



Solid Waste Management of Public Secondary Schools in Pili East District, Philippines

Raquel Lozano-Serillano^{1*}

¹Department of Education, Sagrada Familia High School, Minalabac, Camarines Sur, Philippines.

Received: April 6, 2025

Revised: April 25, 2025

Accepted: August 25, 2025

Published: August 31, 2025

Corresponding Author:

Raquel Lozano-Serillano

raquel.serillano@cbsua.edu.ph

DOI: [10.56566/mandalika.v3i2.345](https://doi.org/10.56566/mandalika.v3i2.345)

© 2025 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: The study used the descriptive, evaluative, and correlational research design to determine the level of respondents' awareness, practices, and extent of implementation of Solid Waste Management (SWM) of Public Secondary Schools in Pili East District for SY 2023-2024. The quantitative data were gathered from 180 teachers, 180 students, 180 Parents, seven non-teaching Staff, and seven Barangay Officials. A survey questionnaire was used to gather the needed data. The statistical tools used in the analysis of the data were the 4-point Likert scale, weighted mean, spearman correlation, percentage, and rank. The results revealed that the level of respondents' awareness of SWM Practices as perceived by the school population was high, and the extent of implementation of SWM practices was very good. In addition to this, a significant relationship was noted between the level of awareness and the extent of implementation of SWM. Along with the implementation of SWM, some facilitating and limiting factors were encountered. Proposed recommendations were made to enhance the implementation of SWM. It can be concluded that the level of awareness greatly influenced the extent of implementation of SWM practices by Public Secondary Schools in Pili East District. Thus, relevant recommendations were made based on the results of the study.

Keywords: Extent of implementation; Level of awareness; Solid waste management (SWM) practices

Introduction

The rapid growth of population, urbanization, and enhanced living standards in the Philippines greatly affect the increase of waste generation. Improper waste management and disposal has become one of the biggest contributors to environmental degradation. Human activities, practices, and attitudes have been the primary cause of this ecological problem. The school communities, which are composed of students and educators, have contributed to the increase of solid waste volume in their localities. They generated waste from used school supplies, old building materials, garden matter, wrappers, and food leftovers. The schools promote cleanliness within their campus and in their surroundings through awareness campaigns and

the implementation of Solid waste management policies and programs. But still, some of their wastes were improperly disposed of, not fully segregated, dumped in school backyards, and sometimes burned. Thus, there is a need to assess the level of awareness, practices, and implementation of solid waste management in different schools (Debrah et al., 2021; Fadhullah et al., 2022; Liao et al., 2019).

One of the national programs mandated to address solid waste management is the Ecological Solid Waste Management Act of 2000 (RA 9003), which declares the policy of the government to "adopt a systematic, comprehensive, and ecological solid waste management program" in the country. The ecological solid waste management (ESWM) policy is based on the management of waste in the following hierarchy: a)

How to Cite:

Serillano, R. L. (2025). Solid Waste Management of Public Secondary Schools in Pili East District, Philippines. *MANDALIKA: Journal of Social Science*, 3(2), 56-61. <https://doi.org/10.56566/mandalika.v3i2.345>

Source reduction (avoidance) and minimization of waste generated at the source. b) Reuse, recycling and resource recovery of wastes at the barangay level. c) Efficient collection, proper transfer, and transport of wastes by city/municipality. d) Efficient management of residuals and of final disposal sites and/or any other related technologies for the destruction/reuse of residuals. Section 55-56 of Republic Act 9003 stipulates that the national government, in coordination with the Department of Education (DepEd), Technical Education and Skills Development Authority (TESDA), Commission on Higher Education (CHED), and Philippine Information Agency (PIA), should conduct a continuing education and information campaign on solid waste management and strengthen the integration of environmental concerns in school curricula at all levels, with particular emphasis on the theories and practices of waste management principles like segregation at source, reduction, recycling, re-use, and composting, in order to promote environmental awareness and action among the citizenry. Furthermore, Republic Act No. 9512 (Environmental Awareness and Education Act of 2008) promotes environmental awareness through environmental education. It integrates environmental education in the school curricula at all levels, public or private, barangay daycare, and pre-school, and non-formal, vocational, and indigenous learning. However, over the years of awareness campaigns and implementation of these programs and policies, solid waste management problems, issues, and concerns are still evident in the country. The people are still not fully aware of the existing programs and policies governing this act. Thus, according to Molina et al. (2021), it is vital to address these emerging issues and concerns.

