

Peruvian Children's Access to Oral Health Information during the COVID-19 Pandemic

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ABSTRACT **Aim:** The aim of this study was to determine the impact of COVID-19 pandemic on access to oral health information of Peruvian children. **Materials and Methods:** The Demographic and Family Health Survey generates annually a national database of Peruvian children between 0 and 11 years old, which is collected through direct interviews applied in the homes of residents of the country. A cross-sectional study was applied with this information collected during 2019 and 2020, with a final sample of 39 124 subjects, 15 974 from the year 2019 (62.03%) and 7088 from the year 2020 (55.54%). The dependent variable was access to oral health information and the independent variable was year; in addition, there were considered sociodemographic and geographical covariates. Finally, there were executed descriptive, bivariate, and multivariate analyses. **Results:** Access to oral health information was 59.85% ($n = 23\ 062$). For the bivariate analysis, the dependent variable showed association with year, natural region, sex, altitude, health insurance coverage, area, place of residence and wealth index. During multivariate analysis, year manifested a negative association with access to oral health information (aPR: 0.89; 95%CI: 0.85–0.92; $P < 0.001$), adjusted for co-variables that previously manifested association. **Conclusion:** Access to oral health information for Peruvian children had a negative impact during 2020, in which COVID-19 pandemic occurred.

KEYWORDS: Child, COVID-19, dental, health education, health services accessibility, Peru

INTRODUCTION

COVID-19 pandemic proved being a global problem that affected health systems due to its high infection rates and their limited capacity to cope with it. Likewise, the economic and social sectors had to face a challenging scenario due to the containment measures imposed by governments to contain the disease, such as quarantines, social immobilization and various restrictions. Within this context, the dental activity faced numerous challenges such as the limitation of care to only urgent and emergency care to reduce the risk of transmission of the virus, closure of services, increase in the cost of care, high rates

of unemployment among oral health professionals, etc., which consequently strengthened certain pre-existing barriers to timely access to dental care, greatly affecting certain vulnerable communities, such as those without health insurance, ethnic minorities, the elderly, children, etc.^[1-3] The latter have been adversely affected not only by the constant postponement of the reopening of educational institutions, but also by the absence of health interventions with a preventive

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approach in schools, these strategies being understood as a substantial tool for the preservation of optimal oral health from the early stages of life.^[4,5]

On the other hand, oral health education (OHE) has emerged as one of the strategies to reduce the important health burden of the main oral pathologies, with the purpose of improving the general knowledge of the population on dental health, which will consequently allow them to adopt, reinforce and maintain favorable behaviors that promote the reduction of the high morbidity of oral cavity diseases. Likewise, OHE is aimed at different population groups, through dental care, in educational and labor institutions, etc., where the dentist stands out as the main provider of information on oral health. In addition, it is noted that the interaction between the professional and the patient has a marked influence on users in terms of adherence to their treatment and optimal health outcomes, while poor health education, together with insufficient preventive measures, have an impact on the increase in the prevalence of oral health problems, especially in developing nations.^[6-9]

Likewise, a large number of Latin American countries have faced, since before the pandemic, vast levels of inequality both at the economic level and in access to health services, which consequently have had repercussions on their populations and their health outcomes.^[10] Within the framework of the pandemic, it is observed that in most of these countries there have been aggressive outbreaks of infection and catastrophic lethality rates, despite efforts to contain and mitigate the spread of the virus, which have had indirect consequences on society. This is evidenced by the increased morbidity and mortality of those seeking health care for causes unrelated to COVID-19,^[11] including dental care, with perceived obstacles in access to all types of dental care, including preventive care.^[12] It is notorious the scarce scientific evidence at regional level about the implications of the pandemic in certain population groups that should be prioritized; therefore, the objective of this study was to determine the impact of COVID-19 pandemic on access to oral health information of Peruvian children.

