

Cite as:

Tafur NA, Pizarro O, Ordinola CM, Bustamante SY. Family oral health and dental caries expenditures in children attended at a health center in Lámud, Peru, during the year 2023. *Rev Estomatol Herediana*. 2024; 34(4): 267-274. DOI: 10.20453/reh.v34i4.6159

Received: September 26, 2023

Accepted: November 14, 2024

Online: December 23, 2024

Conflict of interest: The authors declare no conflict of interest.

Funding: Self-funded.

Ethics approval: It has the authorization of the Institutional Research Ethics Committee of the Faculty of Human Medicine of the Universidad de San Martín de Porres, through Official Letter No. 591-2023-CIEI-FMH-USMP.

Authorship contribution:

NATC: conceptualization, methodology, supervision, validation, writing of original draft.

OPS: funding acquisition, research, project administration.

CMOR: data curation, visualization, writing - review & editing.

SYBV: research, resources, software.

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Family oral health and dental caries expenditures in children attended at a health center in Lámud, Peru, during the year 2023*

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ABSTRACT

Objective: To determine the correlation between family oral health and dental caries costs in children attended at Centro de Salud de Lámud, Peru, during the year 2023. **Materials and methods:** Quantitative study, observational approach, cross-sectional design and analytical type. The sample consisted of 240 preschool children whose parents and/or guardians attended dental consultations at Centro de Salud Lámud. The selection was non-probabilistic and by convenience. **Results:** There was no statistically significant correlation between family oral health and dental caries expenditure in children attended at Centro de Salud Lámud during the year 2023 ($p > 0.05$). There was also no significant correlation between the oral health of the children attended and the dental expenses for dental caries in the same health center ($p > 0.05$). In addition, there was no statistically significant correlation between the oral health of the parent and the dental expenses for dental caries in the referred health center ($p > 0.05$). **Conclusion:** There is no correlation between family oral health and dental caries costs in children attended at Centro de Salud de Lámud during the year 2023.

Keywords: oral health; dental caries; community odontology; economics in odontology; odontology in public health.

*This article was based on the thesis of Nestor Arturo Tafur Chávez to obtain a master's degree in Health Services Management from Universidad de San Martín de Porres.

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INTRODUCTION

Currently, oral health is constantly related to quality of life. This was analyzed by Dr. Patrick Hescot (1), president of the International Federation of Dentists, who considers it a determining factor for overall physical health, mental health, and quality of life, as it encompasses a variety of skills such as speaking, smiling, tasting, chewing, swallowing, etc. Conditions such as oral pain, discomfort, and/or oral pathology can disrupt quality of life to varying degrees of severity (2). At present, it is known that dental caries can cause unnecessary stress, growth delays, and have negative consequences on body weight in a significant number of infants (3, 4); however, despite all efforts, it remains one of the most common and preventable pathologies in early childhood worldwide, with a prevalence, in some countries, of over 90% in children between 3 and 5 years old (5, 6). It is known that dental caries lesions present in teeth have an unfavorable influence on the quality of life of infants due to orofacial pain, discomfort, infections and the ability to chew and eat (7, 8).

It is estimated that approximately 3.5 million people suffer from oral health diseases (9). According to research studies conducted in 2017 on the morbidity of dental caries in permanent teeth, it is the most common health condition (10). Currently, it is known that there are 530 million pediatric patients who suffer from caries in their primary teeth. Early-stage dental caries affects deciduous or permanent dentition, impacting health and quality of life. It also shares risk factors with diseases such as obesity due to high sugar consumption. It can cause abscesses, pain, problems with eating and sleeping, thus affecting childhood growth. In addition, its treatment can be financially expensive, especially with procedures requiring general anesthesia (11). This oral health condition arises from an imbalance in the dental biofilm, where acidogenic and aciduric microorganisms predominate, with a decrease in beneficial bacteria. This imbalance is associated with modifiable risk factors and social determinants, such as a diet high in free sugars, which also contributes to other non-communicable diseases (12).

