Factors associated with oral health-related quality of life in homeless persons: a cross-sectional study

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Abstract: This study aimed to evaluate the clinical and sociodemographic factors associated with the oral health-related quality of life (OHRQoL) of homeless persons. A cross-sectional study was conducted, with participants (n = 176) attending a Specialized Reference Center for the Homeless Population in Teresina, Brazil. Dental caries (DMFT index, WHO criteria), periodontal disease (CPI index), and the consequences of untreated caries (PUFA index) were measured by a single calibrated examiner (Kappa ≥0.83). Sociodemographic, oral health, and OHRQoL (OHIP-14) data were obtained through interviews. Data analysis included descriptive statistics and Poisson regression, with a significance level of 5%. Most of the participants were male (86.4%) and from the age group of 30 to 43 years (52.2%). Mean DMFT was 11 (SD ± 6.9) and mean total PUFA score was 1.2 (SD ± 2.2). Most of the participants (88.6%) had dental calculus and 8.5% and 1.7% of the sample had gingival bleeding and periodontal pocket > 3.5mm, respectively. The highest prevalence of negative impact in the OHRQoL was associated with females (1.4 (95%CI 1.1–1.7)), low educational level (2.0 (95%CI 1.3–3.0)), caries (1.6 (95%CI 1.1–2.6)), fistulas (1.9 (95%CI 1.3–3.1)), gingival bleeding (1.7 (95%CI 1.1– 2.7)), dental calculus (1.8 (95% CI 1.3–2.5)), periodontal pockets > 3 mm (1.5 (95%CI 1.1–2.0)), and need for extraction (2.3 (95%CI 1.1–5.0)). In conclusion, the negative impact on the OHRQoL of homeless persons was associated with low educational level, presence of decayed teeth, gingival bleeding, and dental calculus.

Keywords: Homeless Persons; Oral Health; Quality of Life.

Introduction

The homeless population is a heterogeneous group of people in absolute poverty, with interrupted or weak family ties.[1] These individuals use public places and degraded areas as temporary or permanent living spaces, as well as shelter accommodation for overnight stays or as temporary housing.[1,2,3] They are often victims of discrimination and social stigma due to their dwelling status that is built around the absence of a home. Their struggle for survival, housing, and dignity demands a great deal of resiliency.[3,4,5]

The lack of permanent housing affects about 2% of the world population[6] and represents a risk factor for morbidities and mortality

when compared with the general population.[7] In Brazil, 70% of the estimated 100,000 people that live in homeless situations is concentrated in cities with more than one hundred thousand inhabitants.[8] Being homeless creates a barrier to health services and programs; homeless persons generally only have access to emergency health services.[9] Therefore, these individuals generally present a series of untreated health problems, which could be minimized by assistance, prevention, and health promotion services, including oral health services.[10,11]

Previous studies have identified a high prevalence of oral health problems in homeless individuals.[12-17] However, studies on how oral diseases affect homeless persons' lives may help understand the social impact of diseases and are important to direct public health policies, in order to reduce inequalities and their impact on quality of life.[18,19] Brazil has a policy for the homeless population that aims to guarantee their access to health services and programs.[2] The implementation of inclusive health care actions for the homeless population is a policy that seeks to reduce the impact that the living conditions of these people have on their health and quality of life, including oral health-related quality of life.[20]

Oral health-related quality of life (OHRQoL) is a multidimensional construct of the subjective evaluation of an individual's oral health, functional and emotional well-being, expectations and satisfaction with care, and sense of self. Hence, it is negatively affected by oral disorders.[21-24] Although OHRQoL of homeless populations is negatively impacted by their poor oral health conditions, the impact of the clinical and sociodemographic determinants of oral diseases on OHRQoL is not yet fully understood. Analysis of these factors could help with the formulation and assessment of oral health promotion actions and services.[12-18]

Therefore, this study aimed to assess the factors associated with the OHRQoL of the homeless population in a state capital in northeastern Brazil. The hypothesis that worse specific clinical and sociodemographic conditions are associated with a greater negative impact on the OHRQoL of these individuals was tested.