The Pili East District is one of the large districts of the Schools District Office of Camarines Sur. It consists of seven large schools with annexes to another part of Pili. It is important to assess the solid waste management of its different schools due to the fact that they may have a huge contribution on the environmental issues on their locality.

At present, the schools in Pili East District are implementing the DepEd Order No. 10, s 2016 (Policy and Guidelines for Comprehensive Water, Sanitation and Hygiene in Schools (WinS) Program). The Department of Education issued this policy to promote correct hygiene and sanitation practices among schoolchildren and to create a clean environment in and around schools to keep learners safe and healthy. It aims to ensure correct knowledge and understanding among learners on the effective hygiene and sanitation projects; improve equitable access to safer water, adequate toilets, and hand washing facilities; improve hygiene and sanitation practices among the learners to enable them

to develop life-long positive hygiene and sanitation behaviors; ensure that schools are kept clean and safe.

Moreover, it was evident that the different schools in Pili East District are implementing Waste Segregation because of the availability of color-coded and labeled trash bins located in their school vicinities. They also have schedules on waste disposal posted near their trash bins. But still, there was a lot of garbage all over their school grounds and their trash bins still have unsegregated solid wastes. Some of the schools have large landfills located in the backyard area, and some even have traces of burned waste. The large volume of their waste was composed of papers, plastic wrappers, and plastic bottles.

The study of solid waste management of public secondary schools in Pili East district aims to assess the level of their awareness, their practices, and their level of implementation, as well as their correlations. The study also identifies the facilitating and limiting factors, and formulated the needed recommendations.

Method

The study utilized the descriptive-evaluative and correlational research design. A descriptive design was used to present the school profile and the existing practices in solid waste management. The evaluative design used the 4-point Likert scale to assess the level of awareness and measure the level of implementation. The Correlation was also used to analyze the significant relationships between the level of awareness and implementation of SWM.

Data Gathering Procedure

The researcher asked for the approval of the Public Schools District Supervisor of Pili East District through a written communication and coordinated with the school heads and key personnel. They assisted the researcher to administer the questionnaire to the identified respondents to gather the needed data. A researcher-made survey questionnaire was used. It was adopted from Abolucion et al. (2012) and Cahoy (2013).

The respondents were identified through purposive sampling. A total of 554 respondents answered the questionnaire. They were composed of 180 students, 180 teachers, seven admin staff and seven barangay representatives. An ocular visit and random interviews were also made by the researcher in order to validate data and gather information that may support the answers to the questionnaire.

Statistical Treatment of Data

The data gathered was subjected to statistical treatment, analysis, and interpretation to answer the specific objectives of the study. The weighted mean,

frequency, rank, and 4-point Likert scale were used to determine the level of awareness and implementation of solid waste management. Spearman's rank correlation was used to analyze the relationship between the level of respondents' awareness and the extent of implementation of SWM and whether it is significant or not.

Result and Discussion

In this study, the demographic and geographic data of each school plays an important role in solid waste generation. The larger the population, the more solid wastes can be produced. This is related to Medrano-Flores (2023) statement that a high rate of solid waste accumulation is relevant to the continuous increase of

the population in a particular locale. He also articulates that the solid wastes generated in a specific location reflect the economic advancement in society, thus contributing to a high generation of waste (Awino et al., 2024; Gutberlet, 2021; Sharma et al., 2020).

Table 1 shows the demographic profile of Public Secondary Schools in Pili East District. It reflects that Pili National High School has the highest number of school population for the school year 2023-2024. This population generated solid waste inside the school vicinities. Moreover, the V. Bagasina Sr. Memorial High School and Doña Basilia S. Quilon Memorial High School had the highest ratio of teachers to students, which is 1:21. This implies that they have enough teachers to conduct orientations on SWM and to improve students' awareness through subject integrations.

