

TYPES OF WASTE GENERATED IN NABARI PAYAM SOUTH SUDAN. A CROSS-SECTIONAL STUDY

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Abstract

Background

There is a dire need to create environmental education and awareness, practices, and knowledge in high schools to enhance environmental monitoring and management in the country for both present and future periods. The study aims to assess the types of waste generated in Nabari Payam, South Sudan.

Methodology

A cross-sectional survey, descriptive and explanatory design where quantitative and qualitative methods were adopted. A questionnaire and Focus group discussion were adopted and interviews for Key Informants. Data was analyzed descriptively using the Statistical Package for Social Sciences and thematic methods for quantitative and qualitative data.

Results

197 (59.0%) were male and 137 (41.0%) were female. (47.9%) mentioned inorganic waste, 10 (3.0%) with recyclable waste, 53 (15.9%) with solid waste, 100 (29.9%) organic waste, 4 (1.2%) for liquid waste and 4 (1.2%) of the respondents mentioned hazardous waste. Qualitative information also revealed that waste of different types was mixed since there were not enough storage facilities, and in some health centers, nothing was available to store waste generated. One participant said, "... Here wastes are mixed despite the source and this is due to limited containers. Wastes are discarded together in open space outside the Payam and sometimes I could see the safety boxes are being burnt using kerosene".

Conclusion

Inorganic and organic waste were the main types of waste generated followed by sharp objects and solid waste. The local people and authorities have limited capacity to manage waste generated per day and this affects the health and environmental aspects of the Payam.

Recommendations

Residents of Nabari Payam should reduce the generation of different types of waste most especially those that are more dangerous, especially if not well managed.

Keywords: *Types of waste, Inorganic waste, Organic waste, Nabari Payam*

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Background

Waste management in communities especially cities and urban areas has become a global public health issue that has to be addressed amidst other environmental challenges including global warming (Kabito, 2021). Currently, the world generates 2 billion tons of household waste per year, containing more than 60 tons of waste every second (Akrou, Moore & Grimes, 2021). Poor management of waste in most cities is a result of poor risk management of such waste leading to health and environmental concerns (Aryampa et al, 2019). This has also resulted in poor sanitation and hygiene leading to diseases such as cholera

and diarrhea as well as environmental pollution (Nshimiyimana, 2015).

There is a dire need to create environmental education and awareness, practices, and knowledge in high schools to enhance environmental monitoring and management in the country for both present and future periods. This will go a long way in enhancing education on the environment in an attempt to reorient education to restore environmental competence owing to its basic aim of attaining personal and social competence (Cheela et al, 2021). Countries have to come up with environmental policies for waste management in urban places and this should be adhered to by the residents

if the best outcomes are to be achieved in the community (Wiesmeth & Iläckl, 2017). The possibility that the community will enjoy the best practices for waste management greatly depends on the degree to which such a policy is enforced, monitored, and evaluated regarding behaviors in a community (Tsai et al, 2021).

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The poor management of waste is a threat to the environment and the eco-system and therefore, it is important to have regulations regarding how people behave towards such hazardous waste in the communities (Thakur, Parida & Raj, 2022). Management of waste in a country is best done following a pre-determined garbage/waste master plan. It is therefore, vital to note that programs and activities related to landfill management, waste collection timeliness, waste recycling, treatment, and regular collection as mandated by laws for the management of waste institutions in a country (Cheng & Urpelinen, 2015). In China's capital Shanghai, management of waste is carried out with a set of activities including segregation and this has been considered effective in the fight against mismanagement of waste among the Chinese (Chen, 2020). For the management of waste, factors such as leadership, stewardship behavior, and waste risks might determine the rate at which positive outcomes for timely waste collection, recycling, waste collection, and treatment among others are achieved and such also depends on the availability of human, technological, financial and enabling laws in place (Bloomberg, 2020). It was though noted by Bloomberg (2020) that the management of waste in China has been greatly affected by the existence of the COVID-19 pandemic with a basis on human and financial resources. For purposes of environmental protection, it is good for every country and city in particular to have an integrated environmental policy that guides all management of waste activities and programs for sustainability outcomes (Wiesmeth & I-läckl, 2017). It is thus important to note that waste management in municipal and city centers is linked with challenges that might be administrative, financial, and social, therefore, it is vital to make the best strategies on how to implement the best practices for solid waste management in such places (Saja, Zimar & Junaideen, 2021). The study aims to assess the types of waste generated in Nabari Payam, South Sudan.

