

Effects of the COVID-19 pandemic on food insecurity in El Salvador during 2020

Carlos Ayala Durán

Suggested citation Ayala Durán C. Effects of the COVID-19 pandemic on food insecurity in El Salvador during 2020. *Rev Panam Salud Publica*. 2022;46:e209. <https://doi.org/10.26633/RPSP.2022.209>

ABSTRACT

Objective. This study sought to quantify the prevalence of food insecurity among Salvadorian households, to identify the determinants of food insecurity and to explore the impact of the COVID-19 pandemic on food insecurity.

Methods. A nationwide, representative random sample of 2358 households was used for this cross-sectional study. The Household Hunger Scale (HHS) was used to assess the prevalence of food insecurity during a 30-day period. For comparison, three items were used from the Household Food Insecurity Experience Scale (HFIES), which measures hunger occurring during a 12-month time frame. For determinant analysis, binary logistic regression was used for the HHS and ordered logistic regression for the HFIES.

Results. The prevalence of food insecurity was 6.45% (152/2356) among Salvadorian households when the HHS was used, affecting 5.48% (129/2356) to a moderate degree and 0.98% (23/2356) to a severe degree. The prevalence significantly increased when the HFIES scale items were used, with 35.41% (835/2358) of households being affected, a figure closer to the national poverty level. Determinants of food insecurity according to the HHS included agricultural problems ($P = 0.00$, odds ratio [OR] = 1.69), the household's prepandemic income ($P = 0.00$, OR = 0.48) and higher educational levels (i.e. having a secondary education [$P = 0.00$, OR = 0.31], technical [$P = 0.03$, OR = 0.24] or university education [$P = 0.00$, OR = 0.05]). When using the HFIES, the determinants were similar (i.e. income, agricultural problems, educational level). In more than 94% (744/785) of households, participants reported that food insecurity was exacerbated by the COVID-19 pandemic.

Conclusions. When compared with other relevant international studies, the prevalence of food insecurity identified using the HHS – only 6.45% – was low for El Salvador. However, when using the HFIES scale, the prevalence rose to 35.41% of households. Some determinants align with previous studies, namely income, educational level and agricultural problems. The COVID-19 pandemic appeared to have direct effects on food insecurity

Keywords


Central America; eating; prevalence; regression analysis.

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their preferences and dietary needs for an active and healthy life (1). Societies around the world strive to achieve optimal levels of food security because food insecurity (FI) represents a public health issue. For instance, FI can lead to the prevalence of anemia, mental health issues, clinical depression and suicide (2). Some of the negative consequences of FI can also harm vulnerable groups, such as infants and teenagers,

by affecting their noncognitive skills (e.g. patterns of thought, feelings and behaviors), increasing their chance of developing asthma, reducing their academic performance and affecting their general health outcomes (2, 3).

Although the concept of food security is constantly updated and its meaning has varied over time (4), one of its main, unchanging dimensions is economic access to food. Numerous tools center the importance of economic access in measuring food security, including those published by the United States

Fundación Naturaleza El Salvador, San Salvador, El Salvador ✉ Carlos Ayala Durán, carlos.ayala@ufrgs.br

 This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 IGO License, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited. No modifications or commercial use of this article are permitted. In any reproduction of this article there should not be any suggestion that PAHO or this article endorse any specific organization or products. The use of the PAHO logo is not permitted. This notice should be preserved along with the article's original URL. Open access logo and text by PLoS, under the Creative Commons Attribution-Share Alike 3.0 Unported license.

Department of Agriculture (USDA) (5), the Household Food Insecurity Experience Scale (HFIES) (6), the Household Hunger Scale (HHS) (7) and the Integrated Classification of Food Security (or CIF) (8). It is precisely the economic dimension that has worsened in El Salvador and around the world since the beginning of the COVID-19 pandemic, particularly the indicators relating to income, employment and financial contributions to social security (9, 10). Moreover, global food supply chains have suffered serious disruptions (9), potentially exacerbating FI internationally.

Although all nations have faced major food challenges since 2020, conditions in developing countries can be particularly worrying since socioeconomic indicators are fragile and safety nets are often nonexistent or insufficient. Within Latin America, El Salvador stands out as a country with unique FI challenges.

In 2015, international organizations, such as the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Development Programme, reported that 49.4% of Salvadorian households faced some degree of FI (1). Additionally, recent publications have emphasized that lack of access to adequate food during the pandemic may have increased FI in El Salvador (8, 11). Moreover, it has been estimated that by August 2021, 1.04 million people faced severe FI in the country (8). Geographical departments within the dry corridor (12) in the east of the country have been particularly affected (8). Additionally, food scarcity has been exacerbated by the rainy season and hurricane cycle in 2020, which negatively affected up to 150 000 people and approximately 3 000 hectares of crops (13). Similarly, reports by the FAO emphasized that El Salvador had a medium to high food price index in 2020, which contributed to the reduction in the food supply nationwide during the same period (9). All of these challenges help to explain the 4% increase in poverty nationwide, which affected approximately 26.2% of all households in 2020 (14).

Although these reports shed some light on FI in El Salvador, there are no public databases that allow for its systematic assessment in the country. Moreover, most of these reports rely on qualitative methodologies (1, 8, 9, 11, 13). In light of the worsening sanitary and social conditions in the country following the COVID-19 pandemic, generating reliable nationwide information on food security constitutes a pressing need. This information is also essential to developing evidence-based public policies to address FI.

