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Research Article

EFFECTS OF NO SINGLE-USE PLASTIC POLICY ON HOUSEHOLD'S BUYING BEHAVIOR OF FOOD PRODUCTS IN BOHOL, PHILIPPINES

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This study was conducted to determine the effect of no single-use plastic policy on households' buying behavior of food products. The policy was intended to influence consumer behavior and increase awareness on environmental sustainability but consumers have differing perceptions. This study sought aims to compare the generated household waste in the municipality with and without the No Single-use Plastic policy and identify the factors affecting household's buying behavior of food products amidst policy implementation. Multiple linear and ordinal logistic regression was used to determine the factors that affect households' buying behavior of food products. The study findings revealed that respondents from the municipality without the policy are more likely to purchase more frequently than the respondents from the municipality with the policy. Findings revealed that respondents from the municipality with the policy are less likely to consume single-use plastics providing evidence that the policy was able to reduce single use plastics.

***Keywords*:** no single-use plastic policy, buying behavior, plastic pollution

***JEL Classification codes*:** D12, Q53, Q58

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1. INTRODUCTION

The world is now facing lots of environmental issues. One of the most significant ecological risks is the usage of single-use plastic packaging and the frequently unregulated disposal of it. It is named the most severe environmental outgrowth globally, next to climate change (Humprey et al., 2022). The impacts of these issues are felt directly and indirectly by earthly creatures, such as human and animal welfare. It is threatening not only to the environment but also the human health. The toxic chemicals from plastics drift from single-use plastic packaging to the food, contaminating it. In 2021, a survey showed that the Philippines was audited for using an outrageous number of single-use plastics, with an estimated consumption of around 163 million pieces of sachets every day. That level of plastic dependence made the Philippines viewed as a sachet economy (The World Bank, 2021).

Single-use plastics refer to disposable items intended to be used only once or momentarily (Chen et al., 2022). According to Green Peace (2021), there are varieties of single-use plastics that are commonly used in the daily transactions of people; some of these are plastic bags, plastic straws, PET bottles, plastic cups & lids, plastic utensils, plastic/disposable gloves, sachets, balloons, polystyrene, and food containers (Charlebois et al, 2021). Although single-use plastics are known for offering features that lead to convenience for humans, they still embody characteristics that make them dangerous for living creatures on Earth. Some of the reasons are, (1) disposable materials do not biodegrade; instead, they break down into pieces that lead to environmental contamination, and (2) only a tiny percentage of the total single-use plastics get recycled; the majority of them get dumped or burned which causes an outrageous amount of plastic pollution (Charlebois et al, 2021).

The Philippines is often listed among the world's worst offenders of plastic pollution (Phys Org, 2019). The government implemented various policies and actions to address this alarming environmental issue. The simple 3Rs – Reduce, Reuse, and Recycle most Filipinos practice that is not enough to solve the problem of plastic pollution as single-use plastics are not designed to be reused and are tough and uneconomical to recycle (Dayrit, 2019). Despite its adverse effects, it is inevitable to use plastic in daily transactions as it offers a variety of conveniences to human beings due to its distinctive features such as - low cost, lightweight, design versatility, and durability (Awan et al., 2021).

One of the United Nations' Sustainable Development Goals (SDG) goals is to promote responsible production and consumption habits to ensure sustainable development worldwide – SDG 12 (UN Environmental Programme). This goal demands

a significant change in our consumption and production by minimizing the toxic materials and the waste pollutants generated. It calls for the government and all citizens to work together to reduce waste pollution to save the world for future generations. Consistently, according to Karasik and Schachter (2022), as of 2021, a significant number of Philippines cities and municipalities have implemented ordinances to manage and at least lessen the volume of plastics in the surroundings. Consequently, rather than comprehensively restricting all plastic types throughout their life cycle, these subnational ordinances rely more on regulating the use and sale of plastic bags and other single-use plastics (Karasik and Schachter, 2022). One of those municipalities is the municipality of Jagna, Bohol.

Commercial and business establishments regularly use plastic bags as retail or containers in Jagna and elsewhere. These non-biodegradable materials can clog our canals, rivers, and other waterways, which generally leads to flash floods and causes water to overflow during the rainy season. Plastics and similar materials threatened the environment despite the municipality's strenuous attempts to segregate existing solid waste. To formally address the alarming environmental issue in the municipality, the former municipality official (Hon. Rodrigo B. Lloren) sponsored Municipal Ordinance No. 09-12-2015. The Jagna, Bohol, Phil., Municipal Ordinance No. 09-12-2015 (2015) regulates all business and commercial establishments to prohibit single-use plastic and encourages consumers to bring their own 'bayongs' or bags when purchasing perishable goods. Those offenders will be imposed under section 11 of the Penal provision states that penalties will be assessed to those violators. The first-time offenders will be fined, amounting to 500.00 Php. While for the second offense, the fine will be 1,000.00 Php, and for the third offense, violators will be fined 2,500.00 Php and imprisonment for more than six (6) months upon the court's decision and, in the case of business establishments, cancellation of their license to operate for one (1) year (Municipal Ordinance No. 09-12-2015, §11, 2015). The following consequences and fines are still presented today.

The No Single-use Plastic Policy is an action to minimize single-use plastic usage among business establishments and consumers. It has significantly impacted the day-to-day transactions of consumers and sellers. Although the policy was intended to influence the sustainability of the environment positively, still, many people had different perceptions as a consumer (Umasankar et al., 2021). Despite the growing interest in the consumer's perspective on this policy, only a few studies have been made. Thus, to slightly fill the gap in the literature, this study was conducted to determine households' buying behavior of food products amidst the policy implementation.

