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COMPARISON OF FOOD SECURITY AND THE LEVEL OF EDUCATION IN ECUADOR

Alejandra Gómez (a)*, Carlos Silva (b), Erika Méndez (c), Magdalena Espín (d)
*Corresponding author

(a) Universidad Técnica del Norte, Av. 17 de Julio, Ibarra Ecuador, amgomez@utn.edu.ec
(b) Universidad Técnica del Norte, Av. 17 de Julio, Ibarra Ecuador, cmsilva@utn.edu.ec
(c) Universidad Técnica del Norte, Av. 17 de Julio, Ibarra Ecuador, epmendezc@utn.edu.ec
(d) Universidad Técnica del Norte, Av. 17 de Julio, Ibarra Ecuador, cmespin@utn.edu.ec

Abstract

Food Safety occurs when there is availability, adequate intake of healthy, nutritious, and safe foods, for the good growth of humans. The objective of this research was to compare the level of food security, food availability and level of education of families in the rural parishes in the provinces of Imbabura and Carchi. The type of study was descriptive, quantitative, cross-sectional, and correlational. To obtain socio-demographic and food availability data, a structured survey was conducted. The Latin American and Caribbean Food Security Scale (ELCSA) was used to measure the level of food security. The instruction that the majority of the population reached is of complete and incomplete primary school, the same largely are engaged in agriculture. The level of food safety of adult households is mild and moderate and households consisting of adults and children under 18 years of age are mild. As regards food availability 76.9% of families have land for the planting of different food groups and livestock production on a smaller scale. Most people buy their food in the markets. In conclusion, most of the families are slightly food insecure and there is an association between food security with the availability and level of education of families.

Keywords: Availability, Carchi, education, food security, Imbabura

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1. Introduction

The Food and Agriculture Organization of the United Nations (FAO), states that food security exists, when every person at all times has economic and physical access to sufficient safe and nutritious food to meet their food needs, in order to lead an active and healthy life. Globally, strategies are promoted to reduce both poverty and population hunger, achieving food security and improved nutrition (FAO, OPS, WFP & UNICEF, 2018).

2. Problem Statement

In Ecuador, the prevalence of undernourishment, stunted growth in children under 5 years and obesity in adults, is the second country in Latin America and the Caribbean with the highest prevalence of stunting, it has more than one fifth of children under 5 years of age with stunted growth represented by 25.30%; it is also one of 11 countries that remains unchanged in the number of undernourished people. Since 2013, it has had a prevalence of 1.3% of undernourishment. Consequently, in severe food insecurity the country has a prevalence of 7.1% (FAO, FIDA, UNICEF, PMA & OMS, 2018).

In rural sectors, undernutrition corresponds to 44% in Ecuador and only 11% of the population accesses enough food to meet their nutritional or energy requirements, this leads to nutritional problems, showing that there is a 25.3% delay in size or chronic malnutrition, where 42.3% corresponds to the indigenous population, especially in the provinces of Chimborazo 48.8%, Bolívar 40.8% and Imbabura 30 - 39% (Freire, 2014).

According to the Ministry of Education, the average years of schooling for people aged 24 and over in 2006 to 2017 was 9.13 for the Carchi and 9.70 years for Imbabura, meaning that the majority of the population of these provinces achieved only full primary education. In addition, the years of education was 11.32 for the urban area and 7.50 for rural areas, showing that in this area there are multiple factors that limit access to education (Ministerio de Educación, 2019).

3. Research Questions

What is the relationship between Food Security, food availability and the level of education of families in rural areas of the Provinces of Imbabura and Carchi - Ecuador, 2019?

4. Purpose of the Study

This study was important, as the level of food security, food availability and level of education of families in rural parishes in the provinces of Imbabura and Carchi was compared. This data described sociodemographic characteristics, assessed the level of food security, identified food availability and economic conditions, and identified the level of education presented by study subjects.

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5. Research Methods

This is a descriptive, quantitative, correlational investigation, which used different instruments for measuring their variables. Sociodemographic characteristics and food availability were determined through a structured survey. The level of Food Security was measured, applying the scale proposed by FAO: Latin American and Caribbean Scale of Food Security ELCSA, in the families of the rural parishes of the provinces of Imbabura and Carchi.

The population was 5879 families in rural areas of the Imbabura and Carchi provinces. The formula for the sample calculation was applied in each parish as shown in Table 1.