MATERIALS AND METHODS

SETTING AND DESIGN

The Demographic and Family Health Survey (ENDES) annually generates a database of Peruvian children between 0 and 11 years of age, directed by the Peruvian National Institute of Statistics and Informatics (INEI), collected through direct interviews applied in homes of residents of the country. A cross-sectional

study was applied with information collected during year 2019 and year 2020. ENDES was designed for being representative at regional and national level; it also follows an urban and rural organization; and possesses a stratified two-stage cluster sample designed. Additionally, it has data about access to information on oral health in children from 0 to 11 years old.

SAMPLING CRITERIA

In 2019, a sample size of 36760 residences was considered, while in 2020 it was 37390 residences. The initial bases included an amount of 167 560 subjects in 2019 and 177 414 for 2020; however, for this study, only the register of those who answered to the question about access to oral health information were considered, forming a final sample of 39 124 individuals, 15 974 for 2019 (62.03%) and 7088 for 2020 (55.54%). It is important to mention that the information was collected through the ENDES, which uses methodology provided by the World Demographic and Health Surveys Program, currently known as MEASURE DHS; the purpose of this instrument is to obtain current information to analyze the change, trends and factors that determine fertility, mortality and health in over 90 developing countries, as is the case of Peru. MEASURE DHS is a globally recognized tool whose validity and reliability follows international standards, and which has the ability to collect and expose data with a rigorous methodology on children's health status, gender, family planning, etc. About the year of application, the surveys took place on January to December for 2019 and 2020, respectively; however, about 2020 (the COVID-19 pandemic year), the way to collect information suffered some modifications in due to the health emergency and the need to insure the biosecurity of field personnel, so telephone interviews were implemented and subsequently then, the direct interviews were retaken. On the other hand, the ENDES applies three questionnaires: one for dwellings and its residents, one for women between 12 to 49 years old, and the last a health questionnaire which involve topics including access to oral health information. In addition, interviewers were duly trained and calibrated for collecting participants replies.^[13,14]

VARIABLES

Regarding the definition of variables, the dependent variable was established as access to oral health information; while, for independent variable, year was categorized into 2019 and 2020, taking into account this last year as the time frame which COVID-19 pandemic hit Peru. Moreover, the study included other covariates such as natural region, understood as Metropolitan Lima (national capital), rest of the coast, highlands

and jungle; altitude measured in fewer than 2,500 meters above mean sea level (MAMSL) and from 2,500 MAMSL and above; place of residence arranged into capital, city, town and countryside; area of residence, categorized into urban and rural; wealth index, defined as the disposition to spend and benefit from goods and services that each dwelling has. Subsequently, using the methodology executed in the United States Demographic and Health Surveys Program, a punctuation was attributed to each house, and the same to each of its inhabitants. This classification made it possible to categorize each household from the poorest to the richest (quintile one to five);^[15,16] in addition, the possession of health insurance was considered, with the understanding that within the national territory there coexist institutions providing health insurance, of a public nature such as the Comprehensive Health Insurance (Seguro Integral de Salud – SIS in its original language), EsSalud which is the social security health insurance, Army Forces and Police Forces Health Insurance; on the other hand, Health Care Provider Companies offer a complementary coverage, in public or private sphere, to that provided by social security's basic plan.^[17] Sex and age were also included as variables, the last one categorized in two groups: from 0 to 5 years old and 6 to 11 years old. It is worth mentioning that the covariates mentioned above have been studied in a previously published study.^[18]

ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was not requested for this research due to the use of anonymous information provided by the participants, made available by the INEI and its collection is free and open access.

METHODOLOGY

The official INEI website (<http://inei.inei.gob.pe/microdatos/>) provides access to the DHS databases, which were unified into a single matrix for analysis. It was used a complex sample module; therefore, this type of instrument brings representative estimates.

STATISTICAL ANALYSIS

For statistical analysis, it was used the STATA version 15.1.643 software. For each of the variables, a descriptive analysis was performed to find frequencies: absolute and relative. Thereafter, to proceed with bivariate analysis, a Chi-square test determined association and for multivariate analysis, Poisson regression tests obtained prevalence ratios: crude (PR) and adjusted (aPR), where the dependent variable was access to oral health information, the independent variable was the year where the survey was applied, and the other variables were considered as co-variables. In order to define the

representative estimates, the svy command was used and for data analysis, in addition, the sampling patterns were configured in stratum, primary sampling unit and weight at the time of analysis. The study presented a 95% confidence level, also as a statistical significance indicator, a value of $P < 0.05$ was considered in all tests.