Methodology

Research Design

The study adopted a cross-sectional survey, descriptive and explanatory design for accurate estimation of the relationship between the variables. The cross-sectional design provided a snapshot of a sample of a population at a single point in time. The study also used a quantitative approach and analytical research design on the data that was collected.

Study Area and Population

Juba city has Muniki Payam, Kator Payam, Rajaf Payam and Juba Nabari payam system. The administrative demarcations of Juba City are based on the following divisions: Muniki Payam, Juba Nabari Payam, Kator Payam, and Rajaf Payam. The city and Nabari Payam have a prevailing disparity of densities of population and incomes. Those who are generally the most affluent are those people living in the suburbs of the West, sharply contrasting with their counterparts who live in the eastern suburbs that are in the lower and middle-income levels (JCC, 2010). Wetland Sub-county borders the low-income areas of Konyo Konyo. The constituency has an area of 72.4 km². It contains some of the highest-income areas in Juba City, as well as low-income areas like Juba Nabari, and Deep River Nile wetland.

Deplorable living conditions and environmental degradation are characteristic lifestyle experiences of those living in low-income settlements. The brunt of it all is their diminished low level of participation in the social, economic, cultural, and political spheres of the city. The most painful of the incidental consequences of these exclusions is the worsening of poverty among the poor (UN-Habitat, 2010). Westland Sub-county has 88 students with 4,166 in public schools and 3,022 in private schools (Sub-county Director of Education Westlands, 2016).

Time Scope

The study was based on a period of 5 years that is from 2017-2022 to be able to assess knowledge, attitude, and practices among residents of Nabari Payam regarding waste management.

Sample Size

A sample size of 384 respondents were involved in this study. Key Informants (KIs) were; the Juba City-Environment Officer, City Authority Waste Management Officer, and City Private Company-Based Waste Management staff in charge of waste management.

Formula by Leslie Kish (1965) was used for estimation of sample size:

Where

n = sample size

z = the standard normal deviation at 95% confidence (1.96)

p = 50% of the estimated proportion of Juba City-Nabari Payam residents.

$q = (1-p) = (1-0.5) = 0.5$

= maximum acceptable error (5%)

Therefore, sample size $n =$

Sample size $n = 384$ Respondents

Sampling Techniques

Purposive sampling was used to select 3 key informants (KI) for the study that is; the Juba City-Environment Officer, City Authority Waste Management Officer, and City Private Company-Based Waste Management staff. Simple random sampling was also opted for to select respondents (Residents of Nabari Payam). This was because it would give an equal chance to be selected and thus, prevent the researcher from bias at the time of respondents' selection.

Data Collection Methods

The questionnaire, interview, and focus group discussion methods were used for data collection as indicated below.

Questionnaire

Quantitative data was obtained through the use of a questionnaire anchored on a five-point Likert-type scale ranging from 5 (strongly agree) to 1 (strongly disagree). This scale was selected to allow the respondents to express how much they agree or disagree with the statements in the questionnaire. This instrument was applied among the Nabari Payam Residents in the urban and semi-urban of the area. The design of the questionnaire guide was based on the objectives and variables of the study. A total of 334 residents of Nabari Payam were engaged in quantitative data collection using a questionnaire guide.

Interview

A structured interview was designed based on the objectives of this study and it was administered among the three (3) key informants. The interview method was designed to last for 4- I hours to elicit information regarding waste management practices, knowledge, practices, and attitudes as stated by the study objectives. This method was applied physically using an interview guide with the study participants and the researcher moderated the data collection exercise.

Focus Group Discussion

The researcher carried out five (5) focus group discussions in zones of Nabari Payam with a total of 50 participants. The FGD method was accompanied by an FGD guide that contained questions regarding knowledge, practices, and attitudes about waste management in Nabari Payam.

Validity and Reliability of the Research Instrument

The validity of the instrument was obtained through the development of the scales with the help of the experts in the field using the Content Validity Index (CVI). The reliability of the tools was enhanced through pre-testing of pilot

samples in a simulated environment from the field which enabled the re-phrasing of some questions if they did not pass the test.

The pretesting of the questionnaire is instrumental and vital to ensure it is not faultless and understandable by the respondents. The discussion with two random respondents helped to prove the validity and relevance of the questionnaire. The respondents who participated in the reliability test were not included in the study.