One of the pediatric pathologies with a high global incidence is early childhood caries (ECC). When seeking care and treatment for chronic pain and its sequelae, patients' families often experience stress and financial strain due to the time spent taking children to multiple dental appointments. They incur expenses for transportation and other related needs, which

impacts their finances and reduces their quality of life even though the government also allocates funds to prevent and treat oral diseases. Currently, the Peruvian health care system is grappling with the management of the severe impact of early childhood dental caries in emergency services and operating rooms across various healthcare facilities (13-16).

Since caries is a microbial dysbiotic disease with multiple etiological factors; primary preventive measures focus on controlling the colonization of children's oral flora during the first year of life (17). In this context, evidence confirms that the success of the dentist's intervention increases when preventive activities begin during pregnancy (18) especially if the mother is adequately motivated to care for her own oral cavity, so that, in this way, she also protects that of her child. This approach reduces the number of cariogenic microorganisms in the child mouth (19), thus controlling a key factor that predisposes the development of carious lesions in early childhood (20, 21).

The concept currently being promoted is a culture of family oral health, which provides adequate and regular care from the initial months of life, focusing on adequate nutrition and general and oral hygiene of the infant, as well as an adequate assessment of the child's oral health condition during his first years of life (22). All healthcare professionals should embrace this philosophy, as they will be in closer contact with the child during the early years of life (23). Dental carious lesions in teeth during early childhood, as a problematic situation in Peru, cause direct and indirect economic losses to households and the country. In this regard, preventive activities are very effective, and the investment in them is very low (24, 25).

In the region of Amazonas, dental caries is a pathology that affects a large percentage of the population, mainly during the first months of infants' lives, impacting not only the social aspect, but also the economic one. That is why it is of vital importance to understand the social and economic impact that this disease represents in early childhood in the families of this region, specifically in the district of Lámud, considering that its health center only has two dentists to serve the entire population. In this way, it will be possible to determine how to guide preventive measures to reduce the negative impact of this disease. Apart from that, it is often observed that to visit the health facility, residents must cover transportation, food, and income loss expenses associated with taking their younger children to their dental appointments, which results

in an additional expense, both directly and indirectly, to cover dental treatments. In this sense, the objective of this research study was to determine the correlation between family oral health and dental caries expenses in children treated at the Lámud Health Center in 2023.

MATERIALS AND METHODS

The method used is quantitative, because numerical data were collected. The approach was observational, as it was limited to the observation and recording of data without the researcher's intervention in the variables. The type of study was cross-sectional and analytical.

To select the sample, we used the database of preschool children aged 3 to 5 years who attended the Lámud Health Center in the province of Luya, city of Amazonas, Peru, in 2023. The children were accompanied by their parents, who signed an informed consent. Those who did not live with their children, those of a nationality other than Peruvian, and those with any physical or motor disability were excluded. On the other hand, preschool children with physical or motor disabilities, those with uncontrolled systemic diseases, those with oral cavity lesions, and those of a nationality other than Peruvian were not considered. These criteria were considered to homogenize the sample and avoid biases and thus ensure that the variables of interest could be comparable among participants. For this purpose, the HIS-MINSA platform was used, considering a projected population for the year 2023, which amounted to 280 children attended. To define the sample size, it was considered that the population was finite. Accordingly, the corresponding sample size calculation formula was applied, obtaining a value of 240. The sample selection was non-probabilistic and based on convenience.

Prior to data collection, authorization was obtained from the Head of Lámud Health Center to carry out the research study. In the same way, approval was obtained from the Institutional Research Ethics Committee of the Faculty of Human Medicine at Universidad de San Martín de Porres on May 29, 2023, through Official Letter No. 591-2023-CIEI-FMH-USMP.

To record data regarding family oral health, the Early Childhood Oral Health Impact scale (ECOHIS) was used, which was transculturally adapted for the Peruvian population in 2011 by López et al. (25). In their study, psychometric tests demonstrated construct validity, discriminant validity, and

internal consistency; they obtained Cronbach's alpha coefficients of 0.935 for the child impact domain, 0.882 for the family impact domain, and 0.948 for the global ECOHIS. These values show that the instrument has good internal consistency, so it was not necessary to determine its validity or reliability.

