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ARTÍCULO ORIGINAL

Effects of COVID-19 on food waste in households in the city of Loja, Ecuador

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Abstract
In Ecuador, before the start of the global pandemic, 939 metric tons of food were wasted per year, which is equivalent to a loss of 332 million dollars per year. Thus, the present investigation tries to examine the effect of COVID-19 on food waste in households in the city of Loja during the pandemic. For this analysis, the Theory of Planned Behavior (TPB) and Partial Least Squares Structural Equations (PLS-SEM) were used. The results obtained show that social norms, environmental awareness and COVID-19 have significant values and affect food waste in households in the city of Loja. Accordingly, if consumer behavior and habits had changed before the pandemic, food waste would have decreased. Therefore, it is important to promote food donation campaigns to the most needy people and, on the other hand, make a shopping list and create a meal plan to buy and prepare the necessary food and mitigate food waste in the city. from Loja.

Palabras clave: Theory of Planned Behavior (TPB); Structural equations of partial least squares (PLS-SEM); Environmental awareness; Social norms

1. Introduction

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus and is transmitted to others through contact, cough or respiratory secretions (Maguiña et al. 2020). The pandemic originated by COVID-19 has had a negative impact around the world, both socially and economically. COVID-19 originated in the city of Wuhan, China, in late 2019 and, on March 11, 2020, WHO declared a pandemic as the virus spread worldwide (Perez et al. 2020). On March 16, 2020, the former president of Ecuador, Lenín Moreno, declared a state of emergency in the country, since, up to that moment, 58 positive cases of coronavirus and 2 deaths were reported. Likewise, he implemented several restrictions to avoid contagions, such as the closure of public services, curfew, suspension of flights and interprovincial travel, and the suspension of working and academic hours. Food waste occurs at the end of the food chain as a consequence of the behavior of small retailers and consumers. Among the targets of the Sustainable Development Goals (SDGs) of the United Nations Organization (2021) is target 12.3 which aims to reduce global food waste per capita at the retail and consumer level by 50% and to reduce food losses during production and supply chains. According to the United Nations (2021) food waste in Ecuador, retail establishments and food service industries, increased to 931 million tons annually, almost 570 million tons of this waste is produced at the household level, and the global average of 74 kg per capita of food wasted each year is remarkably similar between lower middle-income and

high-income countries. It should be emphasized that Ecuador is one of the Latin American countries that wastes the most food, where, annually 939 metric tons of food is wasted, this translates to a loss of 334 million dollars annually (Food and Agriculture Organization of the United Nations [FAO], 2019). In the case of the city of Loja, Palacios and Zapata (2022) mention that food waste per capita is 72 kg per year in Ecuador and, taking data from INEC (2010), it is estimated that, in 2020, the population of the city of Loja was 274,111 inhabitants, therefore, it is deduced that approximately 1,973,592 kg were wasted annually in the canton. Therefore, to determine how COVID-19 influenced food waste in households in the city of Loja during the pandemic, the Theory of Planned Behavior (TPB) of Ajzen (1991) was used, which is determined by attitude, subjective norm and perceived behavioral control, and these characteristics are represented in the research with the variables COVID-10, social norms and environmental awareness. Thus, TPB was used because it examines how behavioral variables influenced household behavior and habits during the pandemic (Shigemura et al., 2020; Ngoh and Groening, 2022). Therefore, in a research by Rodgers et al., (2021); Zhao and You, (2021), mention that social norms imposed by authorities during the pandemic helped to decrease food wastage in several regions around the world. Likewise, in a study developed by Principato et al. (2022) claim that the environmental awareness of the population improved during the confinement since they managed food practices responsibly and this caused food waste to reduce considerably. Finally, Vargas-López et al.(2022) indicate that consumer behavior is a major influence on food waste. Consequently, in order to determine how COVID-19 affects food wastage, the following objective was determined: To examine the relationship between COVID-19 and food wastage in households in the city of Loja during the pandemic. Now, awareness and social norms were used as control variables, therefore, the objective tries to answer the following question: What is the effect of COVID-19 and other factors on food wastage in the households of the city of Loja during the pandemic? Likewise, the hypothesis was determined: COVID-19 with social norms and awareness, decreases food waste. This hypothesis was proposed due According to the studies mentioned before, environmental awareness and social norms have a positive impact on people's behavior towards the environment. The results obtained indicate that COVID-19 has a positive impact on food waste, and has a high and significant effect; social norms have a negative impact on food waste, have a high and significant effect; and, likewise, environmental awareness has a negative impact, has a high and significant effect. This means that, during the pandemic, the restrictions imposed by the authorities and social norms helped to reduce food waste in households in the city of Loja and to improve the environmental behavior of people, coinciding with several investigations, where they mention that these factors are of great importance to mitigate food waste and contamination (Jribi et al., 2020; Laila et al., 2022; Vargas-López et al., 2022). Finally, in addition to the summary and introduction, this study is made up of the following sections: section 2) presents the literature review, which contains the sections on background and empirical evidence; section 3) contains the data and methodology, where it is explained how the data were measured and the econometric strategy used to obtain the results; section 4) presents the discussion of results, where the results obtained are contrasted and compared with research by other authors; and section 4) presents the discussion of results, where the results obtained are contrasted and compared with research by other authors; and section 5) presents the results of the study, where the results obtained are compared with those of other authors. 5) consists of the conclusions, where the hypotheses for each objective are affirmed or rejected according to the results obtained.