This study considers this challenging scenario and aims to quantify the prevalence of FI among Salvadorian households. Additionally, it seeks to identify the determinants of FI, and finally, it aims to explore the influence of the COVID-19 pandemic on FI.

METHODS

This study was conducted following the Equator Network's Standards for Reporting of Observational Studies in Epidemiology (known as STROBE) (15). Thus, this work is classified as a retrospective cross-sectional study. The data used in the study were collected by El Salvador's General Directorate of Statistics and Censuses (Dirección General de Estadísticas y Censos; DIGESTYC) at the request of the FAO (16). Primary data collection was carried by DIGESTYC across El Salvador's 14 geographical departments, based on a random household sample. Data were collected between November 24 and December 2,

2020. In light of the difficulties brought about by the pandemic, data were collected by telephone, using computer-assisted telephone interviewing. Respondents were at least 18 years old and only one respondent from each household was included. Being younger than 18 years and unwilling to participate were the only exclusion criteria. A total of 25 121 phone calls were made and 2358 surveys were completed, resulting in a 9.38% response rate. This analysis uses all 2358 surveys with valid responses.

Two different scales were used for data analysis and prevalence calculations. The first was the HHS (7). In this study, the calculations for this scale rely on three questions: In the past 30 days, was there ever no food to eat of any kind in your house because of a lack of resources to get food? (denoted here as HH1); in the past 30 days, did you or any household member go to sleep at night hungry because there was not enough food? (denoted here as HH2); in the past 30 days, did you or any household member go a whole day and night without eating anything at all because there was not enough food? (denoted here as HH3).

The HHS relies on a 30-day time frame because longer recall periods pose greater risks of inaccuracy (7). International guidelines advise that the HHS should be administered during or directly after the worst of the lean season (7).

If participants responded "yes" to any of the three HHS questions, they were asked to provide additional information about how often these events happened: rarely (coded as 1), sometimes (coded as 1) or often (coded as 2). If they did not respond "yes" to a question, the response was coded as 0. Based on these scores, an aggregated scale ranging from 0 to 6 was constructed. Following HHS guidelines (7), households with a total score between 0 and 1 are considered to have little to no hunger. Those with total scores between 2 and 6 are considered to face some degree of hunger: they are considered to face a moderate degree of hunger if their score is 2 or 3 and a severe degree of hunger if their score is in the range of 4 to 6.

Additionally, three items from the FAO's HFIES were used (6, 16). Following HFIES guidelines (6), the three HHS questions denoted as HH1 to HH3 were asked using a 12-month time frame. These questions were denoted as HFIES1, HFIES2 and HFIES3. This shortened scale was used for comparison purposes because the HHS covers only a 30-day period. According to the HFIES, these three questions represent thresholds for severe and extreme food insecurity (6, 17). The FAO uses these three items to identify acute food insecurity occurring during a 12-month period. In order to aggregate these three questions for the comparative analysis, a scale of 0 to 3 was constructed. The value of 0 indicated no positive answers for the questions, while values of 1 to 3 indicated a positive answer to any of the three HFIES questions. Notably, a positive answer to any of them would indicate times during which the household had no food during the past 12 months and, as the most worrying scenario, had a household member who did not eat for a whole day. Respondents who answered "yes" to any of these questions, were also asked whether the lack of food was caused by the COVID-19 pandemic. This question was used to explore the relationship between FI and the pandemic.

After the prevalence was calculated, statistical analyses were carried out to identify the determinants of FI. Binomial logistic regression was used for the determinants of household hunger, based on responses to the HHS, and ordered logistic regression was used to assess food deprivation during the previous 12 months, based on responses to the HFIES. The variables used to

identify determinants are summarized in Table 1. They include household characteristics and information about agricultural practices and problems. These have been widely used in food security research (6, 17–20). The odds ratios are reported with 95% confidence intervals and an error level of 0.05. Odds ratios are normally used to measure the association between exposures and outcomes (21), in this case to measure the association between all chosen covariates and FI. Missing values were excluded from the regressions.

To validate the binary model, the Pearson goodness-of-fit test statistic ($P = 0.95$) and the Hosmer–Lemeshow test ($P = 0.93$) were used. Additionally, the area under the curve was plotted (area under the curve = 0.69). All of these tests suggested a good model fit. Calculations were done using Stata 14 (StataCorp, College Station, TX).

Participants gave informed consent at the beginning of the contact to use and store their data. The survey was not completed if a potential respondent did not explicitly accept that

TABLE 1. Description of dependent and independent variables used to assess food insecurity, El Salvador, 2020

