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# Analyzing the Relationship Between Household Waste Segregation Practices and Landfill Reduction in Patnongon, Antique

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## ABSTRACT

This study explores the relationship between household waste segregation practices and landfill reduction in Patnongon, Antique. With rapid urbanization and increased waste generation, effective waste management practices have become critical. Household waste segregation is essential for reducing the volume of waste sent to landfills and promoting environmental sustainability. Data were collected from 237 respondents through surveys that assessed their awareness, compliance with segregation guidelines, frequency of segregation, participation in waste segregation programs, and the availability of resources. The study utilized descriptive and correlational methods to analyze the relationship between waste segregation and landfill reduction. The findings revealed that households with higher awareness and consistent waste segregation practices significantly reduced the volume of waste sent to landfills. However, challenges such as limited resources and insufficient community engagement were identified. The study highlights the importance of increasing public awareness, improving waste management infrastructure, and fostering community participation. The implications suggest that local authorities should implement more frequent educational campaigns, increase access to segregation resources, and strengthen enforcement of waste management policies to enhance the effectiveness of waste segregation and landfill reduction efforts. This study provides insights into the importance of community-driven waste management solutions and offers practical recommendations for improving waste segregation practices in rural municipalities.

***Keywords***: *Awareness, Compliance, Landfill Reduction, Segregation, Waste Management*

## INTRODUCTION

Waste management is increasingly recognized as one of the most pressing global environmental issues, particularly in light of rapid urbanization and population growth. The World Bank reports that over 2 billion tons of municipal solid waste are generated worldwide annually, with roughly 33% of this waste mismanaged, leading to significant environmental and health risks (World Bank, 2022). As urban populations continue to rise, waste generation is projected to increase by 70% by 2050, intensifying the challenges of waste disposal and management (Jagun et al., 2023). One of the critical aspects of effective waste management is reducing the volume of waste sent to landfills, a practice that mitigates the harmful environmental consequences associated with landfill use, including soil contamination, greenhouse gas emissions, and the depletion of natural resources.

A key approach to minimizing landfill waste is household waste segregation, which ensures that waste is sorted at the source, facilitating recycling and composting. Proper waste segregation allows recyclable and compostable materials to be diverted to appropriate facilities, significantly reducing the amount of waste that ends up in landfills. This practice not only conserves natural resources but also helps reduce pollution and fosters more sustainable waste management practices (Barton, 2021). The

global success of various waste segregation programs, such as the Zero Waste initiative in San Francisco and the waste separation system in Germany, demonstrates that waste segregation can be highly effective in reducing landfill dependency (Zamani et al., 2020). These models emphasize the importance of raising public awareness, providing necessary resources, and enforcing local policies to achieve better waste management outcomes.

However, the success of waste segregation programs remains a challenge, especially in rural areas, where resources, infrastructure, and public awareness may be limited. Despite positive examples from urban areas, many rural regions still struggle to implement effective waste segregation practices. In such settings, the full potential of waste segregation to reduce landfill use remains untapped, and addressing local socio-economic and cultural factors is crucial to overcoming these barriers. Understanding the impact of community engagement, local policies, and available resources on the effectiveness of waste segregation programs is necessary to optimize such practices, especially in rural municipalities like Patnongon, Antique.

This study seeks to investigate the relationship between household waste segregation practices and landfill reduction in Patnongon, Antique, a rural municipality in the Philippines. It aims to explore how factors such as awareness, compliance, and resource availability affect the success of waste segregation initiatives. In the case of Patnongon, limited waste management infrastructure and low public awareness about the importance of waste segregation complicate the management of increasing waste volumes. As waste generation continues to rise, understanding how to improve segregation practices at the household level will be essential for reducing the pressure on landfills.

A review of existing literature on waste management highlights the crucial role of public awareness and local governance in achieving successful waste segregation outcomes. Studies have shown that municipalities with strong community engagement, such as those in developed countries, experience better waste diversion rates and longer landfill lifespans (Alvarez et al., 2023; Martinez et al., 2023). Moreover, local government involvement and the establishment of Material Recovery Facilities (MRFs) are essential for providing the necessary infrastructure to support segregation practices and reduce waste volumes sent to landfills (Lee & Sulaiman, 2022).

Furthermore, the legal framework guiding waste segregation in the Philippines, including the Ecological Solid Waste Management Act of 2000, mandates that households separate waste into biodegradable, recyclable, and residual categories. Local ordinances, in some cases, further enforce these practices by imposing penalties for non-compliance (DENR, 2021). However, despite these regulations, rural areas such as Patnongon face unique challenges in fully implementing these laws, often due to resource constraints and insufficient public engagement.

