

## Characterization of the consumption of dairy foods in users of markets and supermarkets in Guayaquil, Ecuador

## Caracterización del consumo de alimentos lácteos en usuarios de mercados y supermercados en Guayaquil, Ecuador

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### Abstract

Ecuador is a country that presents a great diversity of cultures and traditions, which is reflected in its gastronomy. However, the pandemic changed certain approaches to food consumption, especially locating those that included medicinal properties or specifically with antioxidant characteristics, rich in Vitamin C; and other particularities that provide resistance against the SARS-COV-2 virus, known as coronavirus. Dairy products consumption underwent changes, with some reducing their daily intake, while others increasing it. Thus, this study is proposed to define the characteristics of dairy product consumption in the city of Guayaquil, in the year 2021; based on the survey conducted to a sample of 820 people, users of markets and supermarkets in the city of Buenos Aires; matrix constructed from the DRECA study: Diet and Risk of Cardiovascular Diseases in Andalusia, 1999; and adjusted to the typologies of the Guayaquil environment. The results show that, of 15 regularly consumed dairy products, 3 had a higher weekly intake, including whole milk and yogurt as well as cream cheese. In the case of yogurt and whole milk, they have a greater incidence in the population with consumption between 1 time a week and 5 - 6 times a week in portions of one cup or 200 cc; while in the case of cream cheese there is a higher consumption, 2 - 4 times a week in segments of 25 g. These

three products represent the most consumed, considered weekly consumption, included in the diet, given their organoleptic and access characteristics.

**Palabras claves:** characterization, consumption, Guayaquil, dairy.

## Resumen

Ecuador es un país que presenta una gran diversidad de culturas y tradiciones, lo cual se ve reflejado en su gastronomía. Sin embargo, la pandemia cambió ciertos enfoques en el consumo de alimentos, especialmente ubicando aquellos que incluían propiedades medicinales o específicamente con características antioxidantes, ricos en Vitamina C; y demás particularidades que provean resistencia frente al virus SARS-COV-2, conocido como coronavirus. El consumo de lácteos cambió, en algunos casos se redujo la ingesta diaria, mientras que en otros aumentó. Es así que, se plantea el presente estudio para delimitar las características de consumo de productos lácteos en la ciudad de Guayaquil en el año 2021; basado en el levantamiento de encuesta dirigido a muestra de 820 personas, usuarias de mercados y supermercados de la urbe porteña; matriz construida a partir del estudio DRECA: Dieta y Riesgo de Enfermedades Cardiovasculares en Andalucía, 1999; y ajustado a las tipologías del entorno guayaquileño. Los resultados muestran que, de 15 productos lácteos de consumo regular, 3 presentaron mayor ingesta semanal, entre ellos la leche, yogurt entero y el queso cremoso. En el caso del yogurt y leche entera, tienen una mayor incidencia en la población con un consumo entre 1 vez a la semana hasta 5 – 6 veces a la semana en porciones de una taza o 200 cc; mientras que para el caso del queso cremoso se tiene un mayor consumo de 2 – 4 veces a la semana en segmentos de 25 g. Estos tres productos representan los de mayor consumo considerándose de consumo semanal, incluida en la dieta, dado sus características organolépticas y de acceso.

**Keywords:** caracterización, consumo, Guayaquil, lácteos.

## 1. INTRODUCTION

Ecuador is located in South America at parallel 0°0'0". With an area of 283,561 km<sup>2</sup>, the country has four biogeographic regions: the Sierra, which is crossed by the Andes Mountains, the Pacific Coast, the Amazon and the Galapagos Islands. Its geography contributes largely to the biodiversity present in the country (F.A.O, 2024).

Guayaquil is the most populated city in Ecuador with a total of 2,746,403 inhabitants. If Guayaquil is the most populated city in Ecuador, with 2.7 million inhabitants, Durán, on the other bank of the Guayas River, occupies eighth place with 303,910 residents; Adding the populations of Daule (222,446) and Samborondón (98,540), a total of 3,371,299 people live in the so-called Greater Guayaquil;

that is, 20% of the national population (Carrasco, 2023).

