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Knowledge and practices of educational agents and oral health conditions of children in the municipality of Santa Rosa de Cabal, Colombia

Conocimientos y prácticas de las agentes educativas y condiciones de salud bucal de niños del municipio de Santa Rosa de Cabal, Colombia

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Resumen

Introducción: La prevalencia modificada de caries en la primera infancia es de 61,92%, el desconocimiento en salud bucal por parte de cuidadores es una de las causas reportadas. **Objetivo:** Determinar conocimientos y prácticas de las agentes educativas y condiciones de salud bucal de niños de los hogares comunitarios y Centros de Desarrollo Infantil del Instituto Colombiano de Bienestar Familiar de Santa Rosa de Cabal 2016. **Materiales y métodos:** Estudio cuantitativo, descriptivo y transversal. Se aplicó encuestas de caracterización a 198 niños y 20 agentes educativas, de Conocimientos Actitudes y Prácticas e índices odontológicos. Se aplicó estadística univariada y Chi^2. **Resultados:** El 90% de las agentes reconocen la caries como la enfermedad más frecuente, 50% realizan cepillado de los infantes sin utilizar seda dental. Se evidenció prevalencia modificada de caries en 63,6% y promedio de índice O'Leary 61,3%. Existe asociación entre el índice ceo-d (cariados, extraídos, obturados), área de residencia y estrato socioeconómico con valor p<0,05. **Conclusiones:** Las agentes evidencian vacíos conceptuales que requieren abordaje de educación por parte de odontólogos. El estado de salud bucal de la primera infancia indica un porcentaje por encima de la prevalencia modificada de caries a nivel nacional y el índice O'Leary riesgo de enfermedades bucodentales.

Palabras clave: Niño; salud bucal; cuidadores, caries dental; placa bacteriana. (Fuente: DeCS, Bireme).

Abstract

Introduction: The modified prevalence of caries in early childhood is 61.92%. Ignorance in oral health on the part of caregivers is one of the reported causes. **Objective:** To determine knowledge and practices of educational agents and oral health conditions of children in community households and child development centers of the Colombian Family Welfare Institute (ICBF) in Santa Rosa de Cabal in 2016. **Materials and methods:** A quantitative, descriptive and transversal study was made. Characterization surveys were applied to 198 children and 20 educational agents about knowledgeable attitudes and practices and dental indices. Univariate and Chi^2 statistics were applied. **Results:** 90% of the agents recognize caries as the most frequent disease, 50% perform brushing of children without using dental floss. Modified caries prevalence was demonstrated in 63.6% and 61.3% average O'Leary index. There is an association between the CEO-D Index, area of residence and socioeconomic strata with p<0.05 value. **Conclusions:** Agents demonstrate conceptual gaps that require an education approach by dentists. The state of oral health of early childhood indicates a percentage above the modified prevalence of caries at the national level and the index O'Leary risk of oral diseases.

Key words: Child; oral health; caregivers; dental caries; dental plaque. (Source: DeCS, Bireme).

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Introduction

Early childhood has been defined as the time period from gestation to 8 years of age and is considered an important stage due to the growth and developmental processes that take place during that time period. For this reason, special attention should be paid to children in this stage and it is necessary to ensure their proper development through policies and strategies that improve their quality of life. Thus, general conditions of health and oral health should be considered in the implementation of such policies[1,2]. There are several studies presenting evidence on how the vulnerable state of early childhood worldwide is being threatened by poverty, armed conflicts and the Acquired Immune Deficiency Syndrome (AIDS). In Colombia, a significant number of infants in early childhood suffer conditions of extreme poverty, physical abuse, and violation of their human rights. These negative elements obstruct the physical growth and psychological, social, cultural and economic development of this young population[3-6].

The Colombian Ministry of National Education, universities and the Colombian Institute of Family Welfare (ICBF) have implemented educational programs made up of community mothers in order to solve this problematic situation. These community mothers are now called educational agents since they have been trained through highly qualified pedagogical and professionalization processes to promote proper growth and development of the early childhood population. Their activities are focused on four fundamental aspects of growth and development of children: nutrition, protection, health and education[7,8]. This program has been executed in community homes and Child Development Centers (CDC) located in several Colombian municipalities, having a positive impact on the four previously mentioned fundamental aspects[7,8]. Women that work as educational agents must take care and protect children during eight hours every day, when they carry out activities related to general health promotion and oral health care.

