

## SOLID WASTE MANAGEMENT PRACTICES AMONG JUNIOR HIGH SCHOOL STUDENTS IN VARIOUS SCHOOLS IN DAVAO CITY AND COTABATO CITY, PHILIPPINES

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### ABSTRACT

Solid waste management has become one of the Philippines' most critical environmental concerns in the present period of rapid urbanization. In view of the foregoing, educational institutions integrate solid waste management concepts and environmental education in their curriculum, as mandated by R.A. No. 9003 and R.A. No. 9512. In this study, the Grade 7 students showed a high level of awareness on solid waste management with weighted average of 3.59 or very high showing that students have high awareness on the importance of SWM for a clean and green environment, except on the laws and ordinances where students rated them as low, which means that they are not so familiar on the contents of said laws and ordinances. On the other hand, proper waste segregation, clean-as-you-go, waste recycling, and reusing and recycling waste into a new product obtained a Good weighted score. These indicates that students are very good at the following practices such as 1) segregation and identification of biodegradable and non-biodegradable wastes, non-recyclables and non-harmful waste; 2) reutilization of compostable waste such as fertilizers including reusable items instead of single use; 3) generating funds out of plastic waste, metals, and tin cans and 4) converting old items into new products. This implies that students have very good practices in solid waste management.

**Keywords:** Solid waste management, ESWM awareness and practices, Junior High School SWM.

### INTRODUCTION

In the current era of rapid urbanization, Solid Waste Management (SWM) has appeared as one of the top environmental concerns in the Philippines. Several strategies have been implemented to address the issues related to SWM, such as the waste management policies outlined in the Republic Act 9003 or the Ecological Solid Waste Management Act of 2000. Nonetheless, the implementation of policies has always been a challenge, even at the barangay level (Camarillo & Bellotindos, 2021). In the Philippines, 35,580 tons of garbage are estimated to be collected daily, or about 14.66 million tons a year in 2014 (Coracero, Gallego, Frago, & Gonzales, 2021). Moreover, in a Performance Audit Report conducted by the Commission of Audit (COA) in 2023, solid waste generation in the country has significantly increased from 9.07 million metric tons in 2000 to 16.63 million metric tons in 2020, more than 20 years after the passage of RA 9003.

The objective of the study is to evaluate the awareness and practices of some junior high school students in Davao City and Cotabato City. Specifically, it sought the following: 1) the student's

level of awareness about SWM; and 2) the student's SWM practices on waste segregation, reusing waste, waste reduction, and waste recycling.

## LITERATURE REVIEW

As defined, SWM involves overseeing the generation of solid waste to its disposal. It seeks to minimize the adverse impacts of solid waste through effective practices for public health, the country's economy, and the environment (Masood, Barlow, & Wilson, 2014). During the past years, both developed and developing countries formulated different strategies to address solid waste problems. However, despite all the government's efforts, solid waste management is often taken lightly, and cities still have difficulty managing the increasing volume of collected waste.

R.A. No. 9003 section 55 stated that the Department of Education (DepEd), Commission on Higher Education (CHED), and other national agencies should continue to educate and disseminate information about SWM. Moreover, the Environmental Awareness and Education Act of 2008 R.A. No. 9512 mandates that all public and private institutions shall incorporate environmental education in their curriculum. Schools play a critical role in providing education and information about SWM, and several studies have been conducted on its impact on students' awareness and practices. According to a study by Paghasian (2017), Mindanao State University Maigo School of Arts and Trades, a tertiary education school, has organized a SWM program committee and was given a commission to implement it strongly. However, after all school programs and activities, a huge amount of waste and garbage remains evident. This indicates that even though students in Maigo demonstrate a high level of awareness regarding SWM, this awareness is not reflected in their practices.

Figure 1 depicts the conceptual framework of the study, which includes the input, process, and output. The input consists of the respondents' profiles, specifically their names and schools. The process involves the data gathering procedure, while the output comprises the results and recommendations after the analysis of the data collected.

