An Exploratory Study on Urban Household's Food Waste Management in Asingan, Pangasinan and Paniqui, Tarlac - Philippines

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Abstract

Food wastes as one of the prevalent problems in Europe and America, now felt and experienced by other nations became the focus of many researches. Poor segregation of food wastes mixed up with plastics and other polymers created health concerns from its foul odor causing insect proliferation and bacterial growth. For this reason, this exploratory study based on purposive survey involving 30 urban households following specific criteria residing in Asingan, Pangasinan and Paniqui, Tarlac which aims to investigate food waste management gathering qualitative and quantitative data by questionnaire. By identifying food waste produced and food waste practices, this study addresses concerns on how to take action on proper food waste disposal and recommends other ways to reduce such wastes. The result showed that 70% of the respondents are aware and practiced proper segregation of food wastes as it has been used for various purposes. The collected data gathered from both municipalities are analyzed, tabulated and compared resulting to a very positive correlation using Pearson correlation coefficient (r) which can be used as a reference in addressing food waste problems in the urban places in the country.

Keywords: Food waste, urban households, disposal, Pearson correlation coefficient

1. Introduction

As food wastes increases exponentially throughout the years, it has been considered worldwide as one of the critical issues that needs attention and should be addressed [1]. Food wastes from storage, production, consumption and preparation, produces 20% of global greenhouse gas emission which contributes to global warming [17]. From these human interferences, food consumption causes 1/3 of food wastes around the world, wherein, those who live in the urban community are the great contributors due to leftovers, expired and rotten foods [2,12].

Food wastes dumped in landfills collected by municipal garbage trucks causes environmental pollution by releasing toxic gases and create ground water contamination by attracting flies over it [3] When food wastes are properly managed, it can be used as organic composts and animal feeds, that helps both biodiversity and agricultural sector [14].

Municipal solid waste is now given attention to address environmental issues affecting community health and municipal financial status due to the fees in collection, disposal and transfer to landfills [6]. And because of the unstoppable urbanization, population and pollution increases drastically, and one concern is the booming of wastes produced especially food

wastes [11, 13]. For this reason, Municipal Solid Waste (MSW) acts to attain sustainable waste management requiring different methods such as recycling, but consumers behavior is much more important to reduce such wastes [18]. By educational awareness in schools and in community, food wastes can be reduced since there is a relationship between consumer behavior and food waste production [4, 5, 7, 16]

The main objective of this study is to identify dominant household food wastes from Paniqui, Tarlac and Asingan, Pangasinan and to determine their food waste disposal practices. This study allows the researcher to formulate environmental plan for the reduction of food wastes, helping the community and biodiversity.

2. Theoretical Framework

Data gathered from urban household respondents from Paniqui, Tarlac and Asingan, Pangasinan is subject for qualitative and quantitative analyses to determine the process involved in food waste management and disposal. The result of analysis is assessed and compared to present its findings from the two municipalities.

3. Objectives of The Study

As wastes proliferates daily due to human interventions in our surroundings, it is of great importance to asses our actions starting on those we considered small things that makes a big impact in the environment. For this reason, the researchers aim (1) to identify food wastes produced by selected urban households in the municipalities of Asingan, Pangasinan and Paniqui, Tarlac and (2) to monitor the practice of these households in food waste disposal. The researchers intend also (3) to share awareness and impart possible solutions to the potential health risk and climate change impacts of wastes from foods. This study is aligned with the National Higher Education Research Agenda-2 2009-2018 priority areas which are health and pollution to promote and facilitate dissemination of research output and create an impact on the United Nations Sustainable Development Goals (SDGs) #12- Responsible Consumption and Production specifically SDG 12.3 committed food wastes to cut in halves by 2030 [7].

4. Methods and Procedure

Research Design

Using exploratory research, this study aims to identify food waste practices of different urban households residing in Paniqui, Tarlac and Asingan, Pangasinan to determine their practices in disposal. Cross-sectional research design was used to collect data from a cross-section of a population at one point in time. This research design was used to determine the relationship between the data gathered from the two municiplaties using statistics.