Sample calculation

N: population size p: Positive variability 0.5

Z: Confidence percentage 95% q: Negative variability 0.5

E: Error rate of 10%

$$n=Z2pqNNE2+Z2pq \quad (1)$$

Table 1. Calculation of the sample by parishes with 10% error

Province	Canton	Parish/Community	Population	Sample
	Pimampiro	San Francisco de Sigsipamba	969	87
	Otavalo	San Pablo Angla	250	69
IMBABURA	Cotacachi	Cuellaje	386	76
	Cotacachi	Garcia Moreno	901	86
	Cotacachi	Peñaherrera	485	80
	Bolívar	San Vincente de Pusir	547	81
CARCHI	Montúfar	Piartal	316	60
	Tulcan	Julio Andrade	2025	97
	Total		5879	636

The inclusion criteria were families who voluntarily agree to participate in the study and who live permanently in the study places for at least 5 years. The exclusion criteria were people who do not live permanently in the study places.

6. Findings

Table 2. Sociodemographic Characteristics

Indicator	Scale	Frequency	Percentage
	Single	57	9
	Married	377	59,3
	Divorced	20	3,1
Marital status	Widower/Widow	39	6,1
	Free Union	115	18,1
	Separate	28	4,4
	Total	636	100
Family data	With minors	372	58,5
	Adults only	264	41,5

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Number of family members	Total	636	100
	1 to 3	276	43,4
	4 to 6	306	48,1
	7 to 8	52	8,2
	more than 9	2	0,3
	Total	636	100
Level of instruction	None	50	7,9
	Incomplete primary	164	25,8
	Full primary	183	28,8
	Incomplete high school	94	14,8
	Full high school	125	19,7
	Incomplete high school	13	2
	Full high school	7	1,1
	Total	636	100
Ethnicity	Afro-Ecuadorian	22	3,5
	Mestizo	549	86,3
	Indigenous	62	9,7
	White	3	0,5
	Total	636	100

The data obtained in Table 2 present the sociodemographic characteristics of the population, with the married marital status being the predominant, although there is a high percentage of free union. According to family data, households are made up mostly of parents and their minor children, with an average ranging between 4 and 6 members. At the level of instruction there is a lot of closeness between the complete primary and incomplete primary scales, which attests to the low academic level in rural areas. As in most of the Sierra region, study subjects self-identify with the mestizo ethnic group.

According to data obtained from INEC (National Institute of Statistics and Censuses), most Ecuadorians in the provinces of Imbabura and Carchi are married to 42.4% and 40.7% respectively. More than 60% of the population in these two provinces self-identify as mestizos. The level of full primary stands out with 90% in ages from 5 to 14 years (INEC, 2010).

Table 3. Level of Food Security by Provinces in the Rural Zone and family

Province			Slight	Moderate	Severe	Food Safety	Total
Imbabura	Family	With minors	90	91	31	20	232
		Adults only	77	50	22	17	166
	Total		167	141	53	37	398
Carchi	Family	With minors	78	33	4	25	140
		Adults only	68	13	2	15	98
	Total		146	46	6	40	238
Total	Family	With minors	168	124	35	45	372
		Adults only	145	63	24	32	264
	Total		313	187	59	77	636

Table 3 presents the level of food safety by province, indicating that there is a higher percentage of mild food safety in Imbabura and Carchi, followed by a moderate level and a lower percentage a severe level. An interesting fact is that families made up of minors in both Imbabura and Carchi have a mild,

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moderate, and severe level of food security higher than families that are only composed of adults. This means that it affects children and adolescents more in terms of a good diet for different reasons such as lack of economic resources, availability of food among other factors that prevent covering their nutritional requirements for an active and healthy life (Comité Científico de la ELCSA, 2012). In a study conducted in Colombia, in 150 households that applied the ELCSA scale, 36.7% were found to have food security and in lower percentages there is mild, moderate and severe food safety (Muñoz-Astudillo et al., 2010).