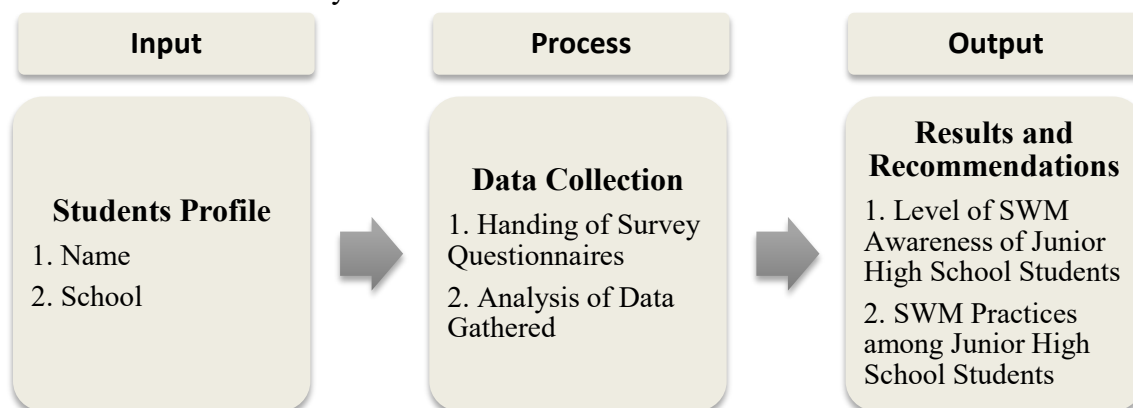


Figure 1. The Conceptual Framework of the Study

A study conducted in Kiblawan, Davao del Sur assessed the SWM awareness and practices among elementary pupils and revealed that although students show a high level of awareness of SWM in terms of taking care of school materials, facilities, and equipment, showing a caring attitude towards the environment, and caring for the environment and utilizing its resources wisely, students still have the difficulty with proper waste disposal and needs intervention (Taypin et al., 2024). SWM studies in basic education are limited and need to be given more attention (Molinda & Catan, 2021). Notably, no studies have been conducted to investigate the level of awareness and practices among junior high school students in Davao City and Cotabato City, hence this study.

## METHODOLOGY

This study involved Junior High School students, particularly Grade 7 students. A total of 150 Grade 7 student-respondents were taken in this study, of which 50 students were randomly selected per school.

The study was conducted at three secondary schools in Davao City and Cotabato City, namely: Maria Cristina P. Belcar Agricultural High School in Brgy. Baguio, Baguio District, Davao City; Sta. Ana National High School in Brgy. 28-C, Poblacion District, Davao City; and Cotabato City National High School in Brgy. Rosary Heights IV, Cotabato City. Barangay Baguio in Baguio District is a rural area where the majority of its land is used for agriculture and forestry. On the other hand, both Barangays 28-C and Rosary Heights IV are located in the highly urbanized areas of Davao City and Cotabato City, respectively.

It has used the Solid Waste Management Awareness and Practices Survey Questionnaire developed by the researchers, which was divided into two parts: The first part was about the level of SWM awareness where students were asked if they are fully aware (4), aware (3), not so aware (2), and not aware (1) of SWM. The second part was about the student's SWM practices, in which they were asked to answer a checklist form showing four (4) levels on SWM practices such as; always (4), often (3), seldom (2), and never (1).

To collect the needed data, a permission letter to conduct a research survey was submitted to the School Principal or School in charge before the distribution of survey questionnaires. After getting approval, questionnaires were handed personally to students where the nature and purpose of the study were also explained. Respondents were also informed that their responses to the questionnaire will be handled with utmost confidentiality and will solely be utilized for the study. After collecting the questionnaires, the data gathered were tallied, recorded, and analyzed.