The research study determined the household's buying behavior of food products amidst policy implementation and assessed the policy's effectiveness. Thus, the findings

may benefit the community with and without the 'No Single-use Plastic' policy, business people, and future researchers. For the community with the policy, the result findings will lead to policy implications toward a more significant positive development regarding the policy. Nevertheless, the result of the study may help the environment of those communities that do not have the policy as the survey will provide data for the effectiveness of the policy regarding the reduction of plastic waste that lessens the natural hazards that the environment experiences nowadays. Therefore, the data findings will be a basis or a motivation for them to adopt and implement the policy for a sustainable environment.

In addition, business people will be beneficiaries of the study's findings as it will help those businesses to assess consumers' willingness to purchase food products given the possible inconvenience brought by the policy. With the data gathered, companies can think of alternative bags or containers and address the average amount consumers are willing to pay on eco-bags in every purchase. Furthermore, the result of the study aims to contribute to the body of knowledge of which there is only limited literature regarding household buying behavior of food products amidst the policy implementation. Thus, it will benefit future researchers as it can be used as an additional reference and inspiration for a new study with the same background.

Overall, the study will directly and primarily benefit the environment as it will lead people to contemplate using single-use plastics in every transaction. It will lead to lesser plastic usage, consequently, reduced plastic pollution.

2. CONCEPTUAL FRAMEWORK

Figure 1 is the conceptual framework that was used in this study. The graph shows the relationship between time and the level of plastic waste generated per household. The variable time is presented on the x-axis, while the level of plastic waste generated per household is shown on the y-axis.

The graph illustrates two curves; the curve that represents without "No Single-use Plastic Policy" slopes upward to the right, which signifies an increasing level of plastic waste generated per household as time passes. Because this area or municipality is not affected by the policy implementation, thus, people will tend to continue using single-use plastics in their daily transactions. On the other hand, the second curve represents a municipality that embodies the "No Single-use Plastic Policy." It signifies decreasing plastic waste generated per household amidst policy implementation.

According to reasoned action and operant conditioning theory, people contemplate before performing a specific action, as every step will lead to a particular

consequence. Thus, to prevent an undesirable outcome and certain punishment, people tend to decrease unwanted activities to achieve desirable and favorable results. In this graph, it is shown that people under the policy implementation decreased their level of single-use plastic usage to accomplish the primary goal of the policy: minimizing plastic pollution in the community.

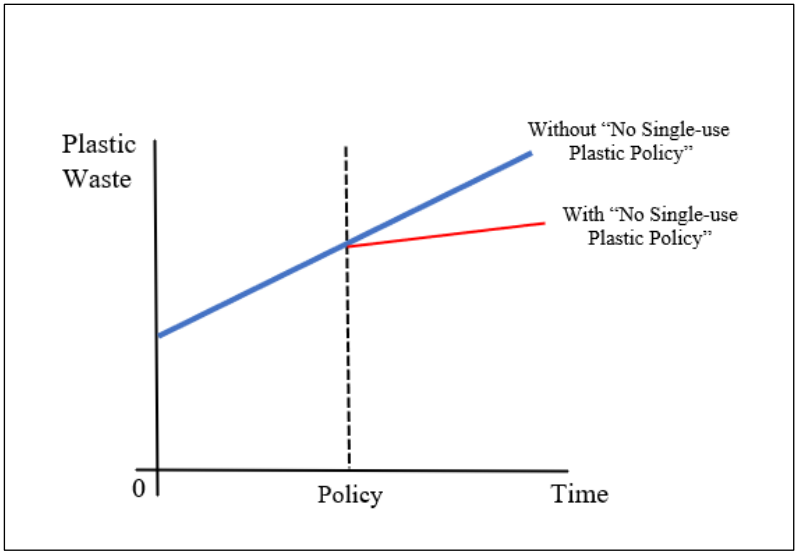

Figure 1. Conceptual Framework

3. METHODOLOGY

Locale of the Study

This study was conducted in the households of the two municipalities in Bohol, Philippines: Jagna and Garcia-Hernandez (Figure 2). The chosen places are neighboring municipalities. Jagna is a municipality where the No Single-use Plastic Policy has been implemented for almost eight years. In comparison, Garcia-Hernandez had no policy concerning the single-use plastic bag ban. In Jagna, the chosen strata are the barangays, Malbog, Canjulao, Tubod-Monte and Tejero. In Garcia-Hernandez, the study sites are Manaba, West-Poblacion, West Canayaon, and East-Poblacion.

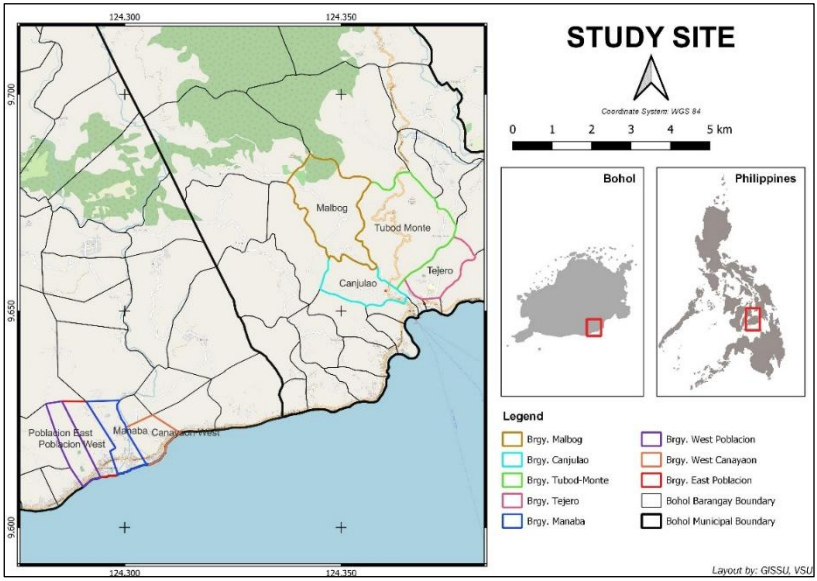

Figure 2. Study Site

Research Design

The descriptive and quasi-experimental research design was used in this study. It was descriptive as it aimed to describe the respondents' socio-demographic characteristics, preferred markets, purchase reasons, problems encountered, and insights regarding the policy implemented. However, the quasi-experimental research design was also utilized as the study aimed to present the cause-and-effect relationship between independent and dependent as affected by the moderating variable. Moreover, the study estimated the underlying effects of the No Single-use Plastic Policy on the target population.