In the city of Guayaquil, the consumption of food products, mainly dairy products, is well marked, forming part of the diet, with weekly and even daily intake. This consumption pattern is influenced by factors such as price, storage time and presentation, which establish a food culture. Over the years, these habits have been changing, however the presence of certain products in markets and supermarkets has not been modified, due to the acceptance and dependence of the consumer, especially in periods of time in which the population has been forced to consume it.

Compared to other South American countries, Ecuadorians eat 21% less cereals than average, 29% less meat products, 76% less legumes, less

than 65% roots and tubers, 19% more of fruits and vegetables, 43% more dairy products, as well as 55% less sugars (FAO, 2016).

Milk is an essential ingredient in several typical dishes of Ecuadorian cuisine. But it is also the basis of various foods and drinks in daily cooking, especially creams, soups and smoothies (CCQ, 2024).

Milk is a food product of great nutritional value, containing vitamins (A, B12, D) and minerals (phosphorus, potassium, calcium, magnesium, selenium, iodine, zinc) and is very necessary for human nutrition. The dairy sector's main activity is the production of milk and its derivatives (cheese, yogurt, butter, etc.) (Ionita, 2022).

Different studies published in the last decade indicate that the regular consumption of milk and dairy products (cheese, butter, yogurt) contributes to the prevention or has a favorable impact on the evolution of various chronic diseases such as diabetes, cancer and cardiovascular disorders. Therefore, milk and dairy products should be part of a balanced human diet (Martínez, 2021).

National milk production in Ecuador is around 5.5 million liters per day. According to data from the Pan American Dairy Federation (Fepale), Ecuadorians ingest about 114 liters of milk annually, a figure that has remained on the decline. The low consumption of this food is due to various factors such as the lack of nutritional education, the discredit derived from biased studies with little scientific participation, the informality of the sector and the high incidence of poverty in rural areas where the malnutrition rate chronic childhood is much higher than in urban areas. Of the total dairy products that each person consumes in

Ecuador, the percentages are expressed as follows, according to data from Fepale (Aguilar, 2024): Cheese: 15.6% per person; yogurt: 9.1% per person; liquid milk: 50.3% per person; powdered milk: 12.7% per person; others (dairy drinks, evaporated, condensed...): 12.3% per person.

According to Surface Survey and Continuous Agricultural Production (ESPAC), 74.91% of the raw milk produced in Ecuador is destined for the sale of fresh milk or liquid for industrial processing, 12.86% is processed in the UPA for cheese, butter, yogurt and other dairy products for self-consumption and/or sale, and the rest for various other purposes. Of every 100 liters of milk consumed, 47% is made in Quito, and 53% in Guayaquil. Dairy consumption in Guayas, and especially in Guayaquil, is at least 8%, in recent years (Expreso, 2020).

An important factor that significantly influences the purchase of a food is taste. According to the Innova Trends Survey study carried out in 2019, 74% of global consumers stated that their tendency is to discover new flavors, while 57% prefer to consume foods and beverages that are good for their health (Alimentosecuador, 2020).

Market studies carried out by the market researcher Kantar indicate that, after the Covid-19 pandemic, 42% of Ecuadorian households are looking for healthier, less processed products with more natural formulas, in order to improve their health and nutrition, through changing their eating and consumption habits (Lizarzaburo, 2024).

