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Analysis of Willingness to Pay for Improved Waste Management among Food Vendors in Mzumbe Ward, Mvomero District

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Abstract

Despite the alarming situation of the waste generated by street food services, their WTP is also reported to be low, which makes waste management more challenging, especially in developing countries, particularly Tanzania. This study analyzes the factors influencing willingness to pay for improved waste management in Mzumbe ward, Morogoro District. A quantitative, cross-sectional study was used to obtain a sample of 196 food vendors in the Mzumbe ward. The study questionnaires for data collection. The study used logistic regression analysis to analyze the factors influencing the willingness to pay for improved waste management in Mzumbe ward, Morogoro District. The findings show that the probability of food vendors willing to pay is influenced by the sex of the food vendor (male), education of the vendor (higher education), amount willing to pay, frequency of payment, awareness campaigns, and waste management campaigns. This study highlights the importance of considering these factors when designing strategies and interventions to improve payment compliance among food vendors. By addressing these factors effectively, it is possible to enhance the success and sustainability of initiatives related to payment collection in the context of food vending. The study recommends that the Government of Tanzania should review policies and aim to promote sustainable waste management practices, enhance vendor engagement, and contribute to a cleaner and healthier environment in Mzumbe ward. These can be implemented through partnerships between government authorities, waste management agencies, educational institutions, and community organizations. Monitoring and evaluation should be conducted regularly to assess the effectiveness and impact of these policies and interventions.

Subject Areas

Hydrology

Keywords

Willingness to Pay, Waste Management, Food Vendors

1. Introduction

In particular, the willingness of food vendors to pay for waste management services is an important factor in achieving sustainable waste management practices all around the globe and of course, including Tanzania. Nevertheless, the cost of waste management services is a significant barrier for many food vendors, particularly those operating in low-income areas [1]. As a result, Willingness to Pay (WTP) among households and waste generators has been low. For instance, in Nigeria, [2] conducted a mixed research study, which revealed that households were willing to pay a maximum of $1.14 and a minimum of $1.13 per month for waste management, which is very low. In contrast, a study by [3] in Hong Kong SAR reported that 36% out of 753 respondents were not willing to pay for waste management. Thus, understanding the factors that influence their willingness to pay, as well as their attitudes and behaviors toward waste management, is crucial for developing effective waste management policies and strategies [4]. Previous research has highlighted the importance of stakeholder engagement in designing and implementing sustainable waste management practices in Tanzania [5] [6], and this study seeks to build on these findings by examining the perspectives and priorities of food vendors themselves concerning waste management.

Moreover, according to [7], for countries to achieve sustainable waste management practices, it is essential to take a multi-stakeholder approach that involves government agencies, waste management professionals, private sector actors, and civil society organizations. In recent years, the Tanzanian government has made efforts to improve waste management services and infrastructure through the implementation of the Environmental Management Act of 2004 and the National Solid Waste Management Strategy [6] [8]. These tools provide a legal framework for solid waste management in the country and emphasize the importance of stakeholder engagement, public awareness, and capacity building in achieving sustainable waste management practices. Private sector actors also have an important role to play in addressing the issue of waste management, particularly in terms of providing waste management services to low-income communities [7].

In Tanzania, waste management is a growing concern, particularly in food waste produced by households and food vendors [9]. According to the Tanzania investment guide on waste management, food waste contributes to 37% of the total municipal solid waste produced in the country [10]. Despite the existence of waste management policies and regulations such as the Investment Guide on Waste Management of 2020, National Solid Waste Management Strategy of 2018 and National Environmental Policy of 2021 aiming to manage waste within the country, improper disposal of waste remains a prevalent issue. This problem affects the environment

and poses a health hazard to the community, as it attracts pests and vermin, leading to outbreaks of diseases [11].