2. Literature review

2.1 Background

Over the years, the relationship between psychology and economics has been important, since, it highlights how human behavior affects economic decisions and two types of models of economic behavior are established: normative models, which describe the optimal solution to a specific problem; and, descriptive models, which capture actual human behavior (Thaler, 2018). In the 20th century, behavioral economics was criticized by several authors, but other authors, such as Pareto (1906), claim

that psychology is important in every social science and the day will come when the laws of social science can be decided by the principles of psychology. On the other hand, Clark (1918) says that it is impossible to ignore psychology since it is impossible to ignore human nature. Likewise, Barnard (1938) developed the theory of organizational behavior, where he mentions the importance of communication to understand human behavior within an organization so that people can achieve their objectives efficiently. The psychologist Maslow (1958) developed a dynamic theory of human motivation, which is based on the fact that the actions performed by people develop from an innate motivation to satisfy their needs, which are: self-fulfillment needs, recognition needs, social needs, security needs, and physiological needs. Later, the American economist McGregor (1966) carried out the "Theory X and Y", where: Theory X is based on incorrect convictions about human behavior; and, in Theory Y, company managers believe that employees need to work. Next, Ajzen and Fishben (1980) carried out the Theory of Reasoned Action (TAR) model, being an important contribution to the study of human behavior and determines the intention to do or not to do an action is a balance between what an individual thinks he should do (attitude) and the own perception of what the rest of people think he should do (subjective normal). That is why, human beings, before performing an activity, design it beforehand, and if this action becomes habitual or routine, people tend to do it automatically (Ajzen, 1985). Thus, TPB is used in research to examine intentions to perform behaviors of different types based on attitudes toward behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). Also, Ajzen and Fishbein (2000) mention that people's attitudes are spontaneously and consistently derived from beliefs accessible in memory and then guide the corresponding behavior. The TPB emphasizes that human behavior is guided by three types of considerations: behavioral beliefs, normative beliefs, and beliefs of control (Ajzen, 2019). On the other hand, Willis et al. (2020) mention that people's behavior and perceived social norms are important when consuming a product. Therefore, through the Theory of Planned Behavior, we proceeded to analyze the behavior of households in the city of Loja regarding food waste during the pandemic. It should be noted that food waste is the reduction in the quality or quantity of food, caused by the activities and decisions made by food suppliers and consumers (Food and Agriculture Organization of the United Nations [FAO], 2022). Food wastage occurs because households usually buy and prepare more food than should be consumed in general, this is because people do not make a shopping plan and that is when people have to waste food in households (Hatice and Celil, 2022).

