L. per year per household. Both the multivariate logistic and Tobit regression showed that nationality, perception of the MSWM as a household responsibility, and as a government responsibility are significantly associated with the

households' WTP and maximum WTP amount for the proposed integrated MSWM service. Moreover, the logistic regression model showed that the walking distance from the nearest solid waste collection point, and household disease history have also significant association with households' WTP. The Tobit model showed that household income level, and perception of MSWM as an important problem, are also significantly associated with the maximum WTP amount for the proposed integrated MSWM service. The high respondents' WTP percentage (79.39%) for the proposed integrated MSWM service reflects the importance and the high economic value of such service to the public in rural areas motivating the municipality to act fast and enhance the MSWM situation locally. Furthermore, the interview with the municipality mayor showed the willingness of the municipality to support the implementation of the hypothetically proposed integrated MSWM project. Indeed, the mayor revealed that the municipality has already started with a decentralization initiative of the local MSWM services since mid of June, 2018 by cooperating with the municipality of Ghosta, a neighboring town in Kesrouane. Lastly, this study provided the evidence that the municipality is willing to proceed with the decentralization initiative of the local MSWM services at the village and revise/update the yearly municipality fee to include the households' yearly average WTP amount and partially cover the costs of the local improved MSWM project. Finally, the results of this contingent valuation study and its estimated statistical models can serve as a model to help policy makers and administrators in determining the optimal charges for proper MSWM services in Lebanese rural areas.

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ABBREVIATIONS

CV	Contingent Valuation
CME	Choice modeling experiment
WTP	Willingness to Pay
SW	Solid waste
MSWM	Municipal solid waste management
HH	Household
L.L.	Lebanese Lira
\$	US Dollars
NGO	non-governmental organization
MOE	Ministry of Environment
FHS	Faculty of Health Sciences
AUB	American University of Beirut
IRB	Institutional Review Board
CITI	Collaborative Institutional Training Initiative
OR	Odds Ratio
SD	Standard Deviation
CI	Confidence Interval
Min	Minimum
Max	Maximum

CHAPTER 1

INTRODUCTION

1.1. Background

Solid waste results from basic everyday economic, social, recreational and other human activities (Minghua et al., 2009). Municipal Solid Waste Management (MSWM) is a procedure that includes solid waste collection, treatment and disposal services (Adapa et al., 2006). Solid waste generation has globally increased in the last few decades due to rapid civilizational progress, population growth, increased urbanization, booming economy, improved living standards, changed lifestyles and changes in consumption patterns (Minghua et al., 2009; Singh et al., 2014; Tchobanoglous et al., 1993). This has often gone hand in hand with inadequate MSWM which has become a problem globally, particularly for developing countries that lack the appropriate financial and technical resources as well as political will for proper management (McAllister, 2015; Ogwueleka, 2009; Chakrabarti & Sarkhel, 2003).

1.2. Impacts of Improper MSWM on the Environment and Human Health

Open dumping, one of the most common solid waste dumping practices in developing countries, is a case in point, as it has been associated with negative environmental and health outcomes. Open dumping practices are main contributors to surface and ground water pollution, air pollution, acid rain, global warming, climate change, soil pollution, failure of agricultural crops, and ecosystem deterioration (Alam & Ahmade, 2013; Ejaz et al., 2010; Azar & Azar, 2016). The environmental problems

associated with open dumping practices will in turn lead to negative health outcomes on the local populations such as cancer, chemical poisoning, low birth weight, congenital defects, neurological disorders, nausea, vomiting, asthma, rabies, malaria, and cholera (Agunwamba, 1998; Alam & Ahmade, 2013). A review about MSWM in Indian cities by Sharholly et al. (2008) found that approximately 90% of the solid waste are disposed in unsanitary open dumps, exposing the surrounding populations to heavy metal from the groundwater resources polluted by the leachate percolating from the open dumps. In Nigeria, improper MSWM has been found to spread odors and pests, including mosquitoes and other disease vectors (Agunwamba, 1998). Another study conducted by Ejaz et al. revealed that open burning of solid waste, another practice normally used in developing countries will cause air pollution and the liberation of dioxins which in turn will result in health impacts such as chloracne, neurological disorders, cancer, endocrine disruptions, congenital defects, cleft palate, low birth weight and stillbirths (Ejaz et al., 2010; Kogevinas, 2001). Low collection frequency of solid waste is also highly present in developing countries leading to the accumulation of the solid waste on the sides of streets and river banks as well as blockage of drains and sewers; eventually, this will cause floods and unhygienic situations as well as bad odors and aesthetic nuisance to the public (Ejaz et al., 2010). In addition, the accumulation of solid waste around the waste containers will attract people who collect and sell recyclables, which increases their risk of injury and infection (Alam & Ahmade, 2013). Solid waste workers will also face severe occupational injuries and diseases especially in developing countries due to the lack of protective devices and measures (Ejaz et al., 2010). Thus, improved MSWM that includes source-separation of refuse, recycling/composting and final disposal in sanitary

landfills is necessary for preserving the environment and improving the public and human health.

1.3. Environmental Economic Valuation

Improving MSWM services, however, comes at a cost and economic assessments are critical tools for planning and implementing such services (Kinnaman, 2009). The environmental economic valuation tools include stated preference techniques such as contingent valuation and choice experiments as well as revealed preference techniques such as hedonic market, travel cost, and averting behavior methods (Mustafa et al, 2014). Assessing people's willingness to pay (WTP) for improved environmental services has been a widely used approach to provide the evidence base for environmental and resource policy and decision-making, and the contingent valuation (CV) method has often been used as a tool of choice for estimating WTP (Amiga, 2002; Ferreira & Marques, 2015; Wang et al., 2014; Whittington, 2002). According to Amiga (2002), "Contingent valuation is an environmental valuation method, which uses an artificial market to measure consumer preferences by directly asking their willingness to pay or willingness to accept a change in the level of environmental goods or services". The contingent valuation technique is designed based on the assumption that a market exists for environmental services and goods. Therefore, the public has unseen preferences for environmental services that can be translated in monetary terms via the willingness to pay question (Joel et al., 2012). Contingent valuation method measures the environmental good holistically and has four main steps: administration and designing of contingent valuation survey, analyzing responses, estimating the average willingness to pay value, and evaluating the contingent valuation

exercise (Amiga, 2002; Bateman et al., 2002). In the contingent valuation exercise, estimation of WTP can be derived by different formats such as by: open-ended question, bidding game, payment card and dichotomous choice (Mustafa et al., 2014). In addition to estimating the WTP, a contingent valuation exercise aims to link the amount of WTP to the socio-economic status of respondents and to the level of their environmental awareness, so that beneficial conclusions can be drawn to guide the decision-making process (Amiga, 2002; Mustafa et al., 2014). Therefore, contingent valuation studies will give reliable evidence that can guide the policy making process if conducted properly and carefully.

1.4. Solid Waste Management and Decentralization

Decentralization of the MSWM services became popular in the last few decades as a solution for the massive increase in the solid waste generation and its associated problems whereby each municipality can handle its own local MSWM services (Ullrich, 2001; Oosterveer & Van Vliet, 2010). However, the magnitude of decentralization differs among countries depending on their historical and political development. For instance in Latin America and many developing countries, centralization of the public services dominated decentralization due to the remnants of the colonization era (Ullrich, 2001). The centralization mentality persisted in many African countries even after the end of the colonization era due to the weak infrastructure, extensive poverty, and underdeveloped private sector which required the central government to guide the economy and handle the public services (Ullrich, 2001). Nevertheless, the presence of political corruption in the central governments of many developing countries accompanied by the lack of appropriate financial and technical

resources, led to poor solid waste management and raised the call for the decentralization of the local MSWM services (Ullrich, 2001; Oosterveer & Van Vliet, 2010). For instance, the government of Ghana approved the decentralization of the MSWM services in Berekum and Dormaa municipalities to promote accountability and compensate the failure of the MSWM services provided previously by the government (Kyere, 2016). Another example is from India, where the municipality of Chennai experimented a successful decentralization of their local MSWM services in 1989 with the help of EXNORA International NGO that provided small waste management units managed by local people in Chennai. The operational costs of this decentralized MSWM project were covered partly by the local community contributions and partly by selling the recyclables. In addition, this project provided job opportunities for the local community (Singh, 2014).

Decentralization of the MSWM services has many advantages such as: creating local centers to provide MSWM services which are closer to the residents, responding more quickly and flexibly to the resident's needs and expectations through autonomous decision that is taken only by the respective municipality without the governmental and political elite's interferences, and making the MSWM more efficient through shortening many bureaucratic procedures (Henry et al., 2006; Iyer, 2016; Ullrich, 2001). Additionally, decentralization redistributes the political power by giving local stakeholders such as the municipality mayors a greater role in the decision making process leading to better and more publicly supported decisions that suits the specific local needs (Dhokhikah & Trihadiningrum, 2012; Oosterveer & Van Vliet, 2010). On the other hand, decentralization of the MSWM services has many disadvantages such as: the relatively small local MSWM projects and the small amount of generated solid

waste resulting in high operational costs and lack of financial sustainability (Ullrich, 2001). Thus, municipalities must ensure that the provided MSWM services are affordable and of high quality standards to the public. To this end, cooperation between nearby municipalities can increase the cost efficiency of the provided MSWM services (Ullrich, 2001). In Uganda, for instance, the environmental and natural resource management is decentralized since 1996 aiming at improving the efficiency, effectiveness, transparency, and democracy of environmental policies by shifting the responsibilities from the government to the local (district) level. However, this decentralized system in Uganda included successful and failure elements. The successful elements were improvements in the service delivery and more local political participation; whereas the failure elements were insufficient knowledge, scarce financial and technical means, and increased tension between the technical staff and the elected local politicians (Oosterveer & Van Vliet, 2010). Finally, decentralization of MSWM services is a continuously changing political process that depends on the scientific/technological advance, the financial capability, and the political priorities of governments and local municipalities (Oosterveer & Van Vliet, 2010).

1.5. The Case of Lebanon

In 2014, Lebanon had an estimated population of 7 million (5.6 million Lebanese and 1.4 million Syrian refugees) and produced around 2,040,000 tons of municipal solid waste per year (MOE, EU & UNDP, 2014; Sweep Net, 2014). Most of the municipal solid waste in Lebanon (about 60%) is generated by Beirut and the Mount Lebanon governorates (Sweep Net, 2014). The composition of the generated municipal solid waste consists mainly of organic biodegradable matter (50%-55%) giving it a high

moisture content. The rest of the waste composition is distributed between recyclables such as: paper and cardboard (15%-17%), plastic (10%-13%), glass (3%-4%), metal (5%-6%) and other miscellaneous material (10%-12%) (Sweep Net, 2014).

Solid waste management, including solid waste collection, treatment and final disposal in the Naameh landfill for Beirut and Mount Lebanon have been carried out by Sukleen and Sukomi Company (contracted by the government) since 1994 (Sweep Net, 2014). The Sukleen and Sukomi MSWM services were highly inefficient whereby the system was characterized by high dependence on landfilling with minor recycling and composting services as well as high net costs up to \$130 annual cost per ton of solid waste (Sweep Net, 2014). In addition, the central government annually renewed the contract of Sukleen and Sukomi without amendments as well as the lifetime of the Naameh landfill every time it reaches its full capacity (Sweep Net, 2014). However, in July 17, 2015, the Naameh landfill was closed due to the following reasons: (1) the Sukleen contract with the government was expired, (2) the Naameh landfill reached its full capacity and cannot handle additional amounts of solid waste, and (3) Walid Jumblat (member of parliament and political leader in the Chouf region, in which the landfill is located) publicly denounced the Naameh landfill and vowed its closure (Massoud & Merhebi, 2016; Menhall, 2017). Since then, Lebanon has been suffering from a solid waste management crisis which has led to solid waste accumulating on the sides of the streets and in river banks, especially in Beirut and the Mount Lebanon, posing serious environmental and public health hazards (Massoud & Merhebi, 2016). Additionally, the absence of an effective governmental plan for proper MSWM, have led some municipalities to implement primitive solutions fo accumulating garbage piles in their territory such as open dumping and open burning practices increasing the risk of

diseases among the Lebanese citizens (Abbas et al., 2017; Morsi et al., 2017). This situation led to the eruption of public protests asking the government to find solutions for the solid waste crisis (Massoud & Merhebi, 2016). Hence, the government responded by offering a temporary solution in March, 2016 by dumping the collected solid waste from Beirut and Mount Lebanon in the two coastal landfills (Costa Brava and Bourj Hamoud landfills); however, these landfills will soon reach their maximum capacity, booming the solid waste crisis once again (Khawaja, 2017).

Many factors have led to improper MSWM in Lebanon and consequently to the solid waste crisis including; lack of public awareness about recycling/composting, negative public attitudes and practices regarding MSWM, the weak political-economic infrastructures in the country, the personal interests of the political elites, and most importantly, the absence of legislations and policies that deal directly with solid waste management (El Harakeh et al., 2017; Menhall, 2017; Sweep net, 2014). For example, the only two laws that deal with solid waste management indirectly are decree 8735 of 1974 which states that solid waste management is the responsibility of municipalities and decree 9093 of 2002 which emphasizes granting incentives to municipalities that host a solid waste management facility (Sweep Net, 2014). However, these laws are rarely enforced due to the political corruption, unclear responsibilities, lack of coordination, and absence of knowledge and enforcement skills (Sweep Net, 2014). In 2005, the ministry of environment prepared a draft law concerning integrated solid waste management and the council of ministries approved it in 2012; nevertheless, the Lebanese parliament has not ratified it yet (El Harakeh et al., 2017). Recently, the council of ministries discussed the policy for the integrated solid waste management in their meeting on January 11, 2018, whereby the policy emerged based on eight

principles: respecting the principles of the Environmental Protection Law No. 444/2002; adopting the integrated solid waste management hierarchy; reinforcing the policy of cooperation between the Ministry of Environment, the other relevant ministries and public departments, and the municipalities and local communities; assigning administrative decentralization for solid waste management to the municipalities upon getting approval from the ministry of environment; adopting centralization of the final steps of the solid waste management hierarchy for the small municipalities; including all the governorates in the proposed integrated solid waste management policy; adopting various internationally proven technologies; and spreading a culture of shared responsibility for integrated solid waste management (MOE, 2018). Therefore, this policy is suggesting partial decentralization (administrative decentralization) of MSWM as a solution for the solid waste crisis in Lebanon. Administrative decentralization includes devolving the first stage of the integrated MSWM hierarchy (solid waste reduction, reuse, separation at source, and collection) to the municipalities. In addition, municipalities can be responsible for the other stages of the integrated MSWM hierarchy (sorting, treatment, and final disposal of solid waste) conditional upon getting prior approval from the Ministry of Environment if the respective municipality propose an environmentally and economically sound MSWM project within the assigned deadlines (MOE, 2018).

The concept of decentralization as a sustainable solution for local problems have been widely proposed on the table since the “Al Taif” agreement in 1989 which ended the civil war in Lebanon. However, the divergence in the political elite interests always hindered the development of practical decentralization policy measures (Menhall, 2017). The emergence of the solid waste crisis in Lebanon since 2015

accompanied by a massive social movement, public protests, and mistrust in the central government, however, raised the call for the necessity of complete decentralization (each municipality manage its own solid waste without the need to maintain approvals from the Ministry of Environment) as a possible solution for the solid waste crisis in Lebanon (Giannozi, 2017; Menhall, 2017). Nevertheless, many policy makers still have doubts regarding decentralization being a sustainable solution for the MSWM crisis especially for the small municipalities and villages who lack the needed technical and financial resources for proper solid waste management (Giannozi, 2017). Not to mention that villages produce low amounts of solid waste which makes it difficult to attract donations and/or investments to establish a local integrated MSWM project (Giannozi, 2017). Therefore, decentralization of the MSWM sector depends on the availability of the necessary technical and financial resources as well as a national will for decentralization by the political elites (Menhall, 2017). Hence, the yearly municipality fee can serve as a local resource for municipalities to finance their own improved MSWM services if they possess the political will for decentralization and estimating the Lebanese public's WTP for improved MSWM services and its associated factors can provide the evidence base for local municipalities to update/revise their yearly municipality fee.

To this end, Jdeidet Ghazir, a village located in the Kesrouane district of the Mount-Lebanon governorate, was chosen as a case study. This village has been selected for four major reasons. First, the MSWM system in this village is typical of the rest of Mount Lebanon and it is handled by the central government; it includes: (1) collection of mixed refuse by the RAMCO Company (contracted by the government to provide solid waste management services in Mount Lebanon and Beirut), (2) treatment in the

Karantina area of Beirut, and (3) final disposal in the Costa Brava open dump south of Beirut. Hence, our study can reveal the residents' and the municipality opinion regarding RAMCO's solid waste management services. Second, Jdeidet Ghazir village has been encouraged to participate in a project that will improve the MSWM situation locally, reduce the high costs associated with the RAMCO service, and be part of a decentralization initiative of the local MSWM services. Therefore, our study can help collect data on the villagers' response toward MSWM improvement as well as assess the financial feasibility of the implementation of such project by estimating the peoples' WTP for the proposed integrated MSWM service. Third, most of the recent debate and literature concerning the solid waste management situation in Lebanon has been focused on urban areas and cities neglecting rural areas and villages although the solid waste management situation in the latter might be worse due to the limited financial and technical resources as well as governmental support. Thus our study will shed the light on the MSWM situation in rural areas by taking Jdeidet Ghazir as a case study. Fourth, so far, up to my knowledge, no published studies have tried to assess the WTP for improved MSWM services in Lebanon, and only a few articles have investigated the WTP for improved MSWM services globally in rural areas and villages. This study will therefore attempt to fill these gaps in the literature.

1.6. Objectives of the Study

- a. Determine the villagers' awareness of and satisfaction with the existing MSWM services at Jdeidet Ghazir village.
- b. Conduct an environmental contingent valuation to measure the households' willingness to pay for a hypothetical MSWM service that include better source

separated solid waste collection and recycling/composting services in Jdeidet Ghazir village as proposed by the researcher.

- c. Assess the households' willingness to engage in recycling/composting activities that include source separation of their generated refuse.
- d. Study the association between WTP and various factors including: respondents' willingness to engage in recycling/ composting activities that involve source separation, recycling/composting awareness, socio-demographics, and political-economic factors.
- e. Assess the municipality willingness to support the implementation of the hypothetically proposed MSWM service.

CHAPTER 2

LITERATURE REVIEW

To obtain information on environmental economic valuation in the solid waste management field, a literature review was conducted (Appendix VI). This review was constructed by searching for scientific research papers on Science Direct, Sage, Scopus, and Google Scholar web search engines using the descriptors (all caps indicates that the term is a Boolean operator): willingness to pay AND solid waste management, environmental economic valuation AND solid waste management, stated preference techniques AND solid waste management, and contingent valuation AND solid waste management. The available published articles from 2003 till 2017 were screened based on their title and abstract and their relation to the following guiding question: “what are the determinants of publics’ willingness to pay for improved solid waste management services?”. The constructed literature review table (Appendix VI) showed the publics’ willingness to pay for improved solid waste management services reflecting an annual surcharge, the determinants associated with their willingness to pay, and the policy implications of the studies. The studies in the literature review reported either the annual mean of HH WTP or the monthly mean of HH WTP. For consistency, all the monthly means were converted to annual means by multiplying the monthly mean by 12. In addition, all the money currencies were converted to USD by using an online conversion calculator (<https://www.oanda.com/currency/converter>).

The examined research studies showed the importance of environmental economic valuation in guiding the policy and decision-making process in the MSWM field for better environmental conditions and public health. They also revealed that the publics' mean willingness to pay for improved MSWM services ranged between \$1.5 and \$84 per year. The examined studies also presented a huge variety of contexts. The different studies have showed that the yearly average of households' WTP amount varied according to the country classification or economic situation, ie. higher WTP amounts for developed versus developing countries. For example, the highest average households' WTP amount belonged to the USA, a developed high-income country (\$84 per year), while the lowest average households' WTP amount belonged to Pakistan, a poor developing country (\$1.5 per year). Also, within the same country, the average households' WTP amount for improved MSWM services varied depending on the area of the study, ie. higher WTP amounts for urban versus rural areas. For instance, in China, the average households' WTP amount was \$61.68 per year in Shanghai (the capital of China) versus \$3.98 per year in the rural areas of China.

It can be noticed that most of the stated preference studies regarding improved MSWM services were conducted in urban areas and cities while only limited literature exist on rural areas and villages.

Most of the examined studies in the literature review used the face-to-face interview method during data collection phase to reduce the non-response rate and allow respondents to elaborate more on the reasons behind their WTP.

The main determinants of the publics' WTP for improved MSWM services included socio-economic determinants such as respondents' age, gender, occupation and educational level, and households' income, ownership and size; as well as other

determinants such as disease history, respondents' environmental/health awareness, recycling/composting practice and perception of MSWM services. Specifically, the higher the household income, the higher the demand for improved MSWM services, resulting in higher WTP amounts (Afroz & Masud, 2011; Afroz et al., 2009; Alhassan et al., 2017; Banga et al., 2011; Blaine et al., 2005; Challcharoenwattana & Pharino, 2016; Fonta et al., 2007; Maskey & Singh, 2017; Trang et al., 2017; Yusuf et al., 2007; Zhang et al., 2012). However, Danso et al. (2006) and Zeng et al. (2016) have found that the association between the WTP amount and income is a negative one. This divergence can be explained by the fact that households with high income are located in rich neighborhoods and are supplied with improved MSWM services. On contrast, households located in low income neighborhoods are suffering from environmental and health problems due to poor MSWM services resulting in higher WTP amounts.

Similarly, the higher the respondents' educational level, the higher the WTP amount. Respondents with high educational level, specifically university level, are more aware about the negative health and environmental impacts caused by poor MSWM services and hence are willing to pay higher amounts of money to improve the MSWM situation in their community (Afroz & Masud, 2011; Alhassan & Mohammed, 2013; Alhassan et al., 2017; Banga et al., 2011; Danso et al., 2006; Al-Khateeb et al., 2017; Maskey & Singh, 2017; Patrick et al., 2017; Trang et al., 2017; Yusuf et al., 2007).

Gender and marital status are other determinants for the WTP for improved MSWM services. According to Alhassan et al. (2017), married people are more willing to pay for improved MSWM services as compared to single people because they have an increased concern toward the health of their children. Moreover, many studies showed that females are more willing to pay for improved MSWM services because

they are responsible for the cleaning and hygiene activities in most of the households (Alhassan & Mohammed, 2013). Also, females are more concerned about the health of their family and children which reflects their high WTP for improved MSWM services (Ichoku et al., 2009). Whereas from a cultural perspective, males desire to accumulate wealth, get married and support their families; thus paying for such services is not of high priority resulting in lower WTP amounts (Challcharoenwattana & Pharino, 2016; Fonta et al., 2007). In contrast, Alhassan et al. (2017) and Trang et al. (2017) showed that males are more willing to pay for improved MSWM services because they have higher paid salary jobs and control financial decisions in their households.

On the other hand, respondents' age is one of the controversial determinants of WTP for improved MSWM services. Some studies have found that the higher the respondent's age, the higher the WTP amount for improved MSWM services. This is mainly explained by the fact that as people become older in age, awareness about the importance to live in a clean and healthy environment increases (Afroz et al., 2009; Alhassan et al., 2017; Blaine et al., 2005; Ferreira & Marques, 2015; Al-Khateeb et al., 2017; Zeng et al., 2016). While, several studies have found that young people are more enthusiastic about improving the environmental condition in their communities and thus have higher reported WTP amounts (Afroz & Masud, 2011; Alhassan & Mohammed, 2013). In addition, older people might consider the improvements in the MSWM services the responsibility of the government and hence they will be less willing to pay for its improvement. Whereas, young people are more open minded toward the shared responsibility between the public and the government and hence they will be more willing to pay for MSWM improvements (Banga et al., 2011; Challcharoenwattana & Pharino, 2016; Danso et al., 2006; Patrick et al., 2017; Yusuf et al., 2007).

Household size, which represents the number of family members in the household, is another determinant for the WTP for improved MSWM services. Some studies showed that as the household size increases, the generated quantity of solid waste increases, and thus the demand and WTP for improved MSWM services increases (Nkansah et al., 2015; Zhang et al., 2012). In contrast, other studies showed that as the household size increases, the WTP for improved MSWM services decreases. Many households are dependent on one family member's income and thus large families will be willing to pay less amount of money for MSWM services (Alhassan & Mohammed, 2013; Ezebilo, 2013; Al-Khateeb et al., 2017; Yusuf et al., 2007). On a similar note, owned household is an indication of wealth as compared to rented household and thus it is associated with higher WTP amount for improved MSWM services (Banga et al., 2011; Joel et al., 2012; Rahji & Olonruntoba, 2009; Awunyo-Vitor et al., 2013).

Moreover, the location of the household, whether in a highly urbanized area or rural area, also affects the WTP for improved MSWM services. As the level of urbanization increases, the WTP for improved MSWM services increases; highly populated areas will result in high solid waste generation rate and thus high demand for improved MSWM services (Challcharoenwattana & Pharino, 2016; Danso et al., 2006). Even so, some studies have shown that high solid waste generation rate, whether in urban or rural areas, will result in high WTP for improved MSWM services (Fonta et al., 2007; Ichoku et al., 2009).

