



Trabajo Original

Epidemiología y dietética

Studying food security among students: a comparative case study between public and private universities in Quito-Ecuador

Seguridad alimentaria en estudiantes: estudio de casos comparativo entre una universidad pública y una privada en Quito-Ecuador

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Abstract

Introduction: food security (FS) has become a global concern. However, despite the implementation of international policies to promote it, very little is being done to understand the food security, health and nutrition issues in young populations at the university level.

Aim: to explore the state of food security among two different student populations from private and public universities in Quito, Ecuador.

Methods: this quantitative study includes students from most of the faculties. A total of 730 students were surveyed at the University of The Americas (private) and Central University of Ecuador (public), Quito, Ecuador.

Results: according to our results, there is a wide socioeconomic difference among households and students from both institutions; almost 50% of the all surveyed population are food insecure due to the increase of food prices, household food spending and economic restrictions. The results show that student's populations with good food access are food insecure. But, also, food insecurity affects students from households with low income, to the point they have to skip at least a meal a week.

Conclusion: the findings here show that students from private universities are as food insecure as public university students, despite having better food access. Having good food access and food availability does not mean there is more food security among students.

Key words:

Food insecurity.
Nutrition. Health
education.

Resumen

Introducción: la seguridad alimentaria (FS) se ha convertido en una preocupación global. Sin embargo, a pesar de la implementación de políticas internacionales para promoverla, se está haciendo muy poco para comprender la seguridad alimentaria, la salud y los problemas de nutrición en poblaciones jóvenes a nivel universitario.

Objetivo: explorar el estado de la seguridad alimentaria entre dos poblaciones estudiantiles diferentes de universidades privadas y públicas en Quito, Ecuador.

Métodos: este estudio cuantitativo incluye estudiantes de la mayoría de las facultades. Un total de 730 estudiantes fueron encuestados, procedentes de la Universidad de Las Américas (privada) y la Universidad Central del Ecuador (pública), Quito, Ecuador.

Resultados: el estudio encuentra que existe una amplia diferencia socioeconómica entre los hogares y estudiantes de ambas instituciones. Casi el 50% de la población estudiada presenta inseguridad alimentaria debido al aumento de los precios de los alimentos, el gasto en alimentos de los hogares y las restricciones económicas. Los resultados muestran que las poblaciones de estudiantes con buen acceso a los alimentos tienen inseguridad alimentaria. Pero, también, la inseguridad alimentaria afecta a los estudiantes de hogares con bajos ingresos, hasta el punto de que deben saltarse al menos una comida a la semana.

Conclusión: los hallazgos muestran que los estudiantes de la universidad privada tienen inseguridad alimentaria al igual que los estudiantes universitarios de la institución pública, a pesar de tener un mejor acceso a los alimentos. Tener un buen acceso a los alimentos y disponibilidad de alimentos no significa que haya más seguridad alimentaria entre los estudiantes.

Palabras clave:

Inseguridad
alimentaria. Nutrición.
Educación para la
salud.

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INTRODUCTION

Food security (FS) has become a global concern and a critical future challenge in the face of climate change, rapid population growth, environmental degradation and economic and food crises. The 1996 World Food Summit stated that “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (1).

In this context, Ecuador recognizes in its 2008 National Constitution the right to food as an independent right applicable to all people, stating as follows: “Individuals and communities have the right to secure a permanent access to healthy, sufficient and nutritious food” (2). From a global perspective, FS and the eradication of hunger are at the center of the current sustainable development goals (SDG) (3). However, despite the implementation of international policies to promote and foster food security worldwide by international development agencies, very little is being done to understand or to tackle the food security, health and nutrition issues in young populations at the university level. On the other hand, food security studies, food policies and international development discussions and projects are barely considering the food in-security state of young university students.

