

Waste management practices for residents in Nabari payam south sudan. A cross-sectional study.

Agaar Chep Aboor*, Dr. Deng Mubiru
School of Public Health, Team University

Page | 1

Abstract

Background:

Management of waste in terms of knowledge, attitude, and practice among household members in Nabari Payam is seemingly unclear, yet people and the general environment continue to be exposed to hazardous waste in the different urban and rural communities. The aim of the study is to assess the waste management practices for residents 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 interview for Key Informants. Data were analyzed descriptively using the Statistical Package for Social Sciences and thematic methods for quantitative and qualitative data.

Results:

164 (49.1%) and 31 (9.3%) of the respondents agreed and strongly agreed that they had regulations for waste. 202 (60.5%) of the respondents strongly disagreed that there was enough being done by the regulators in the management of waste. 242 (72.8%) of the respondents disagreed that guidelines are in place and followed. About the use of different color bags and containers, 226 (67.7%) of the respondents disagreed. The effectiveness of the city authority and leaders was presented as not being effective by 73 (21.9%) respondents. 166(49.7%) and 120 (35.9%) of the respondents disagreed and strongly disagreed, respectively, that costs for waste collection or management were cheap.

Conclusion:

Waste management practices were inadequately applied, and this led to overaccumulation of waste in the Payam. There was low practice of waste management activities in the Payam.

Recommendations:

The Government of the Republic of South Sudan through the Ministry of Health and the City authority should develop waste management guidelines, adopt them, and widely distribute them to the various Payam residents in the country.

Keywords: Waste management practices, Residents in Nabari Payam, South Sudan, Waste management guidelines.

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Corresponding author: Agaar Chep Aboor

School of Public Health, Team University

Background

Public knowledge, attitudes, practices, and participation are key elements of any waste management program, and in Ethiopia, however, the level of KAP and associated factors regarding waste management at the household level are not well studied and understood (Kabito et al, 2021). City dwellers need to adapt to new methods and technology of managing waste with strategies such as new smart cities that seek to improve health and the environment within urban and city places for sustainable environment management (Mishra et al, 2022). In the effort to manage waste, knowledge, attitude, and practice of people need to be explored in order to ascertain the degree to which the environment can be saved from being affected by problems associated with waste management (Almasi et al, 2019).

Management of waste in terms of knowledge, attitude, and practice among household members in Nabari Payam is seemingly unclear, yet people and the general environment continue to be exposed to hazardous waste in the different urban and rural communities. Yet, there is a high degree of waste generation and dumping in Juba City (Loboka et al, 2013).

Practices are defined as behaviors held by people, and in terms of waste management, this is described as ways through which local people in an urban place manage waste to save the environment from being degraded (Shukla & Hait, 2022). Urban places where waste is generated need to have a streamlined plan for the management of waste and adoption of the best practices to that effect (and technology might be used as one of the driving factors for the realization

of good practices (Sharma et al, 2020). Practices such as sustainable food waste management are required to be implemented in urban places as a move to better management of domestic waste generated at households (Kasavan et al, 2022). This goes with guidelines in terms of the generation of domestic waste, most especially food waste in homes and business places such as hotels and restaurants. Respondents' behavior and practice they engage in waste management are because they value cleanliness and want to mitigate possible disease occurrences; it is apparent that there is a necessity to develop students' attitudes and willingness to reduce problems related to solid waste management (SWM) in urban places (Desa, Ba'yah Abd Kadir and Yusoff, 2011).

The Constitution of South Sudan 2010 states that environmental sustainability is one of the major areas of focus. The world is moving with technology, and so should be the waste management practice in urban places (Khan et al, 2022). So, it is the role of administrative units to come up with budget allocations to fund technology-based practices for the management of waste, and this requires that good technology-linked practices are put in place to save the communities from the dangers of poor waste management. An increase in population in urban centers such as South Sudan has resulted in increased waste management challenges (Singh, Kumar, Mishra & Kumar, 2022). The aim of the study is to assess the waste management practices for residents 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. 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 that of incomes. Those who are generally most affluent are those people living in the western suburbs of the west, sharply contrasting with their counterparts who live in the eastern suburbs that are in the lower- and middle-income levels. 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 for low levels in 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.

Westland Sub-county has 88 students with 4,166 in public schools and 3,022 in private schools.