Most of the time, the objective of consumers is to maximize their utility (satisfaction) obtained from the offered services and goods. As a result, respondents' satisfaction with the current MSWM services can influence their WTP for the improved MSWM services (Bhattarai et al., 2017). Many studies showed that if respondents are

satisfied with the available MSWM services including the SW collection services, their WTP for the improved service will be high (Afroz et al., 2009; Maskey & Singh, 2017). On the other hand, Alhassan & Mohammed (2013) showed that people who are satisfied with the current solid waste disposal services are less willing to pay for the improved service as compared to those who are not satisfied because they don't want to waste money on additional improvements.

Furthermore, some studies found that if the walking distance to the nearest solid waste collection point is far, the demand and WTP for improved MSWM services will increase (Alhassan & Mohammed, 2013; Ezebilo, 2013). In addition, low collection frequency also results in high WTP responses for improved MSWM services that include higher SW collection frequency (Ku et al., 2009).

Respondents' awareness, participation, and attitude toward MSWM in their community is one of the strong determinants of the WTP for improved MSWM services. Usually, as the level of respondents' environmental/ health awareness and perception increases, the WTP for improved MSWM services increases (Afroz & Masud, 2011). In addition, high WTP for improved MSWM services is associated with high concern toward MSWM crisis that will affect the environment and public health (Afroz et al., 2009; Alhassan & Mohammed, 2013; Blaine et al., 2005; Chalcharoenwattana & Pharino, 2016; Danso et al., 2006; Fonta et al., 2007; Ichoku et al., 2009; Maskey & Singh, 2017; Patrick et al., 2017; Trang et al., 2017). Moreover, many studies have shown that the willingness of respondents to engage in improved MSWM services that involve source-separation of refuse for recycling and composting purposes is associated with high WTP amount (Afroz et al., 2009; Chalcharoenwattana & Pharino, 2016; Zeng et al., 2016; Zhang et al., 2012). On the contrary, Afroz and

Masud (2011) showed that respondents decreased their WTP amounts for the improved MSWM services when they were asked to source-separate their generated refuse for recycling and composting purposes. According to some studies, people are willing to pay for improved MSWM services but they do not want to source-separate their generated refuse due to lack of time and lack of appropriate knowledge on proper source-separation of refuse and its associated benefits (Afroz & Masud, 2011). Similarly, Koushki et al. (2004) showed that 89% of the respondents agreed to source-separate their generated refuse mainly due to the availability of servants that would do the required task; but when asked to pay for the improved MSWM service, only 15.7% of the respondents expressed their WTP. Therefore, source-separation of solid waste is a controversial issue that depends on the situation of individual households and respondents' characteristics.

The respondents' attitude toward the responsibility of proper MSWM is also considered one of the important determinants of the WTP for improved MSWM services. When people perceive the MSWM as a government responsibility, their WTP for improved MSWM services will decline (Wang et al., 2014).

Finally, the policy implications of the examined studies supported the importance of economic valuation studies for the policy making process and showed that policy makers should take advantage of the public's WTP to improve the MSWM situation. Furthermore, most of the examined studies showed the importance of environmental and health awareness in triggering high WTP responses for improved MSWM services, emphasizing the importance of environmental and health awareness campaigns for the public.

CHAPTER 3

MATERIALS AND METHODS

3.1. The Study Area

Lebanon is a developing Middle Eastern country that covers an area of 10,452 Km² and is divided into eight governorates: Aakkar, Baalbeck-Hermel, Beirut, Beqaa, Mount Lebanon, Nabatiyeh, North Lebanon, and South Lebanon (referrer to Appendix III). Jdeidet Ghazir is a small village located in Kesrouane district under the Mount Lebanon governorate. Jdeidet Ghazir is surrounded by Ghazir from the west, El-Kfour and Herhraya & Kattine from the north, Aramoun from the east, and Dlebta from the south (refer to Appendix III). Its altitude is 540 m above the sea level and its distance from Beirut is 31 Km. Moreover, Jdeidet Ghazir village belongs to Jdeidet Ghazir, Herhraya and Kattine municipality which covers an area of 51 hectares and holds a population density of 1133 registered voters (Localiban, 2016). The main socio-economic activities carried out in this village include: agriculture practices, commercial businesses such as supermarkets, and industries, mainly grain mills and quarries/pebbles industry.

3.2. Conceptual Framework of the Study

Based on the literature review summarized in Chapter 2, the conceptual framework for the publics' WTP for the proposed integrated MSWM service at Jdeidet Ghazir and its associated factors was developed by the researcher, as shown below:

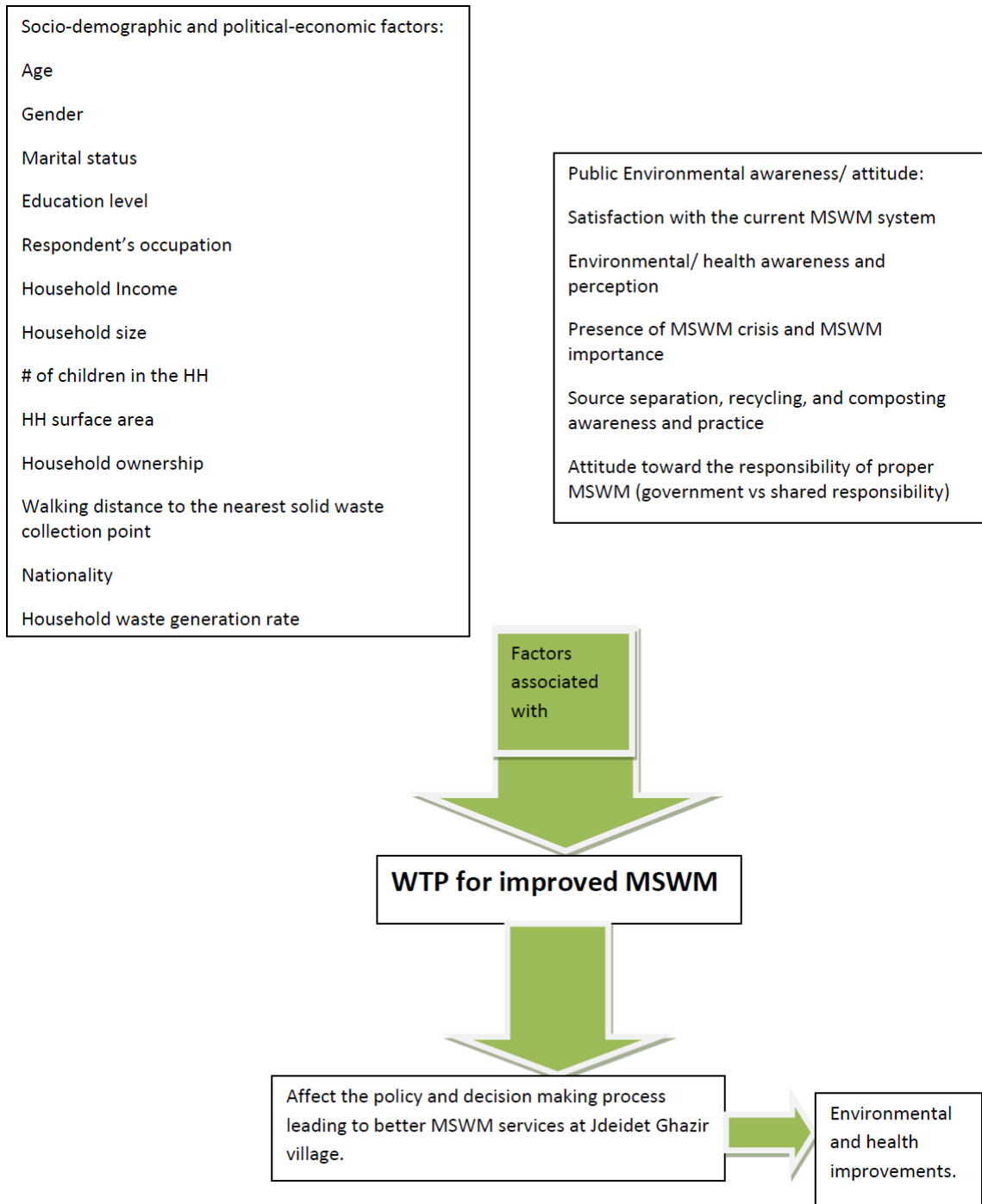


Figure 1: Conceptual framework of the study

3.3. Study Design and Survey Questionnaire

In this cross-sectional study, contingent valuation questionnaire was the primary method used to collect needed information. The employed survey mode was face-to-face interviews which were conducted by the researcher in the Arabic language (native language of participants). Contingent valuation method was applied to elicit the participants' WTP responses due to its ability to capture both the use and non-use values as well as its easy data collection, interpretation, and use in policy interventions. The data for this study was collected within a three-week period, from March 23 till April 09, 2018. In order to evaluate the people's WTP for a proposed integrated MSWM service, a contingent valuation survey was developed based on the conducted literature review (Appendix VI) and hence the survey was organized into three sections. The first section of the questionnaire covered the household/respondent characteristics and socio-economic status. The second section incorporated general questions about each participant's recycling/composting awareness and opinion about the current state of MSWM in Lebanon in general, and in Jdeidet Ghazir in particular. The third and final section of the questionnaire included a vignette, whereby a hypothetical purchase scenario for a proposed integrated MSWM project that includes better source-separated refuse collection and recycling/composting services was described (Appendix I). Respondents were asked first about their WTP (yes/no question) for the proposed project. Then, respondents were asked using a payment card about their maximum WTP amount for the proposed integrated MSWM service as a surcharge above their yearly municipality fee. Finally, respondents who were not willing to pay for the project were asked to choose a reason that explains their unwillingness to pay (Appendix I).

The study population included all the households that are located in Jdeidet Ghazir village. Based on the municipality and the researcher field observation, the total number of households (HHs) in this village is 334. A cadastral map, which was obtained from the municipality that maps all the streets and sub-streets of the village and the location of the households (Appendix IV), was used as a guide to efficiently navigated between the 334 households starting with the households that are located on the main street and followed by the households located on the sub-streets. A senior member (homemaker or household head) of each household was asked about his/her willingness to participate, voluntarily, in the survey and anyone who refused to participate was marked as a non-response. An excel sheet that contains questionnaire IDs, parcel numbers, and household response status was constructed from the cadastral map for management purposes.

3.4. Ethical Considerations

Each questionnaire was assigned a specific ID number during the survey collection and data entry phase. No direct identifiers were collected in this research study. The data was aggregated, analyzed and used for the purposes of academic research and statistical analysis only.

The consent form was read to the respondents asking for permission to conduct a face-to-face interview. The explanation elaborated on the fact that informed consent is part of the ethical research conduct and it guarantees that all the personal information obtained during the survey will be kept anonymous and confidential. Also, the participants were informed that their participation is voluntary and that they have the right to withdraw at any time during the interview process. The researcher provided the

participant with a copy of the consent form in Arabic language and the participant was given time to read it, ask further clarification questions, and decide whether to participate in the survey. The interview took place inside the household of the participants.

A tape-recorded interview was conducted with the municipality mayor of Jdeidet Ghazir, Herhraya and Kattine after getting his oral consent. The recorded tape was deleted at a later stage after transcription and extraction of the needed information. In addition, the mayor was informed that he can still participate in the interview even if he doesn't provide consent to tape-record the interview since handwritten notes can be taken by the interviewer instead.

The study protocol was submitted to and approved by the Institutional Review Board (IRB) at the American university of Beirut on March 19, 2018 prior to the data collection phase. In addition, all the investigators and research team members were certified by the collaborative institutional training initiative (CITI) on social and behavioral research, which ensures that they are authorized to conduct social and behavioral research that involves human subjects.

3.5. Data Analysis

All the collected data were coded numerically and analyzed with the statistical software STATA (version 14.0). Preliminary tests were conducted, in order to check the association between the explanatory variable, namely Chi2 and Cramer's V tests. The associations that showed significant Chi2 result ($P\text{-value} < 0.05$) and Cramer's V coefficient of 0.5 or more implied that there is a significant moderate to strong associations and one of the explanatory variables – the least important variable based on

the literature review -was dropped (Cohen, 1988; Mukaka, 2012). Once all the explanatory variables were selected, two models of univariate regression were carried out; all the explanatory variables that showed statistical results with a P-value of 0.2 or less were entered into the multivariate analysis model, which was used to assess the factors associated with respondents' WTP and maximum WTP amount for the proposed integrated MSWM service respectively (Table 1). As mentioned earlier, respondents' WTP was investigated using two questions (are you willing to pay for the proposed integrated MSWM service? If the answer is "yes" then what is your maximum WTP amount from the provided payment card?). Since the first question elicited Yes or No responses, binary logistic regression was employed (Maskey & Singh, 2017; Awunyo-Vitor et al., 2013). The responses of the second question which was used to obtain the households' maximum WTP amount was analyzed using the Tobit model (Nkansah et al., 2015; Maskey & Singh, 2017; and Awunyo-Vitor et al. 2013). All the respondents that were not willing to pay were considered to have a zero maximum WTP amount. Tobit analysis was considered since the outcome was continuous and the data was censored at zero (Chib, 1992). The robust function in STATA software was used during the multivariate analysis to adjust for the heteroscedasticity of data.

Table 1: Description of the Independent variables used in this study and their expected association with respondents' WTP for improved MSWM services.

Variable	Variable description	Variable measurement	Expected sign of association (+ positive or – negative) with respondents' WTP based on the literature review in Chapter 2
Gender	Respondent's gender (male or female)	Dummy variable (male=0 & female =1)	+ or -
Income	The average household monthly income in Lebanese Lira (L.L.)	Dummy variable (low income: < 2 million L.L. = 1, middle to high income: \geq 2 million L.L.=2)	+ or -
Household size	The total number of individuals living in the same household.	Dummy variable (low family size: \leq 3 = 1, Medium size: $4 \leq Z \leq 5$ =2, Large size: \geq 6 = 3).	+ or -
MSWM importance	Whether the respondent identifies MSWM problem as an important environmental problem in the village that needs immediate attention and action.	Dummy variable (no= 0 and yes=1)	+
Walking distance	The average walking distance time measured in minutes between the household and the nearest solid waste collection point.	Dummy variable (less than 5 minutes =1, 5 to 10 minutes =2, and more than 10 minutes =3)	+
Handling sector	Respondents preference on which sector should handle the MSWM services in the village.	Dummy variable (public sector=1, private sector=2, and both in cooperation=3)	+
Composting awareness	Whether respondents know what composting is.	Dummy variable (no =0, and yes =1)	+
MSWM household responsibility	Whether respondents consider the responsibility of proper MSWM a shared responsibility between the residents and the local government.	Dummy variable (no= 0 and yes=1)	+
MSWM government responsibility	Whether respondents believe that the local government is responsible for proper MSWM.	Dummy variable (no= 0 and yes=1)	-
Disease history	Whether any of the household residents suffered from a disease due to poor MSWM services at the village.	Dummy variable (no =0, and yes =1)	+
Nationality	Whether the respondent is of Lebanese nationality or not.	Dummy variable (Lebanese nationality= 1, otherwise =0).	+

3.6. Data reliability and Validity

To ensure the data reliability in this study, the following measures were taken into consideration from the pilot-testing to the data analysis phases. As a start, the questionnaire was pilot-tested on a sample of five households from Kfour village (a nearby village with similar socio-demographic profile) to ensure that all the questions are clear and understandable. Special emphasis was placed on ensuring that respondents understand the vignette. Based on the pilot-testing phase, revisions to the questionnaire and the vignette were made prior to the implementation of the study. The consent form and the introduction at the beginning of each survey were very clear and phrased with a simple understandable language.

Data content validity was guaranteed in this research study by collecting information from households within the research area (Jdeidet Ghazir village) only. In addition, external data validity was guaranteed by collecting information from households at a single point in time; single contact with the respondents helps the researcher to avoid the Hawthorne effect (respondent's behavioral change due to time lag effects that can disturb the study information) (Morse et al., 2002).

3.7. Interview with the Municipality Mayor

An interview was conducted with the mayor of Jdeidet Ghazir, who is also in charge of the municipalities of Herhraya and Kattine on August 20, 2018. The interview aimed to learn more about the municipality's willingness to support the implementation of the proposed hypothetical integrated MSWM project and what they need in terms of awareness/education, material/equipment, and governmental support for its implementation. In addition, the interview was used to identify past attempts at

improving the MSWM situation and the challenges that we previously faced. The face-to-face interview with the municipality mayor was conducted in the Arabic language.

CHAPTER 4

STUDY FINDINGS

4.1. Response Rate and Socio-Economic Characteristics

In total, 228 out of 334 households agreed to participate in the survey and gave complete responses; hence the response rate was 68.26%. The remaining households either refused to participate in the survey (n= 31, 9.28%) or no one was present in the household at the time of data collection (n= 75, 22.46%), following two visits.

Moreover, the socio-economic characteristics of households and respondents are summarized in Table 3. As shown in Table 3, 59.21% of respondents were females while 40.79% were males and 78% were married while 22% were single. The mean age was 44.32 with a standard deviation of 16.73. A large percentage of respondents achieved university level education (44.3%) followed by intermediate school education (31.58%), while only 24.12% of respondents achieved secondary or technical school education. As expected, most of the respondents that have intermediate school level fell in the low-income category (n=56, 77.78%), while most of the respondents with a university degree belonged to the middle-income category (n= 79, 78.22%) (Table 2). Only 6.14% of the respondents work in the public sector, which accounts to the very few job openings as compared to the private sector. Consequently, most respondents work in the private sector category (32.46%) or are unemployed (43.42%). It is also noticed that 83.84% of the respondents who do not work are females, given that culturally in the villages most women are homemakers. Household income plays an important role in determining the maximum WTP amount. The majority of households

belonged to the middle-income category (n= 121, 53.07%, households with monthly income between 2,000,000L.L. and 5,000,000 L.L. inclusive) and low-income category (n= 95, 41.67%, households with monthly income < 2,000,000 L.L.) while minority of households belonged to the high-income category (n= 12, 5.26%, households with monthly income > 5,000,000 L.L.). This shows that the population in Jdeidet Ghazir belongs mostly to the middle-income category, similar to the Lebanese population profile whereby according to the World Bank, Lebanon is classified in the upper middle-income category (FAO, 2006).

Table 2: Distribution of education levels among the three income categories.

Educational level	Low income households		Middle income households		High income households		Total	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Intermediate school	56	77.78	15	20.83	1	1.39	72	100
Secondary or technical school	26	47.27	27	49.09	2	3.64	55	100
University	13	12.87	79	78.22	9	8.91	101	100
Total	95	41.67	121	53.07	12	5.26	228	100

The results showed that around 76% (n= 173) of the respondents privately owned their houses while 24.12% (n= 55) lived in rented houses. In addition, household ownership and nationality were highly positively correlated (Chi2 test= 111.87, P-value=0.000) whereby most of the rented houses (n=32) are occupied by non-Lebanese respondents, mostly Syrian respondents (n=30). This can be explained by the influx of Syrian refugees to Lebanon following the Syrian civil war that started in 2011. In fact, around one million registered Syrian refugees are currently residing in the Lebanese

territory according to the United Nations High Commissioner for Refugees latest figures, (UNHCR, 2018).

Table 3: Descriptive statistics of the socio-economic characteristics of respondents and households (N=228).

Variable	Category	Count	Percentage
Respondent Gender	Female	135	59.21
	Male	93	40.79
Respondent marital status	Single	50	21.93
	Married	178	78.07
Respondent Age	30 years and below	58	25.44
	31-59	125	54.82
	60 and more	45	19.74
Respondent Employment	Private sector employees	74	32.46
	Own business	41	17.98
	Government employees	14	6.14
	Not working	99	43.42
Respondent Education	Intermediary school level	72	31.58
	Secondary and technical school level	55	24.12
	University level	101	44.30
Household Income	<2,000,000 L.L.	95	41.67
	2,000,000- 5,000,000 L.L.	121	53.07
	>5,000,000 L.L.	12	5.26
Household surface area	<100 m ²	43	18.86
	100-300 m ²	175	76.75
	>300 m ²	10	4.39
House ownership	Privately owned	173	75.88
	Rented	55	24.12
Length of stay at the current household	Mean± SD = 25.18 ± 18.12 Min = 1 Max= 80		
Household size	Mean± SD = 4.07 ± 1.58 Min = 1 Max= 10		
Children living in the household	Households that has children below 15 years old	112	49.12
	Households that do not have children below 15 years old	116	50.88
Nationality	Lebanese	195	85.53
	Syrian	31	13.59
	Egyptian	1	0.44
	Indian	1	0.44

4.2. Respondents' Awareness and Knowledge Regarding Solid Waste Management

The majority of respondents indicated that the two most important environmental issues in the village that require immediate attention and action are the solid waste management problem (n=198, 86.84%) and the wastewater treatment problem (n=186, 81.58%). Most of the residents (n=186, 81.58 %) complained about the “Al Tine” spring which passes through the village, where the untreated wastewater and some of the solid waste are being dumped (Figure 2). The spring is now highly polluted which in turn produces bad smells and the spread of mosquitos in the vicinity. Jdeidet Ghazir residents, are concerned about the environmental and health impacts of this pollution and they are requesting the municipality to find appropriate solutions.



Figure 2: The scene in Al tine spring (Picture taken by Mary Abed Al Ahad, 31 March 2018).

When respondents were asked whether common global warming issues we are currently experiencing affects the environment, 97.81% (n=223) answered “yes”. Similarly, 97.37% (n=222) of respondents indicated that global warming affects people’s health while only 78.51% (n=179) of respondents indicated that global warming affects solid waste issues and their management.

The results also showed that 95.18% (n=217) of respondents indicated their knowledge about the recycling process and 90.79% (n=207) about the composting process. Most of the respondents became familiar with composting and recycling practices from television news and programs as well as from friends and neighbors, while only a minority of respondents got their knowledge from the municipality (Figure 3 and 4). Almost all of the respondents (n=226, 99.12%) were aware of the MSWM problem in Lebanon. Most of them reported having acquired this knowledge from television news and other social networks as well as from the direct daily observation of the solid waste piling on the sides of the streets and besides the waste green containers. In addition, respondents were asked about the obstacles facing improvements in the MSWM sector in Lebanon (Table 4) as well as possible suggestions to improve the current MSWM system in Lebanon. The respondents chose the following suggestions: improving the solid waste management infrastructure and building appropriate SWM facilities (n=153, 67.11%), putting an end to political corruption by exerting pressure on the government through public protests, NGO and non-state actors’ pressures (n=137, 60.09%), increasing awareness campaigns that are related to source-separation and the 3Rs concept of reduce, reuse and recycle (n=108, 47.37%), encouraging the households to source separate their generated refuse (n=81, 35.53%) and decentralization of the solid waste sector where each municipality will become responsible for its own MSWM

(n=28, 12.28%). All of the respondents (n=228, 100%) were aware that poor MSWM causes environmental problems as well as health problems. In addition, 20.18% (n=46) of respondents indicated that some members of their household suffered from a disease recently. The diseases varied and included: allergy (n=12), asthma (n=1), cold/flu (n=26), fly bite (n=4), food poisoning (n=1), heart and cardiovascular diseases (n=1), and respiratory problems (n=2). All of these respondents (n=46) associated the reported diseases with the poor MSWM situation in Lebanon.

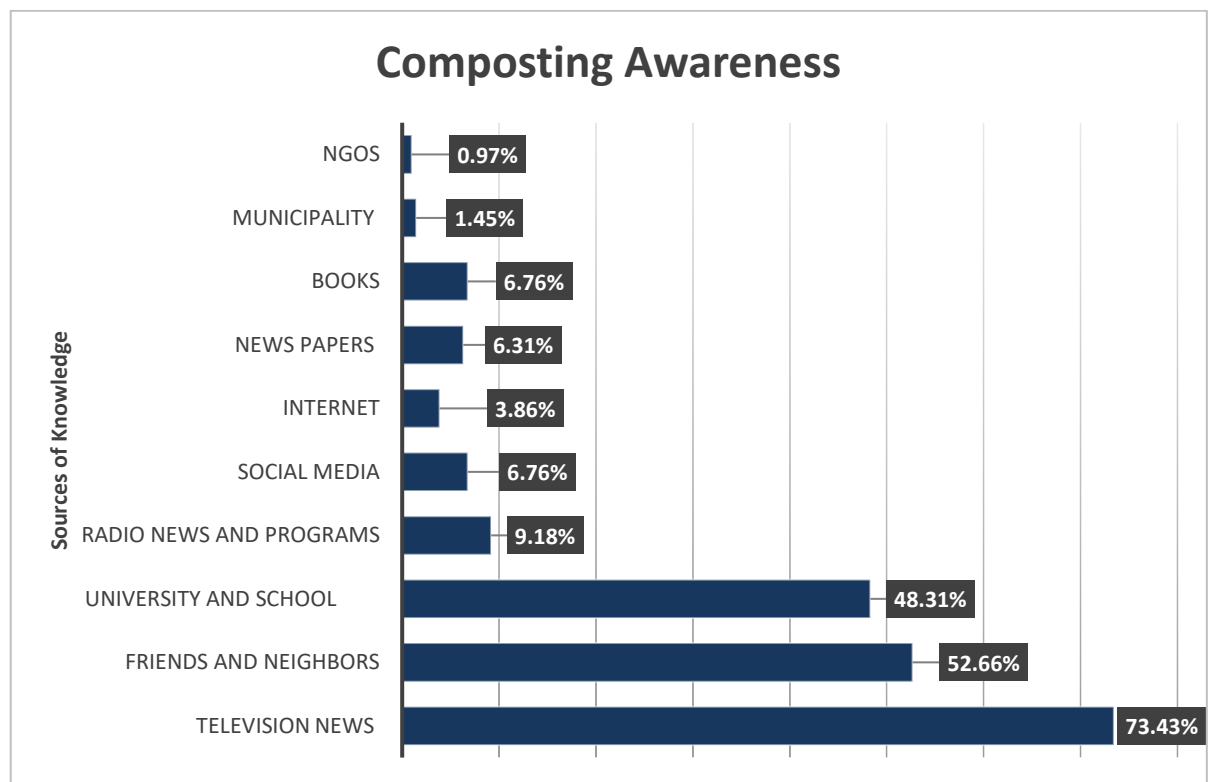


Figure 3: Distribution of the sources of respondents' composting awareness (N*=207).

