

PERCEPTION ON THE PROPER SOLID WASTE MANAGEMENT AMONG NAVALEÑOS

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ABSTRACT

Improper solid waste management was a significant issue in developing countries like the Philippines. The Municipality of Naval aimed to become a city, which made it crucial for the municipality to have well-planned, systematic, and scientifically-based programs on solid waste management. A study was conducted to assess the knowledge, attitude, and practices of the residents of the Municipality of Naval on solid waste management. The researchers used a standardized questionnaire by Trondillo et al. (2018) and conducted the study in the largest barangay of the municipality. The data collected were analyzed using multivariate regression analysis and a descriptive-correlational research design. Results indicated that Navaleños was aware of the laws and regulations on solid waste management but had negative responses toward the awareness, practice, and attitude regarding solid waste management. Furthermore, Navaleños rated the solid waste management programs of the government as neutral or slightly effective. Therefore, the study recommended information campaigns, seminars, proper solid waste management plans, and incentives to intervene in this problem. The study highlighted the urgent need for the Municipality of Naval to implement comprehensive and effective solid waste management programs to address the issues related to improper solid waste management.

Keywords – solid waste management, Naval, Biliran, municipal waste, perception, KAP

INTRODUCTION

Solid waste disposal is a severe and pervasive issue in urban and rural settings in developed and developing nations. According to Abdel-Shafy and Mansour (2018), one of the most significant issues facing urban environments today

in most nations is the collection and disposal of municipal solid waste (MSW). It is evident in developing countries like the Philippines as it is considered the most neglected essential service in the government. Unprecedented stresses were placed on the environment as a result. Poor administration and a lack of money and technology

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have left solid waste management inadequate (Anand, 2010). Solutions for MSW management must be technically practical, economically viable, socially and legally acceptable, and ecologically beneficial. Solid waste management is the main problem facing small and large city governments. The increase in solid waste is emerging due to different factors such as population growth, fast urbanization, and lack of systems in solid waste management. Uncollected garbage caused by improper waste management and collection is often most prevalent in close slums and less wealthy neighborhoods. Particularly in less developed areas, the prevalence of illnesses like diarrhea and acute respiratory infections connected to water pollution and open garbage burning is substantially greater. Municipalities are also financially burdened by MSW. Except maybe in the capital and major cities, solid waste management receives a very low priority in developing nations. Typically, trash management costs 20% to 50% of a city's budget in developing nations, and 90% of a developing city's yearly budget allotted for solid waste management was likely consumed in the first six months (Ogawa, 2008).

This problem of improper waste disposal is urgent in less developed nations like the Philippines. According to Trondillo et al. (2018), the Philippines' growing garbage production is in line with its rapid population expansion, urbanization, and improvement in living conditions. The environment's destruction has been chiefly attributed to improper trash disposal. Therefore, it is necessary to implement a powerful waste management system. The lack of knowledge of the various elements is a primary factor that influences the various phases of waste management and the connections required to make the complete handling system functional (Guerrero, Maas, Hogland, 2013). The sustainable development plan of emerging nations now requires a sustainable MSW management system. To create a sustainable solid waste management system, certain procedures, including sampling, surveying to address the problem and gather waste information, modeling and simulating the situation, figuring out the economic and environmental

effects of various management options, and putting the decision-making process into action, should be efficiently carried out. However, the inappropriate waste management systems in developing nations result from the study's neglect to establish a sustainable waste management system (Mihn Giang, 2017).

