

## **Households' Levels of Awareness, Perception, and Attitude towards Improved Solid Waste Collection Services in Kano Metropolis, North-Western, Nigeria**

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**ABSTRACT:** In the recent past, policies such as “command and control” towards solid waste collection services have not been successful, basically due to inadequate and insufficient existing policies and legislation for a sustainable waste management and often framed without consulting local communities. However, households’ decisions to participate in waste management strategies are generally triggered by their knowledge of the problems and perceived benefits of environmental sustainability. This study focuses on households’ awareness, perceptions and attitudes toward solid waste collection services in Kano metropolis, north-western Nigeria. A survey questionnaire was administered to 391 households in the metropolis. Data were evaluated using exploratory factor analysis (EFA) and the theory of value in Psychology. The study deduces that households’ level of awareness was high going by the overall mean score (M=4.07), and standard deviation (SD=0.84), perception level was moderate (M= 3.56), while, (SD=0.86), and cognitive attitudes were also moderate (M= 3.19), while (SD= 0.89). Both levels of affective and behavioral attitude were high (M= 4.26), while (SD= 0.85), and (M=3.84), while (SD= 0.84) respectively. Hence, we recommend households involvement for improved solid waste collection services in Kano metropolis.

**Keywords:** Exploratory Factor Analysis, Households’ Awareness, Perception and Attitude, Kano Metropolis, Social Psychology, Solid Waste Management,

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### **I. INTRODUCTION**

The issue of solid waste management (SWM) is one of serious environmental worry particularly in Nigerian major cities and urban centers. [1]; [2] observed that there has been a remarkable increase in the daily amount of solid waste generated in Nigeria today. Following [3], about 25 million metric tonnes of solid waste is generated annually in Nigeria. The consequence of uncollected waste could be great when a country is fronting rapid population growth, and waste generated cannot be sufficiently and adequately managed [4]. Major streets in most Nigerian cities experience the persistent accumulation of indiscriminate dumps of wastes from the households or commercial sources [5].

[6] reported that the global estimate of solid waste collection (SWC) is about 1.3 billion tonnes annually, which contribute about 5% of greenhouse gases (GHGs) emission of the organic component of the solid waste decayed. Its generation is anticipated to significantly increase by 2025 to about 2.2 billion tonnes. However, poor waste management which consists of the inefficient collection system and ineffective disposal method results in pollutions of both air, water, and land, contributing to the contamination of the sources of drinking water, posing serious threats to public health. Following [7], the per capita generation of waste ranges from 0.75 kg/day in the suburban area. And 1.2 to 1.7kg/day in the city and government reserved area (GRA) respectively in Kano metropolis, perhaps due to variations in the socio-economic status of the residential zones. In the recent past, however, SWC services used to be the responsibility of municipal authorities [8]. This responsibility is not mutually exclusive, as none of the local governments in the Nigeria that meets the expense of the enormous financial, technical, administrative and human resource requirements to effectively carry out this constitutional duty [9]. An account of the inability of the government at both levels (local government and state) to deal with SWC effectively ascended conceivably from the misconception of this task as a public good.

Thus, the ability to address the issues of waste collection depreciates with time due to increasing capital costs for plant, equipment, operation and maintenance costs, coupled with the rapid population and spatial

growth, as well as increase in level of waste generation and decrease in coverage levels, confronted by growing public demand for improved SWC services [10]; [11];[12].

