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Indiscriminate Disposal of Sachet Water Bags and Its Impact on the Environment: A Case Study of Potiskum Town.

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Abstract
There is a disequilibrium between man and his environment because of his economic activities, this misunderstanding has led to so many environmental problems. The daily activities of human to meet their basic needs and nutritional requirement for sustenance generate a lot of unwanted material. The amount of trash generated from consumption of sachet water has been on the increase for the past few years throughout the country. This research work examines the effect of Indiscriminate disposal of polythene bags in Potiskum town, by examining the level of awareness of the disposal of polythene bags by the residents, the environmental and health effect on the residents, and the management attitude towards the disposal of polythene waste. The purpose of this research is to examine the environmental and health problems associated with sachet water waste disposal in Potiskum town. Their search work reveals that, used sachet water polythene bags are improperly disposed of Potiskum town due to lack of awareness of the environmental and health effect of Indiscriminate disposal of polythene waste, lack of management by the government to provide machine and personnel. Qualitative and Quantitative methods were was used in carrying out this research. Qualitative tools such as questionnaire is randomly distributed for data collection, descriptive analyses analysis was used for data analysis and the results were presented in table and charts. Recommendations such as advising or suggesting that the people of the study area (Potiskum) should introduce a deposit refund system as a useful method in managing the sachet water bags trash from the street, and also implement the use of 3R system of reuse, reduce, and recycle which will help in controlling the numbers of waste sachet water bags generated and finally, the local authority should take charges on enlightening the residents on the detrimental effect of improper disposal of polythene waste.
Keywords: Environment, Health, Disposal, Sachet, polythene bags

Introduction

Polythene or plastic are made up of synthetic organic polymers which are widely used in different applications ranging from water bottles, clothing, food packaging, medical supplies, electronic goods, construction materials, and sachet water bags etc. [1]. In the last six decades, plastics or polythene has become an indispensable and versatile product with a wide range of properties, chemical composition, and applications. Although, this polythene or plastic was initially assumed to be harmless and inert, however, many years of polythene or plastic disposal into the environment has led to diverse associated problems. Environmental pollution by polythene or plastic wastes is now recognized widely to be a major environmental burden especially in the aquatic environment where there is prolong biophysical breakdown of plastics detrimental negative effects on wildlife and limited plastic removal options [1]

In many instances, sheeting and packaging plastics are disposed of after usage, however, because of their durability, such plastics are located everywhere and remain persistent in the environment. Research on the monitoring and impacts of plastic wastes is still at the infancy stage, but thus far, the reports are worrisome. In human occupational and residential environment, plastics made of petrol-based polymer are present in high quantity [2]. Usually, the end life of these plastics and municipal wastes are the land-filled which have several toxic constituents among which are phthalates, poly-fluorinated chemicals, biphenyl A (BPA), brominated flame retardants and antimony trioxide which can reach out to have adverse effects on environmental and public health. Plastics in electronic waste (e-waste) have become a serious global environmental and public health concern due to its large production volume and the presence of inadequate management policies in several countries. Reports from China, Nigeria, and India indicated that plastic hazardous substances from e-wastes can migrate beyond the processing sites and into the environment [3].

Global production of plastics and generation of waste

In modern life, plastics are ubiquitous. Its early usage dated back to 1600 B.C., at the time when human hands shaped natural rubber and polymerized into different useful objects in prehistoric Mesoamerica [4]. Diverse usage and manufacturing of plastics and plastic products began in 1839 when polystyrene (PS) and vulcanized rubber were discovered. Production of Bakelite which is the first truly synthetic polymer was in 1907 in Belgium, however, by 1930, Bakelite was everywhere, especially in fashion, communication, and electrical and automotive

industries. It took a decade after this for mass production of plastics to begin and it has constantly expanded ever since [1].

According [1] stated that as of 2008, the annual plastic production was estimated to be 245 million tons globally. At present, single-use packaging is the largest sector, accounting for almost 40% of the overall plastic usage in Europe, this is followed by consumer goods, materials for construction, automotive, electrical and agriculture applications at 22%, 20%, 9%, 6% and 3%, respectively. It was estimated in 2015, that the highest rate of production is in Asia (with 49% of total global output, with China as the largest world producer (28%), followed by North America and Europe at 19% each. In terms of production, the rest regions are of lesser importance although not necessarily in terms of plastic consumption [5]. Globally, plastic production was estimated to be 380 million tons in 2018. Since 1950 to 2018, plastics of about 6.3 billion tones have been produced worldwide, 9% and 12% of which have been recycled and incinerated, respectively. Plastics of about 5 million tones are yearly consumed in UK alone, with only about one-quarter recycled, and the rest landfilled. It has been suggested by researchers that by 2050, oceans might contain more plastics than fish in terms of weight. Yearly, approximately 500 billion plastic bags are used out of which an estimated 13 million tones end up in the ocean, killing approximately 100,000 marine lives [6].

