

A MIXED-METHODS STUDY ON THE AWARENESS, IMPLEMENTATION, AND EFFECTIVENESS OF R.A. NO. 9003 (ECOLOGICAL SOLID WASTE MANAGEMENT ACT OF 2000)

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Abstract

This study assessed the level of awareness, implementation, and effectiveness of Republic Act No. 9003, also known as the Ecological Solid Waste Management Act of 2000, among the residents of Barangay Catbangan, San Fernando City, La Union. Employing a mixed-method sequential explanatory design, utilizing quantitative surveys and qualitative semi-structured interviews to gather data across six key domains: waste segregation, composting and recycling, proper waste disposal, MRF, penalties for non-compliance, and impact on health. Quantitative results revealed a "High" level of awareness, while implementation and effectiveness were rated "Moderate". Statistical analysis demonstrated a significant positive relationship between awareness, implementation, and effectiveness, although high awareness did not always guarantee consistent implementation. Qualitative findings identified barriers such as weak monitoring, inconsistent waste management, irregular garbage collection, and inadequate infrastructure. The study recommends increasing barangay resources, improving collection services, and using digital infographics to strengthen environmental education and support effective waste management practices.

Keywords: *Republic Act No. 9003, waste management, lived experiences, waste segregation, composting, recycling, material recovery facility*

1. Introduction

“The planet’s greatest threat is not pollution, but those who choose to ignore it.” Overflowing landfills, increasing pollution, and piles of uncollected waste have become a common sight in many growing communities, leading to a global crisis that threatens both the environment and human health. As our world continues to develop as time goes by, the population density continues to increase, urbanization occurs, the economy continues to grow, and industrialization takes place (Xioa et al., 2020). Therefore, the amount of resources used and consumed on a daily basis drastically increases, which results in an increase in waste production, which leads to a global concern for solid waste management (Trushna et al., 2024). Despite the efforts of implementing a law to respond to this growing concern, perhaps the problem is not found in the law itself; one must ask whether the lack of significant change comes from the lack of awareness and participation of the people.

Currently, solid waste management is one of the most critical issues that is being faced by numerous countries around the world (Nyampundu et al., 2020). Solid waste management issues are often observed in low-income and low-middle-income countries since the majority of municipal solid waste is dumped in the open, and most nations rely on the unorganized sector and insufficient waste infrastructure (Sharma and Jain, 2020). Based on the study conducted by Fadhullah et al. (2020) in the East Coast of Malaysia, the findings show that there was no significant difference between the respondents who performed waste segregation and those who did not. The amount of municipal solid waste disposed of in landfills is steadily rising due to respondents' inadequate understanding of the crucial importance of waste segregation, which also endangers the remaining landfill space.

Worldwide, one of the most common types of waste produced annually is municipal solid waste, which is reported to generate more than two billion tonnes of waste yearly, and is still expected to double annually by 2050 (World Bank, 2022). The UNEP’s Global Waste Management Outlook 2024 claims that by 2025, the amount of municipal solid waste generated will rise nearly 2 billion tons, reaching 3.8 billion tons. With an increasing amount of waste annually, improper solid waste management can lead to pollution in our environment, which includes land pollution, water pollution, and air pollution. With this, it can lead to various health problems, such as the increase in transmission of cholera and vector-borne diseases (for instance, dengue and malaria). This results from flooding and water contamination (WHO, 2024).

In the Philippines, as the country continues to develop, the amount of solid waste produced on a daily basis is estimated to be 61,000 metric tons, whereas 24 percent of the solid waste produced is plastic, based on the data obtained from the

Department of Environment and Natural Resources (Climate Change Commission, 2024). The rapid increase in the country's population also drastically affects the production of plastic waste in order to accommodate the increasing demand for packaged goods. According to the World Bank Group (2021), an estimated amount of plastic generated annually in the Philippines is 2.7 million tons, wherein 20 percent of these plastic wastes go to the ocean.

To address the poor waste segregation in the Philippines, Republic Act 9003 or also known as the "Ecological Solid Waste Management Act of 2000," was enacted on January 26, 2001. This environmental law was enacted to address the shortcomings of the Philippines in regards to improper solid waste management. Furthermore, the law was enacted with the sole purpose of protecting public health and the environment (Ecological Solid Waste Management Act of 2000, 2001).