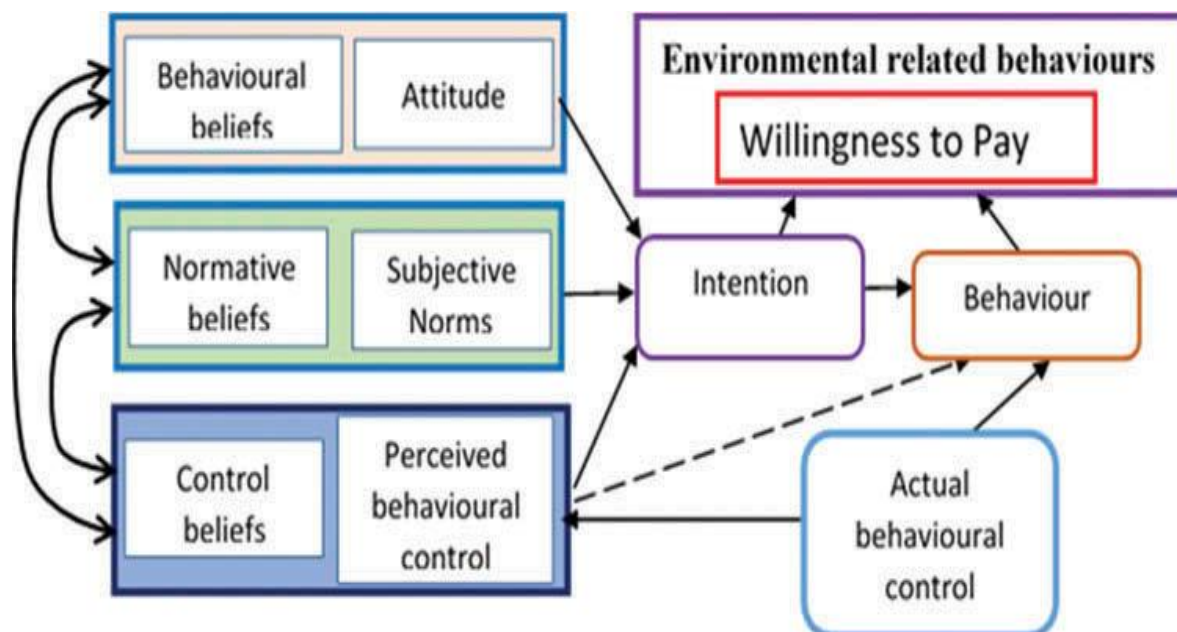
## II. Environmental Concern and Theory of Value in Psychology

Environmental concern is a common word been used to describe pro-environmental behavior. It is common to discover such words “environmentalism”, “environmental concern”, “environmental perception” or “environmental attitude” in the social psychology literature to explain the motivations behind pro-environmental behaviors which are used interchangeably in describing concern for environmental degradation, pollution and conservation [13]. Behavioral intention or motivation as it has been used in attitude-behavior models by cognitive and social psychologists resembles the use of “economic value” in economics [14]; [15]. However, such models like the theory of reasoned action (TRA) by [16]; [17], conceived attitude, perception as predictors of behavioral intentions [18].

Natural systems cannot be fully managed, understood, and conserved well without identifying peoples’ attitude and perception on the environment [19]. Thus, it can be easier to develop effective conservation and management strategies, which are sustainable and sensitive to their needs by knowing their perception and attitude on the environment [20]. For instance, understanding how landscape perception varies among different groups such as outdoor recreationists or farmers can assist in creating and implementing effective management measures [21].

However, this theory is extended and modified as the Theory of Planned Behaviour (TPB) [22]. The theory maintains that an individual’s intention to perform a behavior is basically predisposed by a combination of behavioral attitude, subjective norms, and behavioral control [23]. It postulates that attitude, norms, and perceived behavioral control, however, determine environmental behavior (see figure1). Thus, [24] expresses attitude and perception as those psychological constructs which represent an individuals’ readiness to “act or react” in a certain manner.

Hence, human attitude towards the environment is centered on complex moral and social values [25]. They comprise behavioral intention, beliefs, and affective responses people holds pertaining environmental issues and activities [26]. This is imperative in understanding how respondents from the valuation of a decision or an object based on their perceived attitude and participation on such outcome [18]. Models exclusively on the traditional approach on stated preference (SP) do not offer sufficient understanding on why an outcome is supported by respondents [27]. Hence, embracing a broader stated preference (SP) model that accounts not only for the demographic factors or variables impacts, but also on awareness, attitude, and perception is also indispensable. Because demand is also not only determined by utility, however, it is beyond the microeconomics theory; also by attitude, and perception [28]. [29, 30]; and [18] establish that respondents’ attitude and perception predicts pro-environmental behaviour.



**Figure 1:** Theory of planned Behaviour (TPB) and Enviromental-Related Behaviour.

**Source:** Adopted from [31].

This study uses the TPB, a usual social psychological construct in determining the households' levels of awareness, attitude, and perception towards SWC services. And, hypothetical model of the household's behavior on SWC services was developed using 5 Likert scales.

