

Educational level of food providers and sugar consumption in Peruvian children: analysis of the 2021 Nutritional Food Surveillance survey by Life Stages

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ABSTRACT

Objective: To identify the association between the educational level of the primary food provider and the frequency of sugar consumption in Peruvian children aged 5 to 11, based on data from the 2021 Nutritional Food Surveillance Survey by Life Stages (VIANEV). **Materials and methods:** A cross-sectional study design was used, analyzing a final sample of 689 records that met the selection criteria. Descriptive, bivariate, and multivariate analyses were conducted using Stata v. 18.0, considering a 95% confidence level and a p-value of $p < 0.05$. **Results:** A total of 71.53% ($n = 479$) of children consumed sugar two or more times a day, compared to 28.47% ($n = 210$) who consumed it once a day or less. No statistically significant association was found between the frequency of sugar consumption and the educational level of the food provider ($p = 0.360$), area of residence ($p = 0.078$), caregiver relationship ($p = 0.814$), or child's sex ($p = 0.116$). **Conclusions:** The educational level of the child's primary food provider is not a determining factor in the frequency of sugar consumption in the Peruvian pediatric population, according to the analysis of the most recent nutritional surveillance survey.

Keywords: educational level; sugar consumption; eating behavior; oral health, nutritional surveys.

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INTRODUCTION

Early childhood represents a particularly sensitive period to nutritional and metabolic factors, which influence not only growth and development but also long-term health outcomes. Nevertheless, food choices are determined by biological, socioeconomic, demographic, and cultural variables that dynamically interact according to context and life stage. The development of dietary habits during childhood may be influenced by product availability and the frequency of exposure to such products (1). In this regard, the World Health Organization (WHO) has expressed concern about sugar consumption among children, emphasizing that sugar-sweetened beverages constitute one of the main contributors to hypercaloric diets (2).

Given that these habits are established during childhood and that, during the early years, parents or caregivers are primarily responsible for children's diets, they must have adequate knowledge of healthy nutrition (3). Within these contexts, nutrition and oral health are closely interrelated; therefore, caregivers need to understand the effects that dietary choices have on children's oral health (4). A healthy diet plays a key role, as excessive sugar consumption is associated with diseases such as dental caries, which significantly affects quality of life and generates substantial costs for healthcare systems (5, 6). This relationship is multifactorial, encompassing both the influence of nutrition on craniofacial development and the risk of infectious diseases (4–6). Hence, reducing sugar consumption, promoting healthy dietary habits, and implementing educational interventions and public policies constitute key strategies for improving these indicators (5).

The quality of children's diets is associated with caregiver-related factors such as cultural practices and educational level, both of which are decisive in shaping food preferences (7). Several studies suggest that children of parents with higher educational attainment have healthier diets, probably due to greater purchasing power and improved access to nutrition-related information (8). Similarly, these decisions influence oral health, as parents with higher educational attainment tend to better understand the importance of oral care and to seek preventive dental services more frequently (9), thereby promoting appropriate oral hygiene habits (10).

Numerous studies support that caregivers' educational level influences both food provision and the habits developed by children (11,12). For instance, a study conducted in Spain found that lower maternal educational attainment was associated with a greater risk of unhealthy behaviors, such as the consumption of processed foods, fast food, or daily sweets intake. That study highlighted the central role of the family in dietary practices (11). Similarly, a study involving vul-

nerable families in Chile, where most caregivers had completed secondary education, demonstrated how family dynamics directly or indirectly influence children's dietary practices (12).

In Peru, data from the National Institute of Statistics and Informatics (INEI) show diverse family structures in which children may be under the care of grandparents, uncles or aunts, or other guardians, who participate both indirectly and actively in their upbringing and nutrition (13). Within this framework, the National Institute of Health (INS) monitors the nutritional status of the population through the Nutritional Food Surveillance Survey by Life Stages (VIANEV), generating relevant information for addressing public health problems (14).

Considering this evidence, caregivers' knowledge of healthy nutrition is essential and may constitute a determining factor in children's overall well-being, particularly oral health. Given that children depend on their caregivers for food provision, this study aimed to identify the association between the educational level of the primary food provider and the frequency of sugar consumption among Peruvian children aged 5 to 11, using data from the 2021 VIANEV survey.