Sampling Method

The methodology for this study was the stratified random sample in the two municipalities in Bohol, Philippines – Jagna and Garcia-Hernandez. Stratified sampling was used, where the population was divided into strata. While Cochran's formula determined the sample size with a 50% known population maximum variability, 95% confidence level, and a 6% margin of error. After finding out the sample size, the researcher divided the sample size into two categories – 60% for the treated group and

40% for the controlled group. It follows Frost (2022), which specified that the control group must not be less than 20% and not more than 40% in the sample population. The sample size was calculated as follows:

$$n = \frac{z^2 pq}{e^2}$$

Where:

n = sample size
z = standard error associated with the chosen level of confidence (1.96 at 95% level of confidence)
p = variability/ standard deviation (expressed as decimal 0.5)
q = 1 – p
e = margin of error/ allowable error

$$n = \frac{(1.96)^2(0.5)(1-0.5)}{(0.06)^2} = 267 \text{ sample size}$$

The result displayed 267 sample sizes for an unknown population. Therefore, dividing the sample size into two categories resulted in 160 respondents for the treated and 107 for the controlled groups.

Data Collection

The researcher collected primary data, which was measured to determine the effects of the No Single-use Plastic Policy on households' buying behavior of food products. The data collection process involved a survey method through questionnaires. The questionnaire consisted of five sections, namely: (1) socio-demographic profile, (2) general perception towards purchasing food products in a physical market, (3) household's buying behavior of food products, (4) estimated waste generated by a household, and (5) general perception towards 'No Single-use Plastic Policy.'

Data Analysis

In analyzing the data, descriptive analysis such as means, totals, frequencies, and percentages was used to analyze qualitative and quantitative data. Correspondingly, ordered logistic regression analysis and multiple linear regression analysis were used to measure the effects of the policy on households' buying behavior of food products. It was

to determine the significant difference between the treated and controlled group. The primary statistical tool that was used for this study is Stata.

After the regression analysis of the models, the researcher conducted various diagnostic tests to measure the validity and acceptability of the proposed models. The following tests are shown for the linear regression model: normality test, heteroskedasticity, omitted variable, and multicollinearity. On the other side, specification errors were performed to test for the goodness of fit, omitted variable test, and multicollinearity test for the ordinal regression model.

Econometric Models

In this study, the ordered logistic regression analysis was used for the dependent variable: frequency of Single-use plastic consumption per purchase. While multiple linear regression analysis was used for the dependent variables – amount willing to pay for eco-bags per purchase and frequency of purchase every week. These three variables were considered as effect indicators in this study; thus, the empirical models were hypothesized as follows:

Model 1:

$$\boldsymbol{freq\_purc} = \boldsymbol{\beta}_0 + \boldsymbol{\beta_1} age + \boldsymbol{\beta_2} civ\_stat + \boldsymbol{\beta_3} sex + \boldsymbol{\beta_4} income + \boldsymbol{\beta_5} hh\_size + \boldsymbol{\beta_6} educ + \boldsymbol{\beta_7} motiv + \boldsymbol{\beta_8} percep + \boldsymbol{\beta_9} socmed\_inf + \boldsymbol{\beta_{10}}\ distance + \boldsymbol{\beta_{11}}\ policy + \varepsilon$$

Model 2:

$$\boldsymbol{Ecobags} = \boldsymbol{\beta}_0 + \boldsymbol{\beta_1} age + \boldsymbol{\beta_2} civ\_stat + \boldsymbol{\beta_3} sex + \boldsymbol{\beta_4} income + \boldsymbol{\beta_5} hh\_size + \boldsymbol{\beta_6} educ + \boldsymbol{\beta_7} motiv + \boldsymbol{\beta_8} percep + \boldsymbol{\beta_9} socmed\_inf + \boldsymbol{\beta_{10}}\ distance + \boldsymbol{\beta_{11}}\ policy + \varepsilon$$

Model 3:

$$\boldsymbol{freq\_plastic} = \boldsymbol{\beta}_0 + \boldsymbol{\beta_1} age + \boldsymbol{\beta_2} mar\_stat + \boldsymbol{\beta_3} sex + \boldsymbol{\beta_4} occup + \boldsymbol{\beta_5} income + \boldsymbol{\beta_6} hh\_size + \boldsymbol{\beta_7} educ\_attain + \boldsymbol{\beta_8} motiv + \boldsymbol{\beta_9} percep + \boldsymbol{\beta_{10}} socmed\_inf + \boldsymbol{\beta_{11}}\ distance + \boldsymbol{\beta_{12}}\ policy + \varepsilon$$

Where:

freq_plastic = the household's buying behavior of food products using the frequency of Single-use plastic consumption per purchase as then measurement;

freq_purc = the household's buying behavior of food products using the frequency of purchase in a week as the measurement;

ecobags	=	the household's buying behavior of food products using the amount willing to pay for eco bags per purchase as the measurement;
age	=	the age of the respondent (in years);
civ_stat	=	the civil status of the respondent;
mar_stat	=	the marital status of the respondent (0 – non-married; 1 – Married);
sex		the sex of the respondent (0 – Male; 1 – Female);
occup	=	the occupation of the respondent (0 – non-professional; 1 – Professional);
income	=	the monthly income of the respondent;
hh_size	=	the household size of the respondent;
educ	=	the total years of schooling of the respondent;
educ_attain	=	the educational attainment of the respondents (0 – low educational attainment; 1 – high educational attainment);
motiv	=	the motivation of respondents in purchasing food products;
percep	=	the perception of the respondent in buying food products;
socmed_inf	=	the social media influence on household's buying behavior of food products;
distance	=	the distance influence on a household's buying behavior of food products;
policy	=	0 if without 'No Single-use Plastic' Policy; 1 if with 'No Single-use Plastic' Policy; and
ε	=	error term

4. RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Respondents

Table 1 displays the socio-demographic characteristics of the respondents in the two municipalities in Bohol – Jagna and Garcia-Hernandez. Jagna is the place with the 'No Single-use Plastic' policy, and Garcia-Hernandez embodied no policy regarding the single-use plastic ban. There are 165 and 108 respondents from Jagna and Garcia-Hernandez, respectively. There are 273 respondents, most of whom are females, with 58.2% and 70.4% in Jagna and Garcia-Hernandez, Bohol, correspondingly. Most of them were married (63.4%). On average, they were in their mid-forties (43 years old), with more than one-fourth (28.9%) within an age range of above 50 years old, and most were college graduates (30.4 %).

Table 1. Socio-demographic Profile of the Respondents

Socio-demographic Characteristics	With 'No Single-use Plastic Policy'		Without 'No Single-use Plastic Policy'		TOTAL	
	n	%	n	%	n	%
Sex						
Male	69	41.8	32	29.6	101	37
Female	96	58.2	76	70.4	172	63
Total	165	100	108	100	273	100
Marital Status						
Single	33	20	38	35.2	71	26
Separated	10	6	3	2.8	13	4.8
Widowed	9	5.5	7	6.5	16	5.9
Married	113	68.5	60	55.5	173	63.4
Total	165	100	108	100	273	100
Age						
30 and below	25	15.2	34	31.5	59	21.6
31 – 35	20	12.1	13	12	33	12.1
36 – 40	20	12.1	3	2.8	23	8.4
41 – 45	27	16.4	17	15.7	44	16.1
46 – 50	20	12.1	15	13.9	35	12.8
Above 50	53	32.1	26	24.1	79	28.9
Total	165	100	108	100	273	100
Mean	41		45		43	
Highest Educational Attainment						
No Grade Completed	6	3.6	1	0.9	7	2.6
Elementary Level	5	3	1	0.9	6	2.2
Elementary Graduate	21	12.7	2	1	23	8.4
Highschool Level	29	17.6	1	0.9	30	11
Highschool Graduate	35	21.2	32	29.6	67	24.5
College Level	30	18.2	25	23.1	55	20.2
College Graduate	39	23.6	44	40.7	83	30.4
Post-Graduate			2	1.9	2	0.7
Total	165	100	108	100	273	100

Moreover, Table 2 shows that most respondents are self-employed or owned businesses (21.2%). They earned 15,000 Php on average monthly.

Table 2. Respondents' Occupation and Monthly Income

	With 'No Single-use Plastic Policy'		Without 'No Single-use Plastic Policy'		TOTAL	
	n	%	n	%	n	%
Occupation						
Self-employed/ owned business	39	23.6	19	17.6	58	21.3
Professional	26	15.8	29	26.9	55	20.2
Labor, Production, and related worker	27	16.4	17	15.7	44	16.1
Housewife/husband	27	16.4	13	12.0	40	14.7
None	24	14.5	13	12.0	37	13.6
Farmer/Agricultural worker	16	9.7	6	5.6	33	8.2
Brgy. Official/ Worker	2	1.2	8	7.4	10	3.7
Sales Worker	4	2.4	3	2.8	7	2.6
Total	165	100.0	108	100.0	273	100.0
Monthly Income						
20,000 and below	136	82.4	80	74.1	216	79.1
20,001 – 25,000	11	6.7	11	10.2	22	8.1
25,001 – 30,000	10	6.1	6	5.6	16	5.9
30,001 – 35,000	2	1.2	4	3.7	6	2.2
35,001 – 40,000	5	3.0	2	1.9	7	2.6
40,001 and above	1	0.6	5	4.6	6	2.2
Total	165	100.0	108	100.0	273	100.0
Mean	13,907.58		16,684.87		15,006.29	

Estimated Waste Generated by Households

The respondents were asked about the estimated waste generated in their households in kilograms per month. Wastes are categorized into four categories: food waste, plastic and sachet waste, paper waste, and plastic bottles. This section aimed to compare if there is a significant difference in waste generated by households in the two

municipalities – with and without the 'No Single-use Plastic Policy.' It was to ensure the positive outcome of the policy and if it did make a difference towards the improvement of the community's environment. The Mann-Whitney U test was used to determine the significant difference between the wastes generated by the two municipalities due to data that were not normally distributed.

Shown in Table 3 is the difference in household waste between the two municipalities– Jagna and Garcia-Hernandez, Bohol. For the food waste generated by households, the mean average per month is 145.94 and 131.15 kilograms for Garcia-Hernandez and Jagna, respectively. The mean difference equates to 14.79 kilograms (Garcia-Hernandez > Jagna). The result showed that the p-value is greater than alpha (0.05), which means there is no sufficient evidence that the actual mean food waste significantly differs between the two municipalities. Thus, the policy implemented does not significantly impact the estimated food waste generated in the households of Jagna, Bohol.

Parallel to this, the result also revealed that in terms of paper waste, households from the two municipalities do not significantly differ in their usage and consumption of paper. Garcia-Hernandez, with a mean average paper waste of 129.55 kilograms, and Jagna, with 141.88 kilograms, obtained a mean difference of 12.33 kilograms. However, that particular difference is not significant enough to say that the policy implemented impacted the respondents of Jagna in terms of paper waste generation/usage.

Conversely, plastics, sachet wastes, and plastic bottles differ significantly between the two municipalities. Regarding the mean difference, plastic and sachet waste is around 24.97 kilograms, and plastic bottles are 21.39 kilograms per month. Both obtained a p-value less than the alpha (.05). Hence, there is sufficient evidence to say that the policy implemented positively impacted the respondents in Jagna, Bohol. It indicates that the policy achieved its goal of reducing household single-use plastic usage.