*N= 207 including all respondents with a positive response regarding composting awareness.

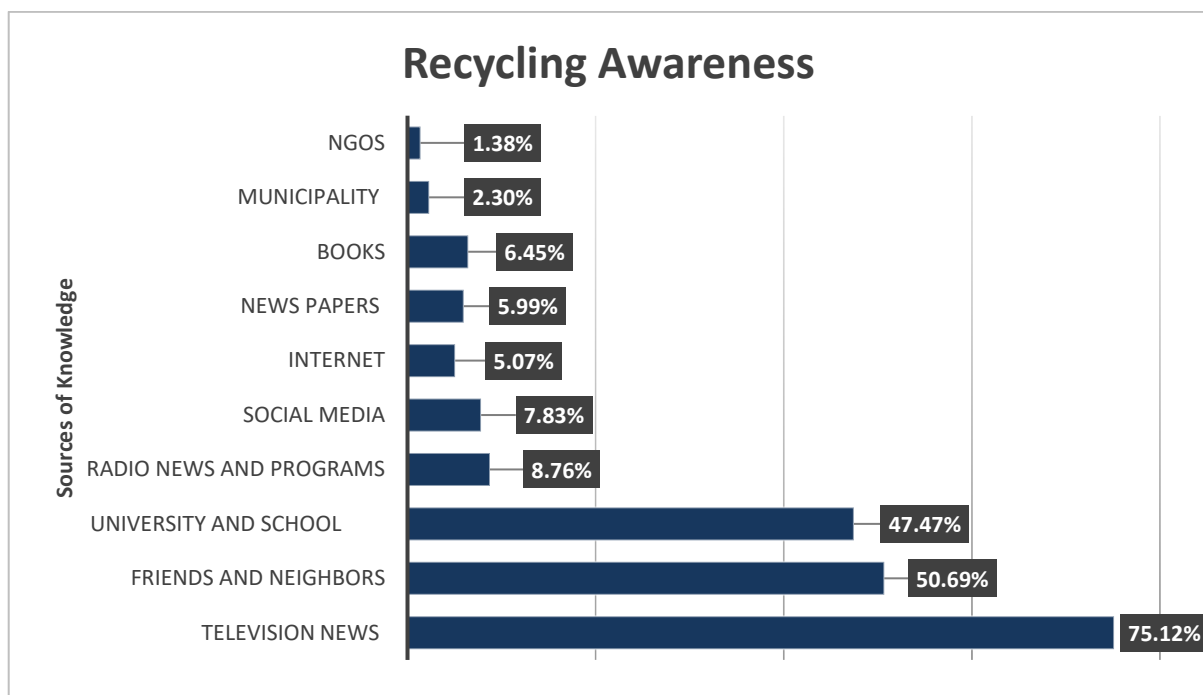


Figure 4: Distribution of the sources of respondents' recycling awareness (N*=217)

*N= 217 including all respondents with a positive response regarding recycling awareness.

Table 4: Distribution of the respondents' opinion about the obstacles that are hindering improvements in the MSWM sector in Lebanon (N=228).

Obstacle	Count	Percentage
People do not care about the effects of poor solid waste management.	5	2.19
Lack of public awareness/ knowledge about the negative effects of poor solid waste management.	22	9.65
There are other priority problems in the community that need to be solved such as electricity, water, education, health and other problems.	1	0.44
No adequate action is taken by the municipality.	11	4.82
Presence of political corruption in the country.	211	92.54
Lack of appropriate budget and financial resources.	34	14.91
No proper incentives are given to residents to practice proper solid waste management.	7	3.07
The failure of the MSWM deals between the government and the private sector.	8	3.51
I don't know.	2	0.88

4.3. Respondents' Solid Waste Management Practices

Despite the high proportion of recycling/composting awareness, only 16.67% (n=38) of respondents indicated that they separate their generated refuse at the source (separating plastics, glass, paper/cardboard, and metals from organic food remains at the household level). On the other hand, 83.33% (n=190) of respondents indicated that they do not separate their generated refuse at source and the reasons behind this are summarized in Table 6. In addition, 19.3% (n=44) of respondents indicated that they send their source-separated recyclables to organizations or companies that can benefit from them. Moreover, 39.04% (n=89) of respondents indicated that they make use of the food left overs as compost for agricultural purposes and as an animal feed for chickens and other domestic animals. Composting and reusing of the organic portion of solid waste is practiced mostly by respondents who have a backyard that allows such practices. The 3Rs (reduce, reuse, and recycle) principle stresses the importance of recycling as well as reusing certain stuff instead of throwing them as solid waste. Almost all of the respondents (n=227, 99.56%) reuse certain stuff such as clothes (n=205, 89.91%), glass jars and bottles (n=200, 87.72%), plastic bags (n=83, 36.4%), plastic containers and bottles (n=43, 18.86%), and cardboard boxes (n=3, 1.32%). All of the respondents (n=228, 100%) indicated that they throw their generated solid waste in the municipal green garbage containers. However, none of the households indicated that they throw their generated solid waste in the village springs and open spaces although the scene in “Al Tine” spring shows that some of the solid waste was thrown there.



Figure 5: One of the respondents' handmade crafts from reusing recyclable solid waste materials such as clothes, cardboard boxes, papers, glass jars, plastic bottles etc. (Picture taken by Mary Abed Al Ahad, 3 April 2018).

Additionally, most of the households generate 1 to 2 bags of solid waste per day with a mean of 1.38 and a standard deviation of 0.61. Households mainly generate papers, tissue papers, and cardboard (n=226, 99.12%), plastic (n=208, 91.23%), organic food remains (n=205, 89.91%), metals and cans (n=197, 86.4%), and glass (n=126, 55.26%). Respondents were asked to rank the first and second type of solid waste generated mostly by their respective household; the results are shown in Table 5. More than half of the households (n=119, 52.19%) ranked organic food remains as the most common type of generated solid waste. This result is in line with the Lebanese waste generation profile whereby according to Sweep Net (2014), the composition of the

generated municipal solid waste in Lebanon consists mainly of organic biodegradable matter (50%-55%).

Table 5: Ranking of the household generated solid waste components (N=228).

Type of waste generated	Rank	Count	Percentage
Organic food remains	1	119	52.19
	2	37	16.23
plastic	1	18	7.89
	2	61	26.75
Metal	1	4	1.75
	2	24	10.53
Paper and cardboard	1	85	37.28
	2	105	46.05
Glass	1	2	0.88
	2	1	0.44

Table 6: Distribution of respondents' reasons for not source separating their generated refuse (N=190*).

*N= 190 including all respondents with a positive response regarding source separation of their generated refuse.

Respondents' Reasons	Count	Percentage
Separation at source is not useful because solid waste is being collected as a common-mingled waste	176	92.63
The municipality does not provide colored solid waste recycling bags to the households and there is no available recycling solid waste bins in our village	143	75.26
We don't have enough time to source separate our generated solid waste	11	5.79
Source-separation is not a social norm in our society and it is socially acceptable not to source separate our generated refuse	10	5.26
We don't have the required knowledge/awareness for the correct solid waste source-separation	5	2.63
The municipality/ RAMCO private company is not making use of the source separated solid waste and the final disposal is mainly by open dumping	5	2.63
solid waste is being collected by RAMCO private company without the need of source-separation	2	1.05

4.4. Respondents' Satisfaction with the Current MSWM System

Even though 64.47 % (n=147) of respondents stated that the green solid waste containers are not far from their household and thus they can easily reach them by walking (strictly less than 5 minutes' walk), the majority of respondents (n=127, 55.7%) reported that they were not satisfied with the current solid waste collection and management services in Jdeidet Ghazir village. The majority of respondents indicated that the solid waste collection frequency in the village is twice (n=88, 38.77%) or three times (n=83, 36.56%) per week, whereas according to the respondents this insufficient collection frequency leads to the accumulation of solid waste on the sides of the green containers, spread of bad odors, attraction of pests and wild animals, and spread of diseases (Figure 6). The survey also revealed that 18.42% (n=42) of respondents indicated that the private sector should handle MSWM in the village and Lebanon due to the following reasons: 1) the public sector in Lebanon is corrupt, 2) the public sector has been handling the MSWM sector for the previous years and the results were far below proper management, 3) the private sector is more reliable, has more expertise, better technical and financial abilities, and provides an overall better service. On the other hand, 21.93 % (n=50) of the respondents indicated that the public sector (government and municipalities) should handle MSWM because the municipality is already taking a yearly fee for sweeping and cleaning services, knows the needs of the village, and protects its residents from the private sector exploitation. Finally, the majority of respondents (n=136, 59.65%) noted that MSWM should be handled by both the public and private sector in cooperation, because the private sector has the needed competence, expertise and reliability, while on the other hand the public sector should monitor and control the private sector; in this way, the cost of MSWM services will be

adequate and fair to the public (Figure 7). Furthermore, the survey demonstrated that the majority of respondents perceived the MSWM as a municipality responsibility because each municipality knows what is best for its own area (principle of decentralization) (Table 7). Nearly half of the respondents (n=103, 45.18%) considered that proper MSWM is the responsibility of residents (Table 7).



Figure 6: The accumulation of solid waste on the sides of the green waste containers in Jdeidet Ghazir village (Picture taken by Mary Abed Al Ahad, 6 April 2018).

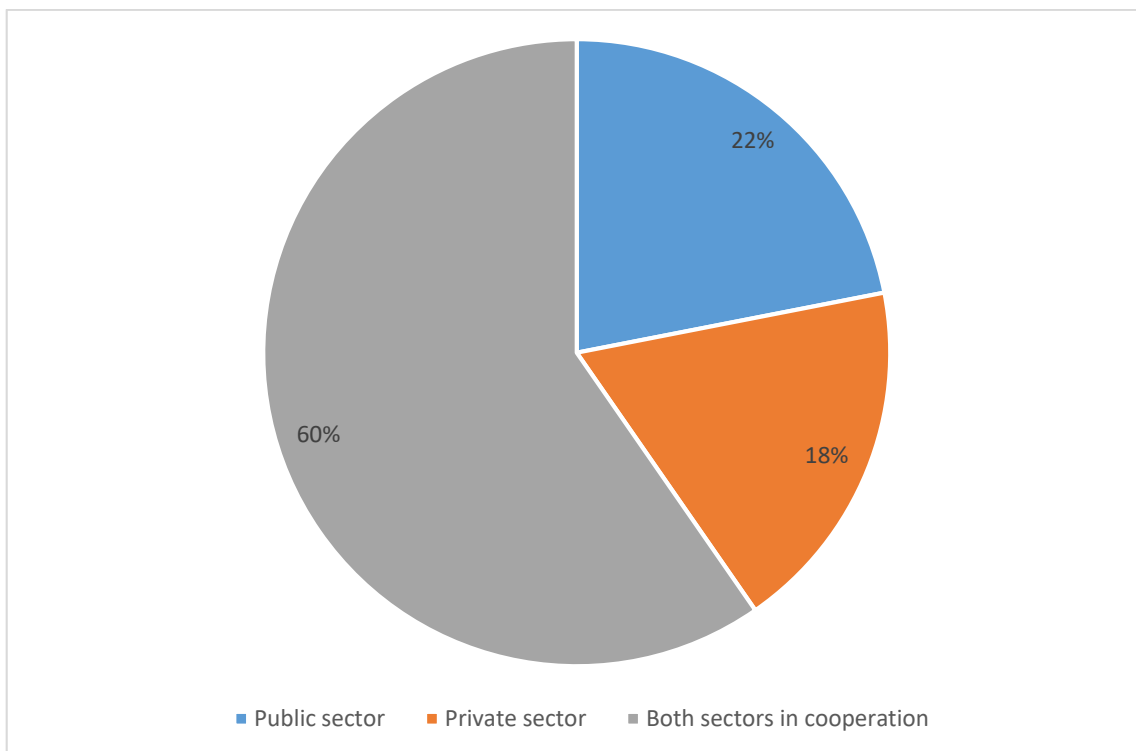


Figure 7: Distribution of respondents' opinion on which sector should handle the MSWM services in Jdeidet Ghazir and Lebanon (N=228).

Table 7: Distribution of respondents' perception of the MSWM responsibility in their village (N=228).

MSWM responsibility	Count	Percentage
Government	62	27.19
Municipality	213	93.42
Private companies	25	10.96
Households	103	45.18

4.5. Households' Willingness to Engage and Pay for the Hypothetical Integrated MSWM Service Proposed in the Survey

Respondents were asked first if they are willing to engage in the hypothetical integrated MSWM service proposed by the researcher, which includes source-separation of refuse by each household before proceeding to the household's WTP question. The result was surprising whereby all the respondents (100%) were willing to engage in

such service. Then, respondents were asked whether they are willing to pay for the proposed service as a surcharge to the yearly municipality fee in which the majority of respondents (n=181, 79.39%) were willing to pay (WTP > 0) for the service with a mean of 73,377.19 L.L. (\$ 48.56) per year. Since the total number of households in the village is 334, then the aggregated WTP amount for the whole village will be 24,507,981.46 L.L. per year. In addition, our study revealed that the mean of the yearly municipality fee is 238,136 L.L. per household per year with a standard deviation of 120,499 L.L. per household per year. Hence, the households at Jdeidet Ghazir village are willing to contribute on average an additional amount of money equals to 73,377 L.L., which constitutes 30.8% of their yearly municipality fee.

On the other hand, 20.61% of respondents (n=47) were not willing to pay anything (WTP = 0) for the proposed integrated MSWM service. The reasons given for this were: 1) Proper solid waste management should be the responsibility of the government (n=22, 46.81%), 2) Respondents do not trust that any cent they pay will lead to improvements in the municipality services (n=7, 14.89%), 3) Respondents are already paying money to the municipality for sweeping and cleaning services and they do not want to pay additional fees (n=1, 2.13%), 4) The proposed integrated MSWM service will generate money by itself and thus households should not pay for such services (n=4, 8.51%), and 5) Respondents do not have money to pay for the proposed integrated MSWM service (n=13, 27.66%).

4.6. Regression Analysis

4.6.1. Cramer's V and Chi2 Tests for the Independent Variables

The Chi2 and Cramer's V test results showed that there is a moderate to strong significant correlation between many independent variables, accordingly, Household surface area, Household ownership, respondent's educational level, and recycling awareness were dropped from the multivariate binary logistic and Tobit regression models.

4.6.2. Binary Logistic and Tobit Regression Analysis

The univariate logistic regression model showed that the following variables have a P-value of less than or equal to 0.2: nationality, MSWM importance, walking distance, handling sector, composting awareness, MSWM household responsibility, MSWM government responsibility, and disease history. These variables were then entered into the multivariate binary logistic regression model, whereby Table 8 represents the results of analysis.

In the Tobit regression model, the following variables showed a P-value of less than or equal to 0.2 at the univariate level: gender, household income level, household size, nationality, MSWM importance, waste generation, composting awareness, MSWM household responsibility, and MSWM government responsibility. These variables were then entered into the multivariate model and the results of the analysis are displayed in Table 9.

Both the multivariate logistic and Tobit regression showed that nationality, MSWM household responsibility, and MSWM government responsibility were found to be significantly associated with both households' WTP and maximum WTP amount for

the hypothetically proposed integrated MSWM service after adjustment. On the other hand, walking distance, and disease history showed a statistically significant association with households' WTP for the proposed integrated MSWM service after adjustment in the multivariate binary logistic regression model; while household income level and MSWM importance showed a statistically significant association with respondents' maximum WTP amount for the proposed integrated MSWM service after adjustment in the multivariate Tobit model.

Table 8: The results of the multivariate binary logistic regression model.

Independent variables		Frequency distribution of WTP responses		Adjusted ORs	Robust Standard error	P-value	95% Confidence interval
		No	Yes				
MSWM importance	No	10 (33.33%)	20 (66.67%)	1			
	Yes	37 (18.69%)	161 (81.31%)	2.44	1.32	0.098‡	[0.85, 7.03]
Nationality	Non-Lebanese	11 (33.33%)	22 (66.67%)	1			
	Lebanese	36 (18.46%)	159 (81.54%)	5.96	3.18	0.001**	[2.10, 16.96]
Walking distance	Less than 5 minutes	31 (21.09%)	116 (78.91%)	1			
	5≤W≤10 minutes	8 (13.56%)	51 (86.44%)	1.81	1.03	0.296	[0.59, 5.55]
	More than 10 minutes	8 (36.36%)	14 (63.64%)	0.25	0.14	0.014*	[0.08, 0.76]
Handling sector	Public	15 (30.00%)	35 (70.00%)	1			
	Private	10 (23.81%)	32 (76.19%)	0.88	0.50	0.818	[0.29, 2.67]
	Both in cooperation	22 (16.18%)	114 (83.82%)	2.10	0.91	0.086‡	[0.90, 4.91]
Composting awareness	No	7 (33.33%)	14 (66.67%)	1			
	Yes	40 (19.32%)	167 (80.68%)	2.04	1.24	0.245	[0.61, 6.75]
MSWM household responsibility	No	37 (29.60%)	88 (70.40%)	1			
	Yes	10 (9.71%)	93 (90.29%)	3.31	1.44	0.006**	[1.41, 7.76]
MSWM government responsibility	No	26 (15.66%)	140 (84.34%)	1			
	Yes	21 (33.87%)	41 (66.13%)	0.26	0.10	0.001**	[0.12, 0.57]
Disease history	No	34 (18.68%)	148 (81.32%)	1			
	Yes	13 (28.26%)	33 (71.74%)	0.34	0.15	0.016*	[0.14, 0.82]
Constant				0.22	0.19	0.088‡	[0.04, 1.26]
Number of observations					228		
Wald chi2(10)					40.36		
Prob > chi2					0.000		
Log pseudo likelihood					-92.98		
Pseudo R2					0.20		

**represents significance at 1%; *represents significance at 5%; ‡ represents significance at 10%.

Table 9: The results of the multivariate Tobit model.

Independent variables		Adjusted Coefficient	Robust standard error	Marginal effect	P-value	95% confidence interval
Gender	Male	Reference (Ref)				
	Female	-20047.38	13806.81	-14299.98	0.148	[-47259.3, 7164.55]
Income level	Low income	Ref				
	Middle to high income	32377.72	12698.61	22701.28	0.011*	[7349.95, 57405.49]
Household size	Small family size	Ref				
	Medium family size	11986.9	12564.85	8406.11	0.341	[-12777.25, 36751.04]
	Large family size	12169.98	19909.5	8538.01	0.542	[-27069.77, 51409.74]
MSWM importance	No	Ref				
	Yes	39503.95	17653.7	26048.69	0.026*	[4710.18, 74297.72]
Nationality	Non-Lebanese	Ref				
	Lebanese	48802.64	15759.95	31760.24	0.002**	[17741.27, 79864.01]
Waste generation	≤ 1 waste bag	Ref				
	> 1 waste bag	-7928.41	14198.54	-5573.96	0.577	[-35912.39, 20055.56]
Composting awareness	No	Ref				
	Yes	29061.18	16192.62	19417.2	0.074‡	[-2852.95, 60975.3]
MSWM household responsibility	No	Ref				
	Yes	54435.45	14619.2	39335.44	0.000**	[25622.38, 83248.51]
MSWM government responsibility	No	Ref				
	Yes	-41302.65	17267.13	-27950.59	0.018*	[-75334.53, -7270.78]
Constant		-68442.83	32390.67		0.036*	[-132281.8, -4603.88]
Number of observations			228			
F(10, 218)			4.60			
Prob > F			0.000			
Log pseudo likelihood			-2370.65			
Pseudo R2			0.01			

**represents significance at 1%; *represents significance at 5%; ‡ represents significance at 10%.

4.7. The Interview with the Municipality Mayor

The interview with the mayor (20 August, 2018) revealed the following viewpoints.

First, the municipality mayor is aware of the effects of climate change on MSWM, the environment, and public health. He gave an example on the crop failure problem faced by Jdeidet Ghazir residents who work in agriculture due to climate change (high temperatures in the morning and low temperatures at night). Second, the municipality mayor indicated that the main factors contributing to the failure of the MSWM sector in Lebanon is that the solid waste is being collected and disposed of without any treatment. He further indicated that the inefficiency of RAMCO's solid waste collection frequency leading to continuous accumulation of solid waste around the green containers and in the roads, valleys, and springs is posing serious environmental and health impacts. In addition, the municipality mayor also complained about the immense amount of money that the municipality pays (up to \$130,000 per year) for RAMCO's solid waste collection, treatment and disposal services.

Additionally, the mayor revealed the municipality's motivation to enhance the solid waste management system in the village which is driven by preserving the environment, and human health and wellbeing. He mentioned that the municipality has already started with an initiative since mid of June, 2018 that aims to enhance the MSWM services in the village by:

- Sending an official document to the ministry of interior and municipalities in Lebanon asking to stop their contract with RAMCO Company.
- Signing a contract with Gosta municipality whereby the municipality of Jdeidet Ghazir, Herhaya and Kattine can send their collected Solid Waste to the Gosta

newly established MSWM plant for treatment and final disposal. The Ghosta MSWM plant was established in 2017 by the municipality of Ghosta in response to the MSWM crisis that struck Lebanon since 2015.

- Buying a small SW collection vehicle.
- Asking all the residents at Jdeidet Ghazir, Herhraya and Kattine to source separate the clean glass and cardboard from the rest of SW components.
- Removing all the SW green containers from the village.
- Collecting all the SW bags daily from each household in the village by municipality employees.
- Selling the collected clean glass and cardboard for a partial cost recovery.
- Sending the remaining SW bags to Ghosta MSWM plant.

Furthermore, the mayor mentioned that the lack of a strategic piece of land in a remote location, distant from households, and the lack of technical/financial support from the government, prevented the municipality from establishing their own MSWM project. Therefore, the mayor advocates for a cooperation between the nearby municipalities to enhance the MSWM situation similar to their recent cooperation with the municipality of Ghosta. Moreover, the municipality of Jdeidet Ghazir, Herhraya and Kattine asks the government to provide support for the municipality's environmental and MSWM initiatives by exempting it from the governmental debts; since it is very difficult for a small municipality to pay large amounts of money for the government. Also, the government should support the municipality by providing the needed equipment for MSWM initiatives such as a large SW collection vehicle.

After assessing the WTP for a proposed integrated MSWM service in Jdeidet Ghazir village in this study, the mayor was asked if the municipality is willing to support the implementation of the hypothetically MSWM project in the proposed scenario taking into consideration the average WTP amount (73,377.19 L.L. per year per household) and the aggregated WTP amount (24,507,981.46 L.L. per year). The municipality mayor was enthusiastic in supporting such project if it was to become a reality by providing the needed training/ awareness for the residents regarding proper source-separation of refuse, the needed recycling colored waste bags to the residents, and the needed municipality SW recycling containers.

To sum up, the Mayor of the municipality of Jdeidet Ghazir, Herhaya and Kattine is willing to support the implementation of the researchers' proposed integrated MSWM project suggested in the hypothetical scenario of this contingent valuation study. The interview discovered the motivation of the municipality for improving the MSWM situation in the village especially that the municipality has already started providing improved MSWM services to its residents. In addition, the interview underlined the challenges that prevented the municipality from enhancing the MSWM situation in the village previously (lack of land and technical/ financial support) and the needed support from the government (exemption from debts and equipment/ technical support).

CHAPTER 5

DISCUSSION

5.1. Extent of Respondents' Awareness, Knowledge and Practice Regarding MSWM

As indicated previously, a high percentage of respondents indicated that they are familiar with recycling and composting practices (95.18% and 90.79% respectively) which is in contrast to a recent study conducted by Alhassan et al. (2017) who found that only 45% of respondents indicated some knowledge about the proper MSWM practices proposed in their study. However, as shown in Figures 3 and 4, most of the respondents got their knowledge from television news and programs, friends and neighbors, and university/school while only a minority were educated by the municipality. This demonstrates that the municipality is not conducting enough awareness campaigns regarding proper MSWM, recycling and composting. Community awareness is a vital component to encourage public participation in MSWM initiatives including recycling and composting activities. The community has the right to be informed about the MSWM activities being implemented in the village and the means of public participation from a reliable resource such as the municipality. Therefore, communication and spreading awareness about recycling and composting as suggested by several studies conducted in developing countries, is essential to enhance public participation and effective implementation of such projects (Al-Khateeb et al., 2017; Awunyo-Vitor et al., 2013; Bhattarai et al., 2017; Koushki et al., 2004; Olojede & Adeoye, 2014; Niringiye, 2010; Trang et al., 2017).