Table 1. Geographic & Demographic Profile of Public Secondary Schools in Pili East District

Pili East District School	Size (Area)	Distance from Pili Centro & LGU	Ratio of Teachers to Students	School Population
Doña Basilia S. Quilon Memorial High School	1 hectare	9.9 kms.	1:21	650
Altamarino-Clasio High School	2 hectares	13.8 kms.	1:21	423
Binanuaanan High School	1 hectare	2.9 kms.	1:18	661
Binobong High School	0.5 hectare	10.0 kms.	1:16	449
Concepcion F. Llorin National High School	1 hectare	8.2 kms	1:18	276
V. Bagasina Sr. Memorial High School	1 hectare	5.6 kms	1:21	1094
Pili National High School	3 hectares	3.3 kms	1:19	3016

This is related to the statement of Abella & Balla (2013) that the ratio of teachers to students is a determining factor in the rate of transfer of learning to students to develop good practices and improve attitude towards solid waste management. The geographical data of this study is also shown on Table 1. It indicates that the location and size of the school contribute to the environmental issues of SWM. It can be a determinant factor in the type and amount of waste being produced in a certain locality. Moreover, the distance of each school from the LGU-Pili office influenced the awareness and implementation of the SWM municipal ordinances. School accessibility is one of the considerations of the LGU-Pili office when conducting and monitoring SWM campaigns.

Solid Waste Management Awareness & Practices

The findings of this study are supported by the study of Busi et al. (2023) on how curricular aspect further intensify environment consciousness as a response of teachers and students to waste problems in the school setting. In addition, as a learning institution, it is then the nature of the school to provide transformational learning experiences that promote environmental sustainability within and across school contexts to put forward educators' role in helping

students gain experience that protect the environment from the classroom to the extended community and along its similarities, promote environmental programs that are integral to the school's educational mission (Green, 2018; Menon et al., 2020; Valli et al., 2018). According to Madrigal et al. (2018), active participation of the members of the academic community is important for the implementation of its institutional programs.

The awareness level has a weighted mean of 3.21 which indicates a High level of awareness on SWM. This means that the respondents have a high knowledge of the concept of SWM as an important factor for ecological preservation and protection.

Table 2 presents a summary of the solid waste management practices of Public Secondary Schools in Pili East District. The highest weighted mean of 3.42 interpreted as "Highly Practiced" is on the solid waste management practices in terms of reuse. This result indicates that they demonstrated good practices in terms of reusing materials to lessen waste production. Solid waste management practices in terms of disposal garnered the lowest weighted mean of 2.33 which is interpreted as "Less Practiced". Generally, the result shows that Public Secondary Schools in Pili East District has "moderately practiced" the SWM as indicated by the average weighted mean of 3.00. This has something to

do with the awareness and implementation of each school.

Table 2. Solid Waste Management Practices of Secondary Schools in Pili East District

Indicators	Average Weighted Mean	Interpretation
Segregate	3.16	Moderately Practiced
Reduce	3.35	Highly Practiced
Reuse	3.42	Highly Practiced
Recycle	2.74	Moderately Practiced
Disposal	2.33	Less Practiced
Grand Mean	3.0	Moderately Practiced

Relationship between the Level of Awareness and Level of Implementation on Solid Waste

As shown in Table 3, the study found that the level of awareness and level of implementation of solid waste management have a highly significant positive relationship. The strong positive relationship implies that respondents with high awareness of SWM have full implementation of SWM programs in their schools. It was also revealed that the level of awareness is a significant factor in the level of SWM implementation.

Table 3. Relationship between the Level of Awareness and Level of Implementation on Solid Waste (Spearman Correlation)

Correlation Matrix	Awareness Implementation
Awareness	Spearman's rho p-value
Implementation	Spearman's rho p-value
	0.741 *** < .001

Note. H_a is positive correlation

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, one-tailed

Facilitating Factors on the Implementation of Solid Waste Management

This study reveals the factors that facilitate the implementation of solid waste management in public secondary schools in the Pili East District. The responses

were classified into five categories: Positive attitude and behavior, Support from Other school stakeholders, Availability of waste disposal facilities, Compliance with policies, and High level of awareness. Percentage was used to compare each facilitating factor against another. The assumption is that the higher the percentage, the more it affects the implementation of SWM.