### III. MATERIALS AND METHODS

#### 3.1 Sample Determination and Data Collection Procedure

We employed multi-stage cluster sampling method to identify the target urban communities for this study and then a systematic random sampling using a random number tables. [32] criteria were employed in determining the sample size of households in each of the randomly selected neighborhoods (Table1). Using the criteria, the precise sample size of a population of 9857 as obtained from the Kano State Ministry of Local Governments as well as the Kano State Housing and Corporation is 368 at alpha ( $\alpha$ ) = 0.05 levels of significance, this figure was rounded up to 400 respondents to avoid missing of an instrument, or non- response from those interviewed [34]. Data were collected through face-to-face interviews using well-structured questionnaires. The distribution of the sample size across each of the three neighborhoods was obtained through the following formula:

$$ni = \frac{Ni}{N}n \quad (1)$$

Where;

n = Total sample selected

N = Total household population

ni = Sample size in each neighborhood

Ni= Household population in each neighborhood

**Table 1: Sample size determination of households by neighbourhoods**

Neighbourhoods	Household Population	Sample Size Selected
Gandu	3075	$ni = \frac{3075}{9875} \times 400 = 124$
Dorayi	5291	$ni = \frac{5291}{9875} \times 400 = 215$
Hotoro	1491	$ni = \frac{1491}{9875} \times 400 = 61$
<b>Total</b>	<b>9857</b>	<b>n =400</b>

*Note: Sample size was determined based on Krejcie and Morgan (1970)*

#### 3.2 Exploratory Factor Analysis (EFA)

The principal component analysis (PCA) was conducted using orthogonal rotation varimax solution on the items measuring households' awareness, attitude, perception, and participation levels towards SWC services in Kano Metropolis.

Therefore, for construct (awareness), it has two factors extracted, with an eigenvalue of 4.871, explaining 48.715% of the variance and has Cronbach's alpha of 0.811 (Table 2).

**Table 2: Awareness**

	Items	Component	
		1	2
<b>Awareness towards pollution threats</b>			
1	I am not satisfied with the services rendered by REMASAB towards waste collections	.909	
2	Deposits of uncollected solid waste can constitutes a public health problem	.875	
3	A clean environment is a source of happiness	.502	
4	We are vulnerable to the threats exposed by the illegal dumpsites in our community	.492	
5	Solid waste collection services improves environmental quality	.452	
<b>Awareness towards SWC services</b>			
6	Private sector participation on SWC services would have a positive impact to our neighborhood		.729
7	Environmental Knowledge is an integral part to human livelihood		.720
8	The negative impact of dirty environment has not been over exaggerated		.709
9	I am aware of the services offer by private service providers on SWC services		.645
10	Environmental defaulters on SWC for indiscriminate disposal could be prosecuted by law		.579
11	I know REMASAB's waste collection services alone cannot cover the whole of Kano metropolis effectively		.422
	<b>Cronbach's alpha</b>	<b>0.811</b>	
	<b>Eigenvalue</b>	<b>4.871</b>	
	<b>% Variance</b>	<b>48.7</b>	

For the construct (attitude) three dimensions were extracted, with eigenvalue 5.167, explaining 51.67% of the variance. The internal consistency for the items measured of the construct were examined by reliability analysis, the Cronbach's alpha was 0.844 (Table 3) which is by far above the minimum threshold of 0.6. The factors are named as cognitive, affective and a behavioral attitude towards SWC.

**Table 3: Attitude**

Items	Component		
	1	2	3
<b>Affective Attitude</b>			
1	I am ready to accept the new policy on SWC in the neighborhood	.759	
2	REMASAB's policy on SWC has open up new avenues for us on SWC services	.751	
3	I get disturbed seeing my environment in a dirty condition	.731	
4	I have concern for the future generation	.655	
5	I cherished my environment been clean and tidy	.550	
6	I really want to see our neighborhood is sustained for the next coming generations	.511	
7	I have fears on pollutions in the neighborhood	.409	
<b>Behavioral Attitude</b>			
8	I have a plan to improve in SWC for the future in my house	.746	
9	I am not positively affected by REMASAB's activities on SWC	.741	
10	I have more to do with solid waste recycling program	.728	
11	I will contribute to accept SWC services in my house through waste segregation, reuse and recycle for recycling	.723	
12	I belief sustainable SWC can enhance environmental quality	.622	
13	I would have more confidence on the services of private waste collectors than the public sector handling solid waste issues	.616	
<b>Cognitive Attitude</b>			
14	Monthly environmental sanitation exercise has change my views on environmental pollution reduction and degradation in our neighborhood	.928	
15	I have never heard anything about private solid waste service providers	.921	
16	SWC issues are important for the societal development	.513	

17 I so much have passion for environmental sustainability	.493
18 SWC issues are included in my life priorities and activities for environmental quality improvement	.436
<b>Cronbach's alpha</b>	<b>5.1674</b>
<b>Eigen value</b>	<b>5.1674</b>
<b>% Variance</b>	<b>51.7</b>

For construct (perception), it has only one factor extracted (unidimensional), which has eigenvalue of 3.929 explaining 39.3% of the variance. Internal consistency of all the items obtained of the Cronbach's alpha was 0.735 (Table 4).

