International Journal of Sustainable and Integrated Studies
Volume 1, Issue 4 | ISSN: 3155-6361
DOI: https://doi.org/10.65339/ijsis.V1.I4.285

Level of Awareness on the Proper Waste Disposal Among Residents in Dapa, Surigao Del Norte: Basis for Recommendation

Paula F. Ranes[1], Jamica Darmis[1], Hanna Jane M. Anito[1], Bebelyn C. Boncaros[1], Ralph A. Bayod[1], Maria Lelanie A. Goyonan, PhD[2]

[1]*Bachelor of Science in Tourism Management, Siargao Island Institute of Technology, Siargao Island, Surigao del Norte, Philippines*

[2]*Research Adviser, Siargao Island Institute of Technology, Siargao Island, Surigao del Norte, Philippines*

Email of Corresponding Author: ranespaula8@gmail.com

Publication history:

Received: October 2, 2026 Accepted: November 13, 2026
Revised: November 10, 2026 Published: November 14, 2026

International Journal of Sustainable and Integrated Studies, Vol. 1, No. 4, pp. 302–310, November 2026.

Abstract

This study assessed residents' awareness of proper waste disposal in Dapa, Surigao del Norte, focusing on waste segregation using the 5Rs, household waste management, composting, and challenges encountered in implementing appropriate practices. A quantitative descriptive-survey design was employed involving 200 adult residents from Barangays 1, 12, and 13, selected through stratified random sampling. Data were collected using a researcher-made structured questionnaire and analyzed through descriptive statistics, the Kruskal–Wallis test, and Spearman's rank-order correlation. Results revealed that residents demonstrated awareness of household waste management (M = 3.31), composting (M = 3.27), and waste segregation (M = 3.05), despite experiencing waste disposal challenges (M = 2.90). Significant differences were observed across awareness indicators ($\chi^2 = 23.50$, $p < .001$). Positive correlations were identified between challenges and awareness of waste segregation ($\rho = 0.421$), household waste management ($\rho = 0.360$), and composting ($\rho = 0.387$), all statistically significant ($p < .001$). The findings indicate that environmental awareness coexists with practical implementation challenges, particularly in waste segregation. Strengthening environmental education, improving collection facilities, and promoting community participation are recommended. The study was limited to self-reported data from three selected barangays, restricting broader generalizability. Its findings provide localized evidence to guide community-based waste management initiatives and support Sustainable Development Goals 3, 11, 12, and 14 by promoting public health, sustainable communities, responsible consumption, and coastal environmental protection.

Keywords: Community Participation; Composting; Environmental Awareness; Household Waste Management; Sustainable Development; Waste Disposal; Waste Segregation

1. Introduction

Proper waste disposal is essential for environmental protection, public health, and sustainable community development. In the Philippines, Republic Act No. 9003 mandates waste segregation at the source and promotes responsible waste collection and disposal (Republic Act No. 9003, 2001). Republic Act No. 11898 further strengthens waste management responsibilities among stakeholders. However, improper waste disposal remains a concern due to inadequate facilities, inconsistent collection services, and limited community participation (Yazawa et al., 2025). These challenges highlight the importance of assessing residents' awareness of waste segregation, household waste management, and composting.

Previous studies emphasize that environmental knowledge, education, and community participation influence proper waste disposal practices. Elmosaad, AlHammadi, and Elshaer (2023) and Alghuson and Alghuried (2025) identified awareness as an important factor in household waste segregation and recycling. Similarly, Tajuddin, Ridwan, and Mansor (2021), Arifin (2019), and Fadhullah, Imran, Syed Ismail, and Jaafar (2022) highlighted the role of environmental education in promoting responsible waste management. However, Qaderi, Muradi, and Haqiqat (2021), Castilla et al. (2024), and Verzosa et al. (2024) indicated that inadequate infrastructure and limited institutional support may prevent awareness from translating into consistent practices. These findings demonstrate that effective waste management requires both individual responsibility and accessible community services.

In the Philippine context, local government units and barangays play essential roles in implementing environmental policies. Bueta et al. (2024) and Yazawa et al. (2025) highlighted the importance of institutional coordination, community participation, and effective waste management policy implementation. In Dapa, Surigao del Norte, households use various waste disposal methods, including garbage collection, private pits, and burning (Philippine Statistics Authority [PSA], 2025). Barangays 1, 12, and 13 have populations of 4,112, 3,676, and 2,019, respectively (Philippine Statistics Authority, 2024). Furthermore, flooding has affected approximately 9,700 residents across 12 barangays (Department of Social Welfare and Development, 2025), while poor waste management has contributed to drainage blockages and sanitation problems (Planas, 2026). These conditions emphasize the need to strengthen environmental awareness and responsible disposal practices in the municipality.