Solid waste management is undoubtedly the most crucial municipal function; thus, there is a need for all other municipal actions. (Hoorweg and Bhada-Tata, 2012). This fact is also evident in the small island province of Biliran, which has a capital town, Naval. It serves as the province's central hub for trade and business. Moreover, it is the home of the biggest and most populated barangay in the province, Barangay Calumpang, which contributes a lot to the solid waste in the province. Based on the unpublished undergraduate study of Rosales et al. (2021), Barangay Calumpang 4Ps beneficiaries do not know their barangay's solid waste management programs, and it was found in the study that this unit needs information dissemination as the capital town aims for its cityhood. The Local Government Unit of the Naval submitted the Sangguniang Bayan Resolution No. 80, s.2019, urging its lawmaker to file a bill for cityhood. A year later, the lawmaker filed House Bill No. 6230 in February, which is still pending with the Committee on Local Government in the House of Representatives. The researchers posit this as a detrimental issue to understand and address. Thus, conducted study on assessing the perception of the Navaleños, residents of the Municipality of Naval, towards solid waste management.

The perception of the Navaleños on Solid Waste Management, including their know-how on the different laws and regulations and solid waste management programs in the municipality, and their attitude, status, and assessment of the effectiveness of such programs will be determined in this study.

OBJECTIVES OF THE STUDY

This study assessed the residents' perception of solid waste management in Naval, Biliran.

Correspondingly, it sought the following specific objectives:

1. Determine the socio-economic profile of the respondents in terms of:

- 1.1. Age;
- 1.2. Sex;
- 1.3. Occupation;
- 1.4. Highest Educational Attainment; and
- 1.5. Household Monthly Income.

2. Ascertain the perception of residents on solid waste management in terms of:

- 2.1. different laws and regulations;
- 2.2. programs;
- 2.3. attitude;
- 2.4. status; and
- 2.5. its effectiveness.

3. Find out the relationship between the socio demographic profile and the perception of solid waste management.

METHODOLOGY

Research Design. Using the descriptive correlational research design, this study adopted a quantitative methodology. Descriptive correlational design is employed in research studies that give static depictions of situations and establish links between numerous variables (IvyPanda, 2022). The design is appropriate in the study as it tested the relationship between the profile variables and the perception of solid waste management in Naval, Biliran.

Research Respondents and Sampling. The sampling in the study was done in stages. Multistage sampling entails two or more rounds of random selection depending on the hierarchical structure of the population's natural groupings. Each level randomly samples a new type of cluster, and the clusters are layered inside one another. A random sample of individuals from the designated clusters is picked in the penultimate sampling stage. The researchers first applied cluster sampling from the Municipality of Naval down to choosing one barangay, the Barangay Calumpang, the biggest and most populated barangay in the entire Province of Biliran. Then,

the researcher used a simple random sampling technique with a 5% margin of error, 90% confidence level, and 50% response distribution. Out of the total population of 7,063, the researchers identified 261 respondents as the study's sample size.

Data Collection and Procedure. The research instrument used is a standardized questionnaire from the study on solid waste management by Trondillo et al. (2018). It was designed to assess residents' awareness, practice, and attitude toward waste management and the status and effectiveness of the solid waste management programs in the barangay. The researcher conducted the study in Barangay Calumpang, Naval, and Biliran and has sought permission from the Barangay Chairperson, Sangguniang Kabataan Chairperson, Dean, and the Research Chair of the school before distributing the questionnaires. Moreover, the researchers provided a letter of consent to the respondents before data gathering to ensure their willingness and the confidentiality of their information.

Data Analysis. The researchers used multivariate regression analysis to analyze the data of the study. An extension of multiple regression with several independent variables and one dependent variable is multivariate regression analysis (Korwar, 2021), which was the tool used to measure if there would be a significant influence of the independent variables on the awareness of the different laws and regulations, awareness and practice, attitude, status, and effectiveness of solid waste management programs. The study uses a significant value of less than 0.05 to determine if there is a significant influence between dependent and independent variables. Descriptive and inferential statistics were utilized using Stata (version 14). Descriptive statistics summarize a specific data collection, which may be a sample or a representation of the entire population (Adam, 2022).

Meanwhile, inferential statistics is a branch of statistics that draws inferences about population data from sample data using a variety of analytical approaches (CueMath, 2022). The researchers used frequency, percentage, and mean in this



study to summarize the data set. While in order to conclude the study, the researchers used inferential statistics.