## 2. MATERIALS AND METHODS

### 2.1. Location

This research work was carried out in the city of Guayaquil, province of Guayas, Ecuador. Applying research tools in:

- Supermarkets (100 surveys carried out in each shopping center. Total: 400): Coral Hypermarkets (Av. Carlos Julio Arosemena. Km 1.5); Megamaxi, Mall del Sur (Av. 25 de Julio and Ernesto Albán); Hypermarket, RíoCentro Norte (Av. Fco. de Orellana and Av. Rodolfo Baquerizo); Hipermarket RíoCentro Los Ceibos (Av. Del Firero Km 6.5).
- Producers Markets (100 surveys carried out for each purchasing center, with the exception of M.M. "Las Esclusas", in which 120 were carried out. Total: 420): "Montebello" Municipal Wholesale Market (Vicente Piedrahita 453); Municipal Market "Sauces IX" (Av. Cuarta, between Callejón C, and 13° Pa. 17); Gómez Rendón Municipal Market (Abel Pazmiño and Gómez Rendón Streets); "Las Esclusas" Municipal Market (Av. Raúl Huerta /Av. 25 de Julio and Quinta).

### 2.2 Materials

For the preparation of this investigation, the following materials and equipment have been used: Texts (books, book chapters, reports, articles from scientific journals); Electronic devices (Tablet, Computer, removable memories); Software (Microsoft Forms electronic surveys; Excel, Word, Google Earth).

### 2.3 Methods

For this work, deductive – inductive and analysis – synthesis have been established as research methods, as the information is flexible, allowing the identification of the eating habits of Guayaquil residents, from a general perspective and by its components, providing a logical and coherent response to the topic under study.

The work is focused on determining dairy consumption habits in users of farmers' markets and supermarkets, for which information was collected through surveys, structured with 15 questions associated with dairy products. The surveys were designed in the Microsoft Forms application, while for their execution, a tablet (electronic device) was used, so that, as a face-to-face interview, the information was generated at each of the points of sale.

### 2.4 Techniques

In this work, the survey technique was used, allowing the collection, analysis and selection of information, establishing and complementing the research, with the theories of different authors. The part of the questionnaire about diet (average consumption during the past year) is a validated food consumption frequency questionnaire (Figure 1), previously used in the DRECA study: Diet and Risk of Cardiovascular Diseases in Andalucía, 1999 (Junta de Andalucía, 1999); and adapted to eating habits of the population of Guayaquil. It consists of collecting data about the usual dietary intake of the respondents, expressed as monthly, weekly or daily frequency of consumption of a list of dairy foods.

