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Awareness and Practices of Solid Waste Management among Grade 12 HUMSS Students of Ipil Shepherd Montessori Center, Zamboanga Sibugay

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ABSTRACT
This research investigates the level of awareness and practices towards solid waste management among Grade 12-HUMSS students of Ipil Montessori Academy, Philippines. Employing a descriptive-correlational quantitative design, the study involved 100 respondents (64 females and 36 males) aged 16–29 years. Data were gathered through a structured questionnaire and analyzed using descriptive statistics, independent samples t-test, and Pearson correlation to determine differences and relationships between variables. The findings revealed that students generally demonstrated a moderate level of awareness of solid waste management, particularly in their knowledge of definitions, risks, prohibited activities, and their own roles and responsibilities. Television and radio emerged as the most common sources of awareness, while reduction and reuse were the most frequently practiced methods of managing waste. Gender was not found to significantly influence either awareness or practices. Importantly, this research found that students acknowledged the importance of waste management for environmental health and sustainability, yet gaps remained in their understanding of relevant laws and school interventions. The study concludes that although students exhibit positive attitudes and practices towards responsible waste management, strengthening environmental education is essential to address existing knowledge gaps and encourage more sustainable behaviors. These findings imply the need for schools and policymakers to reinforce awareness programs, integrate legal and practical aspects of waste management into the curriculum, and cultivate long-term environmental responsibility among students.

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INTRODUCTION

In today's world, solid waste was a common byproduct of human activities that acquire challenges for both the environment and the society[1]. The word "solid" in English came from the Latin word "solidus", which means "whole" or "entire". The term "waste" meant "wasted, wasted away, or ruined". It was derived from the need to differentiate waste that was in solid form from waste that occurs in liquid or gaseous forms. Discarded materials from businesses, industries, mines, farms, and homes are all considered solid waste. These materials can be solid, liquid, semi-solid, or contain gaseous stuff. It can be divided into a variety of categories, including hazardous trash, industrial waste, and home waste[2]. Managing solid waste entailed gathering, handling, and getting rid of these wastes. It is crucial for environmental health since incorrect solid waste disposal could result in pollution and other health risks[3]. Millions worldwide have suffered greatly from water scarcity, poor air quality, and rising temperatures, as highlighted by Unal et al[4]. These environmental issues have had a profound impact on human life[5].

Solid waste had always been an issue all over the country and even outside. Castin, et al.[6] concluded in their study that the waste composition from most sources is predominantly organic, indicating a significant potential for resource recovery such as animal feed or biogas production through anaerobic digestion. This emphasized that it could be done through various methods such as making waste as animal feed, fertilization, or recycling which effectively utilized than being discarded or thrown somewhere. Republic Act 9003, also called "The Philippine Ecological Solid Waste Management Act of 2000", obligates local governments to create and implement plans to reduce waste by 25% using reduce, reuse, and recycle approach (3Rs)[7]. Studies have further emphasized that

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[1] Hussein I. Abdel-Shafy and Mona S.M. Mansour, (2018). Solid waste issue: Sources, composition, disposal, recycling, and valorization, *Egyptian Journal of Petroleum*, Volume 27, Issue 4, Pages 1275-1290. https://doi.org/10.1016/j.ejpe.2018.07.003.

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[6] Castin, C. et al. (2022). Household Solid Waste Management (HSWM) Awareness and Applications: A Comparative Study on Urban and Rural Sustainable Practices. *International Journal of Environment, Engineering & Education, 6* (3*),* 93-99. Retrieved from https//doi.org/10.55151/ijeedu.v4i3.79

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successful implementation of such policies requires not only legislative frameworks but also strong community participation and local enforcement[8].

Schools often face several challenges with solid waste management. Unpleasant odors from garbages or rubbish is a common issue, which could also lead to pest infestations[9]. Spills from overflowing or poorly sealed trash containers worsened the situation. Ineffective waste management is the reason many schools still struggle with litter, despite having waste disposal facilities[10]. Additionally, there's often an insufficient knowledge regarding on how to dispose waste properly. Effective waste management in schools is crucial, not only for maintaining cleanliness but also for teaching students environmental responsibility[11].

While technology for waste collection and disposal has improved, many recent studies concentrate on municipal solid waste management in specific regions or areas with particular challenges. In summary, no research on solid waste management in Ipil, Zamboanga Sibugay, has been found. However, relevant research exists elsewhere, such as Bose's study on Barangay Deet's system[12] and Eshete et al.'s (2023). The current analysis investigates the awareness, views, and behaviors concerning residential waste disposal practices in Gelemso Town, Ethiopia[13]. Another research conducted by Abubakar et al[14]. that investigated the "Environmental Sustainability Impacts of Solid Waste Management Practices" in the Global South. The research conducted by De and

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[8] Almazan, J. U., Cruz, J. P., Alamri, M. S., & Albougami, A. S. (2020). Solid waste management practices and challenges in the Philippines. *International Journal of Environmental Science and Technology*, 17(3), 1435–1444. https://doi.org/10.1007/s13762-019-02562-6; Memon, M. A. (2010). Integrated solid waste management: A global review. *Waste Management*, 30(12), 2625–2636. https://doi.org/10.1016/j.wasman.2010.06.005.

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[10] Guerrero, L. A., Maas, G., & Hogland, W. (2013). Solid waste management challenges for cities in developing countries.

[11] Moqsud, M. A., Rahman, M. A., Rahman, M. A., Rahman, M. M., & Hoque, M. A. (2011). Environmental awareness among school students: A case study in Dhaka City. *Procedia - Social and Behavioral Sciences*, 25, 85–89. https://doi.org/10.1016/j.sbspro.2011.10.534.

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[13] Eshete, H. (2023). Knowledge, Attitude and Practices on Household Solid Waste Management and Associated Factors in Gelemso Town. Ethiopia, *PLoS ONE*, 18 (2), 1-13. Retrieved from https://doi.org/10.1371/journal.pone.0278181

[14] Abubakar, I. et al. (2022). Environmental Sustainability Impacts of Solid Waste Management Practices in the Global South. *Int. J. Environ. Res. Public Health, 19,* 1-26. Retrieved from https://www.mdpi.com/journal/ijerph

Debnath[15] was confined to Koltaka, India, whereas Torres examined only the citizens of Baranggay Poblacion in Tanza, Cavite, Philippines[16].

This study aims to identify sustainable and environmentally friendly strategies for solid waste handling, processing, and disposal. By understanding current challenges and best practices, researchers hope to improve waste management, reduce environmental impact, promote recycling and resource recovery, and create a cleaner, healthier environment for students and the community.

Related literature

Awareness towards Solid Waste Management refers to the knowledge and understanding about the proper methods of handling and disposing of solid waste. This understanding is not merely about knowing the facts but also about applying them in daily life. It involves segregating waste, recycling when possible, and ensuring waste does not end up in places where it can harm the environment or human health. Awareness has also spread through many social media platforms, especially in this period of modernization, where communication technologies shape environmental behavior[17]. Solid waste management awareness specifies the level of learning of a person that drives their behavior in managing waste responsibly, and is increasingly recognized as a critical factor in sustainable waste management[18].