However, despite the implementation of the law, its impact after over two decades of being implemented is still minimal. Many municipalities and cities still experience problems when it comes to solid waste management, therefore, leading to pollution and flooding, which has a significant impact on people's health. According to the study conducted by Catiil and Daud (2025), the number of municipalities or cities that implement this law is still relatively small. Similarly, a study conducted by Badua (2022) at barangay Sapilang, Casiaman, and Arosip of Bacnotan, La Union, highlights the low compliance rate of residents to this law due to a lack of awareness. The study presented that in terms of scheduled dates for the collection and transportation of wastes, the residents of the barangays are poorly aware of the set schedules.

Despite more than two decades since the enactment of R.A. No. 9003, its full effectiveness remains limited across many municipalities and cities in the Philippines. The literature consistently identifies recurring challenges, poor law enforcement, limited facilities, low stakeholder engagement, and weak public participation (Catiil & Daud, 2025). However, many of these studies highlight only surface-level compliance problems and do not fully examine the deeper behavioral and awareness-related factors that influence the implementation of the law.

The effectiveness of Republic Act No. 9003 is based on the triangular connection among the Level of Awareness (LOA) of residents, their Level of Implementation (LOI) demonstrated through waste segregation, and the Level of Effectiveness (LOE) of the said policy to improve environmental health conditions. The latest empirical studies have shown that these three factors work together in a linear causal relationship rather than separately. According to Malque Publishing (2026), there was a substantial positive correlation ($r = 0.778$, $p < 0.05$) found between LOA of a resident regarding RA 9003 and LOI in terms

of segregation activities. Thus, it is apparent that LOA is the most important psychological predictor of LOI. In addition, the research works of UBT (2025) and AIJMR (2026) revealed that LOE is the dependent variable of implementation on a consistent basis at the community level. These studies show that the municipal system can achieve its maximum effectiveness if households have adequate knowledge about proper procedures and guidelines in waste segregation.

Fundamentally, this study played a significant role in evaluating the implementation of R.A. No. 9003, The Ecological Solid Waste Management Act of 2000, in barangay Catbangan of San Fernando City. Through evaluating people's level of awareness, level of implementation, and the effectiveness of the policy, this study aims to determine the relationship between the level of awareness and the level of effectiveness of solid waste management policies. This study also played a role in obtaining valuable insights from respondents regarding solid waste management policies, the effectiveness of the existing policies, and their recommendations to improve these existing policies.

2. Objectives

This study aimed to evaluate the awareness, implementation, and effectiveness of R.A. No. 9003 and examine their relationship through the waste management practices and experiences of residents in Catbangan.

3. Materials and Methods

The researchers utilized a mixed-method research design for this study, specifically adopting the sequential explanatory approach. It focused on collecting and analyzing quantitative data first, followed by qualitative data to explain and expand the quantitative findings (Taherdoost, 2022). According to Sharma et al. (2023), mixed-method research was particularly suitable for complex studies that could not be adequately addressed using a single method alone.

The study was conducted at Barangay Catbangan, San Fernando City, La Union, a large and densely populated area. For the quantitative part of this study, an adult representative from each household was selected as a respondent for this study. Using the Slovin's formula with a 5% margin of error and the total number of 3,174 households of the barangay, the required quantitative sample size was computed to be 355 respondents. Participants were chosen based on the following inclusion criteria: residents of Barangay Catbangan, aged 18-65 years old, residing in the barangay for at least six months, directly involved in household waste management, able to understand written instructions, and willing to participate in the study. Those who did not meet the criteria were excluded. Meanwhile, for the qualitative part of the study, 8 participants were purposely

selected from the initial sample of 355 household representatives for a semi-structured interview. The data collection continued until saturation is reached to ensure the completeness and reliability of the qualitative data.

Prior to data collection, the researchers secured approval from the research instructor, adviser, panel, and the Lorma Colleges Research Ethics Committee, as well as permission from the Dean of the College of Nursing and the barangay captain of Catbangan. Respondents were informed about the study's purpose, procedures, and ethical considerations through the informed consent form, and participation was strictly voluntary. Data for the quantitative phase were gathered through Google Forms for approximately 2–3 weeks.

Following the quantitative phase, eight participants were selected for face-to-face interviews using a pre-established interview guide. Permission to record the interviews was obtained for documentation and transcription purposes, and participants were allowed to use the language or dialect they were most comfortable with. Throughout the study, ethical principles such as confidentiality, anonymity, voluntary participation, and protection from harm were strictly observed.