Sample Size

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

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

$$n = \frac{z^2 pq}{\delta^2}$$

Where

n = sample size

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

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

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

δ = maximum acceptable error (5%)

Therefore, sample size $n = \frac{1.96^2 \cdot 0.5 \cdot 0.5}{0.05 \cdot 0.05} = 384$

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

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 areas. 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 to 1 hour in order to elicit information in regard to waste management practices, knowledge, practices, and attitude 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

Validity of the instrument was obtained through the development of the scales with the help of 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 rephrasing of some questions if they did not pass the test.

The pretesting of the questionnaire is instrumental and vital to ensure it is 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.

Reliability of the items was determined with the application of the Cronbach's Alpha coefficient to check for internal consistency. Items that confirmed a Cronbach's Alpha Coefficient of 0.7. The instruments were pretested in Kator Payam among local 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 were tabulated, sorted, edited, classified, and coded into a coding sheet. The cleaned data were summarized and converted into frequencies and percentages using the category system. The researcher then used the 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) was used to show the degree of the mean scores, where a mean of three represented a neutral (Neither Agree Nor Disagree), less than three (<3) indicated disagreement, and above three (>3) indicated agreement on a given variable item. Analyzed data were presented using frequency distribution tables.

For objective two, knowledge about waste management was measured in terms of high or suboptimal (poor) among the respondents in regard to waste management. The objective about attitude was considered in terms of holding a negative or positive attitude among the study respondents in regard to 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 and presented it 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 is 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 engagement in the data collection exercise.

Confidentiality of the respondents was paramount except in the case where they were given permission to be cited in the study. To achieve this, respondents were not be presented by their names or job titles in chapter four but rather they were referred to as KRI, KR2 and KR3, Residents of Nabari 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.

Privacy of the respondents was considered at the time of data collection by ensuring that data collection was carried out in a private manner, whereby 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.

Limitations of the Study

In focus with practices and attitudes, the adoption of a quantitative data collection method (Questionnaire) was inadequate to understand respondents' emotions, behavior, and feelings about waste management and how each category of stakeholders fulfils their roles and responsibilities; this was partly filled by focus group discussion and interview data.

The use of a cross-sectional research design did not provide data reflecting the cause-and-effect relationship between the study variables. This would lead to bias in the study outcomes.

However, the researcher remained objective with the findings of the study.

The study was affected by non-response from some of the respondents under study. They were viewed from the required information as confidential. The researcher, however, had a reference letter from the university to confirm that the information was to be handled with confidentiality.

In some instances, where the required respondents were on duty and busy, it was hard to get the information needed from their key informants, and this caused delays since the researcher may have to wait until they came back on duty. Some respondents became suspicious about the data required from them for fear of their security in reference to waste management in their respective offices and households. It is, however, noted that a clear explanation was provided emphasizing how the research is strictly for academic purposes.

Results

Introduction

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

Background Information of Respondents

Age, gender, occupation, marital status, education, and time spent in the Nabari Payam were considered for descriptive results of this study.

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 (Motorist)	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%) were 36-45 years, 60 (18.0%) of the respondents were aged 18-25 years, and 56 (16.8%) were 46 years.

In terms of marital status, 255 (76.3%) of the respondents were married, 56 (16.8%) were 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 in regard to occupation, majority of the respondent 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, the majority of the respondents, 305 (91.3%) had stayed in Nabari for > 5 years.