Variables	Description and scale
Dependent	
Model 1: HHS	Binomial, based on the aggregation of questions HH1, HH2 and HH3; 6-point scale. Following the guidelines, if the consolidated score is 0 or 1, little to no hunger exists. If the score is 2 to 6, some hunger exists, with a score of 2 or 3 classified as moderate hunger and a score of 4 to 6 classified as severe. These scores were coded into a binomial variable as: 1 = Hunger in the household 0 = No hunger in the household.
Model 2: HFIES	Discrete, based on the aggregate score for responses to questions HH1, HH2 and HH3 (denoted as HFIES1 to HFIES3) with a 12-month time frame; 3-point scale. A unified indicator ranging from 0 to 3 was constructed. A score of 0 indicates no positive answers; a score of 3 implies all answers were positive.
Independent	
No. of people in household	Continuous; the number of people in the household
Rural area	Binomial; scored 0 or 1. Is the house in an urban or rural area? Values: 1 = Rural 0 = Urban.
Educational level completed	Discrete; refers to the highest educational level achieved by any household member. Values: 0 = None (reference) 1 = Did not complete primary school 2 = Completed primary school 3 = Completed secondary school 4 = Completed technical or professional education 5 = Completed university.
Received government help	Binomial; the question was, In the past 30 days, did you receive any government help? Values: 1 = Received 0 = Did not receive.
Use of native seeds	Binomial; refers to the use of native seeds in agriculture. Values: 1 = Used native seeds 0 = Did not use.
Use of hybrid seeds	Binomial; refers to the use of hybrid seeds in agriculture. Values: 1 = Used hybrid seeds 0 = Did not use.
Animals used for farm work	Binomial; the question was, Do you use animals for farm work? Values: 1 = Yes 0 = No.
Agriculture problems	Binomial; the question was, Did you experience problems with agriculture or livestock? Values: 1 = Yes 0 = No.
Household income	Discrete; the question was, Taking February 2020 as a reference, how is your family's income performing? Values: 0 = Less income (reference) 1 = Same income 2 = More income.

HFIES: Household Food Insecurity Experience Scale; HHS: Household Hunger Scale.
Source: Table prepared by the author with data from the study.

their data could be used in this way. Staff from the FAO and DIGESTYC worked together to plan, conduct and supervise the study. This joint committee considered the ethical aspects of survey implementation.

RESULTS

The scores for the descriptive variables are summarized in Table 2. The mean age of respondents was 44 years (data not shown), and the most common level of education completed was secondary school, which was completed by 30.49% of the respondents. Around half of surveyed households engaged in agriculture and reported having problems during the previous 12 months. Furthermore, 69.02% (1615/2340) of households reported having less family income when compared with February 2020 (data not shown).

The prevalence of household hunger as measured by the HHS reached 6.45% (152/2356) of households: 5.48% (129/2356) of these households were categorized as having moderate hunger and 0.98% (23/2356) as severe hunger. This indicator summarizes food deprivation during the past 30 days and identifies particularly fragile households. Nonetheless, this was lower than the FI prevalence as reported in other international studies using the same methodology (18, 20) and in those addressing hunger and food security during the pandemic (22).

In light of such a low prevalence, the HFIES might provide a more accurate comparison (16). According to the HFIES, 64.59% (1523/2358) of households did not experience FI and 35.41% (835/2358) of households did. Altogether, 18.74% (442/2358) reported at least one indicator of FI. These indicators identified in the HFIES are much closer to the official poverty level in

2020, which affected 26.2% of all households in the country (14). FI levels drop to 11.03% (260/2358) for households responding affirmatively to two HFIES questions and to 5.64% (133/2358) for those responding positively to three HFIES questions. Notably, 7.59% (179/2357) of households reported at least one member went a whole day without eating during the previous 12 months because there was not enough food or resources. In more than 94% (744/785) of cases, the COVID-19 pandemic was the reason for this food shortage. This confirms that the pandemic severely affected food security, and the magnitude of the effect, greater than 90%, highlights its enormous influence.

Figure 1 shows household hunger prevalence by geographical department. With a few exceptions, eastern departments, such as Usulután, San Miguel, Morazán and La Unión, presented higher hunger levels. These last four departments fall within the dry corridor, an area of historical drought that is often associated with FI (8, 12). Thus, the eastern parts of the country continue to face more challenges to food security. However, the metropolitan department of La Libertad accounted for the highest level of hunger among all geographical departments. Considering that La Libertad is home to a large proportion of the Salvadorian population and is located next to the capital, it might be prioritized when drafting assistance policies.

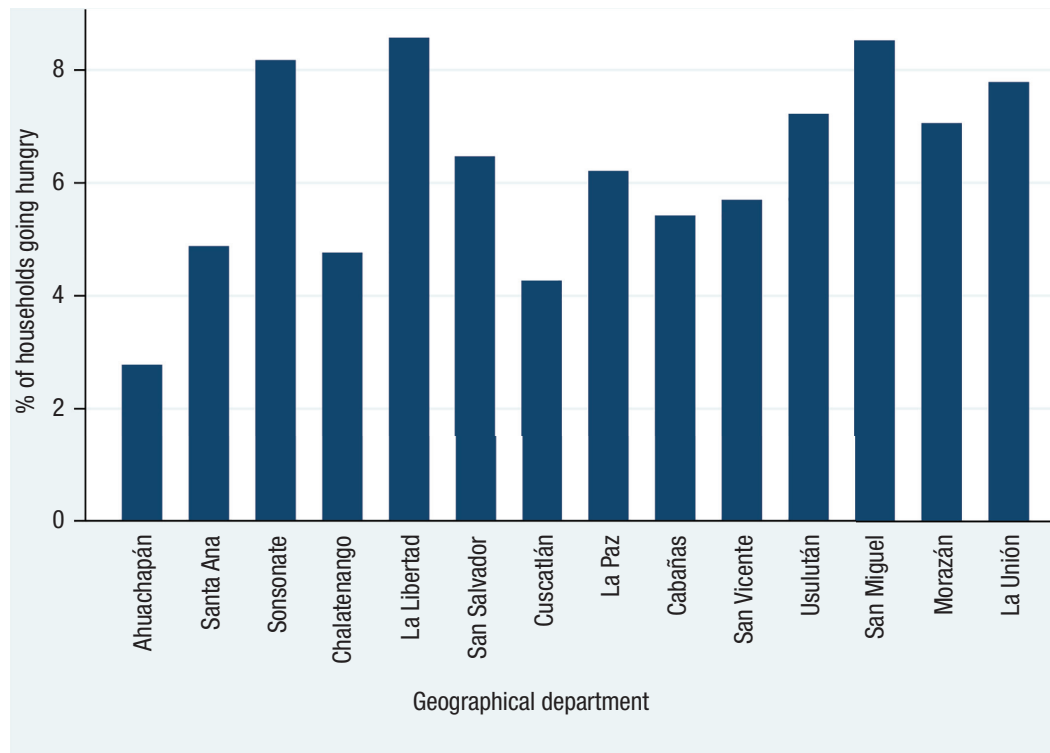
Table 3 shows the results of the binary logistic regression model used to identify the determinants of household hunger. As expected, families who had the same income at the time of the study as in February 2020 have lower levels of hunger ($P = 0.00$, odds ratio [OR] = 0.48). Similarly, having a higher education level was inversely related to the prevalence of FI. This was the case for households with a member who had