Locale of the Study

The study was conducted separately in the urban barangays of the municipalities of Asingan, Pangasinan and Paniqui, Tarlac, Philippines. Asingan is a 2nd class municipality in the Eastern-mid part of Pangasinan (Latitude: 16.002300, Longitude: 120.670000), comprised with 21 barangays and having a population of 57,811 according to Philippines Census 2020. The urban barangays composed of Poblacion East and Poblacion West (inside the town proper); Baro and Domanpot which are just outskirts of town but still considered urbanized and were the target of research gathering in Asingan. On the other hand, Paniqui, is a 1st class municipality situated

Northern part of Tarlac (Latitude: 15.666065, Longitude: 120.55856), composed of 35 barangays and population of 103,003 as of Census 2020. The focus of the study in Paniqui lies within urban barangays of Poblacion Norte and Poblacion Sur (inside town), Estacion, Abogado and Tablang (outskirts), where the town proper resides. [9, 10, 11]

Respondents and Sampling Procedure

Thirty (30) respondents are selected for the study consisting of 15 respondents from different urban barangays of Paniqui, Tarlac and the other 15 from different urban barangays of Asingan, Pangasinan. The study used purposive sampling to determine its participants following the criteria as (a) household should reside within or outside the town proper which can be considered as urban community (b) the household should consist a minimum of three (3) family members, and (c) the household should prepare and cook their own foods minimum of five (5) days per week. This sampling was used to ensure a fair and equal selection of population as require by this study.

Instrumentation

The research instrument used for data gathering is a survey questionnaire given to the respondents to gather demographic profile and measure the degree of awareness in food waste management. In addition, the households were visited everyday by the researchers from May 30 to June 05, 2022 weighing and record their food wastes collected for each day. The data gathered from the two municipalities has been tabulated, analyzed and compared to present its findings.

Analysis of Data

The information gathered was tabulated and presented in graphs through means and percentages to identify dominant food wastes and the disposal practices. The researchers also used Pearson coefficient correlation (r) [8], to identify the significant relationship of the weights of the urban household food wastes collected from the two municipalities in the given time.

Pearson Correlation Coefficient (r)

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where: n = the number of pairs of scores
Σxy = the sum of the products of paired scores
Σx = the sum of x scores
Σy = the sum of y scores
Σx2 = the sum of squared x scores
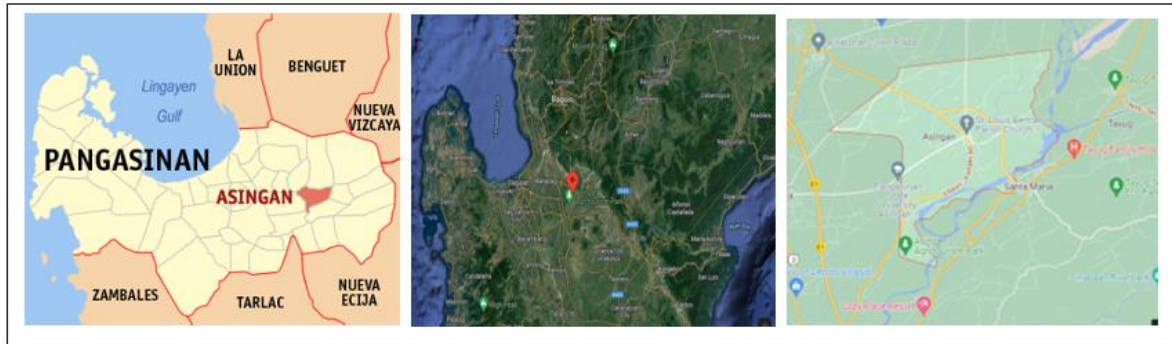Σy2 = the sum of squared y scores