Ethical Consideration. The ethical guidelines for conducting research were followed in this study. The respondents were informed through an informed consent form and transmittal letter before the conduct of the study. In answering the survey questionnaires, the respondents answered voluntarily and did not force to participate, including physically or psychologically harming human participants. Additionally, the researchers had no competing interests. Further, the researchers secured the anonymity of the respondents, and their answers will remain confidential and only be served for this study.

RESULTS AND DISCUSSION

1. Perception of the Proper Solid Waste Management among Navaleños

Table 1
Socio-Economic Profile of the Respondents

Age	Frequency	Percentage
18 – 31	150	57.47%
32 – 45	57	21.84%
46 – 59	34	13.03%
60 – 73	19	7.28%
74 – above	1	0.38%
Total	261	100%
Sex		
Male	103	39.46%
Female	158	60.54%
Total	261	100%
Occupation		
Unemployed	147	56.32%
Self-Employed	50	19.16%
Private Employed	49	18.77%
Public Employed	15	5.75%
Total	261	100%
Highest Educational Attainment		
Elementary Level	27	10.34%
Elementary Graduate	8	3.07%
High School Level	107	41%
High School Graduate	26	9.96%
College Level	57	21.84%
College Graduate	35	13.41%
Master Graduate	1	0.38%
Total	261	100%
Household Monthly Income (in PHP)		
Below – 7,999	173	66.28%
8,000 – 15,999	74	28.35%
16,000 – 23,999	4	1.53%
24,000 – 31,999	9	3.45%
32,000 – 39,999	0	0
40,000 – above	1	0.38%
Total	261	100%

Most of the respondents are young adults – adults, with 57.47%. According to PhilAtlas, this age population was 44.65% of the total population of Barangay Calumpang. While for the sex of the population, most of the respondents were female, with 60.54%. It means that most likely, the females are the ones who are in charge when it talks about garbage. However, according to Muller and Schienberg’s (1997), in terms of trash and disposal, women are largely in charge of cleaning, cooking, taking care of the family's health, doing the laundry, and maintaining the home. The best way to dispose of household waste may differ for men and women. Their ideas of what constitutes waste or junk may differ.

They could also handle garbage differently and give disposal varied priority. Most of the respondents were unemployed for the occupation, 56.32% of the total population. Meanwhile, for the highest educational attainment and monthly income, respondents were mainly from the college level, with 21.84% and 66.28% having an income of 7,999 or below, respectively.

2. Perception of the Proper Solid Waste Management among Navaleños

Table 2
Awareness of the Different Laws & Regulations

Questions	Yes	No
1. Are you aware of the Ecological Solid Waste Management Act (RA 9003)?	141 (54.1%)	120 (45.9%)
2. Are you aware of The Clean Air Act (Republic Act 8749)?	138 (52.8%)	123 (47.2%)
3. Are you aware of the Ecological Solid Waste Management Act of 2000 (Republic Act 9003)?	147 (56.3%)	114 (43.7%)
Total	142 (54.4%)	119 (45.6%)

As shown in Table 2, most respondents are aware of the different Laws and Regulations of solid waste management. 54.1% of the residents surveyed have agreed that they are aware of the Ecological Solid Waste Act, 52.8% are aware of the Clean Air Act, and 56.3% are aware of the Ecological Solid Waste Management Act of 2000. This result means that most respondents knew that different laws and regulations exist.



Solid waste management necessitates considering technical, political, legal, sociocultural, environmental, and economic concerns as well as readily available resources, as Al-Katib et al. (2010) claimed. Solid waste management initiatives will fail if there are no resources available. As a result, the locals will be dissatisfied (Lad, Chauhan, & Gole, 2020). In addition to this, widespread agreement and active engagement are required. As a result, it has become crucial for solid waste management to teach the public how to treat created solid waste.