To determine the level of SWM awareness and practices of students, Weighted Mean was used.

$$X = \frac{\sum fx}{f}$$

Where:

$X$  = Weighted Mean

$f$  = Frequency

$\sum fx$  = Summation of Weighted Means

The level of SWM awareness of students were interpreted using the scale below used also in a study of Paghasian (2017):

| Weighted Mean | Interpretation |
|---------------|----------------|
| 3.25 - 4.00   | Very High      |
| 2.50 - 3.24   | High           |
| 1.75 - 2.49   | Low            |
| 1.00 - 1.74   | Very Low       |

The SWM practices of students were interpreted using the scale below used also in a study of Paghasian (2017):

| Weighted Mean | Interpretation |
|---------------|----------------|
| 3.25 - 4.00   | Very Good      |
| 2.50 - 3.24   | Good           |
| 1.75 - 2.49   | Fair           |
| 1.00 - 1.74   | Poor           |

## RESULTS AND DISCUSSIONS

### Solid Waste Management Awareness

The level of solid waste management awareness of Grade 7 students was assessed using 23 statements. Table 1 shows the level of awareness among Grade 7 students from various schools in Davao City and Cotabato City.

**Table 1: Awareness on Solid Waste Management on Grade 7 Students**

| Item          | Description  | Responses   |       |              |           | GWA  | Interpretation |
|---------------|--|-------------|-------|--------------|-----------|------|----------------|
|               |  | Fully Aware | Aware | Not So Aware | Not Aware |      |                |
| 1.1           | Municipal Solid Waste (MSW)  | 45          | 87    | 17           | 1         | 3.17 | High           |
| 1.2           | Industrial Waste   | 18          | 77    | 38           | 17        | 2.64 | High           |
| 1.3           | Commercial Waste   | 36          | 65    | 35           | 14        | 2.82 | High           |
| 1.4           | Construction and Demolition Debris   | 37          | 57    | 41           | 15        | 2.77 | High           |
| 1.5           | Hazardous Waste  | 45          | 80    | 21           | 4         | 3.11 | High           |
| 1.6           | Electronic Waste   | 45          | 75    | 23           | 7         | 3.05 | High           |
| 1.7           | Agricultural Waste   | 38          | 78    | 29           | 5         | 2.99 | High           |
| 2.1           | Improper Waste Disposal leads to canal clogging  | 76          | 61    | 12           | 1         | 3.41 | Very High      |
| 2.2           | Improper Waste Disposal leads to breeding of pests   | 55          | 73    | 13           | 9         | 3.16 | High           |
| 2.3           | Improper Waste Disposal leads degradation of the environment                               | 51          | 62    | 29           | 8         | 3.04 | High           |
| 2.4           | Improper waste Disposal causes human illnesses   | 64          | 69    | 11           | 6         | 3.27 | Very High      |
| 3.1           | R.A. No. 9003  | 20          | 56    | 29           | 45        | 2.34 | Low            |
| 3.2           | R.A. No. 8749  | 21          | 50    | 31           | 48        | 2.29 | Low            |
| 3.3           | R.A. No. 9275  | 22          | 48    | 30           | 50        | 2.28 | Low            |
| 4.1           | Littering/throwing of wastes is prohibited   | 87          | 49    | 9            | 5         | 3.45 | Very High      |
| 4.2           | Open burning of trash is prohibited  | 73          | 59    | 12           | 6         | 3.33 | Very High      |
| 4.3           | Mixing of solid waste in any waste box or receptacle is prohibited                         | 65          | 53    | 23           | 9         | 3.16 | High           |
| 4.4           | Unauthorized removal of recyclable materials from waste boxes or receptacles is prohibited | 59          | 49    | 35           | 7         | 3.07 | High           |
| 5.1           | Policies on Solid Waste Management Program of my School                                    | 77          | 60    | 11           | 2         | 3.41 | Very High      |
| 5.2           | Sanctions on Solid Waste Management Program of my School                                   | 54          | 64    | 26           | 6         | 3.11 | High           |
| 5.3           | Generating funds out of trash/waste of my School   | 60          | 59    | 24           | 7         | 3.15 | High           |
| 6.1           | Importance of SWM: Achieving a clean and green environment                                 | 97          | 44    | 9            | 0         | 3.59 | Very High      |
| 6.2           | Importance of SWM: Protect public health   | 94          | 48    | 8            | 0         | 3.57 | Very High      |
| Weighted Mean |  |             |       |              |           | 3.05 | High           |

As shown in Table 1, Grade 7 students show a high level of awareness on solid waste management with a weighted mean of 3.05. This implies that most Grade 7 students are fully aware of solid waste management. The highest general weighted average of 3.59 interpreted as “Very High” fell on item 6.1. This shows that students are aware that SWM is important to achieve a clean and green environment. However, the level of awareness on the implemented laws and ordinances related to SWM is relatively low.