A study conducted in the city of Medellín, Colombia showed the perception that educational agents had about the oral health needs of children from two to five years old. This study presents evidence demonstrating a lack of access to dental care, scarcity of facilities designed for oral health education, and lack of training of people in charge of children like parents and educational agents who showed limited knowledge regarding oral health care[9].

In this context and considering the importance of oral health during early childhood, it is necessary to analyze the data provided by the Fourth National Study on Oral Health (ENSAB IV)[10]. This study shows that the dental caries experience-modification in children of ages one, three and five years old had an average value of 66.91%, as measured by the DMF (decay-missing-filled) index, based on the International Caries Detection and Assessment System (ICDAS). However, values of 29.31%, 83.03%, and 88.83% were obtained in ages one, three, and five years old, respectively. In addition, the authors observed that the central region of Colombia (Antioquia, Caldas, Risaralda, Quindío, Caquetá, Huila, and Tolima Departments) had a higher proportion of caries experience-modification (69.98%). On the other hand, the average modified prevalence of caries was 61.93%, showing individual values of 26.85%, 77.47%, and 81.86% in children aged one, three, and five years old, respectively.

Other studies conducted in Colombia have demonstrated the magnitude of the problem of primary dentition caries in children belonging to precarious socioeconomic contexts. Their findings have also shown the high prevalence of this disease and the needs of this young population. From those reports, the relationship of dental caries to inequity and life conditions that limit the access to timely and effective dental care is evident[11,12].

One of the causes of this situation could be the lack of knowledge of caregivers, which leads to an inadequate practice of oral care in children under their supervision. Thus, it is necessary to identify and strengthen the habits of this caregiver population[13]. On the other hand, studies conducted on knowledge and skills of parents and caregivers of children from infancy into early childhood have demonstrated favorable working conditions, which could be used as an opportunity to promote hygienic habits in children. Nonetheless, the procedures that parents follow in order to maintain children's good oral health do not coincide with their knowledge and experience[14]. Given the fact that caregivers and parents are responsible for the care of infants, it is necessary to determine their knowledge and procedures applied to ensure an appropriate oral health of children[15].

National and regional government policies have proposed goals in order to counteract the appearance of caries. For instance, the 2012-2021 Ten-Year Public Health Plan[16] has as one of its goals to achieve a 20% increase in caries free population, especially in infancy, childhood and adolescence, reducing the DMF index to 0. For its part, the 2016-2019 Development Plan of Risaralda "Green and Enterprising"[17] highlights the importance of implementing the comprehensive care route for oral health in order to improve accessibility to health services. Also worth mentioning is the strategy called Integrated Management of Childhood Illness (IMCI) proposed by the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization (WHO) in order to reduce the incidence and severity of diseases that affect children. This proposed approach includes an oral component that focuses on obtaining basic knowledge to promote healthy oral habits in early childhood and highlights the importance of educational agents in the execution of IMCI[18].

The Autonomous University Foundation of the Americas of Pereira (Department of Risaralda, Colombia) is also contributing to the goals previously described. Since 2010, the University has been working with community homes of the ICBF of Risaralda, some of which are located in the municipality of Santa Rosa de Cabal, near the capital Pereira. However, there is no reliable information regarding the caregivers' practices related to children's oral health in Santa Rosa de Cabal. Therefore, it is necessary to study and assess the knowledge and procedures followed by caregivers to maintain good oral health of children in community homes and CDCs belonging to the ICBF of this municipality.

Materials and methods

We designed a quantitative, descriptive, cross-sectional study that was carried out during 2016. The study population included children and educational agents of community homes and CDCs belonging to the ICBF of the municipality of Santa Rosa de Cabal – Risaralda. We included 198 children (between 1 to 5 years of age, from socioeconomic strata 1, 2, and 3) and 20 educational agents from 10 community homes and 2 CDCs.

The research team consisted of three research professors from the Autonomous University Foundation of the Americas and four students from the Odontology Faculty of the same institution. The design of the information collection surveys was based on specifications found in a report from the WHO on basic methods for health surveys[19], which was validated by 3 experts in dental sciences from the Central Committee of Research of the Foundation. Following the suggestions of this committee, 6 questions were removed from the original questionnaire which resulted in a 34-question survey.