Waste Management Practices for Residents in Nabari Payam

Table 2: Distribution of Responses Regarding Waste Management Practices

Overall N = 334							
Variable Items	SD	D	N	A	SA	Mean	Std
There is regulation of waste in this area by authorities	37 (11.1%)	82 (24.6%)	20 (6.0%)	31 (9.3%)	164 (49.1%)	3.60	1.54
The regulator has done much to manage waste in this area	202 (60.5%)	62 (18.6%)	51 (15.3%)	6 (1.8%)	13 (3.9%)	1.70	1.04
There are guidelines for proper waste management in this Payam	56 (16.8%)	242 (72.8%)	7 (2.1%)	14 (4.2%)	14 (4.2%)	2.06	0.85
The different color bags/containers are used to manage waste	47 (14.1%)	226 (67.7%)	24 (7.2%)	24 (7.2%)	13 (3.9%)	2.19	0.90
Guidelines provided for color coding for local people	54 (16.2%)	236 (70.7%)	16 (4.8%)	16 (4.8%)	12 (3.6%)	2.08	0.84
There is a reporting system for any harm, huge amounts of waste generated, or effects caused by waste	40 (12.0%)	238 (71.3%)	33 (9.9%)	12 (3.6%)	11 (3.3%)	2.14	0.79
Sign posts describing proper waste disposal for residents	40 (12.0%)	243 (72.8%)	9 (2.7%)	24 (7.2%)	18 (5.4%)	2.21	0.93
I manage my waste by disposing of it in the rubbish bins	81 (24.3%)	8 (2.4%)	37 (11.1%)	99 (29.6%)	109 (32.6%)	3.44	1.55
I practice open burning of waste at my residence	18 (5.4%)	97 (29.0%)	10 (3.0%)	52 (15.6%)	157 (47.0%)	3.69	1.43
Burying is used by my household as a waste management method	41 (12.3%)	82 (24.6%)	8 (2.4%)	165 (49.4%)	28 (8.4%)	3.22	1.27
At my residence, waste is poured into the river sometimes	49 (14.7%)	228 (68.3%)	20 (6.0%)	23 (6.9%)	14 (4.2%)	2.17	0.91

Waste from home is poured at the city council waste/rubbish collection points.	29 (8.7%)	81 (24.3%)	8 (2.4 ⁰ /00	127 (38.0%)	89 (26.6%)	3.49	1.33
Disinfection of waste boxes carried out by residents in this Payam	199 (59.6%)	79 (23.7%)	22 (6.6%)	9 (2.7%)	25 (7.5%)	1.74	1.17
There is use of incineration for management of waste	41 (12.3%)	147 (44.0%)	120 (35.9%)	19 (5.7%)	7 (2.1%)	2.41	0.85
At my residence, landfilling is used for waste management	10 (3.0%)	130 (38.9%)	29 (8.9%)	53 (15.9%)	112 (33.5%)	3.31	1.36
Average Mean score						2.46	1.04

Source: Primary Data (2022)

Table 2 indicates that 164 (49.1%) and 31 (9.3%) of the respondents agreed and strongly agreed that they had regulations for waste. It was, however, found that 37 (11.1%) of the respondents strongly disagreed and 82 (24.6%) disagreed. It was found that 20(6.0%) were undecided. It was found that the mean score was 3.60 and the standard deviation was 1.54. This is an indication that it was agreed by respondents that there was a regulation for them to follow in regard to waste management.

Findings also showed that 202 (60.5%) of the respondents strongly disagreed that there was enough being done by the regulators in the management of waste. It was further noted that 62 (18.6%) of the respondents strongly disagreed. Findings also revealed that 51(15.3%) of the respondents were undecided, as 6 (1.8%) and 13 (3.9%) agreed and strongly agreed. The mean score and standard deviation were 1.70 and 1.04, respectively. The findings point out that there was disagreement among respondents on the variable item.

It was found that 242 (72.8%) of the respondents disagreed that guidelines are in place and followed. A total of 56 (16.8%) of the respondents strongly disagreed. It was further noted that 14 (4.2%) of the respondents agreed and strongly agreed, as 7 (2.1%) were undecided. The mean score was 2.06 and the standard deviation 0.85. The findings reflect that respondents had faults with how regulations for waste management were handled.

Respondents were asked about the use of different color bags and containers. It was found that 226 (67.7%) of the respondents disagreed and 47 (14.1%) disagreed. The findings also showed that 13 (3.9%) of the respondents strongly agreed and 24 (7.2%) agreed. Those who were undecided were 24 (7.2%), the mean score was 2.19, and the standard deviation was 0.90. The findings point out that there was disagreement, and so there was no use of different containers for different waste in the Payam.

About the provision of guidelines for color coding, 236 (70.7%) of the respondents strongly disagreed, 54 (16.2%) strongly disagreed, 16 (4.8%) were undecided, the same

percentage agreed, and 12 (3.6%) strongly agreed. It was found that the mean score and standard deviation were 2.08 and 0.84, respectively. The findings offered an implication that coding for colors in terms of waste management was not considered vital by the respondents and partly by their local authorities.

Existence of a reporting system is vital in waste management. Respondents were asked if this was in place in Nabari Payam. Findings showed that 238 (71.2%) of the respondents disagreed, 40 (12.0%) strongly disagreed, 33 (9.9%) were undecided, 12 (3.6%) agreed, and 1 (3.3%) of the respondents strongly agreed. The mean and standard deviation for the variable item were 2.14 and 0.79. The findings imply that there are no systems in place to report any behaviors regarding waste management.