The study is anchored on the Extended Theory of Planned Behavior (ETPB), which explains how attitudes, subjective norms, and perceived behavioral control influence environmental behavior (Pan and Liu, 2024). Wang et al. (2021) further emphasized environmental knowledge and moral responsibility, while the Sustainability Theory of Planned Behavior highlights sustainability values and concern for future generations (Ilagan et al., 2024). The Input–Process–Output (IPO) Model also guides the study by organizing residents' profiles, awareness, and challenges into a systematic assessment that serves as the basis for proposed waste management recommendations.

Although previous research has examined environmental awareness and waste management practices, limited localized evidence addresses residents' awareness and challenges in Dapa, Surigao del Norte. Shaibur et al. (2025) identified inadequate infrastructure and limited awareness as barriers to practicing the 5Rs, while Li Dong (2025) emphasized sustainable household waste management. Addressing this gap, the present study assessed residents' awareness of waste segregation through Refuse, Reduce, Reuse, Repurpose, and Recycle, household waste management, and composting. It also examined challenges, differences in awareness, and the relationship between awareness and encountered difficulties to develop appropriate recommendations.

The study supports Sustainable Development Goal (SDG) 3 (Good Health and Well-Being), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 14 (Life Below Water). Proper waste disposal promotes healthier communities, reduces environmental pollution, encourages responsible resource use, and helps protect coastal ecosystems. These objectives are particularly relevant to Dapa as a coastal and tourism-dependent municipality.

From a multidisciplinary sustainability perspective, the study contributes to environmental protection, public health, community development, sustainable tourism, and local governance. Its findings may guide barangay officials, local government units, and residents in strengthening environmental education, improving waste management facilities, and promoting community participation. Ultimately, the study provides a basis for practical recommendations that support responsible waste disposal and long-term environmental sustainability in Dapa, Surigao del Norte.

2. Material and methods

2.1 Research Design

The study utilized a quantitative descriptive-survey research design to measure residents' awareness of proper waste disposal and identify patterns and differences in their responses. This approach enabled the systematic collection and analysis of numerical data concerning environmental knowledge and waste management practices. Descriptive surveys are commonly used to examine population characteristics, attitudes, and behaviors (Survey Planet, 2022; Qualtrics, 2022). Previous environmental awareness studies also demonstrated the effectiveness of structured questionnaires and descriptive statistics in assessing community waste management practices (Dovetail, 2023).

2.2 Locale of the Study

The study was conducted from March to April 2026 in Barangays 1, 12, and 13 of Dapa, Surigao del Norte, a municipality in southeastern Siargao Island, Caraga Region, Philippines. Dapa covers approximately 92 square kilometers and comprises 29 barangays with an estimated population of 29,000. As a major gateway to Siargao

Island, the municipality experiences tourism-related activities that contribute to increasing waste generation. The selected barangays are relatively populated communities experiencing waste management concerns, including improper segregation, indiscriminate dumping, and limited disposal facilities. These conditions provided a relevant setting for assessing residents' environmental awareness and waste disposal practices.

2.3 Respondents of the Study

The respondents consisted of 200 adult residents aged 18 years and above from three selected barangays in Dapa. Of these, 100 were male and 100 were female. Barangay 1 contributed 92 respondents (46%), comprising 42 males and 50 females; Barangay 12 contributed 56 respondents (28%), consisting of 29 males and 27 females; and Barangay 13 contributed 52 respondents (26%), comprising 29 males and 23 females. This distribution provided representation from the selected communities and enabled the assessment of residents' awareness of the 5Rs, household waste management, composting, and challenges associated with proper waste disposal.

2.4 Sample and Sampling Procedure

The study employed stratified random sampling to select 200 respondents from Barangays 1, 12, and 13. Respondents were proportionally allocated according to the population of each barangay, resulting in 92 participants from Barangay 1, 56 from Barangay 12, and 52 from Barangay 13. This approach ensured representation across the selected communities and supported the assessment of residents' awareness and waste management practices.