Food vendors in Mzumbe ward generate a significant amount of waste, and their practices of waste disposal and management have not been properly documented. Additionally, the willingness of food vendors to pay for waste management services has not been extensively studied. This lack of information is a major obstacle in developing effective waste management strategies for the area. This study seeks to bring light and help decision-makers make informed decisions on the reasonable amount to be imposed for waste management. Following that, Tanzanian scholars haven't invested much time in studying waste generated by food vendors and their respective waste management practices, so it is worth utilizing international references. According to [1], 1158 studied street food stalls in Vietnam generated 8.2 to 12.66 tons of waste per day, which was a lot of waste than expected. In addition, globally, food service is estimated to produce over 19% of the total avoidable food waste [12]. Thus, these few statistics clearly show how serious the problem of environmental pollution is concerning the food service industry.

Moreover, despite the alarming situation of the waste generated by street food services, their WTP is also reported to be low, which makes the process of waste management more challenging, especially in developing countries, particularly Tanzania [13]. Further, according to a mixed research study conducted in Nigeria by [14], households were only willing to pay 1.2878 USD to 1.2951 USD per month. Elsewhere in Hong Kong SAR, [3] found that 36% were unwilling to pay for waste management. This observation indeed justifies the problem of low willingness to pay among households and of course, food vendors who generate similar wastes to households.

The problem of waste management among food vendors, particularly in Mzumbe ward, is a significant issue that requires urgent attention. The lack of proper waste management practices not only poses health risks but also has adverse effects on the environment [15]. Therefore, this intends to answer the central research question: What are the factors influencing willingness to pay for waste management among food vendors in the Mzumbe ward to shed new light for decision-makers to make informed decisions on the appropriate methods of waste management?

2. Data Source, Methods and Model Setting

2.1. Data

To analyze the willingness for improved waste management among food vendors in the Mzumbe ward, Mvomero District at Morogoro Region, primary data was collected through a questionnaire survey. The structured questionnaire, comprising closed-ended questions, was administered to a representative sample of 196 food vendors. The data, collected by a researcher with an emphasis on confidentiality, underwent quantitative analysis using statistical tools such as SPSS 27 and

STATA version 18. Descriptive statistics summarized key variables, and factors influencing willingness to pay were explored through binary logistic regression analysis.

2.2. Methods

This was a cross-sectional study that included all food vendors in the Mzumbe ward, Morogoro. This design allows for the collection of data on both the outcomes and exposures of the study participants at a single point in time. The use of a cross-sectional design enables the researchers to gather data within a specific time frame, providing a snapshot of the study variables. Mzumbe is located between the coordinates 6˚53'29"S, 37˚33'37"E, 20 Km from Msamvu Morogoro Bus terminal (see Figure 1). According to the 2022 census survey, Mzumbe ward has a population of 19,677 people [16]. Mzumbe ward is a specific geographical area within the Mvomero District in Tanzania. The selection of Mzumbe ward as the study area is justified by its economic activities, particularly in the food vending sector, and the presence of Mzumbe University, which can provide valuable support and collaboration opportunities in addressing waste management challenges.

