ANALYSING HOUSEHOLDS' KNOWLEDGE AND AWARENESS ON WASTE MINIMIZATION IN CHIKUN LGA OF KADUNA STATE, NIGERIA

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ABSTRACT

Waste management can require a significant amount of time and resources. Waste minimization should be seen as a primary focus for most waste management strategies; therefore, it is important to understand the benefits of waste minimization and how it can be implemented in all sectors. The most effective way to reduce waste is by not creating it in the first place, and so reduction is placed at the top of waste hierarchies. This paper focused on analysing households' knowledge and awareness on waste minimization techniques in Chikun LGA of Kaduna State, Nigeria. Data was collected through administering 400 copies of questionnaire to households and descriptive statistics was used to analyse the data. Results showed that the general knowledge and awareness of waste minimization and its techniques is rather low and the respondents exhibited a negative behaviour towards waste minimization. It was concluded that the low level of knowledge has translated to the rapid increase in household waste generation and the respondents seldom behave directly or indirectly in a way that will reduce the quantity of wastes they generate.

Keywords: Waste Minimization, Awareness, Reuse, Recycle, Compost

INTRODUCTION

Environmental problem is a global concern. Around the world, efforts are being made to make people aware about environmental protection. One of the main causes of environmental degradation is improper management in the disposal of solid waste. It is a major cause of pollution and outbreak of diseases in many parts of the world. There is no permanent solution for environmental problems, the only way out is by reducing and controlling waste generation through proper awareness and practice (Licy, Vivek, Saritha, Anies and Josphina, 2013).

The generation of waste is an inevitable part of human activity. It is produced either as a by-product of production process or arises from municipal or domestic activities, industry/manufacturing, agriculture and construction, hospitals/medical and tourism sectors. We make so much waste, we buy products and throw them away. So, we should find solutions to reduce this waste and we should fight to save our future. The environmental concern is very important because the interest of a clean environment is among the most important pillars of sustainable development. Therefore, the amount of waste we produce is the result of our unsustainable lifestyle. Most waste can be treated by incineration, composting or landfill. However, all these methods cause air, water and soil pollution, which is harmful to human health, plants, and animals (Bouanini, 2014).

The most environmentally resourceful, economically efficient, and cost-effective

way to manage waste is to address the problem in the first place. The most effective way to reduce waste is by not creating it in the first place, and so reduction is placed at the top of waste hierarchies (USEPA, 2010). Efforts to take action to reduce waste before waste is actually produced can also be termed pre-cycling (HRM, 2010). Proper waste management can require a significant amount of time and resources; therefore, it is important to understand the benefits of waste minimization and how it can be implemented in all sectors (Davidson, 2011). USEPA (2012) defines waste minimization as a process of elimination that involves reducing the amount of waste produced in society and helps to eliminate the generation of harmful and persistent wastes, supporting the efforts to promote a more sustainable society.

There has been hardly any effort in the past to create community awareness, either about the likely perils due to poor waste management or the simple steps that every citizen can take. This could have helped in reducing waste generation and promote effective waste management. Researches have been done on various aspects of waste management but the aspect of waste minimization and its awareness among households has been neglected despite the fact that households generate a large quantity of municipal solid waste. This research is therefore aimed at assessing the general knowledge and awareness on the different techniques of waste minimization and to examine people's behaviour towards waste minimization, in Chikun LGA of Kaduna state.

LITERATURE REVIEW

People's Knowledge and Awareness of Waste Minimization

Bouanini (2014), in his study, Analyzing People's Behavior towards Minimizing Municipal Solid Waste in Bechar City in Algeria, assessed people's knowledge and culture about waste minimization, 89.10% of the sample analyzed watched an environmental education program, and most of them are aware about the negative effects of waste. However, only 58.30% of them think about a healthy way to get rid of waste. Most of them have proposed to provide more awareness programs and develop laws to pay tax for throwing waste in public places and encourage the exploitation of waste and turn it into organic fertilizer for farmland. As well as encouraging incineration to produce energy and promote recycling by facilitating the operations of waste sorting and create factories for recycling in Bechar city. In addition, they suggested providing garbage containers in all neighborhoods with the allocation of special containers for recyclable materials and other for non-recyclable materials, so as to facilitate the separation process from the source and thus facilitate the recycling process. Through analyzing the nature of the factors that may motivate people to reduce waste, Bouanini (2014), also discovered that 45,50% were cultural factors, 27,60% were political factors, and others factors such as religious, social and cultural. Therefore, the culture and knowledge play a good role to push people for waste minimization.