Plastic productions have increased in twenty-fold since 1964. Globally, approximately 311 million tons of plastics were produced in 2014, expected to double in about 20-year time and possibly quadruple by 2050. International Energy Agency World Energy Outlook in 2015 estimated that, the largest application, plastic packaging (26% of the overall volume), is envisaged to have continuous strong growth, which might double within 15 years, with a possibility of fourfold increase by 2050, to about 318 million tones yearly, which is higher than the whole plastic industry today [7].

Plastic Types

There are different types of plastics based on their constituents and type of materials used in their production.

In Nigeria, Sachet water entails the packaging of drinking water in a non-biodegradable synthetic polyethylene (polythene). Sachet water, popularly called pure water in Nigeria has become an everyday intake for an average Nigerian. The evidence of this is seen in the number of disposed sachets littering the streets and the increased number of drainages blocked by 'blocks' of sachet water waste. Sachet water was introduced to the Nigerian markets around 1990 but its regulation by the National Agency for Food and Drug Administration and Control (NAFDAC) started in 2001 [8]. Sachet water gained much popularity in Nigeria because the product is convenient for use, affordable and economically viable. It brought 'potable' water to the doorsteps of many Nigerians. The venture has also given employment to Nigerians which enables them to put food on their table [9].

Notwithstanding the benefits accruing from sachet water production and consumption, the indiscriminate disposal of the waste in various undesired sites such as along the streets, gutters, motor parks, schools, markets, homes, and venues of social functions etc. poses a lot of threat on the environment. The sachets are made of non-biodegradable synthetic polyethylene (polythene) which does not decompose in the soil even after many years [4]. The polythene even when subjected to burning produces major known and harmful greenhouse gases (GHGs) like carbon monoxide, nitrous oxide, and carbon dioxide. Sachet water waste disposal is a vast problem that needs to be tackled because of the implications it has on biophysical environment such as soil, vegetation air and water. In Yobe, and Potiskum the study area, it is a common sight to see sachet water waste indiscriminately littered. This suggests that Potiskum urban dwellers seem not to know the negative impact of indiscriminate disposal of sachet water waste on the environment. Some studies have been carried out on polythene sachet water in other localities; for instance, [10] examined the water quality of sachet water found within Nsukka and its environs. He reported that the iron level of the sachet water was about 2.59mg/l, a level much higher than the WHO (2004) accepted limit of 0.03mg/l. However, he attributed this large disparity to long storage in the tank before packaging. Virtually most literature reviewed on the study area, concentrates on the water quality and the recycling techniques. There was no detailed study on the environmental problems of sachet water wastes disposal on the environment; this is a research loophole/gap this study sets to fill [6].

The purpose of this study is to examine the indiscriminate disposal of sachet water bags and its impact on the environment in Potiskum town, and objectives are to identify ways of minimizing the disposal of sachet water bags, through identifying the causes of indiscriminate disposal of sachet water bags within the study area and to educate or suggest best practice in controlling or mitigating on the health hazard of indiscriminate disposal of sachet water bags.

Figure 1: Photograph of Polythene waste blocking drainage Source: [8]

Materials and Methods

This research is exploratory in nature as it attempts to explore the experiences of individuals in relation to their subjective perceptions from a particular study. For this study, the research paradigm that was followed is of qualitative nature, using open ended-structured questionnaire [9]. explains that qualitative research is based on the belief that firsthand experience provides the most meaningful data. It is also believed that qualitative data gives large volumes of quality data from a limited number of people. It is aimed at understanding the world of participants from their frame of reference [7]. Both primary and secondary data source were used in this study. Primary data was obtained from the field through the administration of open structured questionnaires while, the secondary data was from statistical reports and database.