As shown in Table 4, the Positive attitude and behavior of the students and teachers ranked first with a percentage of 36%. It was believed that the high awareness of students and teachers was applied because of their positive attitude toward SWM policies and practices. This implies that an environment-friendly attitude is one of the important values that should be developed among the learners. Thus, integration of SWM practices on Values education subjects can create an impact on the SWM implementation. The saying that "Attitude is Everything" can be applicable on this result.

Next in rank is the support from other school stakeholders with a 21% rating. This support system and participation were very important in order to effectively implement the SWM to school community. Another important factor that influenced the implementation of SWM, though it became the lowest rank with only a 10% rate, was the Level of awareness of the school community on SWM. The findings of this study imply that a Level of SWM awareness is not the sole indicator of effective implementation. It should be accompanied by other vital factors such as a positive attitude, community support, and policy compliance. There should be a driving force for awareness application.

This is relative to the study of Rahmaddin et al. (2015), that the community's knowledge, attitude, and action on waste management were to a moderate extent, with attitude as the main domain, followed by knowledge and action. This was affirmed by Punongbayan (2014), who said that waste management programs became more effective and sustainable implementation has been achieved as it is accompanied by participation.

Table 4. Facilitating Factors on the Implementation of Solid Waste Management

Factors	Frequency	Percentage	Rank
Positive attitude and behavior	25	36%	1
Support from Other school stakeholders	15	21%	2
Availability of waste disposal facilities	12	17%	3
Compliance to policies	11	16%	4
Level of awareness	7	10%	5

Limiting Factors on the Implementation of Solid Waste Management

The limiting factors of SWM Implementation in Public Secondary Schools are shown in Table 5. It reflects that some of the respondents have encountered several

limiting factors that hinder the effective implementation of SWM in their respective schools. Most of the schools pointed out the inconsistency of SWM Policy implementation as the first rank among the limiting factors and the reason why SWM implementation

became ineffective in some ways. There were 40% respondents who believed that SWM implementation could be more effective if the SWM policies and ordinances were consistently imposed on the school population. Some of them mentioned that the transfers of school heads and teachers from one school to another could also affect the consistency of implementing the policies and the allocations of the budget for SWM facilities. Another reason is “not full participation with the 5R strategy”, which became the rank two as stated by 30% of the respondents. These factors can be a result of being complaisant and not being strict on its implementation. Further, limited resources, budget, and the absence of a strategic location for garbage disposal

also influenced the effective implementation of SWM. It can be a result of a lack of coordination with the Barangay and municipal office regarding the budget for SWM facilities and strategic location for garbage disposal of the accumulated wastes of the schools. This is in connection with Ocenar's statement (2001) that the creation and implementation of policies are important elements in dealing with the different issues and concerns in the governance of solid waste. Policies are necessary for the planning, design, and operation of solid waste management programs. Their absence can impede or limit improvements in garbage collection and disposal.

Table 5. Limiting Factors on the Implementation of Solid Waste Management

Factors	Frequency	Percentage	Rank
Inconsistency of SWM Policy implementation	28	40%	1
Not full participation with the 5R strategy	21	30%	2
Limited resources and budget	13	19%	3
Non- strategic location of garbage disposal	8	11%	4

Conclusion

Based on the findings of the study, the Public secondary schools in the Pili East district have a very high level of awareness of solid waste management but need proper orientation and education on the different policies and their vital roles in the implementation of solid waste management in the academe and community. The respondents of the study also manifested acceptable behavior as they highly practiced reduce and reuse, and moderately practiced segregation and recycling, while fall short in disposing garbage. The implementation of solid waste management in schools is very good, considering the fact that they have a very high level of awareness. This is supported by the findings that there is a significant relationship between the level of awareness and implementation. Further, a positive attitude is the best driving force for the respondents to implement SWM Practices. Thus, it is necessary to have all the ingredients for an effective SWM implementation. A positive attitude, active awareness, sound policies, and community support were all needed for an effective and efficient SWM implementation. The results of this study would be a basis for formulating policies and designing a SWM program for the school community.