Moreover, knowing that almost all of the respondents knew about the MSWM crisis in Lebanon mainly from television news, radio news, social media, and daily observation, this is an indication of the severity of the MSWM situation in Lebanon. In addition, Table 4 shows that the public perception of the largest obstacle for improvements in the MSWM system in Lebanon is “political corruption”. Therefore, the spread of corruption along with the lack of financial/technical resources, the lack of public awareness and other problems are perceived as causes for the MSWM crisis in Lebanon. Similarly and according to Abbas et al. (2017), “Problems facing municipalities at present include lack of technical support, financial constraints, problems in area selection for landfilling, and strong disapproval from nearby communities. Political intervention has also been practiced in many municipalities”. Therefore, cooperation between the nearby municipalities as suggested by the municipality mayor of Jdeidet Ghazir is one of the effective solutions toward sustainable MSWM since it allows municipalities to proceed toward decentralization of the local MSWM services, reduce the political/governmental intervention, and ensure financial sustainability of the decentralized MSWM local project.

In addition, the results showed that despite the high proportion of recycling/composting awareness among Jdeidet Ghazir residents, only 16.67% of respondents indicated that they separate their generated refuse. Those respondents separated their refuse mainly because they believe that this is the right action or because they send their recyclables to organizations like “Arcencial”. Moreover, only 39.04% of respondents indicated that they practice composting at the household level. This demonstrates the lack of composting/ recycling MSWM services in Jdeidet Ghazir whereby SW is being collected as a common-mingled waste rendering households’ source-separation a

useless practice. Similar findings were presented by Zhang et al. (2012) in Shanghai, China where some respondents used to source separate their generated kitchen waste from the rest of the waste despite the absence of a recycling program simply because they wanted to avoid the bad smell generated when kitchen waste is mixed with other types of waste. This situation emphasizes the deficiency in the MSWM system at Jdeidet Ghazir specifically and in Lebanon generally. Therefore, privatization and encouraging municipality-private sector partnerships to invest in recycling/composting services was suggested by some studies as a solution to enhance the efficiency of the MSWM system in developing countries and emphasize the 3Rs concept of reduce, reuse and recycle (Al-Khateeb et al., 2017; Murad et al., 2007; Nkansah et al., 2015). Moreover, as shown in the results section, most of the households generate 1 to 2 bags of solid waste per day. Similar results were found by Zhang et al. (2012) whereby most of the households (64%) generate 3 to 6 bags of solid waste per three days.

Finally, all of the respondents were willing to engage in source-separation activities if an improved MSWM project is implemented by the municipality that includes SW source-separation component. Whereas, a similar study conducted by Zhang et al. (2012) in Shanghai, China showed that only 75.23% of respondents were willing to engage in source-separation activities in the improved MSWM project. Similarly, a study conducted by Zeng et al. (2016) in China showed that only 47.9% of respondents were willing to engage in source-separation activities in the improved MSWM project. Therefore, and compared to these studies, our results show that people in Jdeidet Ghazir are motivated to enhance the situation of MSWM in their village and the municipality should make use of this motivation and meet people's expectations.

5.2. Respondents' Satisfaction with the Current MSWM Services

The insufficient frequency of collection, as revealed in the results of this study, has driven some of the residents to throw their solid waste in rivers and springs, as illustrated earlier in the case of Al Tine spring. Similar circumstances have been found by Hazra et al. (2013) in India, where low frequency of MSWM collection services in India constituted a major risk for environmental quality and public health discouraging the households to pay for the improved MSWM service. Similarly, a study conducted by Afroz et al. (2009) in Bangladesh found that households were encouraged to pay for improvements in the MSWM services if they are satisfied with the existing services. Our study showed that despite the dissatisfaction with the existing MSWM services in Jdeidet ghazir, the majority of respondents prefer the public and private sectors in cooperation to handle the MSWM services. In other words, respondents believe that the public sector (government and municipality) should monitor and control the private sector which has the needed competency, expertise, technical resources, financial resources, and reliability. While the rest of the respondent prefer the responsibility to be either that of the municipality or the private sector separately. This result is reasonable given that the municipality is the public authority which is responsible mainly for MSWM services in Jdeidet Ghazir and thus, it can provide MSWM services at affordable prices to its residents as compared to the private sector. The municipality also has the authority to influence people's actions towards MSWM by means of laws and taxes. A similar study conducted by Kumar et al. (2017) found that respondents consider the municipalities' responsibility for executing MSWM rules and regulations in India as well as developing infrastructure for collection, storage, treatment, and disposal of SW. In addition, approximately half of the respondents consider MSWM as

the responsibility of households since they are the major producers of SW. This opens the door for a shared responsibility between the municipality/government and the households for proper MSWM and preservation of the environment and wellbeing as indicated by Rahmaddin et al. (2015). This also complies with Awunyo-Vitor et al. (2013) study that showed Ghana's community opinion regarding MSWM as a collaborative responsibility rather than merely a governmental responsibility.

5.3. Households' WTP for the Proposed Integrated MSWM Service

As noted above, most of respondents (79.39%) were willing to pay for the proposed integrated MSWM service in Jdeidet Ghazir; the mean of the households' maximum WTP amount was calculated to be 73,377.19 L.L. (\$ 48.56) per year and it is comparable to a study conducted in Malaysia by Nor Rahima et al. (2012) whereby the yearly maximum WTP amount mean was \$52.8. On the other hand, studies conducted in Malaysia by Zen & Siwar (2015), Murad, Raquib, and Siwar (2007), and Pek & Othman (2010) reported lower yearly maximum WTP amount means of \$30, \$36.96, and \$11.28 respectively. However, Afroz & Masud (2011) revealed a higher yearly maximum WTP amount mean of \$82.68 in Malaysia and it is important to note that Malaysia is comparable to Lebanon since both are classified as upper middle income countries by the DAC list (OECD, 2016).

Based on Tables 9 and 10, the results indicate that nationality, MSWM household responsibility, and MSWM government responsibility are significantly associated with both the households' WTP and maximum WTP amount for the proposed integrated MSWM service in both statistical models.

The nationality of respondents showed a statistically significant and positive association with both the households' WTP and maximum WTP amount as expected. Lebanese nationalities are approximately 6 times more likely to pay for the proposed integrated MSWM service (OR = 5.96) as compared to non-Lebanese respondents. Also, the marginal effect indicates that Lebanese respondents are willing to pay on average an additional amount of 31,760.24 L.L. per year for MSWM improvements as compared to non-Lebanese respondents. This demonstrates that Lebanese respondents show more interest than non-Lebanese in improving the MSWM condition in their village, which they consider their permanent home, aiming for a better and healthier future for now and for coming generations. In addition, Lebanese respondents reported higher monthly income as compared to non-Lebanese respondents (Chi2 test = 54.02 and P-value= 0.000) and thus might be more capable to pay for the proposed integrated MSWM service.

Similarly, MSWM household responsibility showed a statistically significant positive association with both households' WTP and maximum WTP amount for the proposed integrated MSWM service as expected. The results indicate that those who perceive MSWM as a household responsibility are approximately 3 times more likely to pay for the proposed integrated MSWM service (OR = 3.31) as compared to those who do not. In addition, the marginal effect demonstrates that on average people who perceive MSWM as a household responsibility are willing to pay an extra amount of 39,335.44 L.L. per year for MSWM improvements in comparison to those who do not. Thus, as expected, when households consider themselves to be the primary producers of SW and thus believe themselves to possess as much responsibility for proper MSWM as

the government, their WTP for MSWM improvements is high. This result is in accordance with the findings of Rahmaddin et al. (2015).

On the contrary, MSWM government responsibility showed a statistically significant negative association with both households' WTP and maximum WTP amount as expected. The MSWM government responsibility OR of 0.26 indicates that those who perceive MSWM as a government responsibility are approximately 4 times less likely to pay for the proposed integrated MSWM service as compared to those who do not. Moreover, the marginal effect proves that on average people who perceive MSWM as a governmental responsibility would pay on average 27,950.59 L.L. per year less than those who do not. Wang et al. (2014) also found similar results, whereby those who perceive MSWM as a governmental responsibility were willing to pay a lower amount of money for MSWM improvements. Moreover it important to note that most of the respondents considered the government a corrupted institution, which further explains the low WTP amount for MSWM improvements when respondents consider it as a governmental responsibility.

Likewise, MSWM importance showed as expected a statistically significant and positive association with households' WTP and with households' maximum WTP amount; those who perceive MSWM as a priority environmental issue are approximately 2 times more likely to pay (OR= 2.44) for MSWM improvements. Furthermore, the marginal effect points out that recognizing MSWM as a priority environmental issue would lead on average to an increase in respondents' maximum WTP amount for the proposed integrated MSWM service by 26,048.69 L.L. per year. It is important to note that the MSWM is perceived as a priority environmental issue by high proportion of respondents in Jdeidet Ghazir due to the MSWM crisis that Lebanon

have been dealing with since 2015. This result is in accordance with the findings of Banga et al. (2011) that showed that respondents who perceive MSWM as a priority problem to be addressed immediately are more willing to pay for its improvement as compared to those who do not. In addition, many studies demonstrated the positive association between households' WTP for improved MSWM services and high concern toward MSWM crisis due to its direct effect on the environment and public health (Afroz & Masud, 2011; Afroz et al., 2009; Alhassan & Mohammed, 2013; Blaine et al., 2005; Challcharoenwattana & Pharino, 2016; Danso et al., 2006; Fonta et al., 2007; Ichoku et al., 2009; Maskey & Singh, 2017; Patrick et al., 2017; Trang et al., 2017).

Disease history showed an unexpected significant negative association only with households' WTP for the proposed integrated MSWM service. The disease history OR of 0.34 indicates that respondents who have a disease family history related to poor MSWM are approximately 3 times less likely to pay as compared to respondents that do not have a disease family history. This result is contradictory with findings of Khattak et al. (2009) whereby disease history showed a positive association with households' WTP. One explanation for this finding is that maybe those who have disease history due to poor MSWM developed a negative attitude and they do not want to contribute anymore for MSWM improvements.

Walking distance showed an unexpected statistically significant negative association with households' WTP only with the "more than 10 minutes" category. This means that those who need to walk more than 10 minutes to reach the nearest SW collection point are less likely to pay for MSWM improvements. This is in contrast to Alhassan & Mohammed (2013) findings whereby as the walking distance to the nearest

solid waste collection point is larger, the demand and WTP for improved MSWM services will increase.

Handling sector also showed a statistically significant and positive trend with households' WTP only with "both in cooperation" category. This indicates that those who prefer both sectors (private and public) to handle MSWM in cooperation are approximately 2 times more likely to pay for the proposed integrated MSWM service (OR= 2.10) as compared to those who prefer the public sector alone. Thus, the association between households' WTP and Both in cooperation handling sector category is a positive association as expected and in line with the WTP contingent valuation hypothetical scenario. Similar results were found by Ezebilo (2013) whereby respondents who were happy and satisfied with the MSWM services provided by the private sector in cooperation with the public sector (government) in Nigeria were more willing to pay for improvements in the MSWM services.

Table 8 also illustrates the positive relationship between composting awareness and households' WTP although the result was insignificant. The results indicate that respondents who are aware of composting practices are approximately 2 times more likely to pay (OR= 2.04) for the proposed integrated MSWM service. However, as shown in Table 9, composting awareness showed a statistically significant and positive trend with the maximum WTP amount dependent variable. The marginal effect demonstrates that on average people with composting awareness are willing to pay an extra amount of 19,417.2 L.L. per year for MSWM improvements as compared to people unaware of composting practices. As expected, composting awareness plays an important role in assessing the WTP for improved MSWM services. In general, people who demonstrate composting awareness highly perceive the benefits of composting as a

proper way of managing the organic portion of SW. The results comply with the findings of Afroz & Masud (2011), Afroz et al. (2009), Alhassan & Mohammed (2013), Banga et al. (2011), Challcharoenwattana & Pharino (2016), Danso et al. (2006), Fonta et al. (2007), Ichoku et al. (2009), Maskey & Singh (2017), Patrick et al. (2017), and Trang et al. (2017).

Table 9, also showed that households' monthly income level is significantly and positively associated with households' maximum WTP amount for the proposed integrated MSWM service. The marginal effect indicated that as income level increases from the "low" category to the "medium to high" category, people are willing to pay on average an extra amount of 22,701.28 L.L. per year. Thus, households who receive higher monthly income would contribute, as expected, higher amounts of money for MSWM improvements as compared to those with lower monthly income. Furthermore, the results are in accordance with the economic theory of demand and supply whereby higher income results in higher demand for environmental goods. This is in line with the findings of Afroz & Masud (2011), Afroz et al. (2009), Alhassan et al. (2017), Banga et al. (2011), Blaine et al. (2005), Challcharoenwattana & Pharino (2016), Fonta et al. (2007), Ichoku et al. (2009), Maskey & Singh (2017), Patrick et al. (2017), Trang et al. (2017), Yusuf et al. (2007), and Zhang et al. (2012).

The results of Table 9 also revealed that gender, waste generation, and household size have an insignificant effect on the maximum WTP amount dependent variable. Female gender showed a negative insignificant relationship with the maximum WTP amount. The result indicates that females are willing to pay lower amounts than males for improvements in the MSWM services. Males are willing to pay higher amounts of money because in Lebanon the financial decision in the household is mainly

taken by males (Chrabieh, 2012). In addition, men in Lebanon work to support their families financially while many women are housewives (Chrabieh, 2012). Also, males are paid higher salaries in their jobs as compared to females in eastern civilizations. Therefore, males have more money and possess control over household financial issues as compared to females. This result is supported by the findings of Alhassan et al. (2017) and Trang et al. (2017). However and as indicated in the empirical literature review, this result contradicts the findings of Alhassan & Mohammed (2013), Challcharoenwattana & Pharino (2016), Fonta et al. (2007), and Ichoku et al. (2009) whereby females are willing to pay higher amounts of money for improved MSWM services as compared to males.

Waste generation showed a negative insignificant relationship with the maximum WTP amount. Thus, respondents who generate more than one solid waste bag per day are willing to pay lower amount of money as compared to those who generate one or less bags per day. This is an unexpected result and contradicts the findings of Challcharoenwattana & Pharino (2016), Danso et al. (2006), Fonta et al. (2007), and Ichoku et al. (2009) whereby high solid waste generation rate results in high demand for improved MSWM services and thus high WTP amounts. One explanation for this result could be that those who have high SW generation rate have priorities other than MSWM improvements or do not have enough money to contribute high WTP amounts. Another explanation could be that respondents who have low SW generation rate are already knowledgeable about SW problems, feel a personal responsibility to produce less waste and thus are keener to contribute in monetary terms for MSWM improvements than those who have high SW generation rate. In all cases, the result is insignificant with a P-value of 0.577 and marginal effect of -5,573.96 indicating a small difference in the

maximum WTP amount between respondents with high waste generation rate and respondents with low generation rate.

Household size has a positive but insignificant effect on respondents' maximum WTP amount. This indicates that as household size (number of family members living in the same household) increases, the maximum WTP amount for the proposed integrated MSWM service increases. This is in line with the findings of Nkansah et al. (2015) and Zhang et al. (2012) whereby large family size indicates high waste generation rate and thus high demand and WTP amount for improved MSWM services. On contrary, other studies such as Alhassan & Mohammed (2013), Ezebilo (2013), Al-Khateeb et al. (2017) and Yusuf et al. (2007) showed that large household size means high monthly expenditure and thus low capability of paying large amounts of money for improved MSWM services.

5.4. The Interview with the Municipality Mayor and Decentralization of the Local MSWM Services

The interview with the municipality mayor of Jdeidet Ghazir, revealed that the municipality has already started with a local MSWM initiative since mid of June, 2018. The municipality mayor of Jdeidet Ghazir proceeded toward the decentralization of the local MSWM services at his village because the services provided by the RAMCO Company (contracted by the government) were highly unsatisfactorily as emphasized by the majority of the residents and the cost was very high up to \$ 130,000 per year according to the Mayor. Also, the mayor indicated that he cannot establish his own MSWM project because the municipality lacks the sufficient financial and technical resources as well as a piece of land that is far from households. Therefore, he

cooperated with the Ghosta municipality where he can send the collected solid waste from the village to the Ghosta MSWM plant for treatment and final disposal. A similar interview conducted by Giannozzi (2017) with the municipality mayor of Beit Merry revealed that Beit Merry village has also proceeded toward decentralization of their local MSWM services by establishing a municipality-private sector partnership with the Cedar Environmental Company. The Cedar Environmental Company has implemented an improved MSWM service at Beit Merry village that was able to recycle 100% of the municipal households' waste since 2015 (Giannozzi, 2017). Therefore, Jdeidet Ghazir and Beit Merry villages are actively looking for ways to improve the local MSWM situation and meet the public's expectations. Additionally, Giannozzi (2017) reported the importance of the municipality-private sector partnerships as an effective way toward the decentralization of the local MSWM services since the private sector possess better technical and financial resources as compared to the public sector. Moreover, Giannozzi (2017) recommended the decentralization as a solution for the solid waste crisis in Lebanon because each municipality knows what are the needs of its residents and thus can provide better service than the central government; however, it is recommended that small municipalities cooperate with each other and establish an improved MSWM project that is financially sustainable. Similar results were shown in our study, where 92.4% of respondents perceived MSWM as a municipality responsibility because each municipality knows the needs of its own area and since Jdeidet ghazir is a small village, the mayor cooperated with a nearby municipality to initiate decentralization and enhance the MSWM services in the village. Finally, our contingent valuation study provided the evidence for the municipality of Jdeidet Ghazir to revise the municipality yearly fee by including an additional fee that covers the

expenses of proper integrated MSWM service. Hence, the municipality can raise an additional amount of funding to cover the costs associated with the solid waste collection and transport service that is being provided by the municipality since mid of June, 2018. To end up, our contingent valuation study provided evidence for policy makers to move into decentralization taking into consideration peoples' high knowledge/awareness regarding MSWM as well as their enthusiasm/motivation to enhance the MSWM situation locally. Additionally, the villagers at Jdeidet Ghazir are willing to pay on average an additional amount of money which is worth 30.8% of their current municipality fee (238,136 L.L.). Hence, it seems that the MSWM crisis resulted mainly from the lack of political will and not from the lack of public's awareness and motivation. Therefore, the policy makers and the government should work on finding appropriate solutions for the MSWM crisis in Lebanon especially in rural areas that have been suffering from the crisis silently as attention has been mainly given to the main cities in urban areas.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSIONS

6.1. Conclusions and Policy Implications

The study findings showed that most of respondents (79.39%) were willing to pay for improved MSWM services in Jdeidet Ghazir. In addition, most of respondents demonstrated awareness with respect to SW source-separation, recycling, and composting, and even some of them reused some material from the solid waste to make handicrafts or reused the food leftovers as a compost and animal feed. This in turn reflects the respondents' interest in improving the MSWM situation in their village and motivates the municipality of Jdeidet Ghazir to take the necessary actions to meet peoples' expectations. Therefore, the municipality should act fast to enhance the MSWM situation in the village. Moreover, the results of this contingent valuation study and the resulting estimates can serve in helping urban planners and administrators in determining the optimal charges for proper MSWM services in Lebanese rural areas. Specifically, the municipality of Jdeidet Ghazir can benefit from the study results to revise and update the municipality yearly fee for sweeping and cleaning services to include an additional fee (approximately equal to the average maximum WTP amount of respondents in this study (73,377.19 L.L.) for the purpose of partially covering the costs of the current decentralized local MSWM service in the village

The study also revealed that respondents prefer both the private and public sectors to cooperate and manage the local MSWM services in the village. This will help the municipality to negotiate contracts with private firms to improve the MSWM

situation without being opposed by the residents. Moreover, the municipality is advised to organize focus groups from time to time to share the environmental problems faced in the village, and engage with the residents in the decision making process especially that a fair percentage of respondents perceive MSWM as a shared responsibility between the households (the primary SW producers) and the municipality (the official public authority in the village).

Finally, our study revealed that the municipality of Jdeidet Ghazir proceeded toward decentralization of the local MSWM services by establishing a partnership with the municipality of Ghosta in response to the solid waste crisis. Therefore, other municipalities in Lebanon can consider the case of Jdeidet ghazir to think about establishing cooperations with nearby municipalities or implementing their own integrated MSWM project as a probable solution for the solid waste crisis.

6.2. Study Limitations and Recommendations

The study investigated households' WTP for MSWM improvements in a quantitative method using a contingent valuation survey. Therefore, it is recommended for future research to investigate households' willingness to engage and enhance the MSWM services qualitatively by conducting focus groups and interviews with the public and community stakeholders. Moreover and despite the benefits of CV questionnaires, it suffers from a major drawback demonstrated by the hypothetical nature of the WTP scenario, ie. the hypothetical nature of the scenario results in responses that are deviated from the true WTP value if the scenario was a reality. In other words, respondents who consider that the hypothetical scenario might become a reality and that the municipality fee might be increased to cover the costs of the

proposed integrated MSWM service will tend to report low WTP amount. On the other hand, respondents who consider only the environmental benefit of the project and do not assume the possibility of a factual increase in the municipality fee to cover the costs improved integrated MSWM services, will report high WTP amounts.

Another limitation related to the questionnaire is that some of the questions in the survey such as the monthly household income, number of waste bags generated per day, length of stay at the current household, and family members history of illness might be subject to recall bias since respondents might find difficulty in recalling such information, thus giving inaccurate answers. Finally, and despite the benefits of face-to-face interviews, social desirability bias might be a major drawback as respondents will try to give answers that might please the interviewer, hence biasing the estimations. At last, the study assessed important aspects of households' environmental and health awareness, as well as households' WTP and willingness to engage in a proposed integrated MSWM service at Jdeidet Ghazir village. However, it is recommended that future studies collect insights from community key actor groups other than households such as hotels, restaurants, commercial businesses, hospitals, and non-governmental organizations to investigate the WTP for improved MSWM services in Lebanon. The findings of such studies would provide valuable information that are needed for the successful planning and implementation of sustainable improved MSWM services and policies in Lebanon. In addition, the study was carried out in one Lebanese village (Jdeidet Ghazir) in Kesrouane district due to the limited time and absence of funds. Therefore, its findings might not be generalizable to the whole country. Thus, for future research, it is recommended that similar studies to be carried out in other rural and urban areas of the country with large sample sizes to allow generalization of the results.

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APPENDIX I

THE CONSENT FORM AND THE CONTINGENT VALUATION QUESTIONNAIRE

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Faculty of Health Sciences

Study title: Factors Associated with People's Willingness to Pay for Better Solid Waste Management Services in Lebanese Rural areas: The Case of Jdeidet Ghazir

Quantitative Component

Oral Consent for household senior member participation

Principal Investigator: Dr. Rima Habib
Co-investigators: Dr. Ali Chalak, Dr. Souha Fares
Address: American University of Beirut
Bliss Street
Beirut, Lebanon
Telephone: 01- 350 000 ext. 4620
Study site: Jdeidet Ghazir

We are seeking an oral consent from a senior household member who is either homemaker or household head. Therefore no names or signatures of the participants is required.

My name is Mary Abed Al Ahad, a graduate student in the Environmental Health Program at the American University of Beirut (AUB), I am conducting this research study as a partial fulfillment of my graduation.

Recruitment methodology: All the households (230 households in total) which are located within the districts of Jdeidet Ghazir village in Lebanon will be reached and the structured interview will be held with a senior household adult member (homemaker or household head).

You are invited to participate in a research study conducted by the Faculty of Health Sciences (FHS) at the American University of Beirut (AUB). You can request clarification or additional information at any time during the interview.

This study includes questions that aim at determining the factors associated with willingness to pay (WTP) for improved municipal solid waste management (MSWM) services in response to the current solid waste management crisis in Lebanon. You have been selected to participate in this study since you are a current resident of Jdeidet Ghazir village. We will interview one senior adult in the household, above 18 years old and who is either the homemaker or the household head, to answer questions related to WTP for improved MSWM services, engagement and awareness of recycling/composting activities.

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and the socio-demographic and political-economic factors that might influence household WTP. The collected data will help policy makers and the municipality in taking adequate actions to improve the MSWM services in your village.

The interview will take around 20 minutes. The interview will not be audio-recorded. During the structured interview, a private setting will be ensured and secured inside the households and no one will be overhearing the interview. We do not expect any direct or indirect risks and there will be no cost or compensation or benefit for participation in this survey. The team will keep all files and records confidential and locked up in a closed cabinet at FHS all the time. Records will be monitored and may be audited by the study investigators and Institutional Review Board (IRB) without violating participant confidentiality. Should the results and findings be published, there will be no link to any of the participating households.

You have the right to accept or reject participating in this study. Your participation is completely voluntary. In case any of the questions annoy you, you have the right to refrain from answering or to stop participating in the study. In case you refuse to participate or decide to withdraw from this study, there will be no consequences or penalty, no loss of benefits to which you are otherwise entitled and no effect on your relationship with AUB/AUBMC. The researcher Dr. Rima Habib is ready to answer any question and address any concern or complaint; you can contact her on the phone number: 01-350 000 ext. 4620. If you have questions about your rights as a participant in this research, you can contact the Institute Review Board office (IRB) at the American university of Beirut on the telephone number: 01350000 ext. 5440 and on the following email: irb@aub.edu.lb

Do you have any questions or clarifications about the study?