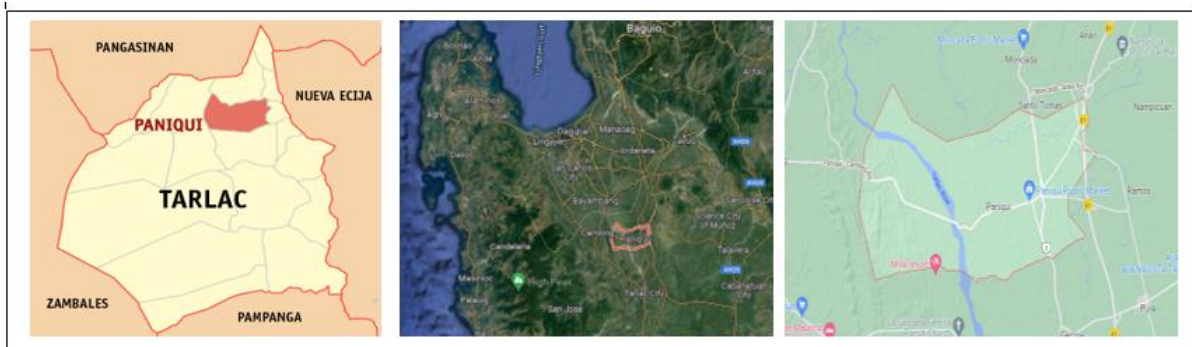**Figure 1: Map of the Municipality of Asingan, Pangasinan**

Figure 2: Map of the Municipality of Paniqui, Tarlac

5. Results and Discussion

From the 30 respondents' data gathered, 21 (70%) of which are living inside the town proper while 9 (30%) of them are just outskirts the town but still in urban community. The dominant number of family size is 5 members (9/30 = 30%), followed by 6 family members (8/30 =26.67%), and 4 members (5/30=16.67%). The result shows that the common family member size is from 4 to 6, where 5 family members are dominating that contributes on the amount of food wastes produced. From these households, 30 households (100%) cooked their own food 3-7 times a week which is one of the criteria of sampling, 13 (43.33%) households and 11 (36.67%) bought foods outside oftentimes from food stalls and fast-food chains since the time of preparation and cooking is at stake, this is also a contributing factor in the food waste produced in the preparations.

Table 1. Food wastes produced

	Fruits & Veg. peels	Eggshells	Meat bones	Fish bones, gills, intestines and scales	Rice	Bread and other pastry	Chips & other junk Foods	Leftover cooked foods
Asingan, Pangasinan	9	6	14	12	10	3	1	13
Paniqui, Tarlac	13	11	12	9	15	4	2	15

TOTAL (149)	22 (14.77 %)	17 (11.41 %)	26 (17.45 %)	21 (14.09 %)	25 (16.78 %)	7 (4.70 %)	3 (2.01 %)	28 (18.79 %)

From the 30 respondents, the researchers allow respondents to identify food wastes that they usually produced in a week; thus, multiple answers are possible. From the collected data, leftover cooked foods resulted as the main food waste produced resulting to 18.79%, followed by meat bones (17.45%), fish bones, gills, intestines and scales (14.09%), rice (16.78%), and fruits and vegetable peels (14.77%).

Table 2. Respondents Who Separate Food wastes from Biodegradable

	Yes	No	TOTAL
Asingan, Pangasinan	9	1	10
Paniqui, Tarlac	4	7	11
Overall	**13 (61.9%)**	**8 (38.1%)**	**21**

In the awareness of respondents, there are only 21 out of 30 respondents (70%) said that they separate biodegradable from nonbiodegradable, from that, 9 out of 30 respondents (30%) said they mix wastes such as paper, food wastes, plastics etc. in a single container. And from the 21 respondents who separate biodegradable from nonbiodegradable. The table 2 shows that 13 of them (61.9%) said that they separate food wastes from other biodegradable wastes such paper, and 8 of them (38.1%) just mix all of the biodegradable wastes.