The reliability of the items was determined with the application of the Cronbach Coefficient Alpha to check for internal consistency. Items that confirmed a Cronbach Alpha Coefficient of 0.7 (Revelle, 1979). The instruments were pretested in Kator Payam among residents. For qualitative data collection instruments, dependability, conformability, and credibility principles were considered and applied to the interview and focus group discussion guide.

Data Analysis and Interpretation

Data collected from the field was tabulated, sorted, edited, classified, and coded into a coding sheet. The cleaned data was summarized and converted into frequencies and percentages using the category system. The researcher then used Statistical Package for Social Scientists (SPSS-23) to analyze the data collected.

Under descriptive analysis, variables were measured using frequency, mean score, and standard deviation. In addition, a scale of below, equal, and above three (<, = and >3) to show the degree for the mean scores where a mean of three represented a neutral, (Neither Agree Nor Disagree) less than three (<3) disagree and above three (>3) agree on a given variable item. Analyzed data was presented using frequency distribution tables.

For objective two knowledge about waste management was measured in terms of high or suboptimal (poor) among the respondents regarding waste management. The objective about attitude was considered in terms of holding a negative or positive attitude among the study respondents regarding waste management.

Qualitative data was analyzed by use of the thematic analysis method. This allowed the information to be presented with themes and elaborated as provided by the respondents. This type of data was triangulated with quantitative data to provide a clear presentation of information for this study.

Ethical Considerations

The researcher acquired an introduction letter from the University together with the identity card presented to Juba City Authority and Nabari Payam leaders and other categories of respondents before data collection. Further, this research project and the dissertation went through the

guidance of the supervisor until its submission to the university.

Assurance was made to management and staff that the information collected was for academic purposes. Thus, there were no other purposes that this study served except providing information regarding knowledge, attitude, practices, and management of waste at Nabari Payam and informing stakeholders about key areas for improvement.

The assent issue was resolved by obtaining informed consent informing target respondents of the purpose of the study, the expected participation from them, and any other information about the research that they wanted to know. The respondents signed the consent form before engaging in the data collection exercise.

Confidentiality of the respondents was paramount except in the case where they were permitted to be cited in the study. To achieve this, respondents were not presented by their names or job titles in chapter four but rather they were

referred to as KRI, KR2, and KR3, Residents of Nabri Payam in the FGI s were referred to as female participant group one or male participant (MP 1 -G-One or FIJ I or FP3-G-3) according to the group in a given place of Nabari Payam.

The privacy of the respondents was considered at the time of data collection by ensuring that data collection was carried out in a private manner where the respondents' offices or private places were utilized to achieve this. However, except in the focus group discussion, this principle was not observed but the respondents were notified of the matter.

Results

The qualitative information is from 334 respondents, qualitative from 50 participants from five focus group discussions, and 3 key informants.

Table 1: Distribution of Respondents by Demographic Information

Overall N = 334			
Characteristic	Variable categories	Frequency	Percentage
Gender	Male	137	41.0
	Female	197	59.0
Age	18-25 Years	60	18.0
	26-35 Years	149	
	36-45 Years	69	20.7
	46 Years and above	56	16.8
Marital Status	Single	14	4.2
	Married	255	76.3
	Divorced/Separated	56	16.8
	Widowed	9	2.7
Level of Education	Primary	5	1.5
	Secondary	64	19.2
	Tertiary	136	40.7
	University	129	38.6
Occupation	Business	70	21.0
	Causal Labor	145	43.4
	Health/Medical Worker	65	19.5
	Transport (Motorlist)	54	16.2
Time Spent in the Payam	< 5 years	29	8.7
	> 5 years	305	91.3

Source: Primary Data (2022)

Table 1 provides descriptive findings where 197 (59.0%) and 137 (41.0%) were male and female respondents respectively. In terms of age 149 (44.6%) of the respondents were aged 26-35 years, 69 (20.7%) had 36-45 years, 60 (18.0%) of the respondents had 18-25 years, and 56 (16.8%) with 46 years.

In terms of marital status, 255 (76.3%) of the respondents were married, 56 (16.8%) separated and 14 (4.2%) were

single. With education, 136 (40.7%) of the respondents had a tertiary level of education, 129 (38.6%) with university degree, 64 (19.2%) secondary level and primary were Findings regarding occupation, majority of the respondents were in casual labor economic activities 145 (43.4%), 70 (21.0%) were in business, health/medical workers were 65 (19.5%) and motorists were 54(16.2%). For time spent in the Payam majority of the respondents 305

(91.3%) had stayed in Nabari for > 5 years.