Mishra et al. define solid waste as discarded, unnecessary, and worthless substance generated by regular activities across diverse sectors, including agriculture, construction, commerce, institutions, street cleaning, homes, and various industries[19]. Knowledge for solid waste is crucial for comprehending its

[15] De, S. & Debnath, B. (2016). Prevalence of Health Hazards Associated with Solid Waste Disposal -A Case Study of Kolkata India. *Procedia Environmental Science*, (35), 201-208, Retrieved from http://creativecommons.org/licenses/by-nc-nd/4.0/)

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[18] Nair, S., George, B., & Malano, H. (2021). Public awareness and participation in solid waste management: A case study of developing economies. *Journal of Environmental Management, 285*, 112123. https://doi.org/10.1016/j.jenvman.2021.112123; Ahsan, A., Alamgir, M., & El-Sergany, M. M. (2019). Practices and challenges of solid waste management in developing countries: A case study review. *Environmental Monitoring and Assessment, 191*(12), 730. https://doi.org/10.1007/s10661-019-7892-6.

[19] Mishra, A. et al. (2014). Solid Waste Management-Case Study. *International Journal of Research in Advent Technology, 2* (1), 396-399. Retrieved from https://www.researchgate.net/publication/262523386

properties and the effect of its mismanagement on the environment and health of humans[20].

Awareness of solid waste management is crucial, so it is essential to consider its disadvantages. One challenge is the lack of motivation even when they are aware of the importance of it. Saputra highlighted education as one of four essential elements of effective solid waste management[21]. Additionally, effective waste management often relies on the availability of foundations, such as recycling facilities, which may not be universally accessible[22]. Waste administration relies on minimal sources such as land, water as well as power. Moreover, there's also what we call benefits, specifically the decision to pollution by ensuring that waste products do not invade and deranged the air, water, and soil. This created many fields of expertise, such as waste removal, waste treatment, mounting of compost, and many others. It enables individuals and communities to make educated decisions and take steps towards environmentally-friendly waste management.

Inadequate managing of waste significantly affect the public health and the ecosystem. Hasan[23] demonstrated this in AI Nassyriah City, where 67% of 1794 respondents from twelve suburban areas reported dissatisfaction with current practices, linking this to health problems and ecosystem degradation. This highlights the crucial role of public awareness, a point reinforced by Debrah[24], who argues for the value of formal education in promoting responsible management of waste, particularly in developing countries. However, findings from Molina[25], examining solid waste knowledge among 332 grade 12 students in a Zamboanga City state college, suggest that while fundamental understanding of solid waste definitions exists, further education is needed to translate this knowledge into responsible waste management practices. These studies collectively underscore the need for multifaceted approaches that combine improved awareness campaigns with comprehensive educational initiatives.

Solid waste management awareness was an important topic that directly affects the public's health as well as the environment, which includes the air,

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[20] Guerrero, L. A., Maas, G., & Hogland, W. (2013). Solid waste management challenges for cities in developing countries.

[21] Saputra, M. H., Prasetyo, Y. T., & Ong, A. K. (2020). Factors influencing students' pro-environmental behavior in waste management. *Journal of Environmental Science and Management*, 23(2), 85–96.

[22] Alam, P., & Ahmade, K. (2013). Impact of Solid Waste on Health and the Environment. *International Journal of Sustainable Development and Green Economics*, 2(1), 165–168.

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[24] Debrah, J. et al. (2021). Raising Awareness on Solid Waste Management Through Formal Education for Sustainability: A Developing Countries Evidence Review. *Multidisciplinary Digital Publishing Institute, 6* (1), 6. Retrieved from https://doi.org/10.3390/recycling6010006

[25] Molina, R. (2021). Solid Waste Management Awareness and Practices among Senior High School Students in a State College in Zamboanga City Philippines. *Aquademia*, *5* (2), 3-8. Retrieved from https://doi.org/10.21601/aquademia/9579.

water, and soil. The increasing global waste generation significantly hinders effective waste management efforts. Effective trash management requires spreading knowledge about municipal solid waste management.. Studies have indicated that a significant portion of people have pro environmental attitudes and awareness of solid waste commitment. A study conducted by Kaza et.al.,[26] highlighted that one of the key concerns of humanity is the issue of waste management.

Practices towards Solid Waste Management

Practices towards Solid Waste Management encompasses collecting, treating, as well as disposing of discarded materials to prevent environmental pollution and health hazards. These practices have evolved over time with technological advancements focusing on recycling and reducing waste at its source. In accordance with, San Juan highlights the crucial role of leadership in public involvement in management of solid waste demonstrated the active engagement of local residents in waste management practices[27]. Lad and Gole further emphasize the need for comprehensive education and information dissemination to empower residents to actively engaged in responsible waste handling methods[28].

The practices of solid waste management have some significant drawbacks. Improper waste disposal could result in environmental pollution, contaminating air, water, and soil, which in turn can harm ecosystems and human health. Improper waste disposal results in the emissions of unwanted environmental pollutants such as GHG[29]. Moreover, unsanitary landfill contributes to pollutant of drinking water, and it can cause many other people and transmit different kinds of diseases. In addition, practicing proper waste disposed instill knowledge, awareness, and understanding of reduction strategies of waste among students.

Crucially, to ensure the successful implementation of new waste treatment systems, it's essential to involve the public in reviews and educate them about the specific region's waste treatment and disposal needs and concerns[30]. A key objective in addressing solid waste practices is to implement comprehensive

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[26] Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*. World Bank.

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[29] Almazan, J. U., Cruz, J. P., Alamri, M. S., & Albougami, A. S. (2020). Solid waste management practices and challenges in the Philippines. International Journal of Environmental Science and Technology, 17(3), 1435–1444. https://doi.org/10.1007/s13762-019-02562-6

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recycling programs to reduce landfill waste, educate the community about waste reduction and proper disposal techniques, and establish sustainable waste management practices to minimize environmental impact[31]. Despite existing policies and global campaigns, effective solid waste management at the school level remains a challenge. Many students still lack adequate understanding of waste concepts, environmental laws, and proper disposal methods, while practices such as segregation, recycling, and reuse are inconsistently applied[32]. Moreover, it is unclear whether gender differences influence these knowledge and practices among students. This research addresses these gaps by examining the awareness and practices of junior high school students in Ipil, Zamboanga Sibugay, thereby contributing to more sustainable, school-based waste management strategies[33].

This study investigates the level of understanding of solid waste management among junior high school students, focusing on concepts, consequences of improper disposal, environmental laws, prohibited actions, school or community efforts, significance of waste management, and the role of students. It further examines whether gender influences students' level of understanding of solid waste management. The study also explores students' waste management practices, particularly in the areas of segregation, reduction, reuse, recycling, and disposal. In addition, it analyzes whether gender differences exist in the waste management practices observed among the students.

Methods

This study employed a quantitative descriptive survey design, which was deemed appropriate to describe and analyze students' awareness and practices toward solid waste management. The survey method was selected because it enables the collection of standardized data from a relatively large group of respondents, thereby allowing statistical description and comparison[34].