Methodology

Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki and Resolutions 466/2012 and 510/2016 of the National Health Council of Brazil. It was approved by the Research Ethics Committee of the Federal University of Piauí (protocol No. 2,100,121). We followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) statement in writing this manuscript.[25]

Study design and participants

This was a cross-sectional observational study. The study location is the only reference center for homeless persons in Teresina, Brazil. The Specialized Reference Center for Homeless Population, namely the POP Center, is a reference unit of Special Social Protection, linked to the Secretariat of Social Assistance and Citizenship of Teresina, PI. This center provides assistance for medium complexity cases of the homeless population, and consists of a staff of psychologists, social workers, and social educators. Socialization workshops are also part of the activities. Furthermore, meals, personal hygiene items and overnight shelter are offered. The POP Center works in partnership with the Street Clinic Team and provides referrals to the homeless population for public health services.

The number of all individuals enrolled at the POP Center at the beginning of the study was made available by the institution's management. A non-probabilistic convenience sample was obtained and all individuals (n = 220) were invited to participate in the study.

We included individuals over 18 years of age. The study did not include individuals who were uncooperative with the exams and those with hearing impairment or difficulty with verbalization.

Pilot study and calibration process

A pilot study (n = 20) was carried out. No change in methodology was necessary and these participants were included in the final sample.

A single examiner, a graduate student, was calibrated in two stages and advised by a researcher

with experience in epidemiological studies and with the use of DMFT[26], CPI,[27] and PUFA[28] indices. The first stage consisted of the presentation of diagnostic criteria established by the World Health Organization (WHO), by means of the presentation and discussion of cases with different severity levels of dental caries, clinical consequences of untreated dental caries, and periodontal health.

The second stage was performed with 20 homeless persons randomly selected in the local study, who were the same participants as those of the pilot study. This phase was carried out at the study center. The examiner independently reexamined the same individuals 2 weeks later and the results were compared. The inter-examiner kappa indices (single examiner - reference researcher) obtained were equal to or greater than 0.86. The intra-examiner kappa indices obtained were 1.0 for DMFT, 0.92 for PUFA, and 0.83 for the CPI.

Data collection

Clinical data were collected by a single examiner (graduate student) and two properly trained assistants (undergraduate students) were responsible for annotating the data. Data were collected between January and October 2018 through oral examinations and interviews (sociodemographic data and habits related to oral health). This was complemented by OHRQoL interviews, using the OHIP-14 questionnaire.[29]

The examiner had to book a room in the morning or afternoon for the clinical examination with the institution's administration staff so that the examination could be carried out in the study center without interfering with the participants' daily activities. The participants were examined sitting in a chair under artificial light of a flashlight (TIKKA XPPETZL, Grenoble, France).

A flat mouth mirror (Duflex, SS White, Rio de Janeiro, Brazil), explorer probe (Duflex, SS White, Rio de Janeiro, Brazil), and periodontal probe (WHO-621, Trinity, Campo Mourão, Brazil) were used as recommended by the WHO.[26] The dental caries experience was measured by the DMFT index, using the WHO criteria[26] and dichotomized into presence (DMFT > 0) or absence (DMFT = 0) of

caries experience. In addition, each component of the index was dichotomized into presence or absence of decayed teeth (caries > 0 or caries = 0), missing teeth (missing> 0 or missing = 0), or filled teeth (filled > 0 or filled = 0).[26] The clinical consequences of untreated dental caries were assessed using the PUFA index, which categorizes teeth according to pulp involvement (P), ulceration (U), fistulas (F), or abscesses (A).[28] The total PUFA score was dichotomized into presence (PUFA > 0) or absence (PUFA = 0) of untreated dental caries. Teeth were also evaluated according to the need for treatment, namely, restoration, prosthetics, extraction, or the absence of need.[30]

The evaluation of the periodontal condition regarding hygiene, bleeding, presence of calculus, or periodontal pockets was performed using the community periodontal index (CPI).[27] A decision was taken to use the short CPI version, based on WHO criteria,[31] due to unclear medical histories, lack of participant cooperation, dental anxiety about probing, and discomfort with dental treatment.