For the quantitative data, the data was analyzed using the weighted mean and the Pearson-r Correlation Coefficient. The data was analyzed based on which indicators for each subvariable and variable had the lowest and highest mean, and their composite weighted mean. In addition, the Pearson Product Correlation Coefficient was utilized to analyze the relationship between the three variables: awareness, implementation, and effectiveness. For the qualitative data, the data were analyzed using thematic analysis, wherein the researchers highlighted recurring themes in the participants' narratives and classified these themes into positive experiences, negative experiences, and their recommendations regarding the enhancement of waste management in their barangay.

4. Results

The findings of the study revealed that the residents of Barangay Catbangan, San Fernando City, La Union demonstrated a high level of awareness regarding Republic Act No. 9003, particularly in terms of waste segregation, composting and recycling, proper waste disposal, material recovery facilities (MRF), penalties for non-compliance, and the impact of waste management on health. However, the study showed that the extent of implementation and level of effectiveness of the law were only moderate. A significant positive relationship between awareness, implementation, and effectiveness were analyzed, indicating that residents with higher awareness contribute to better practice of proper waste management and effectiveness of the policy within the community.

For the qualitative findings, thematic analysis generated three major themes: The Residents' Positive Experiences in Awareness of Waste Management Practices, The Residents' Negative Experiences in Ineffective Waste Management Implementation, and The Residents' Proposed Recommendations to Enhance Waste Management Outcomes. Residents expressed positive experiences regarding increased environmental awareness through the efforts of the barangay. However, participants also shared challenges such as inconsistency in monitoring, practice, discipline, waste collection, gaps in the system, and strays. In response to these concerns, residents proposed recommendations, including investing in improving waste collection systems and stronger community participation.