### Solid Waste Management Practices

Table 2 shows the solid waste management practices of students. A weighted mean of 3.34 was obtained and interpreted as “Very Good”. This indicates that students practice proper waste segregation, clean-as-you-go, waste recycling, and reusing. Recycling waste into a new product obtained the least weighted average of 2.85 interpreted as “Good”.

**Table 2: Solid Waste Management Practices of Grade 7 Students**

| Item                 | Description                                   | Responses |       |        |       | GWA         | Interpretation   |
|----------------------|---|-----------|-------|--------|-------|-------------|------------------|
|                      |   | Always    | Often | Seldom | Never |             |                  |
| a.                   | I practice waste segregation                  | 83        | 55    | 12     | 0     | 3.47        | Very Good        |
| b.                   | I practice Clean as You Go (CLAYGO)           | 102       | 36    | 10     | 2     | 3.59        | Very Good        |
| c.                   | I recycle Waste into New Product              | 46        | 50    | 40     | 14    | 2.85        | Good             |
| d.                   | I Use of eco bag and/or recyclable containers | 75        | 66    | 8      | 1     | 3.43        | Very Good        |
| <b>Weighted Mean</b> |   |           |       |        |       | <b>3.34</b> | <b>Very Good</b> |

In terms of waste segregation, Table 3 shows a weighted mean of 3.24 which is interpreted as “Good”. Item A shows the highest weighted average of 3.43, which indicates that students are very good at segregating and identifying biodegradable wastes such as paper and leaves from non-biodegradable wastes such as plastics. Also, students are good at segregating recyclables from non-recyclables and non-harmful waste from toxic waste.

**Table 3: Solid Waste Management Practices of Grade 7 Students in terms of Waste Segregation**

| Item                 | Description  | Responses |       |        |       | GWA         | Interpretation |
|----------------------|--|-----------|-------|--------|-------|-------------|----------------|
|                      |  | Always    | Often | Seldom | Never |             |                |
| a.                   | I segregate waste which are Biodegradable from Non-Biodegradable | 80        | 57    | 10     | 3     | 3.43        | Very Good      |
| b.                   | I segregate waste which are Recyclable from Non-recyclable       | 66        | 46    | 29     | 9     | 3.13        | Good           |
| c.                   | I segregate non-harmful waste from toxic waste                   | 64        | 51    | 32     | 3     | 3.17        | Good           |
| <b>Weighted Mean</b> |  |           |       |        |       | <b>3.24</b> | <b>Good</b>    |

Table 4 shows the solid waste management practices of students in terms of reusing waste. It displays a weighted mean of 3.22 that interprets “Good”. The results indicate that Grade 7 students are very good at practicing the reuse of paper as scratch in schoolwork, containers, and grocery bags. Reusing compostable waste as fertilizers obtained the least weighted average of 2.80 which is interpreted as “Good”.

**Table 4: Solid Waste Management Practices of Grade 7 Students in terms of Reusing of Wastes**

| Item                 | Description  | Responses |       |        |       | GWA         | Interpretation |
|----------------------|--|-----------|-------|--------|-------|-------------|----------------|
|                      |  | Always    | Often | Seldom | Never |             |                |
| a.                   | I reuse papers as scratch papers for solving   | 89        | 48    | 10     | 3     | 3.49        | Very Good      |
| b.                   | I reuse containers   | 73        | 52    | 21     | 4     | 3.29        | Very Good      |
| c.                   | I reuse grocery bags   | 80        | 53    | 17     | 0     | 3.42        | Very Good      |
| d.                   | I reuse compostable waste as fertilizers   | 45        | 49    | 37     | 19    | 2.80        | Good           |
| e.                   | I reuse clothes and toys to be given to orphanage/ less fortunate/ victims of calamities | 64        | 45    | 32     | 9     | 3.09        | Good           |
| <b>Weighted Mean</b> |  |           |       |        |       | <b>3.22</b> | <b>Good</b>    |