On the contrary, study conducted by Licy *et al* (2013), on the Awareness, Attitude and Practice of School Students towards Household Waste Management in Kerala. Using a well designed and validated questionnaire showed that high school

students are well aware of principles of waste minimization and the role of local authorities in waste management, segregation of wastes, effective mechanism for household waste management, complication of improper waste management and eager to know about environmental problems than the higher secondary school students.

In Malaysia, Ali, Nor and Siong (2012), carried out a research with the aim of evaluating the urban solid waste minimization. Findings revealed that most of the respondents were not aware of the local authorities' initiatives and policies regarding waste minimization. It was also discovered that lack of public awareness from the local authority has hindered waste minimization.

People's Behaviour Towards Waste Minimization

There are several literatures about municipal solid waste management in several countries in the world, and the good examples of municipal solid waste management are in developed countries such as Germany, France, Japan, and United States. Among the literature there is Chung and Poon (1994) who analysed Hong Kong citizens' attitude towards waste recycling and waste minimization. And they found that Hong Kong people generally support waste recycling and minimization measures.

Another research conducted in Ireland by Faly and Davies (2007), to investigate why people behave the way they do towards household waste minimization. A quantitative survey of attitude and reported behaviour was done in order to generate statistical information on the relationship between values and actions and to identify barriers and opportunities that mediate those relationships through the active participation of householders in a way waste minimization is exercise or takes place in the home. It was revealed that active techniques such as the waste minimization have added value of offering enhances learning opportunities for participating householders as well as nuances information for policy makers.

In Oxford, UK, Robertson and Walkington (2009) conducted a study for the purpose of understanding the characteristics of recycling behaviour of university students in Oxford and the factors that influence them. It was found out that students' recycling behaviour was influence by situational variables such as the provision of domestic recycling box and the recycling behaviour of friends and family, whereas the students reported willingness to minimize waste was linked to psychological variables such as environmental concern. These fundamental differences in the behavioural characteristics of waste minimization compared with recycling, demonstrate the importance for local authorities to identify which type of behaviour they wish to encourage.

Bouanini (2014) in their study Analyzing People's Behavior towards Minimizing Municipal Solid Waste in Bechar City in Algeria discovered that the people of Bachar city, Algeria help in reducing the use of plastic bags because most of them carry their own bag when they go to the market for purchasing. About 59% of them agree with the policy of paying for plastic bag, and they suggested replacing plastic bags with paper bags; this means that people are aware about the negative effects of using the plastic bags and they agree to reduce the use of these bags. However, people don't like to buy second hand products, and they are only willing to repair

their commodity and use it again. Therefore, in this case they don't participate in reusing principal. In addition, there is a lack in knowledge and culture of recyclable products, because only 46,2% of people who are willing to buy recyclable products. And most of the people think that these are average products. Moreover, 78,2% are willing to pay tax for waste in case there were stringent monitoring to pay this tax. Bouanini (2012) analyzed how the 3R principle (reduce, reuse and recycle) can help to achieve sustainable development. And she depended on a survey in a university environment in China in order to evaluate and analyze people's behavior and willingness to participate in the 3R principle. Thus, the results showed that although the analyzed sample were educated people but there was a lack in the participation of the 3R principle as well as in environmental knowledge.

MATERIALS AND METHODS

The study population included the urban residents of Chikun LGA. This is made up of Nassarawa, Rido, Yelwa, Narayi, and Sabon Tasha wards. NPC (1991) found the total population of these urban wards to be 211,916. The researcher therefore projected this population to year 2017 and a total population of 405,926 was obtained and used as the target population. The population projection was done using an exponential formula given as follows;

$$Nt = P\, e^{(r*t)}$$

where, Nt = number of people at the future time

P = population at the beginning time (present population)

e = natural logarithm base of 2.71828

r = rate of increase divided by 100

t = time period involved

The construction of the sample frame was done to ascertain a good representation of the sampled communities in the study area. Since the population is a finite one, the application of a statistical formula becomes imperative in determining the sample size. The sample size was obtained through the application of Yamane's (1967) sample size selection formula for a finite population as applied by Uzoagulu, (1998). The formula is given thus:

$$S = \frac{N}{1+N(e)^2}$$

where S= sample size

N= finite population of the study area

e= Error margin or level of significance (0.05)

1= constant

Using the above formula, four hundred (400) copies of questionnaire were administered to the respondents but three hundred and ninety-six (396) copies were properly filled and retrieved giving a response rate of 99%. Analysis was done using the three hundred and ninety-six (396) copies of the questionnaire.

