

Food and Nutritional Insecurity before and during the COVID-19 Pandemic in Households of Women Belonging to a Social Program

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Abstract

Introduction: According to the National Health and Nutrition Survey, the Mexican households in 2018 had food insecurity at 55.5% while in 2012 it was 70%. Food insecurity is a global health problem and now with the COVID-19 pandemic, it has increased. **Objective:** To compare the levels of food and nutritional insecurity in women's households from two Social Impulse Centers of the Secretary for Human Social Development (SEDESHU) before and during the COVID-19 pandemic. **Methods:** A comparative and cross-sectional study was carried out in 41 women participating in a nutritional intervention program in two social promotion centers. Food security was measured with the Latin American and Caribbean Food Security Scale (ELCSA), comparing it in a period from January to April 2020: before and during the health contingency. Socio-economic and demographic variables were also measured, as well as access to water during the COVID-19 pandemic. **Results:** Food insecurity levels during the COVID-19 contingency were found to have increased by more than 60% (from 31.7% to 93%); the main risk factors associated with unemployment and access to healthy food. The COVID-19 contingency reflects impacts on households, but because women participated in the nutritional intervention program, it could influence by observing that, at least, the use of food was adequate since apparently food waste was minimal. **Conclusions:** The implementation of an educational nutrition program can be a strategy in the face of contingencies or extraordinary situations. In this way, the negative impact could be less in the population that does not have any type of food education.

Keywords

Food Insecurity, Access Water, Loss Employment, COVID-19, Social Programs

1. Introduction

Food security is considered when everyone, always, has constant and permanent access to a nutritious and culturally acceptable diet, which presents the key nutrients that make up proper development and growth [1]. More than 820 million people suffer from hunger in the world, and nearly 2 billion people suffer from some type of food insecurity. At the global level, food insecurity in Latin America and the Caribbean went from 4.7% to 6.4% in three years [2]. Lack of access to food increases the risk of presenting poor nutrition, either due to deficiency or excess, the latter through access to energy-dense foods, decreasing their health and quality of life [3].

In our country, according to the National Health and Nutrition Survey (ENSANUT), food insecurity in 2012 was 70% in Mexican households. Although for 2018 it was 55.5%, food insecurity still prevails in just over half of the country [4]. In Guanajuato, 27.3% of the population presented some type of Food Insecurity (FI) [5]. In order to provide Social Food Assistance to vulnerable and marginalized groups, the State government acts through three Food Attention Programs (FAP), with different modalities: a) School breakfasts (hot and cold modality); b) Food Assistance to vulnerable subjects; c) Food care for children under five at risk, not in school. The FAP in the State of Guanajuato is aligned with the 2040 State Development Plan, which seeks to strengthen the development and capacities of primary care groups and, “ensure the conditions for full and equal development in of the priority groups of the State” [6].

Food and nutrition security is not enough without measuring water security. Access to water not only includes the empirical supply, but also includes access to public and safe services. According to the World Health Organization (WHO), around 1.1 billion people lack access to drinking water, in addition to this, there are about 4000 cases of diarrhea in the world, of which, 88% are attributed to the consumption of unhealthy water and poor sanitation [7].

Like malnutrition, Chronic Degenerative Diseases (CDD) has been found to be present in FI environments, where high blood pressure (HBP) and Diabetes Mellitus Type 2 (DM2) are increasingly common. In Mexico, the prevalence of these comorbidities is 26.7% on people over 70 years of age and, 19.5% in the 20-year-old population respectively [4].

Furthermore, overweight and obesity have been related to levels of food insecurity, in a recent study by Morales-Ruán *et al.* where it is pointed out that there is a significant association between the Body Mass Index (BMI) and mild Food Insecurity (MFI) [8]. At the national level, people aged 20 years and over who were overweight and obese in 2018 were 75.2% of the Mexican population, in

2012 this figure was 71.3% [4]. However, overweight and obesity are not the only factors associated with and related to food insecurity, because according to the Organization for Economic Cooperation and Development (OECD), women with little or no educational training, are two to three times more likely to be overweight, compared to women who have sufficient educational training [9]. Likewise, in a study carried out in 4338 men and 4172 women, it turned out that social factors are related to both food insecurity and being overweight or obese [10]. In this sense, it is observed that the relationship between the spheres of health, nutrition and education are relevant for the development or not of pathologies, as well as the state of food insecurity, which is closely related.