3. Perception of the Proper Solid Waste Management among Navaleños

Table 3
Awareness and Practice of Solid Waste Management Programs

Questions	Yes	No
1. Did you ever attend any awareness program conducted by local authorities regarding household or community waste management?	152 (58.3%)	109 (41.7%)
2. Do you know the principle of waste characterization?	69 (26.4%)	192 (73.6%)
3. Do you know the principle of solid waste minimization?	102 (39.1%)	159 (60.9%)
4. Do you know your Barangay's solid waste management program or household waste management?	106 (40.6%)	155 (59.4%)
5. Do you think that barangay officials have an important role in implementing solid waste management in the barangay?	71 (27.2%)	190 (72.8%)
6. Do you know about the segregation of waste?	78 (29.9%)	183 (70.1%)
7. Is waste segregation important in the household and barangay?	85 (32.6%)	176 (67.4%)
8. Do you know the effective household and community waste management mechanism?	92 (35.3%)	169 (64.7%)
9. Do you know the effects of improper waste management?	88 (33.7%)	173 (66.3%)
10. Do you know the penalties for violation of solid waste management?	129 (49.4%)	132 (50.6%)
11. Are you aware of e-waste?	152 (58.2%)	109 (41.8%)
12. Do you know how to dispose of the e-waste?	149 (57.1%)	112 (42.9%)
13. Do you know school subjects with environmental topics?	117 (44.8%)	144 (55.2%)
14. Are you willing to know about environmental issues and concerns?	77 (29.5%)	184 (70.5%)
15. Are you committed to minimizing waste?	85 (32.6%)	176 (67.4%)
16. Do you segregate solid waste in the community or household waste?	143 (54.8%)	118 (45.2%)
17. Do you use kitchen waste as compost?	156 (59.8%)	105 (40.2%)
18. Do you throw your solid waste everywhere?	195 (74.7%)	66 (25.3%)
19. Do you see garbage on the roadside in your barangay?	124 (47.5%)	137 (52.5%)
Total	114 (46.8%)	147 (56.2%)

As shown in the table above, 56.2% was the overall response of the respondents towards the awareness and practice of solid waste management programs is negative. There are 152

respondents out of the 261 sample population who had confirmed that they had attended any awareness program conducted by local authorities regarding household or community waste management. However, most respondents do not know the waste characterization and minimization principle, with 73.6% and 60.9%, respectively. According to the guiding concept that "solid waste is a resource that may be recovered" (RA 9003, ZWRMP 2005), households' involvement in the initial management of the solid wastes they produce is crucial. Understanding the characteristics of the solid wastes produced and examining the management practices used by the respondents, as well as their attitudes toward the pertinent salient features of the current solid waste management scheme, are essential factors to take into account when trying to find an appropriate solution to the solid waste management problem. These factors ultimately determine the respondents' level of participation.

Moreover, the majority of respondents gave negative responses when questioned about the readiness to learn about environmental issues and concerns (70.5%), commitment to reducing waste (67.4%), and use of waste segregation at home (45.2%). This result means an individual's choice is the openness to learn and willingness to help reduce waste. Most respondents still believed that barangay officials have an essential role in implementing solid waste management in the barangay.

4. Perception of the Proper Solid Waste Management among Navaleños

Table 4 showed the overall response attitude of Barangay Calumpang towards solid waste management has been negative. Most respondents do not believe improper waste disposal threatens the environment (67.1%) and that waste segregation benefits the community (76.6%). Even though most people are aware of the harm poor waste handling does to the environment, people's negative attitudes and a lack of environmental awareness results in insufficient practices for maintaining a healthy environment (Licy et al., 2013).