2.5 Research Instrument

A researcher-made structured questionnaire was used to collect quantitative data. The instrument consisted of three parts: demographic characteristics, challenges encountered in proper waste disposal, and awareness of waste management practices. Demographic variables included age, sex, civil status, frequency of waste disposal training, and community participation. The challenges assessed included inconsistent garbage collection, inadequate disposal facilities, insufficient environmental education, increasing waste volume, and weak enforcement of environmental ordinances. Awareness was measured through waste segregation using the 5Rs (Refuse, Reduce, Reuse, Repurpose, and Recycle), household waste management, and composting. A four-point Likert scale was used to evaluate respondents' answers. For challenges, scores ranged from 1 (Below Challenged) to 4 (Highly Challenged), while awareness ratings ranged from 1 (Not Aware) to 4 (Highly Aware). Higher scores indicated greater challenges or awareness, respectively. The questionnaire underwent content validation by the research adviser, and revisions were incorporated to improve its clarity, relevance, and alignment with the research objectives.

2.6 Data Gathering Procedure

Data collection began with the preparation and validation of the questionnaire, followed by coordination with the Local Government Unit of Dapa, barangay officials, and the Municipal Environment and Natural Resources Office (MENRO) to obtain the necessary permissions. The researchers coordinated survey schedules with barangay officials and personally distributed and retrieved questionnaires from eligible residents. Participants were informed of the study's purpose, assured of confidentiality, and asked to provide verbal consent. Assistance was provided when clarification was necessary. Completed questionnaires were checked for completeness and consistency before responses were encoded and organized using Microsoft Excel or Google Sheets for statistical analysis.

2.7 Data Analysis Techniques

Data were analyzed using frequency counts, percentages, mean, and standard deviation to describe respondents' demographic characteristics, challenges, and awareness of proper waste disposal. Frequency and percentage distributions summarized responses, while mean scores measured awareness and challenges using the four-point Likert scale. Standard deviation determined response variability. The Kruskal–Wallis H-test was used to examine significant differences among groups, while Spearman's Rank Order Correlation assessed relationships between study variables. Inferential analyses applied a 0.05 significance level. Data were processed using Excel or SPSS to support accurate statistical interpretation.

2.8 Ethical Considerations

The study observed ethical principles concerning voluntary participation, informed consent, confidentiality, and respondents' welfare. Permission was obtained from the Local Government Unit of Dapa, barangay officials, and MENRO before conducting the survey. Participants were informed of the study's objectives and their right to withdraw without consequences. Verbal informed consent was obtained, and responses were treated confidentially and anonymously, with no personal identifiers recorded. Assistance was provided when necessary without influencing participants' answers, ensuring respect for their privacy, dignity, and autonomy.

3. Results and Discussion

3.1 Demographic Profile of the Respondents

3.1.1 Age

Among the 200 respondents, 83 (41.5%) were aged 30 years and above, followed by 40 (20.0%) aged 18–20 years, 35 (17.5%) aged 21–23 years, 23 (11.5%) aged 24–26 years, and 19 (9.5%) aged 27–29 years. These findings indicate that older adults constituted the largest age group. The distribution reflects participation across different generations. Tecson et al. (2024) and Verzosa et al. (2024) emphasized that demographic characteristics influence household waste management awareness and practices. Similarly, Jou et al. (2024) and Britos and Sambo (2024) highlighted the importance of environmental knowledge and education in encouraging responsible waste disposal.

3.1.2 Sex

The respondents were nearly equally distributed by sex, comprising 101 males (50.5%) and 99 females (49.5%). This distribution provided representation from both groups in assessing waste disposal awareness. The findings reflect balanced participation among male and female residents. Tecson et al. (2024) and Verzosa et al. (2024) emphasized the relevance of demographic and household characteristics in environmental awareness. Castilla et al. (2024) likewise identified relationships among awareness, attitudes, and waste management practices.

3.1.3 Civil Status

Most respondents were single (117 or 58.5%), followed by married residents (70 or 35.0%), widowed respondents (11 or 5.5%), and single parents (2 or 1.0%). The findings indicate that single individuals comprised the majority of participants. The distribution represents different household circumstances that may influence waste management responsibilities. Verzosa et al. (2024) emphasized the importance of household characteristics in environmental behavior, while the United Nations Environment Programme (UNEP, 2024) highlighted public awareness and community participation in promoting responsible waste management.

3.1.4 Frequency of Waste Disposal Training

The findings revealed that 95 respondents (47.5%) always participated in waste disposal training, while 56 (28.0%) seldom participated, 29 (14.5%) rarely participated, and 20 (10.0%) had never attended training. These results indicate varying levels of exposure to environmental education. The findings highlight differences in residents' access to waste management information. Castilla et al. (2024) and Jou et al. (2024) emphasized that environmental knowledge and education influence responsible waste disposal. Similarly, Tecson et al. (2024), Verzosa et al. (2024), and Republic Act No. 9003 (2001) support environmental awareness and community participation as important components of effective waste management.