Oral health-related quality of life (OHRQoL) was measured using the Oral Health Impact Profile (OHIP-14) in its reduced version validated for Brazilian Portuguese.[29] The reference period was the previous 12 months. The questionnaire had five answer options that followed the frequency scale, coded as never (0), rarely (1), sometimes (2), constantly (3), and always (4); the sum of the scores generated values of 0 to 56. Higher total scores reflected a higher negative impact on OHRQoL.[29]

After the clinical examinations, the examiner instructed the participants about oral health care. In addition, all participants received an oral hygiene kit (toothpaste, toothbrush, and dental floss) for supervised dental hygiene. Participants who needed dental treatment were referred to Basic Health Units, which are part of the national public health system, to receive dental treatment.

Data analysis

The data were analyzed using Statistical Package for the Social Sciences (IBM SPSS Version 22.0, Chicago, USA.). A descriptive analysis of the data was performed in absolute frequencies, percentages, mean and standard deviation (SD), minimum

and maximum values. Poisson regression with robust variance in the stepwise method was used to determine the associations between the domains and the total OHIP-14 score with the independent variables. The magnitude of the association was assessed by the crude and adjusted prevalence ratio (PR), confidence intervals (95% CI), and p-values. Variables with p-values ≤ 0.20 in the bivariate analysis were included in the multivariate analysis. Only variables with a value of p < 0.05 remained in the final model.

Results

Clinical examinations and interviews with 176 participants were completed (response rate = 80%). Among those examined, 86.4% were male, 72.7% had less than eight years of schooling, and 66.5% were drug users. Most participants had at least one treatment requirement (98.3%) and 88.6% had dental calculus (Table 1). Figure 1 shows that most participants had caries experience (n = 174) and the clinical consequences of untreated dental caries were present in less than half of the individuals (n = 74). Mean DMFT was 11 (± 6.9). The prevalence of decayed teeth was 86.9% and of missing teeth was 86%. Total PUFA score was 1.2 (± 2.2), with ulcerations (33%) being the most frequent clinical consequence.

Mean total OHIP-14 score was 18.9, with minimum and maximum values of 0 and 54, respectively. The scores per domains are presented in Figure 2. Before the regression analysis, possible multicollinearity for DMFT and PUFA indexes was tested. The collinearities of decayed, missing, and filling with DMF-T were VIF = 1.033, 1.028, and 1.059, respectively. In addition, the collinearities of pulp involvement, ulceration, and fistula in regard to total PUFA were VIF = 1.236, 1.235, and 1.002, respectively. From these values, it is possible to observe that there is no multicollinearity between the total and per score component for DMFT and PUFA indexes.

Bivariate and adjusted associations for the confounding factors using Poisson regression between the domains and the total OHIP-14 score with other oral clinical conditions and sociodemographic aspects are presented in Tables 2 and 3.

Table 1. Sociodemographic and oral health-related data of the homeless participants of the study (n = 176).

Variable	n	%
Sex		
Female	24	13.6
Male	152	86.4
Age (years)		
Up to 29	44	25.0
30–36	46	26.1
37–43	46	26.1
Over 44	40	22.8
Marital status		
Married/Stable relationship	11	6.3
Single/Separated/Widowed	165	93.7
Schooling (in years of formal study)		
≤ 8	128	72.7
> 8	48	27.3
Is a recipient of Government Financial Aid		
No	114	64.8
Yes	62	35.2
Illicit drug user		
No	59	33.5
Yes	117	66.5
Needs dental treatments		
No need	3	1.7
Restorative treatment	12	6.8
Prosthesis	74	42.0
Exodontia	87	49.5
Periodontal condition		
Healthy	2	1.1
Bleeding	15	8.5
Dental calculus	156	88.7
Pocket > 3.5 mm	3	1.7
Total	176	100.0