TABLE 2. Scores for descriptive statistics used to assess food insecurity, El Salvador, 2020

Variable	No. of respondents	Mean score	Standard deviation	Score range	
				Minimum	Maximum
No. of people in household	2358	4.60	1.96	1	16
Rural area	2358	0.65	0.47	0	1
Educational level completed	2358	2.43	1.36	0	5
Received government help	2358	0.32	0.46	0	1
Use of native seeds	2070	0.34	0.47	0	1
Use of hybrid seeds	2070	0.73	0.44	0	1
Animals used for farm work	2358	0.07	0.26	0	1
Agriculture problems	2290	0.48	0.49	0	1
Household income	2340	0.32	0.50	0	2
Food scarcity, measured by HFIES	2358	0.57	0.89	0	3
HFIES1	2357	0.33	0.47	0	1
Caused by the COVID-19 pandemic?	785	0.94	0.22	0	1
HFIES2	2357	0.16	0.37	0	1
Caused by the COVID-19 pandemic?	394	0.96	0.17	0	1
HFIES3	2357	0.07	0.26	0	1
Caused by the COVID-19 pandemic?	179	0.96	0.19	0	1
Food insecurity, measured by HHS	2356	0.06	0.24	0	1
HH1	785	0.30	0.46	0	1
HH2	394	0.36	0.48	0	1
HH3	177	0.40	0.49	0	1

HFIES: Household Food Insecurity Experience Scale; HHS: Household Hunger Scale.

Source: Table prepared by the author with data from the study.

FIGURE 1. Prevalence of household hunger by geographical department, El Salvador, 2020

Source: Figure prepared by the author with data from the study.

completed primary school ($P = 0.09$, $OR = 0.56$), completed secondary school ($P = 0.00$, $OR = 0.31$), completed technical school ($P = 0.03$, $OR = 0.24$) and completed university ($P = 0.01$, $OR = 0.05$). Likewise, experiencing agricultural problems negatively impacted hunger ($P = 0.00$, $OR = 1.69$).

The determinant analysis for the HFIES items is summarized in Table 4. The number of household members is an explanatory variable ($P = 0.00$, $OR = 1.10$). And similar to the HHS determinants, family income and education levels played important roles. Those who had the same income at the time of the study as they did in February 2020 had a lower chance of experiencing FI ($P = 0.00$, $OR = 0.53$). In the same way, higher education levels were associated with lower levels of FI, particularly for those households in which the highest level of education completed was secondary education ($P = 0.00$, $OR = 0.55$), technical school ($P = 0.00$, $OR = 0.31$), and university ($P = 0.00$, $OR = 0.21$). Additionally, households with agricultural problems were more likely to experience FI ($P = 0.00$, $OR = 1.49$). Closely related to these determinants, those who reported using hybrid seed were also more likely to experience FI ($P = 0.02$, $OR = 1.32$).

DISCUSSION

When using a 30-day time frame, the prevalence of household hunger was estimated to be 6.45% of households, representing a relatively low prevalence when compared with other international studies (18, 19, 22, 23). But when using the 12-month time frame, the prevalence is estimated to be substantially

higher, at 35.41% of households. Of those households that experienced FI, 18.74% reported at least one positive answer to the HFIES questions. Also, there was a decrease in FI among families responding positively to two and three HFIES items, as those percentages drop to 11.03% and to 5.64% of households, respectively. Similar differences in indicators of FI have been found in other international studies when comparing these two methodologies (18, 23). For El Salvador, the prevalence of FI as measured by the three HFIES questions is closer to the official poverty level in 2020, which peaked at 26.2% of households (14). Hence, this indicator seems to more accurately represent the country's food security status in 2020.

Additionally, differences in the two scales suggest that the time chosen for data collection (between November 24 and December 2, 2020), represented times when the most critical FI crisis had already occurred. It is likely that the most severe period for FI corresponded to the quarantine and lockdown orders, which occurred between February and August 2020. After August, the economy suddenly reopened, and numerous economic indicators – such as the gross domestic product, exports and job creation – started to recover (10). Thus, when the 12-month time frame was used, the FI prevalence substantially increased. The differences in prevalence levels found using these two different methodological guidelines highlight the need for up-to-date indicators that are measured within appropriate time scales because immediate policies may be drafted based on results from the HHS while mid-term policies may be based on results from the HFIES. Future research might consider using the full HFIES scale, along with other relevant

TABLE 3. Logistic regression for the determinants of hunger using the Household Hunger Scale, El Salvador, 2020^a