3.1.5 Community Cooperation

Community participation was reported one to five times by 95 respondents (47.5%), six to ten times by 56 (28.0%), 11–15 times by 29 (14.5%), and 16–20 times by 20 (10.0%). These findings indicate that participation was concentrated at lower frequencies. The results suggest that community involvement exists but varies among residents. Tecson et al. (2024) described the relevance of community knowledge and participation to household solid waste management. The United Nations Environment Programme (UNEP, 2024) likewise highlighted collective responsibility and community engagement in sustainable waste management.

3.2 Challenges Encountered in Proper Waste Disposal

The respondents experienced challenges in practicing proper waste disposal, with an overall mean of 2.90 and a standard deviation of 0.498, interpreted as "Challenged." The findings indicate that residents encountered difficulties in implementing appropriate waste management practices. These challenges reflect concerns regarding waste management services and community facilities. The United Nations Environment Programme (UNEP, 2024) identified inadequate infrastructure and inconsistent collection services as barriers to effective waste management. Similarly, Bueta et al. (2024) emphasized structural and institutional limitations in Philippine solid waste management, while Republic Act No. 9003 (2001) establishes requirements for proper waste segregation, collection, and disposal.

3.3 Level of Awareness of Proper Waste Disposal

3.3.1 Waste Segregation Using the 5Rs

Waste segregation obtained a mean of 3.05 (SD = 0.613), interpreted as "Aware." Although respondents demonstrated awareness of Refuse, Reduce, Reuse, Repurpose, and Recycle, this indicator received the lowest mean among the three waste management practices. The findings indicate that waste segregation remains an area requiring greater attention. Verzosa et al. (2024) identified gaps in household segregation despite general environmental awareness, while Cando et al. (2022) emphasized the importance of environmental education and accessible recycling facilities in strengthening proper waste management.

3.3.2 Waste Management at Home

Household waste management obtained the highest mean of 3.31 (SD = 0.605), interpreted as "Aware." This indicates that respondents demonstrated greater awareness of household waste management than of the other assessed practices. The findings suggest that residents are more familiar with waste management activities conducted within their households. Verzosa et al. (2024) emphasized household participation in responsible disposal, while Cando et al. (2022) highlighted environmental awareness and community involvement in improving waste management practices.

3.3.3 Composting

Composting obtained a mean of 3.27 (SD = 0.652), interpreted as "Aware." This was the second-highest awareness rating, indicating that residents demonstrated considerable awareness of managing biodegradable waste through composting. The findings reflect residents' knowledge of composting as a household waste management practice. Cando et al. (2022) similarly identified awareness and participation in composting while emphasizing that limited facilities, space, and technical knowledge may affect its implementation.

3.4 Comparative Analysis of Waste Disposal Awareness

3.4.1 Significant Differences in Awareness

The Kruskal–Wallis test revealed a statistically significant difference in awareness across waste segregation, household waste management, and composting ($\chi^2 = 23.50$, df = 2, $p < .001$). Since the p-value was below the 0.05 significance level, the null hypothesis was rejected, indicating that awareness differed significantly among the three waste management practices. The findings demonstrate variations in residents' awareness across waste management activities. Bacud et al. (2022) emphasized the influence of demographic characteristics and environmental knowledge on waste management practices. Similarly, Konstantinidou et al. (2024) and Cando et al. (2022) highlighted differences in environmental awareness and household waste management behavior.

3.4.2 Pairwise Differences in Awareness

Post-hoc analysis using the Durbin-Conover/Wilcoxon test revealed significant differences between composting and waste segregation ($W = -5.299$, $p < .001$) and between waste segregation and household waste management ($W = 6.443$, $p < .001$). However, no significant difference was found between composting and household waste management ($W = 0.828$, $p = 0.828$). These findings indicate that the significant variation was primarily associated with the lower awareness of waste segregation. The findings suggest that residents have comparable awareness of composting and household waste management but demonstrate relatively lower awareness of waste segregation. Konstantinidou et al. (2024) and Castin et al. (2022) emphasized that environmental knowledge and education influence waste segregation practices. Similarly, Matic and Dayag (2022) and Trushna et al. (2024) highlighted the importance of environmental education and community-based interventions in improving waste management awareness.