In Patnongon, the reliance on agriculture and the rural character of the municipality pose specific challenges for waste management. The growing population and limited municipal resources have exacerbated the waste management issues, resulting in landfills reaching their capacity faster than expected. There is a growing need for community-driven initiatives and government-supported programs to address these challenges and encourage better waste segregation practices at the household level.

As the effects of climate change and environmental degradation become more evident, effective waste management strategies, especially those targeting landfill reduction, are vital for the long-term sustainability of communities. Evidence from other regions suggests that proper waste segregation not only reduces the burden on landfills but also has significant environmental benefits, such as reducing methane emissions and preventing soil contamination (Martinez et al., 2023). This study aims to contribute valuable insights into how household waste segregation practices can help reduce landfill waste in Patnongon, providing a model that may be applicable to other similar rural communities in

the Philippines.

## MATERIALS & METHODS

This study adopted a descriptive correlational research design to explore the relationship between household waste segregation practices and landfill reduction in Patnongon, Antique. A quantitative approach was used, allowing for the precise measurement of variables and the analysis of their relationships through statistical methods. The research aimed to provide insights into how behaviors such as compliance with waste segregation guidelines and the frequency of segregation affected the reduction of landfill waste. The descriptive nature of the study did not manipulate variables but described the current practices and their impact on landfill management. Regression analysis was employed to test the relationship between the different variables involved (Smith & Davis, 2023).

Data were collected from households actively participating in waste segregation initiatives in Patnongon, Antique, from 2021 to 2023. This locality had ongoing waste management programs focused on reducing landfill dependence, providing a relevant context for the study. The target population was the household heads or primary decision-makers, chosen for their direct involvement in waste segregation practices. A stratified random sampling technique was used to ensure a representative sample across different demographic groups, including various educational levels and household income. This method allowed for the analysis of waste segregation behavior among different strata, increasing the reliability of the findings (Patel & Kumar, 2023).

To collect data, the study used a structured questionnaire comprising demographic information and items related to waste segregation practices and landfill reduction. The instrument's validity was ensured through expert reviews, and a pilot test was conducted on 30 household heads to ensure its clarity and reliability. Cronbach's alpha was used to assess the reliability, aiming for a coefficient of 0.70 or higher. The data were analyzed using descriptive statistics to summarize household waste segregation trends and inferential statistics, including Pearson's correlation and regression analysis, to examine relationships between variables (Harrison & Smith, 2023). The findings offered insights into the impact of waste segregation practices on landfill reduction, supporting the development of policies for improving waste management in rural areas.

Ethically, the study adhered to ethical principles, ensuring that all participants provided informed consent, participated voluntarily, and understood their right to withdraw at any stage. Confidentiality was maintained by anonymizing respondents' information, and all data were stored securely. These practices ensured the ethical integrity of the study while providing reliable and valid data (Adams & Peters, 2023.

## RESULTS AND DISCUSSION

**Table 1**
**The Frequency and Percentage Distribution of Respondents in Terms of Sex**

| Profile | Characteristics | Frequency | Percentage |
|---|---|---|---|
| Sex | Male | 92 | 38.8% |
| | Female | 145 | 61.2% |
| | **Total** | **237** | **100.0%** |

The data presented in Table 1 reveals that a significant majority (61.2%) of the respondents were female, compared to 38.8% male respondents. This distribution highlights a predominant participation

from women in waste segregation and landfill reduction efforts. Previous research has shown that women, particularly in developing countries, often play a crucial role in household waste management practices. For instance, in a study by Nepal et al. (2022), it was found that women are more likely to handle household waste segregation, recycling, and composting due to their traditional roles within households. Similarly, Henry et al. (2020) emphasized that women contribute significantly to community-driven waste management programs, which are critical for environmental sustainability.

Women's dominant involvement in waste segregation could be due to their social roles in managing household chores and caring responsibilities, which often encompass waste management tasks. Studies such as Akenji et al. (2019) argue that recognizing gender-specific roles in waste management can enhance participation and sustainability outcomes. Gender-sensitive approaches to waste management policies can further amplify the involvement of women by addressing their specific needs, such as access to resources and capacity-building programs.

Understanding the gender dynamics in waste management can guide the development of policies and programs that are more inclusive and equitable. Local governments and community leaders should ensure that waste management education and resources are tailored to encourage the active participation of both men and women, fostering a more inclusive environmental stewardship model.