Another significant factor for presenting food insecurity is economic income. According to ENSANUT 2012, it was found that the highest prevalence of food insecurity is in the lowest quintiles of the well-being line [11]. In 2008, at the beginning of the global economic crisis, the ability of households to purchase food was affected. Food insecurity worsens in contexts that have been affected by protracted crises [12].

With the beginning of the health contingency due to COVID-19, the impact on a global level and especially on the countries of Latin America and the Caribbean, the economic and health fields were affected, because according to figures from the Economic Commission for Latin America and the Caribbean (ELCSA), the growth rate, based on the Gross Domestic Product (GDP) went from 6% to 0.2% [13], likewise, in Mexico, it was estimated that the people living in poverty could increase from 6.1 to 10.7 million in the context of the pandemic [14].

The impact of the COVID-19 pandemic was not only limited to health and the economic sphere, but the channels and production routes were limited in all countries, regardless of whether they are developed, undeveloped or under development growth. The challenges with the pandemic have generated greater poverty, economic and health impacts, so it was sought to integrate evidence about women who participated in a nutritional intervention program and to be an input for key accompaniments in this population group and identify the main risk factors so that they contribute to the explanation of the situation that still exists during the pandemic [15].

The Secretariat of Social and Human Development (SEDESHU in Spanish) of Guanajuato has the purpose of offering an improvement in the needs of the population by locality and family, for 4 years it promoted the development of Social Impulse Centers (SIC) that add 54 centers, to integrate and repair the social cohesion that currently suffers, through education and training, through workshops and talks, as well as social, cultural and sports activities [16].

Therefore, derived from a study carried out in a population of women assigned to SEDESHU in January 2020 entitled "Intervention Program for the Promotion of Food Security in women and their homes who attend two impulse centers" and because of the health contingency, is that it was decided to

measure the impacts on the Food Security (FS) the homes of these women three months after starting the contingency where sociodemographic variables were integrated.

2. Materials and Methods

2.1. Description of the Study Population

In Leon city since 2002 the Municipal Planning Institute (IMPLAN in Spanish) has distributed the town into seven large poverty zones [17], in which the SIC “Nuevo Amanecer” and “Villas de San Nicolás” are located. The area is located to the southeast of the municipality of León, which in 2010 was classified as having high levels of marginalization, but a low degree of social backwardness [5]. Mainly, the population that attends and participates in the SIC presents social disarticulation in some of the neighborhoods, from antisocial attitudes at the family and community level, as well as the limitation of the population to access information and training [18]. Therefore, social vulnerability is higher in areas classified as marginalized, thus being the main indicator for establishing community and recreation centers.

An analytical, comparative and cross-sectional study was carried out in 40 female heads of household over 18 years of age belonging to two SEDESHU Social Impulse Centers in the State of Guanajuato, who were participating in the intervention program “*Promotion of Food Safety in the women and their homes who attend the SIC Nuevo Amanecer and Villas de San Nicolás*”, which should have had 80% adherence to this program at the time, being adapted to virtual program before the contingency, have the initial information on food and nutritional security in their complete files regarding the initial evaluation of food security, to accept participate and to answer the survey. The sampling was of consecutive cases, the initial sample size was 100 of the Promotion Project, but only 43 participants completed the criteria.

During the health contingency in April, a survey was generated through the Google Forms® platform. The Latin American and Caribbean Food Security Scale (ELCSA) and an Access to Water survey [7] were integrated into the virtual survey. Authorization was requested to participate of the women in the study “Program for the Promotion of Food Security in women and their homes who attend the SIC Nuevo Amanecer and Villas de San Nicolás: an intervention project”, through a declaration of confidentiality of the data described in the virtual survey.

The variables that were counted prior to the present study were general data (age, education, SIC belonged), ELCSA, monthly family income, frequency of meals, loss of employment, hand washing and health services.

For the second moment, during the application of the virtual survey, variables that were not at the beginning were obtained: people living at home, food awareness, food waste, weight perception and emotional vulnerability. The pre-selection or recruitment process diagram is shown below (Figure 1).