3.5 Relationship Between Challenges and Waste Disposal Awareness

3.5.1 Relationship Between Challenges and Awareness

Spearman's rank-order correlation revealed significant positive relationships between challenges encountered and awareness of waste segregation ($\rho = 0.421$, $p < 0.001$), household waste management ($\rho = 0.360$, $p < 0.001$), and composting ($\rho = 0.387$, $p < 0.001$). These findings indicate that respondents reporting greater waste disposal challenges also tended to demonstrate higher awareness across the three practices. The positive relationships suggest that residents with greater awareness may also recognize more difficulties in implementing proper waste disposal. Castin et al. (2022) and Castilla et al. (2024) examined environmental awareness and waste management practices. Similarly, Sison (2025) identified inadequate facilities and institutional support as barriers to effective waste management despite residents' awareness.

3.5.2 Relationships Among Waste Management Practices

Significant positive correlations were also observed between waste segregation and household waste management ($\rho = 0.539$, $p < 0.001$), waste segregation and composting ($\rho = 0.486$, $p < 0.001$), and household waste management and composting ($\rho = 0.675$, $p < 0.001$). The strongest relationship was between household waste management and composting, indicating that higher awareness in one practice was associated with higher awareness in the other. These findings demonstrate that awareness across different waste management practices is interconnected. Castin et al. (2022) and Castin et al. (2022) reported positive relationships among environmental knowledge, attitudes, and waste management practices. United Nations Environment Programme (2024) further emphasized that awareness should be supported by adequate facilities, effective policy implementation, and community participation to promote sustainable waste management.

4. Conclusion & Recommendations

The study concluded that residents of Barangays 1, 12, and 13 in Dapa, Surigao del Norte demonstrated a generally high level of awareness of proper waste disposal, particularly in household waste management and composting,

while waste segregation using the 5Rs received comparatively lower awareness ratings. Despite this awareness, residents experienced moderate challenges in implementing appropriate waste disposal practices. Significant differences were observed among the three awareness indicators, indicating that residents' knowledge varied across waste management activities. Furthermore, significant positive relationships were identified between the challenges encountered and awareness levels, suggesting that residents who reported greater difficulties also tended to demonstrate greater awareness of waste management practices. Positive relationships among waste segregation, household waste management, and composting further indicated that these areas of environmental awareness were interconnected. Overall, the findings highlight the importance of addressing practical waste management challenges alongside environmental awareness to strengthen responsible disposal practices within the selected communities.

Based on the findings, the Local Government Unit of Dapa, through the Municipal Environment and Natural Resources Office (MENRO), should strengthen waste management programs by improving garbage collection services, providing accessible disposal facilities, and reinforcing compliance with Republic Act No. 9003. Barangay officials should prioritize regular environmental education campaigns focusing on waste segregation and the proper application of the 5Rs, as this area demonstrated comparatively lower awareness. Practical demonstrations on household composting, recycling, and waste classification should be conducted to strengthen residents' knowledge and encourage responsible disposal practices. Schools, community organizations, and tourism establishments should collaborate with local authorities in organizing clean-up drives, environmental awareness activities, and community-based waste management initiatives. Greater emphasis should be placed on encouraging consistent participation among residents with limited exposure to environmental training. Regular monitoring and evaluation of these initiatives are also recommended to identify implementation challenges, assess community participation, and support improvements in local waste management services and environmental sustainability.

The study was limited to 200 adult residents from Barangays 1, 12, and 13 in Dapa, Surigao del Norte, restricting the generalizability of its findings to other communities. Its quantitative descriptive-survey and cross-sectional design relied on self-reported responses, which may not fully reflect actual waste disposal behavior or seasonal variations. The study excluded minors, transient residents, commercial establishments, and tourism businesses, while factors such as household income, household size, and cultural influences were not examined. Future studies may include broader populations, additional variables, direct observations, and longitudinal assessments to provide a more comprehensive understanding of community waste management practices.

5. Compliance with ethical standards

The authors affirm that no conflicts of interest exist in relation to this study. The research involved 200 adult residents from Barangays 1, 12, and 13 in Dapa, Surigao del Norte, with permission obtained from the Local Government Unit of Dapa, barangay officials, and the Municipal Environment and Natural Resources Office (MENRO). Participation was voluntary, verbal informed consent was obtained, and respondents were informed of the study's purpose and their right to withdraw at any time without consequences. Data were collected through survey questionnaires, and respondents were assured of anonymity and confidentiality, with no personally identifiable information recorded and responses used solely for academic purposes.