**Table Error! No text of specified style in document.: Perception**

Items	Component 1
1. I support government's decision and plan to engaging private sector participation regarding solid waste collection services for a sustainable solid waste management	.768
2. I am not satisfied with overall solid waste management in our neighborhood	.672
3. I am willing to pay more for services that will enhance environmental quality	.648
4. Poor solid waste management causes environmental deterioration and brings about public health problems	.642
5. Government should only partake in the contracting process of private solid waste service providers	.575
6. I am keen for improvement in solid waste collection in our neighborhood	.574
7. Solid waste management services is handled effectively and efficiently in our neighborhood	.467
<b>Cronbach's alpha</b>	<b>0.735</b>
<b>Eigen value</b>	<b>3.929</b>
<b>% Variance</b>	<b>39.3</b>

## IV. DATA ANALYSIS

### *4.1 Socio-economic Profiles of the Respondents*

The socio-economic variables is summarized as in the Table 6 below. Households' disparity across gender reveals that the male (n=234) constitute 59.8% and female (n=157) account for a relatively smaller size of 40.2%. In terms of age distribution, much variation was not expected, thus only adults of 18 years old and above were sampled. However, the findings based on age categories shows that the average age of the households was 36 years. It shows that majority of the households are within the age range from 18 to 30 years were 146 respondents which accounts for (37.3%), while those who were few in the survey are within the age range of 51 years and above who are only 14.1%. This implies that majority of the survey respondents were within the active and productive age of 31 to 40 year accounts 114 (29.2%) and 41 to 50 years 76 (19.4 %) respectively.

However, among these age cohort, 9.7% disclosed to have attended Islamiyya schools which is presumably informal educational system. This implies that 90.3% of the sample have formal education. The disaggregate falls 6.6% those with basic primary education, and 109 (27.9%) completed secondary education. Majority of the respondents reported to have completed tertiary education (post-secondary education) which accounts for 55.8%.

It is apparent that, the sizeable number of households' dependents averagely under each household the analysis reveals that, the average family size is 6 persons in a household, with a maximum of 13 persons and minimum of 2 persons. Hence, significant number of households 200 that account for 51.2% have 4 to 6 family members. Respectively, another (29.9%) have 7 to 9 families and only 8.7% have more than 10 family size. Among the households, however, majority (46.8%) and (33.5%) respectively, reported earning total household

monthly income ranging between ₦40, 000 to ₦60, 000. While, only 6.4% earn household monthly income from ₦81,000 and above, another 13.3% have their earnings ranging from ₦61.000 to ₦80,000. The mean household income was approximately ₦38, 000.

**Table 6: Households' Socio-economic Profiles**

Variable (s)	Frequencies	Percentage	Mean±SD	Min.	Max.
<b>Gender</b>					
Male	234	59.8			
Female	157	40.2			
<b>Age/Age Group</b>					
Below 30	146	37.3	<b>36.14±11.95</b>	<b>18</b>	<b>68</b>
31-40	114	29.2			
41-50	76	19.4			
51 and Above	55	14.1			
<b>Household Size</b>					
2-3 Persons	40	10.2	<b>6.13±2.30</b>	<b>2</b>	<b>13</b>
4-6 Persons	200	51.2			
7-9 Persons	117	29.9			
10 and Above	34	8.7			
<b>Household Monthly Income</b>					
₦40000 and Below	183	46.8	<b>37692.33±11834.00</b>	<b>₦18000</b>	<b>₦85000</b>
₦41000-60000	131	33.5			
₦61000-80000	52	13.3			
₦81000 and Above	25	6.4			

**Note:** 1 USD = ₦197

#### **4.2 Procedure for the Descriptive Analysis**

To determine the households' levels of awareness, attitude, perception, and participation towards solid waste collection services (SWC) services, we used three levels as "low", "moderate" and "high". These levels were assessed using a five-point Likert scale of agreement "1" = strongly disagree to "5" = strongly agree. Thus, this five-Likert scale was further categorized into 3 by dividing the range into three.