The respondents of the study were one hundred Grade 12 HUMSS students enrolled at Ipil Montessori Academy. Among them, 64 percent were female and 36 percent were male. Their ages ranged from 16 to 29 years, with a mean age of 17.24 years and a standard deviation of 1.311, suggesting that most

[31] Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.* ; Zurbrugg, C., Gfrerer, M., Ashadi, H., Brenner, J., & Kuehr, R. (2012). Determinants and sustainability of recycling systems in developing countries. *Resources, Conservation and Recycling*, 68, 14–22. https://doi.org/10.1016/j.resconrec.2012.08.005

[32] Moqsud, M. A., Rahman, M. A., Rahman, M. A., Rahman, M. M., & Hoque, M. A. (2011). Environmental awareness among school students: A case study in Dhaka City.; Castin, C. et al. (2022). Household Solid Waste Management (HSWM) Awareness and Applications: A Comparative Study on Urban and Rural Sustainable Practices. *International Journal of Environment, Engineering & Education, 6* (3*),* 93-99. Retrieved from https//doi.org/10.55151/ijeedu.v4i3.79

[33] Mmereki, D., Baldwin, A., & Li, B. (2016). The solid waste management system in Gaborone, Botswana: Challenges and prospects. Waste Management & Research, 34(6), 489–500. https://doi.org/10.1177/0734242X16652955

[34] Gravetter, F. J., & Forzano, L.-A. B. (2018). Research methods for the behavioral sciences (Sixth Edit). Cengage Learning, Inc.

participants were relatively close to the average age. Respondents were selected using simple random sampling to ensure equal representation and minimize bias.

Data were gathered using a self-administered questionnaire, which was divided into three major parts. The first section measured awareness of solid waste management through 36 items. The second section, consisting of 10 items, explored students' sources of awareness regarding responsible waste disposal. The third section comprised 25 items focusing on students' waste management practices, such as segregation, reduction, reuse, recycling, and disposal. Responses were rated on a four-point Likert scale ranging from "Always" to "Never." The instrument was subjected to content validation by experts in environmental science and education to ensure clarity and appropriateness.

The reliability of the instrument was tested through a pilot study involving 50 students who were excluded from the main survey. Cronbach's alpha coefficients indicated strong internal consistency. For the awareness scale, reliability values ranged between 0.768 and 0.887, with an overall coefficient of 0.933. For the practices scale, alpha values ranged from 0.771 to 0.865, with an overall coefficient of 0.930. These values confirm that the instrument used in the study was highly reliable.

Ethical considerations were carefully observed throughout the research process. Participation in the study was voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality of responses were assured, and participants were free to withdraw at any stage without any form of penalty. The researchers were committed to ensuring that no physical, psychological, or social harm would result from participation in the study, thereby upholding the highest ethical standards.

RESULTS

Awareness Towards Solid Waste Management

The data from the Awareness Towards Solid Waste Management Scale was entered into SPSS and analyzed using descriptive statistics. The mean and standard deviation were calculated to measure the respondents' overall awareness of solid waste management. The results of this analysis are shown in the table below.

Table 1 Respondents'Awareness Towards Solid Waste Management

Subscales	N	Mean	SD	Verbal Interpretation
Difinition of Solid Waste (DSW)	100	2.0657	.54424	Moderate Level
Effect of Improper Solid Waste Disposal (EISW)	100	2.0080	.54600	Moderate Level
Relevant Laws on Solid Waste (RLSW)	100	2.2720	.68903	Moderate Level
Solid Waste Prohibited Activities (SWPA)	100	2.0700	.57866	Moderate Level
School Intervention on Solid Waste (SISW)	100	2.0400	.68876	Moderate Level
Importance of Solid Waste Management (ISWM)	100	1.8400	.65044	Moderate Level
Student's Roles and Responsibilities (SRR)	100	1.9843	.58635	Moderate Level

Sources of Solid Waste Management Awareness (SSWMA)	100	1.9570	.50096	Moderate Level
OVERALL AWARENESS TOWARDS SOLID WASTE	100	2.0296	.35964	Moderate Level

Table 1 indicates that respondents generally demonstrate a good understanding of solid waste management concepts. The average score across all awareness subscales falls within the "Moderate level" range (M=2.0296, SD=.35964), suggesting that respondents are generally familiar with the topic. While they recognize the importance of solid waste management, the relevant laws, and their roles, a deeper understanding may be lacking.

This study also revealed differences in awareness regarding specific aspects of solid waste management. Respondents demonstrated a strong awareness of the laws governing solid waste management, with the highest mean score (M=2.2720, SD=.68903). However, the lowest mean score was for the understanding of the importance of solid waste management (M=1.8400, SD=.65044), indicating a need to emphasize the significance of responsible waste management practices.

Research suggests that awareness plays a crucial role in promoting environmentally responsible behaviors, including waste management practices[35]. Additionally, educational background can influence perspectives on environmental issues, with higher levels of education often correlating with more informed viewpoints[36]. These findings highlight the importance of targeted educational initiatives to enhance students' understanding of solid waste management and promote responsible waste disposal practices.

Table 2 Legend/Interpretation of APTSWMQ

INTERVAL	INTERPRETATION
1-1.75	High Level
1.76-2.5	Moderate Level
2.51-3.25	Low Level
3.26-4.00	Lack of Awareness/Did not Practice

Table 2 reveals the interpretaton of Awareness and Practices towards Solid Waste Management Questionnaires using such as (High Level, Moderate Level, Low Level and Lack of Awareness/Did not Practice) with an interval of 1-1.74 for High Level, 1.75-2.49 for Moderate Level, 2.50-3.54 for Low Level, and 3.25-4.00 for Lack of Awareness/Did not Practice.

Learners' Awareness of Solid Waste Management Across Subscales

To assess respondents' comprehension of managing solid waste at both the item and subscale levels, as illustrated in Table 1.2-1.9, we examined factors

[35] Gorman, M. 1993. Environmental Hazards—Marine Pollution. ABCCLIO Inc. Santa Barbara

[36] Lad, D. et al. (2020). A Study on Solid Waste Management Awareness Amongst Youngster of Mumbai. *EPRA International Journal of Multidisciplinary Research*, 6 (3), 116-119. Retrieved from https://doi.org/10.36713/epra4115

such as the frequency of occurrence, mean score, percentages, and the variability of scores. The findings and their interpretations are presented in the following sections.

Table 3 Definition of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
1. "solid waste are:"			
a. "agricultural waste"	1.79	0.795	High Level
b. "construction debris"	2.09	0.780	Moderate Level
c. "commercial waste"	2.04	0.909	Moderate Level
d. institutional waste"	2.12	0.946	Moderate Level
e. "street sweepings"	2.03	0.989	Moderate Level
f. "discarded household"	2.13	0.939	Moderate Level
g. "non-hazardous industrial waste"	2.26	0.991	Moderate Level
DSWTOTAL:	2.0657	0.54424	Moderate Level

Table 3 presents the results of the survey regarding 12-HUMSS students' understanding of the definition of solid waste. Respondents scored an average of 2.0657 on the part of the survey about what counts as solid waste, with scores varying by 0.54424. This shows they have a moderate level of understanding of solid waste. Previous studies have shown how important it is to manage solid waste properly, as it affects both the environment and people's health[37]. Furthermore, effective solid waste management practices are crucial for achieving sustainable approaches in households[38]. A comprehensive understanding of current methods and perceptions regarding household solid waste management is crucial for informed decision-making aimed at achieving a more sustainable future.