RESULTS

Access to oral health information was 59.85% ($n = 23\ 062$), 34.20% ($n = 10\ 125$) of the participants were mainly from Metropolitan Lima, 77.53% ($n = 50\ 037$) were from urban areas, while 34.20% ($n = 101,125$) came from the capital, 78.79% ($n = 52\ 378$) were residing at less than 2 500 meters above mean sea level. As for their wealth index, 22.06% ($n = 19\ 244$) showed to be poor, 75.38% ($n = 228\ 594$) had health insurance, 74.51% ($n = 138\ 395$) were male, and children between 6 and 11 years old were represented by 62.74% ($n = 25\ 194$) [Table 1].

According to bivariate analysis, access to oral health information showed association with year, natural region, area of residence, place of residence, altitude, wealth index, health insurance coverage and sex ($P < 0.05$) [Table 2]. Simultaneously, when multivariate analysis was applied, a negative association was determined with access to oral health information (aPR: 0.89; 95%CI: 0.85–0.92; $P < 0.001$), adjusted for the covariates that showed association previously [Table 3].

DISCUSSION

In the present study, it is observed that access to oral health information for children has decreased in 2020, compared to the previous year. It is documented that during the COVID-19 pandemic, Peruvian children faced low access to dental services, which prior to this period was characterized as limited. However, this situation worsened due to the restrictions and changes attributable to the pandemic, with an increase in the time it took to obtain dental care,^[19] which could be linked not only to the delay in the delivery of recuperative care, but also to preventive care. On the other hand, O'Donnell *et al.* state that within the context of the health emergency, access to preventive dental activities has been insufficient, especially affecting children and their possibility of acquiring benefits aimed at reducing the risk of dental caries, such as OHE;^[20] this causes concern about the possible increase in preventable oral pathologies, which would consequently aggravate pre-existing inequalities in this population group.^[21]

From a geographic location perspective, results of this study indicate that access to oral health information was

Table 1: Characteristics of the sample of Peruvian children under 12 years old

Variables	n	%
Year		
2019	167560	66.32
2020	177414	33.68
Access to oral health information		
Yes	23062	59.85
No	16062	40.15
Natural region		
Metropolitan Lima	10125	34.20
Rest of coast	21041	24.80
Highlands	27282	25.76
Jungle	17109	15.24
Area of residence		
Urban	50037	77.53
Rural	25520	22.47
Place of residence		
Capital	10125	34.20
City	20769	20.55
Town	19143	22.78
Countryside	25520	22.47
Altitude		
Less than 2500 MAMSL	52378	78.79
From 2500 MAMSL and above	23179	21.21
Wealth Index		
Very poor	21084	20.02
Poor	19244	22.06
Medium	15181	21.34
Rich	11901	19.26
Very rich	8820	17.32
Health Insurance		
With Insurance	228594	75.38
Without Insurance	54545	24.62
Sex		
Man	138395	74.51
Woman	144744	25.49
Age		
From 0 to 5 years old	37431	37.26
From 6 to 11 years old	25194	62.74

n: Absolute frequency. %: Relative frequency

associated with factors such as natural region in which participants lived, with greater access being observed for the inhabitants of the highland region; despite the fact that in previous research, Solis *et al.* showed that in that same region, children under eleven years of age had a weaker adherence to proper toothbrushing than those in Metropolitan Lima,^[17] a situation that could be mediated by multiple factors, including access to oral health information. However, this figure should be interpreted with caution because the confidence intervals are very close to the cut-off values.