REFERENCES

Alghuson, M. K., & Alghuried, A. (2025). A survey and partial dependency analysis to assess residential solid waste recycling awareness in Saudi Arabia. Scientific Reports, 15, 7952. https://www.nature.com/articles/s41598-025-92484-w

Amir, F., Miru, A. S., & Sabara, E. (2025). Drivers of zero-waste behavior among households in Indonesian urban communities. Journal of Cleaner Production, 418, 140221. https://arxiv.org/abs/2505.17864

Anania, N. C., Laurito, M. D., Biol, G., & Quimpan, C. L. (2023). Awareness and practices on solid waste management among Grade 6 pupils. Tinubdan, 16(1), 1–15. https://ieesjournals.com/index.php/tinubdan/article/view/79

Arga, C. N., Barawel, D. A., Parde, G. J. B., & Palmiano, D. A. (2024). Demographic and psychographic analysis of the integration of 3Rs in solid waste management in the coastal area of Sabang, Calabanga, Camarines Sur. International Journal of Research Studies in Education, 13(14).

Balaba, S. J. G., Entia, A. C., Echavez, L. F. J., & Vedra, S. A. (2024). Level of awareness and practices on solid waste management at Initao College, Misamis Oriental, Philippines. International Journal of Science and Management Studies, 7(4), 208–215. https://www.ijsmsjournal.org/ijsms-v7i4p126.html

Britos, V., & Sambo, T. (2024). Knowledge, attitudes and practices of grade school learners on solid waste management. Psychology and Education: A Multidisciplinary Journal, 26(5), 418–428.

Bueta, G. R. P., Domingo, S. N., & Manejar, A. J. A. (2024). Study on circular economy pathways for waste management in the Philippines (Discussion Paper No. 2023-46). Philippine Institute for Development Studies. https://doi.org/10.62986/dp2023.46

Bushara, M., William, M. A., & Rahmtullah, H. (2021). Assessment of households' practices towards management of solid waste in Al-Ozozab, Khartoum (Sudan). International Journal of Public Health and Health Sciences, 3(2). https://he01.tci-thaijo.org/index.php/ijphs/article/view/247406

Cando, E. N. T., III, Burdeos, K. B., Gonzales, D. F., & Arlan, E. N. (2022). Knowledge, attitude and practices on solid waste management among households in the urban communities of Butuan City, Philippines. Journal of Environmental Science and Management, 25(1), 1–8.

Castilla, D. G., Abucay, G. M. J., Aguilar, L. J. H., Avila, K. L. G., & Momo, R. A. (2024). Waste disposal knowledge, attitude, and practices of Barangay Poblacion, Compostela, Cebu, Philippines. International Journal of Science and Research Archive, 12(1), 2146–2157. https://doi.org/10.30574/ijsra.2024.12.1.0987

Dawane, M., & Gawande, A. (2025). Solid waste management practices in academic institutions: Challenges and opportunities. International Journal of Environmental Science and Technology, 22(1), 115–128.

Department of Agriculture. (2023). Accredited organic fertilizer and compost supplier registry. https://www.da.gov.ph/accredited-organic-fertilizer-compost-supplier-registry

Department of Environment and Natural Resources. (2023). Composting facilities for biodegradable wastes (CFBW) program guidelines. https://www.denr.gov.ph/composting-facilities-for-biodegradable-wastes-program-guidelines

Department of Environment and Natural Resources. (2023). National waste reduction and 5Rs campaign materials. https://www.denr.gov.ph/national-waste-reduction-5rs-campaign-materials

Department of Environment and Natural Resources. (2025). Implementing rules and regulations of Republic Act No. 9003: Ecological Solid Waste Management Act of 2000. National Solid Waste Management Commission. NSWMC composting guidelines

Department of Environment and Natural Resources – Caraga Region. (2025). Regional solid waste management status report. DENR Caraga.

Department of Social Welfare and Development. (2025, July 11). DSWD DROMIC report on the flooding incidents in Dapa, Surigao del Norte, 11 July 2025, 6PM. https://dromic.dswd.gov.ph/wp-content/uploads/2025/07/DSWD-DROMIC-Report-on-the-Flooding-Incidents-in-Dapa-Surigao-del-Norte-11-July-2025-6PM-23-March-2025.pdf

Dovetail. (2023). Descriptive research: Design, methods, examples, and FAQs. https://dovetail.com/research/descriptive-research/

Elmosaad, Y. M., AlHammadi, A., & Elshaer, I. A. (2023). Self-reported household waste recycling and segregation practices and awareness. International Journal of Environmental Research and Public Health, 20(7), 5367. https://doi.org/10.3390/ijerph20075367

Environmental Management Bureau Caraga. (2025). Regional solid waste management assessment report: Surigao del Norte. Environmental Management Bureau – Department of Environment and Natural Resources Caraga. https://emb.gov.ph/emb-caraga-reports