Table 4 Effect of Improper Solid Waste Disposal

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
2. improper disposal of solid waste may lead lead to:			
a. "clogging of drainage canal that will lead to floods during rainy season"	1.89	0.942	Moderate Level
b. "breeding or shelter of pests such as flies, rats and mosquitos"	2.00	0.932	Moderate Level
c. "human ilnesses"	1.86	0.865	Moderate Level
d. "degradation or destruction on environment: such as a pollution"	2.15	0.903	Moderate Level
e. "serious threat on animals"	2.14	0.921	Moderate Level

[37] Debrah, J. et al. (2021). Raising Awareness on Solid Waste Management Through Formal Education for Sustainability: A Developing Countries Evidence Review. *Multidisciplinary Digital Publishing Institute, 6* (1), 6. Retrieved from https://doi.org/10.3390/recycling6010006

[38] Fadhullah, W. et al. (2022). Household Solid Waste Management Practice and Perceptions Among Residents in the East Coast of Malaysia. BMC Public Health 22 (1), 1-20 Retrieved from https://doi.org/10.1186/s12889-021-12274-7

EISWTOTAL:	2.0080	0.54600	Moderate Level

Table 4 reveals the awareness level of senior high students regarding the negative effects of improper disposal of solid waste. The subscale's mean score of 2.00 indicates that while students recognize the potential consequences of mismanaged waste, their awareness is moderate (SD=0.54600). This suggests that although the issue is acknowledged, it may not be perceived as a highly pressing concern.

Globally waste generation has risen dramatically in recent decades, with concerning statistics highlighting the low recycling rate (less than 20%) and the significant food produced is lost or wasted (over 30%). In line with Sustainable Development Goal 12, achieving a sustainable future necessitates transforming our consumption, production, and waste disposal practices. Responsible waste management is paramount for our future[39].

Table 5 Relevant Laws on Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
3. different laws or ordinances relevant to solid waste management such as			
a. "Presidential Decree No. 825"	2.15	0.989	Moderate Level
b. "R.A No. 9003"	2.21	0.957	Moderate Level
c. "R.A No. 8749"	2.40	0.974	Moderate Level
d. "R.A No. 9275"	2.25	1.038	Moderate Level
e. "Zambonga City Ordinance No. 500"	2.35	1.092	Moderate Level
RLSWTOTAL:	2.2720	0.68903	Moderate Level

Table 5 presented the anotivation total of the subscale with a mean score of 2.2720 which indicated that the impact of relevant laws is limited in addressing improper waste disposal issues with a total standard deviation of 0.68903. Both urban and rural areas face the ongoing challenge of managing waste effectively[40]. The Ecological Solid Waste Management Act of 2000 (Republic Act 9003) was enacted to address waste management concerns by protecting public health and the environment, promoting resource conservation and recovery, and fostering public involvement and accountability.

Table 6 Solid Waste Prohibited Activities

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
4. "Following prohibited activities such as:"			
a. "littering throwing or dumping of waste in public places such as roads, esteros, etc."	1.95	0.914	Moderate Level

[39] Raphela, T. et al. (2024). The impact of improper waste disposal on human health and the environment: a case of Umgungundlovu District in KwaZulu Natal Province, South Africa. *Original Research Article, 5,* 1-10. Retrieved from https://doi.org/10.3389/frsus.2024.1386047

[40] Domingo, S & Manejar, A. (2021). An Analysis of Regulatory Policies on Solid Waste Management in the Philippines: Ways Forward. *Philippine Institute for Development Studies, 2,* 1-46. Retrieved from https://hdl.handle.net/10419/241050

b. "open burning of leaves and plastics"	2.14	0.921	Moderate Level
c. "open dumping of waste on flood prone areas"	2.08	0.939	Moderate Level
d. "mixing of solid waste in any waste box or receptacle"	2.19	0.940	Moderate Level
e. "unauthorized removable of recyclable materials from waste boc or receptacle"	1.99	0.893	Moderate Level
SWPATOTAL:	2.0700	0.57866	Moderate Level

Table 6 reveals that senior high school learners have a moderate level of awareness regarding prohibited activities related to solid waste management, with a central tendency of 2.0700 and a dispersion of 0.57866. A strong understanding of prohibited solid waste management practices can lead students to avoid penalties, adhere to Section 48 of RA No. 9003, prevent violations, and adopt responsible waste management practices. As stated by Balaba, S. et al.,[41] the awareness and practices related to solid waste management among students indicates that the students possess adequate knowledge of several key aspects of solid waste management.

Table 7 School Intervention on Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
5. school initiative such as			
a. "having solid waste management program"	1.93	0.967	Moderate Level
b. "having policies on solid waste management"	2.06	0.993	Moderate Level
c. "having sanction on violating the schools or community solid waste management policy"	2.01	0.927	Moderate Level
d. "generating funds out of waste"	2.16	0.972	Moderate Level
SISWTOTAL:	2.0400	0.68876	Moderate Level

Table 7 demonstrates the level of awareness on the school intervention regarding solid waste management. As shown in the table, learners obtained a mean score of 2.0400, revealing that school interventions on solid waste management are implemented but may lack the engagement needed to make a significant impact with a standard deviation of 0.68876. According to Ramachandra, TV. et al.[42], urban solid waste management (USWM) typically encompasses five critical stages: collection, segregation, transportation, treatment,

[41] Balaba, S. et al. (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), 208-214. Retrieved from https//doi.org/10.51386/25815946/ijsms-v7i4p126

[42] Ramachandra, TV. et al. (2013). Interventions in the management of urban solid waste. International Journal of Environmental Sciences, 1 (3), 259-267. Retrieved from https://www.apn-gcr.org/publication/interventions-in-the-management-of-urban-solid-waste/

and disposal. The efficacy of urban solid waste management was contingent upon efficient waste collection. The community's positive response have inspired the city municipality to collaborate with local residential associations for effective waste management and was a direct result of the community's favorable support.

Table 8 Importance of Solid Waste Management

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
6. "the importance of Solid Waste Management such as:"			
a. "key to achieve a clean and green environment"	1.74	0.917	High Level
b. "reduce the reproduction of pests"	1.77	0.874	Moderate Level
c. "protect public health"	2.01	0.980	Moderate Level
ISWMTOTAL:	1.8400	0.65044	Moderate Level

Table 8 displays the awareness levels of Grade 12 HUMSS students about the significance of managing waste. The data reveals a high level of understanding among these students, as evidenced by the central tendency of 1.8400, with a dispersion of 0.65044, indicates a strong understanding of the importance of solid waste management. However, it is crucial to remember that a combination of both full and partial awareness is essential for the successful implementation of solid waste management initiatives. Research has consistently identified solid waste management as a significant challenge for both rural and urban communities[43]. However, studies have also shown that factors like age, educational attainment, and awareness are strongly linked to attitudes and practices related to solid waste management. Interestingly, gender did not exhibit a significant correlation with attitudes towards this issue. The study validates the importance of environmental education in influencing knowledge and subsequent behavior by Madrigal and Oracion[44].