Cochran, (1977) proportional allocation formula was used for the allocation of questionnaire to each ward.

$$n = \frac{ni(n)}{N}$$

Where ni = Population of the community (group)

n = total sample size

N= Total population of the study.

The number of questionnaires given to each ward is given in Table 1.

Table 1: Size and Number of Questionnaire given to each ward in Chikun LGA

S/N	Wards	Pop. as at 1991	2017 Projected Pop.	No. of Questionnaires
1	Narayi	26559	50874	50
2	Nassarawa	68021	130294	129
3	Rido	10218	19573	20
4	Sabon Tasha	32213	61704	61
5	Yelwa	74905	143481	141
Total		211916	405926	400

Source: Research Survey (2017) in NPC (1991)

A purposive sampling technique was applied for selecting the urban wards in Chikun LGA, this is because of the peculiarity of urban centres in waste generation and then a simple random sampling was used to administer the appropriate number of questionnaires to each ward. The questionnaire was prepared according to the Likert Scale in order to measure the strength of the respondents' opinion on the household waste minimization issues under consideration. By Likert's method, a person's attitude is measured by combining their responses across all items. For the data analysis, Mean, standard deviation and severity index were used using the formulas

Mean $\overline{(X)} = \frac{\sum FX}{\sum F}$

Standard Deviation, (SD) = $\sqrt{\frac{\sum F(X-)2}{\sum F}}$

Where $\overline{X}$ = mean
F = frequency
X = rating on point scale

Severity Index (SI) was calculated using the following equation after Al-Hammed and Assaff (1996):

$$S.I = \sum_{i=1}^{4} \frac{a_i n_i}{4N} X100$$

Where:
a_i = the index of a class; constant expressing the weight given to the class
n_i = the frequency of response
i = index (0, 1,2,3,4)
N= is the total number of responses for this research

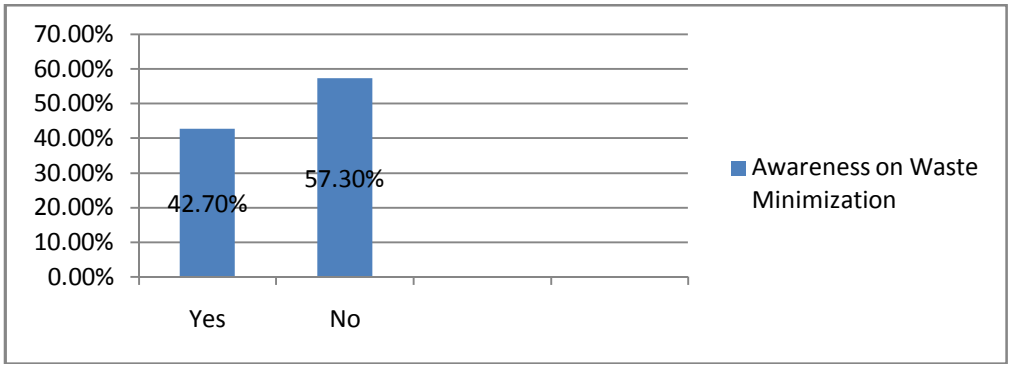
The rating classification was adapted after Majid and McCaffer (1997):
a_0= low or extreme ineffective 0.00≤ SI < 12.5
a_1= low or ineffective 12.5≤ SI < 37.5
a_2 = moderate or effective 37.5≤ SI < 62.5
a_3= high or very effective 62.5≤ SI < 87.5
a_4= very high or extreme effective 87.5≤ SI < 100

RESULTS AND DISCUSSIONS

Knowledge of Waste Minimization

Respondents were asked if they ever heard of the term waste minimization, their responses are given in Figure 1.

Figure 1: Knowledge of Waste Minimization



Source: Field Survey (2018)

It could be observed that majority (57.3%) of the respondents never heard of the term waste minimization. Lack of environmental ethics and awareness contribute to the failure of waste minimization and its practices. Therefore, instilling information on waste issues will go a long way in raising awareness in waste minimization.