2.2. Food Security

Food security was measured with the Latin American and Caribbean Food Security Scale (ELCSA), where it is classified as severe food insecurity with a result of 7 to 8 points in households composed of adults and of 11 to 15 points in households made up of adults and minors under 18 years of age; moderate insecurity at a score of 4 to 6 or 6 to 10, in households composed of adults and in households where children under 18 also live, respectively; mild insecurity, at a score of 1 to 3 in households made up of adults and 1 to 5 in households made up of adults and those under 18 years of age; A level of food security was considered for results of 0 points. In addition to food insecurity, the sociodemographic characteristics and other variables were evaluated as shown in **Table 1**, as well as the specification of the variables that were obtained from the beginning and those that were only during [13].

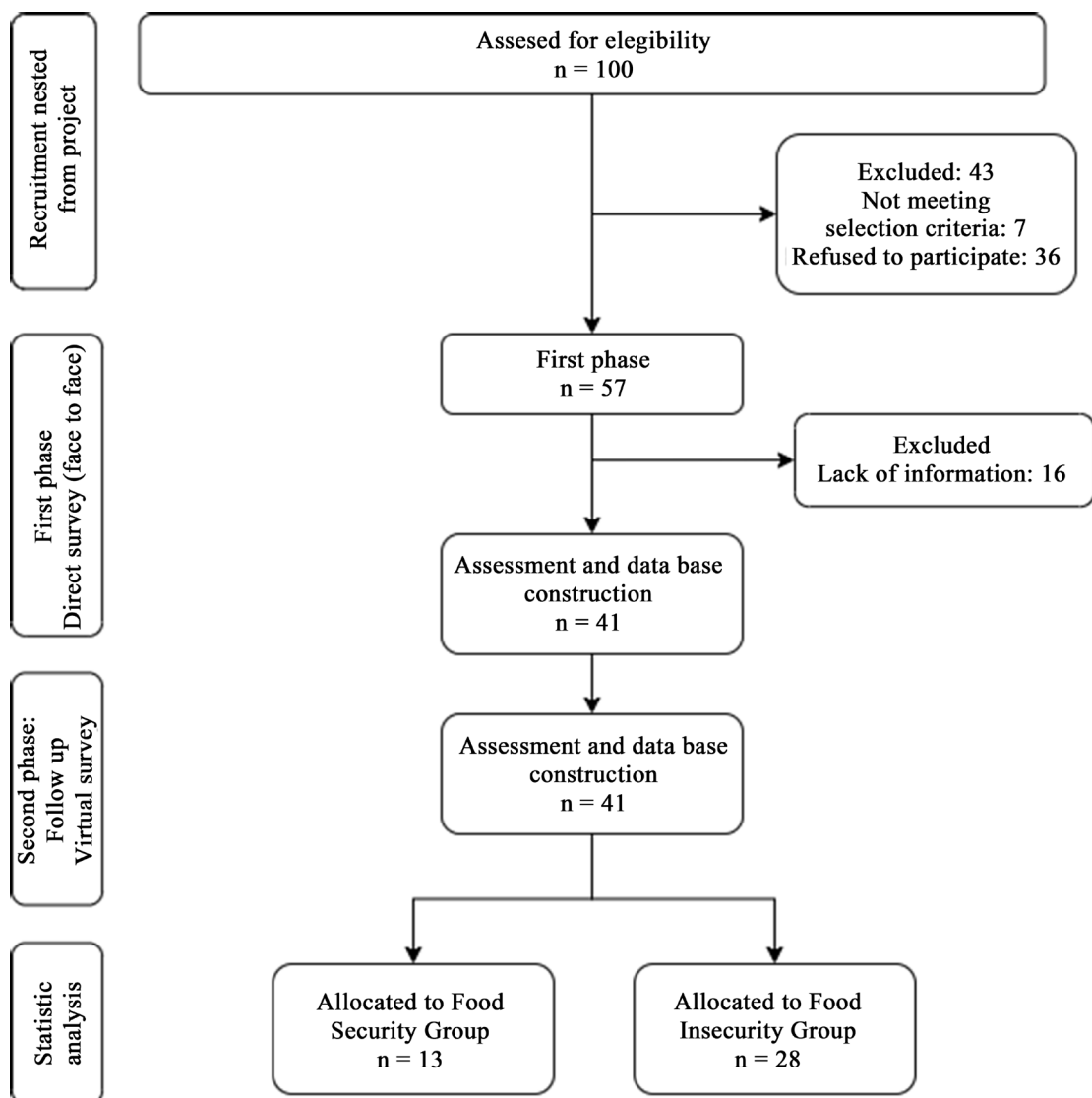


Figure 1. CONSORT flow diagram.