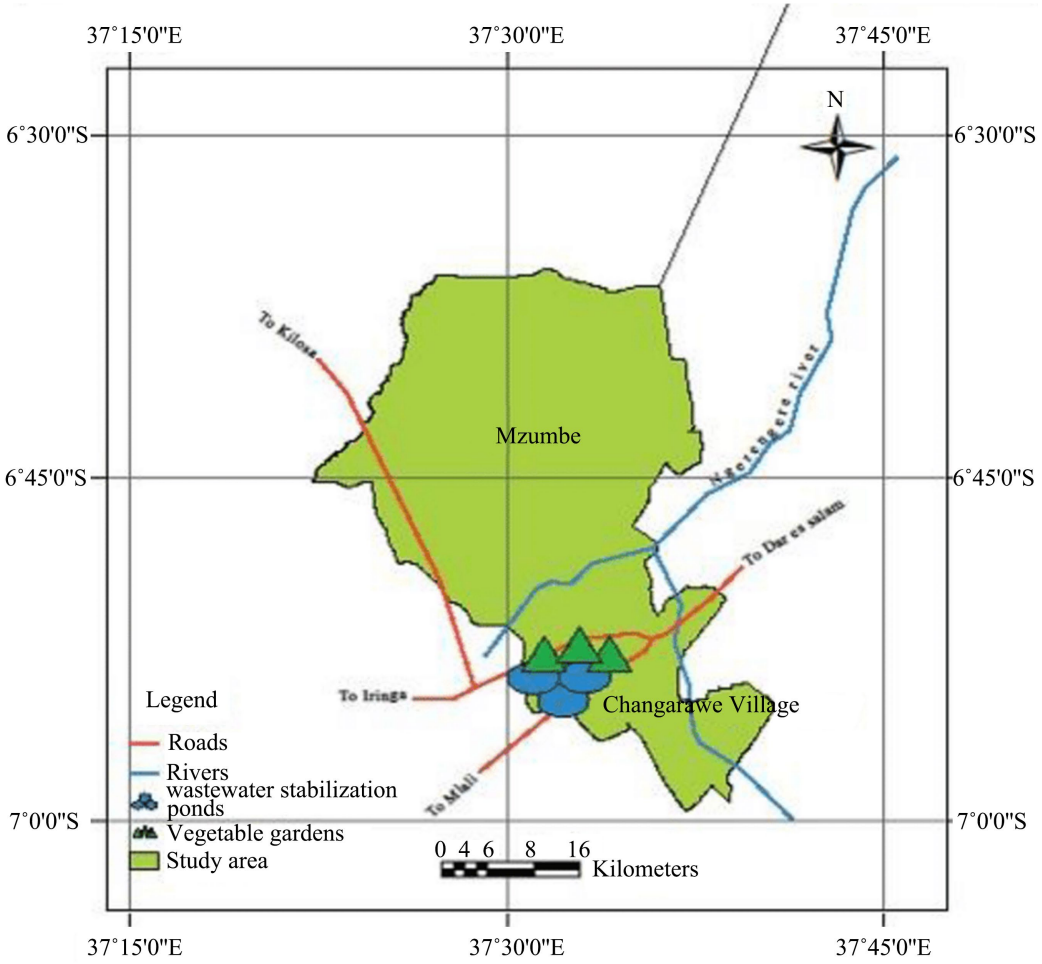

Figure 1. Mzumbe ward map. Source: Google maps (Mzumbe ward).

Given that the food vendor population is unknown to be studied at once. The sample size formula [17] was adopted to get the sample size for this study as follows:

$$n = \frac{Z^2 p \cdot q}{e^2}$$

where, n = sample size, Z = standard variate at a given confidence level, p = sample proportion success ($q = 1 - p$), e = acceptable error (5%) and at 95% confidence interval taken p as 0.05.

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.07^2}$$

where, n = 196 food vendors.

This study used stratified sampling techniques to get a representative sample. This technique involves dividing the population of food vendors into strata or subgroups. In this case, a researcher chooses Mzumbe, Osterbay, Vikenge and Sangansanga as strata. Within each stratum, a simple random sample of food vendors was selected to participate in the study, thus making a total of 196 food vendors were obtained. To ensure that the sample is representative of the population, the sample selection was done using a simple random technique within each stratum. This technique would ensure that the sample is representative of the population and would allow for comparisons between different subgroups. Stratified sampling reduces bias in the sample by ensuring that all subgroups are represented in the sample. This can help to ensure that the sample is more representative of the population as a whole.

In this study, primary and secondary data were both used. Primary data were gathered using structured questionnaires that had both open-ended and closed-ended questions, requiring respondents to select predetermined answers for the former and express their opinions and thoughts for the latter. The information obtained aims to determine the factors related to the utilization of antenatal care services. Given the number of respondents that a researcher used, the questionnaire was distributed as per village, which was selected as equal to the number of questionnaires. The list of variables used and their expected signs are explained in Table 1.