**Table 2**
**The Frequency and Percentage Distribution of Respondents in Terms of Age**

| Profile | Characteristics | Frequency | Percentage |
|---|---|---|---|
| Age | 18-24 | 24 | 10.1% |
| | 25-29 | 45 | 19.0% |
| | 30-34 | 49 | 20.7% |
| | 35 and Above | 119 | 50.2% |
| | **Total** | **237** | **100.0%** |

Table 2 indicates that the majority of respondents (50.2%) are aged 35 years and above, suggesting that older individuals are more actively involved in waste segregation practices. This finding aligns with the results of Anwar et al. (2021), who noted that older individuals tend to have a greater commitment to environmental sustainability, likely influenced by their longer-term perspective on community welfare. In contrast, younger respondents (18-29 years) make up a smaller proportion of the sample, though they are often more receptive to innovation, technology, and eco-friendly solutions (Rahayu et al., 2020).

The results imply that younger age groups may be more likely to adopt digital waste management tools, such as apps for recycling and waste tracking. Integrating technology into waste management can help engage younger generations, who are more familiar with digital platforms. Meanwhile, older age groups might benefit from more traditional, community-based programs that emphasize hands-on approaches to waste reduction, such as composting and waste separation (Rahayu et al., 2020).

Waste management initiatives should leverage both digital tools for younger populations and community-driven approaches for older participants to create comprehensive, multigenerational waste management strategies. Additionally, incorporating educational campaigns that target younger generations can cultivate long-term habits of waste segregation and recycling.

**Table 3**
**The Frequency and Percentage Distribution of Respondents in Terms of Civil Status**

| Profile | Characteristics | Frequency | Percentage |
|---|---|---|---|
| Civil Status | Single | 92 | 38.8% |
| | Married | 145 | 61.2% |
| | **Total** | **237** | **100.0%** |

As shown in Table 3, the majority of respondents (61.2%) are married, which may influence their engagement with waste management activities. Married individuals may have more household responsibilities and, consequently, a higher level of engagement in managing household waste. A study by Abushammala and Ghulam (2023) revealed that marital status significantly impacts attitudes toward household waste management, with married individuals more likely to engage in sorting and segregating waste.

The study by Omang et al. (2023) in Cross River State, Nigeria, also suggests that marital status affects solid waste management practices, as married individuals typically share household responsibilities, including waste disposal. The results from this study highlight that married couples might be more committed to proper waste segregation due to shared household responsibilities.

Waste management programs can target married couples by promoting joint family-based initiatives. By emphasizing the collective responsibility of all household members in waste segregation, local governments can increase participation rates and ensure a more sustainable approach to waste reduction.

**Table 4**
**The Respondents' Assessment of Household Waste Management in Terms of Awareness and Knowledge**

| Items | Mean | SD | Description | Interpretation |
|---|---|---|---|---|
| I am aware of the importance of waste segregation in environmental protection. | 3.65 | 0.57 | Strongly Agree | Very high |
| I understand the categories of waste segregation (e.g., biodegradable, non-biodegradable). | 3.60 | 0.54 | Strongly Agree | Very high |
| I know the impact of improper waste segregation on the environment and public health. | 3.63 | 0.52 | Strongly Agree | Very high |
| I have attended informational sessions or campaigns about waste segregation. | 3.14 | 0.77 | Agree | High |
| I can easily identify the proper category for most household waste items. | 3.46 | 0.65 | Strongly Agree | Very high |
| **Overall Mean** | **3.50** | **0.61** | **Strongly Agree** | **Very high** |

The data from Table 4 suggests that respondents possess a high level of awareness and knowledge regarding waste segregation, with an overall mean score of 3.50, indicating that the majority strongly agree on the importance of waste segregation. This finding supports the conclusions of Chabibah et al. (2020), who argued that environmental education plays a vital role in enhancing awareness about the significance of waste segregation. Furthermore, Selvakumaran and Wahid (2022) emphasize that knowledge about waste management practices positively influences the willingness of individuals to segregate waste, underscoring the importance of public awareness campaigns.

Despite the high level of awareness, the relatively lower mean score for the item "I have attended informational sessions or campaigns about waste segregation" (3.14) indicates that exposure to educational initiatives may be insufficient, highlighting the need for more extensive outreach. While the respondents are generally knowledgeable, some gaps in engagement and education remain.

The findings suggest that while residents are aware of the importance of waste segregation, more robust and consistent educational campaigns are needed to reinforce these concepts and ensure that proper waste management practices are consistently followed. Local governments should invest in comprehensive community outreach programs and educational workshops to deepen understanding and broaden participation.