Table 4. Food Safety Level by parishes and family

Parish			Slight	Moderate	Severe	Food Safety	Total
Cuellaje (Imbaura)	Family	With minors	8	23	6	15	52
		Adults only	17	0	1	6	24
		Total	25	23	7	21	76
García Moreno (Imbaura)	Family	With minors	24	21	12	0	57
		Adults only	4	10	8	7	29
		Total	28	31	20	7	86
Piartal (Carchi)	Family	With minors	25	3	3	0	31
		Adults only	22	6	1	0	29
		Total	47	9	4	0	60
San Francisco de Sigsipamba (Imbaura)	Family	With minors	23	14	7	5	49
		Adults only	18	11	6	3	38
		Total	41	25	13	8	87
Peñaherrera (Imbaura)	Family	With minors	33	4	1	0	38
		Adults only	32	5	5	0	42
		Total	65	9	6	0	80
San Vicente de Pusir (Carchi)	Family	With minors	22	4	1	18	45
		Adults only	20	5	1	10	36
		Total	42	9	2	28	81
San Pablo (Imbaura)	Family	With minors	2	29	5	0	36
		Adults only	6	24	2	1	33
		Total	8	53	7	1	69
Julio Andrade (Carchi)	Family	With minors	31	26	0	7	64
		Adults only	26	2	0	5	33
		Total	57	28	0	12	97
Total	Family	With minors	168	124	35	45	372
		Adults only	145	63	24	32	264
		Total	313	187	59	77	636

As shown in Table 4, following the implementation of THE ELCSA, the level of food security in rural areas of the provinces under study was determined, resulting in the majority of people in both Imbabura and Carchi having a mild level of food security followed by the moderate level. However, the

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concern is that there is still a low percentage of families with a severe level of food security, higher in Imbabura than in Carchi. This indicates that there are people who do not eat food in a day. Another important fact found was that most families with mild, moderate, and severe security, have minors within the family nucleus. Analysis by parishes indicates that Peñaherrera (Imbabura) and Julio Andrade (Carchi) are the provinces with the highest number of families with mild food security. San Pablo (Imbabura) and Julio Andrade (Carchi), has the highest number with families in moderate food security. The most alarming fact is that in García Moreno (Imbabura) they have the highest number of families with a severe level of food security. It is worth noting the parish of Julio Andrade which has no cases of severe levels of food security. However, there are encouraging but very low data from parishes such as Cuellaje (Imbabura) and San Vicente de Pusir (Carchi), with food security levels in families.

Table 5. Food availability

Indicator	Scale	Frequency	Percentage
DOMESTIC PRODUCTION			
Terrain type	Own	417	65,6
	Leased	39	6,1
	Lent	33	5,2
	It doesn't have	147	23,1
	Total	636	100
Sow food	Yes	413	64,9
	No	76	11,9
	It has no ground	147	23,1
	Total	636	100
Destination of agricultural production	Own consumption	191	30
	Sale	163	25,6
	Seed	2	0,3
	Own consumption and sale	133	20,9
	It has no ground	147	23,1
	Total	636	100
Livestock production	Sheep	26	4,1
	Pig	50	7,9
	Beef	103	16,2
	Poultry	136	21,4
	Guinea pig	30	4,7
	Fish farming	10	1,6
	It doesn't have	281	44,2
	Total	636	100
Destination of livestock production	Own consumption	109	17,1
	Sale	240	37,7
	Exchange	6	0,9
	It doesn't have	281	44,2
	Total	636	100

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Droughts	Yes	342	53,6
	No	294	46,2
	Total	636	100
FOOD PROCUREMENT			
Place where food is purchased	Store	179	28,1
	Market	443	69,7
	Street sales	14	2,2
	Total	636	100
Economic situation	Lower Basic Wage	283	44,5
	Basic Salary	315	49,5
	Higher than the Basic Wage	38	6
	Total	636	100
Monthly value for grocery shopping	Less than $25	186	29,2
	$26-50	235	36,9
	$51-100	206	32,4
	$101-200	9	1,4
	Total	636	100

In Table 5, the findings of the study are presented in the rural parishes of Imbabura and Carchi, allow to consider that the availability of food is linked to domestic production, since being from areas where population density is not lower there is the possibility of having spaces for the cultivation of short-cycle food and also for the rearing of smaller animals; and in a smaller proportion cattle. This allows, on the one hand, to ensure the food of household members and on the other hand to sustain the family economy. However, the presence of droughts and post-grant damage due to a lack of technological transfer decreases the production chain, influencing levels of food insecurity. On the other hand, the acquisition of food is carried out in local markets and shops since in most do not have a difficulty in accessing the roads. In addition, household economic income is distributed in similar percentages between those with less than the unified basic salary income and those within this area. The amount they spend on food is divided into three parts which spend between less than 25 USD, 25 – 50 USD per month, and those that spend between 51 – 100 USD per month; worryingly, those who allocate or have fewer resources for food could not diversify their diet. On the other hand, the support of the state's institutions on solidarity bonds is for the least amount of the population since the rest have no support.