The "functional limitation" domain was associated with a greater negative impact on the OHRQoL in individuals with a single/separated/widowed marital status (PR = 2.6; 95%CI: 1.2–5.3) and with the presence of fistulas (PR = 1.9; 95%CI: 1.3–3.1). Being a female participant (PR = 1.4; 95%CI: 1.1–1.6), having decayed teeth (PR = 1.6; 95%CI: 1.1–2.3), gingival
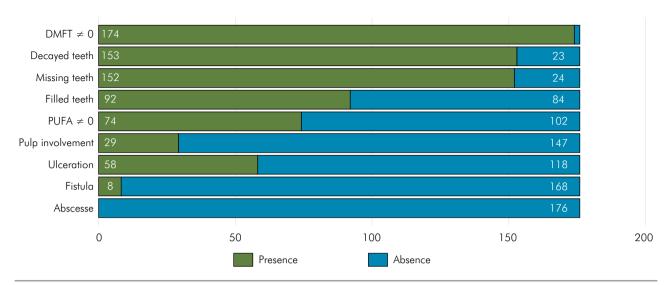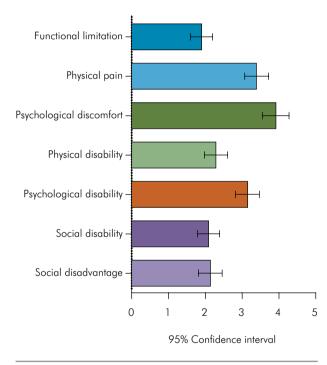
Figure 1. Oral health conditions of homeless persons, per study participants (n = 176).

Figure 2. Mean and 95% confidence interval of OHIP-14 scores per domains (n = 176).

bleeding (PR = 1.6; 95%CI: 1.2–2.2), dental calculus (PR = 1.7; 95%CI: 1.7–1.9), and periodontal pockets > 3.5 mm (PR = 1.5; 95%CI: 1.1–2.0) had a greater negative impact on the "physical pain" domain. For the "psychological discomfort" domain, a greater negative impact on OHRQoL was associated with the presence of decayed teeth (PR = 1.4; 95%CI: 1.1–1.9).

Homeless persons over the age of 44 with less than eight years of schooling had a higher negative impact on the "physical disability" and "social disadvantage" domains. "Psychological disability" was negatively associated with being female (PR = 1.3; 95%CI: 1.1–1.6) and needing an extraction (PR = 2.3; 95%CI: 1.1–5.0). The "social disability" domain was associated with having less than eight years of schooling (PR = 2.0; 95%CI: 1.3–3.0) and the presence of caries (PR = 1.6; 95%CI: 1.1–2.5). The highest prevalence rate of the negative impact on OHRQoL, measured by the total score, was observed among homeless individuals with less than eight years of schooling (PR = 1.4 95%CI 1.1–1.8), with decayed teeth (PR = 1.4 95%CI 1.1–1.8), bleeding (PR = 1.7 95%CI 1.1–2.7), and dental calculus (PR = 1.8 95%CI 1.3–2.5).

Discussion

The findings of the present study support our hypothesis that specific clinical and socioeconomic conditions are associated with a negative impact on the OHRQoL of homeless persons, who live in a state capital in northeastern Brazil. Homeless individuals with little schooling, decayed teeth, gingival bleeding, and dental calculus reported a greater negative impact on OHRQoL.

Almost all participants (98.9%) had experienced dental caries, which corroborates studies in other

Table 2. Bivariate analysis between domains and total score of the OHIP-14 instrument with sociodemographic and oral health variables (n = 176).