Although Ecuador, due to its own agriculture diversity and food production, is a food secure country, imports and keeps sufficient food to provide with minimum international nutritional standards (the food offer is represented by the average increase of GDP from agriculture at a 4.9% per year, in relation to 1.5% annual population growth), this is not the case for poor people. The 2013-2014 living conditions survey (ECV acronyms in Spanish) found that 25.8% of the population suffers from poverty by consumption (this concept applies to households with incomes or consumption below the value of a basket of goods that allows the satisfaction of basic needs at a low cost), which is 47.3% and 15.5% in the rural and urban areas, respectively. Additionally, three out of ten households do not have access to a food basket to cover the minimum calorie demand (4). Poverty is the main determinant for food insecurity, and the current food insecurity is related to former childhood food insecurity, therefore undernourishment, which is related to food insecurity, has become a major world problem, especially in developing countries (5).

In the Ecuadorian context, this problem is mostly located in the rural areas, affecting 9% of the population, in contrast to 5.1% in the urban areas; it is more severe among children younger than five years (25.8%) and in indigenous regions (50%) (6). These two demographic-ethnic groups are to be considered as the most vulnerable. Moreover, rising rates of nutrition-related diseases (e.g., diabetes, obesity, allergies, heart and vascular diseases, etc.) will have far-reaching social and health consequences for Ecuadorian society.

Food security is understood as the capability of individuals and communities to have physical availability of food, economic access to food, and utilization of food (FAO) (1). The lack of adequate resources for people to feed themselves is defined as food insecurity (7). The USDA has described the levels of food security,

which can go from high to marginal food security, as well as food insecurity, which is portrayed as low and very low food security.

In urban areas, food insecurity is related to the availability of economic means to afford or have access to a basket of goods that covers the minimum calorie requirements of the household. In regard to the state of food security among university students, research conducted in small-scale studies has discovered the prevalence of food insecurity among students at universities in the United States.

To give a few examples: 21% of students at the University of Hawaii were considered to be food insecure (8); at Bowling Green State University in Ohio, 19% of the students participants were found to be food insecure due to financial dependence (9); food insecurity was detected in 59% of the students at the Western Oregon University; and the City University of New York (10) and the University of California (11) found that 39% and 32% of their students are experiencing food insecurity, respectively. Additionally, these data show that the perseverance of food insecurity in the student population is higher than the 14% national average (12). Other limited studies in Canada (13), Australia (14) and South Africa (15) have identified food insecurity in students as a hidden threat, which places them at a higher risk than the general population. Food insecurity, however, has the potential to impact academic performance, psychosocial function and health, as well as to produce public detrimental outcomes on student's success at any age and level (16).

There are currently no published studies that focus on the food insecurity of students and its repercussions on educational outcomes, in Ecuador. This research aims at framing the food security and determining the food insecurity determinants of students between two different public and private high education institutions located in Quito.

METHODS

The evaluation of food security between two large universities is the beginning of a project that aims at collecting broader information from other universities, to develop a clearer food insecurity panorama of students in Ecuador. The selected public university for this study has more than 30,000 students and the private university has a population of around 18,000 students. This cross-sectional study includes students from most of the faculties; a total of 730 students were surveyed in both universities. The sample size was calculated to provide sufficient power to detect statistical differences among two proportions (e.g., public vs private). In addition, the study had the assistance from trained students in the Scientific Research Method field at both universities. The questionnaire was tested in a pilot survey to calibrate the questions according to the group population. Consequently, the questionnaires were collected by trained students from students inside the university campuses in a random manner without any screening process, in order to obtain a representative sample.

The primary data were collected using a survey with quantitative close-ended questions in the frame of the four dimen-

sions of food security: availability, access, use and utilization (i.e., food quantity and food quality), and stability of food. It also assess relevant socio-demographic and economic factors, households malnutrition (undernourishment and obesity) associated with food insecurity and hunger in university students. Descriptive statistics, parametric tests and, where appropriate, crosstabulations with Chi-square and independent t-test analyses were conducted using the statistical package SPSS (version 21.0). Chi-square analysis (or Fisher's exact probability test for small cell counts) helps to determine the statistical association between food insecurity and an array of socioeconomic and demographic attributes. Moreover, the independent t-test as an analysis of dependence finds the influence of the independent variable on the dependent variable.