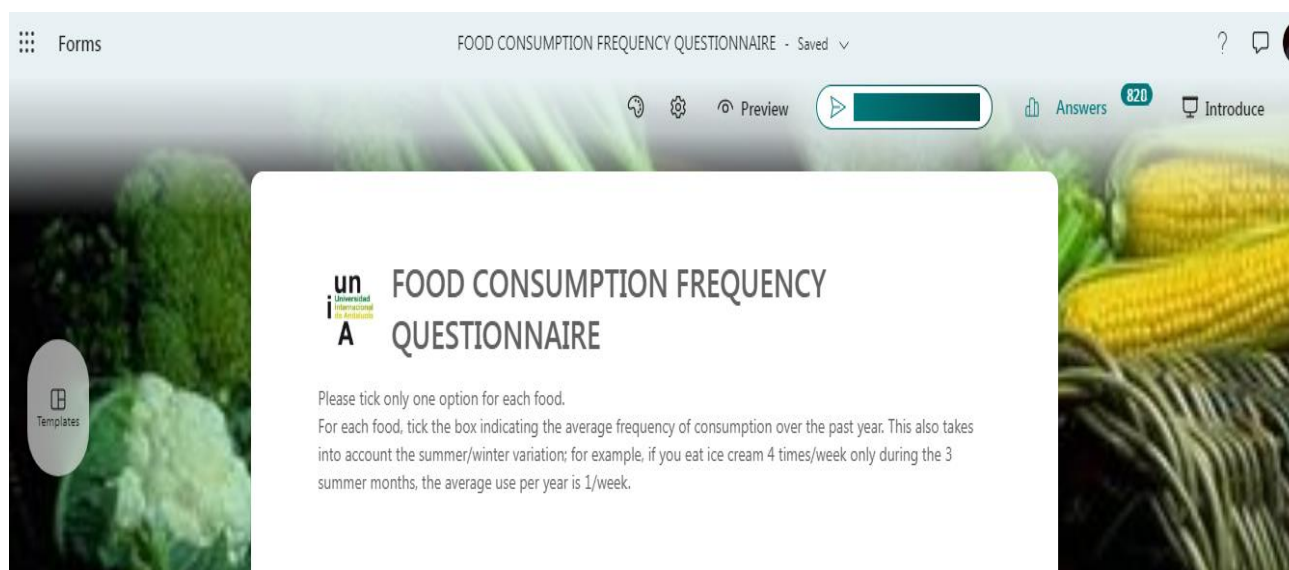


Figure 1. Food consumption frequency questionnaire survey model (Source: Microsoft Forms, 2021).

## 2.5 Analysis variables:

The basis of the survey was focused on:

- **Shopping Center Features:** Name; location (city, district, parish, coordinates)
- **Product consumption:** Dairy (whole milk (1 cup 200 cc), semi-lactose milk (1 cup 200 cc), semi skimmed milk (1 cup 200 cc), skin milk (1 cup 200 cc), lactose free milk (1 cup 200 cc), condensed milk (1 tablespoon), cream or milk cream (1/2 cup), milk shakes (1 cup 200 cc), whole yogurt (1,125 g), skim yogurt (1,125 gr), petit suisses (55 g), cottage cheese or curd (1/2 cup), cheese cream (25 gr), other cheeses (cured, Swiss, mozzarella, Dutch, cheddar) (25 g) and white or fresh cheese (25 g).

- **The same ones that were measured in 9 aspects:** Consumption; Never or almost never, 1 to 3 times a month, 1 time a week, 2 to 4 times a week, 5 to 6 times a week, 1 time a day, 2 to 3 times a day, 4 to 6 times a day, more than 6 times a day.

## 2.6 Population and sample:

The city of Guayaquil, according to the INEC, by the year 2023, has a population of 2.7 million inhabitants; Considering a consumer population equal to 600,000, a representative sample was obtained with a margin of error of 5%, and a confidence level of 99%, equal to 660 surveys to be applied; however, 820 were applied (Figure 2 y 3).