Variable	n	Functional limitation PR$_{crude}$ (95%CI)	Physical pain PR$_{crude}$ (95%CI)	Psychological discomfort PR$_{crude}$ (95%CI)	Physical disability PR$_{crude}$ (95%CI)	Psychological disability PR$_{crude}$ (95%CI)	Social disability PR$_{crude}$ (95%CI)	Social disadvantage PR$_{crude}$ (95%CI)	Total score PR$_{crude}$ (95%CI)
Sex									
Female	24	1.3 (0.8-2.1)	1.4 (1.1-1.7)*	0.9 (0.7-1.3)	1.4 (0.9-1.9)	1.3 (0.9-1.6)	1.3 (0.9-1.9)	0.9 (0.5-1.5)	1.2 (0.9-1.6)
Male	152	1	1	1	1	1	1	1	1
Age (years)									
Over 44	40	1.1 (0.7-1.8)	0.8 (0.6-1.2)	1.1 (0.8-1.4)	1.6 (1.1-2.5)*	1.2 (0.9-1.7)	1.2 (0.7-1.8)	1.6 (0.9-2.7)	1.2 (0.9-1.5)
37–43	46	1.6 (1.1-2.3)*	0.8 (0.6-1.1)	1.0 (0.8-1.4)	1.5 (0.9-2.3)	1.1 (0.8-1.5)	0.9 (0.6-1.5)	1.4 (0.9-2.4)	1.1 (0.8-1.5)
30–36	46	0.8 (0.5-1.3)	0.9 (0.7-1.1)	1.1 (0.8-1.4)	1.5 (0.9-2.2)	1.0 (0.7-1.4)	1.2 (0.8-1.8)	1.5 (0.9-2.5)	1.1 (0.8-1.4)
Up to 29	44	1	1	1	1	1	1	1	1
Marital status									
Married/Stable relationship	11	0.5 (0.2-1.0)	0.9 (0.7-1.4)	0.9 (0.6-1.4)	1.2 (0.6-2.2)	0.9 (0.6-1.3)	0.9 (0.6-1.6)	0.7 (0.4-1.2)	0.9 (0.6-1.3)
Single/ Separated/ Widowed	165	1	1	1	1	1	1	1	1
Schooling (in years of formal study)									
≤ 8	128	1.3 (0.9-1.9)	1.2 (0.9-1.5)	1.2 (0.9-1.6)	1.5 (1.1-2.1)*	1.3 (1.1-1.8)*	2.0 (1.3-3.0)*	1.9 (1.3-2.7)*	1.4 (1.1-1.8)*
> 8	48	1	1	1	1	1	1	1	1
Is a recipient of Government Financial Aid									
No	62	1.3 (0.9-1.7)	1.1 (0.9-1.3)	1.3 (1.1-1.5)*	1.2 (0.9-1.6)	1.1 (0.9-1.3)	1.2 (0.9-1.6)	1.2 (0.9-1.6)	1.2 (0.9-1.4)
Yes	114	1	1	1	1	1	1	1	1
Illicit drug user									
Yes	117	1.0 (0.7-1.5)	1.1 (0.9-1.4)	1.1 (0.9-1.4)	1.0 (0.8-1.4)	1.0 (0.8-1.2)	1.2 (0.9-1.6)	1.1 (0.8-1.5)	1.1 (0.9-1.3)
No	59	1	1	1	1	1	1	1	1
Decayed teeth									
Yes	153	1.5 (0.9-2.3)	1.6 (1.1-2.4)*	1.3 (0.9-1.7)	1.5 (0.9-2.3)	1.3 (0.9-1.9)	1.5 (0.9-2.3)	1.1 (0.7-1.7)	1.4 (1.1-1.8)*
No	23	1	1	1	1	1	1	1	1
Missing									
Yes	152	1.1 (0.7-1.7)	0.9 (0.7-1.3)	1.2 (0.8-1.6)	1.4 (0.9-2.3)	1.3 (0.9-1.9)	1.4 (0.8-2.4)	1.4 (0.8-2.4)	1.2 (0.9-1.6)
No	24	1	1	1	1	1	1	1	1
Filled									
Yes	92	1.1 (0.8-1.5)	0.9 (0.7-1.1)	1.0 (0.8-1.2)	1.1 (0.8-1.4)	1.0 (0.8-1.3)	1.0 (0.8-1.4)	0.9 (0.7-1.2)	0.9 (0.8-1.2)
No	84	1	1	1	1	1	1	1	1
Dental caries experience									
Yes	174	0.9 (0.2-3.8)	1.1 (0.3-4.5)	2.6 (0.7-10.5)	-	3.2 (0.8-12.7)	1.4 (0.3-5.6)	1.1 (0.3-4.3)	1.7 (0.4-6.9)
No	2	1	1	1		1	1	1	1
Pulp involvement > 0									
Yes	29	0.9 (0.6-1.5)	0.8 (0.7-1.1)	1.0 (0.8-1.2)	1.1 (0.8-1.5)	1.2 (0.9-1.5)	1.0 (0.7-1.4)	1.1 (0.7-1.6)	1.0 (0.8-1.2)
No	147	1	1	1	1	1	1	1	1
Ulceration > 0									
Yes	58	1.2 (0.9-1.6)	0.9 (0.8-1.2)	1.2 (0.9-1.4)	1.1 (0.8-1.4)	1.1 (0.9-1.3)	1.1 (0.8-1.5)	0.9 (0.6-1.2)	1.1 (0.9-1.3)
No	118	1	1	1	1	1	1	1	1