Study Area

Potiskum is the largest city in Yobe State and originally a Ngizim town. It is one of the Local Government Area in Yobe State Nigeria, it is on the A3 highway at 11°43′N 11°04′E with latitude 11042'50.80" N and longitude 11004'51.89" E.

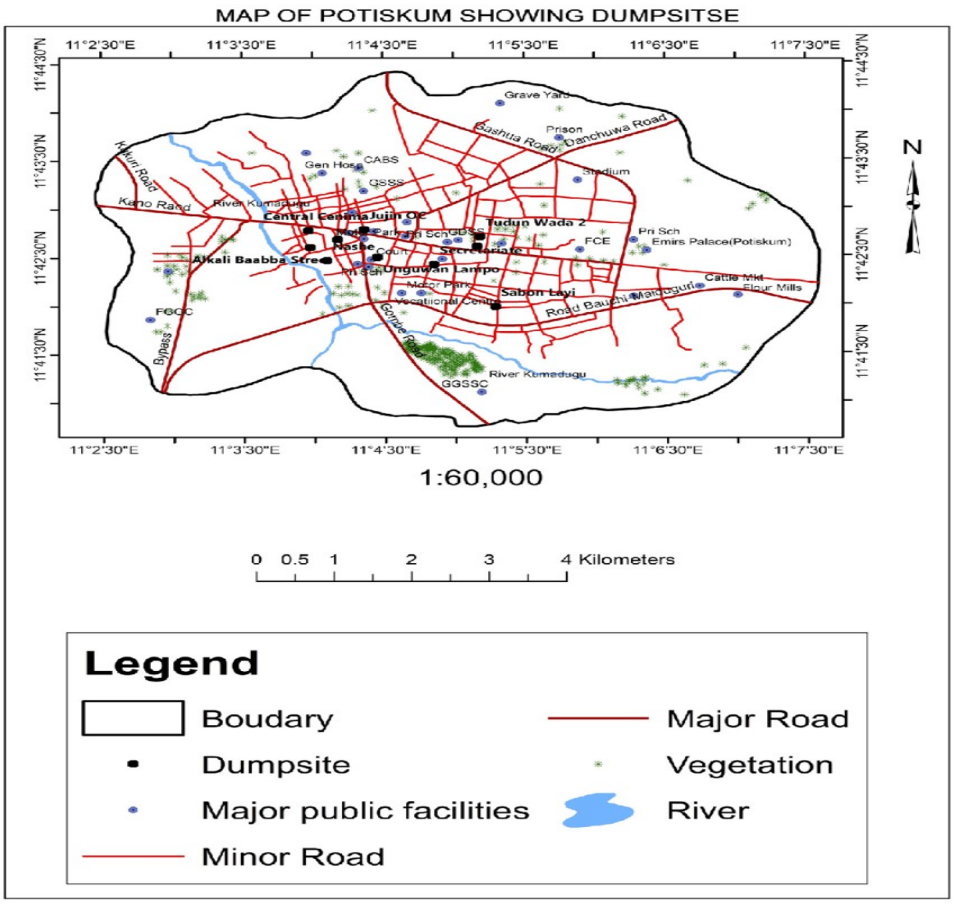


Figure 2: Map of Yobe showing study area. Source: Dakasku, G.I., 2020

Results and Discussion

The data collected for this research work was analyzed and discussedusing simple frequency table and chart. The study is targeted at assessing the "Indiscriminate disposal of used sachet water bags" with special focus on Potiskum town as a case study. This was assessed using fifty (50) questionnaires of twenty (20) questions. The responses to each question were analyzed using simple percentage. The findings of the study were presented as follows. Demographic profile of respondents on the indiscriminate disposal of sachet water bags in Potiskum town, Yobe State.