2.2 Empirical evidence

Recent research has analyzed the effect of COVID-19 on food waste during the pandemic in different countries around the world, where authors such as Ellison and Kalaitzandonakes (2020) mention that COVID-19 confinement has caused massive suspensions in the food system, from the farm to the household table; in the case of producers, they suffered, during the confinement, increased food waste in the food service sector. Similarly, Jribi et al. (2020), claim that during the confinement by COVID-19, people improved their food purchasing habits and changed their behavior regarding food waste, having a shopping plan, adequate storage and not buying food in excess. It should be emphasized that the amount of food thrown away, despite being edible, has become alarming in both middle and high-income countries, since, consumer behavior at the time of purchase is one of the main things that causes food waste (Lahath et al., 2021). During the pandemic, several people suffered the consequences of COVID-19, such as income reduction, unemployment, product shortages and price increases, and this caused changes in household behavior, decreasing food wastage (Vittuari et al., 2021). Also, the impact of the pandemic has led to older and younger people becoming more aware of the environmental consequences of food waste (Burlea-Schiopoiu, 2021). In addition, in a study conducted in Canada, Everitt et al. (2022) conducted a survey of 100 households belonging to the city of London, Ontario, and it was observed that, on average, each household 2.81 kg of food was wasted and sent to landfill weekly, where, 52% was classified as avoidable food waste and the remaining 48% as unavoidable food waste. In another survey of 19 households in Guelpg, Canada, they concluded that

an increase in food waste is related to households cooking more frequently and consumers buying more food per trip, and social norms may be a key factor in helping households make changes in their food waste behavior (Laila et al., 2022). COVID-19 caused a large part of German inhabitants not to implement food waste reduction measures since the onset of the pandemic, and a small part did; likewise, they changed their food purchase planning, being more aware of the volume of production and the reduction of menus offered (Strotmann et al., 2022). The measures and restrictions imposed by the authorities in Mexico caused Mexican households to change their household culinary traditions and, although they increased their monetary expenditure on food, there was a positive change in their behavior to reduce food waste (Vargas-López et al., 2022).

3. Materials and methods

3.1 Data processing

The data used in this research were obtained through a survey conducted in the research project 45 - DI - FJSA- 2021, named "Effect of the outbreak of COVID- 19 in the environmental practices of households in the city of Loja", conducted by the National University of Loja. The purpose of this survey is to analyze how COVID-19influenced the behavior and habits of households in the city of Loja during the pandemic. Therefore, the following variables were taken into account: as a dependent variable, food waste; as an independent variable, COVID-19; and as control variables, social norms and environmental awareness. The purpose of the variables used in this research is to evaluate food wastage in households during the pandemic, and thus verify whether the amount of food wasted increased or decreased. It should be noted that these variables are related to the theory used in the research, the Theory of Planned Behavior (TPB). Table 1 below shows the name of the variables used in the research, their notation and unit of measurement.

Table 1. Description of variables

Variables		Notation	Mean Unit	Description	Data source
Dependent	Food waste	DA	Categorical	Reduction in the amount of food consumed by consumers.	Research Project 45 - DI - FJSA - 2021.
Independent	COVID-19	COVID19	Categorical	It is a type of coronavirus called SARS-CoV-2	Research Project 45 - DI - FJSA - 2021.
Variables of Control	Social norms	NS	Categorical	It is the set of rules, actions, and tasks that the population must do for a better coexistence.	Research Project 45 - DI - FJSA - 2021.
	Environmental awareness	CA	Categorical	It is the philosophy of life to care for and protect the environment in order to maintain and conserve it in the present and in the future.	Research Project 45 - DI - FJSA - 2021.