Table 3. Difference in Household's Waste (in kilograms) per Month Using Mann-Whitney U Test

Household's Waste (In kilograms)	**Garcia-Hernandez**	**Jagna**	**Mean Difference**	**Z**	**P-value**
Food Waste	145.94	131.15	-14.79	1.546	.1222
Plastic and Sachet Waste	152.09	127.12	-24.97***	2.619	.0088
Paper Waste	129.55	141.88	12.33	1.324	.1854
Plastic Bottles	149.93	128.54	-21.39**	2.225	.0261

***, **Significant at α = .01 and .05, respectively

The reduction of plastic, sachet waste, and plastic bottles brought by the policy implemented in Jagna, Bohol, is consistent with the findings from the study of Alboiu et al. (2018). This study's article states that the effectiveness of the single-use plastic ban interventions helps reduce plastic pollution by 33% to 96%. The degree of reduction will depend on the policy's effectiveness and consequences.

Household's Trash Disposal/Collection

After asking respondents about the estimated waste generated in their household, they were also queried on whom individuals are responsible for disposing or collecting trash in every household. Furthermore, they were asked how frequently trash is disposed of or collected per month and the amount paid for the trash collection per month.

Responsible for Disposing of/Collecting Trash

Shown in Figure 3 is the information related to whom individuals are responsible for the household's waste. Respondents only answered two specific groups - the household and the Local Government Unit Solid Waste Management. It displays information that all respondents in Garcia-Hernandez, Bohol, were referring to LGU Solid Waste Management as the ones who consistently collect or disposing their trash at home. Also, 100 respondents in Jagna responded the same. The LGU Solid Waste Management collects household waste through waste management garbage trucks. Various types of waste were segregated. Plastics, cans, and other materials in good condition will be recycled, while others were dumped and disposed of at a particular municipality's dumpsite.

On the other hand, 65 respondents in Jagna answered that their households are the ones who are responsible for disposing of trash as there are no trash collectors in their areas. They practiced creating their compost pit (for waste that will decay) and own dumpsite for plastics and other materials that will not decompose.

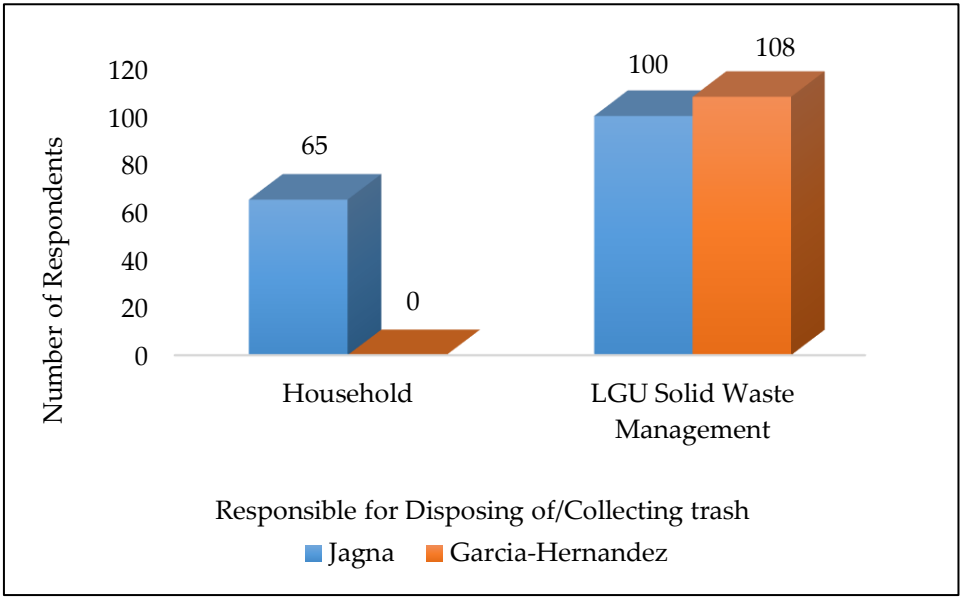

Figure 2. Responsible for Disposing of/Collecting Trash

Respondents from Jagna, Bohol Insights Regarding No Single-use Plastic Policy

In this section, the respondents from Jagna, Bohol, were asked about their insights regarding the policy. They were queried about their proposition or stand on the policy and the advantages and disadvantages they have encountered amidst the policy's existence. The responses were tabulated and presented in the following subsections.

Proportion of Respondents that Support and Against the Policy

The total number of respondents in Jagna, Bohol, is 165. Figure 4 shows that 79.39% of the respondents are in favor. However, 20.61% of them are against the policy. This result indicates different perspectives of individuals toward the policy because of the various experiences they have encountered amidst the policy implementation.

Respondents were in favor of the policy due to the various advantages they have experienced amidst the policy's existence, as discussed in the following subsection (F.2). Correspondingly, disadvantages and issues as discussed in the subsequent subsection (F.3) are the reasons why respondents were against the policy.