Table 1. Variables measurements and expected signs.

Variable name	What it measures	How its measured	Measurements	Sign
Willingness to pay (DV)	Readiness of a food vendor to pay for waste management	1 = if a respondent is willing to pay 0 = not willing to pay	Dummy	
		Independent variables		
Age	The number of times during which someone or something has lived or existed	Time elapsed between date of birth and a specific point in time	Continuous	–

Continued

Education level	The highest level of education you have achieved	It is measured in terms of the highest class an individual has attained	Ordinal	+
Income	Amount of money obtained by households from employment or involvement in any activity	It is measured in terms of TZS	Continuous	+
Sex of vendor	Biological difference between males and females	It is measured by looking if a vendor is a male or female.	Dummy	+/−
Amount of waste produced	The total amount of materials that are landfilled, recycled, or composted is referred to as solid waste generation	Estimated Number of kg/tones a vendor generates	Continuous	+
Quality of service	Is a term used to describe or quantify the overall performance of a service	focus on how consumers perceive the service	Categorical	−
Amount to be paid	Amount of money that when you pay someone money	It is measured on the amount of Tsh. a person is paying	Continuous	−
Frequency of payment in a month	Measure the intervals at which the payments are to be made	Interval of payment in a month	Categorical	−
Awareness campaigns	Measures the effect of sensitization programs	Number of awareness campaigns conducted	Continuous	+
Institutional legal regulations and rules	Measures the effect of rules and regulations on waste management	If the vendor adheres to the rules or not	Dummy	+
Institutional support	This measures the effect of support such as funds from the institution	If food vendors receive support from institutions nearby or not	Dummy	+
Information dissemination	This measures the effect of disseminated information to the food vendors	If food vendors are well disseminated with waste management information from institutions nearby or not	Dummy	+
Waste management campaigns	Waste management campaigns food vendors attend	If food vendors attended waste management campaigns or not	Dummy	+

2.3. Model Setting

This study uses a binary logistic regression model to reflect food vendors' willingness to pay with two levels of "willing" and "unwilling". 1 indicates food vendors' willingness to pay for improved waste management and 0 for food vendors who are unwilling to pay for improved waste management.

The logistic regression model estimates the probability of the dependent variable taking on a particular value (say 1) based on the values of the independent variables. The output of the model is a log-odds ratio (also known as the logit), which represents the natural logarithm of the odds of the dependent variable taking on a particular value. This log-odds ratio can then be transformed back into probabilities using the logistic function (also known as the sigmoid function).

The logistic regression model can be represented mathematically as:

$$logit(P) = ln\frac{P_1}{1-P_1} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \beta_n X_n \quad (1)$$

where, $logit(P)$ is the log-odds ratio of the dependent variable taking on the value 1, P is the probability of the dependent variable taking on the value 1. $\beta_0, \beta_1, \beta_2, \beta_3, \cdots, \beta_n$ are the coefficients of the model and $X_1, X_2, X_3, \cdots, X_n$ are the values of the independent variables. To estimate the coefficients of the model, Maximum Likelihood Estimation (MLE) is commonly used. The MLE approach involves finding the values of the coefficients that maximize the likelihood of observing the data given the model. The goodness of fit of the model can be assessed using various statistical tests, such as the likelihood ratio test or the Hosmer-Lemeshow test. In this case, Equation (2) summarizes the model by in-corporating all the variables expected to be utilized in this study for this objective.

$$WPT = \beta_0 + \beta_i X_i + \acute{\varepsilon}_i \quad (2)$$

This model is used for many reasons. The logistic regression model is a widely used statistical tool that is particularly useful for analyzing binary outcomes in various fields. It can handle categorical predictors, making it a flexible tool for data analysis. Additionally, the model can handle interactions between predictors, which is useful in situations where the effect of one predictor on the dependent variable depends on the value of another predictor. The coefficients of the model are easy to interpret and quantify the effect of each predictor on the probability of the event occurring. Finally, the model can provide valuable information for predicting future outcomes, making it a valuable tool in practical applications. Generally, the logistic regression model is a versatile and powerful statistical tool for analyzing binary outcomes and is widely used in medicine, social sciences, marketing, and finance, among others [18].