Findings for the signposts revealed that 243(72.8%) disagreed, 40 (12.0%) of the respondents strongly disagreed, 9(2.7%) of the respondents were undecided, 24(7.2%) agreed, and 18(5.4%) strongly agreed. The findings revealed a mean score of 2.21 and a standard deviation of 0.93.

It is therefore noted that signposts were not in place in an adequate way to support proper waste management in the Payam.

Open burning was used by most of the respondents. For example 157(47.0%) of them strongly agreed, 52(15.6%) agreed. The study also found that 97(29.0%) of the respondents strongly disagreed and disagreed, respectively. A total of 10(3.0%) of the respondents were undecided, with a mean score of 3.61 and a standard deviation of 1.43. It is for this study that it can be stated that one of the practices for waste management was open burning by residents of Nabari Payam.

Burying of waste at household level was also practiced as indicated by 165 (49.4%) of the respondents; 28 (1 1.4%) of the respondents strongly agreed. It was noted that 41 (12.3%) and 82 (24.6%) of the respondents strongly disagreed and disagreed, respectively. A total of 8 (2.4%) of the respondents neither agreed nor disagreed. The mean and standard deviation were 3.22 and 1.27, respectively. The

findings therefore point out that burying waste would be applied by some homesteads as a means for waste management.

Pouring waste in the river might be a practice for some people in disposing of waste generated at home or from any other place. In this study, it was found that 228(68.3%) of the respondents disagreed, and 49 (14.7%) strongly disagreed about this practice. However, it was found that 23 (6.9%) and 14(4.2%) of the respondents agreed and strongly agreed about the practice. It was also noted that 20 (6.0%) of the respondents were undecided, with a mean of 2.17 and a standard deviation of 0.91. For this study, this implies that there were fewer practices for dumping waste in the river as far as Nabari Payam is concerned.

City rubbish was poured into city council collection points as indicated by 127 (38.0%) and 89 (26.6%) who agreed and strongly agreed, respectively. It was found that 29 (8.7%) and 81 (24.3%) of the respondents strongly disagreed and disagreed, respectively; it was further noted that 3.49 and 1.33 were the mean score and standard deviation for the variable item.

It was further noted from the findings that 109 (32.6%) of the respondents agreed that they managed their waste well by disposing of it in the rubbish pits, and therefore, only 99 (29.6%) of the respondents strongly agreed, as 37 (11.1 0/0) of the respondents were undecided. It was further noted that 81 (24.3%) and 8 (2.4%) of the respondents disagreed and strongly disagreed, respectively. This is an indication that most of the respondents used rubbish pits to dispose of their waste.

Respondents were asked about disinfection of waste, and 199 (59.6%) and 79 (23.7%) of the respondents strongly disagreed and disagreed, respectively. Findings also showed that 25 (7.5%) and 9(2.7%) of the respondents strongly agreed and agreed on the same item, while 22 (6.6%) of the respondents neither agreed nor disagreed. For this item, the mean score and standard deviation were 1.74 and 1.17, respectively. The findings indicate that disinfection of waste was not a practice for all respondents for waste management. It was further found that with incineration for waste management, 147 (44.0%) and 41 (12.3%) of the respondents disagreed and strongly disagreed, respectively; 120 (35.9%) of the respondents were undecided, as 19 (5.7%) and 7 (2.1%) agreed and strongly agreed, respectively. The mean score and standard deviation were 2.41 and 0.85, respectively. It is at this point that one states that incineration was not a practice at all and it was used by those with capabilities in terms of waste management.

Findings also revealed that with regard to landfilling, a total of 112 (33.5%) and 53 (15.9%) of the respondents strongly

agreed and agreed, respectively. Findings also reveal that 130 (38.9%) of the respondents disagreed and 10 (3.0%) strongly disagreed. The number of respondents who neither agreed nor disagreed was 29 (8.9%), with a standard deviation and mean score of 1.36 and 3.31, respectively. The overall standard deviation and mean score were 2.46 and 1.04, respectively. This is an indication that items for this objective were responded to in disagreement by respondents.

From the FGD, it was noted that regarding record keeping for waste as a practice, it was revealed by some key informants that some facilities have no records in place and staff are not oriented on it upon recruitment.

"No, since I started to work in this clinic in April this year, I haven't seen any document/record of that kind. If it exists, then our project manager did not share it with us in this Payam..." (Interview with one of the Participants-K13).