Table 1. Variables definitions.

Variables	Definition	Variable VBD ^a o VD ^b
Food security	It is the physical and economic access, to enough safe and nutritious food, within the last three months.	VBD
Water security	It refers to access to drinking water services within the home or dwelling.	VD
Level of education	Last school grade that was successfully completed according to the Secretary of Public Education (SEP): a) Elementary school b) Middle school c) Elementary school d) College university e) Postgraduate	VBD
Public health services	Access to public or private health services: a) IMSS b) ISSSTE c) Seguro Popular d) PEMEX e) Private sector	VD
Family economic income	Net income that the family receives monthly from: a) Less of 3000 mexican pesos b) Between 3000 to 5000 mexican pesos c) More than 5000 mexican pesos	VBD
Loss of employment job due to contingency	Derived from the contingency, due to lack of income, the employment job was lost.	VD
Body weight increase by contingency	Subjective perception of body weight lost/gained during the contingency compared to the previous three months.	VD
Food consumption during contingency	Choice of food during contingency: industrialized products, sugary and alcoholic beverages.	VD
Hand washing	Subjective perception of the frequency of hand washing compared to before and during the health contingency.	VD

a. VBD = Variables that are counted before and during contingency, b. Variables only during contingency.

2.3. Loss of Employment Due to Contingency

Derived from the contingency, due to lack of money or resources, the employee was terminated from his job.

2.4. Ethical Aspects

This study, which is derived from a macro study, was registered with the Ethics and Research Committee of the Maternal and Child Hospital of León, Guanajuato with number CEI 10/2020. The research was carried out respecting the ethical principles and scales of a low-risk investigation, but informed consent was applied, which is considered in the Official Mexican Standard NOM-012-

SSA3-2012, which establishes the criteria for the execution of research projects for human health.

2.5. Statistical Analysis

Descriptive and inferential statistics were applied to qualitative variables as percentages. To carry out the comparisons, chi-square, calculation by proportions was applied. Odds Ratio analysis was applied for the analysis of the main risk factors associated with the presence of food insecurity. An 80% power was considered with an alpha of 0.05 in cursive form. Graphs and tables were used.

3. Results

The average age of the women in each family was 40 ± 5.6 (range 32 to 52 years). A 9.7% had elementary school, a 70.3% completed middle school and 19.5% high school. Food insecurity before the COVID-19 pandemic was 68% while during the COVID-19 contingency increased to 92% (Table 2). A significant difference ($p = 0.00079$) to compare food insecurity per Social Impulse Center (SIC) (Analysis with *Two proportions*), SIC “Villas de San Nicolás” and SIC “Nuevo Amanecer” (Table 2).

Regarding the responses of the applied food safety scale (ELCSA) before and during the contingency, they are presented in Table 3 and Table 4, where the questions that presented a significant difference were “*Did anyone stop having a healthy diet in their home and balanced?* ($p < 0.006$), *Do you or an adult in your household feel hungry, but did not eat?* ($p < 0.012$), *Has anyone under the age of 18 in your household stopped having a healthy and balanced diet?* ($p < 0.002$) and *Did anyone under the age of 18 in your household eat a diet based on a few types of food?* ($p < 0.017$).”

Variables That Were Measured Only during the Contingency

Water access

Regarding access to water, during the contingency, 68% of the women in the family mentioned not having water in their home, and of this which 53.6% reported lack of access to water.

Table 2. Levels of food security and insecurity and comparison by period before and during the COVID-19 contingency.