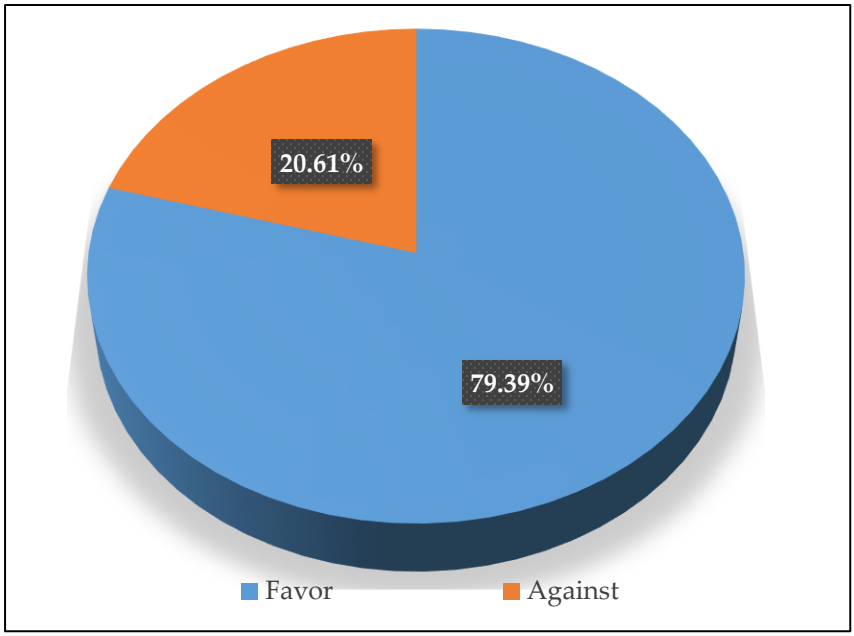

Figure 4. Against vs. In Favor of the 'No Single-use Plastic' Policy

Advantages of the No Single-use Plastic Policy

After asking respondents about the policy implemented, the researcher queried the various advantages they have encountered in purchasing food products in a physical market amidst the policy implementation.

Figure 5 presents the proportion of respondents who think the policy creates benefits for them. It shows that 93.33% experienced advantages, while only 6.67% expressed that the policy implemented did not make an advantage/s for them as a consumer.

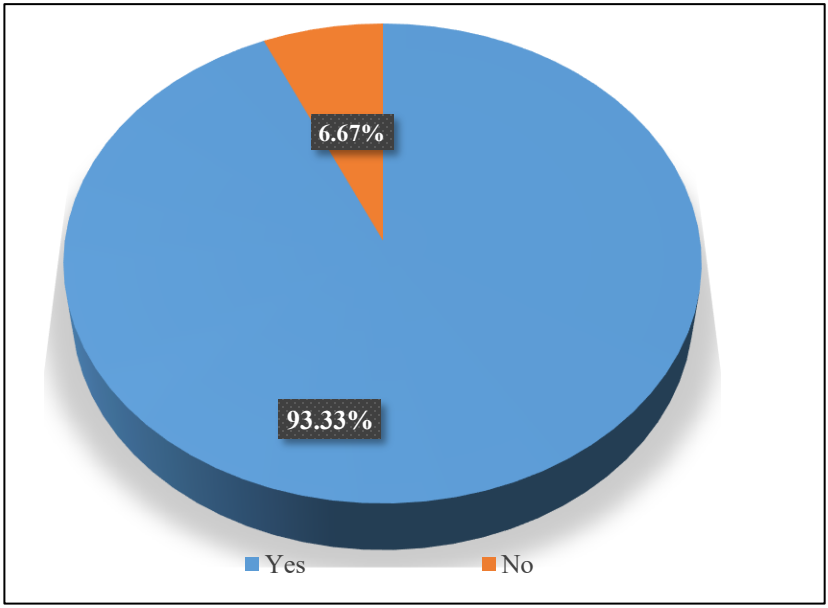

Figure 5. Proportion of the Respondents Think that No Single-use Plastic Policy has an Advantage

Parallel to this, respondents were also asked about the specific advantages they have experienced as consumers purchasing food products in a physical market. Presented in Table 4 is the list of the various benefits experienced by the respondents. It revealed that 85.45% of the respondents from Jagna, Bohol think the policy creates an advantage by lessening waste in every household. Due to the absence of plastic bags and minimal usage of single-use plastic packaging, households waste sachets and plastic bags, and plastic bottles explicitly, if not diminish, at least it lessens. Moreover, more than half (55.15%) of the respondents believed that the policy inspired them to have greater discipline. Also, eco bags (alternative to plastic bags) are thought to handle greater volume compared to plastic bags (47.88%), households believed that the policy enabled them to have less exposure to chemical contamination (40.61), and due to additional cost for eco bags, respondents think that they can save more money since it can lessen their impulsive buying behavior (27.88%).

Table 4. Experienced Advantages of the Respondents

Advantage	**Jagna**	
	n	%

Lessen waste in the household	141	85.45
Can establish greater discipline	91	55.15
Ecobags can handle greater volume compared to plastic bags	79	47.88
Less exposure to chemical contamination	67	40.61
Can save money (lessen impulsive buying)	46	27.88

*Multiple Response

Multiple Linear Regression of the Frequency of Purchase Model

The study focuses more on the 'No Single-use Plastic Policy' effects on household buying behavior. The buying behavior was categorized into three different variables to be examined. One of the study's objectives is to determine the following factors that affect changes in an individual's purchase frequency. This study was supported by the study of Kadiresan et al. (2022), which claimed that a shift in purchasing behavior was reported in the places where the single-use plastic ban was implemented. Thus, this section tabulated and presented various factors affecting individual purchase frequency amidst the policy implementation.

Shown in Table 5 is the multiple linear regression output of the Frequency of Purchase model. The model shows a total of 273 observations, with a statistical significance value of 0.0000, which means that the Frequency of Purchase model is statistically significant and what has been examined matters. It also implies that the following factors (age, sex, marital status, education (number of schooling years), household size, income, motivation, perception, social media influence, distance influence, and policy) explain 15.73% of the variance of individual's frequency of purchase in the dataset.

The study finds six insignificant variables, namely, sex, marital status, household size, motivation, social media influence, and perception. The variable sex indicates a positive relationship with an individual's purchase frequency; however, insignificant predictor. It is attributed to the study that women are more involved in shopping and preparing food for the family (Ramprabha, 2017). However, in this study, it is insignificant because males and females do not significantly differ in their purchase frequency, as most males answered the same frequency as females, considering that only 37% are males of the total respondents. Also, marital status is an insignificant positive predictor, which can be concluded that married and non-married individuals do not differ in their buying behavior; parallel to this, the majority of the respondents are married, with 63.4% of the total respondents. These biases can be fixed in further research.