MATERIALS AND METHODS

A cross-sectional study was conducted based on records of children aged 5 to 11 residing in Metropolitan Lima, Callao, as well as other urban and rural areas of Peru. The 2021 VIANEV survey database was used, corresponding to the most recently published information. Sample size was determined using prevalence estimates from previous studies, considering a margin of error below 5%, an expected nonresponse rate of 40%, and a 95% confidence level. Following a stratified probabilistic sampling process, the initial sample comprised 1,596 records; of these, those meeting the selection criteria were included, resulting in a final sample of 689 records.

The inclusion criteria considered children who had resided in the household for at least the last nine weeks of the three months preceding the survey. Records of children diagnosed with febrile or congenital diseases that precluded clinical assessment were excluded, as were records with incomplete data regarding the variables of interest, including food provider educational level, relationship, and frequency of food consumption.

The main variables were the educational level of the food provider and the frequency of sugar consumption. Covariates included area of residence, the relationship of the food provider, and the child's sex. Since all variables were categorical, educational level—defined as the highest level attained—was classified into the following categories: primary education, secondary

education, non-university higher education, and university higher education. Frequency of sugar consumption was categorized as “two or more times a day” and “once a day or less.” Area of residence was classified into Metropolitan Lima and Callao, other urban areas, and rural areas, according to the official 2021 VIANEV classification and the criteria established by the National Institute of Statistics and Informatics (INEI). The food provider’s relationship was grouped into “parents” and “other relatives,” while the child’s sex was categorized as “male” and “female.”

As for data collection, the National Open Data Platform was accessed, “VIANEV” was searched, and the database corresponding to the “2021 VIANEV Survey: Healthy Eating Habits and Food Consumption among Children Aged 5 to 11 Years INS-CENAN” was selected. Data were processed using Stata v. 18.0 software, excluding records that did not meet the selection criteria prior to analysis.

Descriptive analysis included absolute and relative frequencies. In the bivariate analysis, the chi-square test was applied to evaluate associations. For multivariable analysis, Poisson regression was employed to estimate crude prevalence ratios (PR) and adjusted prevalence ratios (aPR). Two models were constructed: a crude model (educational level as the independent variable and sugar consumption as the dependent variable) and an adjusted model that included covariates showing significant bivariate associations. The “svy” command was used to incorporate the survey sampling design (strata, primary sampling units, and weighting factors).

The protocol was approved by the Institutional Research Ethics Committee of Universidad Peruana Cayetano Heredia (CERTIFICATE-CIEI-E-035-05-25, approved on January 27, 2025). As this was a publicly accessible database, confidentiality was maintained through the use of anonymized and coded data.

RESULTS

Of the 689 child records included, 71.53% ($n = 479$) consumed sugar two or more times a day, whereas 28.47% ($n = 210$) consumed sugar once a day or less. As for food providers, 52.01% ($n = 310$) had completed secondary education, and 12.23% ($n = 94$) had attained university-level education. Among providers with

secondary education, 72.01% ($n = 223$) of children consumed sugar two or more times a day, compared with 27.99% ($n = 87$) who consumed sugar once a day or less. Among providers with university education, 78.15% ($n = 72$) of children consumed sugar two or more times a day, whereas 21.85% ($n = 22$) consumed sugar once a day or less. No statistically significant association was found between the food provider’s educational level and frequency of sugar consumption ($p = 0.360$) (Table 1).

Regarding area of residence, 30.91% ($n = 290$) of children lived in other urban areas, whereas 56.22% ($n = 180$) resided in Metropolitan Lima and Callao. Among children residing in other urban areas, 74.37% ($n = 222$) consumed sugar two or more times a day, compared with 25.63% ($n = 68$) who consumed sugar once a day or less. In Metropolitan Lima and Callao, these proportions were 72.75% ($n = 125$) and 27.25% ($n = 55$), respectively. No significant association was observed between area of residence and frequency of sugar consumption ($p = 0.078$) (Table 1).

In terms of relationship, 89.29% ($n = 640$) of food providers were parents, and 10.71% ($n = 49$) were other relatives. Among parents, 71.31% ($n = 444$) provided sugar two or more times a day, whereas 28.69% ($n = 196$) did so once a day or less. A similar pattern was observed when the food provider was another relative; however, no statistically significant association was found between the provider’s relationship and frequency of sugar consumption ($p = 0.814$) (Table 1).

As for sex, 51.05% ($n = 350$) of the children were male, and 48.95% ($n = 339$) were female. Among boys, 74.98% ($n = 244$) consumed sugar two or more times a day, compared with 25.02% ($n = 106$) who consumed sugar once a day or less. Among girls, these proportions were 67.94% ($n = 235$) and 32.06% ($n = 104$), respectively. No statistically significant association was found between the child’s sex and frequency of sugar consumption ($p = 0.116$) (Table 1).