3. Results and Discussions

3.1. Respondents' Demographic and Socio-Economic Characteristics

The findings in **Table 2** reveal that a significant majority of business owners are

female (74.49%), while the rest are male (25.51%). In terms of education, most owners have secondary education (44.90%), followed by those with college or university education (21.43%), with fewer having no formal education (20.92%) or primary education (12.76%). Regarding service quality, 61.73% of respondents are satisfied with the waste management services, though a notable 38.27% are not. Information dissemination on waste management appears lacking, as 61.73% report not receiving such information. Institutional support is strong, with 73.47% of vendors receiving help from nearby institutions. Most vendors (86.22%) adhere to environmental rules on waste management, though a small portion (13.78%) does not. Finally, 59.18% of vendors have attended waste management campaigns, leaving 40.82% without such engagement.

Table 2. Demographic and socio-economic characteristics.

Variables	Categories	Frequency	Percentage
Sex of business owner	Male	50	25.51
	Female	146	74.49
Education level	No formal education	41	20.92
	Primary education	25	12.76
	Secondary education	88	44.90
	College/university education	42	21.43
Quality of services	Waste management services provided are satisfactory	121	61.73
	Waste management services are not satisfactory	75	38.27
Information dissemination	Disseminated with waste management information	75	38.27
	Not Disseminated with waste management information	121	61.73
Institutional Support	If vendor receive support from institution nearby	144	73.47
	If vendors not receiving support from institution nearby	52	26.53
Legal and regulatory rules	Vendor adhere to the environmental rules on waste management	169	86.22
	Vendor not adhere to the environmental rules on waste management	27	13.78
Waste management campaigns	Food vendor attended waste management campaigns	116	59.18
	Food vendor not attended waste management campaigns	80	40.82

3.2. Factors Influencing Willingness to Pay for Improved Waste Management

Given the results presented in Table 3 show the estimate of the factors influencing willingness to pay for improved waste management among food vendors in Mzumbe ward. The probability associated with the Wald Chi-square test statistic is P = 0.000 (P < 1%), which is less than the conventional significance level of 0.05. This suggests that the relationship between the independent variables and the dependent variable is statistically significant. P-value 0.0000 at P < 1%. The Pseudo R-squared was R^2 = 0.4585, indicating the goodness of fit for a statistical model. In this case, the model explains approximately 45.8% of the variation in the dependent variable. A higher pseudo r-squared value generally suggests a better fit of the model to the data. The Wald Chi-square value of 54.41 is a statistical test used to evaluate the significance of the coefficients in a model. In this case, the test statistic suggests that there is a significant relationship between the independent variables and the dependent variable. However, the log pseudo-likelihood value of −73.422486 is a measure of how well the model fits the data. A lower value indicates a better fit, so −73.422486 suggests a relatively good fit. The logit regression in Table 3. indicates that the probability of food vendors' willingness to pay is influenced by the sex of the food vendor (male), education of vendor (higher education), amount willing to pay, frequency of payment, awareness campaigns and waste management campaigns. These factors were found to be statistically significant to their willingness to pay.

Table 3. Logistic regression for the factors influencing willingness to pay for improved waste management among food vendors.