Researcher Approval:

I explained in details to the participant the nature and effects of the study and I answered all his/her questions clearly. I will let the participant know about any changes in the course of this research or negative effects or possible benefits in case they occur during the search. The participant will get a copy of this oral consent form.

Mary Abed Al Ahad

Researcher's Name

Researcher's Signature

Date

Do you want to participate in the study?

Yes, I want

No, I do not want

The oral consent was given in the attendance of the researcher

Mary Abed Al Ahad

Researcher's Name

Researcher's Signature

Date

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A note for the interviewer: please read all the options to respondents unless specified not to read them.

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ID	Questionnaire ID	_ _ _		
VDATE1	Interview date	DD-MM	TS1	Start of Interview (time)
	_ _ - _ _			hh-mm _ _ - _ _
			TE1	End of Interview (time)
				hh-mm _ _ - _ _
Interviewers				
INT	_ _ _ _			
RESULT	Interview Status	Comments:		
	1 Interview completed			
	2 Partly completed			
	3 Household vacant			
	4 No contact			

PI-B				
PI-B1	Are you a senior household member?	1	Yes →	Continue survey
		0	No →	Ask for someone else
PI-B2	Gender	1	Female	
		0	Male	
PI-B3	Age	----- years		
PI-B4	Marital status	1	Single	
		2	Married	
		96	Other, specify	
PI-B5	Education level	1	Intermediary school level	
		2	Technical/ secondary school level	
		3	University level	
		96	Other, specify:	
PI-B6	Occupation	1	Government employee	
		2	Private sector employee	
		3	Own business	
		4	Not working	
		96	Other, specify:	

Section 1: Household Characteristics and Socio-Economic Status:

HSE-A1	Total number of the members living in the household	Adults: Children:
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HSE-A2	Household Income level	1 2 3 98 99	Less than two million Lebanese pounds Between two and five million L.P More than five million L.P No answer I don't know
HSE-A3	Length of stay at the current house:	 years
HSE-A4	Housing arrangement	0 1 96	Rented Privately owned Other, specify:
HSE-A5	The surface area of your residence	1 2 3 98 99	Strictly less than 100 m ² Between 100 and 300 m ² inclusive Strictly more than 300 m ² No answer I don't know
HSE-A6	Are you Lebanese? (have the Lebanese citizenship)	1 0 98	Yes No No answer

Section 2: General questions about solid waste amount/ composition, respondent's recycling/ composting awareness, and the municipal solid waste management situation in Lebanon and Jdeidet Ghazir village:

GQ-A0a	In your opinion, what are the two most important environmental issues in your village that require immediate attention and action?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 96 98 99	Solid waste management Toxic and radioactive waste contamination Electricity production Domestic water supply Wastewater treatment Traffic and car exhaust Air quality Deforestation and forest fires Hunting Land degradation Natural resources degradation Quarries Sea pollution Global warming Other(s) specify: No answer I don't know
GQ-A0b	Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects the environment?	1 0 98 99	Yes No No answer I don't know

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GQ-A0c	Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects the solid waste issues and their management?	1 0 98 99	Yes No No answer I don't know
GQ-A0d	Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects people's health?	1 0 98 99	Yes No No answer I don't know

GQ-A1	How many solid waste bins (bags) are generated from your household each day? (The standard medium size commercial bag which normally fits 30 Liters of solid waste).	
GQ-A2	What is the composition of your generated solid waste? (Pick all applicable answers)	1 2 3 4 5 6 7 8 96 98 99	Organic food remains Organic yard trimming waste Plastics Metals Paper, tissue papers and cardboard Clothes Glass Hazardous waste and chemicals Other(s) specify: No answer I don't know
GQ-A3	The solid waste type with the highest generation amount:	1 2 3 4 5 6 7 8 98 99	Organic food remains Organic yard trimming waste Plastics Metals Paper, tissue papers, and cardboard Clothes Glass Hazardous waste and chemicals No answer I don't know
GQ-A4	The solid waste type with the second highest generation amount:	1 2 3 4 5 6 7 8 98 99	Organic food remains Organic yard trimming waste Plastics Metals Paper, tissue papers, and cardboard Clothes Glass Hazardous waste and chemicals No answer I don't know
GQ-A5	Do you know what is composting?	1 0	Yes No → GQ-A7

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GQ-A6	What is the source of your knowledge about composting? (pick all applicable answers)	1 2 3 4 5 6 7 8 9 10 96 98 99	The municipality Non-governmental organizations University or school Friends or neighbors Television news and programs Radio news and programs Internet Social media books News papers Other(s) specify: No answer I don't know
GQ-A7	Do you know what is recycling?	1 0	Yes No → GQ-A9
GQ-A8	What is the source of your information about recycling? (pick all applicable answers)	1 2 3 4 5 6 7 8 9 10 96 98 99	The municipality Non-governmental organizations University or school Friends or neighbors Television news and programs Radio news and programs Internet Social media Books Newspapers Other(s) specify: No answer I don't know
GQ-A9	Do you sort your waste at source for recycling, ie. into organic waste, paper and cardboard, glass, plastics and metals?	1 0	Yes → GQ-A11 No
GQ-A10	Please indicate the reason for not sorting your generated solid waste? (pick all applicable answers) Do not read the choices, ask them about the reason and then fit their answer into one or more of the listed choices or describe the new option next to the "Others" category.	1 2 3 4 5 6 7 8 9 96 98 99	Separation at source is not useful because solid waste is being collected as a common-mingled waste. The municipality/ RAMCO private company is not making use of the source separated solid waste and the final disposal is mainly by open dumping. There is no incentives that encourage us to source separate our generated solid waste such as paying us money in return for useful separated products. There is no law that panelizes us for non-source separation. The solid waste is being collected by Ramco company / municipality as it is without source separation. We don't have enough time to source separate our generated solid waste. We don't have the required knowledge/ awareness for the correct solid waste source separation. The municipality does not provide colored solid waste recycling bags to the households and there is no available recycling solid waste bins in our village Source separation is not a social norm in our society and it is socially acceptable not to source separate. Other(s) specify: No answer I don't know

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GQ-A11	Do you send recyclables to special companies that do recycling for them?	1 0	Yes No
GQ-A12	Do you compost?	1 0	Yes No
GQ-A13	What are the uses of your compost? (pick all applicable choices)	1 2 96 98 99	As a natural fertilizer for agricultural purposes For chicken and animals feeding Other(s): No answer I don't know
GQ-A14	Do you reuse any of this stuff? (pick all applicable answers)	1 2 3 4 5 6 7 96 8 98 99	Plastic bags plastic containers and bottles Glass jars or bottles Cardboard boxes papers Clothes aluminum cans Other(s) specify: I don't reuse any stuff No answer I don't know
GQ-A15	Where do you throw your waste? (pick all applicable answers)	1 2 3 4 96 98 99	In the municipal garbage containers that are distributed on the streets On the sides of streets and street corners In the valleys, open space or wild land Burn it in your backyard or in your chimney to get warm in the winter Other place: No answer I don't know
GQ-A16	How far is the municipal garbage container from your residence?	1 2 3 4 98 99	Less than 5 minutes walk 5 to 10 minutes walk 11 to 20 minutes walk More than 20 minutes walk No answer I don't know
GQ-A17	How much do you pay for the municipality services in L.L. per year?	
GQ-A18	How many times does the private company "Ramco" collect the waste accumulated in the municipality garbage containers per week?	1 2 3 4 5 98 99	Once Twice Three times Four times More than four times No answer I don't know
GQ-A19	Are you satisfied with the current municipality waste collection and solid waste management services?	1 0 98 99	Yes No No answer I don't know
GQ-A20	Are you aware of the solid waste management problem in Lebanon?	1 0	Yes No → GQ-A22

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GQ-A21	<p>From where is your information about the solid waste management problem in Lebanon?</p> <p>(pick all applicable answers)</p>	1 2 3 4 5 6 7 8 9 96 98 99	Facebook/ twitter/ social media Television news Radio news Newspapers and magazines online websites Scientific journals and books Conferences and workshops School or university or work Daily observation of the current MSWM situation Other(s) specify: No answer I don't know
GQ-A22	<p>In your opinion which of the following is an obstacle for improvements in the solid waste management sector:</p> <p>(pick all applicable answers)</p> <p>Do not read the choices, ask them about the reason and then fit their answer into one or more of the listed choices or describe the new option next to the "Others" category.</p>	1 2 3 4 5 6 7 8 96 98 99	People do not care about the effects of poor solid waste management. Lack of public's awareness/ knowledge about the negative effects of poor solid waste management. There are other priority problems in the community that need to be solved such as electricity, water, education, health and other problems. No adequate action is taken by the municipality. Presence of political corruption in the country. Lack of appropriate budget and financial resources. No proper incentives are given to residents to practice proper solid waste management. The failure of the MSWM deals between the government and the private sector. Other(s) specify: No answer I don't know
GQ-A23	<p>What do you suggest to improve the current condition of solid waste management in Lebanon/ your village?</p> <p>(pick all applicable answers)</p> <p>Do not read the choices, ask them about the reason and then fit their answer into one or more of the listed choices or describe the new option next to the "Others" category.</p>	1 2 3 4 5 6 7 8 9 96 98 99	Increase awareness campaigns that are related to source separation, the 3Rs concept of reduce, reuse and recycle etc... Stop political corruption by exerting pressure on the government to improve the solid waste management situation through public protests, NGO and non-state actors' pressures. Improve the solid waste management infrastructure and build appropriate SWM facilities such as material recovery/ recycling facilities, composting facilities and sanitary landfills. Enhance the solid waste collection system by doing contracts with reliable private companies. Decentralization of the solid waste sector where each municipality will become responsible for its own solid waste. Establish municipality's cooperation with each other and with the private sector to increase the efficiency of the current SWM system. Involve the public in the decision making process which is related to the SWM sector. Encourage the households to source separate their generated refuse. Nothing can be done to improve the situation. Other(s) specify: No answer I don't know

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GQ-A24	Who do you think is responsible for solid waste management in your village? (pick all applicable choices)	1 2 3 4 96 98 99	The government The municipality Private companies Households Other(s) specify: No answer I don't know
GQ-A25	Which of the following do you think is the best to handle solid waste management in Lebanon?	1 2 3 98 99	The government and/ or municipality (public sector) → GQ-A26 The private sector → GQ-A27 Both in cooperation with each other → GQ-A28 No answer I don't know
GQ-A26	Please state the reason for your choice on why the public sector should handle solid waste management in Lebanon? (pick all the applicable answers)	1 2 3 4 5 96 98 99	Public sector is more reliable and effective The government and municipalities knows the needs of each area within Lebanon. We are satisfied with the municipality services We are already paying a fee to the municipality, so the public sector should handle the SW services. We don't want the private sector to control the MSWM in our village. Other(s) specify: No answer I don't know
GQ-A27	Please state the reason for your choice on why the private sector should handle solid waste management in Lebanon? (pick all the applicable answers)	1 2 3 96 98 99	Private sector is more reliable and effective Private sector has more expertise and better technological / financial abilities. Public sector is corrupted Other (s) specify: No answer I don't know
GQ-A28	Please state the reason for your choice on why the both the public and private sectors in cooperation should handle solid waste management in Lebanon? (pick all the applicable answers)	1 2 96 98 99	The public sector should control the price suggested by the private sector. The public sector should monitor, evaluate, regulate and control the private sector Other (s) specify: No answer I don't know
GQ-A29	Do you think that poor solid waste management causes environmental problems?	1 0 98 99	Yes No → GQ-A31 No answer I don't know

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GQ-A30	Which of the following environmental problems do you associate with poor municipal solid waste management services? (pick all applicable answers)	1 2 3 4 5 6 7 96 98 99	Odor nuisance Fire risks due to open burning Air pollution Water pollution Soil pollution Affect the biodiversity of fauna and flora Global warming Other(s) specify: No answer I don't know
GQ-A31	Do you think that poor solid waste management causes health problems?	1 0 98 99	Yes No → GQ-A33 No answer I don't know
GQ-A32	Which of the following health problems do you associate with poor municipal solid waste management services? (pick all applicable answers)	1 2 3 4 5 6 7 8 96 98 99	Heart and cardiovascular problems Skin diseases Respiratory problems (asthma, pneumonia, bronchitis, etc.....) Cancer Allergy problems Diarrhea and cholera disease Breeding of vectors such as mosquitoes Attraction of pests and wild animals Other(s) specify: No answer I don't know
GQ-A33	Did any of your family members suffer from any disease recently?	1 0 98 99	Yes No → section 3 No answer I don't know

GQ-A34			
GQ-A34-1 Family member	GQ-A34-2 Age of the family member	GQ-A34-3 Disease	GQ-A34-4 Correlation with poor Solid waste management (Do you think that the disease among your family member which you indicated is associated with poor solid waste management in your village/ Lebanon?)
Member 1	_____years		1 Yes 0 No
Member 2	_____years		1 Yes 0 No
Member 3	_____years		1 Yes 0 No
Member 4	_____years		1 Yes 0 No
Member 5	_____years		1 Yes 0 No
Member 6	_____years		1 Yes 0 No
Member 7	_____years		1 Yes 0 No

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Section 3: Household's willingness to pay for improved solid waste management services at Jdeidet Ghazir/ Lebanon:

Imagine that the municipality of Jdeidet Ghazir in collaboration with company X is going to provide an improved solid waste management service in the village. Currently, the collected mixed refuse in all Keserwan villages is transported to be disposed mainly in open dump (Costa Brava dump) with minimal treatment without taking into consideration the environmental and public health effects of open dumping.

With the new service, on the other hand, would include the following:

- Source separation of the solid waste by each household.
- Collecting the source separated refuse 6 times per week instead of 3 times per week, which will reduce the amount and odor of the accumulated waste.
- Managing the separated non-decomposable wastes by recycling.
- Managing the separated decomposable organic waste by composting.
- Sending the remaining solid waste for proper landfilling.

However, implementing this plan will cost money. Therefore, households are required to pay for this service by means of a surcharge to your yearly municipal fee. The plan would be implemented after 1 year from the present if the households in your village, including yours, contribute a sufficient amount of money.

HHW-A1	Is your household willing to engage in the proposed improved MSWM project that includes refuse source separation by each household in the village including yours?	1 0	Yes No
HHW-A2	Is your household willing to pay for the improved solid waste management service system indicated above?	1 2 3 0	Yes Probably Yes Probably No No → HHW-A4
HHW-A3	How much is your household willing to pay for the improved municipal solid waste management service per year?	Please pick any value from the payment card below → End of Survey	
HHW-A4	If your household is not willing to pay, can you tell us the reason please? (pick only one answer) Do not read the choices, ask them about the reason and then fit their answer into one or more of the listed choices or describe the new option next to the "Others" category. → End of Survey	1 2 3 4 5 96 98 99	Proper management of solid waste should be the responsibility of the government We are satisfied with the current situation and it does not need improvement. We don't trust that any cent we pay will not lead to any improvements in the municipality services. We don't have money to pay We don't want to source separate our generated refuse Other, specify: No answer I don't know

0 L.L.	5,000 L.L.	10,000 L.L.	20,000 L.L.	30,000 L.L.	50,000 L.L.	70,000 L.L.	90,000 L.L.
110,000 L.L.	130,000 L.L.	150,000 L.L.	170,000 L.L.	190,000 L.L.	210,000 L.L.	230,000 L.L.	
250,000 L.L.	270,000 L.L.	290,000 L.L.	310,000 L.L.	330,000 L.L.	350,000 L.L.	370,000 L.L.	
390,000 L.L.	410,000 L.L.	430,000 L.L.	450,000 L.L.	470,000 L.L.	490,000 L.L.	510,000 L.L.	
530,000 L.L.	550,000 L.L.	570,000 L.L.	590,000 L.L.	620,000 L.L.	650,000 L.L.	680,000 L.L.	
710,000 L.L.	740,000 L.L.	770,000 L.L.	800,000 L.L.	830,000 L.L.	860,000 L.L.	890,000 L.L.	
920,000 L.L.	950,000 L.L.	980,000 L.L.	1,030,000 L.L.	1,080,000 L.L.	1,130,000 L.L.	1,180,000 L.L.	
1,180,000 L.L.	1,230,000 L.L.	1,280,000 L.L.	1,330,000 L.L.	1,380,000 L.L.	> 1,380,000 L.L.		

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الجامعة الأمريكية في بيروت

كلية العلوم الصحية

عنوان الدراسة: العوامل المرتبطة باستعداد المنازل في بلدة جديدة غزير لدفع مبلغ من المال لقاء تحسينات في خدمة جمع وإدارة النفايات المنزلية الصلبة

Quantitative Component

طلب موافقة احد افراد الاسرة الاساسيين على الاشتراك في تعبأة الاستمارة

الباحث الرئيسي: الدكتورة ريم حبيب

الباحثون المتعاونون: د. علي شلق، د. سها فارس

العنوان: الجامعة الأمريكية في بيروت، شارع بلس، بيروت، لبنان

الهاتف: 01/350000 مقسم: 4620

مكان اجراء الدراسة: بلدة جديدة غزير

في هذا المستند، نحن نطلب موافقة احد افراد الاسرة الاساسيين (رب(ة) الاسرة او المسؤول عن المنزل) الشفهية و بالتالي لن يتم اخذ اسم او امضاء المشاركين في هذا الاستبيان.

انا ميري عبد الاحد، تلميذة في كلية الصحة في الجامعة الاميركية في بيروت. لقد قمت بهذه الدراسة كجزء من دراستي للماستر البحثية في علوم الصحة البيئية.

طريقة الاشراف: سيتم التواصل مع جميع المنازل التي تقع داخل بلدة جديدة غزير في لبنان التي يبلغ عددها حوالي 230 منزلا، وستجرى المقابلة مع أحد سكان المنزل الاساسيين (رب(ة) المنزل او رأس الاسرة).

انت مدعو(ة) للمشاركة ببحث علمي باشراف كلية العلوم الصحية في الجامعة الاميركية في بيروت. بإمكانك طلب ايضاحات أو معلومات إضافية عن أي شيء مذكور في هذه الإستمارة أو عن هذه الدراسة.

تتضمن هذه الدراسة اسئلة عن العوامل المرتبطة باستعداد المنازل في بلدة جديدة غزير لدفع مبلغ من المال لقاء تحسينات في خدمة جمع وإدارة النفايات المنزلية الصلبة تلبية لحاجة لبنان الى مثل هذه الخدمات نظرا الى ازمة النفايات الحالية. لقد تم اختيارك للمشاركة في هذا البحث لانك من سكان بلدة جديدة غزير الحاليين. سوف نقوم بمقابلة فردا واحدا من افراد المنزل الاساسيين (رب(ة) المنزل او رأس الاسرة) فوق 18 سنة من العمر، للإجابة على اسئلة الإستمارة المتعلقة باستعداد المنازل في بلدة جديدة غزير لدفع تكاليف تحسين خدمات إدارة النفايات الصلبة، الرغبة في الانخراط في أنشطة إعادة التدوير و فرز النفايات من المصدر، وعي و معرفة اهالي القرية باعادة تدوير النفايات الصلبة و تصنيع السماد، فضلا عن العوامل الاجتماعية - الديمغرافية والسياسية -الاقتصادية. لاحقا، سوف يتم تحليل البيانات التي تم جمعها لمساعدة صانعي السياسات والبلدية في اتخاذ الإجراءات المناسبة لتحسين خدمات إدارة النفايات الصلبة في بلدتك.

تستغرق المقابلة حوالي ال 20 دقيقة من وقتكم. لن يتم تسجيل المقابلة صوتيا. خلال المقابلة ، سيتم ضمان الخصوصية داخل المنزل ولن يستمع احد الى المقابلة. لا يوجد اي ضرر مباشر او غير مباشر كما وانه لن يكون هنالك اي تكلفة او تعويض مادي للمشاركة في هذا البحث. يؤكد الفريق العمل على السرية التامة في الدراسة وأن المعلومات التي تُسجل في الإستمارة ستُحفظ في خزانة مغلقة طوال الوقت في كلية العلوم الصحية في الجامعة الاميركية في بيروت. هذه البيانات ستكون متاحة

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فقط للباحثين الرئيسيين ولجنة الاخلاقيات في الجامعة الاميركية في بيروت. ومتى نُشرت النتائج، ستُعرض بشكل اجمالي و لن يتم ربطها بأي من المنازل المشاركة في البحث.

لديك الحق في الموافقة أو رفض المشاركة في هذا البحث. ان مشاركتك في هذا البحث هو عمل تطوعي. في حال الإنزعاج من اي سؤال في الاستمارة، يحق للمشارك الامتناع عن الاجابة او التوقف عن المشاركة في البحث بعد الموافقة على الاستمارة. في حال رفض المشاركة في هذه الدراسة, لن تترتب على المشترك او اي من افراد المنزل اية عواقب او أي فقدان للمزايا التي يحق لك خلاف ذلك وليس لها تأثير على علاقتك مع الجامعة الأميركية في بيروت / مستشفى الجامعة الأميركية في بيروت.

ان الباحثة الدكتورة ريماء حبيب مستعدة للاجابة على اية اسئلة, و باستطاعتك (ي) الاتصال با على الهاتف 01-350000 المقسم 4620. كما يمكنك الاستفسار عن اي موضوع متعلق بالبحث او تقديم اي شكوى بالاتصال معي على رقم الهاتف: 205652-70 او على البريد الالكتروني mja52@mail.aub.edu.

إذا كانت لديك أسئلة حول حقوقك كمشارك في هذا البحث، يمكنك الاتصال بمكتب لجنة الاخلاقيات في الجامعة الأميركية في بيروت على رقم الهاتف: (01350000 المقسم 5440) او على البريد الالكتروني: irb@aub.edu.lb

هل لديك اية اسئلة او ايضاحات عن هذه الدراسة البحثية؟

موافقة الباحث: لقد شرحت بالتفصيل للمشارك طبيعة البحث و مجرياته و تأثيراته. و لقد اجبت على كل اسئلته بوضوح على خير ما أستطيع. و سوف اعلم المشترك باي تغييرات في مجريات هذا البحث او تأثيراته السلبية او فوائده في حال حصولها اثناء البحث. سوف يحصل المشترك على نسخة من طلب الموافقة الشفهية على المشاركة في هذا البحث.

ميري عبد الاحد
اسم الباحث

التاريخ

توقيع الباحث

هل تريد المشاركة في هذا البحث؟

كلا, لا اريد

نعم اريد

تم الموافقة بحضور الباحث

ميري عبد الاحد

التاريخ

توقيع الباحث

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سيتم اجراء هذه المقابلة مع احد افراد المنزل الاساسيين اي المسؤول عن ادارة المنزل و الأسرة من الذكور والإناث.
ملاحظة للباحث: يرجى قراءة جميع الخيارات للمشاركين الا اذا حدد عدم قراءتها.