Monetary data records were made using instruments validated in Peru in 2018 by Munayco (26). These documents recorded the dental expenses and the families' budgets for the patients. Since these are numerical data, no validation was necessary, but the author of this research deemed it appropriate to determine the content validity through expert judgment. To do this, the binomial test was applied, obtaining an 89% agreement among the judges. According to the criteria mentioned by the author, based on psychometry notes by Aura Nidia Herrera in 1998, this value indicates excellent validity of the instrument. In this process, criteria such as the instrument's ability to address the research problem, the adequacy and clarity of the items, and their sequence to facilitate its application were evaluated.

All actions taken were done prior to the completion of an informed consent for the parents and an informed assent for minors. The database in Excel was analyzed using the SPSS v. 25 statistical software, and the results obtained were presented in tables. For the statistical analysis, the Kolmogorov-Smirnov test was first applied, which showed no normality between the variables; therefore, the Spearman correlation test was then used with a 95% confidence interval and a significance level of 0.05.

RESULTS

A total of 240 preschool-aged children were analyzed, with 135 females and 105 males. In addition, 240 parents were interviewed, with 151 females and 89 males. The average expenditure of all the surveyed families was 70.70 soles (SD = 26,635), with a minimum expenditure of 15 soles and a maximum of 165 soles (Table 1).

Table 1. Dental expenses for dental caries in children treated at the Lámud Health Center in 2023.

Dental expenses (in soles)				
n	Minimum	Maximum	Mean	SD
240	15	165	70.70	26.635

SD: standard deviation.

No statistically significant correlation was found between family oral health and dental caries expenses in children treated at the Lámud Health Center in 2023 ($p = 0.611$). No statistically significant correlation was observed between the oral health of the children attended and the dental caries expenses ($p = 0.705$). In addition, no significant correlation was found between the oral health of the father or mother and the dental expenses for dental caries ($p = 0.300$) (Table 2).

Table 2. Oral health of the family, oral health of the children treated, oral health of the parents, and dental expenses for dental caries in children treated at the Lámud Health Center in 2023.

	Dental expenses	
	Spearman's Rho	p
Sum of family oral health	0.033	0.611
Oral health of children treated	-0.025	0.705
Oral health of parents	0.067	0.300

DISCUSSION

The study found no significant correlation between family oral health and dental expenses for caries in children attended at the Lámud Health Center in 2023. Similarly, no significant correlation was found between the oral health of the children attended and the dental expenses for dental caries, nor between the oral health of the father or mother and the dental expenses in the same context.

When comparing the results with those obtained by Lee et al. (27), it was observed that, from the point of view of statistics, they did not identify significant associations when analyzing the correlation between oral health and expenses related to dental caries. This is similar to the findings of the present study, where family oral health is not directly correlated with the expenses associated with the presence of dental caries in children.

In evaluating Munayco's research study (26), which found that the connection between family dental expenses and the experience of carious lesions is direct and weak, it was also observed that there is a connection between oral health and the expenses they represent. Although it is a study conducted in Lima, the capital of Peru, and the results do not resemble ours, this may be because the expenses incurred by families in the district of Lámud are lower, and their

economy is not affected in the same way as in coastal families. Apart from that, access to the health facility requires a very high cost, and the local population's economy is limited.

When examining the study by Pesaressi et al. (28), from 2019, it was observed that the presence of carious dental lesions, both cavitated with or without pulp involvement, negatively affects the oral health-related quality of life of 3-year-old children. These findings are similar to the results obtained in this study, as dental caries have an adverse impact and generate expenses for families. Although the economic and geographical realities differ between both studies, the negative effects of caries on quality of life and family expenses seem to be a recurring pattern in our national context.