		FS (n%)			FI Mild (n%)			FI Moderate (n%)			FI Severe (n%)		
		B*	D**	<i>p</i>	B	D	<i>p</i>	B	D	<i>p</i>	B	D	<i>p</i>
Total household	SIC VSN n = 8	2 (4.87)	1 (2.43)	0.00079	2 (4.87)	4 (9.75)	0.00504	2 (4.87)	2 (4.87)	0.00053	2 (4.87)	1 (2.43)	0.025
	SIC NA n = 33	11 (26.82)	2 (4.87)		10 (24.39)	20 (48.78)		12 (29.26)	7 (17.07)		0	4 (9.75)	

FS: Food security; MLFI: Mild Food Insecurity; MFI: Moderate Food Insecurity; SFI: Severe Food Insecurity. SIC-VSN: Social Impulse center—Villas de San Nicolás; SIC-NA: Social Impulse Center-Nuevo Amanecer. * B = Before; D** = During.

Table 3. Comparison of the scale (ELCSA) questions by Social Center Impulse (SIC).

Questions	Affirmative answer		
	Before (%)	*During (%)	p
1. Did you worry that food would run out in your home?	24 (58.53)	35 (85.36)	0.655
<i>SIC VSN</i> (<i>n</i> = 8)	5 (21)	6 (17)	0.248
<i>SIC NA</i> (<i>n</i> = 33)	19(79)	29 (83)	0.058
2. Was there no food in your home?	6 (14.63)	9 (21.95)	0.742
<i>SIC VSN</i> (<i>n</i> = 8)	3 (50)	1 (11)	0.078
<i>SIC NA</i> (<i>n</i> = 33)	3 (50)	8 (89)	0.18
3. Did you stop having a healthy and balanced diet in your home?	19 (46.34)	13 (31.70)	0.006*
<i>SIC VSN</i> (<i>n</i> = 8)	5 (26.3)	3 (23)	0.092
<i>SIC NA</i> (<i>n</i> = 33)	14 (73.7)	10 (77)	0.004 *
4. Did you or any adult in your household eat a diet based on a small variety of foods?	17 (41.46)	18 (43.90)	0.338
<i>SIC VSN</i> (<i>n</i> = 8)	4 (23.5)	4 (22.2)	0.355
<i>SIC NA</i> (<i>n</i> = 33)	13 (76.5)	14 (77.8)	0.003 *
5. Did you or an adult in your household stop eating breakfast, lunch, or dinner?	4 (9.75)	10 (24.39)	0.242
<i>SIC VSN</i> (<i>n</i> = 8)	0	2 (20)	-
<i>SIC NA</i> (<i>n</i> = 33)	4 (100)	8 (80)	0.021 *
6. Did you or any adult in your household eat less than you should?	7 (17.07)	15 (36.58)	0.638
<i>SIC VSN</i> (<i>n</i> = 8)	2 (28.5)	3 (20)	0.092
<i>SIC NA</i> (<i>n</i> = 33)	5 (71.5)	12 (80)	0.086
7. Did you or an adult in your household feel hungry, but did not eat?	7 (17.07)	9 (21.95)	0.012*
<i>SIC VSN</i> (<i>n</i> = 8)	3	1	0.172
<i>SIC NA</i> (<i>n</i> = 33)	4	8	0.51
8. Did you or an adult in your household only eat once a day or did you stop eating all day?	1 (2.43)	4 (9.75)	0.746
<i>SIC VSN</i> (<i>n</i> = 8)	1	0	0.388
<i>SIC NA</i> (<i>n</i> = 33)	0	4	-

**During contingency*; SIC VSN: Social impulse Center “Villas de San Nicolás”; SIC NA: Social Impulse Center “Nuevo Amanecer”. *Analysis by proportions, significance value $p < 0.05$.

Table 4. Household food security with children under 18 years of age before and during the COVID-19 contingency.

Question	Affirmative questions		
	Before (%)	*During (%)	p
9. Has anyone under the age of 18 in your household stopped having a healthy and balanced diet?	13 (31.70)	14 (34.14)	0.002*
<i>SIC VSN</i> (<i>n</i> = 8)	2 (15.3)	3 (21.4)	0.355
<i>SIC NA</i> (<i>n</i> = 33)	11 (84.7)	11 (78.6)	0.052
10. Did anyone under the age of 18 in your household eat a diet based on a small variety of foods?	11 (26.82)	19 (46.34)	0.017*
<i>SIC VSN</i> (<i>n</i> = 8)	1 (9)	4 (21)	1
<i>SIC NA</i> (<i>n</i> = 33)	10 (91)	15 (79)	0.120