Table 6. Association between the variable's food safety and availability (Have ground or non-land)

		Type of terrain				Total
		Own	Leased	Lent	It doesn't have	
Food Safety Level	Slight	207	20	13	73	313
	Moderate	134	8	7	38	187
	Severe	30	3	8	18	59
	Food Safety	46	8	5	18	77
Total		417	39	33	147	636

p value 0.029

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Table 6 presents the crossing of food safety and availability variables. The Cramer V statistical test determined that there is an association between the variables food security level and availability (have ground or non-land) with a p value of 0.029 that is less than 0.05 and a weak intensity of 0.099. This fact is alarming, since people who do not own land or do not plant in rural areas are families who would be at risk of being in a situation of food insecurity. FAO (2010) notes that small agriculture is important for food provision, so policies aimed at strengthening this sector are fundamental (FAO, 2010). However, it was also noted that most people do not have support for programs for the farmer or the solidarity bond despite being in situations of extreme poverty.

Table 7. Partnering among the variables food safety and availability (Monthly value for food purchase)

		Monthly value for food				Total
		Minor 25 Dollars	26-50 Dollars	51-100 Dollars	101-200 Dollars	
Food Safety Level	Slight	55	121	135	2	313
	Moderate	73	75	39	0	187
	Severe	38	21	0	0	59
	Food Safety	20	18	32	7	77
Total		186	235	206	9	636

p value 0.000

Table 7 shows the results of the Gamma test for the association of variables, obtaining a p value of 0.000 less than the value of the error of 0.05. This means that if there is an association between the variables of Food Security level and the value that it allocates for the purchase of food, it has a weak association with a value of -0.27. This is consistent with the availability survey that was applied where it was obtained that, not all people sow and a percentage of those who sow sell those foods, then in order to access the food they must have money. In Ecuador, while the national poverty rate was 30% in 2012, it amounted to 60% for indigenous peoples in 2019 (FAO, FIDA, OMS, PMA & UNICEF, 2019). Therefore, compared to this data, if there is no good family income, there is not enough money to buy food and therefore people will have less access to one or more meals a day.

Table 8. Association between food security and level of education variables

		Level of instruction							
		None	Incomplete primary	Full primary	Incomplete high school	Full high school	Incomplete high school	Full high school	Total
Food Safety Level	Slight	13	79	85	43	85	5	3	313
	Moderate	21	48	60	32	20	5	1	187
	Severe	12	20	12	7	7	0	1	59
	Food Safety	4	17	26	12	13	3	2	77
Total		50	164	183	94	125	13	7	636

p value 0.000

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In Table 8 a Cramer's V was applied, having a p value less than the significance level and a value of 0.164, which indicates a weak association between the level of food security and the level of education of the people in the study. Ecuador has a system of protection and guarantees that are at the forefront at the international level to precaution the right to education without discrimination, as well as the universalization of education from the initial level to the high school, and its gratuitousness throughout the university. However, this research sees that most people have incomplete and complete primary in other cases. The level of food security is related to education because those who do not finish primary are engaged in work such as agriculture or masonry, which does not allow them to have higher incomes at home, therefore it is difficult to get enough food for their families.

7. Conclusion

• The demographic characteristics of study subjects were determined, resulting in 59.3% of the population being married, 58.5% of families living with minors, 48.1% have 4 to 6 members. In terms of the instruction level, 25.8% have incomplete primary and 28.8% full primary. The vast majority of the population with 86.3% is mestizos. It is evident that the demographic characteristics of rural areas are consistent with data from the last population census and behave very similarly.

• After implementation of the ELCSA, the level of food security in rural areas of the provinces under study was determined, resulting in the majority of people in both Imbabura and Carchi having a mild level of food security followed by the moderate level. However, the concern is that there is still a low percentage of families with a severe level of food security, higher in Imbabura than in Carchi.

• The availability of food in Imbabura and Carchi considering domestic production, 65.6% of families have their own land, however, 23.1% do not own it. 64.6% plant food on their land and spend their agricultural and livestock production on a smaller scale, for their own consumption and sale. Regarding livestock production, 21.4% is dedicated to poultry farming followed by beef, but 44.2% is not engaged in this activity. 37.7% of families sell livestock production and refer to 53.6% of families that have droughts during the year. According to the purchase of food, 69.7% of families buy their food in the market followed by the neighborhood store. 94% earn equal to or less than the unified basic salary. The amount they spend on monthly food purchases is $25 – $50 for 36.9% of families and $51 to $100 per month for 32.4%. Only 20% of families receive the solidarity bond.

• A statistically significant association was found between the variables of food security with availability and the level of education of the families, with a p value less than 0.05 but a weak association. Therefore, it is concluded that the availability of food and the level of education of families influences the level of food security.

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