Table 4
Attitude Towards Solid Waste Management

Questions	Yes	No
1. Improper waste disposal is a threat to the environment.	86 (32.9%)	175 (67.1%)
2. Waste segregation is beneficial to my community.	61 (23.4%)	200 (76.6%)
3. Household waste management is the responsibility of my parents.	101 (38.7%)	160 (61.3%)
4. Local officials should spearhead community waste management programs.	90 (34.5%)	171 (65.5%)
5. Solid waste collection and disposal or household waste disposal is the sole responsibility of the Local Authorities.	82 (31.4%)	179 (68.6%)
6. I am also responsible for the generation of community solid waste or household waste.	88 (33.7%)	173 (66.3%)
7. I also have a role in minimizing community waste.	103 (39.5%)	158 (60.5%)
Total	87 (40.6%)	174 (66.6%)

One of the surveyed participants mentioned that waste segregation is very difficult to practice due to a lack of resources such as trash bins. He added that it is not their job to segregate waste. However, 66.3% of the respondents confessed that they are also responsible for solid waste generation. This result indicates that the respondents still require additional environmental education in order to persuade them all to see solid waste management favorably.

5. Perception of the Proper Solid Waste Management among Navaleños

Table 5
Status of Solid Waste Management Program

Questions	Yes	No
1. Waste materials are collected according to the schedule in the barangay.	117 (44.8%)	144 (55.2%)
2. Waste materials are collected during weekends and even during holidays.	118 (45.2%)	143 (54.8%)
3. Solid wastes are collected once a week only.	116 (44.4%)	145 (55.6%)
4. Barangays are informed on the days when garbage is to be collected.	123 (47.1%)	138 (52.9%)
5. Solid waste designated area or material recovery facility is used in the barangay or community.	110 (42.1%)	151 (57.9%)
6. No garbage is left uncollected in the designated area.	132 (50.6%)	129 (49.4%)
7. Waste materials are collected in designated areas.	110 (42.1%)	151 (57.9%)
8. Medical wastes from the barangay are placed in an appropriate container (if applicable).	123 (47.3%)	137 (52.7%)
9. The maintenance staff collects waste.	133 (50.9%)	128 (49.1%)
10. Infectious waste, chemical waste, and toxic substances are collected together, regardless of whether or not they are contaminated (if applicable).	140 (53.6%)	121 (46.4%)
11. Grease trap, kitchen waste, are collected by authorized staff in strong, leak proof containers that are clearly labeled.	163 (62.4%)	98 (37.6%)
Total	126 (48.2%)	135 (51.8%)

As displayed in Table 5, there are 51.8% total negative responses regarding the status of the solid waste management program in Barangay

Calumpang, Naval. Most respondents accounted to 55.2 % answered that garbage is not collected according to the schedule. 50.9% of the respondents answered that the maintenance staff assigned were the ones who collected the garbage. However, 138 (52.9%) responses answered that the barangay does not give information on the days the garbage will be collected. This result means that the respondents had poor waste management practices for solid waste. Lack of access to door-to-door solid trash collection and inadequate solid waste management knowledge may have contributed to the reported incorrect solid waste practice.

6. Perception of the Proper Solid Waste Management among Navaleños

Table 6
Effectiveness of Solid Waste Management Programs

Questions	Mean	Interpretation
1. Waste materials are collected according to the schedule in the barangay.	2.93	Slightly Effective
2. Waste materials are collected during weekends and even during holidays.	3.01	Slightly Effective
3. Solid wastes are collected once a week only.	2.96	Slightly Effective
4. Barangays are informed on the days when garbage is to be collected.	2.97	Slightly Effective
5. Solid waste designated area or material recovery facility is used in the barangay or community.	3	Slightly Effective
6. No garbage is left uncollected in the designated area.	2.89	Slightly Effective
7. Waste materials are collected in designated areas.	2.96	Slightly Effective
8. Medical wastes from the barangay are placed in an appropriate container (if applicable).	2.97	Slightly Effective
9. The maintenance staff collects waste.	2.97	Slightly Effective
10. Infectious waste, chemical waste, and toxic substances are collected together, regardless of whether or not they are contaminated (if applicable).	2.84	Slightly Effective
11. Grease traps and kitchen waste are collected by authorized staff in strong, leak-proof containers that are clearly labeled.	2.83	Slightly Effective
Total	2.94	Slightly Effective

This study not only focuses on how the researcher measures the awareness and practices of the respondent but also on the effectiveness of the initial program about solid waste management conducted by the barangay officials. The researchers have found that the level of effectiveness of their program was mainly slightly effective as shown in Table 6. Jack Dunigan (2019) states that "effectiveness is a vision in action," which means doing the right thing. In order to do the right thing, the researchers consider the slight



room for improvement of the program to make it very effective.