Household Hunger Scale variable	Odds ratio (standard error)	z score	P	95% confidence interval
No. of people in household	1.07 (0.04)	1.63	0.10	0.98 to 1.17
Rural area	0.91 (0.18)	-0.44	0.66	0.61 to 1.36
Educational level completed				
No education	1 (reference)			
Primary not completed	0.75 (0.25)	-0.83	0.40	0.38 to 1.46
Primary completed	0.56 (0.19)	-1.68	0.09	0.28 to 1.10
Secondary completed	0.31 (0.11)	-3.2	0.00	0.15 to 0.63
Technical or professional school	0.24 (0.16)	-2.13	0.03	0.06 to 0.89
University	0.05 (0.04)	-3.79	0	0.01 to 0.24
Received government help				
No	1 (reference)			
Yes	1.20 (0.22)	0.99	0.32	0.83 to 1.74
Use of native seeds				
No	1 (reference)			
Yes	1.23 (0.25)	1	0.31	0.81 to 1.85
Use of hybrid seeds				
No	1 (reference)			
Yes	1.21 (0.29)	0.79	0.43	0.74 to 1.97
Animals used for farm work				
No	1 (reference)			
Yes	0.88 (0.29)	-0.37	0.70	0.46 to 1.68
Agriculture problems				
No	1 (reference)			
Yes	1.69 (0.32)	2.79	0.00	1.17 to 2.46
Household income				
Less income	1 (reference)			
Same income	0.48 (0.12)	-2.92	0.004	0.29 to 0.78
More income	1.01 (0.75)	0.01	0.98	0.23 to 4.39
Constant	0.07 (0.03)	-5.68	0	0.03 to 0.18

^a Pseudo $R^2 = 0.0688$.

Source: Table prepared by the author with data from the study.

alternatives, such as the Integrated Classification of Food Security (or CIF) scale (8) or the USDA's *Guide to measuring household food security* (5). Similarly, future studies could also collect anthropometric information, as this text relies only on social and economic indicators of FI.

The exploration of the COVID-19 pandemic's influence on FI emphasizes that between 94.78% and 96.09% of respondents attributed their hunger to the pandemic (questions 1 to 3 on the HFIES). Of particular concern are those households that reported having at least one member who went one full day without eating during the previous 12 months, which was 7.59% of total households. This indicator serves as a threshold for identifying severe FI (6, 17). According to self-reports, the pandemic directly affected food security, a trend that had already been identified in relevant international studies (8, 11).

Moreover, the determinants of FI prevalence yielded similar explanatory variables, irrespective of the measurement scale used. One of the most prominent was income: those households that reported having the same income at the time of the study

as in February 2020 had a lower prevalence of FI across either a 30-day ($P = 0.00$, OR = 0.48) or 12-month ($P = 0.00$, OR = 0.53) period. These results align with other relevant studies reporting an inverse relationship between FI and household income (17, 24, 25). This implies that ensuring people possess enough economic resources or food is a pressing public health matter in El Salvador. To that end, public policies, such as food donations or monetary transfers, may represent valid ways to address FI (26), although such initiatives have faced multiple barriers in El Salvador (27).

Similarly, the number of household members proved to be a determinant of and positively associated with FI (in the HFIES, $P = 0.00$, OR = 1.10), contrary to findings in other studies (23, 28). However, international empirical evidence is not conclusive when assessing the influence of the number of household members on FI (28).

Additionally, those households reporting agricultural problems during 2020 had higher levels of FI, either measured through the HHS ($P = 0.00$, OR = 1.69) or HFIES ($P = 0.00$, OR = 1.49). In a country such as El Salvador, with numerous households engaged in agriculture, it is increasingly necessary to ensure acceptable food production and consumption standards are met. It may be relevant to consider developing public policies such as widespread agricultural subsidies or the use of native seeds (29–31). Also, households using hybrid crop seed appeared to have a higher prevalence of FI. One explanation for this might be that production using hybrid seed requires more expensive agricultural inputs, and households experienced a general reduction in income in 2020.

Even those variables that are not determinants might provide some key information about FI in the country. For instance, rural households were not more prone to FI. Historically in El Salvador, rural areas are more economically fragile (14). Additionally, agricultural production was harmed during 2020 due to social and environmental factors. Social factors include the strict mobility restrictions (i.e. the lockdowns) put in place to fight the pandemic in 2020. Environmental stressors include excess precipitation during the rainy season, particularly tropical storms and hurricanes Amanda, Cristobal, Eta and Iota (32, 33). These environmental events destroyed 60% of vegetable crops and almost 6 million kg of beans (9). Similarly, Oxfam International estimated that 150000 people were affected by these storms (13). Consideration of these conditions would lead to predictions that rural households would be more prone to FI. Surprisingly, the evidence in this study does not support rural households having a higher FI prevalence.

Another variable that seemed not to have a determining role was governmental assistance. Although 32.70% (771/2358) of households reported having received governmental support during the 30 days before data collection, this was irrelevant to the prevalence of FI. This may be partially explained by the fact that many public schemes have been flagged as inefficient and even politically biased, both before the pandemic (29, 34) and during the current COVID-19 health emergency (27).