Willingness to pay	Odds ratios	Robust St. Err.	T-value	P > z
Age	−0.055	0.031	−1.78	0.075*
Sex of a vendor (male)	2.463	1.098	2.24	0.025**
Primary education	0.517	1.739	0.30	0.766
Secondary education	−2.03	1.672	−1.21	0.225
Higher education	3.699	1.701	2.17	0.030**
lnINCOME	0.091	0.654	0.14	0.889
LnAmount waste generated	0.19	0.403	0.47	0.638
Amount willing to pay	0.0003	0.00012	1.78	0.076*
Quality of services	−0.479	0.589	−0.81	0.415
Frequency of payment	1.42	0.629	2.26	0.024**
Legal and regulatory rules	−0.226	0.59	−0.38	0.702
Awareness campaigns	1.289	0.701	1.84	0.066*
Information dissemination	0.786	0.5	1.57	0.116

Continued

Institutional support	−0.065	0.47	−0.14	0.890
Waste management campaigns	0.75	0.45	1.67	0.095*
Constant	−5.488	9.083	−0.60	0.546
Pseudo r-squared	0.4585		Number of obs. = 196	
Wald Chi-square	54.41		Prob > Chi^2 = 0.0000	
Log pseudo-likelihood	−73.422486			

***P < 0.01, **P < 0.05, *P < 0.1.

3.3. Discussions of the Findings

3.3.1. Age of a Vendor

The age of a vendor is measured as a continuous variable to mean the number of years a vendor has lived in the study area. The findings in **Table 3** indicate that the age of a vendor was negative and statistically significant at 10% (P = 0.075) to influence vendors' willingness to pay for waste management. The findings indicate that for every unit increase in the age of a vendor, the odds of being willing to pay for improved waste management are more likely to decrease by 0.055, ceteris paribus. The findings are consistent with the findings of research done by [19] [20] who found that elderly people were less inclined to pay for enhanced waste management services than younger people. However, some studies were against the results of the current study. For example, a study by [21] evaluated Ethiopian households' willingness to pay for improved solid waste management and associated determinants and found that the age of the household had a statistically significant relationship with WTP. Together, [22] investigated the willingness of Nepalese households to pay for better solid waste management and revealed that respondent age influences willingness to pay for better solid waste management.

3.3.2. Sex of a Vendor (Male)

The sex of the vendor is measured as a dummy variable to if a vendor is male or female. The findings show that being a male vendor was found to be significant at 5% (P = 0.025) on willingness to pay for waste management. The findings indicate that being a male vendor increases the odds of being willing to pay for improved waste management by a factor of 2.463 compared to being a female vendor. The findings align with the study by [21], which evaluated Ethiopian households' willingness to pay for improved solid waste management and associated determinants and found that the sex of the household heads (being male) had a statistically significant relationship with WTP. Together, [22] investigated the willingness of Nepalese households to pay for better solid waste management and revealed that respondent sex influences willingness to pay for better solid waste management.

3.3.3. Education Level (Higher Education)

Education was measured in terms of the highest level a vendor has achieved. The

findings show that vendor with higher education (college/university) was found to be statistically significant at a 5% significant level with P = 0.030. The findings show that a vendor with higher education increases the odds of being willing to pay by 3.699 compared to a vendor with no formal education. The findings align with the study by [21], which evaluated Ethiopian households' willingness to pay for improved solid waste management and associated determinants and found that the educational status of the household had a statistically significant relationship with WTP. Together, [22] investigated the willingness of Nepalese households to pay for better solid waste management and revealed that respondent level of education influences willingness to pay for better solid waste management. Different findings by [23] investigated the association between selected socio-economic variables of households and their willingness to pay for enhanced solid waste management using a contingent valuation technique. According to the results of the logit model secondary education, the respondents' post-vocational and primary education were positive and statistically significant to willing to pay for solid waste management.

3.3.4. Amount Willing to Pay

The amount a vendor is willing to pay was measured to mean the amount of money a vendor is willing to pay for improved waste management in the study area. The findings show that the amount willing to pay was found to be statistically significant at 10%, with a P-value of 0.076. The findings indicate that for every unit increase in the Tanzania Shillings vendors are willing to pay, the odds of being willing to pay increase by 0.0003, ceteris paribus. The findings align with the study by [21], which evaluated Ethiopian households' willingness to pay for improved solid waste management and associated determinants and found that the bid amount had a statistically significant relationship with WTP. Together, [22] investigated the willingness of Nepalese households to pay for better solid waste management and revealed that the bid amount influences willingness to pay for better solid waste management.