Continued

11. Has anyone under the age of 18 in your household stopped having breakfast, lunch or dinner?	4 (9.75)	7 (17.07)	0.667
<i>SIC VSN</i> (<i>n</i> = 8)	3 (75)	1 (14.2)	0.172
<i>SIC NA</i> (<i>n</i> = 33)	1 (25)	6 (85.8)	0.282
12. Did anyone under the age of 18 in your household eat less than they should?	5 (12.19)	11 (26.82)	0.077
<i>SIC VSN</i> (<i>n</i> = 8)	4 (80)	3 (27.3)	0.159
<i>SIC NA</i> (<i>n</i> = 33)	1 (20)	8 (72.7)	<0.001
13. Did you have to decrease the amount served at meals to anyone under the age of 18 in your household?	4 (9.75)	10 (24.39)	0.976
<i>SIC VSN</i> (<i>n</i> = 8)	3 (75)	3 (30)	0.159
<i>SIC NA</i> (<i>n</i> = 33)	1 (25)	7 (70)	0.272
14. Did anyone under the age of 18 in your household feel hungry, but did not eat?	3 (7.31)	3 (7.3)	0.692
<i>SIC VSN</i> (<i>n</i> = 8)	3 (100)	0	0.084
<i>SIC NA</i> (<i>n</i> = 33)	0	3 (100)	-
15. Did anyone under the age of 18 in your household eat only once a day or did they stop eating for an entire day?	3 (7.31)	2 (4.87)	0.692
<i>SIC VSN</i> (<i>n</i> = 8)	3 (100)	0	0.084
<i>SIC NA</i> (<i>n</i> = 33)	0	2 (100)	-

[§]During contingency; *SIC VSN*: Social impulse Center “Villas de San Nicolás”; *SIC NA*: Social Impulse Center “Nuevo Amanecer”. *Analysis by proportions, significance value $p < 0.05$.

Table 5. Comorbidities presented in the family during the contingency as well as the health service to which it is assigned.

Access to health services	[§] During = 41 (%)
IMSS	19 (46.3)
ISSSTE	1 (2.4)
Seguro Popular	18 (44)
None	3 (7.3)
Main illnesses (comorbidities) in household members	
Allergies	1 (2.4)
Diabetes Mellitus	5 (12)
Hypertension	2 (4.9)
Overweight and obesity	9 (22)

[§]During contingency.

Access to health services and morbidity in household members

A 92.6% have some type of health service where IMSS and the Seguro Popular being the ones with the greatest access. Comorbidities in household members correspond to 70.7% for Type 2 Diabetes Mellitus (**Table 5**).

Family income

The average economic income during the contingency was from \$3000.00 to \$5000.00 Mexican pesos (\$149 - \$248 dollars) per month for 56% of the families

before the contingency, and during the contingency it went to 46.3% of the households. Similarly, prior to the contingency, 17% of the families received less than 3000.00 Mexican pesos, but during the contingency this figure increased to 41.5% of the families. And 27% of the families before the contingency had an income of more than 5000.00 pesos, which during the contingency decreased to 12%.

The average of household members was four to six people before and during the contingency. A 46.3% of the household members lost their job and in 65.8% of the cases, only one of the household members contributed with money. A 95% of the families were not financially prepared and 4.9% had economic stability.

Eating and consumption behavior

A 61% of people limited their purchases during the contingency. And the places of preference for the purchase and acquired their food and supplies in grocery stores near the home and in flea markets (**Table 6**).

Regarding food waste they did not generate food waste with rationalization of food portions.

The main risk factors associated with FI were unemployment ($OR = 1.9$, 95% $IC: 1.04 - 3.58$, $p = 0.047$), children under 18 years of age in the home, elementary school, middle school and high school scholarship, economic income of one or two household members, presence of morbidities (diabetes, hypertension, obesity mainly) in one or more household members. The economic income did not present statistical significance but affects food security (See **Table 7**).

4. Discussion

In the present study, an increase in food insecurity (24%) was found

Table 6. Establishments where families preferred to buy their food.