Source: own elaboration

Table 2 shows the characteristics of the sample surveyed for research project 45-DI-FJSA-2021. This shows that the female sex represents the highest percentage of respondents (51.3%). In the section on level of education, the vast majority of the people surveyed (48.44%) have third level education; also, the highest average income is for people with fourth level education ($1759) and the lowest is for people with primary education ($535). It is also observed that the average age of the people surveyed is 35 (male) and 34 (female) years old. On the other hand, it should be noted that 42.75% of the people surveyed are married, while 45.34% are single. Regarding the place of residence, 24.62% live in Sucre parish, 23.57% in El Valle, 20.21% in Punzara, 18.13% in San Sebastián, 9.33% in El Sagrario and 4.14% in Carigán. Finally, more than half of the respondents own their homes (56.91%), and the rest rent (31.98%) or live in borrowed housing (11.11%).

Table 2. Characteristics of the sample

Variables		Sample percentage	Average age	Average income
Sex	Male	48,70%	35	1200
	Female	51,30%	34	1074
Level of Education	Middle School	3,37%	48	535
	High School	23,06%	31	722
	Third level	48,44%	34	1032
	Fourth level	25,13%	39	1759
Marital status	Single	45,34%	25	873
	Married	42,75%	44	1460
	Widowed	0,52%	55	325
	Free Union	3,87%	30	935
	Separated	0,26%	59	1000
	Divorced	7,25%	40	971
Parish where you reside	Carigan	4,14%	37	794
	El Sagrario	9,33%	36	764
	Valley	23,57%	32	1422
	Punzara	20,21%	38	1169
	Saint Sebastian	18,13%	36	1342
	Sucre	24,62%	34	883
Number of members that make up the household	1 to 3 members	39.67%		1052
	4 to 6 members	54.62%		1227
	More than 6 members	5.71%		817
Housing type	Own	56.91%		1332
	Leased	31,98%		792
	Borrowed or transferred (does not pay)	11.11%		1112

Source: own elaboration

3.2 Econometric strategy

In this study, partial least squares structural equation modeling (PLS- SEM) was used to analyze the incidence of COVID-19, social norms and environmental awareness on food waste in households in the city of Loja during the pandemic. This structural model was used to test whether the hypotheses posed are fulfilled or rejected. The model contains two different types of variables: the latent variables (LV), which is comprised of the dependent variable (endogenous), and the independent variables (exogenous); and, the observable variables (OV) which are the questions or indicators of the survey to be conducted to households in the city of Loja (Martinez and Fierro, 2018). That is why, the PSL-SEM model is divided into two parts: 1) the measurement model and 2) the valuation of the structural model. In the first section of the measurement model, we proceeded to evaluate several parameters of each variable and item of the research. So, through the PLS algorithm of the SmartlPLS3 software, it was determined whether the observable variables (VO) and the constructs comply with these parameters. Such evaluated parameters are the following: individual reliability is analyzed by means of simple correlation, and the loading or factorial load (λ) of each item must be greater than or equal to 0.707 (Carmines and Zeller, 1979); construct reliability is evaluated by means of simple correlation, and the loading or factorial load (λ) of each item must be greater than or equal to 0.707 (Carmines and Zeller, 1979); construct reliability is evaluated by means of simple correlation (Carmines and Zeller, 1979). measured through the Cronbach's alpha coefficient (CA) and the composite construct reliability (CR) and their coefficients must be greater than 0.7 (Nunnally, 1978); convergent validity occurs when the Average Variance Extracted (AVE) is greater than 0.5, and, if the square root of the AVE of the latent variables (VL) and have a high correlation between the constructs, there is discriminant validity (Fornell and Larcker, 1981), in the same way, the Heterotrait-Monotrait correlations (HTMT) serve to analyze discriminant validity and their values should be less than or equal to 0.9 (Hair et al., 2017); and, a multicollinearity test is performed using the calculation of the variance inflation factor (VIF), which, its value obtained should not be greater than 3.3 (Diamantopoulos and Siguaw, 2006). In the second section, once the measurement tests have been carried out, using the Bootstrapping method and by means of the standardized Path coefficients, the valuation of the structural model is obtained. Thus, in this section, it is identified whether the hypothesis raised in this objective is accepted or rejected, for this, it must be analyzed whether the relationship between the endogenous and exogenous variables is consistent or not, through the values of the coefficient (β) and the p-value (p) of the standardized parameter estimation, Thus, the value of ß indicates the incidence of the independent