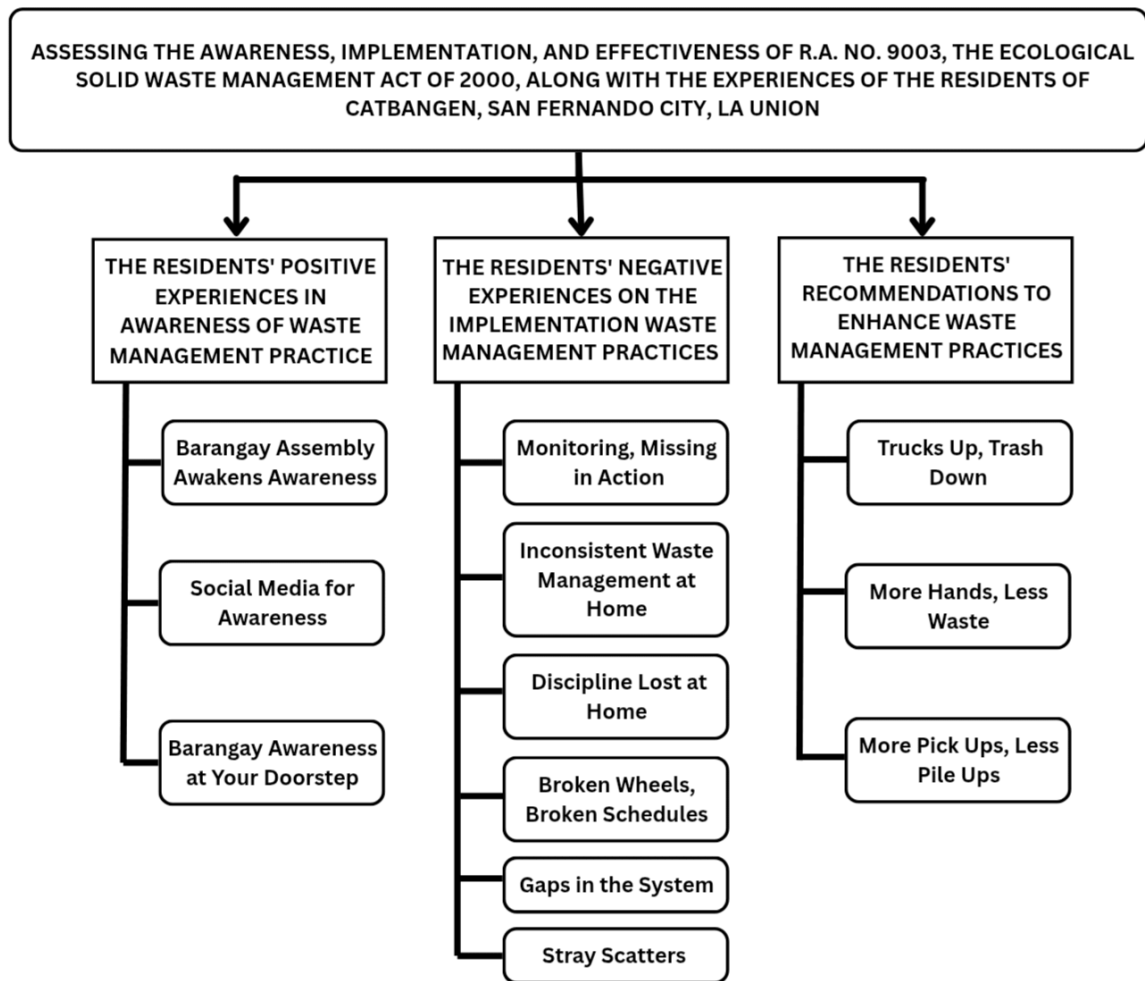


Figure 1 The awareness, implementation, and effectiveness of R.A. No. 9003 among the residents of Catbangan, San Fernando City, La Union, revealing three (3) major themes and their corresponding subthemes. The themes include the residents' positive experiences in waste management practices, their negative experiences in waste management implementation, and their recommendations to enhance waste management practices.

5. Discussion

The findings revealed that the respondents generally had a high level of awareness regarding R.A. No. 9003. This suggests that the residents are knowledgeable about proper waste management practices as mandated by the law. Particularly, the very high rating in the "Impact on Health" subvariable indicates that the respondents strongly understand the relationship between improper waste disposal and health, specifically waste-related diseases and environmental contamination. This implies that health concerns serve as a motivating factor for residents to practice proper waste management. However, the low awareness regarding Material Recovery Facility (MRF) suggests limited community knowledge about the purpose of MRFs in waste segregation, recycling, and waste reduction. This may be attributed to the lack of an MRF in the barangay, highlighting a gap in the implementation of the provisions of R.A. No. 9003 at the barangay level.

In addition, the findings also showed that the level of implementation of R.A. No. 9033 was only moderate. This suggests that despite the residents' awareness of the proper waste management practices, implementation of these practices remains inconsistent. The high rating under "Impact on Health" suggests that respondents practice waste management behaviours that benefit their health, such as disposing of waste properly to avoid illnesses and unsanitary surroundings. This further supports that health concerns serve as a motivating factor for residents to practice waste management. Similar to the "Awareness" variable, the "Material Recovery Facility" subvariable revealed a very low implementation rating, attributed to the lack of an MRF in the barangay. This implies that awareness alone does not ensure implementation of proper waste management practices, especially when structural and operational limitations are present.

Similarly, the level of effectiveness of R.A. No. 9033 was interpreted as moderate, indicating that the current waste management practices of the barangay are not optimal in achieving the goals of R.A. No. 9003. The high effectiveness rating in the "Impact on Health" subvariable suggests that residents perceived waste management efforts as effective in maintaining cleanliness and reducing waste-related disease in the community. However, the very low effectiveness of the "Material Recovery Facility" further supports the negative impact of the lack of an MRF in the barangay, affecting the effectiveness of their waste management efforts. This finding highlights that effective waste management requires not only community participation but also functional facilities and consistent and organized systems that support proper waste management practices to improve waste management outcomes in the barangay.

The significant relationships among awareness, implementation, and effectiveness indicate that these three variables are interconnected in enhancing the outcomes of R.A. No. 9003. The positive, moderate, and statistically significant correlation between awareness and implementation suggests that as the residents become more informed about the provision of R.A. No. 9003, they are more likely to practice proper waste management behaviours. Similarly, the positive relationship between awareness and effectiveness implies that knowledgeable communities are more capable of achieving better waste management outcomes. Furthermore, the very strong correlation between implementation and effectiveness indicates that consistent enforcement of waste management programs and practices is essential in achieving better waste management outcomes. These findings emphasize that increasing public awareness alone is insufficient if the implementation of waste management practices is weak. Effective waste management requires active participation, consistent enforcement, and continuous monitoring from the barangay officials and residents.