In addition, it shows that out of eleven independent variables, only five (age, education (number of schooling years), income, distance influence, and policy) are statistically significant predictors of the individual's purchase frequency.

The variable age indicates a negative relationship with an individual's purchase frequency. It means that in every one-year increase in an individual's age, there is a decrease of 0.027 units of an individual's average purchase frequency. It is supported by the study of Witek and Kuzniar (2020) that the older one is, the tremendous pressure is placed by friends and family to establish purchasing habits that lessen the detrimental impact on the environment (less purchase frequency means less potential for plastic consumption).

Also, another significant predictor is the variable education, which stands for the respondent's number of schooling years and implies a positive relationship towards an individual's purchase frequency. It infers that in every additional one schooling year of an individual, the average frequency of purchase increases by 0.074 units. It conforms with the study of Burghelea et al. (2014), which stated that educated individuals manage their budgets better and has potential stability in the labor market than less educated individuals, thus, having means of control over how frequently they can purchase food products in a physical market.

Correspondingly, the variable income embodied a positive relationship towards an individual's purchase frequency and indicates that in one peso increase in income, the average frequency of purchase increases by 0.00003 units. It follows the fundamental concept of economic theory - purchasing power, which states that individuals with a higher income (considering all factors constant) have greater purchasing power than those with a lower income (Afriat, 1975).

Moreover, the variable distance influence refers to respondents considering distance as a factor in purchasing food products. It has a negative relationship with an individual's purchase frequency, which means that a one-unit increase in individuals' sensitiveness of the distance from their household towards the market decreases the average purchase frequency by 0.263 units. It is because of the distance that requires time and additional monetary expenses (transportation fares).

Finally, the policy is another significant predictor of an individual's purchase frequency. Two municipalities are mentioned – one has a policy regarding a single-use plastic ban, whereas the other one embodied no policy regarding single-use plastics. A negative relationship exists between the variable policy and the individual's purchase frequency. It indicates that, on average, the respondents from the municipality (Jagna, Bohol) with the policy regarding the single-use plastic ban reported an individual's frequency of purchase that is 0.746 units lower than the respondents from the

municipality without the 'No Single-use Plastic Policy' (Garcia-Hernandez, Bohol). The reason behind this claim conforms to the study performed by Shahariah et al. (2018) and Ahamad et al. (2013), which specified that consumers felt inconvenient preparing and carrying reusable bags for every purchase and the need for extra money (for eco bags) is needed when the absence of consumers' own packing materials was encountered.

These results undergo diagnostic tests to assess the model's validity and acceptability. The regression diagnostic tests are normality, heteroskedasticity, omitted variable, and multicollinearity. The model has homogenous data, no omitted variable, and a low correlation of that predictor with other predictors. Nevertheless, the model was found to have violated the normality assumption. However, Statistics Solutions (2013) revealed that this assumption is only a consideration when the sample size is very small (< 200). The normality assumption is unnecessary when the sample size is sufficiently large, with a sample greater than 200 respondents. In this case, the model has 273 observations. Thus, the normality assumption is the least important among the diagnostic tests.

Table 5. Multiple Linear Regression of Frequency of Purchase Model

Variable	Coefficient	Standard Error	P-value
Age	-.027**	.013	.035
Female	.253	.243	.298
Marital Status			
Separated	-.078	.603	.897
Widowed	.297	.666	.656
Married	.101	.362	.781
Education	.074**	.037	.045
Household size	.032	.063	.611
Income	.00003**	.00001	.015
Motivation	-.190	.169	.260
Perception	-.126	.155	.417
Social media influence	.041	.136	.766
Distance influence	-.263**	.126	.038
With Policy on Single-use Plastic Policy	-.746***	.251	.003
Constant	6.216***	1.268	.000

Adj R^2 = .1573 Prob > F = .000 Root MSE = 1.8551

n = 273

***, ** Significant at α = 0.01, and 0.05 respectively

Ordinal Logistic Regression for Frequency of Single-use Plastic Consumption Model

One of the indicators of the household's buying behavior of food products in a physical market involved the frequency of single-use plastic consumption per purchase. It was studied to ensure that the single-use plastic consumption of households was in line with the goal of the implemented policy of Jagna, Bohol. This variable is categorical as it embodies never, rarely, sometimes, often, and always responses.

The model (Table 6) consists of twelve independent variables: age, sex, marital status, occupation, educational attainment, household size, monthly income, motivation, perception, social media influence, distance influence, and policy. There are 273 observations in the data used in the analysis. The test revealed that the likelihood ratio chi-square of 78.93 with a p-value of 0.0000 tells us that our model as a whole is statistically significant compared to the null model with no predictors. A predictor r-squared value of 0.0956 was also presented. The ologit model estimates on the factors affecting the frequency of single-use plastic consumption were derived, and to easily interpret the relationship between variables through its probability, deriving the marginal effects after ologit estimation was done.

Out of twelve independent variables being tested, only five were considered significant predictors of the dependent variable – frequency of single-use plastic consumption at an alpha value of 0.05. The significant predictors involved the following: educational attainment, household size, monthly income, distance influence, and municipality.

Table 6 shows that respondents with high educational attainment (college level, college graduate, and post-graduates) decreased the chance of always consuming single-use plastic by 9.6% compared to those with less educational attainment (high school graduate and below). Conversely, the possibility of never consuming single-use plastic increases by 3.6% compared to those with less educational attainment. It is because educated individuals can distinguish environmental issues, are more sensitive to them, and are most likely to purchase green products (Chen et al., 2022).

Moreover, household size is also a significant positive predictor of the frequency of single-use plastic consumption. A one-member increase in every household would increase the chance of always consuming single-use plastic by 3.2%. It is because as more household members are presented, more people are potential consumers of single-use plastics.