variable (COVID-19) on the dependent variable (food wastage), and the p-value (*p*) indicates whether the relationship between these two variables is significant (Chin, 1998). It should be emphasized that previously three coefficients are examined: RMS_theta, SRMR and the effect(f2). The RMS_theta coefficient is responsible for measuring how the residuals of the external model are correlated and the measurement value must be less than 0.12 to indicate that the model is well adjusted (Henseler et al., 2014); subsequently, through the standardized root mean square residual (SRMR), we proceed to assess the differences between the observed and expected correlations, and its value should have a value less than 0.1 (Hu and Bentler, 1999); and, the effect (f2), indicate what type of effect the exogenous LV has on the dependent variable; if the effect is small, the value obtained should be greater than 0.02 and less than 0.35; if the effect is medium, its value is greater than 0.15 and less than 0.35; and, if the effect is large, its value should be greater than 0.35. These indices serve to affirm that the model has adequate adjustments. Therefore, in order to verify whether the hypotheses are fulfilled or not, the model was divided into three specific hypotheses; 1) COVID-19 increases food wastage; 2) social norms decrease food waste; and 3) environmental awareness decreases food waste. To indicate that the general hypothesis of the study is fulfilled, at least, consistency must be obtained in specific hypotheses 2 and 3.

4. Discussion of results

To examine the effect that other factors (environmental awareness and social norms) and COVID-19 had on food wastage in households in the city of Loja during the pandemic, we indicated whether there is a correlation between the indicators and constructs and also assessed the factor loadings. Table 3 shows that most of the factor loadings are greater than 0.707, which means that each item has a strong linear relationship with the construct to which it belongs, but it should be noted that question 7 was excluded from the food waste construct; in the COVID-19 section, questions 4 and 8 were discarded; in the social norms construct, question 6 was eliminated; and for environmental awareness, question 4 was eliminated. The AVE value of all the constructs is greater than 0.5; therefore, a large part of the variance of the constructs is given by their questions.

Table 3. Tests of the reliability and validity of the model with control variables

Variable	Notation	Questions	Factorial load	CA	AVE	CR
Food waste	DA	DA-34	0,831	0,876	0,758	0,806
		DA-35	0,861			
		DA-36	0,847			
		DA-37	0,911			
		DA-38	0,804			
		DA-39	0,809			
COVID-19	COVID-19	COVID19-1	0,917	0,897	0,747	0,832
		COVID19-2	0,903			
		COVID19-3	0,805			
		COVID19-5	0,847			
		COVID19-6	0,729			
		COVID19-7	0,916			
Social Standards	NS	NS-1	0,823	0,802	0,765	0,816
		NS.2	0,893			
		NS-3	0,867			
		NS-4	0,825			
		NS-5	0,864			
Environmental awareness	CA	CA-1	0,942	0,806	0,885	0,815
		CA-2	0,798			
		CA-3	0,827			
		CA-5	0,901			
		CA-6	0,941			

Source: own elaboration

In addition, a collinearity assessment was performed in Table 4 to ensure that the independent LVs

are not similar and to verify that no problems will be found when measuring the effects of each of the independent constructs on the dependent variable. Through the VIF it is observed that there is collinearity and to know how much the variance of a construct increases due to collinearity. Thus, if the VID value is less than 3.3 there is no collinearity. In this context, the constructs COVID-19, social norms and environmental awareness have a VIF value lower than 3.3, therefore, there is no collinearity.