3.3.5. Frequency of Payment

The frequency of payment was measured to indicate the number of times vendors are willing to pay for improved waste management in the study area. The findings show that the frequency of payment was found to be statistically significant at 5%, with a P-value of 0.024 on willingness to pay for improved waste management in the study area. The findings show that a higher frequency of payment increases the odds of being willing to pay for improved waste management by 1.42 compared to a lower frequency. One study conducted in Indonesia by [24] indicated that payment frequency was a strong predictor of willingness to pay for enhanced waste management services. Individuals who were willing to pay for waste management services more regularly were more likely to be willing to pay larger amounts than those who were willing to pay less frequently. This is consistent with the findings, which demonstrate a positive relationship between frequency of payment and

willingness to pay for waste management services. Another study by [19] in Nigeria revealed that payment frequency was a strong predictor of willingness to pay for enhanced waste management services. The study found that individuals who were willing to pay more frequently for waste management services were more likely to be willing to pay higher amounts compared to those who were willing to pay less frequently.

3.3.6. Awareness Campaigns

Awareness campaigns were measured number of awareness campaigns or sensitization programs conducted to improve waste management. The findings indicate that a number of awareness campaigns were found to be statistically significant at 10%, with a P-value of 0.066 on willingness to pay for improved waste management in the study area. The findings indicate that an increase in attendance to a number of awareness campaigns among vendors increases the odds of being willing to pay by 1.289, ceteris paribus. The findings are in line with those of [25], who discussed Municipal solid waste management as a growing problem in urban areas of Nepal where municipalities are severely forced by budget to manage it efficiently and found that waste collection service and environmental awareness significantly influence households' WTP. Similar findings were obtained by [26], who conducted a study on the factors influencing individuals' willingness to pay for solid waste disposal and found similar results. Their research revealed that awareness of the health risks associated with indiscriminate waste disposal, along with residential areas and certain socio-demographic characteristics, significantly affects households' willingness to pay for waste disposal services.

3.3.7. Waste Management Campaigns

Waste management campaigns were measured to indicate if food vendors attended and were exposed to any waste management campaigns over the last 12 months. The findings indicate that waste management campaigns were statistically significant at 10%, with a P-value of 0.095 on waste management. The findings indicate that an increased attendance of food vendors in waste management campaigns increases the odds of being willing to pay for improved waste management by 0.75 compared to those not attending. The findings suggest that attending waste management campaigns has a positive impact on the willingness of food vendors to pay for improved waste management. A similar study has been conducted, for example, a study by [27] investigated the impact of trash management initiatives on household behavior change. Participation in waste management campaigns was found to dramatically boost trash segregation and recycling behaviours, according to the study. This implies that raising awareness and exposing people to trash management initiatives might have a favourable impact on their attitudes and actions toward waste management. Furthermore, in a study conducted by [28] on the impact of waste management education programs on the behaviour of college students, it was discovered that students who participated in waste management campaigns and received waste management education demonstrated a

higher level of knowledge and willingness to engage in waste reduction and recycling activities.

3.3.8. Post-Estimation Tests

This section lists all the econometric tests performed following the logit model estimation to determine whether or not the estimations will make sense in light of the obtained results. To evaluate the factors influencing food vendors' willingness to pay for improved waste management, several tests were employed to validate the model. These tests included the Hosmer-Lemeshow goodness of fit test and the specification error test, ensuring the model's reliability and accuracy.

3.3.9. Goodness of Fit Test (Hosmer-Lemeshow)

The finding in Table 4 indicates the goodness-of-fit statistics are used to see if the model accurately reflects the data. If the significance value is less than 0.05, the Hosmer-Lemeshow statistic indicates the model fits well the data. In addition, if the model fits the data well enough, the statistics are greater than $P > 0.05$. Thus, in this case, the $P = 0.1083$ indicates that the model fits well the data.

Table 4. Hosmer-Lemeshow test.