That is:

The minimum value of '1' was subtracted from the maximum value of '5' (5-1=4), which is equal to 4.

$$\therefore \frac{4}{3} = 1.33.$$

Therefore, the value of 1.33 was added to the minimum value of 1.

Thus,

$$\begin{aligned} 1+1.33 &= 2.33 \\ 2.33 + 1.33 &= 3.66 \\ 3.66 + 1.33 &= 4.99 \text{ (5)} \end{aligned}$$

Accordingly, the respondents who scored between 1 and 2.33 are within the lower level. Those who scored between 2.34 and 3.66 are within the moderate level, while the respondents who scored between 3.67 and 5 are at the highest level.

### 4.3 Households' Level of Awareness towards Solid Waste Collections

The eleven items contain in the construct was used to measure households' level of awareness towards SWC. A five-point Likert scale was presented to respondents in which 1 denotes 'strongly disagree' and 5, 'strongly agree'. This is to understand respondents' conscious of their immediate environment. Thus, the result depicts the dominance of consensus on respondents' agreement and high level of environmental awareness, that deposits of uncollected solid waste can cause public health problem (M = 4.29, SD = 0.72), a clean environment is a source of happiness (M = 4.24, SD = 0.84), Vulnerability due to illegal dumpsites in the neighborhood exposes the residents to threats to public health and reduces environmental quality (M = 3.99, SD = 0.83), improvement in environmental quality due to an effective and efficient solid waste collection (M = 4.34, SD = 0.75), and generally, lack of satisfaction with services rendered by REMASAB by the respondents (M = 4.29, SD = 0.72). This implies that there is a good level of awareness towards environmental pollution among the households that proliferation of uncollected solid waste could be a risks to public health. On the awareness towards SWC services that, private sector participation, and positive impact for private sector involvement on SWC services to the environment (M = 3.84, SD = 0.87), environmental knowledge as an integral part to human lively also indicate high level of awareness to it among the households (M = 4.09, SD = 0.85), the negative environmental impact of a filthy environment has not been over emphasized (M = 4.09, SD = 0.85), services been offered by private service providers on SWC services (M = 3.80, SD = 0.89), prosecution of environmental defaulters for indiscriminate waste disposal (M = 3.79, SD = 1.05). Also, households' level of awareness is quite high with respect to fact that the government agency responsible for municipal waste management alone cannot effectively cover the whole of Kano metropolis (M= 3.99, SD = 0.83). However, the analysis revealed that very few of the respondents were low or moderate in terms of their awareness levels, hence, the researcher concludes that there was quite high level of awareness among the households towards solid waste management issues, the majority of the respondents score high based on the overall mean of 4.07 and standard deviation (SD) of 0.84 as the parameters used in the descriptive statistics to describe levels of awareness among the households towards SWC in Kano metropolis.

**Table 7: Households' Level of Awareness toward Solid Waste Collection**

S/N	Statements	Mean	SD	Levels		
				Low	Moderate	High
<b>Awareness towards pollution threats</b>						
1	I am not satisfied with the services rendered by REMASAB towards waste collections	4.29	0.72	12 (3.1%)	24 (6.1%)	355 (90.8%)
2	Deposits of uncollected solid waste can constitutes a public health problem	4.29	0.72	12 (3.1%)	24 (6.1%)	355 (90.8%)
3	A clean environment is a source of happiness	4.24	0.84	20 (5.1%)	38 (9.7%)	333 (85.2%)
4	We are vulnerable to the threats exposed by the illegal dumpsites in our community	3.99	0.83	24 (6.1%)	59 (15.1%)	308 (78.8%)
5	Solid waste collection services improves environmental quality	4.34	0.75	14 (3.6%)	23 (5.9%)	354 (90.5%)
<b>Awareness towards SWC services</b>						
6	Private sector participation on SWC services would have a positive impact to our community	3.84	0.87	37 (9.5%)	73 (18.7%)	281 (71.9%)
7	Environmental Knowledge is an integral part to human livelihood	4.09	0.85	24 (6.1%)	50 (12.8%)	317 (81.1%)
8	The negative impact of dirty environment has not been over exaggerated	4.09	0.85	24 (6.1%)	50 (12.8%)	317 (81.1%)
9	I am aware of the services offer by private service providers on SWC services	3.80	0.89	41 (10.5%)	73 (18.7%)	277 (70.8%)
10	Environmental defaulters on SWC for indiscriminate disposal could be prosecuted by law	3.79	1.05	64 (16.4%)	63 (16.1%)	264 (67.5%)
11	I know REMASAB's waste collection services alone cannot cover the whole of Kano metropolis effectively	3.99	0.83	24 (6.1%)	63 (16.1%)	304 (77.7%)