Types of Waste Generated in Nabari Payam

Table 2: Types of Waste

Overall N =334		
Types of Waste	Frequency	Percentage
Organic Waste	100	29.9
Inorganic Waste	163	47.9
Recyclable Waste	10	3.0
Liquid Waste	4	1.2
Solid Rubbish/Waste	53	15.9
Hazardous Waste	4	1.2

Source: Primary Data (2022)

Table 2 indicates that with the types of waste in Nabari Payam, the majority of respondents 163 (47.9%) mentioned inorganic waste, 10 (3.0%) with recyclable waste, 53(15.9%) with solid waste, 100 (29.9%) organic waste, 4 (1.2%) for liquid waste and 4 (1.2%) of the respondents mentioned hazardous waste.

From the qualitative information, it was also revealed that waste of different types was mixed since there were not enough storage facilities, and in some health centers, nothing was available to store waste generated. This finding is complemented by the words of one participant during the FGD;

"..... Here wastes are mixed despite the source and this is due to limited containers. Wastes are discarded together in open spaces outside the Payam and sometimes I could see the safety boxes being burnt using kerosene. I haven't seen the guidelines on waste disposal here and neither have I heard my boss talking to me about guidelines on waste disposal since I started to work in this Payam. So I am not sure if it exists or not but insure then I should have heard about it or come across one day as I have spent more than 5 years working in this Payam "(Interview with Key Informant 2).

It was, however, found that one of the male participants revealed that due to the assistance of ICRC, to know the different waste types produced in community and health facilities.

"..... the waste produced entails that for used sharps, dirty waters after washing, one for used swabs, gauze, drip sets, clothes, motorcycles, cars, wrappers/papers and one for food leftovers these containers once full with wastes, are taken to a place allocated within the hospital here for throwing away and burning the wastes " (FGD with one the Participants-MP I -G2).

Some key informant interviews revealed that all that is available are safety boxes for syringes and needles. One key informant revealed;

"..... Apart from safety boxes for the used syringes and needles during vaccination, I know nothing more than that. So, these form part of the waste generated from the health facilities and probably at household levels " (Key Informant 3).

Discussion

Types of Waste Generated in Nabari Payam

Quantitative and qualitative findings revealed that different types of waste were generated in Nabari Payam. The waste ranged from organic, inorganic, solid, liquid, and hazardous waste. At the household level waste included; food peeling remains, dirty water, water detergent, wash water, and recyclable rubbish in plastic forms. It was further revealed that sharp objects such as syringes broken bottles, and food remains especially from restaurants were produced right from different places, and at home domestic waste would be generated each day. These findings could be linked to the different economic activities as well as activities at health facilities and homes where residents reside.

It is further argued that the management of these households, health facilities, and any sources of the different types of waste had limited capacity to manage generated amounts of waste. Focusing on the study, the types of waste generated required different ways of management which could not be adequately provided at home and other areas where it was generated. It is further argued that in line with this objective, poor waste generation at Nabari Payam would translate into improper management of the different types of waste making the public exposed to health and environmental hazards. Alam and Ahmade (2013) revealed that waste on human and environmental health identified components of waste, types and quantity, and disposal methodology of wastes in communities. The different types of waste pose risks to humans, the environment, and the entire ecosystem.

The generation of different waste puts it to the authorities, health facilities, non-government organizations, members of households, and communities to rethink the best ways to manage such waste. In households, the generation of waste is inevitable so it is vital to manage it well to save the environment, humans, and the entire eco-system.

Conclusion

Inorganic and organic waste were the main types of waste generated followed by sharp objects and solid waste. The local people and authorities have limited capacity to manage waste generated per day and this affects the health and environmental aspects of the Payam.

Recommendations

Residents of Nabari Payam should reduce the generation of different types of waste especially those that are more dangerous, especially if not well managed. This will save the country's ecosystems and humans from the danger of poor waste management.

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who provided me with SPSS software that I used to analysis data.

List of abbreviations

CVI: Content Validity Index
FPG-One: Female Participant Group One
JCC: Juba City Council
KI: Key Informant
Kr: Key Respondent
MP1-G: Male Participant- Group One
MPG-Three: Male Participant Group-Three
SPSS: Statistical Package for Social Sciences

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Conflict of interest

The author did not declare any conflict of interest

Author Biography

Agaar Chep Aboor is a student with a master's degree in public health at Team University.

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