CONCLUSIONS

This paper reports the FI prevalence in El Salvador in 2020. The two different scales report varying prevalence indicators,

TABLE 4. Ordered logistic model for the determinants of food scarcity using the Household Food Insecurity Experience Scale, El Salvador, 2020^a

Household Food Insecurity Experience Scale variable	Odds ratio (standard error)	z score	P	95% confidence interval
No. of people in household	1.10 (0.02)	4.36	0.00	1.05 to 1.15
Rural area	1.13 (0.11)	1.23	0.22	0.92 to 1.39
Educational level completed				
No education	1 (reference)			
Primary not completed	0.94 (0.20)	-0.24	0.81	0.62 to 1.45
Primary completed	0.86 (0.18)	-0.68	0.49	0.56 to 1.31
Secondary completed	0.55 (0.12)	-2.7	0.00	0.36 to 0.85
Technical or professional school	0.31 (0.10)	-3.43	0.00	0.15 to 0.60
University	0.21 (0.05)	-5.72	0.00	0.12 to 0.36
Received government help				
No	1 (reference)			
Yes	0.95 (0.09)	-0.5	0.61	0.78 to 1.15
Use of native seeds				
No	1 (reference)			
Yes	1.08 (0.11)	0.71	0.47	0.87 to 1.33
Use of hybrid seeds				
No	1 (reference)			
Yes	1.32 (0.16)	2.29	0.02	1.04 to 1.69
Animals used for farm work				
No	1 (reference)			
Yes	0.90 (0.14)	-0.6	0.55	0.65 to 1.25
Agriculture problems				
No	1 (reference)			
Yes	1.49 (0.14)	4.26	0.00	1.24 to 1.79
Household income				
Less income	1 (reference)			
Same income	0.53 (0.06)	-5.54	0.00	0.43 to 0.66
More income	0.95 (0.36)	-0.11	0.91	0.45 to 2.00
Cut point 1	0.98 (0.26)			0.47 to 1.49
Cut point 2	2.07 (0.26)			1.55 to 2.58
Cut point 3	3.31 (0.27)			2.77 to 3.85

^a Pseudo R² = 0.0463.

Source: Table prepared by the author with data from the study.

but the HFIES most closely matched El Salvador's poverty level. However, regardless of the scale used, the COVID-19 pandemic seems to have been a major catalyst for FI, with more than 94% of households attributing their food shortages to it.

The study also quantifies the determinants of FI in El Salvador in 2020. To the author's knowledge, no similar work has been published. The determinants of FI in El Salvador in 2020 included lower income, lower educational level and issues with agriculture (i.e. problems, use of hybrid seeds). Households with these traits should be of special concern, as their food security may be more fragile than households without these characteristics. Public, and even private, action to counter FI, should target populations with these characteristics. Future research should use scales with both short and medium time frames. Similarly, collecting and incorporating anthropometric data could potentially strengthen food security research in the future.

Author's contributions. CAD is the sole author of the text. CAD conceived the original idea, analyzed the data, interpreted the results, wrote the paper and revised it according to the reviewers' comments.

Acknowledgments. The author expresses his gratitude to Karina Cantó for her kind support. Similarly, Jerry Arguello's assistance is appreciated. The author thanks Oscar Peña Rodas for proofreading the document. Special gratitude to the Food and Agriculture Organization of the United Nations for providing the data set and key supporting information.

Conflicts of interest. None declared.

Funding. No funding was received for this study.

Disclaimer. The author holds sole responsibility for the views expressed in the manuscript, which may not necessarily reflect the opinion or policy of the *Revista Panamericana de Salud Pública/Pan American Journal of Public Health* or those of the Pan American Health Organization.

REFERENCES

- Organización de las Naciones Unidas para la Alimentación y Agricultura (FAO), Programa de las Naciones Unidas para el Desarrollo (PNUD). Seguridad alimentaria y nutricional: camino hacia el desarrollo humano [Food and nutrition security: pathway to human development]. San Salvador: FAO, PNUD; 2016.
- Gundersen C, Ziliak JP. Food insecurity and health outcomes. *Health Aff.* 2015;34(11):1830–9.
- Wolfson JA, Leung CW. Food insecurity during COVID-19: an acute crisis with long-term health implications. *Am J Public Health.* 2020;110(12):1763–5.
- Santos AAMT, Redin C, Ayala Durán CE, Machado DCM, Zuñiga Escobar M, Printes RB, et al. Segurança alimentar e nutricional e a sustentabilidade [Food and nutrition security and sustainability]. In: Dal Soglio F, Kubo RR, editors. *Desenvolvimento, agricultura e sustentabilidade [Development, agriculture and sustainability]*. Porto Alegre: Universidade Federal do Rio Grande do Sul; 2016. p. 115–39.
- Bickel G, Nord M, Price C, Hamilton W, Cook J. Guide to measuring household food security, revised 2000. Alexandria (VA): United States Department of Agriculture; 2000.
- Cafiero C, Nord M, Viviani S, Del Grossi ME, Ballard T, Kepple A, et al. Methods for estimating comparable prevalence rates of food insecurity experienced by adults throughout the world. Rome: Food and Agriculture Organization of the United Nations; 2016.
- Ballard T, Coates J, Swindale A, Deitchler M. Household Hunger Scale: indicator definition and measurement guide. Washington (DC): Food and Nutrition Technical Assistance; 2011.
- Sistema de la Integración Centroamericana. Análisis de inseguridad alimentaria aguda de la CIF Noviembre 2020 – Agosto 2021 [Acute food insecurity analysis (CIF) November 2020 – August 2021]. San Salvador: Sistema de la Integración Centroamericana, Ministerio de Salud de El Salvador; 2020.
- Organización de las Naciones Unidas para la Alimentación y Agricultura (FAO). Seguridad alimentaria bajo la pandemia de