Upon reviewing the research study by Bernabé et al. (29) and comparing it with this study, it is observed that not all families experience the same degree of economic imbalance. Here, differences can be identified between that study and this research study, as it shows a greater economic imbalance in families that are basically from the rural sector, with nearly 100% of them living in poverty or extreme poverty.

When another Peruvian study was evaluated, similarities were found, since they focus on the limited attention given to oral health within the Peruvian healthcare system. It was observed that the number of specialized professionals in oral health care is significantly lower compared to other healthcare professionals. This greatly impacts the consequences of dental caries on the expenses incurred and, therefore, on family oral health, which is affected both by the child suffering from dental caries and by the family that must bear additional expenses for their child's recovery (30).

When evaluating the research study by Morales & Gómez (31), it can clearly be observed that, despite not being conducted in the same region, the results are similar. This may be attributed to the fact that both populations share comparable realities, considering that they are predominantly rural communities facing similar issues within their respective healthcare systems, as well as comparable budgets and expenses. These factors contribute to repercussions on the fact that the children of families have dental caries and need treatment.

The study by Hincho et al. (32) presents a similar reality across the entire national territory. The relationship they found between the expenses generated by dental caries and the impact on family oral health is direct, as

in this study. Therefore, there are similarities that are consistent with all the national studies that have been analyzed so far.

In the study by Chaffee et al. (33), in Brazil, the expenses related to dental caries and their impact on family oral health are lower. Therefore, economic investment in the prevention of dental diseases should be a priority. This is an issue that needs improvement in the Peruvian healthcare system, where a disadvantage is observed compared to other Latin American countries.

González et al. (34), in their research study, provide relevant information on the impact of oral health on the quality of life of preschool children and their families in the Chilean context. The results highlight the importance of promoting good oral health from an early age and the need to provide adequate dental care to prevent and treat dental problems despite limitations due to the low educational level of parents and their limited understanding of the importance of oral health.

When analyzing and comparing with the study by Rodríguez et al. (35), a similarity found was that the socioeconomic context significantly influences the results obtained. Therefore, it would be crucial to investigate whether this relationship manifests similarly in the urban populations of the region. This would allow us to analyze and compare the results, especially to design effective strategies for addressing carious lesions across all social strata.

In the research study by Vargas-Castañeda et al. (36), it is suggested that oral health does not have a significant adverse impact on the quality of life of preschoolers in the studied sample. When analyzing the study by Zambrano et al. (37), the results highlighted the importance of implementing effective strategies for the prevention and treatment of dental caries in the pediatric population, with the aim of improving quality of life and reducing the social and emotional burden associated with this oral disease. These findings are consistent with other studies in rural contexts but suggest the need to implement preventive policies and improve economic accessibility to address the issue in our nation.

When evaluating Santos' research study (38), it was observed that the child's age is significantly related to the quality of life associated with oral health. This suggests that as children grow, their perception of oral health and its impact on their quality of life may change.

When analyzing the study by Anusch & Aravena (39), it was observed that the studies they evaluated used

several instruments to analyze the variables related to oral health and found that at least one of these has a significant impact on the quality of life of preschool children, adolescents, and/or their families. These resolutions highlight the importance of considering oral health as a determining factor in the quality of life of this population. These results suggest that, although economic variations between regions may be a factor, the issue remains consistent in rural areas of the country.

One of the identified limitations was the lack of interest from parents, who did not pay adequate attention to the oral health of the family, as they prioritized other daily concerns. Another limitation was the geographical context in which the study population was located, as it often made data collection challenging. However, none of these factors influenced the results or significantly affected the development of the research.

Finally, the paper highlights the importance of addressing oral health in rural regions as an integral part of the public health strategy in Peru. Future studies could focus on evaluating prevention programs and improving access to specialized dental services to reduce the financial burden on families.

CONCLUSIONS

There is no correlation between family oral health and dental caries expenses in children treated at the Lámud Health Center during 2023. In the same way, no significant correlation was found between the oral health of the treated children and dental caries expenses at the same health center, nor between the oral health of the parents and dental caries expenses in the same institution.

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