Additionally, according to area of residence, Gaber *et al.* report that individuals present in rural areas are less likely to take part in activities aimed to disease

Table 2: Access to oral health information considering the characteristics of Peruvian children under 12 years old

Variables	Access to oral health information				p*
	Yes		No		
	n	%	n	%	
2019	15974	62.03	10166	37.97	<0.001
2020	7088	55.54	5896	44.46	
Natural region					
Metropolitan Lima	2742	63.64	1593	36.36	<0.001
Rest of coast	5761	54.89	4448	45.11	
Highlands	7794	63.67	3857	36.33	
Jungle	4604	53.49	4117	46.51	
Area of residence					
Urban	14549	60.94	9585	39.06	<0.001
Rural	6352	56.25	4430	43.75	
Place of residence					
Capital	2742	63.64	1593	36.36	<0.001
City	6081	60.18	4125	39.82	
Town	5726	57.81	3867	42.19	
Countryside	6352	56.25	4430	43.75	
Less than 2500 MAMSL	14234	58.38	10838	41.62	<0.001
From 2500 MAMSL and above	6667	65.11	3177	34.89	
Wealth Index					
Very poor	5192	54.46	3889	45.54	<0.001
Poor	5127	56.92	3707	43.08	
Medium	4007	58.69	2675	41.31	
Rich	3122	63.69	1818	36.31	
Very rich	2480	71.04	1096	28.96	
Health Insurance					
Without Insurance	18260	61.27	11987	38.73	<0.001
With Insurance	4802	55.51	4075	44.49	
Man	16488	60.67	11048	39.33	0.004
Woman	6574	57.44	5014	42.56	
From 0 to 5 years old	11462	59.30	8414	40.70	0.329
From 6 to 11 years old	11600	60.17	7648	39.83	

n: Absolute frequency. %: Relative frequency. p: Statistical significance

*Chi-square test

prevention and promotion of favorable health behaviors, due to a deficit in health information and inadequate knowledge on the part of health professionals,^[22] coinciding with this research, which reports lower levels of access to information on oral health in rural areas of Peru. Considering the altitude at which the communities are located, this research establishes that those residing in localities at less than 2500 meters above sea level have greater access to health information; a finding similar to some publications, which describe the situation of an altiplano community at 3854 meters above sea level, which faces both, the lack of access to stomatological evaluation and the absence of information provided to promote oral health.^[23]

Table 3: Impact of the year of COVID-19 pandemic on access to oral health information in Peruvian children under 12 years old

Variables	Access to oral health information						
	PR	95%CI	p	aPR	95%CI	p	
Year							
	2019	Ref.		Ref.			
	2020	0.89	0.86-0.93	<0.001	0.89	0.85-0.92	<0.001
Natural region							
	Metropolitan region	Ref.					
	Rest of coast	0.89	0.85-0.93	<0.001	-	-	-
	Highlands	1.06	1.01-1.10	0.012	-	-	-
	Jungle	0.83	0.80-0.88	<0.001	-	-	-
Area of residence							
	Urban	Ref.					
	Rural	0.92	0.89-0.96	<0.001	-	-	-
Place of residence							
	Capital	Ref.					
	City	0.95	0.90-0.99	0.013	-	-	-
	Town	0.91	0.87-0.95	<0.001	-	-	-
	Countryside	0.88	0.84-0.93	<0.001	-	-	-
Altitude							
	Less than 2500 MAMSL	Ref.					
	From 2500 MAMSL and above	1.12	1.08-1.15	<0.001			
Wealth Index							
	Very poor	Ref.					
	Poor	1.02	0.98-1.06	0.447	-	-	-
	Medium	1.05	1.01-1.09	0.023	-	-	-
	Rich	1.11	1.06-1.16	<0.001	-	-	-
	Very rich	1.21	1.16-1.27	<0.001	-	-	-
Health Insurance							
	Without insurance	Ref.					
	With Insurance	1.10	1.06-1.15	<0.001	-	-	-
Sex							
	Man	Ref.					
	Woman	0.95	0.91-0.98	0.005	-	-	-
Age							
	From 0 to 5 years old	Ref.					
	From 6 to 11 years old	1.01	0.99-1.05	0.329	-	-	-