From Nabari Payam, it was also revealed that residents had not seen any formal document related to waste management ever since he started working. The only information obtained was from one participant. It is therefore, from such revelation, that it can be noted that there was a lack of documentation for waste management among Payam residents, and this could be attributed to several other factors as indicated in this study.

One participant also revealed that they had not seen any waste guidelines in place, and this further reflected that waste generated had no proper mechanism for handling in this Payam.

".... I haven't seen one, and neither 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 if sure then I should have heard about it/ or come across one day, as I have spent more than 5 years working in this Payam " (Information from one of the FGD participants 0-G1).

Regarding sorting of waste, it was revealed by the FGD participant that this was rarely carried out at their facilities. One of them revealed that there was no person responsible for waste sorting at their facility.

"..... Regarding sorting, I am no/ sure if any one of us working in this Payam is aware because I have not come across any of my fellow Payam residents here who is concerned about sorting out the waste we produce daily as a result of the services we are providing to the patients according to type or risks related with each waste, except the vaccination team using Safety boxes, for keeping used syringes and needles and used cotton wools, syringe covers and gauze in separate containers... (FGD with one of the participants, MP9-G3).

Evaluation of Waste Management Practices for Residents in Nabari Payam

Table 3: Distribution of Responses about Waste Management Evaluation Practices

Overall N = 334							
Variable Items	SD	D	N	A	SA	Mean	Std
There is effectiveness with waste management practices adopted in this area	73 (21.9%)	87 (26.0%)	86(25.7%)	64(19.2%)	24 (7.2%)	2.63	1.21
This Payam has proper storage areas provided for collecting waste	59 (17.7%)	226 (67.70/0)	18 (5.4%)	14 (4.2%)	17 (5.1%)	2.11	0.91
There is a need to have special containers in my area of residence	32 (9.6%)	48 (14.4%)	8 (2.4%)	91(27.2%)	155(46.4%)	3.86	1.38
The waste disposal space in my area is restricted to some specific persons.		271(81.1%)	23 (6.9%)	13 (3.9%)	21 (6.3%)	2.31	0.84
Correct method for collecting are used disposable plastic, needles, and human anatomic and other waste items.	111 (33.2%)	64 (19.2%)	79 (23.7%)	56 (16.8%)	24 (7.2%)	2.45	1.29
It is easy to transport the container with waste from one storage point to another in this area	120(35.9%)	136(40.7%)	32 (9.6%)	32 (9.6%)	14 (4.2%)	2.05	1.29
It is cheap/less costly to deal with authorities to manage waste in this place	120 (35.9%)	166 (49.70/0)	31 (9.3%)	0 (0.0%)	17 (5.1%)	1.88	0.94
It takes a shorter time to collect waste from the areas of this Payam	159 (47.6%)	123 (36.8%)	17 (5.1%)	1 (0.3%)	34 (10.2%)	1.88	1.20
Average Mean score						2.39	1.09

Source: Primary Data (2022)

Table 3: The effectiveness of the city authority and leaders was presented as not being effective, with 73 (21.9%) and 87 (25.7%) of the respondents disagreeing and strongly disagreeing, respectively, and 86 (25.7%) of the respondents neither agreed nor disagreed. It was further found that 64(19.2%) and 24 (7.2%) of the respondents agreed and strongly agreed, with a mean score of 2.63 and a standard deviation of 1.21. In line with this objective, it is noted that there was limited effectiveness perceived from the authorities in regard to waste management.

In terms of storage facilities, a total of 226 (67.7%) and 59 (17.7%) of the respondents disagreed and strongly disagreed, 18 (5.4%) of the respondents neither agreed nor disagreed, as 14 (4.2%) agreed and 17 (5.1%) agreed. The variable had a mean score of 2.11 and a standard deviation of 0.91. It is at this point that one states that respondents had no kind words for the authorities in regard to the setting up of a well-built storage/collection place for waste.

The need to have special containers for waste management in the Payam was responded to differently by respondents. A total of 155 (46.4%) and 91 (27.2%) of the respondents agreed and strongly agreed to the item. It was, however, noted that 48 (14.4%) and 32 (9.6%) of the respondents disagreed and strongly disagreed with the item of the variable. There was a total of 8 (2.4%) of the respondents who neither agreed nor disagreed with a mean score and standard deviation of 3.86 and 1.38 respectively. It is therefore noted that most of the respondents wanted more containers to be put in place for waste management in the Payam. This further shows a gap in place in terms of provision of such facilities for the best practices for waste management.