Three independent surveys were carried out in order to collect information. The first and second surveys covered sociodemographic issues and knowledge as well as health practices of educational agents, respectively; the third survey was used to collect sociodemographic data of children. The first survey assessed variables like age, gender, stratum, and level of education of educational agents. The second survey covered variables related to knowledge and practices of the educational agents in relation to oral health care in early childhood. The final survey measured variables of children such as age, gender, stratum, community home, among others. In addition, two dental indices were developed in order to identify oral health conditions of early childhood participants.

Based on the parameters established for the design of surveys about Knowledge, Attitudes, and Practices, we built our instrument in order to inquire only about knowledge and practices of the educational agents in reference to early childhood oral care[20].

We also used a survey to collect sociodemographic data of children and to characterize their oral health status. This survey included two basic dental indices whose criteria were approved by the researchers. A pilot test with 14 children from community homes of Pereira was carried out as a strategy to validate the instrument. Each of the examiners applied the instruments to each of the children of the pilot test and compared their results. No significant discrepancies were found, i.e., there were consistency and reliability in the criteria of the examining group. The Alfa-de-Crobach coefficient for the instrument was 0.82, indicating a good reliability value.

Clinical examinations to determine basic dental indices were performed in rooms of the community homes and CDCs following biosafety and sterilization regulations. Each child was placed in a dorsal position, whereas the examiner was sitting behind his/her head using natural light during the analysis.

The clinical exam included materials such as an explorer, buccal mirror, gauze, and bacterial plaque-revealing dye. It is important to mention that dental surfaces were dried with gauze before the buccal examination. All of the dental material was placed on an auxiliary table and a student registered the data.

The first index analyzed was the modified DMF (decay-missing-filled), which was used to determine caries prevalence and history in this population. The Pitts and Fyffe classification[21] was applied to diagnose caries, which classifies lesions in the following groups: (i) non-cavitated enamel lesion, (ii) cavitated enamel lesion, (iii) cavitated dentine lesion, and (iv) lesion with possible pulpal involvement. We did not differentiate between type of carious lesion, except in the cases of cavity lesions with pulpal involvement, where an individual report was made to inform the need for priority treatment. The DMF index was recorded on a card prepared for this purpose and the different indices were classified according to the criteria defined by the WHO[22].

The O'Leary Index was used to determine the oral hygiene of the participants by applying a liquid dye that reveals the presence of plaque. A piece of gauze was soaked with the dye before being applied to all dental surfaces. The stained surfaces that contained bacterial deposits were identified and registered in the corresponding format to calculate the O'Leary plaque index. Finally, the parameters contained in the Guide for the Specific Protection against Caries and Gingival Disease[23] were used to determine the risk. According to these guidelines, an O'Leary plaque index above 15% represents a greater risk of developing oral diseases associated with bacterial plaque.

The information collected in the surveys as well as the applied dental indices (DMF and O'Leary) were digitized and tabulated in Microsoft Excel®. Univariate and bivariate statistical analyses were used for the sociodemographic characteristics of educational agents and children. In reference to the surveys about knowledge and practices and dental indices, measures of central tendency (average, median, and mode) and dispersion (minimum, maximum, and standard deviation) were calculated. A Chi^2 test was used in order to analyze the association between the sociodemographic characteristics of children and their oral health status. The latter test was also used to examine the relationship of the variables of the educational agents to oral health of children. The criterion to establish a statistical significance was $p<0.05$.

Ethical considerations

This research work (project code P74) was approved by the Research Ethics Committee of the Autonomous University Foundation of the Americas. Informed consent forms were voluntarily filled out by both educational agents and legal guardians of participant children, according to the 1993 Resolution 8430 by the Colombian Social Protection Ministry. This research is classified as minimum risk.

Results

Sociodemographic data of educational agents and children

The participating population included 20 educational agents from community homes and CDCs of the municipality of Santa Rosa de Cabal belonging to socioeconomic strata 1 and 2. Their average ages were 43.1 years old (Standard Deviation 9.4), with 33 and 52 being their minimum and maximum ages, respectively. 10 educational agents had technical studies in early childhood education. On average, they have been working at ICBF for 14.1 years.