Table 3. Food Wastes Disposal Practice

	Use in feeding domesticated animal	Placed in a compost pit to produce organic fertilizer	Collect in a plastic bag and dispose into garbage collector
Asingan, Pangasinan	6	2	2
Paniqui, Tarlac	4	1	6
TOTAL (21)	**10 (47.62%)**	**3 (14.29%)**	**8 (38.09%)**

In table 3, the food waste disposal practice was determined on which 10 of them (47.62%) use food waste to feed domesticated animals like dogs and cats; 3 (14.29%) of which use food waste as organic fertilizer; and the remaining 8 respondents (38.09%) just collect and separate in a plastic bag and allowing garbage collectors to collect it and later goes into landfills.

Table 4. Average weights of collected food wastes from the urban communities of the two municipalities from May 30, 2022 - June 05, 2022.

	May 30 Monday	May 31 Tuesday	June 01 Wednesday	June 02 Thursday	June 03 Friday	June 04 Saturday	June 05 Sunday	Weekly Ave. Weight of Food Wastes
Asingan, Pangasinan	1.3 kgs.	1.4 kgs.	0.9 kgs.	1.2 kgs.	0.5 kgs.	2.1 kgs.	1.9 kgs.	**1.33 kgs.**
Paniqui, Tarlac	1.5 kgs.	1.7 kgs.	1.6 kgs.	1.3 kgs.	1.5 kgs.	2.3 kgs.	2.0 kgs.	**1.70 kgs.**

Table 4 shows the average weight of food wastes produced from the two municipalities from May 30, 2022 to June 04, 2022. The average weight of food wastes in Asingan, Pangasinan show 1.33 kgs while in Paniqui, Tarlac is 1.70 kgs, this shows that the collected wastes are close with each other with a difference of 0.37 kgs or 24.42% difference.

Figure 3: Pearson Correlation Coefficient Result of the Average Weights of Two urban Municipalities using SPSS

To show the commonality and relationship between the two municipalities' urban households, the researchers use the Pearson Correlation coefficient (r). The result shows +0.799 correlation coefficient, which means a very strong positive correlation (~+0.8) is identified, and the significance of 0.031 indicating that it is statistically significant (falls between 0 & +1). From this result, the researcher assumed that the food waste produced in Asingan, Pangasinan and Paniqui, Tarlac are closely related when it comes to day-to-day basis as well as on its weekly production.

6. Conclusion

In conclusion, this study shows that people from Asingan, Pangasinan and Paniqui, Tarlac are aware of proper disposal of wastes but the practice and attitude to participate in waste reduction is still a big concern. Food wastes such as leftover cooked foods, rice, meat and fish bones and others are used in different ways, but some are collected and dumped mixed with nonbiodegradable wastes. When food wastes and plastics are mixed together in landfills, the

community around it may experience health risks because of the odor and may attract flies and other insects. Urban households with domesticated animals are benefitted since the leftovers are used for animal feeds, but the number of households with these pets are low when compared with rural areas. Also, few respondents practice the use of food waste as organic fertilizer since it takes time and space, while others do not have soil in their backyards. A big concern also lies when garbage trucks collect wastes from urban households, since trucks mixed all kinds of wastes they collected and then transferred to landfills for disposal.

Recommendation

With the research findings, the researchers recommend proposed course of actions to reduce food waste produced in the urban communities. Since, people are aware on the proper disposal of wastes, the problem still resides on their behavior and disposal practices which can be addressed through constant education and trainings from the local government unit. Barangays should promote organic fertilizers from food wastes that can be used in the flowering pots and soil, or encourage its citizens to use food wastes as food for domesticated animals. When animals are not around, they could share their food waste on their neighborhood with animals to create a win-win solution. Municipal Waste Management (MSW) units should reconsider the collection of food wastes form urban households which can be use in various ways. To help the urban communities, the Environmental Solid Waste Management (ESWM) of a certain municipal must be strengthen. One solution is creating and implementing policy like a municipal ordinance rejecting food wastes in collection of garbage would help the reduction of collected wastes transferred into landfills and may mitigate health risks from the surrounding community. From this, the citizens will initiate actions of how to reduce food wastes that will benefit the community and biodiversity.

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