Table 9 Student's Role and Responsibilities

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
7. "my role and responsibilities such as:"			
a. "reduce and waste generated"	1.99	0.882	Moderate Level
b. "clean as you go or CLAYGO"	1.88	0.913	Moderate Level
c. "segregate waste when disposing based on the trash can labels"	1.97	0.937	Moderate Level
d. "compost organic waste"	2.10	0.969	Moderate Level

[43] Castin, C. et al. (2022). Household Solid Waste Management (HSWM) Awareness and Applications: A Comparative Study on Urban and Rural Sustainable Practices. *International Journal of Environment, Engineering & Education, 6* (3*),* 93-99. Retrieved from https//doi.org/10.55151/ijeedu.v4i3.79

[44] Madrigal, D & Oracion, E. (2017). Solid Waste Management Awareness, Attitude, and Practices in a Philippine Catholic Higher Education Institution. *Recoletos Multidisciplinary Research Journal, 5* (2), 1-15. Retrieved from https.://doi.org/10.32871/rmrj1705.02.04

e. "recycle waste into a new product"	2.06	0.973	Moderate Level
f. "refuse single used items"	1.98	0.899	Moderate Level
g. "reuse items"	1.91	1.016	Moderate Level
SRRTOTAL:	1.9843	0.58635	Moderate Level

Table 9 demonstrates that Grade 12 HUMSS students possess a strong understanding of their roles and responsibilities within solid waste management program implementation, as indicated by a mean score of 1.9843 and a standard deviation of 0.58635. Although this positive finding is encouraging, research highlights the ongoing challenges faced by many nations in effectively implementing solid waste management programs. These challenges often result in heightened health risks, environmental degradation, and socioeconomic problems[45]. Past research has primarily focused on external factors like education and income when examining households' financial commitment to better waste management. However, a recent study by Alhassan, H. et al.[46] bridges this gap by exploring the combined influence of both external variables and the impact of beliefs, social pressures, and perceived control on households' willingness to invest in better waste services.

Table 10 Sources of Solid Waste Management Awareness

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
8. "I became aware towards Solid Waste Management because of:"			
1. "Television or Radio"	1.76	0.889	Moderate Level
2. "Newspapers or Magazines"	1.99	0.870	Moderate Level
3. "School's Orientation or Campaign"	1.96	0.887	Moderate Level
4. "Teacher's Discussion"	2.02	0.974	Moderate Level
5. "Seminar Workshop"	2.13	0.928	Moderate Level
6. "Books"	2.11	0.984	Moderate Level
7. "Peers or Classmates"	2.00	0.899	Moderate Level
8. "Parents"	1.87	0.960	Moderate Level
9. "Research Articles"	1.93	0.956	Moderate Level
10. "Social Media"	1.80	0.841	Moderate Level
SSWMATOTAL:	1.9570	0.50096	Moderate Level

Effective information dissemination is crucial for successful solid waste management, as it raises awareness and highlights key sources of knowledge. Table 10 reveals that television and radio emerged as the most influential pathways through which respondents became informed about solid waste

[45] Kilaton, L. et al. (2023). Assesing Students Awareness and Practices in Solid Waste Management among Grade 11 Senior High School in Jasaan South District. *Psychology and Education: A Multidisciplinary Journal, 15* (3), 235-241. Retrieved from https://ssrn.com/abstract=4645087

[46] Alhassan, H. et al. (2017). Do socio-psyhological factors ifluence households willingness-to-pay for improved solid waste management services? Evidence from Ghana. *Int. J. Green Economics, 11,* 3-4. Retrieved from https//doi.org/10.1504/IJGE.2017.089854

management, achieving a mean score of 1.76. This finding suggests that mass media play a significant role in disseminating information about solid waste management practices. This observation aligns with research by Olumorin, C. et al.,[47] posits that broadcast media act as a vital source of information for the public. Indeed, since the early 20th century, media has played a crucial role in supplementing traditional education, enhancing the learning experience.

The Influence of Gender on Awareness of Solid Waste Management

Researchers conducted an independent samples T-test to compare solid waste management awareness between genders. Table 11 displays the findings of this analysis.

Table 11 Independent Sample T-test for Gender Differences in Awarenes Towards Solid Waste Management

Dependent Variable	Independent Variable	N	Mean	Std. Deviation	Sig. (2-tailed)
DSW	Male	36	2.0516	.69664	.886
	Female	64	2.0680	.44356	
EISW	Male	36	2.1000	.56061	.195
	Female	64	1.9492	.53638	
RLSW	Male	36	2.1778	.64988	.282
	Female	64	2.3302	.71406	
SWPA	Male	36	2.1889	.57300	.121
	Female	64	2.0000	.57921	
SISW	Male	36	2.1181	.74994	.434
	Female	64	2.0000	.65838	
ISWM	Male	36	1.8796	.60239	.683
	Female	64	1.8254	.68223	
SRR	Male	36	2.0556	.56659	.328
	Female	64	1.9365	.59942	
SSWMA	Male	36	1.9250	.52989	.657
	Female	64	1.9730	.49095	
OVERALL	Male	36	2.0621	.36074	.495
	Female	64	2.0103	.36337	

An independent samples t-test revealed no statistically significant difference in solid waste management awareness between genders ($p = .495 > .05$), as presented in Table 11 Both males ($M = 2.0621$, $SD = .36074$) and females ($M = 2.0103$, $SD = .36337$) demonstrated similarly high levels of knowledge about solid waste management. This finding suggests that gender does not appear to be a significant factor influencing understanding of this topic.

Practices Towards Solid Waste Management

Table 12 presents the respondents' practices related to solid waste management across five key areas: segregation, reduction, reuse, recycling, and

[47] Olumorin, C. et al. (2018). Students Awareness and Utilization of Educational Broadcasts to Learn in Ogbomoso, Oyo State Nigeria. *Turkish Online Journal of Distance Education, 19,* 182-192. Retrieved from http://tojde.anadolu.edu.tr/

disposal. The composite mean score for these practices among the 100 respondents is 2.0178, which falls within the "often" range on the descriptive rating scale. This indicates that respondents generally engage in solid waste management practices frequently.