**Note:** Low (1 – 2.33); Moderate (2.34 – 3.66); High (3.67 – 5.00)

Overall Mean = 4.07; SD 0.84; N = 391

#### 4.4 Households' Attitudinal Levels towards Solid Waste Collection

Attitudinal concern for the environment is centered from the view of individual attractiveness and commitment in the environmental resource management. Hence, individual level of awareness on environmental managements for its conservation reflects on individuals' attitude towards environmental management for its sustainability. An 18-item statement on a five-point Likert scale was used in determining the attitudinal concern towards SWC services. The results are presented in Tables 8, 9, and 10 below.

#### 4.5 Households' Level of Cognitive Attitude towards Solid Waste Collection

The result of monthly environmental sanitation exercise has change views of the respondents on environmental pollution reduction and degradation (M = 3.76, SD = 0.98), the statement that, "I have never heard anything about private solid waste service providers" (M = 3.76, SD = 0.98), the statement "SWC issues are important for the societal development" (M = 4.07, SD = 0.87), to "I so much have passion for environmental sustainability" (M = 4.06, SD = 0.85), for the statement "SWC issues are been included in my life priorities and activities for environmental quality improvement ( M = 3.73, SD = 0.83). The scores here and the later ones empirically revealed that the cognitive attitude was encouraging for environmental sustainability. Based on the outcomes the researcher concludes that indeed there was a moderate level of cognitive attitude towards SWC among households in the metropolitan Kano. As the overall mean score is given by 3.19 and Standard deviation (SD) 0.89 which indicates that the individual items mean scores fall within the moderate level category.

**Table 8: Households' Level of Cognitive Attitude towards Solid Waste Collection**

S/N	Statements	Mean	SD	Levels		
				Low	Moderate	High
1	Monthly environmental sanitation exercise has change my views on environmental pollution reduction and degradation in the community	3.76	0.98	39 (10%)	50 (12.8%)	302 (77.2%)
2	I have never heard anything about private solid waste service providers	3.76	0.98	39 (10%)	50 (12.8%)	302 (77.2%)
3	SWC issues are important for the societal development	4.07	0.87	23 (5.9%)	53 (13.6%)	315 (80.6%)
4	I so much have passion for environmental sustainability	4.06	0.85	28 (7.2%)	47 (12%)	316 (80.8%)
5	SWC issues are included in my life priorities and activities for environmental quality improvement	3.73	0.83	33 (8.4%)	93 (23.8%)	265 (67.8%)

**Note:** Low (1 – 2.33); Moderate (2.34 – 3.66); High (3.67 – 5.00)  
Overall Mean = 3.19; SD 0.89; N = 391

#### 4.6 Households' Level of Affective Attitude towards Solid Waste Collection

The surveyed households were offered with motivational factors for solid waste collection and asked to rate them based on 1 to 5 points Likert scale for the respective 7 items of affective attitude. The results in Table 9 shows that bulk of the respondents agree with the statement that "I am ready to accept the new policy on SWC in the neighborhood" (M= 3.89, SD= 0.90), descriptive analysis for the statement "REMASAB's policy on SWC has open up new avenues for the respondents on SWC services" (M = 3.89, SD = 0.90), to "I get disturbed seeing my environment in a dirty condition" (M = 4.28, SD = 0.86), the statement about the motivational factor for solid waste collection highly endorsed was "I have concern for the future generation" (M = 4.28, SD = 0.86), Additionally, majority of the respondents also agree to "I cherished my environment been clean and tidy" ( M = 4.36, SD = 0.83). The statement on environmental sustainability "I really want to see our neighborhoods is sustained for the next coming generations" (M = 4.13, SD = 0.81), another agree to the statement that "I have fears on pollutions in the neighborhood" (M = 4.11, SD = 0.86). Conclusively, the analysis revealed that there was high level of affective attitude among the households in Kano metropolis toward SWC because the overall mean score is given by 4.26 and standard deviation of 0.85 which shows the individual items mean scores fall within the high-level category, hence, earnestly in demand of an improved and cleaned environment to safeguard public health.