Multivariable analysis showed a valid model after adjustment for covariates (area of residence, relationship of the food provider, and child’s sex; $p = 0.004$). Despite this, no statistically significant association was confirmed between the educational level of the food provider and the frequency of sugar consumption in the study population (Table 2).

Table 1. Association between the educational level of food providers and the frequency of sugar consumption among Peruvian children aged 5 to 11: analysis of the 2021 VIANEV survey.

Variables	n	%	Frequency of sugar consumption				p*
			Two or more times a day		Once a day or less		
			n	%	n	%	
Educational level of food providers							
Primary education	176	18.44	100	63.50	76	36.50	0,360
Secondary education	310	52.01	223	72.01	87	27.99	
Non-university higher education	109	17.32	84	73.97	25	26.03	
University higher education	94	12.23	72	78.15	22	21.85	
Area of residence							
Metropolitan Lima and Callao	180	56.22	125	72.75	55	27.25	0,078
Other urban areas	290	30.91	222	74.37	68	25.63	
Rural areas	219	12.87	132	59.36	87	40.64	
Relationship of food provider							
Parents	640	89.29	444	71.31	196	28.69	0,814
Other relatives	49	10.71	35	73.41	14	26.59	
Child's sex							
Male	350	51.05	244	74.98	106	25.02	0.116
Female	339	48.95	235	67.94	104	32.06	
Total	689	100	479	71.53	210	28.47	

*Chi-square test.

Table 2. Multivariable analysis of the association between the educational level of food providers and frequency of sugar consumption among Peruvian children aged 5 to 11: 2021 VIANEV survey.

Variables	Frequency of sugar consumption (two or more times a day)								
	Null model	Crude model				Adjusted model 5			
		Coefficient	PR	95% CI	p	Coefficient	aPR	95% CI	p
Model 1: Educational level of food providers									
Primary education	Ref.					Ref.			
Secondary education	0.24	1.3	1.00-1.60	0.05		0.2	1.2	0.95-1.56	0.13
Non-university higher education	0.3	1.4	1.01-1.81	0.04		0.24	1.3	0.92-1.75	0.15
University higher education	0.3	1.4	1.00-1.83	0.05		0.21	1.2	0.87-1.74	0.24
Variance	0.82					0.77			
Intraclass correlation coefficient (ICC %)	0.13					0.09			
p	0.15					0.004			
Model 2: Area of residence									
Metropolitan Lima and Callao	Ref.								
Other urban areas	0.1	1.1	0.89-1.37	0.38		-	-	-	-
Rural areas	-0.14	0.9	0.68-1.11	0.26		-	-	-	-
Variance	0.21								
Intraclass correlation coefficient (ICC %)	0.47								
p	1								

PR: prevalence ratio; aPR: adjusted prevalence ratio; p: statistical significance; a: adjusted for area of residence, kinship relationship of food provider, and child's sex.

Table 2. (Continuation).

Variables	Frequency of sugar consumption (two or more times a day)								
	Null model	Crude model				Adjusted model 5			
		Coefficient	PR	95% CI	p	Coefficient	aPR	95% CI	p
Model 3: Relationship of food provider									
Parents		Ref.							
Other relatives		0.03	1	0.73-1.45	0.87	-	-	-	-
Variance		0.06							
Intraclass correlation coefficient (ICC %)		0.03							
p		0.004							
Model 4: Child's sex									
Male		Ref.							
Female		-0.01	1	0.83-1.19	0.95	-	-	-	-
Variance	0.2	0.25							
Intraclass correlation coefficient (ICC %)	0.05	<0.001							
p	0.003	0,003							

PR: prevalence ratio; aPR: adjusted prevalence ratio; p: statistical significance; a: adjusted for area of residence, kinship relationship of food provider, and child's sex.

DISCUSSION

The present study found no statistically significant association between caregiver educational level and frequency of sugar consumption among children aged 5 to 11, according to the analysis of data from the 2021 VIANEV survey. According to the National Institute of Statistics and Informatics (INEI), between 2013 and 2023, there was a progressive increase in secondary and higher educational attainment within the Peruvian population, accompanied by a decline in the proportion of individuals with only primary education (15). These findings partially contrast with the literature, which generally associates higher parental educational attainment with healthier dietary habits, whereas lower educational levels are linked to less favorable dietary patterns (16).