For the practice of having a restrictive waste disposal place, it was found that 217 (81.1%) and 6 (1.8%) of the respondents disagreed and disagreed, 23 (6.9%) of the respondents neither agreed nor disagreed, 13 (3.9%) and 21

(6.3%) of the respondents agreed and strongly agreed, respectively. It was found that the mean score and standard deviation were 2.31 and 0.84, respectively. In relation to this objective, this implies that some paces were too restrictive for people to use them for waste management, and therefore, this would lead to good waste management practices, but it was not the case.

Waste management with correct collection methods might enhance good waste management practices. For this study, it was found that 111 (33.2%) and 64(19.2%) of the respondents strongly disagreed and disagreed, respectively. Findings also showed that 66(16.8%) and 24(7.2%) of the respondents agreed and strongly agreed, respectively, as 79(23.7%) of the respondents neither agreed nor disagreed. The variable item had a mean score and standard deviation of 2.45 and 1.29 respectively. This is offering an implication that respondents believed that good correction methods for waste management would make them have a good and clean environment for human living.

Easy for waste transportation, findings showed that 120(35.9%) and 136(40.7%) of the respondents disagreed and strongly disagreed, respectively. Findings also showed that 32 (9.6%) and 14 (4.2%) of the respondents strongly agreed and agreed, respectively, to the variable item. The mean score was 2.05, and the standard deviation was 1.29. Such information points out that there was less adequacy in the transportation of waste from the respondents despite the fact that they lived in the city area. There were hardships for them to get services in terms of waste transportation to the collection or dumping place designated by the city authorities.

In regard to costs for waste collection or management, findings showed that 166(49.7%) and 120 (35.9%) of the respondents disagreed and strongly disagreed that it was cheap. Findings also revealed that 31 (9.3%) of the respondents neither agreed nor disagreed, and 17(5.1%) of the respondents strongly agreed; the mean score was 1.88, and the standard deviation was 0.94. The information presented denotes that it was too expensive for residents of Nabari Payam to get their water collected and taken away from their residences, and there was dissatisfaction with the amount of money required to have good management of such waste.

Findings indicated that with regard to the use of shorter time for waste collection, respondents totaling 123 (36.8%) and 159 (47.6%) disagreed and strongly disagreed. It was, however, noted that 34 (10.2%) and 1 (0.3%) of the respondents strongly agreed and agreed, respectively, to the item; 17 (5.1%) were undecided. With a mean score of 1.88 and a standard deviation of 1.20. This, in relation to this study, points out that there was disagreement with respondents on matters of time for waste collection; therefore, it took longer time to get waste removed from the dumping places within the Payam. The time was not shorter than it would have been.

Findings from Table 4.6 provide a mean score of 2.39 and a standard deviation of 1.09. This means that most items of this objective were objectively responded to with disagreement by most respondents and therefore, a lot could have been desired by respondents in the effort to have good waste management in Nabari Payam.

In terms of qualitative information, results reveal that there are no local community/zonal policies on waste management in the Payam residents sampled, meaning that all practices are unguided. This was linked to the absence of a national policy that would guide the existence of such a policy, as revealed by one study participant.

"..... If at all policy or guidelines on wastes exist in this country, they have to be made available to all Payam residents, and the Payam residents should be following the guidelines to protect themselves and the public from the possible risk associated with the wastes produced (FGD with one of the Participants-FP1-G4).

From the FGD conducted, it was revealed that disposal of waste was not a priority for most of the Payam residents. Some households and facilities, like pits, were not in place, as one of the study participants revealed;

"..... No placental pits in the Payam health facilities due to cultural norms of the communities in the County. The filmily doesn't 't leave the placenta to the Payam residents but takes it home and burry after performing some rituals in the way they believe in" (FGD with one of the Participants-FP5-G5).

It was also revealed that dumping of waste was carried out using the open surface method, and this was sometimes accompanied by open burning. Such practices are said to be hazardous to humans, plants, animals, and the environment.

"Open surface dumping of mixed wastes by some Payam residents and open burning in drums and in hollow holes commonly being practiced by most Payam residents one could see " (FGD with one of the Participants-FP3-G3).