Acknowledgments

The author would like to express her sincere gratitude to the people who unselfishly share time, knowledge and effort for the accomplishment of this research work. To CBSUA-Graduate School Professors, Dr. Claribelle C. Haber; Dr. Yolanda S. Agawa; Dr. Rene N. Rabacal, Jose Noel S.

Villavicencio, and Lilia C. Pasiona, for their remarkable ideas and suggestions for the refinement of the study. Also, sincere gratitude to Dr. Kennedy A. Beltran for the encouragement and technical assistance on its publication. To the Principals, Faculty & staff, and students of the seven Public Secondary Schools in Pili East District: Altamarino- Clasio High School, Binanuanan High School, Binobong High School, Doña Basilia S. Quilon Memorial High School, Pili National High School, Concepcion F. Llorin National High School, and V. Bagasina Sr. Memorial High School for heartfully providing the information needed during the data gathering.

Author Contributions

The author greatly contributed to the creation of this article, starting from the initial stages of research until the completion of this article.

Funding

No external funding.

Conflicts of Interest

No conflict interest.

References

- Awino, F. B., & Apitz, S. E. (2024). Solid waste management in the context of the waste hierarchy and circular economy frameworks: An international critical review. *Integrated Environmental Assessment and Management*, 20(1), 9–35. <https://doi.org/10.1002/ieam.4774>
- Busi, R., Gandipilli, G., & Kuramana, S. (2023). Elements of Environmental Education, Curriculum and Teacher's Perspective: A Review. *Integrated Journal for Research in Arts and Humanities*, 3(6), 9–17.

- <https://doi.org/10.55544/ijrah.3.6.2>
- Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling*, 6(1), 6. <https://doi.org/10.3390/recycling6010006>
- Fadhullah, W., Imran, N. I. N., Ismail, S. N. S., Jaafar, M. H., & Abdullah, H. (2022). Household solid waste management practices and perceptions among residents in the East Coast of Malaysia. *BMC Public Health*, 22(1), 1. <https://doi.org/10.1186/s12889-021-12274-7>
- Green, T. L. (2018). School as Community, Community as School: Examining Principal Leadership for Urban School Reform and Community Development. *Education and Urban Society*, 50(2), 111-135. <https://doi.org/10.1177/0013124516683997>
- Gutberlet, J. (2021). Grassroots waste picker organizations addressing the UN sustainable development goals. *World Development*, 138, 105195. <https://doi.org/10.1016/j.worlddev.2020.105195>
- Liao, C., & Li, H. (2019). Environmental Education, Knowledge, and High School Students' Intention toward Separation of Solid Waste on Campus. *International Journal of Environmental Research and Public Health*, 16(9), 1659. <https://doi.org/10.3390/ijerph16091659>
- Madrigal, D., & Oracion, E. (2018). Solid Waste Management Awareness, Attitude, and Practices in a Philippine Catholic Higher Education Institution. *Recoletos Multidisciplinary Research Journal*, 5(2), 43-57. <https://doi.org/10.32871/rmrj1705.02.04>
- Medrano-Flores, N. (2023). Municipal solid waste treatment complex in small towns. Case study: San Andrés de Machaca. *Renewable Energy, Biomass & Sustainability*, 5(1), 22-37. <https://doi.org/10.56845/rebs.v5i1.65>
- Menon, S., & Suresh, M. (2020). Synergizing education, research, campus operations, and community engagements towards sustainability in higher education: a literature review. *International Journal of Sustainability in Higher Education*, 21(5), 1015-1051. <https://doi.org/10.1108/IJSHE-03-2020-0089>
- 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>
- Sharma, K. D., & Jain, S. (2020). Municipal solid waste generation, composition, and management: the global scenario. *Social Responsibility Journal*, 16(6), 917-948. <https://doi.org/10.1108/SRJ-06-2019-0210>
- Valli, L., Stefanski, A., & Jacobson, R. (2018). School-community partnership models: implications for leadership. *International Journal of Leadership in Education*, 21(1), 31-49. <https://doi.org/10.1080/13603124.2015.1124925>