Level of Awareness of Waste Minimization

Table 2 reveals that 42.4% of the respondents indicated the fact that they have a bad knowledge of waste minimization, 26% indicated they have a fair knowledge of it, while about 18%, 9% and 5% say they have a good, very good and excellent knowledge of waste minimization respectively ($\overline{x}$ = 2.1,SD 1.4).

Tabe 2. Level of Awareness of Waste Minimization

Level of Knowledge of Waste Minimization	Frequency	Percentage
Excellent	19	4.8
Very good	34	8.6
Good	72	18.2
Fair	103	26
Bad	168	42.4
$\overline{X}$	2.1	
Std Dev	1.4	

Source: Field Survey (2018)

It can be deduced that the general knowledge of waste minimization is rather low. This is similar to the result of Ezeah (2010) which showed that approximately 47% of his respondents in Abuja, Nigeria, said they had good to excellent knowledge of waste minimization. On the other hand, 48% of respondents evaluated their knowledge of waste minimization to be between fair and very poor. If the number of respondents who were not sure of their response to the question were taken into consideration, the percentage of respondents with very low understanding of waste minimization knowledge went up even higher. This implies that over half of the study population by self-acclaim had very low understanding of waste minimization. This result is also similar to the general perception and accounts in

published literature that public awareness on MSW subjects in Abuja is rather low (Ezeah *et al.*, 2009). This finding also contradicts the findings of Nor, Haji and Ho (2016) who discovered that Solid waste minimisation is not a new concept in Malaysia. The level of knowledge the respondents had on solid waste minimisation as shown by the results of the study is high.

Level of Knowledge of Waste Minimization Techniques

Table 3 presents the results of the respondents' assessment of the level of their knowledge of waste minimization techniques.

Table 3. Level of knowledge of waste minimization techniques

Level of Knowledge of Waste Minimization Techniques	Frequency	Percentage
Excellent	22	5.6
Very good	36	9.1
Good	75	18.9
Fair	105	26.5
Bad	158	39.6
$\overline{X}$	2.1	
Std Dev	1.3	

Source: Field Survey (2018)

Table 3 reveals that majority (39.9%) of the respondents have a bad knowledge of the waste minimization techniques followed by about 27% with a fair knowledge, then about 19% have good knowledge, ($\overline{X}$=2.1,SD=1.3). Only about 9% and 6% have a very good and an excellent knowledge of the waste minimization techniques respectively.

This is contrary to the result of Licy et al (2013) in Kerala, India, which revealed that high school students are well aware of principles of waste minimization. Awopetu et *al.* (2012) in their study in Makurdi revealed a very high degree of awareness of the importance of solid waste reduction in the fight against the problems of waste management across the study area. Analysing the residents' knowledge of waste reduction, re-use and recycling, more than 65% of the residents agreed that solid wastes can be reduced, reused and recycled.

Level of Knowledge of Reuse of Waste

Table 4: Knowledge of Reuse

Level of Knowledge of reuse of Waste	Frequency	Percentage
Excellent	37	9.3
Very good	49	12.4
Good	81	20.5
Fair	188	47.5
Bad	41	10.4
$\overline{X}$	2.6	
Std Dev	1.1	

Source: Field Survey (2018)

Majority of the respondents, approximately, 10% and 48% reported bad and fair knowledge of the reuse of domestic waste respectively, while about 21% of the respondents have good knowledge, about 12% have a very good knowledge and about 9% have an excellent knowledge of waste reuse. Thus, giving a low $\overline{X}$ of 2.6, SD=1.1. This result is contrary to that of Awopetu et al (2012) who found out that most of their respondents in Makurdi knew and agreed that solid waste can be reused and about 42% of their respondents knew much about reuse and thereby agreed that solid waste can be reused.

Knowledge of Recycling

Table 5: presents the result of the respondents' knowledge of waste recycling.

Level of Knowledge of Waste Recycling	Frequency	Percentage
Excellent	16	4
Very good	29	7.3
Good	45	11.4
Fair	177	44.7
Bad	129	32.6
$\overline{X}$	2.1	
Std Dev	1.0	

Source: Field Survey (2018)