**Table 9: Households' Level of Affective Attitude towards Solid Waste Collection**

S/N	Statements	Mean	SD	Levels		
				Low	Moderate	High
1	I am ready to accept the new policy on SWC in the neighborhood	3.89	0.90	39 (10%)	50 (12.8%)	302 (77.2%)
2	REMASAB's policy on SWC has open up new avenues for us on SWC services	3.89	0.90	39 (10%)	50 (12.8%)	302 (77.2%)
3	I get disturbed seeing my environment in a dirty condition	4.28	0.86	18 (4.6%)	20 (5.1%)	353 (90.3%)
4	I have concern for the future generation	4.28	0.86	18 (4.6%)	20 (5.1%)	353 (90.3%)
5	I cherished my environment been clean and tidy	4.36	0.83	17 (4.3%)	19 (4.9%)	355 (90.8%)
6	I really want to see our neighborhood is sustained for the next coming generations	4.13	0.81	23 (5.9%)	34 (8.7%)	334 (85.4%)
7	I have fears on pollutions in the neighborhood	4.11	0.84	19 (4.9%)	45 (11.5%)	327 (83.6%)

**Note:** Low (1 – 2.33); Moderate (2.34 – 3.66); High (3.67 – 5.00)  
Overall Mean = 4.26; SD 0.85; N = 391

**4.7 Households' Level of Behavioral Attitude towards Solid Waste Collection**

For the behavioral concern about the environment on solid waste pollution 6 items measuring each of the dimensions were employed. The response anchored contains a 5-point Likert scale, 1 denoting “strongly disagree”, through 5 “strongly agree” about behavioral attitude questions on pollution related problems. The results is indicate in Table 10. Thus, on the households plans to improve in SWC services it shows that (M = 3.58, SD = 0.93), while, the statement “I am not positively affected by REMASAB’s activities on SWC” (M = 3.59, SD = 0.91). Also, endorsement for the statement that “I have more to do with solid waste recycling program” revealed that (M = 3.96, SD = 0.67), while, “I will contribute to accept SWC services in my house through waste segregation, reuse and recycle for recycling” showed that (M=3.97, SD=0.67). Similarly, on having confidence in terms of effective service delivery of private waste collectors than the public sector it shows that (M = 4.02, SD = 0.90) while enhancing environmental quality by a sustainable SWC services (M = 4.03, SD = 0.91). Based on these results, therefore the researcher concludes that there was a high level of behavioral attitude towards SWC among households in Kano metropolis having considering the overall mean score of 3.84 and standard deviation of 0.84 which fall within the high-level category.

**Table 10: Households' Level of Behavioral Attitude towards Solid Waste Collection**

S/N	Statements	Mean	SD	Levels		
				Low	Moderate	High
1	I have a plan to improve in SWM for the future in my house	3.58	0.93	56 (14.3%)	100 (25.6%)	235 (60.1%)
2	I am not positively affected by REMASAB's activities on SWC	3.59	0.91	56 (14.3%)	99 (25.3%)	236 (60.4%)
3	I have more to do with solid waste recycling program	3.96	0.67	17 (4.3%)	45 (11.5%)	329 (84.1%)
4	I will contribute to accept SWC services in my house through waste segregation, reuse and recycle for recycling	3.97	0.67	16 (4.1%)	47 (12%)	328 (83.9%)

*Households' Levels of Awareness, Perception and Attitude towards Improved Solid Waste ..*

5	I belief sustainable SWC can enhance the environmental quality	4.03	0.91	33 (8.4%)	45 (11.5%)	313 (80.1%)
6	I would have more confidence on the services of private waste collectors than the public sector handling solid waste issues	4.02	0.90	32 (8.2%)	47 (12%)	312 (78.8%)

**Note:** Low (1 – 2.33); Moderate (2.34 – 3.66); High (3.67 – 5.00)  
Overall Mean = 3.84; SD 0.85; N = 391

**4.8 Households' level of Perception towards Solid Waste Collection**

Households' perceptions towards solid waste collection virtually are based on their understanding and sensitivity generally about the environment. Environmental sensitivity is an individual's affective characteristics to observe environments with compassion [34]. While, [35] refers environmental sensitivity as the 'predisposition to take an interest in learning about the environment, feeling concern for it, and acting to conserve it, on the basis of formative experiences'. Hence, the analysis for households' level of perception on SWC services is envisaged to give an insight on the views of the households' concern about environmental pollution. 7-items were used to determine the respondent' perception on Likert scale which 1 denotes 'strongly disagree', and 5 'strongly agree'. The result shows a positive response to most of the items used in defining households' perception towards SWC services (Table11).