The qualitative findings further support the quantitative results by revealing both positive and negative experiences of the participants regarding waste management practices within the Barangay. The first major theme, “The Residents' Positive Experiences in Awareness of Waste Management Practice,” discusses the experiences of the residents that resulted in a high level of awareness of R.A. No. 9003 in the barangay. These experiences included barangay assemblies, social media, and house-to-house visits, which reflect the three (3) subthemes under this major theme. First, “Barangay Assembly Awakens Awareness”, the residents recognized barangay assemblies as the primary mode of communicating ordinances in the barangay, including waste-related ordinances. Second, “Social Media for Awareness”, the residents also recognized the role of social media in disseminating information, particularly for residents who are unable to attend barangay assemblies, using the barangay's official social media account. Third, “Barangay Awareness at Your Doorstep” reflects the residents' experience of house-to-house visits by the barangay officials to personally remind them of waste management ordinances. These strategies have been effective in increasing community awareness about R.A. No. 9003, demonstrating the importance of continuous education and communication in encouraging community participation in waste management programs.

However, the participants also identified negative experiences that hindered the implementation and effectiveness of waste management practices. Hence, the major theme “The Residents' Negative Experiences on the Implementation of Waste Management Practices” has six (6) subthemes. First, “Monitoring Missing in Action” reflects the lack of monitoring of proper waste

management practices. Residents identified that the lack of monitoring and enforcement of fines and penalties promotes improper and inconsistent waste management practices. Second, “Inconsistent Waste Management at Home” reflects the residents’ inconsistency in practicing proper waste management practices. Residents have identified that sometimes they do practice proper waste management, such as segregating and composting, but most often than not, they don’t, as they do not see the need to follow these practices. This may be attributed to the lack of monitoring and enforcement of fines and penalties within the barangay. Third, “Discipline Lost at Home” reflects the residents’ lack of discipline in following proper waste management practices. Some residents have admitted that despite the prohibition of burning in their barangay, they sometimes burn their garbage, due to waste accumulation and the lack of consequences. Fourth, “Broken Wheels, Broken Schedules” reflects the frequent breakdown of the garbage collection vehicles affecting waste collection schedules. Fifth, “Gaps in the System” refers to gaps in the operation and facilities within the barangay regarding waste management. Residents have identified the insufficient garbage collection vehicles, lack of MRF, and color-coded bins as issues that affect the effectiveness of their waste management practices. Lastly, “Stray Scatters” refers to the scavenging behaviors of dogs on garbage bags ready for collection. Residents have identified that despite proper waste disposal practices, dogs often scavenge garbage bags to be collected and scatter their contents on the street, deeming their efforts as useless. Overall, this major theme reflects the issues and weaknesses that limit the implementation and effectiveness of waste management in the barangay.

Hence, the third major theme, “The Residents’ Recommendations to Enhance Waste Management Practices,” reflects the residents’ insights on how the waste management system of their barangay can be improved. Its three (3) subthemes were based on their insights. First, “Trucks Up, Trash Down” reflects the residents’ recommendation of increasing the garbage collection vehicles in order to increase the frequency and efficiency of waste collection. Second, “More Hands, Less Waste” reflects the residents’ recommendation of hiring additional personnel. Residents have identified that increasing the number of garbage collection vehicles must be accompanied by increasing the number of personnel to handle the additional vehicles. Residents have identified that the once-a-week garbage collection schedule is insufficient. Hence, the third subtheme, “More Pick Ups, Less Pile Ups” reflects the residents’ recommendation to increase the frequency of the waste collection schedule. To conclude, the findings indicate that effective waste management requires not only community awareness but also efficient systems, adequate facilities, and consistent implementation efforts from the local community and its residents.

6. Conclusion

The enforcement of Republic Act No. 9003, the Ecological Solid Waste Management Act of 2000, continues to be an important component in promoting environmental sustainability and proper solid waste management within the community. The study showed that residents of Barangay Catabangen have a generally high level of awareness of the provisions and significance of the law. Residents acknowledged the importance of waste segregation, proper disposal of waste, recycling, and composting, as well as the impact of waste management in maintaining environmental cleanliness and protecting public health. The use of various dissemination strategies, such as barangay assemblies, social media platforms, and community-based awareness campaigns, enables the public to be aware of the law.