RESULTS

The descriptive analyses of the socioeconomic and demographic variables show the difference among students from the two universities; specifically, there is a predominance of female population in both institutions and a double fold difference regarding household income, where households that choose private universities have better incomes. Taking the 2018 basic family food basket value in consideration (US \$711), lower income households can get 1.14 food baskets whilst better-off households can get 2.25, which increases the food access capability.

FOOD AVAILABILITY

It is one of the dimensions of food security which needs to be guaranteed by governments to provide local or imported foodstuff in good quality and quantity conditions (1). The gastronomic offerings to students inside and outside the campus are varied, including fast food, lunch meals and *à la carte*. Regarding the sources of the food options: 38% of public students go home for lunch, 9% eat at a restaurant and 49% get their food from both home and restaurant. Students at the private university are in a similar situation, 40% eat at home, 8% at the restaurant and 46% eat at both places.

From a structural perspective, in order to understand food availability inside the universities, both have several snack stalls and faculty restaurants that serve fast and slow-food; however, they lack of adequate lunch rooms for students as the private university has coffee-break rooms for academic and administrative staff while the public has not. Therefore, it limits students to bring food from home and reduces food availability, particularly for those coming from low-income households.

FOOD ACCESS

In urban centers, food access is very dependent on economic assets and expenses (1). Students rely on household income for

buying food and other needs. Therefore assessing the average of household income frames the economic access to food by the students. There is a broad difference in the average household income between students from the public (US \$813; SD = 514.08) and private (US \$1,601; 1,774.95), which is reflected on the university money given to the students by their parents. Students at public universities receive a daily average of US \$4.32 (SD = 2.49) whereby US \$2.57 (SD = 1.32) are spent on food and beverages; students from the private university expend US \$3.97 (SD = 3.05) in food and beverages from the daily average of US \$6.89 (SD = 4.69) they receive.

Thus, students from the private university are spending 55% more money on food than students from the public university, and received 57.6% more money for their expenses. These results are somehow mirrored in the differences of the average number of meals consumed per day, as there were 3.3 meals/day for the public university students and 3.5 meals/day for the participants from the private university. Based on the Pearson correlation, there is a significant positive correlation ($p < 0.001$) between household income and money spent on food by the respondent. In other words, the bigger the household income the greater is the amount of money spent on food at the public university. At the private university, there is no significant correlation ($p = 0.137$), therefore, the amount of money spent on food has no relation with the household income. The difference between private and public participants' household income mean is not represented when it is compared to the money spent on food by the participants.

Regarding gender, an independent t-test was conducted to find out whether a statistical significance existed between the amount of money spent on food and gender. There was no indication of violation assumptions, and the results were not significant for both private $t(357) = 0.459$, $p = 0.647$ and public $t(360) = 0.856$, $p = 0.392$. Hence, male and female were not associated with a statistically significantly larger expenditure of money on food. However, 46% from public and 45% from private stated that there is at least one day a week when they are not fulfilling their food demands due to the lack of food for economic restrictions.

Understanding how food access differs across types of universities is useful. Chi-square test results show there is a relation between food access and the type of university $\chi^2(2, n = 730) = 9.903$, $p = 0.007$. This means that students from the private university have better food access in comparison to students from the public. Altogether, 46% of participants from both universities have good access to food, 39% of whom have very good access and 14%, acceptable access.

Subsequently, low food access increases the chances of students to eat at home, and their food security becomes dependent on the income and purchasing power capacity of the household. As low-income households barely cover the basic family food basket, students from these households are vulnerable to household economic shocks, which in turn as a strategy to reduce economic constraints and to increase food availability could take food from home, as long as universities provide tool and spaces for students to warm and eat their food.