7. Perception on the Proper Solid Waste Management among Navaleños

Table 7
Regression Result (Significant at p-value <0.05)

	Relationship Variable	P-Value	Decision
Age	Awareness of the Different Laws & Regulations	0.447	Accept H_0
	Awareness and practice of solid waste management programs	0.225	Accept H_0
	Attitude toward solid waste management	0.143	Accept H_0
	Status of solid waste management program	0.604	Accept H_0
Sex	Effectiveness of solid waste management programs	0.334	Accept H_0
	Awareness of the Different Laws & Regulations	0.966	Accept H_0
	Awareness and practice of solid waste management programs	0.596	Accept H_0
	Attitude toward solid waste management	0.509	Accept H_0
Occupation	Status of solid waste management program	0.793	Accept H_0
	Effectiveness of solid waste management programs	0.508	Accept H_0
	Awareness of the Different Laws & Regulations	0.366	Accept H_0
	Awareness and practice of solid waste management programs	0.026	Reject H_0
Household Monthly Income	Attitude toward solid waste management	0.263	Accept H_0
	Status of solid waste management program	0.009	Reject H_0
	Effectiveness of solid waste management programs	0.209	Accept H_0
	Awareness of the Different Laws & Regulations	0.615	Accept H_0
	Awareness and practice of solid waste management programs	0.013	Reject H_0
	Attitude toward solid waste management	0.784	Accept H_0
	Status of solid waste management program	0.082	Accept H_0
	Effectiveness of solid waste management programs	0.001	Reject H_0
	Awareness of the Different Laws & Regulations	0.089	Accept H_0
	Awareness and practice of solid waste management programs	0.900	Accept H_0
	Attitude toward solid waste management	0.090	Accept H_0
	Status of solid waste management program	0.049	Reject H_0
	Effectiveness of solid waste management programs	0.034	Reject H_0

Table 7 above presents that neither age nor sex influences the respondents' awareness, practices, and attitude towards solid waste management, as well as the status and effectiveness of the barangay's program in managing solid waste. For the occupation, it was found that it influences not only the awareness and practices of the respondents but also the status of the solid waste management of the barangay. Their highest educational attainment also influences their awareness and practices, along with the effectiveness of the solid waste management program of the barangay. Finally, their monthly income has influenced the status and effectiveness of the solid waste management program of the barangay.

CONCLUSIONS

The occupation, highest educational attainment, and monthly income of the Navaleños influence the awareness, attitude, and practices toward solid waste management. This shows that education plays a vital role in people's proper solid waste management as it influences their awareness, attitude, and practices. The solid waste management of the Municipality of Naval based on the perception of the residents is only neutral. Moving forward, as the Naval Eyes become a city, one of the focuses of the local government unit should be developing a proper waste management system and addressing the problem's gaps.

RECOMMENDATIONS

It is recommended in the study to intensify the actions towards educating the residents, developing systems, and creating mechanisms that could establish proper solid waste management. This study also conforms to the literature that education is the main solution in providing better awareness, attitudes, and practices of the residents toward proper solid waste management. Information-driven campaigns, seminars, and sustainable solid waste management plans should be done by the local government units and barangay officials. The slightly effective result or neutral on the effectiveness of solid waste management programs manifests that there is still room for improvement in the implementation. Thus, the availability of funds should also be prioritized to establish a great solid waste management system.

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