Logistic model for willingness to pay, a goodness-of-fit test		
Number of observations	=	196
Number of covariate patterns	=	196
Pearson $Chi^2(181)$	=	203.76
Prob > Chi^2	=	0.1083

3.3.10. Test for Model Specifications

Moreover, a specification error test using the Link test was run to see if the model's specifications were accurate or not and presented in Table 5. The finding shows that _hatsq is insignificant with a P-value of 0.981, indicating that the model is well specified as compared to _hat, which is significant.

Table 5. Link test for specification error.

Logistic regression			Number of obs.	196
			LR $Chi^2(2)$	124.36
			Prob > Chi^2	0.0000
Log-likelihood	−73.422198		Pseudo R^2	0.4585
Willingness to pay	Coefficient	P > z	[95% conf.	interval]
_hat	1.0004	0.000	0.7105384	1.290304
_hatsq	−0.0015	0.981	−0.1255633	0.122518
_cons	0.0035	0.989	−0.5131853	0.5202961

4. Conclusions and Policy Recommendations

The logistic regression analysis reveals that younger, male, and more educated food vendors are more inclined to financially support improved waste management services. It is recommended that there should be development of targeted educational programs that highlight the benefits of improved waste management, specifically tailored to younger vendors. Implement initiatives that engage young vendors in waste management campaigns, workshops, and training sessions to increase their awareness and understanding of sustainable waste management practices. The finding that male vendors are more likely to be willing to pay for improved waste management indicates the importance of gender-sensitive approaches in waste management policies. This study recommends that stakeholders and other government agencies should ensure the development of gender-inclusive waste management programs that encourage and empower female vendors to actively participate. Provide training, support, and resources specifically targeted at female vendors to ensure their equal representation and involvement in waste management activities.

In addition, the finding that vendors with higher education are more likely to be willing to pay for improved waste management emphasizes the importance of educational interventions in waste management policies. The study recommends collaboration with vendors with higher education who are more likely to be willing to pay for improved waste management, emphasizing the importance of educational interventions in waste management policies. Higher education equips individuals with the knowledge and understanding of environmental issues, making them more receptive to sustainable waste management practices. The finding that the amount vendors are willing to pay is statistically significant suggests that there is potential for implementing waste management financing mechanisms. The study recommends that government should conduct a cost-benefit analysis to determine reasonable pricing structures for waste management services.

The finding that a higher frequency of payment is associated with a greater willingness to pay emphasizes the need for flexible payment options in waste management systems. The study recommends the implementation of flexible payment schemes that accommodate vendors' cash flow patterns, such as monthly, quarterly, or annual payment options. Provide accessible payment channels and facilitate easy and transparent payment processes to encourage vendors to participate consistently. The finding that attendance at waste management awareness campaigns positively influences willingness to pay indicates the effectiveness of such campaigns in promoting behavioural change and shaping vendor attitudes towards waste management. The study recommends implementing sustainable waste management initiatives such as promoting the segregation of waste at the source into categories such as recyclable, organic, and hazardous waste. Encouraging recycling and reusing materials, establishing composting systems for organic waste, and investing in waste-to-energy technologies can help minimize landfill use. Governments and businesses should support circular economy models by reducing

single-use plastics, fostering eco-friendly packaging, and creating take-back or repair programs. Public awareness campaigns, strong policies, and collaborations between private and public sectors are essential to driving behavioral change and ensuring the long-term success of these initiatives. Additionally, monitoring and auditing waste management processes can help track progress and ensure continuous improvement.

Generally, these policy implications and recommendations aim to promote sustainable waste management practices, enhance vendor engagement, and contribute to a cleaner and healthier environment in Mzumbe ward. They can be implemented through partnerships between government authorities, waste management agencies, educational institutions, and community organizations. Monitoring and evaluation should be conducted regularly to assess the effectiveness and impact of these policies and interventions.

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Conflicts of Interest

The authors declare no conflicts of interest.

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