FOOD UTILIZATION

This dimension is understood as the capacity of the body to observe nutrients from food. The nutrient intake depends on proper food preparation, a diverse diet, food availability at the household, good health and adequate nutrition practices. In this context, 67% of participants from the private university consider that home food quality is very good and food obtained from restaurants is acceptable for 48%. In comparison, 62% of the participants at the public university consider home food quality as very good and 53% consider restaurant food has acceptable quality (Fig. 1).

The diet composition based on the type of protein consumption and the frequency is different between both universities. The main source of protein is meat for 55% and 66% of participants from the public and private university, respectively, as well as the average consumption of meat is 4.7 and 5.2 times per week. Also, there is a lower consumption of dairy products by participants from the public (4.4 times/week) and public university (5.2 times/week). Furthermore, 92% of students from the public and private universities get fast food 2.3 and 2.4 times per week, respectively. French fries (48%) and *cevichochos* (it is a traditional street and market food, consisting on a sort of cocktail made up by an Andean pulse called chocho (*Lupinus mutabilis*) (other names include altramuz, Andean lupin, and pearl lupin) and roasted soft corn, mixed in sweet-sour tomato with onions and cilantro) (16.3%) are the fast food generally consumed by students from the public university, and hamburgers (32%) and pizza (23%) are consumed by private university participants. An additional food in the form of a snack is incorporated to the diet by 76% and 79% of participants from the public and private universities, respectively. Food diversification in the diet is complemented with the consumption of snack foods; students at the public university consume an average of one snack/day, in comparison to 1.3 snack/day at the private institution.

The availability of fast food places and restaurants in and around universities, with limited meal choices and the absence of healthy food options, has defined a consumption pattern among student populations toward poor quality food in terms of nutrition value (17). These new food preferences are considered as

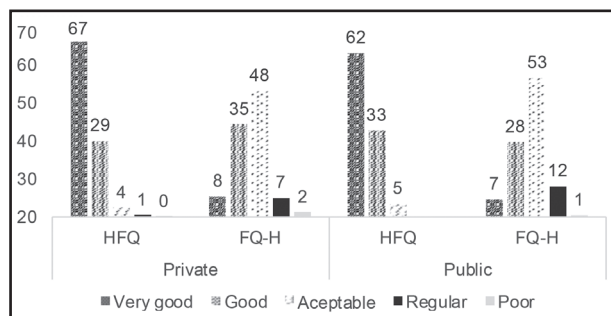


Figure 1. Household food and restaurant food quality (HFQ: household food quality; FQ-H: food quality outside household). There are no respondents who consider that the household food quality is of poor quality.

unhealthy and they are characterized by a low fruit and vegetable consumption (18).

Other authors (19-21) have pointed out that the consumption of this type of foods confirms the increasing presence of the Occidental diet in students, which is based on the intake of high quantities of meat, sweets, carbohydrates, fats and carbonate beverages. Case studies in Argentina (22,23) and Brazil (24) show that university students are facing a nutritional transition due to economic and demographic changes which have replaced the consumption of traditional dishes and foods with high-calorie industrial foods which increase malnutrition diseases.

As a counter measure, Ecuador has designed and implemented a mandatory graphic front-of-packing labeling in a traffic light manner. It aims at guaranteeing people's right to clear and precise information about the contents and characteristic of food, helping consumers to make better food choices. It is composed by colors and stripes, each color (red, yellow and green) representing the concentration (low, medium and high) of sugar, salt and fats; it also warns about the presence of genetic modified organisms (GMO) and non-caloric sweeteners in the food products.

Malnutrition-related problems affecting society have become a public health priority. The 2012 National Survey of Health and Nutrition (ENSANUT) showed that overweight and obesity affect all population ages; 8.6% of children aged under five, 30% of school children (5-11 years old), 26% of teenagers (12-19) and 63% of the adult population (19-60) present these problems (25). High processed foods have displaced the traditional diet, and the consumption of these products is five times bigger and caloric beverages almost threefold in developing countries in contrast to developed countries (26). The surveyed students stated that 48% drink water, 22.7% drink soft drinks and 23.6% consume natural juices. The differences are that students at that private university consume more soft drinks than the comparison population. In contrast, students at the public university tend to drink more natural juices than soft drinks (Fig. 2).