It was found that the existing "incinerators in some of the Payam residents were not consistently being used, and this was due to many factors, including limited knowledge by the health and non-Payam residents who handle waste; for instance, in a FGD, one participant revealed;

"Yes, we do have an incinerator although not in good form as far as I have been told. There is an incinerator, open burning place in one area within the hospital " (FGD with one of the Participants-FP5-G4).

In regard to regulation, information obtained from interviews revealed that less work had been done by the private sector as well as the government of the Republic of South Sudan regarding management of waste in the several Payam residents within Nabari Payam. For instance, the key informant revealed that in Payam residents there was no

private involvement in managing waste except for domestic waste from households and marketplaces.

".....I have not seen any involvement Q/private sectors in handling waste produced in the Payam, but have seen it with waste produced in the market areas and from houses. It appears the policy involving the private sector is not yet introduced in our area, as the country has just gotten independence in July 2011 " (Interview with Key Informant 3).

Information obtained from a study FGD participant that some private individuals use their trucks to collect waste;

"In the county, trucks owned by some locally organized companies are the ones collecting waste produced in marketplaces and those from residential structures, but not waste as far as I know " (FGD with one of the Participants-FP4-G5).

From FGDs, it was also revealed that there was no private sector involved, and waste was not a priority for the authorities; as such, private sectors are not involved in managing the waste produced as a result of service deliveries by different Payam residents in Nabari Payam.

It was also revealed that there is no policy that would guide the private sector in collecting/ managing waste, which is why there was low involvement of this sector in waste management. This was revealed by the participant;

"..... It seems the policy of involving the private sector for handing wastes produced by the Payam residents does not exist in the County and may be in the country (FGD with one of the Participants, FP4-G2).

It was revealed that due to the civil unrest in the area, most of the private individuals who would assist in waste management cannot do this work. Yet the government is not ready to manage waste ever generated from the different Payam residents, and some NGOs have limited capacity to handle waste.

"Due to the current civil unrest/ in the country, which has a/Jested health services delivery system, the government is no/ in the lead in waste management services but NGOs. Most Payam residents and the management team have wedded the County for their lives. NGOs providing comprehensive health service packages are operating independently, hence without a proper waste management system in place " (FGI, with one of the Participants-FP2-G1).

Due to limited private sector involvement in waste, a respondent advised that it is vital for the government of the Republic of South Sudan to have a clear policy or guidelines for waste in place so that Payam residents become aware of the risks that may be faced from a given waste type as well as how such can be managed.

"..... Clear government policy or guidelines on waste management are essential to make the Payam residents aware of different types and the

risks related to waste. It can also make the Payam residents responsible for proper handling and disposal of waste... " (FGD with one of the participants- FP3-G 1).

From the above findings for this last objective, it can be argued that the involvement of private actors in waste management has never assisted much in having the best management practices. In Nabari Payam. It is, however, stated that in terms of evaluation, the efforts so far made have to be recognized for improvements to be made.

Discussion

Waste Management Practices for Residents in Nabari Payam

Findings for this study reflected that the overall mean score pointed towards disagreement with the items presented. It was noted that less effort had been made by the city/Payam regulators to manage waste in the area. This angered most of the respondents and /or residents of the Payam, given the tax they pay to have a clean environment for a good livelihood. The findings are in agreement with literature by Loboka et al (2013), who found that in South Sudan, the poor municipal solid waste management in Juba is posing a high risk to human health and the environment. It is right to state that there is still much that is required to improve waste management practices for Nabari Payam since Loboka et al also found that the country was in a total mess in regard to waste management practices with its local natives.

It was found that there was no use of different color containers or codes for waste management. Yet, this is one of the best practices that would reflect the best practice for waste management in Nabari Payam. It is therefore argued that the weakness of the leaders of the Payam mainly contributed to continued poor waste management practices. This is reflected by a poor reporting system for waste management that makes it hard for the residents to manage waste as it would be expected. Literature by Kasavan et al (2022) presents that in a community, waste management practices such as sustainable food waste management are required to be implemented in urban places as a move to better management of domestic waste generated at households. It is, however, noted that the practices in Nabari Payam in regard to waste management were not sustainable in any way. So, there is little hope that residents' practices for waste management would turn positive to prevent poor practices such as burning of waste, poor disposal, and reckless generation of such waste.