Recycling is a series of activities that includes collection of recyclable materials that would otherwise be considered waste, sorting and processing recyclables into raw materials such as fibers, and manufacturing raw materials into new product. It can be seen in Table 5 that most (45%) of the respondents have fair knowledge, 33% have bad knowledge, while 11%, 7% and 4% have a good, very good and an excellent knowledge of waste recycling respectively. Giving $\overline{X}$=2.1, SD=1.0, indicating that the respondents' knowledge of recycling is equally low. Knowledge about recycling programs has a positive relationship with recycling practice. Generally, the more

knowledge a household has about recycle materials and their impact on the natural world, the more likely they will practice it (Schultz, 1995). Oskamp *et al,* (1991) noted that recycling behaviour may also be affected by lack of knowledge about environmental issues. The result of the current study is similar to that of Lutui (2001) which showed that only 13% of respondents in Tonga knew much about recycling. Overall, nearly 63% of survey population had little or no understanding of recycling. Result of the current study disagrees with that of Nor, Haji and Ho (2016), which shows that majority (91%) of the respondents in Malaysia have knowledge about recycling and materials that can be recycled.

Knowledge of Composting

The respondents' knowledge of waste composting in the study area is shown in Table 6.

Table 6: Knowledge of Composting

Level of Knowledge of Waste composting	Frequency	Percentage
Excellent	28	7.1
Very good	67	16.9
Good	133	33.6
Fair	114	28.8
Bad	54	13.6
$\overline{X}$	2.8	
Std Dev	1.1	

Source: Field Survey (2018)

Table 6 shows that most of the respondents (33.6%) have good knowledge of composting, 28.8% have affair knowledge of compost, followed by those who have a very good knowledge with 16.9%, then 13.6% have bad knowledge of compost and the least of the population (7.1%) has an excellent knowledge of composting. It can be deduced that majority of the respondents (58%) have excellent to fair knowledge of waste compost ($\overline{X}$=2.8, SD=1.1). The Result of the present study disagrees with the result of Ezeah (2010) who found that approximately 34% of respondents in Abuja, Nigeria said they had good to excellent knowledge of composting. On the other hand, about 53% of respondents evaluated their understanding of composting to be between fair and very poor.

Knowledge of the Impact of Waste Minimization

The respondents' knowledge of the impact of waste minimization on the economy, environment and health is shown in Table 7.

Waste minimization has the following impact	SA Freq.(%)	A Freq.(%)	U Freq.(%)	D Freq.(%)	SD Freq.(%)	$\overline{X}$	Std Dev
Economic impact	64(16.2)	142(35.9)	115(29)	59(14.9)	16(4)	3.5	1.5
Environmental impact	98(24.7)	150(37.9)	107(27)	26(6.6)	15(3.8)	3.7	1.0
Health impact	68(17.3)	97(24.5)	81(20.5)	99(25)	51(12.6)	3.1	1.4

Table 7: Impact of Waste Minimization
Source: Field Survey (2017)

Note: - SA= strongly agree, A= agree, U= undecided, D= disagree, SD= strongly disagree

Result shows that 16% and 36% of the respondents strongly agree and agree respectively that waste minimization has economic impact, 29% are undecided, while 15% and 4% disagree and strongly disagree respectively ($\overline{X}$=3.5, SD=1.5). Most of the respondents (24.7% and 37.9%) are of the opinion that waste minimization has environmental impact, 27% are undecided while only about 10.4% disagree with that fact ($\overline{X}$=3.8, SD=1.0). On the health impact of waste minimization, 17.3% strongly agree that waste minimization has a health impact, 24.5% agree, 20.5% are undecided, 25% disagree and 12.9% strongly disagree ($\overline{X}$=3.1, SD=1.4). It can be deduced that awareness on the impact of waste minimization on the economy, environment and health is generally high. This result is similar to that of Lutui (2001) which discovered that the people of Tonga have high awareness of the impact of waste management on the economy, environment and health.

People's Behaviour Towards Waste Minimization

Based on figure 2, 48.7% out of the total respondents indicated that they reduce/avoid the production of waste in their homes while majority 51.3% do not reduce/avoid waste generation. Waste reduction activities are important to halt or slow down the increasing rate of waste generation. Waste reduction aspects such as volume reduction and encouraging the use of products that can be recycled more easily, should be addressed (Awopetu et al 2012).