Solid waste management practices in terms of waste reduction are presented in Table 5. A weighted mean of 3.21 was recorded and interpreted as “Good”. Buying of important items only and in bulk shows the lowest weighted average of 3.01 and using reusable items instead of single use shows the highest weighted average of 3.44 interpreted as “Very Good”.

**Table 5: Solid Waste Management Practices of Grade 7 Students in terms of Waste Reduction**

| Item                 | Description                                      | Responses |       |        |       | GWA         | Interpretation |
|----------------------|--|-----------|-------|--------|-------|-------------|----------------|
|                      |  | Always    | Often | Seldom | Never |             |                |
| a.                   | Using reusable items instead of single use items | 86        | 45    | 18     | 1     | 3.44        | Very Good      |
| b.                   | Buying items with less packaging                 | 62        | 63    | 19     | 6     | 3.21        | Good           |
| c.                   | Convert food waste into compost/animal feed      | 77        | 43    | 22     | 8     | 3.26        | Very Good      |
| d.                   | Repairing broken furniture or appliance          | 54        | 67    | 20     | 9     | 3.11        | Good           |
| e.                   | Buying of important items only and in bulk       | 57        | 49    | 33     | 11    | 3.01        | Good           |
| <b>Weighted Mean</b> |  |           |       |        |       | <b>3.21</b> | <b>Good</b>    |

Table 6 shows the solid waste management practices of students in terms of recycling. Generating funds out of plastic waste, metals, and tin cans shows the least weighted average of 3.21 interpreted as “Good”. Converting old items into new products shows a “Very Good” interpretation with a weighted average of 3.42. The weighted mean value was 3.28 interpreted as “Very Good”. This implies that students have very good practices in recycling waste.

**Table 6: Solid Waste Management Practices of Grade 7 Students in terms of Waste Recycling**

| Item                 | Description   | Responses |       |        |       | GWA         | Interpretation   |
|----------------------|---|-----------|-------|--------|-------|-------------|------------------|
|                      |   | Always    | Often | Seldom | Never |             |                  |
| a.                   | Convert old items into new products                       | 91        | 35    | 20     | 4     | 3.42        | Very Good        |
| b.                   | Generate funds out of plastic waste, metals, and tin cans | 74        | 45    | 19     | 12    | 3.21        | Good             |
| c.                   | Create art crafts   | 75        | 48    | 13     | 14    | 3.23        | Good             |
| <b>Weighted Mean</b> |   |           |       |        |       | <b>3.28</b> | <b>Very Good</b> |

## **CONCLUSIONS**

Based on the study's results, the following conclusions can be drawn: The level of awareness of Grade 7 students in 3 different schools was high. The students are aware of the different types of waste, the effects of improper waste disposal, prohibited activities related to SWM, the school's initiatives and policies on SWM, and its importance. Also, Junior High School students have good practices on waste segregation, reusing waste, waste reduction, and waste recycling. However, students have less knowledge and familiarization on some laws and ordinances related to SWM such as the Ecological Solid Waste Management Act of 2000, the Philippine Clean Air Act of 1999, and the Philippine Clean Water Act of 2004.

Given the results above, the researchers recommended that schools should sustain solid waste management awareness programs and seminars regularly, particularly regarding SWM-implemented laws and ordinances. It is also recommended to incorporate and encourage students to participate in SWM initiatives together with the Student Council Organization with a formulated/in-placed action plan annually jointly implemented by the School and Student Government. Furthermore, future researchers may conduct the same study at their respective schools to determine the SWM level of awareness and practices of students. Assessing the effectiveness of their policies and initiatives may also be added to the objective of the study.

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