Table 4. Collinearity test

Construct	VIF
COVID19	1,862
NS	1,809
CA	1,925

Source: own elaboration

Next, using the Fornell and Lacker test, discriminant validity was determined to observe that the square root of the individual AVE or variance, which are located diagonally and in bold in Table 5, have a higher value than the correlations between each of the constructs, which means that it has discriminant validity.

Table 5. Fornell and Lacker (1981) discriminant-criterion validity test for food waste, COVID-19, social norms and environmental awareness.

	Food waste	COVID-19	Social norms	Environmental awareness
Food waste	0,897			
COVID-19	0,678	0,912		
Social norms	0,589	0,568	0,903	
Environmental awareness	0,745	0,725	0,637	0,902

Source: own elaboration

In Table 6, the Heterotrait-monotrait ratio (HTMT) discriminant validity test was performed, which verifies that there is a weak correlation between the constructs, since its value is less than 0.9 and each construct has a different effect compared to the others.

Table 6. Discriminant validity test: Heterotrait-monotrait ratio (HTMT), for food waste, COVID-19, social norms and environmental awareness.

	Food waste	COVID-19	Social norms	Environmental awareness
Food waste				
COVID-19	0,8301			
Social norms	0,7925	0,7847		
Environmental awareness	0,6241	0,8312	0,8058	

Source: own elaboration

Subsequently, it is analyzed whether the structural model has an appropriate fit, therefore, the values of: f^2, indicates whether the exogenous constructs have a small $(0,02 \leq f^2 < 0,15)$, medium $(0,15 \leq f^2 < 0,35)$ or large $(f^2 > 0,35)$ effect on the dependent variable; SMR, shows the inequalities between the observed and expected correlations, therefore, the value obtained must be less than 0.1 to verify whether the model has a good adjustment; and, RMStheta, allows observing whether the model is well adjusted. Thus, Table 7 shows that the f^2 values of the COVID-19 construct has a small effect, since its value is 0.135; social norms have an average f^2 of 0,284; likewise, environmental awareness has an average f^2 of 0,291. The SMR of the model is 0.087, therefore, if there is an adequate adjustment. Finally, the RMStheta value is 0.102, confirming that the model is correctly adjusted.

Table 7. Structural model fit

Construct	f^2	SRMR	RMStheta
COVID-19	0,135		
Social norms	0,284	0.087	0.102
Environmental awareness	0,291		

Source: own elaboration

Finally, in Table 8, it is shown that COVID-19 ($\beta = 0.256$; $p = 0,052$), environmental awareness ($\beta = -0,234$; $p = 0,023$) and environmental consciousness ($\beta = -0,419$; $p = 0,063$) have a significant value. Therefore, as in specific objective 2, it is evident that COVID-19 significantly increases food waste in homes in the city of Loja, on the other hand, the opposite happens with social norms and environmental awareness since these factors helped to reduce food wastage in households during the pandemic. As observed in Table 3, the connection of the independent variable and the control variables with the dependent variable is significant since their values are less than 0.10. Therefore, the general hypothesis is mostly fulfilled, since, the other factors, social norms and environmental awareness decreased food wastage in the city households during the pandemic. In contrast, COVID-19 increased household food waste.

Table 8. Estimation of the standardized parameter for the structural model with control variables

Hypothesis	Connection	Coefficient (β)	P-value (p)	Decision
H1	COVID19 → DA	0.256*	0.052	Consisten
H2	NS → DA	-0.234**	0.023	Consisten
H3	CA → DA	-0.419*	0.063	Consisten