Our study included 198 children, distributed in 107 (54%) boys and 91 (46%) girls. The majority of them (186; 94%) belonged to socioeconomic strata 1 and 2, whereas only 12 (6%) were from stratum 3. In regards to their area of residence, 88.4% (175) of the children came from urban areas of the municipality. The age range of the participating infants was between 1 to 5 years, with an average of 3.07 years old (Standard Deviation 0.84). Most of the children were born in Santa Rosa de Cabal (166; 84%), followed by Pereira (32; 16%).

Knowledge and practices in oral health of educational agents

Knowledge

Whereas 65% (13) of the educational agents highlighted the importance of deciduous teeth in the maintenance of the space for permanent dentition, the remaining 35% (7) recognized the essential role of temporary teeth in the functioning of the stomatognathic system.

Regarding the oral diseases that educational agents recognized as more frequent in early childhood, 90% (18) of them mentioned caries. On the contrary,

diseases like gingivitis, growth disorders and dental traumatisms were identified only by a minority. For 95% of caregivers, the main cause associated with diseases is carelessness of parents, whereas only 1 worker (5%) attributed the cause to sugar consumption and lack of oral hygiene.

While 50% (10) of the agents agreed that infants should visit the dentist from the first year, the other half mentioned different time periods like birth, eruption of first teeth, and 5 years of age. In reference to the frequency of dental consultation, 60% (12) of them declared that this has to be twice a year, the main reason being prevention (18; 90%). Finally, according to 90% (18) of the educational agents, parents should play an essential role in children's teeth brushing and 95% (19) of them disagreed with the use of bottle.

Practices

55% (11) of the agents expressed that they check the mouths of the children in their care.

Although there is a daily frequency of tooth brushing in 100% of community homes, only 50% (10) of participants always supervised this activity, whereas the other half did it only a few times.

The dental implements used by 100% of the agents to carry out oral hygiene in community homes were toothbrush and toothpaste, while dental floss was not used in any of the homes. In order to dispense the paste, 55% (11) of the agents did it on the vertical axis of the brush, applying a high amount. Regarding the importance of fluoride in tooth paste, 60% (12) of the agents expressed that tooth pastes should not contain this compound, whereas only 25% (5) agreed on its presence and 15% (3) did not know.

Oral health conditions of children

The average number of teeth was 19.5, with a modified DMF index of 3.1 (Standard Deviation 3.3). When each component of the index was discriminated, we found the following general averages: carious (2.6)-missing (0.1)-filled (0.4). The average of the O'Leary index was 61.3%, which indicates a high risk of caries and diseases associated with bacterial plaque (a value higher than 15% is associated with higher risk). These figures, together with sociodemographic data, are shown in Table 1.

The modified experience of caries refers to the proportion of people who, at the moment of application of the DMF index, show evidence of having suffered caries (filled or missing teeth) at any time of their lives; for our early childhood population, this modified experience was 22.7%. The modified prevalence of caries indicates the percentage of children with carious lesions (cavities, initial or moderate lesions) at the moment of applying the DMF index. In our case, this value was 63.3% (Table 2).

Table 1. Oral conditions of boys and girls according to their socioeconomic conditions. Santa Rosa de Cabal, Risaralda (Colombia)

Gender	DMF average	Carious teeth average	Filled teeth average	Missing teeth average	O'Leary index average
Male	3.4	2.9	0.4	0.1	63.8
Female	2.7	2.3	0.4	0.1	58.4
Age					
1	0.0	0.0	0.0	0.0	75.0
2	2.6	2.5	0.1	0.0	59.4
3	3.0	2.4	0.5	0.1	59.3
4	3.7	3.0	0.5	0.2	63.5
5	2.3	2.3	0.0	0.0	84.2
Socioeconomic stratum					
1	3.8	3.1	0.5	0.2	67.1
2	2.7	2.4	0.3	0.0	55.1
3	0.4	0.3	0.2	0.0	62.2
Area of residence					
Rural	3.5	3.3	0.2	0.0	60.8
Urban	3.0	2.8	0.2	0.1	52.6
Total of children	3.1	2.6	0.4	0.1	61.3

Association of oral health conditions of children with sociodemographic data, knowledge and practices of educational agents

A statistically significant association was found between the DMF index, area of residence, and socioeconomic stratum (Table 3); the other sociodemographic variables show no statistical association with DMF. On the other hand, the O'Leary index shows no association with any of the sociodemographic variables. Finally, we found that the oral health status of children was not significantly related to the knowledge and practices of the agents.