PR: Prevalence ratio. aPR: Adjusted prevalence ratio. 95%CI: 95% Confidence intervals. p: Statistical significance

a: Adjusted for natural region, area of residence, place of residence, altitude, Wealth Index, health insurance coverage and sex

It should be considered that, when evaluated together with indicators of socioeconomic deprivation, health literacy follows a marked social gradient,^[24] which coincides with the findings of this study, where a positive association is observed in the wealth index variable, indicating that children in families with greater economic capacity have greater access to oral health information. In relation to this, factors such as economic income and health insurance coverage are mediators for the acquisition of tools provided by health services, such as oral health information and educational programs, which would have an impact on the use of dental services; nevertheless, evidence suggests that children under three years old make less

use of services.^[25] Additionally, this research reports that those who have health insurance have greater access to oral health information, compared to those who do not; it is important to mention that in 2019, the Peruvian government decreed measures to guarantee health coverage for the entire population residing in the national territory, through affiliation to the Integrative Health Insurance, with the aim of closing a gap that by the end of 2020 amounted to more than one million peruvians.^[26,27]

Likewise, it can be seen that Peruvian girls under 11 years old have lower levels of access to oral health information than boys; likewise, some studies have

identified that certain personal characteristics such as age, ethnic origin, sex and gender have an influence in reinforcing inequities in oral health in developing countries.^[28] This corresponds to the findings of Vieira *et al*, who in a study applied to an adult population in Brazil, found that women were less likely to visit a dental office at some point in their lives.^[29] This worrisome finding urges governments to guarantee access to dental care, which consequently will allow vulnerable groups such as girls to perceive fewer barriers when seeking information on dental health.

It is well known that, in addition to the dentist, there are other sources of oral health information, such as the mass media, which provide comprehensive health education to a large proportion of the population through correct health knowledge, transformation of attitudes and values regarding health and the adoption of new health behaviors. Within this group, internet has established itself as a tool that makes it possible to obtain health information, which is favored by the protection of the identity of the person concerned. Health knowledge is disseminated through multiple platforms, known as social networks, using written and audiovisual media; it is also observed that adolescents use social networks as a tool for obtaining information on oral health,^[30,31] with the understanding that this situation may have been accentuated during the COVID-19 health emergency.

As for the limitations of this research, since the information was collected through surveys, the participants could have incurred in memory biases at the time of self-reporting. Nevertheless, the ENDES has been a great tool used by multiple disciplines for a situational description of health in the country. On the other hand, even though the data collectors have undergone a calibration process, there could have been certain inconsistencies when collecting data, especially in a complex context such as the COVID-19 pandemic. In addition, a cross-sectional study does not have the capacity to issue causal relationships based on its results, and therefore it is not within the scope of this research.

This research is characterized as one of the first studies that exposes the problem of access to oral health information in a context such as the COVID-19 pandemic, so its results can be used as a reliable tool for future research in the area. These findings also point the need to strengthen and extend the delivery of oral health information at the national level, using resources such as mass media, and not only directing full responsibility for this to strategies such as tele-dentistry,

which has been effective during the pandemic period, but continues to present barriers for those who do not yet have access to adequate technological infrastructure.

Finally, it is important to consider that oral health information is an important tool that gives the individual a great capacity to make appropriate health decisions, which at the same time, will have a positive impact on other aspects of their daily life. Therefore, ensuring access to this resource is essential for health systems, especially in complex scenarios such as the COVID-19 pandemic, where misinformation and uncertainty have been abundant. In addition, the importance of sharing the responsibility of those who provide oral health education should be emphasized, promoting its delivery not only by dentists, but also calling on the greatest number of strategic allies such as other health professionals, teachers, community workers, etc.

CONCLUSION

Access to oral health information for Peruvian children had a negative impact during 2020, in which COVID-19 pandemic occurred.

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CONFLICTS OF INTEREST

None to declare.

AUTHORS CONTRIBUTIONS

Conceptualization: MCGE, CEDCL, JAB, AAAS, RALM.

Methodology: JAB, AAAS, RALM.

Investigation: MCGE, CEDCL.