Table 12 Respondents' Practices Towards Solid Waste Management

Subscales	N	Mean	SD	Verbal Interpretation
Segregation of Solid Waste(SSW)	100	1.8400	.57731	Moderate Level
Reduction of Solid Waste(RSW)	100	2.0478	.49015	Moderate Level
Reuse of Solid Waste (ROSW)	100	2.0840	.57432	Moderate Level
Recycle of Solid Waste (ROS)	100	2.0400	.61277	Moderate Level
Disposal Of Solis Waste(DOSW)	100	2.0760	.59546	Moderate Level
Overall practices towards solid waste	100	2.0176	.39256	Moderate Level

Reuse of Solid Waste (RSW) had the highest mean (M=2.0840, SD=.57432) indicates that respondents are most likely to involve themselves in reusing solid waste compared to other practices. The lowest mean score was observed for segregation (M=1.8400, SD=.57731), suggesting that respondents are less likely to engage in waste segregation, likely due to the time and effort it often requires. Encouraging active participation from students is essential for promoting effective solid waste management practices, including segregation, reduction, reuse, recycling, and disposal. The study's findings suggest that students generally demonstrate responsible waste disposal habits.

Learners' Practices Towards Solid Waste Management across Subscales

Descriptive statistics, including mean (M) and standard deviation (SD), were used to analyze the data presented in Tables 13 to 17. The results for each questionnaire item are presented, along with their interpretation, to evaluate students' practices towards solid waste management for each subscale and its corresponding items.

Table 13 Segregation of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
1. "segregating waste based on/which are:"			
a. "Biodegradable"	1.70	0.798	High Level
b. "Reyclable"	1.86	0.829	Moderate Level
c. "Non-harmful waste from toxic wastes"	1.96	0.840	Moderate Level
SSWTOTAL:	1.8400	0.57731	Moderate Level

Table 13 presents the awareness levels of Grade 12 HUMSS students regarding the segregation of solid waste. The mean score for segregation is 1.8400, with a standard deviation of 0.57731, indicating that Grade 12 HUMSS students demonstrate an average level of knowledge about solid waste segregation. These findings corroborate the study by Debrah, J. et al., which emphasizes the crucial role of curriculum designed to promote sustainable practices, educational levels in addressing persistent solid waste, and environmental challenges in developing

countries[48]. This approach has the potential to catalyze a comprehensive societal transformation.

Table 14 Reduction of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
2. "reducing waste by:"			
a. "Buying in bulk"	1.93	0.924	Moderate Level
b. "Using ecobag"	2.06	0.839	Moderate Level
c. "Using reusable items rather than single use items"	2.04	0.852	Moderate Level
d. "Saying no to plastic if only have few items bought"	2.17	0.877	Moderate Level
e. "Prettifying items with less packaging"	2.09	0.818	Moderate Level
	2.01	0.847	Moderate Level
lg. "Converting food waste into animal feed"	2.06	0.941	Moderate Level
h. "Repairing broken zfurniture or appliances"	2.04	0.942	Moderate Level
	2.03	0,904	Moderate Level
RSWTOTAL:	2.0478	0.49015	Moderate Level

Table 14 highlights the prevalence of waste reduction practices among students. Waste reduction emerged as the most favored approach to solid waste management, widely recognized as a highly effective strategy. Solid waste management practices are essential public services, critical for all societies and necessary across all regions[49].

The data reveals that HUMSS students achieved a mean score of 2.0478, falling within the "often" category on the descriptive rating scale, indicating frequent engagement in waste reduction practices. These findings suggest that students demonstrate positive habits and outcomes in waste reduction, adopting practices such as using reusable containers, opting for eco-friendly bags, and purchasing only essential items. These sustainable practices reflect students' commitment to minimizing waste.

Table 15 Reuse of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
3. "reusing items such as:"			
a. "scrap papers as memo or scratch for solving"	1.98	0.910	Moderate Level

[48] Debrah, J. et al. (2021). Raising Awareness on Solid Waste Management Through Formal Education for Sustainability: A Developing Countries Evidence Review.

[49] Adeniran, A. et al. (2020). Factors Influencing Solid Waste Management Practices in Joe Slovo Township, Nelson Mandela Bay. *Journal of Public Administration, 55* (3), 400-410. Retrieved from https://www.researchgate.net/publication/346626238

b. "compostable waste is converted into fertilizer"	2.12	0.891	Moderate Level
c. "washable food and water containers"	2.17	0.943	Moderate Level
d. "gocery bags"	2.10	0.959	Moderate Level
e. "intact and unused clothes and toys are given to the less fortunate or orphanage"	2.05	0.869	Moderate Level
ROSWTOTAL:	2.0840	0.57432	Moderate Level

Table 15 presents the awareness levels of Grade 12 HUMSS students regarding the reuse of solid waste. The mean score for reuse is 2.0840, with a standard deviation of 0.57432, suggesting that these students demonstrate a strong understanding of using reusable materials for waste management. The successful implementation of Municipal Solid Waste (MSW) management relies on effective participation, coordination, and concerted efforts from various interconnected entities[50]. This process involves waste generation, composition, recycling, pre-treatment, treatment, and ultimately, disposal.

Table 16 Recycle of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
4. "recycling items by:"			
a. "converting old items into new products"	1.98	0.910	Moderate Level
b. "generating funds out from plastic bottles, metals, or cans"	2.05	0.821	Moderate Level
c. "creating art craft"	2.09	0.866	Moderate Level
ROSTOTAL:	2.0400	0.61277	Moderate Level

Table 16 indicates that Grade 12 HUMSS students demonstrate an average level of proficiency in understanding solid waste recycling, as evidenced by a mean score of 2.0400 and a standard deviation of 0.61277. The importance of recycling, its benefits, and its crucial role in conserving natural resources, reducing waste and pollution, and mitigating climate change have been widely discussed[51]. As global urbanization and population growth accelerate, the challenge of managing increasingly large quantities of solid waste becomes more pronounced. This often leads to a significant portion of solid waste being poorly managed, posing challenges for society.

Table 17 Disposal of Solid Waste

STATEMENT	MEAN	STD. DEVIATION	INTERPRETATION
5. "disposing"			
a. "biodegradable items in compost pit"	1.96	0.920	Moderate Level

[50] Das, A. et al. (2021). COVID-19 and Municipal Solid Waste (MSW) Management: A Reviewer. *Environmental Science and Pollution Research, 28,* 28993-29008. Retrieved from https://doi.org/10.1007//s11356-021-13914-6

[51] Kasim, S. (2012). The Importance of Recycling in Solid Waste Management. *Wiley Online Library, 320* (1), 43-50. Retrieved from https://doi.org/10.1002/masy.201251005

b. "items in proper trash bins"	2.12	0.879	Moderate Level
c. "waste materials in common open dumps"	2.09	0.900	Moderate Level
d. "non-biodegradable items by selling it in junk shop"	2.11	0.827	Moderate Level
e. "special waste are disposed in a garbage container intended for special waste"	2.10	0.893	Moderate level
DOSWTOTAL:	2.0760	0.59546	Moderate Level

Analysis of Table 17 reveals that Grade 12 HUMSS students exhibit a moderate level of insights relating to solid to waste disposal, with an average score of 2.0760. While students acknowledge the significance of proper waste disposal, the findings suggest a need for further educational initiatives to strengthen their knowledge and promote more effective practices. The results emphasize the challenges identified by Khalid, I. et al.[52], who highlight the significant challenges faced by urban areas in developing countries in terms of solid waste management, making it a widespread issue. The rise in the generation of solid waste and the financial strain it places on communities are major contributing factors. Additionally, poor knowledge regarding complexities in the entire solid waste management system persists.