16 MAR 2018

RECEIVED

تعريف الإستمارة		ID	رقم الإستمارة
البرنامج			
VDATE	1	تاريخ المقابلة	شهر - يوم
بدء المقابلة (الوقت)	دقيقة - ساعة	TS1	
انتهاء المقابلة (الوقت)	دقيقة - ساعة	TE1	
العاملون			
INT		الباحث	
RESULT	نتيجة المقابلة	ملاحظات:	
1	مقابلة مكتملة		
2	مقابلة جزئية		
3	الوحدة السكنية فارغة		
4	لا إتصال		

معلومات عن المشارك		PI-B
هل انت فرد من افراد المنزل الاساسيين؟	1 نعم 0 لا	PI-B1
الجنس	1 انثى 0 ذكر	PI-B2
العمر	سنة	PI-B3
الوضع العائلي	1 اعزب 2 متزوج 96 غير ذلك حدد:	PI-B4
المستوى التعليمي	1 المرحلة المتوسطة 2 المرحلة الثانوية/ المهنية 3 المرحلة الجامعية 96 غير ذلك حدد:	PI-B5
الوظيفة/ نوع العمل	1 موظف في القطاع العام 2 موظف في القطاع الخاص 3 عمل خاص (صاحب عملي الخاص) 4 لا اعمل 96 غير ذلك حدد:	PI-B6

القسم الاول: خصائص الأسرة/ المنزل والوضع الاجتماعي-الاقتصادي:

HSE-A1	عدد الافراد الذين يعيشون في هذا المنزل:	البالغون: ----- الأولاد: -----
HSE-A2	مستوى الدخل الشهري للمنزل	1 أقل من مليونين ليرة لبنانية 2 من مليونين الى خمسة ملايين ليرة لبنانية 3 أكثر من خمسة ملايين ليرة لبنانية 98 لا جواب 99 لا اعرف
HSE-A3	عدد السنوات التي قضيتها في هذا المنزل	سنة
HSE-A4	ملكية المنزل	0 ايجار 1 ملك 96 غير ذلك حدد:
HSE-A5	المساحة الاجمالية لمنزلك	1 حصرا اقل من 100 متر 2 من 100 الى 300 متر ضمنا 3 حصرا اكثر من 300 متر 98 لا جواب 99 لا اعرف
HSE-A6	هل انت لبناني؟ (لديه الجنسية اللبنانية)	1 نعم 0 لا 98 لا جواب

القسم الثاني: أسئلة عامة حول كمية النفايات الصلبة / تكوينها، وعى المشارك بالنسبة لإعادة التدوير و التسميد، وحالة إدارة النفايات الصلبة في لبنان و قرية جديدة غزير:

GQ-A0a	برأيك ، ما أهم مشكلتين بيئيتين في قرينك تتطلبان اهتمامًا و معالجة فورية؟	1 ادارة النفايات الصلبة 2 التلوث الناتج عن النفايات الخطرة و الاشعاعية 3 انتاج الكهرباء 4 تأمين المياه للمنازل 5 معالجة مياه الصرف الصحي 6 كثافة حركة المرور و الدخان الناتج عن السيارات 7 نوعية و تلوث الهواء 8 قطع الاشجار و حرائق الغابات و الاحراج 9 صيد الحيوانات و الطيور 10 تدهور الارض و التربة 11 تدهور الموارد الطبيعية 12 المرامل و المقالع و الكسارات العشوائية 13 تلوث البحر 14 التغير المناخي 96 غير ذلك حدد: ----- 98 لا جواب 99 لا اعرف
GQ-A0b	هل تعتقد إنه التغير المناخي (التصحّر، قلة الأمطار، ارتفاع درجات الحرارة يللي عم نعيشها هالايام) عم يآثر على البيئة؟	1 نعم 0 لا 98 لا جواب 99 لا اعرف

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هل بتعتقد إنه التغير المناخي (التصحّر، قلة الأمطار، ارتفاع درجات الحرارة يللي عم نعيشها هالإيام) عم يآثر على مشكلة النفياآت وإدارتها؟	1 نعم 0 لا 98 لا جواب 99 لا اعرف	GQ-A0c
هل بتعتقد إنه التغير المناخي (التصحّر، قلة الأمطار، ارتفاع درجات الحرارة يللي عم نعيشها هالإيام) عم يآثر على صحة الناس؟	1 نعم 0 لا 98 لا جواب 99 لا اعرف	GQ-A0d

كم عدد أكياس النفياآت الصلبة التي يتم توليدها من منزلك كل يوم؟ (كيس نفياآت بيع في المتاجر، متوسط الحجم الذي يستوعب عادة 30 لتر من النفياآت الصلبة)		GQ-A1
ما هي مكونات النفياآت الصلبة الصادرة من منزلك؟ (الرجاء اختيار كل الخيارات المناسبة)	1 بقايا الطعام العضوية 2 النفياآت الناتجة عن تقليم الحديقة و اوراق الشجر 3 بلاستيك 4 حديد و معادن (تنك) 5 اوراق و محارم و ورق مقوى (كرتون) 6 ثياب مستعملة 7 زجاج 8 نفياآت خطرة و مواد كيميائية 96 نفياآت اخرى: ----- 98 لا جواب 99 لا اعرف	GQ-A2
نوع النفياآت الصلبة الذي ينتج من منزلك بالكمية الاكبر في الدرجة الاولى:	1 بقايا الطعام العضوية 2 النفياآت الناتجة عن تقليم الحديقة و اوراق الشجر 3 بلاستيك 4 حديد و معادن (تنك) 5 اوراق و محارم و ورق مقوى (كرتون) 6 ثياب مستعملة 7 زجاج 8 نفياآت خطرة و مواد كيميائية 98 لا جواب 99 لا اعرف	GQ-A3
نوع النفياآت الصلبة الذي ينتج من منزلك بالكمية الاكبر في الدرجة الثانية:	1 بقايا الطعام العضوية 2 النفياآت الناتجة عن تقليم الحديقة و اوراق الشجر 3 بلاستيك 4 حديد و معادن (تنك) 5 اوراق و محارم و ورق مقوى (كرتون) 6 ثياب مستعملة 7 زجاج 8 نفياآت خطرة و مواد كيميائية 98 لا جواب 99 لا اعرف	GQ-A4
هل تعلم ما هو السماد الطبيعي و كيفية تصنيعه؟	1 نعم 0 لا → GQ-A7	GQ-A5

1 2 3 4 5 6 7 8 9 10 96 98 99	البلدية الجمعيات غير الحكومية الجامعة او المدرسة الاصدقاء او الجيران الاخبار و البرامج التلفزيونية الاخبار و البرامج الإذاعية عبر الراديو الانترنت وسائل التواصل الاجتماعي الكتب الجرائد و المجلات غير ذلك حدد: ----- لا جواب لا اعرف	1 2 3 4 5 6 7 8 9 10 96 98 99	ما هو مصدر معلوماتك عن السماد الطبيعي؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A6
1 0	نعم لا → GQ-A9	1 0	هل تعلم ما هو اعادة التدوير؟	GQ-A7
1 2 3 4 5 6 7 8 9 10 96 98 99	البلدية الجمعيات غير الحكومية الجامعة او المدرسة الاصدقاء او الجيران الاخبار و البرامج التلفزيونية الاخبار و البرامج الإذاعية عبر الراديو الانترنت وسائل التواصل الاجتماعي الكتب الجرائد و المجلات غير ذلك حدد: ----- لا جواب لا اعرف	1 2 3 4 5 6 7 8 9 10 96 98 99	ما هو مصدر معلوماتك عن اعادة التدوير؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A8
1 0	نعم لا → GQ-A11	1 0	هل تمارس الفرز من المصدر للنفايات الصادرة من منزلك؟ (هل تفرز النفايات الى نفايات عضوية، ورق و كرتون، زجاج، بلاستيك، معادن).	GQ-A9
1 2 3 4 5 6 7 8 9 96 98 99	فرز النفايات من المصدر هو دون جدوى لانه يتم جمع النفايات بشكل مختلط. البلدية و شركة رامكو لا يستفيدون من النفايات المفروزة حيث يتم رمي النفايات بعد جمعها في اكثر الاحيان في المكبات العشوائية. لا يوجد اي تشجيع للمنازل لفرز النفايات من المصدر مثل اعطاء بدل نقدي لقاء النفايات المفروزة التي يمكن اعادة تدويرها. لا يوجد قانون لمعاقبة الذين لا يتقيدون بفرز النفايات من المصدر. البلدية و شركة رامكو تجمع النفايات الصلبة كما هي من دون فرز من المصدر. ليس لدينا وقت كاف لفرز النفايات من المصدر. لا نملك المعرفة اللازمة لفرز النفايات الصلبة من المصدر بشكل صحيح. البلدية لا توزع اكياس الفرز الملونة على المنازل و لا يوجد مستويات نفايات ملونة لاستيعاب النفايات المفروزة من المصدر في القرية. فرز النفايات الصلبة من المصدر هو ليس عادة اجتماعية و من المقبول اجتماعيا عدم فرز النفايات من المصدر. غير ذلك حدد: ----- لا جواب لا اعرف	1 2 3 4 5 6 7 8 9 96 98 99	ما هو السبب لعدم فرز النفايات الصادرة عن منزلك من المصدر؟ (الرجاء اختيار كل الخيارات المناسبة). لا تقرأ الخيارات، اطلب منهم اطلعك على السبب ومن ثم ناسب إجابتهم في واحدة او اكثر من الخيارات المذكورة أو اشرح الخيارات الجديدة الى جانب "غير ذلك حدد". <i>Institutional Review Board American University of Beirut</i> 19 MAR 2018 APPROVED	GQ-A10

1 0	نعم لا	هل تقوم بإرسال المواد القابلة لإعادة التدوير إلى شركات خاصة تقوم بإعادة تدويرها؟	GQ-A11
1 0	نعم لا	هل تقوم باستخدام النفايات العضوية الصادرة عن منزلك كسماد طبيعي في أرضك؟	GQ-A12
1 2 96 98 99	كسماد للمزروعات كعلف للدجاج و حيوانات اخرى غير ذلك حدد: ----- لا جواب لا اعرف	ما هي استخداماتك لهذا السماد الطبيعي؟	GQ-A13
1 2 3 4 5 6 7 8 96 98 99	اكياس بلاستيك حاويات بلاستيكية حاويات زجاجية صناديق الورق المقوى الورق الثياب علب الألومنيوم لا اقوم باستخدام اي من هذه الاشياء غير ذلك حدد: ----- لا جواب لا اعرف	هل تعيد استخدام أي من هذه الأشياء؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A14
1 2 3 4 96 98 99	في حاويات القمامة التابعة للبلدية الموزعة على شوارع القرية على جوانب و زوايا طرقات القرية في الوديان, و المساحات البرية المفتوحة حرقها في الفناء الخلفي الخاص بك أو في موقدة النار للحصول على الدفاء في فصل الشتاء في مكان اخر: ----- لا جواب لا اعرف	اين ترمي النفايات الصلبة الصادرة عن منزلك؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A15
1 2 3 4 98 99	اقل من 5 دقائق مشيا من 5 الى 10 دقيقة مشيا من 11 الى 20 دقيقة مشيا اكثر من 20 دقيقة مشيا لا جواب لا اعرف	كم تبعد حاوية القمامة عن منزلك؟	GQ-A16
-	-	ما هو المبلغ السنوي الذي تدفعه مقابل خدمات البلدية في البيرة اللبنانية (ل.ل.) ؟	GQ-A17
1 2 3 4 5 98 99	مرة واحدة مرتان ثلاث مرات اربعه مرات اكثر من اربعة مرات لا جواب لا اعرف	كم مرة تقوم الشركة الخاصة "رامكو" بجمع النفايات المتراكمة في حاويات القمامة في الأسبوع؟	GQ-A18
1 0 98 99	نعم لا لا جواب لا اعرف	هل أنت راض عن خدمات جمع و ادارة النفايات الصلبة الحالية؟	GQ-A19

هل أنت على علم بمشكلة إدارة النفايات الصلبة في لبنان؟	1 0	نعم لا → GQ-A22	GQ-A20
ما هو مصدر معلوماتك عن مشكلة ادارة النفايات الصلبة في لبنان؟ (الرجاء اختيار كل الخيارات المناسبة)	1 2 3 4 5 6 7 8 9 96 98 99	وسائل التواصل الاجتماعي مثل تويتر و فيسبوك نشرة الاخبار على التلفزيون نشرة الاخبار على الراديو الصحف و المجلات المواقع الالكترونية الكتب و المقالات العلمية المؤتمرات و ورشات العمل المدرسة، الجامعة، او العمل الملاحظة اليومية لوضع ادارة النفايات الصلبة الحالية غير ذلك حدد: ----- لا جواب لا اعرف	GQ-A21
برأيك أي مما يلي هو عقبة أمام التحسينات في قطاع إدارة النفايات الصلبة؟ (الرجاء اختيار كل الخيارات المناسبة)	1 2 3 4 5 6 7 8 96 98 99	الناس لا تهتم بآثار سوء إدارة النفايات الصلبة. عدم وعي/ معرفة الناس بالآثار السلبية لسوء ادارة النفايات الصلبة. هناك مشاكل أخرى ذات أولوية في المجتمع تحتاج إلى حل مثل الكهرباء والمياه والتعليم والصحة وغيرها من المشاكل. عدم اتخاذ البلدية إجراءات كافية. الفساد السياسي القائم في البلد. الافتقار إلى الميزانية والموارد المالية المناسبة. لا يوجد حوافز مناسبة للمقيمين لممارسة إدارة النفايات الصلبة بشكل سليم. فشل صفقات ادارة النفايات الصلبة بين الحكومة و القطاع الخاص غير ذلك حدد: ----- لا جواب لا اعرف	GQ-A22
ما هي اقتراحاتك لتحسين الحالة الراهنة لإدارة النفايات الصلبة في لبنان / قرينتك؟ (الرجاء اختيار كل الخيارات المناسبة)	1 2 3 4 5 6 7 8 9 96 98 99	زيادة حملات التوعية المتعلقة بفرز النفايات من المصدر، و مفهوم اعادة الاستخدام و التدوير. وقف الفساد السياسي من خلال ممارسة الضغط على الحكومة لتحسين حالة إدارة النفايات الصلبة من خلال الاحتجاجات العامة، وضغوط المنظمات غير الحكومية . تحسين البنية التحتية لإدارة النفايات الصلبة وبناء مرافق مناسبة لإدارة النفايات الصلبة مثل مرافق استعادة المواد / إعادة التدوير، ومرافق سماد و مطامر صحية. تعزيز نظام جمع النفايات الصلبة عن طريق القيام بعقود مع شركات خاصة موثوقة. اللامركزية في قطاع النفايات الصلبة حيث تصبح كل بلدية مسؤولة عن النفايات الصلبة الخاصة بها. إقامة تعاون بين البلديات ومع القطاع الخاص لزيادة كفاءة النظام الحالي في إدارة النفايات الصلبة. اشراك عامة الشعب في عملية صنع القرار المتعلقة بقطاع إدارة النفايات الصلبة. تشجيع المنازل على فرز النفايات من المصدر لا يمكن القيام بأي شيء لتحسين هذه الحالة. غير ذلك حدد: ----- لا جواب لا اعرف	GQ-A23

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الحكومة البلدية المؤسسات الخاصة المنازل و عامة الشعب غير ذلك حدد: ----- لا جواب لا اعرف	1 2 3 4 96 98 99	من برأيك مسؤول عن إدارة النفايات الصلبة في قريرتك؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A24
→ GQ-A26 القطاع العام اي الحكومة و البلدية → GQ-A27 القطاع الخاص → GQ-A28 التعاون بين القطاعين: العام و الخاص لا جواب لا اعرف	1 2 3 98 99	أي مما يلي يعتبر الأفضل للتعامل مع إدارة النفايات الصلبة في لبنان؟	GQ-A25
القطاع العام موثوق و فعال أكثر الحكومة والبلديات تعرف احتياجات كل منطقة داخل لبنان. نحن راضون عن خدمات البلدية نحن ندفع رسوما للبلدية، وبالتالي يجب على القطاع العام التعامل مع خدمات ادره النفايات الصلبة. لا نريد ان يتحكم بنا القطاع الخاص غير ذلك حدد: ----- لا جواب لا اعرف	1 2 3 4 5 96 98 99	يرجى ذكر سبب اختيارك للقطاع العام واختيار جميع الإجابات المناسبة:	GQ-A26
القطاع الخاص موثوق و فعال أكثر لدى القطاع الخاص المزيد من الخبرات وقدرات تكنولوجية / مالية أفضل. القطاع العام غير موثوق به غير ذلك حدد: لا جواب لا اعرف	1 2 3 96 98 99	يرجى ذكر سبب اختيارك للقطاع الخاص واختيار جميع الإجابات المناسبة:	GQ-A27
ينبغي على القطاع العام أن يراقب السعر الذي يقترحه القطاع الخاص. ينبغي على القطاع العام أن يرصد ويقيم وينظم عمل القطاع الخاص. غير ذلك حدد: لا جواب لا اعرف	1 2 96 98 99	يرجى ذكر سبب اختيارك للتعاون بين القطاعين العام و الخاص واختيار جميع الإجابات المناسبة:	GQ-A28
نعم لا → GQ-A31 لا جواب لا اعرف	1 0 98 99	هل تعتقد أن سوء إدارة النفايات الصلبة يسبب مشاكل بيئية؟	GQ-A29
روائح بشعة مخاطر الحريق بسبب حرق النفايات الصلبة تلوث الهواء تلوث المياه تلوث التربة يؤثر على التنوع الايكولوجي و البيئي يؤدي الى الاحتباس الحراري غير ذلك حدد لا جواب لا اعرف	1 2 3 4 5 6 7 96 98 99	أي من المشاكل البيئية التالية قد تنتج عن سوء ادارة النفايات الصلبة؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A30
نعم لا → GQ-A33	1 0	هل تعتقد أن سوء إدارة النفايات الصلبة يسبب مشاكل صحية؟	GQ-A31

لا اعرف	99		
لا جواب	98		
امراض القلب و الشرايين	1	أي من المشاكل الصحية التالية قد تنتج عن سوء ادارة النفايات الصلبة؟ (الرجاء اختيار كل الخيارات المناسبة)	GQ-A32
امراض جلدية	2		
امراض في الجهاز التنفسي مثل الربو و الإنسداد الرئوي.	3		
السرطان	4		
حساسية	5		
الإسهال ومرض الكوليرا	6		
تكاثر الحشرات و البعوض	7		
جذب الحيوانات البرية	8		
غير ذلك حدد: -----	96		
لا اعرف	99		
لا جواب	98		
نعم	1	هل يعاني أي من أفراد عائلتك من أي مرض مؤخرًا؟	GQ-A33
لا (الذهاب الى القسم الثالث)	0		
لا جواب	98		
لا اعرف	99		

GQ-A34			
GQ-A34-4	GQ-A34-3	GQ-A34-2	GQ-A34-1
الارتباط بين المرض و سوء إدارة النفايات الصلبة (هل تعتقد أن المرض الذي يعاني منه احد أفراد عائلتك مرتبط مع سوء إدارة النفايات الصلبة في قرينك / لبنان؟)	المرض	العمر للفرد من العائلة	فرد من العائلة
1 نعم 0 لا		سنة _____	الفرد 1
1 نعم 0 لا		سنة _____	الفرد 2
1 نعم 0 لا		سنة _____	الفرد 3
1 نعم 0 لا		سنة _____	الفرد 4
1 نعم 0 لا		سنة _____	الفرد 5
1 نعم 0 لا		سنة _____	الفرد 6
1 نعم 0 لا		سنة _____	الفرد 7

القسم الثالث: رغبة المنازل في دفع مبلغ من المال مقابل تحسين خدمات إدارة النفايات الصلبة في قرية جديدة غزير/

لبنان:

تخيل أن بلدية جديدة غزير بالتعاون مع الشركة الخاصة " اكس " ستقدم خدمة محسنة لإدارة النفايات الصلبة في القرية. حالياً، يتم نقل النفايات الصلبة المختلطة التي تم جمعها من قرى كسروان للتخلص منها بشكل رئيسي في مكب النفايات "الكوستا برافا" بعد معالجة بسيطة، دون الأخذ بعين الاعتبار الآثار البيئية والصحية لهذا العمل.

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مع الخدمة الجديدة، من ناحية أخرى، سوف تشمل ما يلي:

• على كل منزل في القرية التقييد بفرز النفايات الصلبة الصادرة عن منزله.

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- جمع النفايات الصلبة المفترزة من المصدر ست مرات أسبوعياً بدلاً من ثلاث مرات أسبوعياً، مما يقلل من مقدار ورائحة النفايات المتراكمة.
 - إدارة النفايات غير القابلة للتحلل عن طريق إعادة التدوير.
 - إدارة النفايات العضوية القابلة للتحلل عن طريق تصنيع السماد الطبيعي.
 - إرسال النفايات الصلبة المتبقية للطرر في المطامر الصحية.
- ومع ذلك، فإن تنفيذ هذه الخطة يكلف المال. ولذلك، يطلب من المنازل الدفع لهذه الخدمة عن طريق رسوم إضافية على رسم البلدية السنوي. سيتم تنفيذ الخطة بعد عام واحد من الوقت الحاضر إذا كانت المنازل في قرينك، بما في ذلك منزلك، على استعداد للمساهمة بمبلغ كافٍ من المال.

HHW-A1	هل ترغب أسرتك في المشاركة في مشروع تحسين إدارة النفايات الصلبة المقترح الذي يتضمن فرز النفايات من المصدر من قبل كل منزل في القرية بما في ذلك منزلك؟	1 0	نعم لا
HHW-A2	هل ترغب أسرتك في دفع مبلغ من المال لقاء تحسين نظام خدمة إدارة النفايات الصلبة المشار إليه أعلاه؟	1 0	نعم ربما نعم ربما لا لا → HHW-A4
HHW-A3	ما هو المبلغ السنوي الذي ترغب أسرتك في دفعه مقابل خدمة إدارة النفايات الصلبة المحسنة؟	الرجاء اختيار المبلغ المالي من بطاقة المبالغ المالية أدناه إنهاء المقابلة →	
HHW-A4	إذا لم تكن أسرتك على استعداد لدفع أي مبلغ، فهل يمكنك إطلاعنا على السبب من فضلك؟ لا تقرأ الخيارات، اطلب منهم إطلاعك على السبب ومن ثم ناسب إجابته في واحدة أو أكثر من الخيارات المذكورة أو اشرح الخيارات الجديدة إلى جانب "غير ذلك حدد".	1 2 3 4 5 96 98 99	1 2 3 4 5 96 98 99 إنهاء المقابلة → لا جواب لا اعرف

0 L.L.	5,000 L.L.	10,000 L.L.	20,000 L.L.	30,000 L.L.	50,000 L.L.	70,000 L.L.	90,000 L.L.
110,000 L.L.	130,000 L.L.	150,000 L.L.	170,000 L.L.	190,000 L.L.	210,000 L.L.	230,000 L.L.	
250,000 L.L.	270,000 L.L.	290,000 L.L.	310,000 L.L.	330,000 L.L.	350,000 L.L.	370,000 L.L.	
390,000 L.L.	410,000 L.L.	430,000 L.L.	450,000 L.L.	470,000 L.L.	490,000 L.L.	510,000 L.L.	
530,000 L.L.	550,000 L.L.	570,000 L.L.	590,000 L.L.	620,000 L.L.	650,000 L.L.	680,000 L.L.	
710,000 L.L.	740,000 L.L.	770,000 L.L.	800,000 L.L.	830,000 L.L.	860,000 L.L.	890,000 L.L.	
920,000 L.L.	950,000 L.L.	980,000 L.L.	1,030,000 L.L.	1,080,000 L.L.	1,130,000 L.L.		
1,180,000 L.L.	1,230,000 L.L.	1,280,000 L.L.	1,330,000 L.L.	1,380,000 L.L.	> 1,380,000 L.L.		

APPENDIX II
THE CONSENT FORM AND THE QUESTIONS OF THE
INTERVIEW WITH THE MUNICIPALITY MAYOR OF
JDEIDET GHAZIR, HERHRAYA AND KATTINE

American University of Beirut

Faculty of Health Sciences

Study title: Factors Associated with People's Willingness to Pay for Better Solid Waste Management Services in Lebanese Rural areas: The Case of Jdeidet Ghazir

Qualitative Component

Oral Consent for Jdeidet Ghazir municipality mayor participation

Principal Investigator: Dr. Rima Habib
Co-investigators: Dr. Ali Chalak, Dr. Souha Fares
Address: American University of Beirut
Bliss Street
Beirut, Lebanon
Telephone: 01- 350 000 ext. 4620
Study site: Jdeidet Ghazir

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We are seeking an oral consent from Jdeidet Ghazir municipality mayor. Therefore no signature of the participant is required.

My name is Mary Abed Al Ahad, a graduate student in the Environmental Health Program at the American University of Beirut (AUB), I am conducting this research study as a partial fulfillment of my graduation.

Recruitment methodology: We will do an interview with Jdeidet Ghazir municipality mayor in the second phase of the research study. The municipality mayor will be invited to participate in the interview through a direct face to face invitation whereby the researcher is going to visit the municipality office asking the mayor for permission and appointment to conduct the interview.

You are invited to participate in a research study conducted by the Faculty of Health Sciences (FHS) at the American University of Beirut (AUB). You can request clarification or additional information at any time during the interview.

During the first phase of the study, all the households (334 households in total) which are located within the districts of Jdeidet Ghazir village in Lebanon were approached and a structured interview was held with a senior household adult member (homemaker or household head). In total, we were able to collect 228 complete survey responses. The survey included questions that aim at determining the factors associated with willingness to pay (WTP) for improved municipal solid waste management (MSWM) services in response to the current solid waste management crisis in Lebanon. The collected data will help policy makers

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and the municipality in taking adequate actions to improve the MSWM services in the village.

Currently, we are at the second phase of the study and we aim to conduct a qualitative interview with the municipality mayor of Jdeidet Ghazir to have a discussion regarding the potential implementation of the improved MSWM project. The interview will discover the motivation of the municipality for the successful implementation of the improved MSWM project. In addition, the interview will determine the challenges that prevented the municipality from enhancing the MSWM situation at the village previously and the needed support from the government. The interview will take around 30 minutes. Furthermore, the interview will be audio-tape recorded. During the interview, a private setting will be ensured and secured inside the municipality office and no one will be overhearing the interview. We do not expect any direct or indirect risks and there will be no cost or compensation or benefit for participation in this interview. In addition, there will be no foreseeable risks or discomforts beyond those encountered in daily life. The team will keep all records confidential and locked up in a closed cabinet at FHS all the time. Records will be monitored and may be audited by the study investigators and Institutional Review Board (IRB) without violating participant confidentiality.

I would like to tape-record this interview so as to make sure that I remember accurately all the information you provide. I will keep this tape in a secured manner on my laptop that is protected by a password and will only be used by me to take the necessary information. After transcribing the recorded interview and taking the essential information, the tape will be destroyed and the recorded interview will be erased from my laptop.

You have the right to accept or reject participating in this study. Your participation is completely voluntary. At any point during the interview, you have the right to refrain from answering or to stop participating in the study. In case you refuse to participate or decide to withdraw from this study, there will be no consequences or penalty, and no effect on your relationship with AUB/AUBMC. In addition, you may still be able to participate in the interview even if you refuse to be audio-tape recorded since handwritten notes will be taken instead by the researcher. The researcher Dr. Rima Habib is ready to answer any question and address any concern or complaint; you can contact her on the phone number: 01-350 000 ext. 4620. If you have questions about your rights as a participant in this research, you can contact the Institute Review Board office (IRB) at the American university of Beirut on the telephone number: 01350000 ext. 5440 and on the following email: irb@aub.edu.lb

Do you have any questions or clarifications about the study?