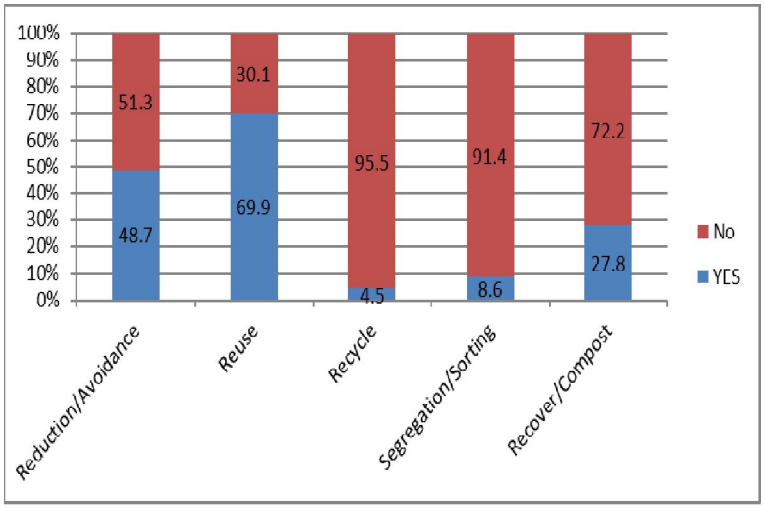


Fig. 2. Practice of waste minimization techniques
Source: Field Survey (2018)

Waste reduction is a low-waste approach that recognizes there is no "away." It mimics nature by viewing solid waste as potential resources that we should be reusing, recycling or composting. Waste reduction is the most preferred solution because it tackles the problem of waste production before it occurs rather than at the tail end after the wastes have already been produced. Waste reduction at source should be vigorously pursued, (Awopetu et al 2012).

69.9% of the respondents which is the majority reuse some of the waste generated in their homes while 30.1% do not reuse their wastes. Waste such as polythene, glass jars/bottles are used in their homes for storage and packaging, food remnants are given to pets such as dogs and cats instead of considering it as waste and wooden wastes are reused as fuel.

Most (95.5%) of the respondents do not recycle their waste and only (4.5%) respondents practice recycling in their homes. This is as a result of lack of recycling services and knowledge for recycling in the study area as observed during the course of the study. This result disagrees with that of Nor, Haji and Ho (2016), which indicated that 58 % of respondents sometimes engage in recycling of such materials as tissues paper, bottle, and plastic, 30% had always engaged in recycling while 12% never recycled any material before.

Respondents' Frequency of Practices of Waste Minimization

Time	Frequency	Percentage
Always	11	2.7
Most times	41	10.3
Sometimes	168	42.4
Rarely	114	28.8
Never	62	15.7
Total	396	100
SI	39	

Table 8: Frequency of Waste Minimization Practice
Source: Field Survey (2018)
Key: SI = Severity Index

Regarding the respondents' frequency of waste minimization practices, majority (42.4%) of the respondents admit they sometimes practice waste minimization, followed by those who rarely practice (28.8%), then 15.7% of the respondents agreed to the fact that they don't practice waste minimization in their homes. 10.3% of the respondents most times practice waste minimization and just 2.7% respondents admitted they always practice waste minimization. This analysis gave a severity index (SI) of 39 which means that the level of practice of waste minimization in the study area is moderate or effective. This result conforms to that of Licy et al (2013) in Thrissur City of Kerala, India, which confirmed that high school students have proper ideas and practice of waste segregation, conversion of waste to kitchen compost are committed to minimize the wastes and to avoid throwing the wastes outside their premises.

Respondents' Frequency of the Purchase of Less Throwaway Products

Table 9 shows the result of the frequency of the purchase of less throwaway product.

Time	Frequency	Percentage
Always	35	8.8
Most times	57	14.4
Sometimes	67	17
Rarely	105	26.5
Never	132	33.3
Total	396	100
SI	34.7	

Table 9: Frequency of the Purchase of Less Throwaway Products
Source: Field Survey (2018**)**
Key: SI = Severity Index

Majority (33.3%) of the respondents do not consider buying less throw away products, 26.5% of the respondents rarely buy less throw away products, 17% indicated they

sometimes buy less throw away products and 14.4% of the respondents most times buy less throw always products. Only 8.8% of the respondents always buy less throw away products. The SI for this result is 34.7 which means that the level of buying less throw away product is low or ineffective. It can be deduced that the study area generally do not consider buying less throw away products hence, the high increase in the generation of domestic solid waste in the study area. This is similar to the findings of Yakubu, Samuel, and Durowoju (2015) in Akure who discovered that majority (51%) of their respondents will not be willing to purchase less throw away products.