Learners' Practices Towards Solid Waste Management Across Gender

To determine if respondents' practices toward solid waste management differed by gender, the dataset was analyzed using inferential and parametric statistics, specifically an independent samples t-test. The primary findings are presented in Table 18.

Tabel 18 Independent Sample T-test for Gender Differences in Practices Towards Solid Waste Management

Dependent Variable	Independent Variable	N	Mean	Std. Deviation	Sig. (2-tailed)
SSW	Male	36	1.8148	.54855	.722
	Female	64	1.8571	.60082	
RSW	Male	36	1.9630	.47290	.159
	Female	64	2.1058	.49386	
ROSW	Male	36	2.0778	.58997	.866
	Female	64	2.0984	.56782	
ROS	Male	36	1.9259	.64296	.163
	Female	64	2.1058	.59516	
DOS	Male	36	1.9889	.51922	.256
	Female	64	2.1238	.63797	
Overall	**Male**	**36**	**1.9541**	**.33982**	**.182**
	Female	**64**	**2.0582**	**.41908**	

[52] Khalid, I. et al. (2021). The Problem of Solid Waste: Origins, Composition, Disposal, Recycling, and Reusing. *International Journal of Advanced Science and Computer Applications, 1* (1), 1-14. Retrieved from https://doi.org/10.47679/ijasca.v1i1.6

Gender did not significantly influence respondents' practices toward solid waste management, as evidenced by the independent t-test results (Table 4.0, p-value (2-tailed) = .182 > .05). Both male (M = 1.9541, SD = .33982) and female (M = 2.0582, SD = .41908) respondents demonstrated positive practices toward solid waste management. Therefore, gender did not exert a substantial impact on HUMSS students' practices toward solid waste management. These findings align with previous research by Reyes and Madrigal[53], Singh et al. [54], and Otitoju et al.[55]. Nevertheless, they contradict the findings of Lad et al.[56], who observed a higher likelihood of women engaging in sustainable solid waste management practices compared to men.

Correlation: Awareness and Practices Towards Solid Waste Management

A Pearson Product Moment Correlation (Pearson r) analysis was performed to investigate the association between respondents' awareness and practices related to solid waste management. The results are summarized in Table 19.

Table 19 Relationship batween Awareness and Practices Towards Solid Waste Management

Variables	p-value	r-value	Interpretation
"Awareness" Practices	.000	.523	Significant

**Correlation is significant at the 0.01 level (2-tailed)

Table 19 indicates a significant positive correlation within respondents' awareness and practices toward management of solid waste (p-value = .000 < .01), demonstrating a moderate strength of association (r-value = .523). This suggests that as awareness increases, practices toward solid waste management also tend to improve significantly. These findings align with those reported by Debnath[57].

DISCUSSION

The findings of this study indicate that students demonstrated a moderate level of awareness towards solid waste management (overall M = 2.03, SD = .36). This suggests that although students possess basic knowledge of solid waste concepts, effects of mismanagement, relevant laws, and prohibited activities, their

[53] Madrigal, D & Oracion, E. (2017). Solid Waste Management Awareness, Attitude, and Practices in a Philippine Catholic Higher Education Institution

[54] Abbas, R., & Singh, Y. (2019). PACS Implementation Challenges in a Public Healthcare Institution: A South African Vendor Perspective. *Healthcare Informatics Research*, 25(4), 324. https://doi.org/10.4258/HIR.2019.25.4.324

[55] Otitoju, T. A., & Seng, L. (2014). Influence of social media on environmental sustainability awareness in Malaysia.

[56] Lad, D. et al. (2020). A Study on Solid Waste Management Awareness Amongst Youngster of Mumbai.

[57] De, S. & Debnath, B. (2016). Prevalence of Health Hazards Associated with Solid Waste Disposal -A Case Study of Kolkata India. *Procedia Environmental Science,* (35), 201-208

awareness is not yet at a level that guarantees consistent and proactive practices. Similar results were observed in the work of Debrah et al. in Ghana[58], which emphasized that awareness among youth often remains superficial, highlighting the gap between knowledge and sustainable practices. Likewise, Molina found that grade 12 students in Zamboanga City exhibited only partial knowledge, indicating that environmental education has not yet translated into full awareness or action[59].

A notable aspect of the results is that awareness of relevant laws on solid waste management scored the highest among the subscales. This aligns with findings by Domingo and Manejar[60], who stressed that legal frameworks such as Republic Act 9003 have increased public familiarity with regulations. However, familiarity with laws does not always equate to compliance or deep understanding[61]. The moderate score here suggests that students may have heard of these laws in school orientations or campaigns but have not fully internalized their implications. This reflects the argument by Lad and Gole that legislation without adequate public engagement remains insufficient to change behaviors[62].

On the other hand, the lowest mean was recorded for importance of solid waste management (M = 1.84). This finding is significant because it suggests that students may recognize laws and rules, but they do not fully appreciate why waste management matters for environmental health and sustainability. Similar concerns were raised by Hasan, who found that communities often comply with waste policies out of obligation rather than conviction[63]. The moderate awareness among students in this study mirrors the global challenge reported by Adeniran et.al., that despite the ecological urgency of waste reduction, younger populations frequently underestimate its broader implications on public health, biodiversity,

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[58] Debrah, J. et al. (2021). Raising Awareness on Solid Waste Management Through Formal Education for Sustainability: A Developing Countries Evidence Review. *Multidisciplinary Digital Publishing Institute, 6* (1), 6. Retrieved from https://doi.org/10.3390/recycling6010006

[59] Molina, R. (2021). Solid Waste Management Awareness and Practices among Senior High School Students in a State College in Zamboanga City Philippines. *Aquademia*, *5* (2), 3-8. Retrieved from https://doi.org/10.21601/aquademia/9579.

[60] Domingo, S & Manejar, A. (2021). An Analysis of Regulatory Policies on Solid Waste Management in the Philippines: Ways Forward. *Philippine Institute for Development Studies, 2,* 1-46. Retrieved from https://hdl.handle.net/10419/241050

[61] Torres, M. (2020). Solid Waste Management Practices and Attitudes of the Residents of Baranggay Poblacion,Tanza,Cavite. *Philippines Biological Science Department*; Abubakar, I. et al. (2022). Environmental Sustainability Impacts of Solid Waste Management Practices in the Global South. *Int. J. Environ. Res. Public Health, 19,* 1-26. Retrieved from https:// www.mdpi.com/journal/ijerph

[62] Lad, D. et al. (2020). A Study on Solid Waste Management Awareness Amongst Youngster of Mumbai. *EPRA International Journal of Multidisciplinary Research, 6* (3), 116-119. Retrieved from https://doi.org/10.36713/epra4115

[63] Hasan, M. (2019). Raising Awareness on Solid Waste Management: A Case Study in AINassyriah City, Iraq. *Aip Conference Proceedings,* Retrieved from https://doi.org/10.1063/1.5111275.

and climate resilience[64]. This gap in recognizing significance is critical, as values and attitudes strongly shape long-term environmental behavior[65].