Researcher Approval:

I explained in details to the participant the nature and effects of the study and I answered all his/her questions clearly. I will let the participant know about any changes in the course of this research or negative effects or possible benefits in case they occur during the search. The participant will get a copy of this oral consent form.

Mary Abed Al Ahad

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Researcher's Name Researcher's Signature Date

Do you want to participate in the study?

Yes, I want No, I do not want

May I audio-tape record this interview?

Yes No

The oral consent was given in the attendance of the researcher

Mary Abed Al Ahad
Researcher's Name _____
Researcher's Signature _____
Date

May I use your position title "Municipality mayor of Jdeidet Ghazir" in the study report and in the publications related to this research study?

Yes No

The permission to use the position title of the municipality mayor of Jdeidet Ghazir

_____ _____
Municipality mayor Name Municipality mayor Signature Date

If no, the interview will be reported as being done with an employee in the municipality of Jdeidet Ghazir to respect and protect your confidentiality.

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The interview questions with Jdeidet Ghazir municipality Mayor

VDATE1	Interview date DD-MM _ _ - _ _	TS1	Start of Interview (time) hh-mm _ _ - _ _
		TE1	End of Interview (time) hh-mm _ _ - _ _
Interviewer: Mary Abed Al Ahad			
RESULT	Interview Status	Comments:	
	1 Interview completed		
	2 Partly completed		

1. How do you classify Jdeidet Ghazir, do you classify it as a village, a peri-urban, or an urban area?
2. Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects the environment?
3. Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects people's health?
4. Do you think that global warming (desertification, lack of rain, higher temperatures that we are currently experiencing) affects the solid waste issues and their management? How?
5. How does the municipality rate the efficiency of the current MSWM (municipal solid waste management) system in the village?
6. Is your municipality motivated to enhance the solid waste management system in the village to preserve the environment, health and wellbeing? Does the municipality already have plans for enhancing the MSWM system in the village?
7. What are the obstacles that faced the initiatives of the municipality to enhance the MSWM situation in the village?
8. How can the challenges be overcome?
9. By assessing the willingness to pay for improved MSWM project that includes refuse source-separation and recycling/ composting services, our study found that people are WTP (willing to pay) on average (73,377.19 L.L. per year per household) for the improved service and that the aggregate WTP amount in Jdeidet Ghazir village is (23,815,000 L.L. per year). Therefore, is your municipality willing to support the implementation of the above improved MSWM project?
10. What kind of support you would like to get from the government?
11. How will the support be given? For example is your municipality willing to contribute to the project by providing the needed education/ awareness for the residents regarding proper refuse source-separation, the needed recycling colored waste bags to the residents and the needed municipality solid waste recycling containers?

We have reached the end of this interview. Thank you very much for your time.

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الجامعة الأمريكية في بيروت

كلية العلوم الصحية

عنوان الدراسة: العوامل المرتبطة باستعداد المنازل في بلدة جديدة غزير لدفع مبلغ من المال لقاء تحسينات في خدمة جمع وإدارة النفايات المنزلية الصلبة

Qualitative Component

طلب موافقة رئيس بلدية جديدة غزير على المشاركة في المقابلة

الباحث الرئيسي: الدكتورة ريم حبيب

الباحثون المتعاونون: د. علي شلق, د. سها فارس

العنوان: الجامعة الأمريكية في بيروت, شارع بلس, بيروت, لبنان

الهاتف: 01/350000 مقسم: 4620

مكان اجراء الدراسة: بلدة جديدة غزير

في هذا المستند, نحن نطلب موافقة رئيس بلدية جديدة غزير الشفهية للمشاركة في المقابلة و بالتالي لن يتم اخذ امضاء لرئيس البلدية.

انا ميرري عبد الاحد, تلميذة في كلية الصحة في الجامعة الاميركية في بيروت. لقد قمت بهذه الدراسة كجزء من دراستي للماجستير البحثية في علوم الصحة البيئية.

منهجية التوظيف: سيتم اجراء مقابلة مع رئيس بلدية جديدة غزير في المرحلة الثانية من الدراسة البحثية. سيتم دعوة رئيس البلدية للمشاركة في المقابلة من خلال دعوة شفوية حيث سيقوم الباحث بزيارة مكتب البلدية شخصيا للحصول على إذن رئيس البلدية وتعيين موعد لإجراء المقابلة.

انت مدعوة (ة) للمشاركة ببحث علمي باشراف كلية العلوم الصحية في الجامعة الاميركية في بيروت. بإمكانك طلب ايضاحات أو معلومات إضافية عن أي شيء مذكور في هذه الإستمارة أو عن هذه الدراسة.

خلال المرحلة الأولى من الدراسة، تم الوصول إلى جميع الأسر (334 أسرة في المجموع) التي تقع ضمن قرية جديدة غزير في لبنان وتم إجراء مقابلة منظمة مع أحد افراد الأسرة الاساسيين (رب(ة) الأسرة). في المجموع، تمكنت من جمع 228 استبياناً كاملاً. تضمن الاستبيان أسئلة تهدف إلى تحديد العوامل المرتبطة باستعداد المنازل في بلدة جديدة غزير للاشتراك و المساهمة في خدمة تحسين إدارة النفايات الصلبة في البلدة استجابة لأزمة إدارة النفايات الصلبة الحالية في لبنان. ستساعد البيانات التي تم جمعها صانعي السياسات والبلدية في اتخاذ الإجراءات المناسبة لتحسين خدمات إدارة النفايات الصلبة في البلدة.

حالياً، نحن في المرحلة الثانية من الدراسة ونهدف إلى إجراء مقابلة و نقاش مع رئيس بلدية جديد غزير لاكتشاف ما إذا كانت البلدية مستعدة لدعم تنفيذ مشروع يهدف الى تحسين خدمة ادارة النفايات الصلبة في القرية. بالإضافة إلى ذلك، ستحدد المقابلة التحديات التي منعت البلدية من تحسين وضع النفايات الصلبة في القرية في السابق والدعم المطلوب من الحكومة. ستستغرق المقابلة حوالي ال 30 دقيقة من وقتك. سيتم تسجيل المقابلة صوتياً. خلال المقابلة، سيتم ضمان الخصوصية داخل مقر البلدية ولن يستمع احد الى المقابلة. لا يوجد اي ضرر مباشر او غير مباشر كما وانه لن يكون هنالك اي تكلفة او تعويض مادي للمشاركة في هذا البحث. بالإضافة إلى ذلك، لن تكون هناك مخاطر أو مضايقات متوقعة تتجاوز تلك التي تواجهها في الحياة اليومية.

يؤكد الفريق العمل على السرية التامة في الدراسة وأن المعلومات التي ستؤخذ من المقابلة ستُحفظ في خزانة مغلقة طوال الوقت في كلية العلوم الصحية في الجامعة الأمريكية في بيروت. هذه المعلومات ستكون متاحة فقط للباحثين الرئيسيين ولجنة الأخلاقيات في الجامعة الأمريكية في بيروت.

أرغب في تسجيل هذه المقابلة صوتياً للتأكد من أنني أتذكر بدقة جميع المعلومات التي تقدمها. سأبقي هذا التسجيل بطريقة آمنة على جهاز الكمبيوتر المحمول الخاص بي المحمي بكلمة مرور ولن يتم استخدامه إلا لأخذ المعلومات الضرورية. بعد نسخ المقابلة المسجلة وأخذ المعلومات الأساسية، سيتم تدمير التسجيل و مسح المقابلة المسجلة من جهاز الكمبيوتر. لديك الحق في الموافقة أو رفض المشاركة في هذا البحث. ان مشاركتك في هذا البحث هو عمل تطوعي. في حال الإنزعاج من اي سوال في المقابلة، يحق لك الامتناع عن الاجابة او التوقف عن المشاركة في البحث. في حال رفض المشاركة في هذه الدراسة، لن تترتب على المشترك او اي من افراد المنزل اية عواقب او أي فقدان للمزايا التي يحق لك خلاف ذلك وليس لها تأثير على علاقتك مع الجامعة الأميركية في بيروت / مستشفى الجامعة الأميركية في بيروت. بالإضافة إلى ذلك، ستظل قادرًا على المشاركة في المقابلة حتى إذا كنت لا توافق على التسجيل الصوتي للمقابلة كونه سيتم أخذ الملاحظات المكتوبة بخط اليد من قبل الباحث.

ان الباحثة الدكتورة ريماء حبيب مستعدة للاجابة على اية اسئلة، و باستطاعتك (ي) الاتصال با على الهاتف 01-350000 المقسم 4620. كما يمكنك الاستفسار عن اي موضوع متعلق بالبحث او تقديم اي شكوى بالاتصال معي على رقم الهاتف: 70-205652 او على البريد الالكتروني mja52@mail.aub.edu.

إذا كانت لديك أسئلة حول حقوقك كمشارك في هذا البحث، يمكنك الاتصال بمكتب لجنة الاخلاقيات في الجامعة الأميركية في بيروت على رقم الهاتف: (01350000 المقسم 5440) او على البريد الالكتروني: irb@aub.edu.lb

هل لديك اية اسئلة او ابصاحات عن هذه الدراسة البحثية؟

موافقة الباحث: لقد شرحت بالتفصيل للمشارك طبيعة البحث و مجرياته و تأثيراته. و لقد اجبت على كل اسئلته بوضوح على خير ما أستطيع. و سوف اعلم المشترك باي تغييرات في مجريات هذا البحث او تأثيراته السلبية او فوائده في حال حصولها اثناء البحث. سوف يحصل المشترك على نسخة من طلب الموافقة الشفهية على المشاركة في هذا البحث.

ميري عبد الاحد
اسم الباحث

التاريخ

توقيع الباحث

هل تريد المشاركة في هذا البحث؟

كلا، لا اريد

نعم اريد

هل يمكنني تسجيل هذه المقابلة صوتياً؟

لا

نعم

تم الموافقة بحضور الباحث

ميري عبد الاحد

التاريخ

توقيع الباحث

هل يمكنني استخدام اسم المنصب الوظيفي لحضرتك "رئيس بلدية جديدة عزيز" في تقرير الدراسة والمنشورات المتعلقة بهذه الدراسة البحثية؟

لا

نعم

موافقة رئيس بلدية جديدة عزيز لاستخدام اسم المنصب الوظيفي الذي يشغره

التاريخ

توقيع رئيس البلدية

اسم رئيس البلدية

في حال الرفض: www.aub.edu.lb/irb تقرير الدراسة على انها اجريت مع احد الموظفين في البلدية للحفاظ على السرية التامة لحضرتك.
American University of Beirut

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أسئلة المقابلة مع رئيس بلدية جديدة غزير باللغة العربية

تعريف الاستمارة		
البرنامج		
VDAT 1	تاريخ المقابلة	شهر - يوم
	بدء المقابلة (الوقت)	دقيقة - ساعة
	انتهاء المقابلة (الوقت)	دقيقة - ساعة
الباحث: ميري عبد الاحد		
RESULT	نتيجة المقابلة	ملاحظات:
1	مقابلة مكتملة	
2	مقابلة جزئية	

1. كيف تصنف حي جديدة غزير ، هل تصنفه كقرية أو منطقة شبه حضرية أو منطقة حضرية؟
2. هل تعتقد إن التغير المناخي (التصحر، قلة الأمطار، ارتفاع درجات الحرارة التي نعيشها هذه الأيام) تؤثر على البيئة؟
3. هل تعتقد إن التغير المناخي (التصحر، قلة الأمطار، ارتفاع درجات الحرارة التي نعيشها هذه الأيام) تؤثر على مشكلة النفايات وإدارتها؟
4. هل تعتقد إن التغير المناخي (التصحر، قلة الأمطار، ارتفاع درجات الحرارة التي نعيشها هذه الأيام) تؤثر على الصحة العامة؟
5. كيف تقيم البلدية كفاءة نظام إدارة النفايات الصلبة في القرية؟
6. هل البلدية على استعداد لتعزيز نظام إدارة النفايات الصلبة في القرية حفاظا على البيئة والصحة العامة؟ هل لدى البلدية بالفعل خطط لتعزيز نظام إدارة النفايات الصلبة في القرية؟
7. ما هي العقبات التي واجهت مبادرات البلدية لتعزيز وضع إدارة النفايات الصلبة في القرية؟
8. كيف يمكن تخطي هذه العقبات؟
9. من خلال تقييم استعداد ابناء قرية جديدة غزير لدفع مبلغ من المال لقاء مشروع تحسين إدارة النفايات الصلبة التي تشمل خدمة فرز النفايات من المصدر وإعادة التدوير / تصنيع السماد، وجدت دراستنا أن الناس هم على استعداد لدفع (73,377.19 ل.ل. كمتوسط في السنة لكل منزل) لتحسين الخدمة و ان مجموع متوسط المبلغ المالي المستعد دفعه في قرية جديدة غزير هو (23,815,000 ل.ل. في السنة). لذلك، هل البلدية على استعداد لدعم تنفيذ مشروع تحسين إدارة النفايات الصلبة المذكور أعلاه؟
10. ما هو نوع الدعم الذي تريد ان تحصل عليه البلدية من الدولة؟
11. كيف سيتم تقديم الدعم؟ على سبيل المثال، هل البلدية مستعدة للمساهمة في المشروع من خلال توفير التوعية اللازمة للسكان فيما يتعلق بفرز النفايات الصلبة من المصدر بطريقة صحيحة، وتقديم أكياس فرز النفايات الملونة لإعادة التدوير إلى السكان وتوفير حاويات إعادة تدوير النفايات الصلبة المطلوبة؟

Institutional Review Board
لقد وصلنا إلى نهاية هذه المقابلة. شكرا جزيلاً على وقتك.
American University of Beirut

13 AUG 2018

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APPENDIX III
THE GEOGRAPHICAL LOCATION OF JDEIDET
GHAZIR VILLAGE



The Map of Lebanon showing the Lebanese districts including Kesrouane district (Hdeib et al., 2012).



The location of Jdeïdet Ghazir village in Kesrouane district and its immediate surrounding villages (localiban, 2016).

APPENDIX IV THE CADASTRAL MAP OF JDEIDET GHAZIR VILLAGE



Jdeidet Ghazir cadastral map showing the streets and sub-streets as well as the land parcels and households that belong to the village (obtained from the municipality of Jdeidet Ghazir, Herhaya, and Kattine).

APPENDIX V DEFINITION OF IMPORTANT CONCEPTS

Household

According to Wilk & Rathje (1982), “A household is defined as a group of people living under a single roof and cooperating economically on a daily basis”. In the concept of this study, the household is a social unit that includes one or more people living under the same roof and sharing their monthly income to meet their basic needs of food and shelter as well as other social needs such as paying for MSWM services.

Solid waste

Solid waste is a waste material that has a solid or semi-solid nature and is discarded for its inherent value without expecting any compensation for it (Khattak et al., 2009). Solid waste is generated by human activities and is classified into residential solid waste (generated mainly by households), industrial solid waste (generated mainly by industries), commercial solid waste (generated mainly by commercial centers such as food markets and offices), agricultural solid waste (generated mainly by farmers), and medical solid waste (generated mainly by hospitals) (Lunojo, 2016). The residential solid waste is mainly composed of the organic biodegradable and the non-biodegradable portions. The organic biodegradable portion (degraded by microorganisms) contains food and vegetables remaining, and garden waste while the non-biodegradable portion contains plastics, paper and cardboard, metals, glass and wood (Zabaleta, 2008).

Municipal Solid waste management (MSWM)

Municipal solid waste management aims to properly manage the generated solid waste from various human activities to preserve the environment and public health. It involves the following main activities: collection, transfer/transport, storage, treatment, and disposal of the generated solid waste (Sharholy et al., 2008). MSWM evolved historically from open dumping and open burning in ancient civilizations to a more complex collection, treatment and disposal systems that employ sophisticated technology in our modern world (Raglin, 2013). MSWM in developing countries has been practiced either by the government or the municipalities but this type of management is characterized by inadequate collection frequency and inappropriate disposal of solid waste. As a result, many communities started to consider privatization of the solid waste management sector (Hagos et al, 2012).

MSWM collection services

Solid waste collection services involve collection of solid waste from households, institutions, businesses, industries, and commercial places; the collected solid waste is then loaded into collection vehicles and transported into a material recovery facility for further treatment or final disposal (Eheliyagoda, 2015). Further treatment involves segregation of non-biodegradable material for recycling from the biodegradable organic material used to produce compost. While the rest of the unrecovered waste is either landfilled or incinerated (Eheliyagoda, 2015). Three options are available for the collection of municipal solid waste. The first option is mixed refuse collection which involves the collection of mixed non-separated solid waste in one collection vehicle with one compartment (Dubanowitz, 2000). This type of collection is

employed currently by RAMCO as part of its SW collection services in Jdeidet Ghazir village. The second option is the recyclables collection which is the collection of common-mingled source separated recyclables in one collection vehicle with two compartments, segregating paper recyclables from non-paper recyclables (Dubanowitz, 2000). Finally the Co-collection option, is the collection of mixed solid waste and source separated recyclables in one collection vehicle; households will place the source separated recyclables in colored waste bags (Dubanowitz, 2000).

Recycling and composting of municipal solid waste

Municipal solid waste can be collected as either common-mingled waste or as a source separated waste. Common-mingled waste needs to be transported into a material recovery facility for separation and recovery processes (Eheliyagoda, 2015).

Following the separation of the collected solid waste into bio-degradable and recyclable portion, the bio-degradable portion will be treated to produce a compost product, which is used in agriculture practices as soil fertilizer. The compost can be produced in three different ways: in piles, in silos and in rotary drums, however all the methods involve the same process of introducing microorganisms under aerobic condition to transform the waste into compost. (Zabaleta, 2008).

The recyclable portion will be further separated either mechanically or manually into metals, plastics, glass, paper and cardboard, and wood. Then each category of the recyclables will be treated, processed, packaged, and sent to the appropriate industries to be used as raw materials (Dubanowitz, 2000).

Willingness to pay (WTP)

Willingness to pay concept is employed by many stated preference economic valuation studies such as contingent valuation studies and aims to assess the public's motivation to preserve certain environmental goods and maximize their potential utility benefits (Lunojo, 2016). The maximum WTP amount for environmental goods is related to the maximum amount of money that consumers can pay based on their revenue without affecting their current lifestyle (Lunojo, 2016).

APPENDIX VI
LITERATURE REVIEW ON WILLINGNESS TO PAY FOR IMPROVED MSWM SERVICES AND ITS ASSOCIATED FACTORS

Author & year	City/ country	Survey method	Sample size	Project evaluated	Valuation method	WTP question format	Additional design features	Mean HH annual WTP	Strong determinants of WTP	Policy implications
Alhassan et al. (2017)	Tamale metropolitan area/ Ghana	Face-to-face interviews	120 HHs	Improved solid waste management	Contingent valuation	Open ended question for maximum WTP	The survey sections dealt with: the WTP scenario and the socio-economic characteristics. Ordered Probit regression model was used to determine the association between WTP and socio-economic factors.	Maximum WTP amount ranged from \$5.28 to \$66.24	Gender, marital status, age, education level, and income.	The study recommends that policy makers generate a flat fee that is charged based on the economic and educational status of each household; ie. Poorer and less educated households should pay a lower flat fee for improved solid waste management services. Also, more information should be available to the public regarding improved MSWM services to elicit high WTP amounts.
Bhattarai et al. (2017)	Birendranagar municipality/ Nepal	Face-to-face interviews	300 HHs	Improved solid waste management	Contingent valuation	Single bounded dichotomous choice	The questionnaire included WTP scenario section, general section on the situation of SWM in the municipality and a socio-demographic section.	\$16.72	Age, household size, bid amount, level of education, present waste collection service and level of income.	The study results offer policy makers the opportunity to collect sufficient funds for the provision of better SWM services in Birendranagar municipality which will enhance the welfare of households. The municipality should offer awareness educational campaigns for the residents. Also, it should increase its solid waste collection coverage because the study showed that only 26.7% of the households are getting the collection service.
Al-Khateeb et al. (2017)	Ramallah & Jericho/ Palestine	Face-to-face interviews	370 HHs	Sustainable solid waste management system	Contingent valuation	N/A	The questionnaire focused on demographic and socio-economic characteristics of the respondents, SWM in the study area, environmental concerns, awareness status, waste separation at the source, recycling and reuse, and willingness to pay for improved SWM services. The analysis was carried out using logistic regression.	N/A	Dwelling premise, gender, education level, and education on waste management.	The study suggests that awareness and educational programs regarding solid waste management should be enhanced. In addition, the solid waste management policy in Palestine should be upgraded to include the 3Rs approach of reduce, reuse, and recycle. Also, the government should encourage the private sector to invest in the MSWM services such as the collection, sorting, and recycling services.
Maskey & Singh (2017)	Gorkha/ Nepal	Face-to-face interviews	401 HHs	Improved waste collection services	Contingent valuation	Open-ended question	Two analysis levels were conducted: the first one is logistic regression to estimate the determinants of WTP for improved MSWM services; the second one is logit Tobit model to estimate the determinants of the maximum WTP amount of money for improved MSWM services.	\$8.64	Income, education, environmental awareness, and waste collection service.	Policy makers at Gorkha municipality should take into consideration the results of this study to charge households with a MSWM fee for the purpose of improving the situation of MSWM in Gorkha. Also, policy makers should conduct awareness campaigns to educate the public about the adverse effects of improper MSWM services on the environment.
Patrick et al. (2017)	Akwa Ibom/ Nigeria	Face-to-face interviews	160 HHs	Improved solid waste management	Contingent valuation	Dichotomous choice question	Descriptive statistics such as mean and standard deviation were used to analyze the collected data.	\$20.64	Education, household monthly expenditure, age, and environmental and health awareness regarding MSWM.	Policy makers should use the results of this study to construct an optimal, socially acceptable charge for MSWM services in Uyo, Nigeria. Also, policy makers should conduct awareness campaigns to educate the public about the importance of clean and safe environment with an aim of increasing the percentage of WTP responses for improved MSWM services.
Trang et al. (2017)	Thu Dau Mot city/ Vietnam	Face-to-face interviews	330 HHs	Improved solid waste management	Contingent valuation	Dichotomous choice question	The survey was divided into 4 sections dealing with: socio-economic characteristics, respondents' environmental awareness, problems with the current management system, and the contingent valuation scenario of WTP respectively. Logistic regression was used to determine the factors associated with the WTP.	\$12.64	Gender, income, education level, starting bid, and environmental awareness.	Policy makers should take advantage of the fact that households are eager to pay for improvements in the MSWM services and set a socially acceptable charge to improve the situation. Also, the municipality should increase the provision of environmental awareness campaigns.

Author & year	City/ country	Survey method	Sample size	Project evaluated	Valuation method	WTP question format	Additional design features	Mean HH annual WTP	Strong determinants of WTP	Policy implications
Challcharoen-wattana & Pharino (2016)	Thailand	Face-to-face interviews	1350 HHs	Municipal waste recycling services in least urbanized, urbanized and most urbanized areas	Contingent valuation	Payment card	The study area was divided into least urbanized, urbanized and most urbanized. The questionnaire consisted of three sections dealing with attitude and management of MSW, WTP for MSW recycling, and the socio-economic status.	\$8.76 (least urbanized areas) \$23.52 (urbanized) \$19.8 (most urbanized)	Urbanization level, gender, income level, education level, age, household size, municipal solid waste generation rate, perception toward solid waste management crisis, and MSW source-separation.	According to the study: "policies, incentives and pricing of MSWM should be tailored to suit the local context and not be a "one-size fits-all" scheme as it is currently implemented in Thailand".
Zeng et al. (2016)	China	Face-to-face interviews	518 HHs	Rural solid waste separation and management	Contingent valuation	Payment card	Rural household was chosen as the unit of sample and analysis. The survey consisted of four parts dealing with: households' behavior and perceptions, attitude, awareness and knowledge toward source separated collection, socio-economic characteristics, and the WTP scenario.	\$3.98	Age, gender, education, household income, household location, perceptions of rural solid waste treatment.	The study suggests that policy makers should establish pilot programs of RSW separation at source and improve RSW collection and management services by making use of the rural households' WTP amounts in addition to the governmental financial budget.
Nkansah et al. (2015)	Tema Metropolis/ Ghana	Face-to-face interviews	156 HHs	Improved solid waste disposal services.	Contingent valuation	N/A	Tobit regression analysis was used to determine the factors associated with the WTP amount.	N/A	Age, education, number of dependents, income, and household size.	The study recommends that the government should cooperate with private companies to invest in solid waste recycling as an effective solution for the waste disposal problem in Tema Metropolis. Also, the government should be well resourced to be able to enforce sanitary MSWM laws. Moreover, policy makers should conduct awareness campaigns to educate the public about the adverse effects of improper MSWM services on the environment.
Zen & Siwar (2015)	Kuala Lumpur/ Malaysia	Face-to-face interviews	460 HHs	Curbside recycling scheme	Contingent valuation	Open-ended question	The study design included the willingness to separate, then the willingness to support curbside recycling and then the willingness to pay for curbside recycling collection.	\$30	Collection rate, age, gender, income, education level and respondents' attitude toward recycling.	Policy makers should use the study findings to improve the recycling program in this country and to provide the adequate finance for it.
Ferreira & Marques (2015)	Portugal	By email	1186 HHs	Municipal packaging waste selective collection	Contingent valuation	Dichotomous choice single bounded	The survey was divided into three sections dealing with their current recycling practice/ attitude, socio-demographic characteristics and WTP scenario.	\$42.81	Income, age, gender, waste fee, recycling practice, education, occupation.	The government should establish a charging system according to the amount of waste produced per household.
Wang et al. (2014)	Yunnan/ China	Face-to-face interviews	223 HHs	Solid waste collection and disposal services	Contingent valuation	Multiple bounded discrete choice	"Among the surveyed households, 110 households are located in the area where a waste collection and disposal system is available, with 37 households located near the existing garbage dumpsite. The remaining 113 households are located in three towns that will be newly covered by the project". The survey consisted of four sections dealing with: socio-economic data, environmental perceptions, current SW situation and the WTP scenario.	\$30.96	Education, age, gender, household income, marital status, family size, current cleaning services, project implement trash site, new coverage, government responsibility.	This study can be applied in benefit transfer studies to extrapolate a confidence interval for the social benefits of similar projects in other rural regions in China.