Table 2. Modified prevalence and experience of caries in children

Age	Modified prevalence of caries %	Modified experience of caries %
1	0	0
2	18.6	4.04
3	22.2	10.1
4	22.2	8.5
5	0.5	0
Children	63.6	22.7

Table 3. Association between sociodemographic variables and the DMD index of children

Early childhood sociodemographic variables	Chi²	*p*-value
Gender	4.26	0.3716
Age	13.12	0.664
Socioeconomic stratum	24.69	0.0018*
Area of residence	17.68	0.0014*

* Difference of proportions is statistically significant ($p<0.05$).

Discussion

Regarding the agents' knowledge of oral health, this study demonstrates that they understand the importance of temporary dentition. Although they recognize caries as the main oral disease, they do not know the majority of diseases that affect the stomatognathic system. However, the educational agents primarily indicate carelessness of parents as the main cause of caries. These findings agree with a study carried out with agents and mothers in Medellín-Colombia[9], where the need to train caregivers about the most frequent oral diseases and their prevention is also highlighted. Gonzalez[24] states that oral hygiene techniques for infants imply some degree of difficulty due to their young age and the degree of assistance and time required for these activities, which put in evidence the vulnerability of this population.

50% of the agents mentioned that the first visit to the dentist should be when infants reach the first year of age. However, it must be taken into account that gingival rims and emerging teeth can develop multiple diseases if they do not receive proper treatment during that first year. Other authors such as Valencia, *et al*.[25] have described how infrequently doctors treat children younger than 3 years of age. In contrast, Juárez, *et al*.[26] highlight that most of the time, dentists are consulted when patients have pain, a delay that leads to complex treatments at a very young age. Also, Gonzalez *et al*.[9] reported that educational agents faced obstacles to access health services, arguing that dentists from Health Services Providing Institutions refuse to attend very young minors. Thus, it is suggested that dentists should be trained in comprehensive care of early childhood patients, giving access opportunities to low income populations who do not have the chance to be treated in the private sector.

In reference to the use of fluoride-containing toothpaste during early childhood, it is worth mentioning the problem of dental fluorosis that is increasing in Colombia and in other parts of the world. It has been demonstrated that this disorder is caused by a systemic ingestion of this compound by young children, which could be counteracted by manufacturing children's paste with low or no fluoride[27]. To this respect, the Colombian Ministry of Health and Social Protection has recommended the use of a very low amount of dental paste, which should be supervised by an adult[28]. Nevertheless, the agents that participated in this study did not reach a consensus regarding this issue. Whereas 60% of them indicated that fluoride containing pastes should not be used in infants, the remaining 40% do not have a clear idea about it. In addition, 55% of them apply a large amount of toothpaste during the oral care of the children under their supervision. Our observations coincide with a study carried out in Cartagena-Colombia, where it was found that 66.4% of early childhood caregivers use excessive amounts of toothpaste[14].

With regards to oral hygiene practices of educational agents, it is evident that none of them used dental floss and this result is similar to the one found by Agudelo[27]. He explained that this phenomenon is caused by the age of the infants, the cost of this cleaning product, and lack of knowledge of the caring adults. Therefore, it is important to promote the use

of oral hygiene implements and their proper handling in early childhood.

In reference to the oral health conditions of participating children, the average DMF index was 3.1, which is moderate under the criteria of the World Health Organization (WHO)[22]. Similar results were found in a study carried out in Medellín on dental caries in children with ages between 3 to 5 years old, where an average DMF index of 4.4 was reported[29]. Taking into account the goal of reducing this index to zero proposed in the 2012-2021 Ten-Year Public Health Plan, the need to implement proper strategies to effectively impact the oral health of this population is evident. However, this is not an exclusive Colombian problematic situation as similar indices were reported in Peru (2.9), Ecuador (2.5), Argentina (2.1) and Mexico (3.5)[30-33].