A study conducted in Spain in 2021 by Cárdenas-Fuentes et al. (11) reported that children whose caregivers had only primary education consumed sweets more frequently. This differs from our findings, in which sugar consumption remained at two or more times a day regardless of the food provider's educational background. Similarly, a study by Wang et al. (17) in China found that caregivers with university education restricted sugar consumption, thereby encouraging children to avoid sugar intake. Such findings diverge from those obtained in this study, where even caregivers with higher educational attainment provided sugar two or more times a day, suggesting that cultural factors influence dietary decisions in Peru.

INEI data (2008–2009) indicate that annual per capita sugar consumption in Peru was 19.5 kg (1.6 kg/month), with higher consumption in rural areas (22.2 kg) than in urban areas (18.7 kg) (18). The results of the present study partially align with this information, as a higher frequency of sugar consumption was observed in non-metropolitan urban areas, suggesting the persistence of elevated consumption patterns that warrant further investigation.

As for relationship, Molina et al. (12) demonstrated in Chile that the family environment significantly influences childhood habits. Similarly, Mathews and Nadorff (19) reported in the United States that children living with grandparents consumed more sugar-containing snacks than those residing only with their parents. In turn, a qualitative study by Burgette et al. (20) indicated that although mothers acknowledged that grandparents provided sweets, one-third avoided addressing the issue because they believed that the grandparents' contribution to the family's quality of life outweighed the potential risks to oral health. In this study, no significant association was observed according to kinship relationship, as both parents and other relatives provided sugar two or more times a day. This pattern may be mediated by socioeconomic factors that warrant more in-depth analysis.

Although child sex is rarely considered a primary variable, Bably et al. (21) found that girls younger than 30 months began consuming sugar earlier than boys. While this evidence differs from the variables examined

in our study, it highlights how dietary habits are shaped by social and cultural influences from early stages of life.

Dental caries, the most prevalent oral disease in early childhood, has a multifactorial etiology associated with environmental and lifestyle factors, underscoring the importance of diet and oral hygiene (22). Several studies confirm the relationship between sugar consumption and the incidence of dental caries during childhood (23,24). In this regard, Lerner et al. (25) demonstrated that personalized nutrition and oral health programs directed toward caregivers increased the adoption of healthy behaviors among children. Similarly, a trial conducted in Uganda by Engh et al. (26) showed that maternal education in nutrition and oral hygiene improved children's self-care practices and reduced disease prevalence. These findings underscore the fundamental role of caregivers in disease prevention through the promotion of balanced diets and reduced sugar intake, thereby contributing to overall well-being and quality of life.

The present study has certain limitations. The use of secondary data may have led to non-homogeneous comparisons, particularly regarding the relationship variable, as well as potential biases in the original data collection process. Furthermore, the cross-sectional design precludes establishing causal relationships; however, one of the principal strengths of the study is the use of a nationally representative database, which supports the validity of the findings.

Overall, these results highlight the need for comprehensive research that incorporates additional variables, as well as qualitative or mixed-method approaches, to

better understand caregivers' perceptions and the environmental influences that shape sugar consumption patterns among Peruvian children aged 5 to 11.

CONCLUSIONS

Findings indicate that the educational level of the primary food provider is not significantly associated with the frequency of sugar consumption among Peruvian children aged 5 to 11, according to data from the 2021 VIANEV survey. This pattern persisted when considering area of residence, caregiver relationship, and child sex, variables that did not demonstrate a determining association.

Nevertheless, it was confirmed that most children consumed sugar two or more times a day. Higher frequencies were observed among children whose caregivers had secondary education, resided in non-metropolitan urban areas, were primarily cared for by their parents, and were male. Since these characteristics do not fully explain the high level of sugar consumption, it is suggested that this phenomenon is widespread across the Peruvian pediatric population and may be linked to factors not evaluated in this study, such as cultural practices, availability of sugar-containing products, or marketing strategies.

In summary, the results underscore the need to address sugar consumption through comprehensive strategies that extend beyond individual educational levels, promoting multisectoral public policies aimed at creating healthier food environments.

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RBAM, GXLQ, NELM, MAVO: conceptualization, methodology, writing of the original draft. **NCQS:** conceptualization, visualization, writing - review & editing. **CDRS:** conceptualization, methodology, writing of the original draft, software, visualization, writing - review & editing.

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