Author & year	City/ country	Survey method	Sample size	Project evaluated	Valuation method	WTP question format	Additional design features	Mean HH annual WTP	Strong determinants of WTP	Policy implications
Addai & Danso-Abbeam (2014)	Dunkwa-on-Offin/ Ghana	Face-to-face interviews	100 HHs	Improved solid waste management	Contingent valuation	Double bounded dichotomous choice question.	In the sampling process, households were stratified according to their income level as low, middle, and high income groups. Logit regression was used to estimate the determinants of WTP responses. In addition, the study examined the level of respondent satisfaction with the existing solid waste collection services in Dunkwa-on-Offin.	\$29.64 (high income group) \$20.4 (middle income group) \$12 (low income group)	Gender, age, education level, income level, and household size.	Policy makers should take advantage of the fact that people are willing to pay for improved MSWM services and improve the situation. Moreover, policy makers should conduct awareness campaigns to educate the public about the adverse effects of improper MSWM services on the environment. The municipality should strengthen the capacities of stakeholders involved in solid waste collection services to provide a satisfactory and improved service to the households.
Olojede & Adeoye (2014)	Akinyele state/ Nigeria	Face-to-face interviews	120 HHs	Improved solid waste management	Contingent valuation	Dichotomous choice question.	Four versions of the WTP structured questionnaire were administered randomly to the respondents' households; each version included one of four methods of solid waste collection (communal container, vehicle in the neighborhood, communal container with door to door collection, and only door to door collection) with four different monthly prices of 1.39\$, 1.94\$, 2.5\$, and 2.78\$ respectively. Logit regression was used to estimate the determinants of WTP responses.	\$22.89	Age, education level, household size, and the price of the suggested service.	The majority of people are willing to pay for the low price collection service as compared to the high price collection service. Policy makers and local authorities should make use of the study results to improve the solid waste management situation in Akinyele state and enhance the waste collection services. Awareness campaigns about the improvements in environmental quality as a result of proper MSWM services should be conducted by the municipality to elicit the households' WTP.
Roy & Deb (2013)	Cachar district/ Silchar/ India	Face-to-face interviews	378 HHs	Improved waste management services	Contingent valuation	Open-ended question	Descriptive analysis was carried out to discover the method of waste disposal adopted by the HHs and the level of household satisfaction regarding MSWM activities. Multiple regression analysis was carried out to estimate the determinants of the maximum WTP amount for improved MSWM services.	\$23.89	Income, education, environmental awareness, family size, occupation.	The MSWM activities taken by the households and municipalities are not up to a satisfactory level. Thus, the municipality should take advantage of fact that households are willing to pay some amount of money to improve the situation of MSWM in the community.
Awunyo-Vitor et al. (2013)	Kumasi metropolit an/ Ghana	Face-to-face interviews	600 HHs	Improved solid waste disposal services	Contingent valuation	Open-ended maximum WTP question	Two analysis levels were conducted: the first one is logistic regression to estimate the determinants of WTP for improved MSWM services; the second one is logit Tobit model to estimate the determinants of the maximum WTP amount of money for improved MSWM services.	\$21.6	Income, age, quantity of waste generated, education, house ownership, and number of children	Policy makers should take advantage of the fact that people are willing to pay for improved MSWM services and improve the situation. Policy makers should charge a fee for the improved MSWM services in accordance with the income level of the households. Also, the municipality should conduct awareness campaigns to inform people about the importance of the polluter-pays principle and the effect of improved MSWM services on the socio-economic development of the nation.
Ezebilo (2013)	Ilorin/ Nigeria	Face-to-face interviews	330 HHs	Improved residential waste collection services.	Contingent valuation	Dichotomous choice	The survey sections dealt with: the WTP scenario, the socio-economic characteristics, and questions about the solid waste management situation.	\$23.76	Price of the current service, income, education, gender, time to travel to the nearest residential waste collection point, household size, dwelling type, whether the respondent is happy with private waste management.	This study will help to determine the amount of money that residents are willing to pay for improved residential waste collection services which will help policy makers and waste management authorities to negotiate with private firms to come up with a collection price that is socially acceptable and to reduce the incidence of illegal dumping. The study should also help authorities to increase the effectiveness of sanitary inspectors. The waste inspectors should pay more attention for performance monitoring of the private sector.

Author & year	City/ country	Survey method	Sample size	Project evaluated	Valuation method	WTP question format	Additional design features	Mean HH annual WTP	Strong determinants of WTP	Policy implications
Alhassan & Mohammed (2013)	New Juaben/ Ghana	Face-to-face interviews	200 HHs	Households' demand for better solid waste disposal services in four communities of the study area.	Contingent valuation	Single bounded dichotomous choice	The survey consisted of four sections dealing with: identification, socio-economic characteristics, current situation regarding solid waste disposal, and the improved situation and WTP scenario.	\$22.2	Environmental safety concern, level of satisfaction with the current waste disposal services, education, gender, household size, length of stay at the current residence, walking time to the dumpster place.	The results of this study can be used for further research about WTP for improved solid waste disposal services such as cost benefit analysis to derive better and more reliable solid waste management practices at the municipality level. The study advocates for the municipality to create environmental awareness programs in the community to emphasize the cost sharing concept for a cleaner environment. The computation of mean WTP for the four communities can help find the effect of place of resident on the WTP.
Hazra et al. (2013)	Kolkata/ India	Face-to-face interviews	529 respondents	Solid waste management service attributes	Choice experiment	Stated preference choice	The survey was divided into three sections dealing with: respondents' socio-economic characteristics, choice from a set of choices, and the characteristics of the existing MSWM services respectively. Multinomial logit model was used for the analysis of WTP and its associated factors.	\$3.25	Income, gender, education, walking time from the dumpster, solid waste collection type/ frequency, and source- separation.	Policy makers should take an advantage that respondents are willing to pay for improvements in the MSWM services and increase the MSWM tax to improve the situation.
Nor Rahima et al. (2012)	West Malaysia	Face-to-face interviews	300 HHs	Introducing integrated solid waste management	Contingent valuation	Single bounded Dichotomous choice	The survey included three sections that dealt with: perceptions and awareness about SW and environmental problems, socio-economic characteristics, and the WTP scenario.	\$52.8	Age, gender, education, household size, income, occupation, environmental and SW perception.	Integrated solid waste management should be introduced by authority intervention. The integrated solid waste management policies should be able to enhance the community participation in the 3 Rs initiatives.
Joel et al. (2012)	Eldoret/ Kenya	Face-to-face interviews	199 HHs	Improved solid waste management	Contingent valuation	Open-ended question	The survey included three sections that dealt with: perceptions and awareness about SW problems, socio-economic characteristics, and the WTP scenario.	\$42.2	Income, education, age, gender, employment, house ownership, total disposal methods available to households.	The government and policy makers can use this study to determine taxable revenues and charges for solid waste services that are socially accepted by the community.
Zhang et al. (2012)	Shanghai / China	Face-to-face interviews	432 HHs	Public opinion about source-separation of municipal solid waste in four different types of communities	Contingent valuation	Dichotomous choice	The survey consisted of four sections dealing with: socio-economic characteristics, respondents' awareness and knowledge for MSW source-separation, respondents' behavior and action regarding generated kitchen waste, and the WTP scenario.	\$61.68	Gender, age, family size, education, occupation, location of the household, income, starting bid, type of community, years at current address.	The study suggests that to reduce the amount of municipal solid waste disposal by 50% per capita by 2020, the attitudes and behaviors of citizens should be taken into consideration. Effort should be made to extend pilot areas and to promote source- separation of kitchen waste. Also, "local authorities should create and enforce practical laws and regulations that should guarantee the success of a separation program". Policy makers should recognize several types of policies such as: pay per generated waste bag, pay per the size of household as well as the population pricing system.
Afroz & Masud (2011)	Kuala Lumpur/ Malaysia	Face-to-face interviews	500 HHs	Municipal waste collection service for 2 versions of questionnaire	Contingent valuation	Dichotomous choice	Two versions of the questionnaire were administered; one of the versions included recycling and separation at source while the other did not. The questionnaire consisted of three sections dealing with respondents' awareness and attitude toward environmental and SWM problems, the hypothetical scenario and the WTP, and socio-economic characteristics.	\$82.68 (the average of mean WTP from the 2 versions).	Age, education, income, starting bid, concern about MSWM, & satisfaction on waste collection services. Also, HHs declined their WTP when asked to source separate their generated waste.	Policy makers should use the set of scenarios proposed by the study according to the WTP amount to build an enhanced waste management project for Kuala Lumpur. Education should be implemented by the government to raise environmental consciousness among the households and encourage the 3Rs concept of reduce, reuse and recycle after waste separation at source.

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Ezebilo & Animasaun (2011)	Southwest Nigeria	Face-to-face interviews	224 HHs	Private sector solid waste management services	Contingent valuation	Payment card	The survey included the WTP scenario section and the socio-economic characteristics section.	\$30.6	Income, education, activities of sanitary inspectors, house type and occupation.	The government should actively monitor the solid waste management services provided by private companies. Also, policy makers can use the study findings to improve the solid waste management systems towards more sustainable ones.
Banga et al. (2011)	Kampala city/ Uganda	Face-to-face interviews	381 HHs	Household WTP for improved door to door solid waste collection services.	Contingent valuation	Double bounded dichotomous choice	To reduce hypothetical bias, the “cheap talk” method was used to remind participants that this is a hypothetical scenario. The households were informed about the current waste management situation before asking them about their WTP.	\$8.04	Income, education, age, home ownership, household size, gender, household paying for SW collection services, household viewing solid waste as a major problem, household being located in Kawempe division.	The WTP amount proposed by the majority of people can be used to overcome the problem of free-rider by introducing a socially acceptable fee for SW collection services. Then, the government can sponsor private companies if needed.
Jones et al. (2010)	Mytilene/ island of Lesbos/ Greece	Post mail	140 HHs	Market-based policy aiming on solid waste management	Contingent valuation	Open- ended question	The survey was organized into three sections dealing with: respondents’ perception regarding MSWM policies, respondents’ environmental behavior, socio-demographic characteristics, and WTP hypothetical scenario respectively. Confirmatory factor analysis with weighted least squares was employed to analyze the WTP and its associated factors.	\$0.51 per one waste bag	Social capital, perception regarding compliance of fellow citizens, perception of the effectiveness of the proposed policy, and income.	Most of the respondents were not in favor of the improved policy regarding MSWM due to low environmental awareness and low levels of trust in governmental institutions. Therefore, the study suggests the public be involved during the decision-making process and the implementation of the proposed policy. The government should also encourage the participation of the state actors and the citizens in the solid waste management schemes.
Sarkhel & Banerjee (2010)	West Bengal/ Bali municipality/ India	Face-to-face interviews	570 HHs	Improved solid waste management services and stakeholders attitudes	Contingent valuation	Double bounded dichotomous choice	The sample was divided into high, medium and low slum population based on their income level. The focus in the WTP scenario was on two aspects: replacement of open dumps with sanitary landfills and production of compost from the biodegradable portion generated by the daily household waste.	\$3.53	Age, gender, education, income, initial bid, ranking of garbage problem, possibility of social sanctions for non-conforming households.	This study demonstrates the net benefits of the improved municipal solid waste management projects to help policy makers in the decision process. The high level of acceptability by respondents for the project can help the local body that is arguing in favor of this project. Also, the mean WTP can be aggregated to approximate the amount of money that the population is going to offer for the improved solid waste management services.
Pek & Othman (2010)	Malaysia	Face-to-face interviews	873 HHs	Household demand for solid waste disposal options	Contingent valuation	Open-ended question	The study compared between mean WTP for a sanitary landfill versus incineration as a final disposal method suggesting that sanitary landfill is a more preferable method. The survey consisted of three sections dealing with: the respondents’ concern about the environment/ SWM problems, the WTP scenario and the socio-demographic characteristics.	\$11.28 (total mean WTP) \$12.72 (sanitary landfill) \$8.88 (incineration)	Where the rubbish is disposed, age, ownership of the household, household income, format of the contingent valuation question.	This study showed that policy makers should address the naming of the technology used for disposal of SW and provide transparent information for the public before putting it into use. Since the respondents do not prefer incineration because it is hazardous to the environment and public health, so policy makers should educate people about the benefits of incineration or use an alternative name that doesn’t stereotype incineration as a hazardous method. Also, policy makers should try to use landfills because it is more publicly acceptable. The policy makers especially the government and ministry of housing and local governments can use the aggregated mean WTP to identify a SW disposal plan that can yield maximum net benefit for the Malaysian community.
Niringiye (2010)	Kampala city/ Nigeria	N/A	182 HHs	Improved solid waste management	Contingent valuation	Dichotomous choice	The sample was divided into low and high income groups. The survey sections dealt with the WTP scenario and socio-demographic characteristics	N/A	Age, income, education, gender, household size, quantity of waste generated. Age was the only variable to be significantly associated with WTP.	“There is little chance of success if solid waste collection service charges are introduced”. Also, the government should concentrate on doing awareness campaigns to educate the residents about the importance of proper SWM and the benefits associated with paying for such services before implementing an improved solid waste management plan in Kampala city.

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Afroz et al. (2009)	Dhaka / Bangladesh	Face-to-face interviews	480 HHs	Door to door Waste collection system	Contingent valuation	Double bounded dichotomous choice	The questionnaire consisted of three sections dealing with respondents' awareness and attitudes toward environmental and SWM problems, the hypothetical scenario and the WTP, and socio-economic characteristics.	\$2.16	Gender, age, number of family members, education, income, starting bid, concern about SWM, satisfaction on MSW collection services, and MSW source-separation.	Policy makers should use the set of scenarios proposed by the study according to the WTP amount to improve the solid waste management system in Dhaka city. And according to the study: "Any policy proposal that affects solid waste management in Dhaka must be comprehensive, integrated, and incentive-compatible while still yielding the required environmental impacts".
Rahji & Olonrunoba (2009)	Ibadan/ Nigeria	Face-to-face interviews	552 HHs	Private solid waste disposal systems	Contingent valuation	Dichotomous choice	The survey collected information on the WTP for private solid waste disposal systems and about the socio-economic characteristics.	\$10.69	Income, asset owned, firm services, education, occupation, age, income, household size, gender.	The government intervention is highly recommended by this study in various ways such as: encouraging public-private participation in solid waste disposal, an aggressive environmental clean-up campaign, decentralization of Waste Management Boards and privatization of some aspects of waste management to improve environmental and public health.
Khattak et al. (2009)	Pakistan	N/A	216 HHs	Better solid waste management services	Contingent valuation	N/A	The survey sections included: awareness of solid waste management, socio-economic characteristics, and the WTP scenario.	\$12.66	Household size, income and education level, awareness to solid waste management, disease history.	Policy makers should advocate for the establishment of recycling plants for environmental improvements as well as creating job opportunities for people. Also, the government should satisfy the public demand for better solid waste management services since they are willing to pay.
Ichoku et al. (2009)	Enugu metropolis/ Nigeria	Face-to-face interviews	200 HHs	Measuring household valuation for improved solid waste management	Contingent valuation	Stochastic payment card	The usage of stochastic payment card to elicit the WTP in which the respondent is presented with a set of WTP values where each value is assigned a certain probability creating a likelihood matrix for each respondent that can be presented in terms of cumulative valuation distribution function.	\$19.2	Age, gender, education, income, occupation, household size, participation in public awareness campaigns, perception of environmental quality, household waste generation, and trust in fund.	This study can be used and compared to other developmental projects in the state for funding opportunities. It is a participatory approach because it can engage the public and policy experts in a dialogue. It can be used to design new solid waste management schemes and help policy makers in the decision making process. Also, the mean WTP can be aggregated to approximate the amount of money that the population is going to offer for the improved solid waste management services.
Ku et al. (2009)	Korea	Face-to-face interviews	492 HHs	Improving the residential waste disposal system	Choice modeling experiment	The choice experiment included three choices: two representing improved residential waste disposal system features while one representing the status quo.	Orthogonal main effects design (this method is effective in isolating the effects of individual attributes on the choice). The survey consisted of three sections dealing with: the general concern about the waste disposal system, the choice experiment/ WTP elicitation, and the socio-economic characteristics.	Ranges between \$1.89 and \$2.02	Cleanliness, collection of small items, store for stickers for solid waste collection service, frequency of collection, price of service, age, income, education.	The results of this study will help policy makers to take the necessary actions to improve, develop and implement more efficient residential waste disposal system in Korea. Policy makers should try to improve the cleanliness of the collection facilities. Due to increasing demand for the collection of small waste items such as damaged cell phones, the government should discuss policies that are related to collection of small items. This study contributes quantitative data that can be used for the evaluation of policies that deal with residential waste disposal system improvements.
Karousakis & Birol (2008)	London/ United kingdom	Face-to-face interviews	188 HHs	Curbside recycling and SW collection services	Choice modeling experiment	The choice experiment included three different choices with one representing the status quo and two representing the improved curbside recycling scenario	Two economic valuation methods were employed: choice modelling experiment and contingent valuation. The contingent valuation survey served as a pre-testing pilot study for this choice experiment study. The choice experiment study collected information on the socio-economic characteristics, current recycling behavior and existing recycling services.	\$37.8 for collection of one additional material \$16.92 for collection of food and garden waste.	Compost collection, textiles collection, frequency of collection, payment, environmental concern, income, education, walking distance to the curbside collection station.	The differences in respondents' preferences should be taken into consideration when designing curbside recycling services. Since most of respondents are willing to pay for dry material curbside collection, then policy makers should take this priority into consideration when designing curbside recycling services. The study revealed that respondents prefer the introduction of a deposit refund scheme rather than pay-as-you-throw or unit pricing programs. The study advocates for further research on economic and policy instruments to create incentives that can help London achieve its recycling goals in a cost-effective way.

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Murad et al. (2007)	Kuala Lumpur/ Malaysia	Face-to-face interviews	300 HHs	Solid waste collection and disposal services	Contingent valuation	Open-ended question	The survey included sections that deal with the socio-demographic characteristics and the WTP scenario.	\$36.96	HH income, education, HH perception of privatized solid waste collection and disposal services, gender, age, type of household, length of stay of respondents in the household.	Privatization of solid waste collection and disposal systems could enhance the value and reduce environmental degradation. The policy makers should devise a variable-rate system like that in the South Korean national policy. Environmental degradation should be emphasized by the policy as a publicly disturbing issue that should be resolved with the available resources.
Yusuf et al. (2007)	Oyo state/ Nigeria	Face-to-face interviews	140 HHs	Improved solid waste management (collection and disposal)	Contingent valuation	Dichotomous choice	The survey obtained information on the WTP and on the socio-demographic status of respondents.	\$41.89	The initial bid, age, education level, income, household family size.	This study shows that the households demand for improved solid waste management is positive due to a positive WTP mean. So, policy makers should take this advantage and improve the solid waste management situation to bring tremendous benefits for the population.
Fonta et al. (2007)	Enugu state/ Nigeria	Face-to-face interviews	200 HHs	Improved solid waste management facility	Contingent valuation	Dichotomous choice	The survey consists of 2 sections that deal with: household socio-economic, environmental and demographic characteristics and the contingent valuation scenario.	\$21.6	Gender, occupation, household size, income, starting price, perception of environmental quality, hypothetical trust-fund.	The results of this study can help policy makers to design and implement improved solid waste management facilities based on the funds that will be available due to the aggregation of the residents' WTP. The contingent valuation method can link the public to policy makers. The results can form a significant basis for the government to request sponsorship and funding from the federal government and other donor agencies.
Danso et al. (2006)	Accra, Kumasi, and Tamale/ Ghana	Face-to-face interviews and focus groups	700 Farmers	Estimating demands for municipal waste compost in urban and peri-urban areas via farmers willingness to pay	Contingent valuation	Dichotomous choice followed by Open-ended question	The survey included three sections that dealt with: the socio-economic characteristics, the experience with/ without compost and the perceptions of compost quality and the WTP scenario in which respondents were shown a sample of the compost to elicit their WTP.	The highest mean WTP was \$7 for commercial pineapple farmers in peri-urban Accra.	Perception of compost quality, education, age, gender, income, experience with compost, soil input, family size, and location (urban/ peri-urban).	Contingent valuation along with other methods can provide useful information for market analysis. The construction sector due to its need of lower compost quality should be included in the compost demand analysis. If waste management which includes composting is conducted on any significant level, it would be costly; so the low WTP for composting in this study can be subsidized by public-private partnerships or by cost savings from transport and landfill that can cover part of the cost.
Jin et al. (2006)	Macao (high population density)/ China	Face-to-face interviews	520 HHs (260 for CV & 260 for CME)	Preferences for alternative solid waste management policy changes and residents' preferences for waste minimization	Contingent valuation & choice modeling experiment	Double bounded dichotomous choice for the CV. The CME included 2 different choices: one representing the status quo & the other representing the improved scenario.	Comparison between contingent valuation and choice experiment stated preference techniques. The two techniques revealed similar results for WTP. The questionnaire consisted of four sections dealing with: attitudes towards and knowledge of waste recycling, daily waste disposal activities, WTP scenario, and socio-economic data.	\$28.8 for CV. \$30.72 for CME.	Gender, age, education, solid waste generated daily, family size, number of children less than 15 years old, household income, respondents' concern for solid waste, starting WTP bid.	The results of the study showed no significant difference between the mean WTP in the two approaches (CV and CME) but the CME has an advantage over CV because it gives more choices and scenarios for the respondents and allows for more efficient solid waste management options. The results of this study can be applied to other policy sites with similar markets and other characteristics.

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Blaine et al. (2005)	Lake county/ USA	By mail	1458 HHs	Household WTP to continue the curbside recycling program in face of budget cuts	Contingent valuation	Two versions of questionnaire were used: one with Single bounded referendum and the other with payment card method	Comparison was made between single bounded referendum and a payment card methods and response rates were virtually identical. The survey sections consisted of: socio-economic section and the WTP scenario section.	\$19.08 for the payment card method. \$26.88 for the single bounded referendum.	Age, household income, gender, frequency of participation in curbside program, the proposed price in the dichotomous choice question.	The study results offer an overview for policy and decision makers about the public priorities and views regarding funding for SWM. Also, the city council decided to keep the curbside recycling program in place and it increased its charge to 1.5\$ per month per household due to the results of this CV study.
Koushki et al. (2004)	Kuwait	Surveys were distributed randomly to students whereby parents were asked to fill the survey.	1439 HHs	Trends and attitudes on collection, separation and WTP for improved MSWM services.	Contingent valuation	Four WTP amount choices were presented to each respondent	The survey gathered information on the respondents' socio-economic characteristics, attitudes on WTP and source- separation, and WTP for improved MSWM services.	\$39.6	Family size, number of servants, daily generated waste, agree on source-separation, choice of collection frequency, income, education, and environmental awareness.	The study suggests that policy makers should implement strategies that aim toward solid waste reduction, reuse, recycling, and composting. The government should conduct environmental awareness campaigns to promote the 3Rs approach.
Aadland & Caplan (2003)	State of Utah/ USA	Phone interviews	1000 HHs	Willingness to pay for curbside recycling with detection and mitigation.	Contingent valuation	Double bounded dichotomous choice	Administration of two surveys: one for the 1000 households in Utah state and the other survey for recycling coordinators to provide background information and verify the HH WTP response. To reduce hypothetical bias "cheap talk" method was used to remind participants that this is a hypothetical scenario.	\$84	Gender, age, education, income, household size, cheap talk, starting bid, non-drop off recycling user, environmental organization member, ethical duty, overstating of the current fee for the recycling service.	This study can help policy makers to estimate a revenue function that relates projected revenues (the product of the fee and the number of participating households) to recycling fees. Also, policy makers can use this study to determine the efficient allocation of resources toward curbside recycling. In addition, the study recommends the application of a "cheap talk" strategy (to remind respondents continuously about the hypothetical situation of the contingent valuation scenario prior to the WTP question and valuation of the environmental good) to mitigate the hypothetical bias associated with such study types.