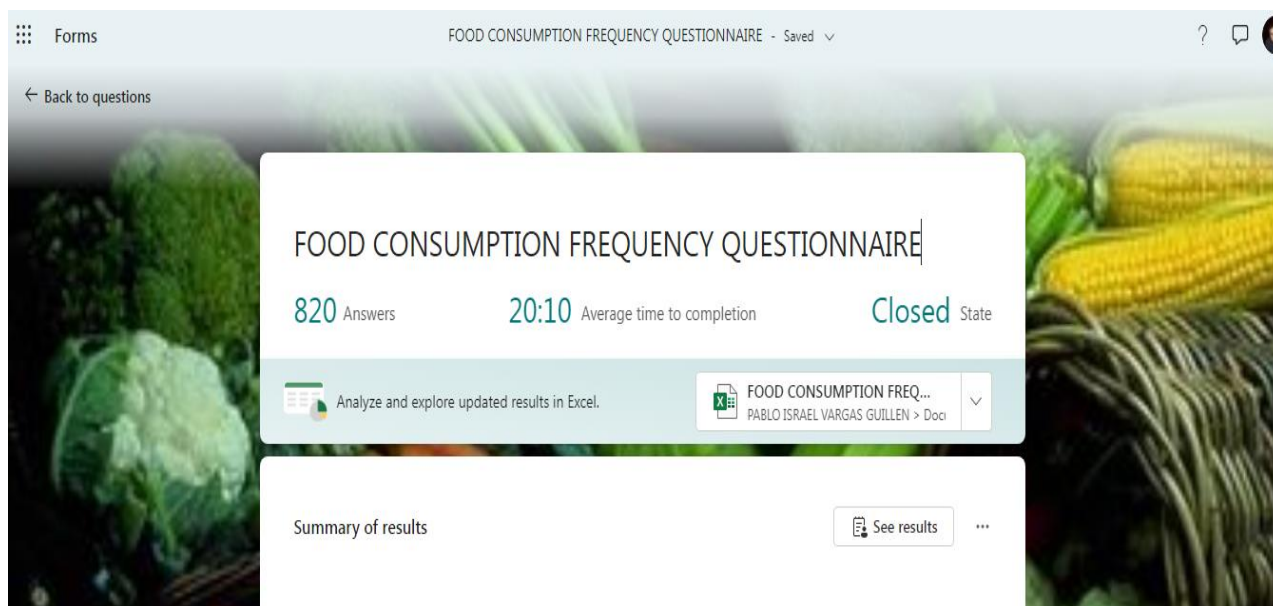


Figure 2. Completed survey of the food frequency questionnaire (Source: Microsoft Forms, 2021).

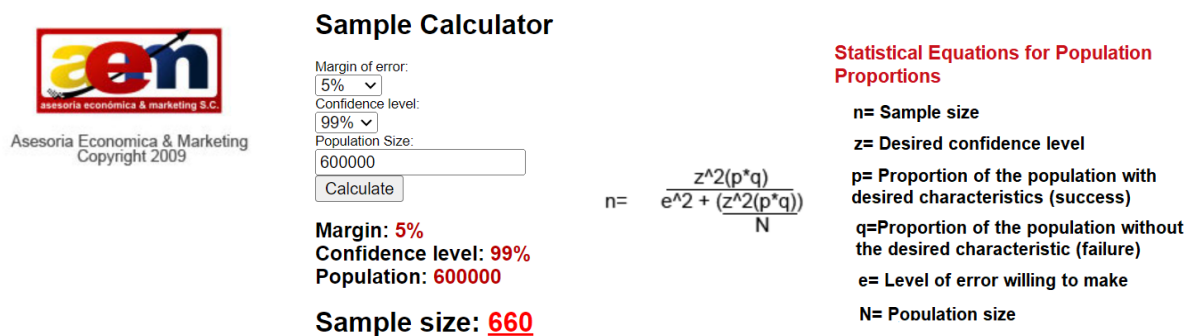


Figure 3. Determination of study sample (Source: AEM, 2024).

### 3. RESULTS AND DISCUSSION

As seen in Table 1, which shows the general results of the survey consumption habits of dairy foods in users of producers' markets versus supermarket customers, in the city of Guayaquil, Ecuador, of 15 proposed products (whole milk (1 cup 200 cc), semi-lactose milk (1 cup 200 cc), semi skimmed milk (1 cup 200 cc), skin milk (1 cup 200 cc), lactose free milk (1 cup 200 cc), condensed milk (1 tablespoon), cream or milk cream (1/2 cup), milk shakes (1 cup 200 cc), whole yogurt (1,125 g), skim yogurt (1,125 g),

petit suisses (55 g), cottage cheese or curd (1/2 cup), cheese cream (25 g), other cheeses (cured, Swiss, mozzarella, Dutch, cheddar (25 g) and white or fresh cheese (25 g)), three presented a greater demand in their consumption, they were (whole milk (1 cup 200 cc), whole yogurt (1,125 g), skim yogurt (1,125 g), and cheese cream (25 g), as well as those with lower consumption, condensed milk (1 tablespoon), Petit suisses (55 g) and cottage cheese or curd (1/2 cup).