<i>Establishment</i>	Frequency = 41 (%)
Malls	1 (2.4)
Market	2 (4.8)
Tianguis	10 (24.4)
Grocery stores	11 (26.8)
Malls and tianguis	1 (2.4)
Grocery stores and tianguis	6 (14.6)
Malls and grocery stores	1 (2.4)
Malls, grocery stores and market	1 (2.4)
Malls, grocery stores and tianguis	3 (7.3)
Grocery stores and street trade	3 (7.3)
Grocery stores and market	1 (2.4)
Grocery stores, market and tianguis	1 (2.4)

Table 7. Main risk factors associated with Food Insecurity in households.

Risk factor	Food security n = 13	Food insecurity n = 28	OR*	**CI95%	p***
Children under 18 years of age	13	27	1.037	0.966 - 1.114	0.683
Elementary school	2	2	2.154	0.349 - 13.647	0.377
Middle school	12	21	1.231	0.944 - 1.605	0.194
High school	1	7	0.308	0.042 - 2.249	0.194
Economic income per person	9	18	1.077	0.683 - 1.698	0.523
Economic income of two or more people	4	10	0.862	0.332 - 2.239	0.523
To have a sick family member	5	17	0.633	0.299 - 1.340	0.160
To have two or more sick family members at home	3	7	0.923	0.283 - 3.009	0.610
Unemployment due to contingency	4	18	1.938	1.048 - 3.586	0.047
Income less than 149 dollars (3 thousand pesos).	3	14	1.538	0.957 - 2.474	0.098
Income between 149 to 248 dollars (3 thousand and 5 thousand pesos).	8	11	1.566	0.834 - 2.941	0.160
Income greater than 248 dollars (5 thousand pesos)	2	3	1.436	0.272 - 7.581	0.514
Family member with diabetes mellitus	3	7	0.923	0.283 - 3.009	0.610
Family member with high blood pressure	2	4	1.077	0.225 - 5.149	0.632
Family member with obesity and/or overweight	2	7	0.615	0.148 - 2.564	0.399

*OR = Odds Ratio; **IC = Confidence interval ***Fisher's exact test.

during the pandemic, where the cases that were in mild food insecurity went to moderate and/or severe insecurity. Before the contingency, 31.7% of the participants presented food security and during the contingency it became 7.3%. The COVID-19 contingency has affected the pillars of food safety, which are stability, availability, accessibility, acceptability and consumption, and the biological use of food [19]. Although it is indicated that food production has been on the rise, paradoxically the figures of famine in the world continues to increase. Food production is so "efficient" that approximately 30% of the food produced worldwide is wasted [20].

According to data from ENSANUT [4], food security in Mexico is present in 44.5% of Mexican households, while 22.6% present moderate and severe food insecurity, 32.9% mild insecurity. In the ENSANUT MC-2016, 69.5% of Mexican families presented some type of food insecurity. However, compared to ENSANUT 2012, there were no significant changes in the period from 2012 to 2016 at the national level [8]. In this context, Food Security must be permanent and sustainable, making use of technology and science to maintain the resources of its origin [21] [22].

On the other hand, it is important to mention that the impact of the contingency on food security was observed in the responses of the participants, since those affirmative responses that correspond to making conscious decisions about

food consumption increased in the period contemplated during the contingency. These results are consistent with those found in previous studies, where it is evident how food security is affected during economic crises [23] as well as its duration exacerbates its effects [24].

Food security implies various elements, income, food availability and access, as well as level education, mental health and basic sanitation (security and access to water) [25].

Security and access to water includes to access to public and safe services. A 1100 million people have lack access to drinking water, in addition to this, there are about 4000 cases of diarrhea in the world, of which 88% are attributed to the consumption of unhealthy water and sanitation deficient [7]. In Mexico, food insecurity and water insecurity include serious problems for public health, but, since 2018, there is coverage of access to sewerage and basic sanitation services at 92.8%, still the rate of infant mortality due to diarrheal diseases is 7.3% [26]. According to data from CONAPO, in the state of Guanajuato, 76% of the homes access to water. According to our study, security and access to water were affected during the contingency, which strengthens the evidence on the importance of this item for food security. Despite the challenges that the contingency has presented worldwide, it is necessary to prioritize strategies focused on security and access to water where institutions, governments and civil society participate to protect this human right [27].