The analysis also showed moderate awareness of school interventions and students' roles and responsibilities. Schools play a central role in shaping environmental literacy, but moderate scores suggest that existing initiatives are not yet impactful enough. This finding resonates with Madrigal and Oracion[66], who stressed that environmental programs in Philippine schools often remain at the level of campaigns rather than integrated pedagogy. Furthermore, Fadhullah et al.[67] noted that effective practices at the household or school level depend on continuous reinforcement and participatory involvement. The data therefore highlight the necessity of embedding solid waste education into everyday school routines rather than treating it as an occasional program.

Finally, the study revealed that sources of awareness were mostly derived from mass media such as television and radio, along with school campaigns and peer influence. This confirms earlier observations by Olumorin et al., who argued that broadcast and digital media remain powerful tools for environmental communication[68]. However, reliance on media may also lead to fragmented knowledge that lacks depth[69]. The challenge, therefore, is to bridge media-driven awareness with structured environmental education in schools. When awareness from multiple sources converges, students are more likely to translate knowledge

[64] Adeniran, A. et al. (2020). Factors Influencing Solid Waste Management Practices in Joe Slovo Township, Nelson Mandela Bay. *Journal of Public Administration, 55* (3), 400-410. Retrieved from https://www.researchgate.net/publication/346626238

[65] Lad, D. et al. (2020). A Study on Solid Waste Management Awareness Amongst Youngster of Mumbai; Almazan, J. U., Cruz, J. P., Alamri, M. S., & Albougami, A. S. (2020). Solid waste management practices and challenges in the Philippines. *International Journal of Environmental Science and Technology*, 17(3), 1435–1444. https://doi.org/10.1007/s13762-019-02562-6

[66] Madrigal, D & Oracion, E. (2017). Solid Waste Management Awareness, Attitude, and Practices in a Philippine Catholic Higher Education Institution

[67] Fadhullah, W. et al. (2022). Household Solid Waste Management Practice and Perceptions Among Residents in the East Coast of Malaysia. *BMC Public Health 22* (1), 1-20 Retrieved from https://doi.org/10.1186/s12889-021-12274-7

[68] Olumorin, C. et al. (2018). Students Awareness and Utilization of Educational Broadcasts to Learn in Ogbomoso, Oyo State Nigeria. *Turkish Online Journal of Distance Education, 19,* 182-192. Retrieved from http://tojde.anadolu.edu.tr/

[69] Kasim, S. (2012). The Importance of Recycling in Solid Waste Management. *Wiley Online Library, 320* (1), 43-50. Retrieved from https://doi.org/10.1002/masy.201251005; Eshete, H. (2023). Knowledge, Attitude and Practices on Household Solid Waste Management and Associated Factors in Gelemso Town. Ethiopia, PLoS ONE, 18 (2), 1-13. Retrieved from https://doi.org/10.1371/journal.pone.0278181

into sustainable practices, as supported by studies in Malaysia[70] (Adeniran et al., 2020) and Ethiopia[71] (Elamin et al., 2021).

In conclusion, the study establishes that Grade 12 HUMSS students of Ipil Montessori Academy exhibit moderate awareness of solid waste management across all dimensions, with relative strengths in knowledge of laws and weaknesses in appreciating the importance of proper waste management. The novelty of this research lies in documenting students' differentiated awareness levels within a Philippine private school context, an area previously underexplored compared to municipal and household-based studies. The findings underscore the need for schools to strengthen curriculum-based interventions, integrate solid waste issues into core subjects, and foster value formation beyond mere legal compliance. Future studies should explore longitudinal approaches and intervention-based programs to assess how awareness can be translated into sustained practices that contribute to environmental sustainability.

Summary of Findings

This study examined the awareness and practices of Grade 12 HUMSS students at Ipil Montessori Academy regarding solid waste management. The findings revealed that students demonstrated a moderate level of awareness across definitions, risks, laws, and prohibited activities related to solid waste. They recognized the significance of managing waste properly, although their appreciation of its importance remains limited.

Gender was not found to significantly influence awareness or practices, indicating that both male and female students displayed similar levels of knowledge and engagement. Television and radio emerged as the primary sources of information, while waste reduction was identified as the most common practice among respondents. In addition, students showed a strong inclination toward reusing solid waste, reflecting their familiarity with sustainable behaviors such as recycling and reusing materials.

Overall, the results highlight that while students possess foundational knowledge and demonstrate moderate engagement in waste management practices, there remains a need for strengthened educational initiatives to deepen understanding and promote more consistent, proactive behaviors in managing solid waste.

CONCLUSION

This research aims to evaluate "the level of awareness and practices of Grade 12 HUMSS students of Ipil Montessori Academy" regarding proper solid waste management. Students demonstrated a basic understanding of key waste

[70] Adeniran, A. et al. (2020). Factors Influencing Solid Waste Management Practices in Joe Slovo Township, Nelson Mandela Bay. *Journal of Public Administration, 55* (3), 400-410. Retrieved from https://www.researchgate.net/publication/346626238

[71] Elamin, M. et al. (2021). Assessment of Households Practices towards Solid Waste Management. *Internatonal Journal of Public Health Sciences, 3* (2), 13-23. Retrieved from https://www.researchgate.net/publication/360188030

management concepts, including the definition of solid waste, the risks linked to incorrect waste disposal, and the vital role of reducing,

While the findings indicated that students demonstrated an average understanding of solid waste management concepts, certain areas require additional attention. For instance, students' knowledge regarding legal implications and the impact of school programs on waste management appeared limited. This suggests that while students are aware of the need for responsible waste management, they may lack the guidance to fully engage in sustainable practices. By strengthening environmental education in these areas, students could be empowered to become more actively involved in waste management, not only within their school but also in their communities.

The study's findings reveal that learners acquire a strong foundation of awareness in solid waste management. However, additional educational efforts focused on the legal aspects of waste management could further enhance their understanding. Strengthening knowledge and understanding would foster greater involvement and commitment to sustainable disposal practices, ultimately contributing to environmental protection and community health.

Recommendation

In light of these findings, the following are the recommendations that other researchers can investigate for future purposes:

- Deeper Insights through Qualitative Methods: To gain a richer understanding of students' knowledge, awareness, and practices regarding solid waste management, future research should utilize qualitative methods, such as in-depth interviews. This approach can delve into the reasons behind their perspectives and behaviors, providing valuable insights beyond the quantitative data.
- Assessing the Impact of Educational Programs: Future studies should evaluate the effectiveness of educational programs designed to improve individuals' practices in handling with solid waste. Analyzing impact from these programs on students' understanding and behaviors would be beneficial.
- Expanding Sample Size and Scope: To better understand broader trends and potential variations, future research should include larger and more diverse samples, encompassing students from different grade levels, schools, and even communities. This expanded scope will allow researchers to identify significant patterns and differences in students' understanding as well as the waste disposal strategies in relation to solid waste.

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