In line with the findings of this objective, it is further argued and discussed that for the case of Nabari Payam, continuous monitoring and evaluation of types of waste in the Payam is a key issue to achieving good biomedical management practices. This can lead to increased adherence to guidelines as required, as well as promotion of precautions against biomedical waste-related diseases among the health and non-health staff and the general public in South Sudan. The

fact that there were limited numbers of signposts that direct residents over proper waste management, the disposal of waste onto rubbish pits, open burning, pouring waste in the nearby water bodies and streams; and absence of incineration use for waste management are a reflection that waste management in Nabari Payam was inefficient and ineffective to the achievement of the desired goals for waste management as standard international laws and regulations stipulate. This information goes back to the literature by Desa, Ba'yah Abd Kadir and Yusoooff (2011) where it was emphasised that behaviour change is key for the purposes of applying the best practices for waste management.

In addition, findings of this study revealed that landfill was practiced at the household level, as more respondents agreed. This is one of the practices that needs to be well regulated, and failure to do this is disastrous to the environment. In relation to the literature by Cheng and Urpelinen (2015), who noted that in the aspects of waste management, landfill can be practiced with proper guidelines that support environmental sustainability. It is therefore argued and discussed in this study that landfill, since was used by most households, it required to be practiced in accordance with regulations and guidelines for the best outcomes for society.

Evaluation of Waste Management Practices for Residents in Nabari Payam

Findings for this objective revealed that the overall mean score pointed towards disagreement with the study items. This is attributed to the poor practices for waste management and low efforts made by local people and those in authority. It is further argued that, with disagreement by most respondents, there is a need to do a lot that is required to have been desired by respondents in the effort to have good waste management in Nabari Payam. In terms of evaluation, the disagreement symbolizes ineffective and inefficient management of waste and development of Nabari Payam. This is not in support of the literature by Chen (2020), who said that in the management of waste, there should be an effective fight against mismanagement of waste. It is, however, noted that the qualitative and quantitative findings of this study reflected ineffective management of waste in Nabari Payam.

The findings of this study also revealed that it was hard to transport waste from one place to the dumping site; indeed, it was also noted that there was a longer time period to collect waste and remove it in one area. These challenges were also supplemented by the expense for the local people to have their waste collected and taken away. This is in disagreement with literature by Tsai et al (2021), who stated that in the management of waste, there should be possibilities that the community will enjoy the best practices for waste management, which greatly depend on the degree to which such a policy is enforced, monitored, and evaluated in regard to behaviors in a community. It is, however, stated

that this information is not applicable due to the status of Nabari Payam in relation to waste management.

It was also found that residents preferred more waste management containers to be put in place to support the best waste management in the Payam. This desire to have adequate facilities for waste management would be a good move towards best practices in waste management.

This is in agreement with literature by Cheela et al (2021), who said that in the management of waste in communities, education so as to restore environmental competence owing to its basic aim of attaining personal and social goals. This point helps to acknowledge that the provision of facilities for waste management would be better utilized with highly trained or educated people in matters of waste management. The fact that it was found that in the whole Payam, waste disposal facilities were mainly at big places such as hotels and health facilities, is a reflection that the area lacked adequate facilities for the proper management of waste in the whole Payam.

Conclusion

Waste management practices were inadequately applied, and this led to overaccumulation of waste in the Payam. This was seen as a way through which the Payam residents would get diseases arising from the over-stay of waste materials in the area. There was low practice of waste management activities in the Payam. Transportation costs and waste collection time were a challenge to waste management in Nabari Payam.

Recommendations

The Government of the Republic of South Sudan through the Ministry of Health and the City authority should develop waste management guidelines, adopt them, and widely distribute them to the various Payam residents in the country. Once this is done, it will enlighten the Payam residents at the Payam level and the entire population of the Republic on the importance of proper management of waste. The private sector should also be engaged by the Ministry of Health to participate in the management of waste. This will help to save the environment and the population from the hazards due to poor management of medical waste generated by Payam residents and haphazardly dumped in communities. Investment by the private sector should be done by entering into a private-public partnership with the Government to streamline their operations in the different Payam residents.

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List of abbreviations

CVI: Content Validity Index

FPI: Female Participant

FPG-One: Female Participant Group One

KAP: Knowledge, Attitudes, Practices

KI: Key Informant

KR: Key Respondent

MP1-G: Male Participant- Group One

MPG-Three: Male Participant Group-Three

NGOs: Non-Governmental Organizations

SPSS: Statistical Package for Social Sciences

SWM: Solid Waste Management

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Author biography

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

Dr. Deng Mubiru is a lecturer at the School of Public Health, Team University.

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