The analysis shows that more than half of the respondents were not satisfied with the statement that "Solid waste management services are handled effectively and efficiently in our neighborhoods" with a reference to its collection in their various communities (M= 3.16, SD = 0.84). The majority of the respondents agree to "Poor solid waste management causes environmental deterioration and brings about public health problems" (M = 4.09, SD = 0.79), Also, much of the respondents endorsed to support government's decision and plan to engage private sector participation regarding solid waste collection services for a sustainable solid waste management (M = 3.97, SD = 0.81), consequently, the results shows that households are willing to pay more for effective and sufficient solid waste collections services that will enhance environmental quality when the Programme is fully privatized to private operators (M = 3.63, SD = 1.00), while, bulk of the respondents were not satisfied with overall solid waste management in their neighborhoods (M = 3.19, SD = 0.89), and therefore opt government should only partake in the contracting process of private solid waste service providers (M = 3.28, SD = 0.91). It reveals that there is a moderate level of perception among households in Kano metropolis having an overall mean score of 3.56 and standard deviation of 0.86 which indicate that majority of the respondents have scored average.

**Table 11: Households' Level of Perception towards Solid Waste Collection**

S/N	Statements	Mean	SD	Levels		
				Low	Moderate	High
1	I support government's decision and plan to engaging private sector participation regarding solid waste collection services for a sustainable solid waste management	3.97	0.81	22 (5.6%)	67 (17.1%)	302 (77.2%)
2	I am not satisfied with overall solid waste management in our neighborhood	3.19	0.89	97 (24.8%)	145 (37.1%)	149 (38.1%)
3	I am willing to pay more for services that will enhance environmental quality	3.63	1.00	64 (16.4%)	83 (21.2%)	244 (62.4%)
4	Poor solid waste management causes environmental deterioration and brings about public health problems	4.09	0.79	24 (6.1%)	34 (8.7%)	333 (85.2%)
5	Government should only partake in the contracting process of private solid waste service providers	3.28	0.91	91 (23.3%)	123 (31.5%)	177 (45.3%)
6	I am keen for improvement in SWC in our neighborhood	3.89	0.79	28 (7.2%)	57 (14.6%)	306 (78.3%)
7	Solid waste collection services is not handled effectively and efficiently in our neighborhood	3.16	0.84	84 (21.5%)	137 (35%)	170 (43.5%)

**Note:** Low (1 – 2.33); Moderate (2.34 – 3.66); High (3.67 – 5.00)  
Overall Mean = 3.56; SD 0.86; N = 391

## V. CONCLUSION

The households' levels of awareness and perception of environmental effects as well as their participation on waste collection services were the factors that most influenced the households' attitude towards environmental improvement. Both the drivers of attitudes and perceived behavioral control can be used by policymakers to direct households' intentions and behaviors toward a sustainable solid waste management practices. These results suggest that households are willing to participate in different aspect of waste management strategies to improve environmental quality and to ensure effective waste collection services. Thus, the implementation of a community-based program in may provide an important tool for the waste management in Kano metropolis. Community-participation on waste management may hold the potential for improving environmental sustainability. Results from this survey have highlighted on issues of policy relevance as follows.

- Both the drivers of attitude and perceived behavioral control can be used by policymakers to direct households' intentions and behaviors toward sustainable solid waste management through community participation.
- It may be a bit difficult to impose waste collection service to the local residents who traditionally view the long-term free waste collection services by the urban agency responsible for waste collection in the metropolis. As such, there is the need for more enlightenment campaigns and programs for environmental education to the residents.
- There should be a corporate collective responsibility from both government and non-governmental organizations in raising the households' levels of perception and cognitive attitude towards waste collection services in the metropolis.
- Community participation for sustainable environmental management should be stimulated from the neighborhoods, to the wards, to the local government, and then to the whole Kano metropolitan levels.

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