Environmental Management Bureau–National Capital Region. (2024, March 19). EMB-NCR convenes first 2024 LGU meeting on the effective implementation of RA 9003. Department of Environment and Natural Resources. EMB-NCR official article

Environmental Management Bureau Region I. (2024, August 2). DENR-EMB Region I holds IEC activity on solid waste management for barangay and SK officials in LGU Batac City, Ilocos Norte. Department of Environment and Natural Resources. EMB Region I official article

Environmental Management Bureau Region VII. (2024, March 4). DENR-EMB 7 conducts IEC on solid waste management to 3 municipalities in Negros Oriental. Department of Environment and Natural Resources. EMB Region VII official article

Environmental Management Bureau Region IX. (2025, April 7). EMB IX's 3-day solid waste management workshop empowers 27 barangay representatives for the development of barangay SWM plans. Department of Environment and Natural Resources. EMB Region IX official article

Environmental Management Bureau Region X. (2024, March 8). Building sustainable communities: EMB-X PEMU Lanao del Norte conducts seminar and workshop on the development of barangay SWM program in LGU Iligan City. Department of Environment and Natural Resources. EMB Region X official article

Environmental Management Bureau Region XIII. (2024, May 24). Focus group discussion on solid waste management strengthens collaboration among Siargao Island stakeholders. Department of Environment and Natural Resources. EMB Region XIII article

Fadhullah, W., Imran, N., Syed Ismail, S. N., & Jaafar, M. H. (2022). Household solid waste segregation practices and challenges. Sustainability, 14(5), 2849. https://doi.org/10.3390/su14052849

Ilagan, S. M. C., Ong, A. K. S., German, J. D., Gumasing, M. J. J., & Pabalan, K. M. P. (2024). Holistic antecedent analysis of behavioral intention among green consumers in the Philippines: A sustainability theory of planned behavior approach. Sustainability, 16(10), Article 3894. https://doi.org/10.3390/su16103894

Jou, Y. T., Chen, C. H., & Lee, W. I. (2024). Environmental knowledge and household waste disposal behavior. Sustainability, 16(4), 1789. https://doi.org/10.3390/su16041789

Jou, Y.-T., Saflor, C. S. R., Bernabe, D., Casuncad, J., Mabbagu, J., Sales, F., & Verceles, K. (2024). Assessing the community perception in San Jose, Occidental Mindoro, of proper waste disposal: A structural equation modeling approach. Sustainability, 16(3), 1087. https://doi.org/10.3390/su16031087

Konstantinidou, A., Ioannou, K., Tsantopoulos, G., & Arabatzis, G. (2024). Citizens' attitudes and practices towards waste reduction, separation, and recycling: A systematic review. Sustainability, 16(22), 9969. https://doi.org/10.3390/su16229969

Kopaei, H. R., Nooripoor, M., Karami, A., Petrescu-Mag, R. M., & Petrescu, D. C. (2021). Drivers of residents' home composting intention: Integrating the Theory of Planned Behavior, the Norm Activation Model, and the moderating role of composting knowledge. Sustainability, 13(12), 6826.

Li Dong, W. (2025). 5R principles for sustainable household waste management. Asia Pacific Journal of Religions and Cultures, 9(1), 264–274. https://so06.tci-thaijo.org/index.php/ajrc/article/view/278741

Lopez, A. (2023, June 23). DENR rolls out sustainability project in Siargao. Philippine News Agency. Philippine News Agency article

Luchavez, R. M., Macusang, Y. C., Roble, C. J., & Comidoy, M. (2024). Correlating the environmental knowledge and attitude on waste management of UM Peñaplata students. University of Mindanao Repository.

Matic, R. S. A., & Dayag, D. M. C. (2022). Assessing households' awareness, attitude and practices for effective implementation of modified waste segregation scheme in selected barangays of Baliwag, Bulacan. Southeast Asian Journal of Agriculture and Allied Sciences, 2(1), 30–43.

Molina, R. A., & Catan, I. (2021). Solid waste management awareness and practices among senior high school students in a state college in Zamboanga City, Philippines. Aquademia, 5(1), ep21001. https://doi.org/10.21601/aquademia/9579

Nabor Jr., A. P., & Ortega-Dela Cruz, R. A. (2022). Pupils' awareness, knowledge, attitude and practice of school-based solid waste management in a public elementary school in the Philippines. University of Wah Journal of Social Sciences, 5(1), 1–14. https://doi.org/10.56220/uwjss2022/0501/01

National Solid Waste Management Commission. (2022). National solid waste management framework. https://www.emb.gov.ph/wp-content/uploads/2022/06/NSWMC-Framework-2022.pdf