Furthermore, monthly income (combined primary and secondary income) is negatively associated with the variable – frequency of single-use plastic consumption. It means that every one peso increase in the respondent's monthly income would decrease

the chance of always consuming single-use plastic by .0006%. It is attributed to the study by Li et al. (2021), which states that higher-income earners show significantly higher willingness-to-pay prices regarding eco-friendly products. Also, they are financially capable of following the policy accordingly despite the potential additional expense of the food products brought by the policy implemented.

Along with it, the distance influence is also negatively associated with the frequency of single-use plastic consumption. A one-unit increase in the sensitiveness of the respondents in the distance from their households to the physical market would decrease the chance of always consuming single-use plastic by 7.3%. It is consistently related to the previous result of the relationship between variable distance influence and the amount willing to pay for eco-bags, which directs respondents that they are willing to pay more for eco-bags if they are distance sensitive. Parallel to this, respondents would be less single-use plastic consumers.

Finally, the policy is also a significant negative predictor of the frequency of single-use plastic consumption. The result shows that the respondents from Jagna, Bohol, would decrease their chance of always consuming single-use plastics amidst the policy's existence by 19.40% more than respondents from Garcia – Hernandez. The result findings align with the perceived outcome of the policy on the respondents' behavior.

Table 6. Ologit model estimates the factors affecting household's buying behavior using marginal effects

Variables	**Marginal Effects**				
	Never	Rarely	Sometimes	Often	Always
Age	.001	.002	.001	-.001	-.003
	(.0007)	(.001)	(.0006)	(.0005)	(.002)
Sex					
Female	.025	.040	.026	-.020	-.071
	(.014)	(.022)	(.015)	(.011)	(.039)
Married	-.001	-.002	-.001	.001	.004
	(.016)	(.025)	(.015)	(.013)	(.043)
Occupation					
Professional	.027	.041	.021	-.025	-.065
	(.021)	(.030)	(.014)	(.021)	(.043)
Educational Attainment					
High	.036**	.059**	.034**	-.032**	-.096**
	(.016)	(.026)	(.016)	(.015)	(.041)

Household size	-.012***	-.019***	-.011***	.010***	.032***
	(.004)	(.006)	(.004)	(.004)	(.010)
Monthly	.000002***	.000004***	.000002***	-.000002***	-.000006***
Income	(.0000008)	(.000001)	(.0000007)	(.0000007)	(.000002)
Motivation	.017	.025	.015	-.013	-.044
	(.011)	(.016)	(.009)	(.008)	(.026)
Perception	-.004	-.007	-.004	.003	.011
	(.009)	(.014)	(.008)	(.007)	(.024)
Social media	-.002	-.003	-.002	.002	.005
influence	(.008)	(.012)	(.007)	(.006)	(.021)
Distance	.028***	.043***	.025***	-.022***	-.073***
influence	(.009)	(.012)	(.007)	(.008)	(.019)
Municipality					
With No Single-	.065****	.107***	.069***	-.047***	-.194***
use Plastic	(.017)	(.024)	(.018)	(.014)	(.041)
Policy					

LR chi2 (13) = 78.93; P-value = 0.0000 Pseudo-R^2 = 0.0956

Standard errors in parentheses;

***, ** Significant at α = 0.01, and 0.05 respectively

5. CONCLUSION AND IMPLICATIONS

As the study's main objective is to identify the effects of the No Single-use Plastic Policy on the household's buying behavior of the respondents, three key indicators were presented. The results revealed that in terms of purchase frequency, respondents from Jagna purchased food products less frequently than Garcia-Hernandez by 0.746 units. It is because consumers felt it was inconvenient preparing and carrying reusable bags for every purchase, and extra money (for eco bags) is needed when the absence of consumers' packing materials is encountered.

Also, for the amount willing to spend for eco-bags, respondents from Jagna are likelier to pay higher for the eco bags than respondents from Garcia-Hernandez by 3.21 Php, as they feel obligated to purchase if they fail to bring their packing materials. Furthermore, respondents from Jagna are less likely always to consume single-use plastics by 19.40% as they are prone to a violation.

In conclusion, the results reveal that the policy generates a difference in the household's buying behavior between respondents from municipalities with and without a single-use plastic policy. From its buying behavior to its generated household waste

regarding single-use plastic was seen to be positively impacted as the policy served its goal to lessen plastic pollution.

Based on the study findings and conclusion, this study finds the following implications:

1. The frequency of purchase model implies that respondents from municipalities with a No Single-use Plastic Policy are less frequently to purchase food products in a physical market than municipalities without a No Single-use Plastic Policy. It is because of the inconvenience and additional expenses brought by the policy implementation. Moreover, the amount willing to pay for the eco-bags model implies that respondents from a municipality with the policy are likelier to pay higher for eco-bags per purchase than respondents without the No Single-use Plastic Policy. Because respondents from municipalities with a policy are not given plastic bags and other single-use plastic in purchasing food products, thus, they are obliged to pay for eco-bags as the primary packing materials. Furthermore, the frequency of the single-use plastic consumption model implies that respondents from municipalities with a policy are less likely to often and always consume single-use plastic than respondents from municipalities without the policy. People tend to contemplate their actions to prevent consequences and achieve desirable outcomes.
2. The No Single-use Plastic Policy is a policy that requires every individual to stop using or consuming plastic bags and other single-use plastics. However, it was shown in the study findings that although there is an improvement in the consumption of single-use plastics by consumers in Jagna, substantial numbers of respondents still responded that they often and always use single-use plastics in every purchase. Therefore, the researcher implies that Jagna Local Government Unit must re-assess and re-evaluate the policy according to their primary objective. It is a call to suggest policy monitoring and enrichment of education and awareness of people towards the policy.
3. The respondents, most explicitly low-income earners, were concerned regarding the prices of eco-bags and other alternative packing materials for purchased products. Thus, the researcher implies that the government must accentuate how to address this concern, as it is the main reason why there is still a significant number of individuals who secretly consume plastic bags amidst the policy implementation.

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