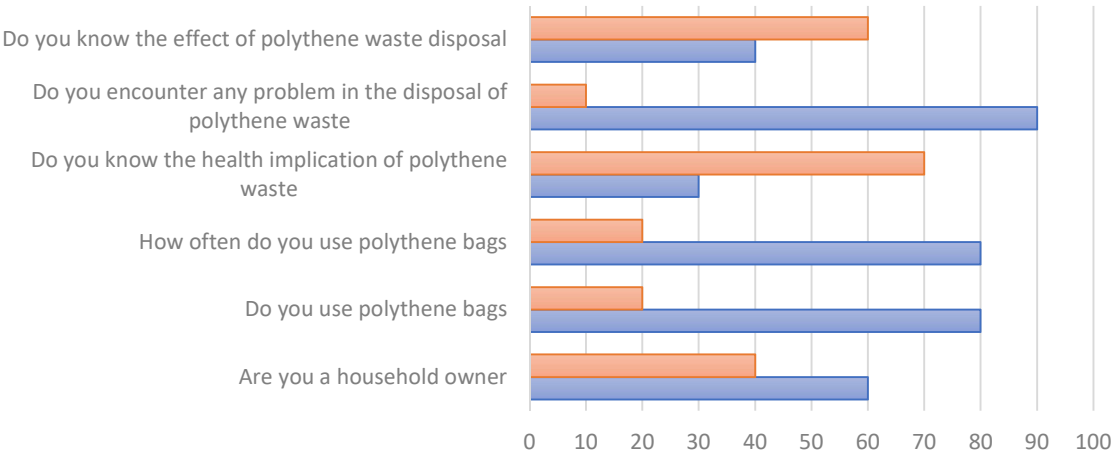
Table 1: Description of demographic information

S/N	VARIABLE	FREQUENCY	PERCENTAGE (%)
1.	**Sex**		
	Male	25	50
	Female	25	50
	Total	**50**	**100**
2.	**Age of the Respondents**		
	15-30	05	15
	31-45	10	35
	45 and above	35	50
	Total	**50**	**100**
3.	**Marital Status**		
	Married	30	61
	Single	12	24
	Widows	08	15
	Total	**50**	**100**
4.	**Educational Status**		
	Primary	05	10
	Secondary	10	20
	Tertiary	25	50
	Non-formal Education	10	20
	Total	**50**	**100**
5.	**Occupation**		
	Civil Servant	20	50
	Farmer	10	15
	Trader	15	25
	(Self-employed, housewife)	05	10
	Total	**50**	**100**

Source: Field survey, 2022.

Table 1 above, indicates that 50 of the respondents representing 50% are male where 50 of the respondents representing 50% are female. The table further indicate that the age distribution of respondents who responded to our questionnaires, 15-30(15.0%), 31-45(35.0), 45 and above (50.0%). This explained that majority respondents' range between 45 and above. In the same table, majority of the respondents (30 representing 61%) are married and few of the population (12 representing 24%) are un-married and (08representing 15%) are widows. The data analyzed above reveals that most of the waste generated is from the house with higher population.

The Table also presents educational status of respondent who responded to the questionnaire. Out of 50 respondent, 05 (10.0%) possess primary school, 10 (20%) possess secondary school, 25 (50%) possess tertiary institution and 10 (20%) have non-formal education. This analysis suggest that majority of the respondent have certain level of educational background. Education is essential for raising public awareness and improving the capacity of people to understand as well as appreciate issue and problem. The table also shows that majority of the respondents are government officials (50%), (25%) are traders, (15%) are farmers while (10%) are housewives.



	Are you a household owner	Do you use polythene bags	How often do you use polythene bags	Do you know the health implication of polythene waste	Do you encounter any problem in the disposal of polythene waste	Do you know the effect of polythene waste disposal
No	40	20	20	70	10	60
Yes	60	80	80	30	90	40

Figure 3: Awareness on indiscriminate disposal of sachet water bags. Source: Field Survey, 2022.

Figure 3 present that 60% of the respondents are household owners and 40% house does owned a house. As regard to the usage of polythene bags (indiscriminate disposal of waste sachet water bags) 80% of the respondent shows positive, while 20% shows negative.

The figure shows 30% are aware on the health implication of indiscriminate disposal of polythene waste, while 70% are ignorant of the implication and so, will make no effort in stopping it. This could be one of the main reasons why bags of polythene waste especially sachet water exists in street, drainage and so on. Also, the figure shows that 10% of the respondent do not encounter problem in the disposal of waste and 90% encountered such problem, this could be so because there is inadequate facility of waste disposal in the area. The figure also shows that 60% are un-aware of the effect of polythene waste disposal on the environment and 40% are aware of the effect.