**Table 1.** General results of the survey consumption habit of dairy foods in users of producers' markets versus supermarket customers, in the city of Guayaquil, Ecuador

Frequency Consumption	Whole milk (1 cup 200 cc)		Semi-lactose milk (1 cup 200 cc)		Semi skimmed milk (1 cup 200 cc)		Skin milk (1 cup 200 cc)		Lactose free milk (1 cup 200 cc)		Condensed milk (1 tablespoon)		Cream or milk cream (1/2 cup)		Milk Shakes (1 cup 200 cc)	
	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets
Never or almost never	30	180	180	100	210	131	179	105	210	131	235	276	129	122	68	88
1 to 3 times a month	20	30	155	200	111	145	113	121	111	145	118	77	137	139	79	77
1 time a week	20	60	62	78	38	53	42	75	38	53	34	37	73	93	110	106
2 to 4 times a week	110	70	8	17	26	39	39	33	26	39	19	17	64	38	89	60
5 to 6 times a week	120	60	5	7	17	27	36	56	17	27	4	3	5	12	31	66
1 time a day	70	10	0	5	7	13	1	14	3	5	0	0	2	5	33	13
2 to 3 times a day	40	0	0	2	1	1	0	4	3	4	0	0	0	1	0	0
4 to 6 times a day	0	0	0	1	0	1	0	2	2	6	0	0	0	0	0	0
More than 6 times a day	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Frequency Consumption	Whole yogurt (1,125 g)		Skim yogurt (1,125 g)		Petit suisses (55 g)		Cottage cheese or curd (1/2 cup)		Cheese cream (25 g)		Other cheeses (25 g)		White or fresh cheese (25 g)	
	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets	Producer markets	Super markets
Never or almost never	130	60	166	142	379	356	261	245	60	140	199	36	88	104
1 to 3 times a month	60	40	109	96	25	39	110	99	50	30	112	145	149	144
1 time a week	70	100	96	115	4	7	33	43	90	40	49	179	99	81
2 to 4 times a week	110	160	37	33	2	5	4	17	150	90	37	27	44	51
5 to 6 times a week	20	40	1	14	0	2	2	5	40	50	13	16	22	27
1 time a day	10	10	1	10	0	1	0	1	20	50	0	5	3	2
2 to 3 times a day	10	0	0	0	0	0	0	0	0	10	0	2	3	1
4 to 6 times a day	0	0	0	0	0	0	0	0	0	0	0	0	2	0
More than 6 times a day	0	0	0	0	0	0	0	0	0	0	0	0	0	0

### 3.1. Most consumed dairy foods, defined in the survey

#### 3.1.1. Consumption whole milk (1 cup, 200 cc)

In the farmers' market, 3.66% of respondents never or almost never consume whole milk; Among those who consume, it is common to consume 2 to 6 200 cc cups per week. For its part, in the supermarket, 21.95% are not consumers of this type of milk, while in this type of spaces, as in the previous case, those who consume between 2 to 4 cups of 200 cc predominate. a week (Table 2).

#### 3.1.2. Consumption Whole yogurt (1.125 g)

In supermarkets, approximately 36% of those surveyed have the habit of consuming whole yogurt in a proportion of 1,125 g, 1 to 6 times a week (Table 3); while 7.32% of the sample never consume or do so very sporadically; The other data are distributed in a very small way with the average. For their part, in the farmers' markets, 15.85% of those surveyed never or almost never consume whole yogurt; Among those who consume, it is common to do so 1 to 3 times a week (7.32%) and 1 to 6 times a week (25%); As the period of time is reduced, its consumption is simultaneously reduced.

**Table 2.** Frequency of consumption of whole milk (1 cup, 200 cc)

Consumption	N° of user	Producer markets	Percentage (%)	Supermarket	Percentage (%)
Never or almost never	210	30	15.85	180	7.32
1 a 3 times a month	50	20	7.32	30	4.88
1 time a week	80	20	8.54	60	12.20
2 to 4 times a week	180	110	13.41	70	19.51
5 to 6 times a week	180	120	2.44	60	4.88
1 time a day	80	70	1.22	10	1.22
2 to 3 times a day	40	40	1.22	0	0.00
4 to 6 times a day	0	0	0.00	0	0.00
More than 6 times a day	0	0	0.00	0	0.00