Data Analysis: MCGE, CEDCL, JAB, AAAS, RALM.

Manuscript writing: MCGE, CEDCL.

Manuscript review and editing: MCGE, CEDCL, JAB, AAAS, RALM.

ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

Due to the fact that this was a database with anonymous information provided by INEI, the study did not request approval from an ethics committee.

PATIENT DECLARATION OF CONSENT

Not applicable.

DATA AVAILABILITY STATEMENT

The data set used in the current study is available at the official INEI website (<http://iinei.inei.gob.pe/microdatos/>).

List of Abbreviations

OHE: Oral Health Education

ENDES: Demographic and Family Health Survey

INEI: National Institute of Statistics and Informatics of Peru

MAMSL: Meters Above Mean Sea Level

SIS: Seguro Integral de Salud (Integrative Health Insurance)

EPS: Health Care Provider Companies

PR: Prevalence Ratio

aPR: Adjusted Prevalence Ratio

REFERENCES

- Bański J, Mazur M, Kamińska W. Socioeconomic conditioning of the development of the COVID-19 pandemic and its global spatial differentiation. *Int J Environ Res Public Health* 2021;18:4802.
- Akin L, Gözel MG. Understanding dynamics of pandemics. *Turk J Med Sci* 2020;50:515-9.
- Mehic D, Adna M, Jusufovic R, Catic T. COVID-19 impact on access and performing dental care in Bosnia and Herzegovina. *Mater Sociomed* 2021;33:145-7.
- Elster N, Parsi K. Oral health matters: The ethics of providing oral health during COVID-19. *HEC Forum* 2021;33:157-64.
- Innes NP, Manton DJ. Minimum intervention children's dentistry: The starting point for a lifetime of oral health. *Br Dent J* 2017;223:205-13.
- Ghaffari M, Rakhshanderou S, Ramezankhani A, Noroozi M, Armoon B. Oral health education and promotion programmes: Meta-analysis of 17-year intervention. *Int J Dent Hyg* 2018;16:59-67.
- Angelopoulou MV, Kavvadia K. Experiential learning in oral health education. *J Educ Health Promot* 2018;7:70.
- Graça SR, Albuquerque TS, Luis HS, Assunção VA, Malmqvist S, Cuculescu M, *et al.* Oral health knowledge, perceptions, and habits of adolescents from Portugal, Romania, and Sweden: A comparative study. *J Int Soc Prev Community Dent* 2019;9:470-80.
- Barnes E, Bullock A, Chestnutt IG. What influences the provision and reception of oral health education? A narrative review of the literature [published online ahead of print, 2021 Sep 14]. *Community Dent Oral Epidemiol* 2021;10.1111/cdoe.12698.
- García PJ, Alarcón A, Bayer A, Buss P, Guerra G, Ribeiro H, *et al.* COVID-19 Response in Latin America. *Am J Trop Med Hyg* 2020;103:1765-72.
- Benítez MA, Velasco C, Sequeira AR, Henríquez J, Menezes FM, Paolucci F. Responses to COVID-19 in five Latin American countries. *Health Policy Technol* 2020;9:525-59.
- Leon S, Giacaman RA. COVID-19 and inequities in oral health care for older people: An opportunity for emerging paradigms. *JDR Clin Trans Res* 2020;5:290-2.
- National Institute of Statistics and Informatics. Demographic and Family Health Survey. Lima; 2021. Available from: <https://proyectos.inei.gob.pe/endes/>. [Last accessed on 21 Feb 2022].
- The Demographic and Health Surveys Program. DHS Overview. Available from: <https://microdata.worldbank.org/index.php/collections/dhs>. [Last accessed on 19 Jul 2022].
- United States Agency for International Development. The Demographic and Health Surveys Program. Wealth index. <https://dhspro-gram.com/topics/wealth-index/>. [Last accessed on 23 Mar 2022].
- National Institute of Statistics and Informatics, Peru. Demographic and Family Health Survey. 2014. Available from: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1153/libro.pdf. [Last accessed on 23 Mar 2022]. (Accessed February 21, 2022).