Ononuju, A. H., Romanus, C. W., Dibia, S. I. C., Iwuagwu, T. E., & Usman, K. G. (2024). Household solid waste management, attitude and practices: A case study of residents in the University of Nigeria Nsukka staff quarters. Journal of Home Economics Research, 30(2). https://journals.heran.org/index.php/JHER/article/view/29

Pan, J., & Liu, P. (2024). Exploring waste separation using an extended theory of planned behavior: A comparison between adults and children. Frontiers in Psychology, 15, Article 1337969. https://doi.org/10.3389/fpsyg.2024.1337969

Philippine Statistics Authority. (n.d.). Municipality of Dapa, Surigao del Norte. Philippine Standard Geographic Code. https://psa.gov.ph/classification/psgc/barangays/1606707000

Philippine Statistics Authority. (2025). Women and men in the Philippines 2025. https://psa.gov.ph/content/psa-issues-updates-women-and-men-philippines-6

Planas, M. I. G. (2026). Perspective of vendors and customers on the functionality of drainage system at Dapa Public Market: Basis for recommendation. International Journal for Multidisciplinary Research, 8(2). https://doi.org/10.36948/ijfmr.2026.v08i02.75600

Qaderi, P., Muradi, M. A., & Haqiqat, S. A. Q. (2021). Assessment of public awareness level regarding solid waste management: A case study of Pol-e-Khumri, Afghanistan. International Journal of Innovative Research and Scientific Studies, 4(4), 200–204. https://doi.org/10.53894/ijirss.v4i4.85

Qualtrics. (2022). Descriptive research design: What it is and how to use it. https://www.qualtrics.com/articles/strategy-research/descriptive-research-design/

Republic Act No. 9003. (2001). Ecological Solid Waste Management Act of 2000. Senate of the Philippines, Legislative Reference Bureau. https://ldr.senate.gov.ph/legislative%2Bissuances/Republic%20Act%20No.%209003

Republic Act No. 11898. (2022). Extended Producer Responsibility Act of 2022. https://www.officialgazette.gov.ph/2022/04/19/republic-act-no-11898/

Rodríguez-Guerreiro, M.-J., Torrijos, V., & Soto, M. (2024). A review of waste management in higher education institutions: The road to zero waste and sustainability. Environments, 11(12), 293. https://doi.org/10.3390/environments11120293

Sambat, L. M. D., Bulaun, C. M., Soliman, R. A. D., Muñoz, E. R., Hu, A. S., Deang, M. A. C., & Dominado, N. L. (2024). Assessment of waste management awareness and practices among parents: A sequential explanatory study. International Journal of Multidisciplinary: Applied Business and Education Research.

Shaibur, M. R., Siddique, A. B., Nahar, N., Al Helal, A. S., Maruf, M. A., Arpon, S. H., Akter, S., & Ambade, B. (2025). Solid waste management in an urban community of a developing country: An overview of 5Rs strategies. World Development Sustainability, 7, 100254. https://doi.org/10.1016/j.wds.2025.100254

Sison, M. H. (2025). Assessment of household solid waste awareness and practices among College of Education students: A basis for strengthening environmental education.

SurveyPlanet. (2022). Survey descriptive research: Design & examples. https://blog.surveyplanet.com/survey-descriptive-research-method-design-and-examples

Tecson, L. M., Sanchez, M. B., & Baleta, F. (2024). Knowledge, attitudes, and practices towards solid waste management (SWM) among households in Suyac Island, Sagay City, Negros Occidental, Philippines. International Journal of Global Community, 7(3), 227–242.

Trushna, T., Krishnan, K., Soni, R., et al. (2024). Interventions to promote household waste segregation: A systematic review. Heliyon, 10(2), e24332. https://doi.org/10.1016/j.heliyon.2024.e24332

United Nations Environment Programme. (2024). Global waste management outlook 2024: Beyond an age of waste—Turning rubbish into a resource. United Nations Environment Programme. https://www.unep.org/resources/global-waste-management-outlook-2024

Verzosa, R. C., Katipunan, F. J. M., Lumangyao, J. G. B., & Antonio, E. S. (2024). Solid waste management awareness and practices in coastal communities. Davao Research Journal, 15(3), 60–77. https://doi.org/10.59120/drj.v15i3.247

Yazawa, T., Tablada, K. N., Baring, K. M., Alojipan, K. L., & Watanabe, M. (2025). Act and reality of the ecological solid waste management act on barangay-level waste management in Barbaza, the Philippines. Discover Sustainability, 6, 1060. https://doi.org/10.1007/s43621-025-01965-5