FOOD STABILITY

To analyze this dimension, food has to be provided in a regular basis in order to maintain a good nutritional status, notwithstanding,

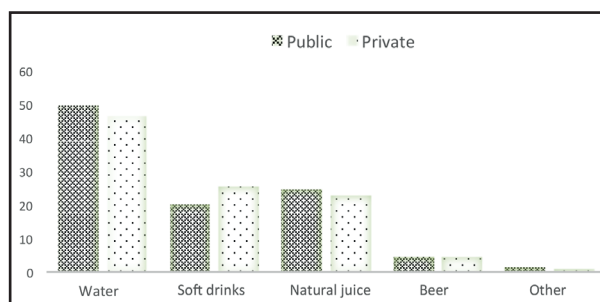


Figure 2. Drinks consumed by students from both universities.

environmental, economic and political stressors can alter this condition. The increase of food prices destabilized the food security of the households. In this regard, 86% and 89% of students from the public and private universities, respectively, consider there has been an increase of food prices during a year (Table II). This indeed can have a decreasing effect on food availability and food stability for students and their families, exposing them to food impacts that could produce an array of problems, from malnutrition to learning capabilities.

Food security stability also demands the implementation of food nutrition and dietetics education programs. In both case studies, nine of ten students do not receive any nutritional or food security-related information or program from the community and the university. More specific questions gather information about household undernourishment; 16% and 20% respondents this problem with at least one of the household members, as well as 32% and 35% at public and private universities are considered to have a family member in an overweight/obesity condition.

FOOD INSECURITY DETERMINANTS AND RISKS

After describing food security pillars, and based on them, students were asked whether they considered their food status as secure or insecure. In this regard, half of the participants from both universities stated that they are in risk of food insecurity (public 50% and private 51%). Deeper analyses showed in table III depict the relation between food access levels and the risk of food insecurity. Chi-square test results determined that there is a significant relationship between these two variables ($\chi^2 [2, n = 365] = 9.04, p = 0.011$). Therefore, lower food access represents higher predominance of food insecurity. From the population sur-

veyed, students who consider to have a good access to food (28.8%) were more likely to be in risk of food insecurity at the public. Private university students face a similar situation ($\chi^2 [2, n = 365] = 8.017, p = 0.018$); participants with good food access (22%) were more likely to be at risk of food insecurity.

The main underlying causes of food insecurity are the low household income of public students and the wide differences among incomes between private and public, which is reflected on the quantity of money given by parents to students to access food. Subsequently, food access is limited by the lack of lunchrooms with adequate equipment to warm food brought from home in both institutions; therefore, students rely on restaurants food quality, which mostly is not considered as healthy due to their contents (fast food) or the lack of nutrients for overcooking the meals (slow food). This shows the latent food insecurity at universities, which can go from *transitional to permanent food insecurity if food access decreases* by household or nation economic shocks.

DISCUSSION

In order to help fight and overcome malnutrition in all of its forms at the university level, the results of this study, which acknowledges the state of student's food security and its main determinants, will help improving student's academic performance and human development in the short and long term, as it has been demonstrated by other authors (27,28) that good academic performance is inversely associated with food insecurity. Food insecurity is a measure of household's economic constraints to provide an adequate and stable food supply (29). A thorough analysis of the data showed that students' food availability depends on the food provided by the households, and this depends on the family income.