Continuation

	n								
Fistulas > 0									
Yes	8	2.2 (1.4-3.5)*	1.1 (0.7-1.6)	1.1 (0.8-1.6)	1.1 (0.6-1.8)	1.3 (0.9-1.9)	0.8 (0.4-1.6)	1.3 (0.7-2.3)	1.2 (0.9-1.7)
No	168	1	1	1	1	1	1	1	1
PUFA > 0									
Yes	74	1.1 (0.8-1.6)	0.9 (0.8-1.1)	1.1 (0.9-1.4)	1.2 (0.9-1.5)	1.2 (0.9-1.4)	1.2 (0.9-1.4)	1.1 (0.8-1.4)	0.9 (0.7-1.3)
No	102	1	1	1	1	1	1	1	1
Needs dental treatments									
Restorative treatment	12	0.7 (0.2-2.3)	1.2 (0.4-3.7)	0.8 (0.3-2.5)		1.1 (0.3-3.9)	0.6 (0.1-2.9)	0.5 (0.1-1.9)	0.9 (0.3-2.6)
Prosthesis	74	0.8 (0.3-2.1)	1.1 (0.4-3.2)	1.1 (0.4-3.0)		2.2 (0.9-4.9)	1.1 (0.5-2.7)	0.9 (0.4-2.5)	1.3 (0.6-3.0)
Exodontia	87	1.1 (0.4-2.8)	1.4 (0.5-4.1)	1.2 (0.5-3.3)		2.7 (1.2-6.1)*	1.5 (0.6-3.5)	1.2 (0.5-3.2)	1.6 (0.7-3.8)
No need	3	1	1	1		1	1	1	1
CPI									
Bleeding	15	1.5 (0.4-6.5)	1.6 (1.1-2.3)*	3.3 (0.8-13.7)	0.8 (0.5-1.4)	3.0 (0.7-12.9)	1.8 (0.4-7.7)	2.1 (0.5-9.4)	1.8 (0.9-3.5)
Dental calculus	156	1.2 (0.3-4.9)	1.7 (1.6-1.9)*	4.0 (1.0-16.1)	1.2 (1.1-1.3)*	3.2 (0.8-12.9)	1.4 (0.3-5.5)	2.2 (0.5-8.7)	1.9 (1.1-3.3)*
Pocket > 3.5 mm	3	2.4 (0.5-12.7)	1.5 (1.1-2.0)*	4.0 (0.9-16.9)	1.8 (1.2-2.7)*	2.0 (0.4-10.6)	1.3 (0.3-5.7)	2.7 (0.4-17.9)	2.1 (0.9-4.4)
Healthy	2	1	1	1	1	1	1	1	1