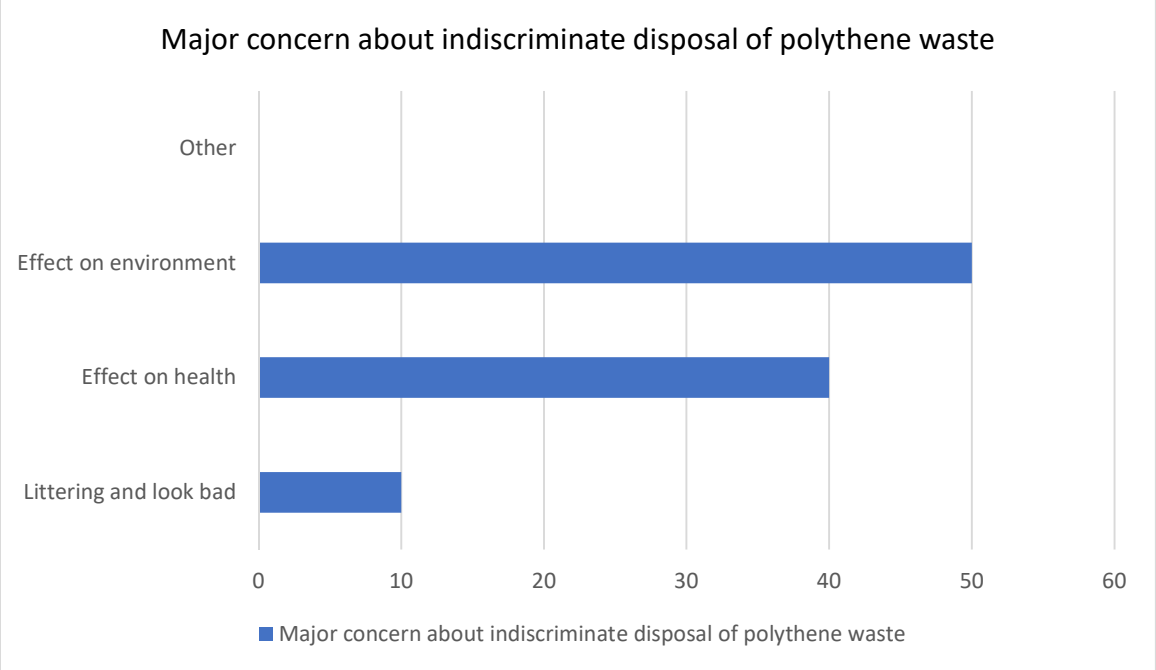


Figure 4: What is your prior concern about indiscriminate disposal of polythene. Source: Field Survey, 2022.

Figure 4 represent the major concern of indiscriminate disposal of polythene waste in the study area, which shows that 50% of the residents are more concern on the environmental effect of polythene waste because it's the main source of drainage blockage and resulting to flooding, 40% of the residents are concerned on the health effect of the disposal of polythene waste in the community because it generates mosquitoes which causes malaria, air and water borne diseases. Furthermore, the chart shows 10% of the residents' concern on the littering and tidiness of the locality.