Despite this, the findings further revealed that R.A.No. 9003 extent of implementation and effectiveness remains moderate due to several existing barriers within the community. Residents experience problems such as irregular garbage collection schedules, insufficient waste management facilities, a lack of functional Material Recovery Facilities (MRF), and inadequate monitoring and non-compliance with proper waste segregation and disposal practices. This indicates that without regular enforcement, adequate facilities, and active public participation, awareness alone cannot ensure consistent compliance with proper waste management practices.

Furthermore, the study found a significant relationship among awareness, implementation, and effectiveness, indicating that stronger implementation contributes to the effectiveness of the waste management programs in the barangay. The findings emphasize the importance of increasing community participation, environmental awareness, and waste handling systems to attain a sustainable future.

Based on the results and findings of the study, the researchers recommend the utilization of the developed Information, Education, and Communication (IEC) materials and their dissemination through social media platforms to strengthen public awareness regarding proper waste management practices. Community members may also consider practicing waste segregation, reducing plastic use, composting, and taking an active role in waste management programs.

Furthermore, Barangay Catabangen and other local government units may further improve waste management by developing a functional Material Recovery Facilities (MRF), providing color-coded bins, ensuring regular waste collection, strengthening information campaigns, and strict enforcement of waste management ordinances.

Moreover, the Department of Environment and Natural Resources may continue supporting LGU's through funding, training, and monitoring to ensure the effective implementation of R.A. N0. 9003. Likewise, the Department of Health may expand health education programs highlighting the risk of improper waste disposal and its impact on public health.

Finally, future generations may use this study as a reference for proper waste management awareness, while future researchers may further explore the

relationship between awareness and implementation and examine ways to enhance community participation in waste management.

7. Acknowledgement

The researchers would like to express their sincere gratitude to the individuals and institutions whose support, guidance, and encouragement made the completion of this study possible.

First and foremost, the researchers give thanks to God Almighty for granting them strength, wisdom, and perseverance throughout the conduct of this study.

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9. Appendices

APPENDIX A Approval Sheet from the Research Ethics Committee

 LC-REC Form #004
APPROVAL LETTER
REC Reference #: 2026-010

February 23, 2026

To: Kristine Acosta, Kristhan Vierre Anaas, Tiffany Faith Marzo, Taryn Monica Miranda and Elyn Samonte
LORMA Colleges, College of Nursing

Subject: Approval of the Research Study – “ASSESSING THE AWARENESS, IMPLEMENTATION, AND EFFECTIVENESS OF R.A. 9003, THE ECOLOGICAL SOLID WASTE MANAGEMENT ACT OF 2000, ALONG WITH THE EXPERIENCES OF THE RESIDENTS OF CATBANGEN, SAN FERNANDO, LA UNION” – by the Research Ethics Committee (REC).

Dear Researcher/s,

The Research Ethics Committee (REC) has reviewed your application to conduct the above-mentioned research study in the Catbangan, City of San Fernando, La Union with you as the Principal Investigators within a duration of February 23, 2026 to February 23, 2027.

The Following documents have been reviewed and approved:


1. Endorsement of the Research Coordinator
2. Title and Statement of the Problem/Objective
3. Literature Review
4. Methods and Procedures
5. Population and Locale
6. Exclusion/Inclusion Criteria
7. Data Analysis
8. Ethical Considerations

We approve the study to be conducted in the presented form, provided the following are integrated in the final research protocol:

1. In the Informed Consent Form's Procedures section, where is the ICF for the interview? The ICF in the resubmission only covers the questionnaire.

The institutional REC expects to be informed about the progress of the study, any revision in the protocol before implementation and participants'/respondents' information/informed consent. Likewise, you are required to provide the Board a copy of the final report.

Yours Sincerely,



J. P. VERA, LPT
Chairman, LC-REC

10. Author(s) Biodata

Ms. Kristine C. Acosta is a current student of the Bachelor of Science in Nursing program from Lorma Colleges, who leads a team of passionate peers alongside their research adviser, Mrs. Editha C. Sabalboro, is conducting a study on the awareness, implementation, and effectiveness of R.A. No. 9003 among the residents of Catbangan. Through this study, the researchers aim to contribute valuable insights regarding solid waste management practices and promote greater environmental awareness and community participation..