**Table 3.** Frequency of consumption of whole yogurt (1.125 g)

Consumption	N° of user	Producer markets	Percentage (%)	Supermarket	Percentage (%)
Never or almost never	190	130	15.85	60	7.32
1 to 3 times a month	100	60	7.32	40	4.88
1 time a week	170	70	8.54	100	12.20
2 to 4 times a week	270	110	13.41	160	19.51
5 to 6 times a week	60	20	2.44	40	4.88
1 time a day	20	10	1.22	10	1.22
2 to 3 times a day	10	10	1.22	0	0.00
4 to 6 times a day	0	0	0.00	0	0.00
More than 6 times a day	0	0	0.00	0	0.00



### 3.1.3. Cheese consumption in portions or creamy (1, portion 25 g)

In supermarkets, 17% of those interviewed never or almost never consume portioned or creamy cheese; Among those who consume it, it

is usual to do so 2 to 4 times a week, in portions of 25 g (Table 4). In the farmers' market, 30% of those surveyed commonly tend to consume portions of 25 g, 1 to 4 times a week, while there is 7.32% whose consumption is sporadic or non-existent in this type of establishments.

**Table 4.** Frequency of consumption of portioned or creamy cheese (1, portion 25 g)

Consumption	N° of user	Producer markets	Percentage (%)	Supermarket	Percentage (%)
Never or almost never	200	60	7.32	140	17.07
1 to 3 times a month	80	50	6.10	30	3.66
1 time a week	130	90	10.98	40	4.88
2 to 4 times a week	240	150	18.29	90	10.98
5 to 6 times a week	90	40	4.88	50	6.10
1 time a day	70	20	2.44	50	6.10
2 to 3 times a day	10	0	0.00	10	1.22
4 to 6 times a day	0	0	0.00	0	0.00
More than 6 times a day	0	0	0.00	0	0.00

With all the above, of the dairy products proposed in the survey, milk, yogurt and cheese; They present greater significance in terms of their consumption; having a high intake almost daily; which shows a clear distribution and destination of production towards this type of dairy, as stated by Armijos (2024), "In Ecuador, 5,5 million liters of milk are produced per day, of which around 51.8 percent enters the formal market. for industrialization distributed in: fluid milk (50.3%), cheese (15.6%), powdered milk (12.7%), yogurt (9.1%) and other dairy products (12.3%)".

## 4. CONCLUSIONS

The collection of information in situ allowed us to determine that the diet in Guayaquil is characterized by a daily consumption of dairy products, mainly yogurt, whole milk and cheese. In contrast, the intake of other dairy

products, such as skimmed milk, lactose-free milk, semi-skimmed yogurt, cream, condensed milk, milkshakes, petit suisse (fresh and unsalted cheese), cottage cheese and other types of cheese (cured, semi-cured, fresh) and custard, is reduced to approximately once a week.

In the consumption of dairy products, there is a clear inclusion in the daily diet of cheese, milk and yogurt, which are alternated daily, emphasizing an intake of 2 to 4 times a week. These products are considered basic, especially during the first hours of the day (breakfast) for children, adolescents and adults. In the case of farmers' markets, there is a marked difference with respect to supermarkets, in terms of the origin of the products. This is mainly because at farmers' markets, the distribution and sale of the raw material (milk) is done directly, without going through safety and conservation processes. Moreover, the products come from

artisanal production models, i.e., they are not stable and use little or no chemicals in the handling of livestock.

In general, the composition of respondents' diets does not appear to differ significantly according to the place of purchase. This is likely due to the fact that lower prices at farmers' markets facilitate access to these foods for the population as a whole. However, notable differences emerge with regard to the origin and quality of the products. At farmers' markets, food is lightly processed and predominantly sourced from family farming, with minimal reliance on industrial inputs. In contrast, supermarkets offer a wider range of products, originating from more intensive farms and from companies specialising in processing, packaging and distribution. Quality is largely contingent upon the traceability processes inherent to the globalised food system.

### Declaración de intereses

None.

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