- COVID-19 [Food security during the COVID-19 pandemic]. Santiago: FAO; 2020.
10. Fundación Salvadoreña para el Desarrollo Económico y Social (FUSADES). Informe de coyuntura económica [Economic situation report]. Antiguo Cuscatlán: FUSADES; 2021.
 11. Ayala C. Seguridad alimentaria y nutricional en tiempos de COVID-19: perspectivas para el Salvador [Food and nutrition security in the time of COVID-19: perspectives for El Salvador]. *Rev Latinoam Investig Soc.* 2020;3(1):42–6.
 12. World Food Programme. Food security and emigration: why people flee and the impact on family members left behind in El Salvador, Guatemala and Honduras. Rome: World Food Programme; 2017.
 13. Oxfam International. Los rostros del hambre en Centroamérica. La inseguridad alimentaria y nutricional en el Corredor Seco como consecuencia de la temporada ciclónica, sequías y la covid-19 [Faces of hunger in Central America: food and nutrition security in the dry corridor as a consequence of cyclones, droughts and COVID-19]. Oxford: Oxfam International; 2021.
 14. Dirección General de Estadísticas y Censos (DIGESTYC). Encuesta de hogares de propósitos múltiples 2020 [Multiple-purpose household survey 2020]. Ciudad Delgado, El Salvador: DIGESTYC; 2021.
 15. Vandenbroucke J, von Elm E, Altman D, Gøtzsche P, Mulrow C, Pocock S, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *PLoS Med.* 2007;4(10):e297.
 16. Organización de las Naciones Unidas para la Alimentación y Agricultura (FAO). Monitoreo de indicadores relacionados con el impacto y las implicaciones de COVID-19 en la agricultura, los medios de vida y la seguridad alimentaria [Monitoring of COVID-19 indicators in agriculture, livelihoods and food security]. San Salvador: FAO, Dirección General de Estadísticas y Censos El Salvador; 2021.
 17. Pool U, Dooris M. Prevalence of food security in the UK measured by the Food Insecurity Experience Scale. *J Public Health (Oxf.)*. 2022;44(3):634–41.
 18. Doocy S, Busingye M, Lyles E, Colantouni E, Aidam B, Ebulu G, et al. Cash and voucher assistance and children's nutrition status in Somalia. *Matern Child Nutr.* 2020;16(3):e12966.
 19. DiClemente K, Grace K, Kershaw T, Bosco E, Humphries D. Investigating the relationship between food insecurity and fertility preferences in Tanzania. *Matern Child Health J.* 2021;25(2):302–10.
 20. Nkegbe PK, Abu BM, Issahaku H. Food security in the Savannah Accelerated Development Authority Zone of Ghana: an ordered probit with household hunger scale approach. *Agric Food Secur.* 2017;6(1):35.
 21. Szumilas M. Explaining odds ratios. *J Can Acad Child Adolesc Psychiatry.* 2010;19(3):227–9.
 22. Basurko C, Benazzouz B, Boceno C, Dupart O, Souchard E, Trepont A, et al. La faim au temps du Covid-19 à Cayenne (Guyane) et dans ses environs [Hunger during the COVID-19 crisis in Cayenne (French Guiana) and its surroundings]. *Bull Epidemiol Hebd.* 2020;29:582–8.
 23. Regassa N, Stoecker BJ. Household food insecurity and hunger among households in Sidama district, southern Ethiopia. *Public Health Nutr.* 2012;15(7):1276–83.
 24. Rose D. Economic determinants and dietary consequences of food insecurity in the United States. *J Nutr.* 1999;129(2 Suppl):517S–20S.
 25. Furness BW, Simon PA, Wold CM, Asarian-Anderson J. Prevalence and predictors of food insecurity among low-income households in Los Angeles County. *Public Health Nutr.* 2004;7(6):791–4.
 26. Gentilini U, Almenfi M, Orton I, Dale P. Social protection and jobs responses to COVID-19. Washington (DC): World Bank; 2020.
 27. Ayala Durán C. COVID-19 monetary transfer in El Salvador: determining factors. *Rev Adm Publica.* 2021;55(1):140–50.
 28. Demeke AB, Keil A, Zeller M. Using panel data to estimate the effect of rainfall shocks on smallholders food security and vulnerability in rural Ethiopia. *Clim Change.* 2011;108(1–2):185–206.
 29. Ayala Durán C. Alcance local de una política agraria en El Salvador: programa público de paquetes agrícolas 2013–2016 [Local reach of an agrarian policy in El Salvador: agricultural packages governmental program 2013–2016]. *Chakiñan Rev Cienc Soc Humanid.* 2021;(13):85–101.
 30. Ayala Durán C, Waquil PD. Factores que influyen en la recomendación de uso del maíz criollo: un estudio para extensionistas salvadoreños [Factors influencing the recommendation for use of creole maize seed: a study of Salvadorian extensionists]. *Trab Soc.* 2020;(34):409–27.
 31. Cortez Azenón M, Ayala Durán C. Contenido de proteína, hierro y zinc en maíces criollos salvadoreños [Protein, iron and zinc content in Salvadorian native maize]. *Real Reflex.* 2020;51:25–35.
 32. Berg R. Tropical storm Amanda (EP022020). Miami (FL): National Hurricane Center; 2020.
 33. Miller T. The climate-induced U.S. border. *NACLA Rep Am.* 2021;53(3):220–5.
 34. Ayala Durán C. Selección de beneficiarios para subsidio agrícola en El Salvador: modelo logit a la producción del maíz [Beneficiaries selection for an agricultural subsidy in El Salvador: a logit model for maize]. *Disjuntiva Crit les Cienc Soc.* 2022;3(2):61.