Table I. Socio economic characteristics of students from both universities

Variable	Indicator	Public (n = 365)		Private (n = 365)	
		Mean	SD	Mean	SD
Age	Years	21.50	2.20	20.70	2.29
<i>Gender:</i>					
Male	%	46.60	-	40.00	-
Female	%	52.60	-	58.42	-
Civil status: single	%	96.40	-	95.30	-
<i>Mestizo children:</i>					
Yes	%	5.80	-	4.70	-
No	%	94.20	-	95.30	-
Household size	*p	<i>4.41</i>	1.26	<i>3.99</i>	<i>1.18</i>
Employed	%	<i>15.90</i>		<i>11.50</i>	-
Unemployed	%	84.10		88.50	
Income household	USD	<i>39.90</i>	123.01	<i>43.8</i>	<i>153.24</i>
Income	USD	812.70	514.08	<i>1,601.46</i>	<i>1,774.95</i>

Main differences are shown in italics. *p: number of people.

Table II. Food security dimensions measures and values

	Variable	Indicator	Public (n = 365)	Private (n = 365)
Food availability	Home	%	37.80	40.30
	Restaurant	%	9.30	7.70
	Both	%	49	46
	Street food	%	3.08	6
Food access	Family income	USD	812.70	1,601.46
	University money	USD	4.32	6.89
	U. money on food	USD	2.57	3.97
	Meals per day	average	3.35	3.58
	Lack of food	(yes)	45.50	44.90
Utilization	Meat	%	54.80	66.3
	Milk	%	19.50	13.70
	Eggs	%	9.30	10.10
	Legumes	%	13.70	6.60
	Other	%	2.70	3.30
	Meat consumption	Times/week	4.74	5.21
	Dairy consumption	Times/week	4.41	5.36
	Eat fast food	%	92.3	91.5
	Fast food consumption	Times/week	2.33	2.45
	Eat snacks	%	75.90	78.90
Stability	Food prices increase	%	86.30	88.50
	Food consumption Increase	%	32.10	35.90
	Decrease	%	26	24.90
	Equal	%	41.90	39.20
	Nutrition program at community	No %	88.80	79.50
	Nutrition program at University	No %	91	83.30

Main differences are shown in italics. The percentage of nutrition programs at the community and university are referred to the lack of these social programs in both places where students grow.

Table III. Test and results of variable analysis between universities

	Public	Private	Test
Household income and money spent on food	<i>000*</i>	0.137	Pearson correlations
Money spent on food and gender	0.392	0.647	Independent samples test
Food access and food insecurity risk	<i>0.011[†]</i>	<i>0.018[†]</i>	Chi-square tests
Type of university and food access	<i>0.007[†]</i>		Chi-square tests

Main differences are shown in italics. *Highly significant at 0.001. [†]Significant at 0.05. The effect of money spent on food based on student's gender.

Food security in urban areas depends on the availability of economic means, however, the findings here show that, besides the gap between students' household income and a better food access for those studying at the private university, more than half of both surveyed populations are food insecure. These results are pretty similar to those of a study conducted in a midsize rural university in the state of Oregon,

USA, where 59% of students were food insecure in the past 12 months and this situation affected their academic performance (27). Moreover, food insecure students are more likely to reduce food quality and diet variability and purchase more fast food than food secure students (30).

Food security depends also on the food availability provided by the households (lunch); driven by quality, economic, and

infrastructural reasons, some students rather eat at home. The increase of income and food availability influences food choices; students from private universities with more means to access food consume more fast-food than students in the public, where they opt for healthier choices. This study found that, in average, nine out of ten students consume fast food. A study of the student population at the University of Texas, USA (31), demonstrated that fast food choices (81%) are higher than healthier choices (55%).

This proves that, in the academic realm, having good food access and food availability does not translate into a higher food security status among students, and this paradox raises due to the incapability of breaking the malnutrition pipe line along the education system. In fact, due to food access capability, university students have the choice to improve their food security, however, the high percentage of fast food consumers is the result of the lack of food nutritional values knowledge, reading of front-of-packing labeling, and education programs at the community and university, which should be designed together with adequate physical structures for food service under the food security conceptual framework.

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