Respondents' Frequency of Taking Shopping Bags When Going Shopping

Time	Frequency	Percentage
Always	5	8.8
Most times	31	14.4
Sometimes	78	17
Rarely	114	26.5
Never	168	33.3
Total	396	100
SI	24.2	

Table 10: Frequency of Taking Shopping Bags When Going Shopping
Source: Field Survey (2018)
Key: SI = Severity Index

In response to the respondents behaviour of taking shopping bags, 42.4% that they do not carry shopping bags along when going for shopping, 28.8% of the respondents rarely carry shopping bags along with them, 19.7% of the respondents sometimes do, most times, 7.8% respondents always carry their shopping bags when going shopping, while 1.7% of the respondents always carry their shopping bags when going shopping. This has a SI of 24.2 which implies that the extent to which respondents carry shopping bags along when going for shopping is low or ineffective. One can be tempted to say that this could be the reason for high content of plastics waste in the household waste generated in the study area. This result disagrees with the result of Lutui (2001) which discovers that majority of the people of Tonga mostly use shopping bag and only 10% never. The result of the present study disagrees to that of Bouanini, (2014) in Bechar city, Algeria which tells that his respondents help in reducing the use of plastic bags because most of them carry their own bag when they go to the market for purchasing.

Respondents' Frequency of the Reuse of Waste

Regarding the issue of the reuse of waste, majority (40.4%) of the respondents most times reuse their waste, followed by 17.9% who say they sometimes reuse their waste, 17.4% of the respondent rarely reuse their waste, 15.7% of the respondents never reuse their waste while 8.6% of the respondents always reuse their waste.

Time	Frequency	Percentage
Always	34	8.6
Most times	160	40.4
Sometimes	71	17.9
Rarely	69	17.4
Never	62	15.7
Total	396	100
SI	52.2	

Table 11: Frequency of the Reuse of Waste
Source: Field Survey (2018)
Key: SI = Severity Index

This analysis gave a severity index of 52.2, implying that the extent to which the respondents reuse their waste is moderate or effective. This result coincides with the results of Lutui (2001) which shows that majority of the respondents in Tonga reuse their waste and consider reuse very appropriate to waste management. On the contrary, results of Ezeah, (2010) show that approximately 26% of respondents in Abuja rated their recycling/reuse performance between good to excellent. On the other hand, nearly 60% of respondents evaluated their recycling/reuse performance to be between fair and very poor.

Respondents' Frequency of Practice of Compost

Time	Frequency	Percentage
Always	9	2.2
Most times	41	10.4
Sometimes	116	29.3
Rarely	165	41.7
Never	65	16.4
Total	396	100
SI	34.8	

Table 12: Frequency of Practice of Compost
Source: Field Survey (2017)
Key: SI = Severity Index

As composting is one way of recovering energy from waste materials, respondent were asked of the frequency of compost, majority (41.7%) of the respondents rarely practice compost, followed by 29.3% respondents who indicated they sometimes do compost, then 10.4% of the respondents most a times practice waste compost and 2.2% of the respondents admitted they always practice waste compost, while 16.41% of the respondents never compost their waste. A severity index of 34.8 was obtained which indicated that the extent of the practice of waste compost is low or ineffective. The result of Lutui (2001) showed that only 30% of those who knew about compost carry out composting themselves, this is similar to the result of the current study.

CONCLUSION

This study has been able to analysed households' knowledge and awareness on waste minimization in Chikun LGA of Kaduna State, Nigeria. The level of knowledge and awareness the respondents have on domestic waste minimisation as shown by the results of the study is low. However, this low level of knowledge has translated to the rapid increase in household waste generation. The respondents seldom behave directly or indirectly in a way that will reduce the quantity of wastes they generate. This shows that a lot needs to be done by Local Authority in the areas in providing more environmental programs for increasing people's awareness about waste minimization. As well as government may play an important role for motivating people to reduce waste by creating some taxes for waste minimization, create recycling facilities, adopt a schedule for waste collection, learn from other countries on how to practice waste minimisation, enforcement by government, and fine defaulters who are found throwing recyclable materials around.

RECOMMENDATIONS

From the study, the following recommendations are made;

1. Both the State and Local governments should organize environmental programs awareness on waste minimization.
2. State and Local governments should create waste minimization centers and facilities.
3. State and Local governments should introduce tax to defaulters who liter the environment with waste materials.
4. Schools Managements should educate students on awareness, attitude and practice of household waste management.
5. Residents should be sensitized by the Sanitary inpectors on knowledge of waste minimization, reduction and recycling.

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