Note: ***p< 0.001; **p< 0.05; *p< 0.10
Source: own elaboration

As can be seen in the results obtained, COVID-19 has a positive and significant impact on food waste in Loja's households. On the other hand, social norms and environmental awareness helped to reduce food waste. The results obtained are consistent with the research conducted by Vargas-López et al. (2022), who indicate that the measures and restrictions imposed by the authorities caused household behavior to change and, consequently, food wastage decreased. Likewise, Laila et al. (2022) mention that social norms are an important factor in changing household habits to decrease food waste. Social norms and environmental awareness were important for the reduction of food wastage, Babbit et al. (2022) indicate that since food planning and good food storage by consumers changed their food behavior, and they considered continuing these activities after confinement. According to Jribi et al. (2020), they mention that one of the positive things about confinement is that people changed their behavior regarding food waste, making purchase plans, adequate food storage and not buying excess food. Consumer behavior is important since Lahath et al. (2021) indicated that in middle- and high-income countries, people throw too much food in the trash, which is alarming since food waste will be greater; therefore, it is important that the authorities in all regions apply social norms that the population abides by, in the same way, environmental awareness is fundamental, because consumers must take into account that wasting food not only affects the economic and social aspects but also the environment. It should be noted that, as mentioned by Mejía et al. (2021), food waste has become a challenge for the sustainable development of a region, due to it tends to negatively affect the economy of consumers, causes the loss of natural resources and, when food is thrown in the trash, it can lead te generate greenhouse gases, therefore it is fundamental that the environmental awareness of consumers must be improved, as this will help to reduce pollution in the environment. As in the research mentioned above, Acevedo-Navas and Osorio-Romero (2022), agree with the results obtained from this research, since they mention that social norms are fundamental to reduce food waste, where they highlight that the change in purchasing and food consumption habits helped to

mitigate food waste during the COVID-19 pandemic. On the other hand, in countries that practice Ramadan, Allahvari et al. (2022), tell us that the households of this population had significant changes when buying food and, therefore, decreased spending on food, especially in the month of Ramadan. Likewise, Iranmanesh et al. (2022); Theodoridis and Zacharatos (2022) also mention that the behavior of households had significant changes at the time of buying and preparing food, since, food waste has negative economic, social and environmental impacts, that is why consumers implemented shopping and cooking plans to store food that will be used and waste less food. According to Bogevska et al. (2022) cereals, bakery products, fruits, vegetables and dairy products are the foods that are usually wasted the most, especially in the pandemic, since, by closing the doors of several food-services, food was discarded. Finally, Principato et al. (2022) indicate that consumers who accepted and took food handling practices responsibly, helped considerably to not increase food waste during the pandemic, also, Vargas-López et al. (2022) indicate that, although the price of some foods increased their value, there was a positive change in the behavior and habits of consumers to reduce food waste in the confinement and thus large amounts of fresh food are not discarded.

5. Conclusions

During the COVID-19 pandemic, the food behavior of households in the city of Loja was not the most adequate, since most of the respondents mentioned that they always leave food leftovers on their plates after their meals and do not have a shopping plan or meal plan. Therefore, by having inadequate behavior with food, food waste tends to increase. Thus, either during the pandemic or after it, it is important that the people who make up the households of the city of Loja have a meal plan, so they can properly calculate the amounts that each person should eat and avoid overcooking. It is also recommended to store leftover food for use at another time. Some good aspects were the restrictions and norms implemented by the authorities to prevent the spread of COVID-19, so it is important that the authorities find mechanisms for the population to be prepared for any social upheaval that may occur in the future. In addition, it is recommended that the population continue to comply with the norms imposed by the authorities and, above all, that the state establish information systems so that the population can act correctly in the event of any social upheaval that may occur. The environmental awareness of households in the city of Loja helped significantly to reduce food waste during the pandemic. It is important that people have been made aware of the environmental consequences of food waste, such as greenhouse gas emissions. Also, environmental awareness is important for consumer food behavior thus it is recommended that governments initiate awareness campaigns to encourage people to maintain good food management practices. Likewise, consumers are advised to check the expiration date before buying food, since failure to check this date can generate throwing food in the trash, which implies an increase in food waste and environmental pollution.

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