Unemployment is a factor that significantly influenced the risk of presenting food insecurity ($p = 0.047$), and although the rest of the factors did not present statistical significance, its presence must be analyzed from a comprehensive perspective, in which a context of social vulnerability that triggers the lack of food security. In this sense, the findings of the present study coincide with those found in the National Survey (ENSANUT) of the characteristics of the population during the COVID-19 contingency: comparative results of the first and second surveys (ENSARS-COV-2), where, In a baseline measurement at the beginning of the contingency, it was found that 27.6% of the participants had lost their job and in a subsequent follow-up to the same sample, this figure increased to 38.2% [28]. During the contingency, 46.34% of household members lost their jobs, which could be one of the most important reasons for the rise in food insecurity. Generally, people who work in services, restaurants or informal commerce, tend to face massive job losses. Initial estimates issued by the International Labor Organization (ILO) indicated a significant increase in unemployment because of the contingency of COVID-19 [29].

The economic conditions are also determined by the area of origin of the people, since within the sample, the heads of households belonging from two areas of the southeast of León city, Guanajuato, which in 2010 have been classified with high levels of marginalization [30]. At the national level, the entities with high indices of food insecurity and poverty are those with a high degree of marginalization and a low index of well-being [31]. To date, there are no refer-

ences that indicate the vulnerability of social isolation and unemployment in relation to food insecurity. However, it can be reaffirmed that economic income is a determining factor of food security [25].

In Mexico, the purchase of food consumes 44.7% of family economic income, the cost of the food basket in our country registered in the current year is 830 dollars (\$1643 Mexican pesos), even though the minimum salary increased 20% since 2019, is still considered limiting to meet the needs of Mexican families. As a result, the levels of food insecurity continue increasing [32].

It is evident that the alteration of the social dynamics around the health contingency fluctuated in the food security conditions of the families ($\chi^2 = 7.7651$). As a result of the above, the increase in food insecurity was 39%. However, it is impossible to marginalize the sample with the results obtained since the data collection was due to an extra-ordinary condition, so hypotheses are valid such as that the previous result is temporary, because within the ELCSA, the questions are aimed at measuring the perception of families regarding the reality of access and availability of food, as well as knowing the food education and possible nutritional risks within the surveyed households for a period greater than three months [8], therefore, the experiences around the present could influence beyond a perspective within the last three months, but rather, in the last weeks prior to the study, reflecting an emergency situation in home. Although food insecurity is a status characterized by the lack of access and availability of food in the last three months, it can be monitored through the acute food insecurity indicator [33].

One of the limitations of the study was the size of the sample that derived from a previous study that may not reflect to complete population, but the socio-demographic characteristics of this study population resemble most of the state of Guanajuato and Mexico according to the ENSANUT (2006 to 2018) and it is reflected in a real and palpable way, the vulnerability of different social groups mainly women and children. "What is measured can be improved", it is necessary to maintain a continuous measurement of food security, as well as health and nutrition, economic and environmental indicators within the different contexts to observe the evolution and the sensitivity of the different dimensions of greater vulnerability in our social environment.

5. Conclusion

The levels of food insecurity during the COVID-19 contingency increased more than 60% (from 31.7% to 93%); the main risk factors associated with unemployment and access to healthy foods. The COVID-19 contingency reflects impacts on households, but because women participated in the nutritional intervention program, it could have an influence by observing that, at least, the use of food was adequate since apparently the waste of Food was minimal, which entails a greater state of awareness regarding the use of food, so the implementation of a Food Support and Orientation Program can be a strategy in the face of

contingencies or extraordinary situations. In this way, the negative impact could be less in the population that does not have any type of food education. This research is an input for the implementation of strategies in favor of Food Safety and Education, turning them into tools to combat the Public Health problems that currently afflict our country: Food Insecurity and the double burden of poor nutrition.

6. Proposals

Being mainly nutritional education an important tool for the self-sufficiency of people in decision-making such as access to food, government institutions could replicate models of nutritional education programs with a focus on well-being, with a multidisciplinary vision, with attention to vulnerable population.

Some strategies to consider in order to advance to the levels of food insecurity in Mexican families.

- 1) Implement long-term Food Educational Programs, consisting of workshops or talks given and directed by nutritionists and dietitians, from the Mexican Education System, as well as in Social Integration Centers.
- 2) Promote Local Commerce, as an economic and sustainable alternative.
- 3) Generate Support Networks or Communities among professionals in the health or related area, with the aim of promoting a culture of prevention.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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