PR_{crude}: crude prevalence ratio; 95%CI: 95% confidence interval; *p < 0.20.

countries.[11,12,13] Moreover, our findings reveal the presence of decayed and/or missing teeth in more than 80% of the participants, results similar to those observed by Daly et al.[12] and Lawder et al.[17] Tooth loss can be the result of oral health neglect combined with the difficulty of access to dental care; caries is not diagnosed soon enough to carry out restorative treatment and teeth end up being extracted.[32]

Considered a worldwide public health problem, dental caries is associated with socioeconomic factors and difficulty or inability to access public services,[33] which acutely affects less favored populations.[32] The presence of decayed teeth in homeless persons resulted in a higher rate of negative impact on the total OHIP-14 score and on the domains of "physical pain", "psychological discomfort", "physical disability", and "social disability", compared with those who did not have caries. These findings can be explained by the absence of adequate biofilm control practices, leading to the impairing consequences of pain due to caries.[12] Thus, our findings suggest that poor oral health conditions and pain negatively impact the OHRQoL of homeless persons, corroborating other studies with similar population and instruments.[10,13,34]

Decayed and missing teeth can also be risk factors for depressive conditions; in addition to decayed teeth being associated with negative impact in the "psychological discomfort" domain, the need for tooth extraction was the only clinical condition of OHIP-14 psychological disability.[34] Tooth loss impairs not only the masticatory function, but also impacts an individual's psychological and social aspects. The need for tooth extraction implies that the tooth crown is extensively compromised by caries, which can have a detrimental esthetic effect. This can be the cause of social embarrassment, thus there is a negative impact on OHRQoL in the psychological disability domain.[35]

Socioeconomic condition is a risk factor for dental caries, which is why there is a polarization of the disease into less privileged social groups.[36] Low income can be associated with placing less value on health, lifestyle, and access to health care information.[35] Thus, the lack of access to preventive measures, and the under treatment of caries can have clinical consequences, as was observed in 42% of our study participants. The presence of a fistula, the most frequently found clinical consequence of untreated

Table 3. Multiple analysis between domains and total score of the OHIP-14 with sociodemographic and oral health variables (n = 176).

Variable	Functional limitation PR_{adjust} (95%CI)	Physical pain PR_{adjust} (95%CI)	Psychological discomfort PR_{adjust} (95%CI)	Physical disability PR_{adjust} (95%CI)	Psychological disability PR_{adjust} (95%CI)	Social disability PR_{adjust} (95%CI)	Social disadvantage PR_{adjust} (95%CI)	Total score PR_{adjust} (95%CI)
Sex								
Female		1.4 (1.1-1.6)*			1.3 (1.1 – 1.6)*			
Male		1			1			
Age (years)								
Over 44				1.8 (1.2-2.7)*			1.7 (1.1-2.8)*	
37–43				1.6 (1.0-2.5)			1.6 (0.9-2.6)	
30–36				1.6 (1.0-2.4)			1.6 (0.9-2.6)	
Up to 29				1			1	
Marital status								
Married/Stable relationship	2.6 (1.2-5.3)*							
Single/Separated/Widowed	1							
Schooling (in years of formal study)								
≤ 8				1.6 (1.1 - 2.2)*		2.0 (1.3-3.0)*	1.9 (1.4-2.8)*	1.4 (1.1-1.8)*
> 8				1		1	1	1
Decayed teeth								
Yes		1.6 (1.1-2.3)*	1.4 (1.1-1.9)*	1.6 (1.1 - 2.6)*		1.6 (1.1 - 2.5)*		1.4 (1.1-1.8)*
No		1	1	1		1		1
Fistulas > 0								
Yes	1.9 (1.3-3.1)*							
No	1							
Needs dental treatments								
Restorative treatment					1.0 (0.3 – 2.9)			
Prosthesis					1.9 (0.9 – 4.1)			
Exodontia					2.3 (1.1 – 5.0)*			
No need					1			
CPI								
Bleeding		1.6 (1.2-2.2)*						1.7 (1.1-2.7)*
Dental calculus		1.7 (1.7-1.9)*						1.8 (1.3-2.5)*
Pocket > 3.5 mm		1.5 (1.1-2.0)*						1.8 (0.9-3.2)
Healthy		1						1