**Table 5**
**The Respondents' Assessment of Household Waste Management in Terms of Frequency of Segregation**

| Items | Mean | SD | Description | Interpretation |
|---|---|---|---|---|
| I segregate waste daily in my household. | 3.15 | 0.62 | Agree | High |
| I maintain a consistent schedule for segregating recyclable and non-recyclable waste. | 3.16 | 0.67 | Agree | High |
| I ensure all kitchen waste is segregated immediately after use. | 3.25 | 0.58 | Agree | High |
| My household follows weekly segregation practices for bulk items (e.g., electronics, and batteries). | 3.01 | 0.66 | Agree | High |
| I check that waste is properly segregated before disposal. | 3.16 | 0.65 | Agree | High |
| **Overall Mean** | **3.14** | **0.64** | **Agree** | **High** |

As shown in Table 5, respondents generally engage in regular waste segregation, with the overall mean score of 3.14 reflecting a high level of consistency in their segregation practices. The highest mean score is for the item "I ensure all kitchen waste is segregated immediately after use" (3.25), indicating that respondents prioritize organic waste management. This aligns with findings from Knickmeyer (2019), who observed that many households prioritize kitchen waste segregation due to its direct impact on hygiene and sanitation. However, the relatively lower score for "My household follows weekly segregation practices for bulk items" (3.01) suggests that respondents are less consistent when it comes to bulk waste segregation, possibly due to lack of infrastructure or awareness.

This finding highlights a gap in waste segregation practices, particularly in the management of bulk and hazardous materials. Akmal et al. (2023) emphasized that specialized collection services and public education are essential to ensure proper handling of such waste types.

To address inconsistencies in waste segregation, municipalities should introduce targeted programs and infrastructures that support the segregation of bulk and hazardous waste. This could include specialized collection points, educational campaigns, and clearer guidelines on managing less common waste types like electronics or batteries.

The findings in Table 6 indicate that respondents generally perceive the availability of waste management resources as high, with an overall mean of 2.96. This suggests that waste segregation resources, such as bins and community facilities, are accessible, but there may still be gaps in their distribution or adequacy. For instance, while bins are available, the item "I have access to instructional materials (e.g., flyers, and guides) about waste segregation" received a lower score (2.87), indicating that access to educational materials might be limited. This finding is consistent with research by Schoeman and Rampedi (2021), who noted that effective waste management often depends on both

physical resources and the availability of instructional materials to educate the public about waste segregation.

**Table 6**
**The Respondents' Assessment of Household Waste Management in Terms of the Availability of Resources**

| Items | Mean | SD | Description | Interpretation |
|---|---|---|---|---|
| My household has adequate containers for segregating different types of waste. | 2.95 | 0.68 | Agree | High |
| My local community provides accessible facilities for segregated waste disposal. | 2.96 | 0.75 | Agree | High |
| Waste segregation bins are easily available for purchase in my area. | 3.06 | 0.62 | Agree | High |
| I have access to instructional materials (e.g., flyers, and guides) about waste segregation. | 2.87 | 0.67 | Agree | High |
| My local government supplies resources to encourage waste segregation. | 2.98 | 0.69 | Agree | High |
| **Overall Mean** | **2.96** | **0.68** | **Agree** | **High** |

Moreover, studies have shown that local government involvement and the provision of accessible infrastructure (such as community recycling bins) are essential for improving waste segregation outcomes (Wu et al., 2019). This was supported by research by Knickmeyer (2019), which found that where resources were made readily available, waste management programs were more successful.

To improve resource availability, local governments should focus on increasing the provision of instructional materials and community-based resources, such as recycling centers and collection points. This will enhance residents' ability to engage in effective waste segregation. Additionally, expanding the reach of resource distribution, especially in low-income or underserved areas, will help ensure equitable participation in waste management efforts.

**Table 7**
**The Respondents' Assessment of Household Waste Management in Terms of Participation in Waste Segregation Programs**

| Items | Mean | SD | Description | Interpretation |
|---|---|---|---|---|
| I actively participate in waste segregation campaigns organized by my community. | 3.05 | 0.70 | Agree | High |
| My household is involved in local initiatives to promote proper waste segregation. | 3.08 | 0.62 | Agree | High |
| I have volunteered in programs to educate others about waste segregation. | 2.95 | 0.70 | Agree | High |
| I contribute to community projects that involve waste segregation (e.g., recycling drives). | 3.10 | 0.64 | Agree | High |
| I encourage my neighbors to join waste segregation initiatives. | 3.06 | 0.67 | Agree | High |
| **Overall Mean** | **3.05** | **0.66** | **Agree** | **High** |

As indicated in Table 7, the respondents generally report a high level of participation in waste segregation programs, with an overall mean score of 3.05. This suggests that community-driven waste management efforts are well-received and that residents are actively engaging in campaigns and

initiatives. Notably, the highest mean score is for the item "I contribute to community projects that involve waste segregation (e.g., recycling drives)" (3.10), implying that community-based programs have successfully mobilized residents. Research by Samitthiwetcharong et al. (2023) supports this, indicating that community-driven initiatives are key to enhancing participation in waste segregation efforts.