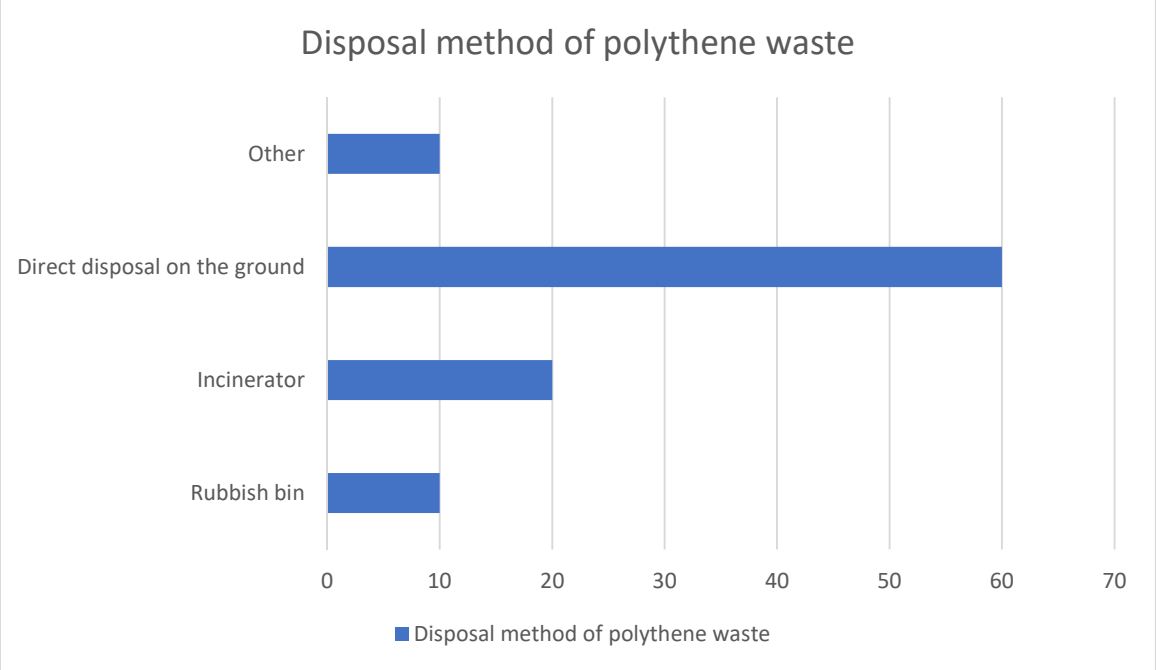


Figure 5: Methods of polythene waste disposal. Source: Field Survey, 2022.

Figure3 represent the disposal method of polythene waste, as shown in the figure above, majority of the residents with 60% of the population dispose polythene waste on the ground due to the ignorance or unaware of its implication, while 20% disposed in incinerators,10% disposed in rubbish bin in their houses and 10% uses other methods of disposal.

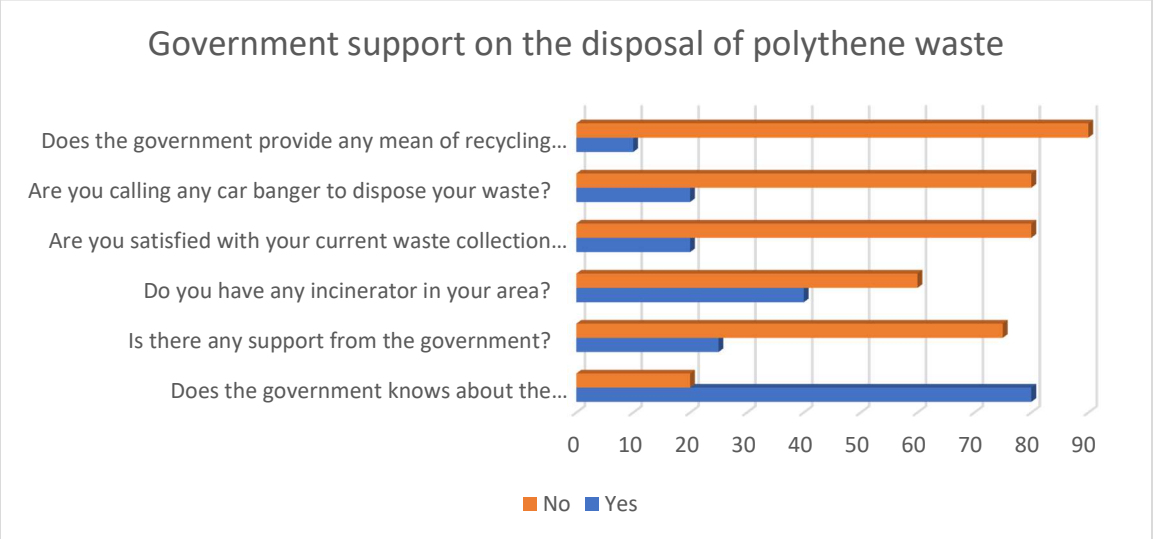


Figure 6: Government support on disposal of polythene waste. Source: Field survey, 2022.

Figure 6 represent the government support on the disposal of polythene waste. According to the residents of the area, majority of the resident with 80% of the population said that government are aware of the indiscriminate disposal of polythene waste, while 20% said they are unaware. 75% of the respondents stated that they do not receive any support from the government on how to tackle the indiscriminate

disposal of polythene waste because it causes many health and environmental implications, while 25% of the residents stated that they receive government support. Also, in the figure above, it shows that 35% of the residents' states that they have incinerators, while 65% of the response show that there are no incinerators in their areas which may be the main source of litters of plastics and polythene bag waste in the area. The result also shows from the respondents that 20% patronized car banger to dispose their waste and 80% areneither happy with their disposal services nor call any car banger to dispose their waste. Lastly, 10% of the respondents shows that the government provide a mean of recycling of polythene waste, while 90% states that the government do not provide any mean of recycling of polythene waste in the community.