- Government of Peru. Health Insurance of Peru. Lima; 2020. Available from: <https://www.gob.pe/281-seguros-de-salud-del-peru>. [Last accessed on 25 Mar 2022].
- Solis G, Pesaressi E, Mormontoy W. Tendencia y factores asociados a la frecuencia de cepillado dental en menores de doce años, Perú 2013-2018 [Trend and factors associated with the frequency of tooth brushing in children under twelve years old, Peru 2013-2018]. *Rev Peru Med Exp Salud Publica* 2019;36:562-72.
- Garcés-Elías MC, del Castillo-López CE, León-Manco RA, Agudelo-Suárez AA. Impact of the COVID-19 pandemic on the timing of dental care in Peruvian children. *Dent Med Probl* 2022;59:37-44.
- O'Donnell R, Vernazza C, Landes D, Freeman Z. Dental public health in action: The covid-19 restrictions on dentistry in England and their impact on access to dental care for high-risk patient groups in the North-East and North Cumbria. *Community Dent Health* 2022;39:4-7.
- Chisini LA, Costa FDS, Sartori LRM, Corrêa MB, D'Avila OP, Demarco FF. COVID-19 Pandemic impact on Brazil's Public Dental System. *Braz Oral Res* 2021;35:e082.
- Gaber A, Galarneau C, Feine JS, Emami E. Rural-urban disparity in oral health-related quality of life. *Community Dent Oral Epidemiol* 2018;46:132-42.
- Calderón M, Alvarado-Villacorta R, Barrios M, Quiroz-Robladillo D, Naupay DRG, Obregon A, *et al.* Health need assessment in an indigenous high-altitude population living on an island in Lake Titicaca, Peru. *International Journal for Equity in Health* 2019;18:94.
- Nutbeam D, Lloyd JE. Understanding and responding to health literacy as a social determinant of health. *Annu Rev Public Health* 2021;42:159-73.
- Gao X, Ding M, Xu M, Wu H, Zhang C, Wang X, *et al.* Utilization of dental services and associated factors among preschool children in China. *BMC Oral Health* 2020;20:9.
- Government of Peru. Emergency Decree No. 017-2019. Emergency Decree that establishes measures for universal health coverage. Government of Peru; 2020. Available from: <https://cdn.www.gob.pe/uploads/document/file/431389/1831446-1.pdf>
- National Superintendence of Health. Technical report: Analysis and identification of uninsured persons in health at the national level. National Superintendence of Health; 2020. Available from: [v.https://cdn.www.gob.pe/uploads/document/file/1494073/Informe%20t%C3%A9cnico%20de%20an%C3%A1lisis%20de%20identificaci%C3%B3n%20de%20las%20personas%20no%20aseguradas%20en%20salud%20a%20nivel%20nacional%2023%20de%20diciembre.pdf](https://cdn.www.gob.pe/uploads/document/file/1494073/Informe%20t%C3%A9cnico%20de%20an%C3%A1lisis%20de%20identificaci%C3%B3n%20de%20las%20personas%20no%20aseguradas%20en%20salud%20a%20nivel%20nacional%2023%20de%20diciembre.pdf). [Last accessed on 26 Mar 2022].

28. Bastani P, Mohammadpour M, Mehraliain G, Delavari S, Edirippulige S. What makes inequality in the area of dental and oral health in developing countries? A scoping review. *Cost Eff Resour Alloc* 2021;19:54.
29. Vieira JMR, Rebelo MAB, Martins NMO, Gomes JFF, Vettore MV. Contextual and individual determinants of non-utilization of dental services among Brazilian adults. *J Public Health Dent* 2019;79:60-70.
30. Maharani DA, El Tantawi M, Yoseph MG, Rahardjo A. The use of internet platforms for oral health information and associated factors among adolescents from Jakarta: a cross sectional study. *BMC Oral Health* 2021; 21:22.
31. Venkat M, Janakiram C. Mass media coverage in Health & Oral Health-related advertisements: A content analysis in Kerala, India. *J Oral Biol Craniofac Res* 2021;11:451-6.