Manuscript submitted 14 May 2022. Revised version accepted for publication on 7 September 2022.

Efectos de la pandemia de COVID-19 en la inseguridad alimentaria en El Salvador durante el año 2020

RESUMEN

Objetivo. Este estudio tuvo por objetivo cuantificar la prevalencia de la inseguridad alimentaria en los hogares salvadoreños, determinar cuáles son los determinantes de la inseguridad alimentaria y explorar los efectos de la pandemia de COVID-19 en la inseguridad alimentaria.

Métodos. En este estudio transversal se utilizó una muestra aleatoria representativa a nivel nacional de 2 358 hogares. Se empleó la escala del hambre en el hogar (HHS, por su sigla en inglés) para evaluar la prevalencia de la inseguridad alimentaria en un período de 30 días. Para la comparación, se utilizaron tres indicadores de la escala de experiencia de inseguridad alimentaria en el hogar (HFIES, por su sigla en inglés), que mide el hambre durante un período de 12 meses. Para el análisis de los determinantes, se empleó la regresión logística binaria para HHS y la regresión logística ordenada para HFIES.

Resultados. La prevalencia de la inseguridad alimentaria fue de 6,45% (152/2356) en los hogares salvadoreños al emplearse HHS, y afectó moderadamente a 5,48% (129/2356) y gravemente a 0,98% (23/2356). La prevalencia aumentó de forma considerable al utilizarse los indicadores de HFIES, con 35,41% (835/2358) de los hogares afectados, una cifra más cercana al nivel nacional de pobreza. Los determinantes de la inseguridad alimentaria según HHS incluyeron problemas agrícolas ($P = 0,00$, razón de posibilidades [OR] = 1,69), los ingresos familiares previos a la pandemia ($P = 0,00$, $OR = 0,48$) y niveles educativos superiores (educación secundaria [$P = 0,00$, $OR = 0,31$], formación técnica [$P = 0,03$, $OR = 0,24$] o universitaria [$P = 0,00$, $OR = 0,05$]). Con HFIES, los determinantes fueron similares (ingresos, problemas agrícolas, nivel educativo). En más de 94% (744/785) de los hogares, los participantes notificaron que la inseguridad alimentaria se agravó por la pandemia de COVID-19.

Conclusiones. En comparación con otros estudios internacionales pertinentes, la prevalencia de la inseguridad alimentaria mediante HHS –de solo 6,45%– fue baja en El Salvador. Sin embargo, al utilizar HFIES, la prevalencia aumentó a 35,41% de los hogares. Algunos determinantes coinciden con estudios anteriores, como los ingresos, el nivel educativo y los problemas agrícolas. La pandemia de COVID-19 parece tener un impacto directo en la inseguridad alimentaria.

Palabras clave

América Central; ingestión de alimentos; prevalencia; análisis de regresión.

Efeitos da pandemia de COVID-19 sobre a insegurança alimentar em El Salvador durante 2020

RESUMO

Objetivo. Este estudo procurou quantificar a prevalência de insegurança alimentar entre as famílias salvadorenhas, identificar os determinantes de insegurança alimentar e explorar o impacto da pandemia de COVID-19 sobre a insegurança alimentar.

Métodos. Este estudo transversal foi realizado com uma amostra representativa nacional randomizada de 2358 domicílios. Usou-se a Household Hunger Scale (HHS) [escala de fome domiciliar] para avaliar a prevalência de insegurança alimentar durante um período de 30 dias. Para fins de comparação, usaram-se três itens da Household Food Insecurity Experience Scale (HFIES) [escala de experiência de insegurança alimentar domiciliar], que mede a fome durante um período de 12 meses. Para a análise de determinantes, usou-se a regressão logística binária com a HHS e a regressão logística ordenada com a HFIES.

Resultados. A prevalência de insegurança alimentar nos domicílios salvadorenhas medida com a HHS foi de 6,45% (152/2356), sendo moderada em 5,48% (129/2356) e grave em 0,98% (23/2356). Quando se usaram os itens da HFIES, a prevalência aumentou consideravelmente, com 35,41% (835/2358) dos domicílios afetados – um número mais próximo do nível nacional de pobreza. Entre os determinantes da insegurança alimentar, de acordo com a HHS, estavam os problemas agrícolas ($P = 0,00$, razão de chances [RC] = 1,69), a renda familiar pré-pandemia ($P = 0,00$, RC = 0,48) e a maior escolaridade (ou seja, educação secundária [$P = 0,00$, RC = 0,31], técnica [$P = 0,03$, RC = 0,24] ou universitária [$P = 0,00$, RC = 0,05]). Com a HFIES, os determinantes foram semelhantes (ou seja, renda, problemas agrícolas e escolaridade). Em mais de 94% (744/785) dos domicílios, os participantes relataram exacerbação da insegurança alimentar pela pandemia de COVID-19.

Conclusões. Em comparação com outros estudos internacionais pertinentes, a prevalência de insegurança alimentar identificada com uso da HHS – somente 6,45% – foi baixa em El Salvador. Entretanto, quando se usou a HFIES, a prevalência aumentou para 35,41% dos domicílios. Alguns determinantes coincidem com os de estudos anteriores, a saber, renda, escolaridade e problemas agrícolas. Aparentemente, a pandemia de COVID-19 teve efeitos diretos sobre a insegurança alimentar.

Palavras-chave América Central; ingestão de alimentos; prevalência; análise de regressão.