Finally, findings from this research study unveiled that the residents of Potiskum town are unaware of the detrimental effect of indiscriminate disposal of polythene waste, with 60% of the respondents not knowing the effect of polythene waste disposal on both the environment and their health status.

Conclusion

The study has made effort to identify the causes of improper management of sachet water plastic waste in Potiskum city. It is clear from the study that, the menace results from inappropriate method of disposing sachet water bags by consumers. This coupled with the low capacity of the local government authority to adequately scavenge sachet water plastic trash from the street of Potiskum has resulted in the aggravation of the menace. This situation provides a conducive ground for mosquito breeding and consequently increases the risk of malaria prevalence in the community. To address the situation all relevant stakeholders should come together and contribute to the sensitization, control, and mitigation of this menace to the barest minimum.

Finally, the study has identified a number of recommendations which when carefully implemented could best help curb the menace in Potiskum city. These recommendations are as follows:

1. Potiskum local authority should introduce a deposit refund system as a useful method in managing the sachet water bags trash from the street.
2. The 3R system of reuse, reduce, and recycle should be adopted.
3. The local authority of Potiskum should take charges on enlightening the residents on the detrimental effect of improper disposal of polythene waste.
4. Appropriate policies and legislation on polythene waste disposal should be made by the local authority, followed by the strengthening enforcement on defaulters.
5. Residents of the locality should endeavor to sanitize the environment by disposing waste properly.

Declaration of conflicting interests

The authors declared no potential conflict of interest

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Sample Questionnaire

Questionnaire on indiscriminate disposal of sachet water bags and its impact on the environment: a case study of potiskum town

Please kindly tick (√) or write answer as appropriate in the space provided.

Section A. Social demographic characteristics of respondents.

Gender
Male ( ) b. Female ( )
Age of the respondent
Below 20 year ( ) b. 21-30 years ( ) c. 31-40 years ( )
41-50 year ( ) e. 50 years above ( )
Marital status
Married ( ) b. Single ( ) c. Divorce ( ) d. Widow ( )
Educational status
Primary ( ) b. Secondary ( ) c. Tertiary ( ) d. Non-formal education ( )
Occupation
Civil servant ( ) b. Trader ( ) c. Farmer ( ) d. House wife ( )

Section B

1. Are you a household owner? Yes ( ) No ( )
2. Do you use polythene bags? Yes( ). No(.)
3. How often do you use polythene bags? Always (.) Not always ( )
4. Do you know the health implication of indiscriminate disposal of polythene waste? Yes ( ) No( )
5. Do you encounter any problem in the disposal of polythene waste? Yes ( ) No ( )
6. Do you know the effect of polythene waste? Yes(.). No(.)
7. Do you think that media has raised your awareness about waste generation and management?
   Yes ( ) No ( )
8. What type of mass media component was more effective in generating your awareness?

i. Radio ii. Television iii. Newspaper iv. Social media v. others _____

9. In your opinion which of these is a priority concern about waste in your area i. Littering and looks bad ( )
   ii. Effect on human health ( )

ii. Effect on environment ( ) iv. Others……..

10. Where do you keep your household rubbish in? For each storage method

Write down the number of each used in a week.

i. Plastic bags ( ) _____ ii. Cardboard boxes ( ) ___

iii. Rubbish bin/ drum ( ) _____ iv. Others ( ) _____

v. No storage (direct disposal to dump) ( )

11. Where do you dispose your generated waste?

i. Nearby container ( ) ii. Open spaces ( )

iii. Near home ( ) iv. Others—Specify _____

12. Is there any large bin in your area?

i. Yes ( ) ii. No ( )

13. Do you have regular garbage collection in your area?

i. Yes ( ) ii. No ( )

14. Does the government know about the indiscriminate disposal of polythene waste in your area?

Yes ( ) No ( )

15. Are you satisfied with your current waste collection service?

YES ( ) NO ( )

16. Do people dump their waste alongside the garbage bins instead of putting it inside?

Yes ( ) No ( )

17. Did you normally put your waste inside dustbin?

Yes ( ) No ( )

18. Does the government provide any mean of recycling of those plastic bags?

Yes ( ) No ( )

19. Did you have any incinerator in your area?

Yes ( ) No ( )

20. Are you calling any car bangers for clearing of the incinerator?

Yes ( ) No ( )

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