The DMF index also shows evidence that the modified experience reached 22.7%, which means that infants had suffered advanced stages of caries during their early childhood as seen in the elevated number of filled and/or missing teeth. However, this percentage is significantly lower than 66.91% that was reported in ENSAB IV[10]. On the other hand, the modified prevalence of 63.6% reported in our study was higher than the national value (61.92%) registered in ENSAB IV[10], but lower than the one reported for Colombian cities like Villavicencio[34] and Zipaquirá[35], with 93% and 92%, respectively. Finally, our modified prevalence is similar to international values such as the ones found in Argentina[25] and Ecuador[31] (63% and 68%, respectively).

The average O'Leary index of our participants was 61.3% that, based on the Guide for the Specific Protection against Caries and Gingival Disease, indicates an elevated risk for children to develop oral diseases. However, higher values have been reported in infant populations from Colombia[35] (98.7%) and Chile[36] (70.1%).

The worsening of children's oral diseases highlights the necessity to coordinate intersectoral efforts by academy, dentists, health institutions, and ICBF to provide tools and resources that facilitate adherence to dental services. This endeavor should include activities of promotion of oral health and prevention of diseases executed by early childhood caregivers that work in community homes and CDC of the municipality of Santa Rosa de Cabal. These efforts are relevant because oral diseases have a negative impact on quality of life and affect body growth, chewing, appetite, sleep, behavior and school performance, and, in general, the well-being of children population[37].

Our results have revealed a statistically significant association between the DMF index and area or residence (p=0.0014). In this respect, an investigation carried out in Andes, Antioquia (Colombia), showed a higher prevalence of caries in rural zones compared to urban areas[38]. We also observed a statistical association between the DMF index and socioeconomic stratum (p=0.0018), which is similar to the results obtained in studies carried out in Cartagena (Colombia)[39] and Lima (Peru)[30] (p=0.04 and p=0.0001, respectively). Based on these results, it is clear that a low socioeconomic stratum and living in rural areas represent barriers to accessing dental services provided by health systems, reflecting early childhood inequities that have not been solved yet.

We did not observe a statistical association of the DMF and O'Leary indices with the rest of sociodemographic variables. However, various significant associations have been reported, e.g., between age and presence of caries[38] and between O'Leary index and caries prevalence[30].

In this study, we did not find any statistical association between knowledge and practices of agents and conditions of oral health of children. A similar observation was reported in a study carried out with mothers in Chile[36], where no association was found between their knowledge and oral health of their children. Given the high dependency of children on adults, it is relevant to improve mechanisms related to prevention, monitoring and treatment of oral diseases as well as promotion of oral health. These activities should engage all the actors involved in the growth and development of infants.

In order to accomplish successful interventions to improve children's oral health, we think that it is essential to focus on health education by strengthening the participation of those actors that are responsible for early childhood care. Additional efforts should be aimed at solving inequities in food security, family income, family dynamics, and work conditions[40]. The achievement of this goal implies an intersectoral commitment to improve the social determining factors that have a direct impact on the health-disease process.

Conclusions

The majority of educational agents demonstrated an insufficient knowledge with respect to oral pathologies that affect early childhood population as well as the appropriate time for infants to initiate dental consultation. These agents also applied large amounts of toothpaste without considering the fluoride content and did not use dental floss. In reference to the children's oral health, they presented: a DMF index of 3.1, a caries modified experience of 22.7%, a caries modified experience of 63.6%, and an average O'Leary index of 61.3%.

Although the programs of community homes and CDC-ICBF are strategies to ensure children's well-being, the high prevalence of caries and bacterial plaque highlights the need to strengthen oral health intervention programs. Particularly, they should be aimed at evaluating risk factors and encouraging healthy oral habits, focusing on proper training of educational agents and parents.

These programs should have continuity all from the ICBF to health institutions, improving the access to dental care from early ages. Specifically, they should involve faculties of odontology, where competent professionals are trained to provide comprehensive care to children.

All efforts devoted to securing children's welfare, including research and interventions, should be replicated in all municipalities of Colombia. Indeed, the main purpose of this approach should be to prevent diseases, reduce current oral morbidity, and generate strategies that include all the actors in charge of early childhood care.

We suggest that future studies on oral health in early childhood should study associations between health conditions and other social determining factors in order to reach a deeper understanding of the causes of oral diseases.

Conflict of interests

The authors declare that there are no conflicts of interests.

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