However, there is a slight gap in volunteer-driven educational efforts, with the item "I have volunteered in programs to educate others about waste segregation" having the lowest score of 2.95. This suggests that while people participate in waste segregation programs, there may be fewer volunteers engaged in directly educating others, which is an area for improvement. Studies show that active participation in educational programs is crucial for spreading awareness and encouraging broader community engagement (Wu et al., 2019).

To further enhance participation, local governments and community organizations should focus on providing incentives and rewards for active participants and volunteers. Additionally, creating a more supportive environment for volunteerism in educational efforts can increase the overall engagement and effectiveness of community-driven waste management programs.

**Table 8**
**The Summary of Respondents' Assessment of Household Waste Management**

| Items | Mean | SD | Description | Interpretation |
|---|---|---|---|---|
| Awareness and Knowledge | 3.50 | 0.61 | Strongly Agree | Very high |
| Compliance with Segregation Guidelines | 3.22 | 0.61 | Agree | High |
| Frequency of Segregation | 3.14 | 0.64 | Agree | High |
| Availability of Resources | 2.96 | 0.68 | Agree | High |
| Participation in Waste Segregation Programs | 3.05 | 0.66 | Agree | High |
| **Overall Mean** | **3.17** | **0.64** | **Agree** | **High** |

Table 8 presents a summary of respondents' assessments of their household waste management practices. The overall mean of 3.17 indicates that respondents generally perceive their waste management practices as effective, particularly in terms of awareness, compliance, and participation in segregation programs. Awareness and knowledge, with a mean score of 3.50, were the highest-rated items, suggesting that respondents feel well-informed about the importance and methods of waste segregation. These results are consistent with the findings of Chabibah et al. (2020), who highlighted the significant role of environmental education in enhancing public awareness of waste management.

The relatively lower mean for "Availability of Resources" (2.96) suggests that while respondents perceive resources as generally accessible, there may still be gaps in resource distribution or adequacy. As Wu et al. (2019) argue, access to adequate waste management infrastructure and resources is a key determinant of successful waste segregation efforts.

These findings imply that while awareness and education play a crucial role in promoting waste segregation, additional efforts are required to ensure that resources are more widely available and accessible, especially in lower-income or rural communities. Local authorities should focus on increasing the provision of necessary resources such as bins, instructional materials, and waste collection services to further support sustainable waste management.

## CONCLUSION

The findings of this study provide valuable insights into the current state of household waste segregation practices and their impact on landfill reduction in Patnongon. The high level of awareness and knowledge among respondents suggests that there is a strong foundation for sustainable waste management in the community. However, the study also highlighted some gaps, particularly in the availability of resources and the consistent participation in waste segregation programs. These challenges indicate that while the community recognizes the importance of waste segregation, more efforts are needed to ensure widespread access to the necessary infrastructure and resources to support effective waste management practices.

In addition to resource accessibility, the study emphasized the crucial role of community participation in waste segregation programs. While a significant number of respondents are actively involved in waste segregation initiatives, the lower involvement in educational volunteerism suggests that there is room for improvement in spreading awareness and encouraging others to take part in these efforts. This finding aligns with previous research indicating that community-driven waste management programs are more effective when they incorporate both participation and education. Strengthening these components will help foster a culture of collective responsibility for waste management in the community.

To enhance the sustainability and effectiveness of waste management programs in Patnongon, it is recommended that local authorities prioritize the expansion of waste segregation infrastructure, increase access to educational resources, and implement targeted programs to further engage the community in waste reduction efforts. By addressing these gaps and fostering a more inclusive, resource-rich environment, Patnongon can create a more sustainable waste management system that reduces landfill dependency, promotes environmental conservation, and ensures the long-term success of its waste reduction initiatives.

### Recommendations

1. Increase the frequency and accessibility of waste segregation educational campaigns to ensure broader community participation, especially targeting underserved groups.
2. Provide adequate waste segregation bins to all households, particularly in rural areas, and distribute instructional materials to educate the public on proper waste segregation practices.
3. Establish more community-based waste segregation programs, encourage volunteerism, and foster partnerships between local schools, barangay officials, and environmental organizations.
4. Implement specialized collection points and regular collection days for bulk waste, such as electronics and hazardous materials, to ensure proper disposal and recycling.
5. Set up a system to monitor and evaluate compliance with waste segregation guidelines across different barangays and use the data to inform future waste management policies.

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