Model adjusted for: ulceration, PUFA, government benefit, marital status; PR_{adjust}: adjusted prevalence ratio; 95%CI: 95% confidence interval; *p < 0.05.

dental caries in this study, negatively affected the "functional limitation" domain especially with regard to chewing, speech, and taste.

The "physical pain" domain was negatively influenced by the presence of gingival bleeding, dental calculus, and periodontal pocket deeper than 3.5 mm, compared with individuals with healthy periodontal conditions. Gingival bleeding and dental calculus were also associated with a greater negative impact measured by the total OHIP-14

score. Greater experience of pain and discomfort are expected findings in this population,[34] which is probably due to less than adequate oral hygiene practices, poor oral health, and limited access to dental care.[12,37]

Homelessness represents greater challenges for women. This was corroborated by the higher prevalence rate of negative impact related to oral health in the domain of "physical pain" among homeless women. Pain and discomfort when eating more frequently reported by women can be explained by their greater biological sensitivity to stimuli and greater attention to health.[38] Women have been traditionally perceived as more fragile and sensitive, express more the sensations and feelings, and being more proactive in the search for health care.[7,39]

Worse oral conditions associated with aging reveals the cumulative effects of a history of poor care and mutilating assistance.[37,40] This may explain why individuals over the age of 44 years had a negative impact in the domains of "physical disability" and "social disadvantage" associated with the loss of multiple teeth. To make matters worse, the homeless population is a constant target of discrimination, which marginalizes them and creates stigmas of inferiority compared with other members of society.[41] Thus, the difficulty of establishing bonds, obtaining physical and emotional support, and the frequent experience of violence can explain a greater negative impact in the "functional limitation" domain among those who are single, separated, or widowed.

Participants with low educational level had a greater negative impact on OHRQoL. Education has a direct impact on quality of life,[42] which explains the findings of this study. Low education negatively affects the interaction of people in the community and access to health services, and consequently makes it difficult to carry out daily activities, in addition to the effects from social marginalization, prejudice, and discrimination.

For public policies in place in the country to be effective, they must ensure access to dental services for the population.[2] It is important that health professionals and public policymakers are aware of these findings and can act in the improvement of oral health care and access for homeless persons.

Brazilian public health policies for the homeless population aim to guarantee the access of this population to health actions and services, reduce health risks arising from living conditions, and improve indicators of health and quality of life.[2] To achieve this goal, Street Clinics Teams were created, which together with the Basic Health Units and Emergency Care Units, create access for the homeless population to the public health system. It is estimated that there are more than 100 Street Clinics Teams operating in Brazi, including in Teresina.[20] However, dentists are not part of these teams and any person with dental treatment need is referred to Basic Health Units. The regrettable scenario revealed in our study could dramatically change for the better if dentists became members of such teams of professionals.

Our study makes an important contribution to one of the objectives of the National Policy for Homeless People, which is to encourage research and production and dissemination of knowledge about homelessness.[2] The findings of our study can be used by authorities responsible for providing health actions and services to homeless people, help the implementation of measures to guarantee their right to health care, and reduce the burden that living conditions may impose on their health and quality of life.

Our study had some limitations. First, cross-sectional data do not show the real cause of the impact on OHRQoL identified for this population. Moreover, although the choice for the most appropriate variables was supported by other studies in the literature,[12,13,17] we might have accidentally overlooked variables that could have been included. A non-probabilistic sampling strategy was adopted due to the small number of individuals available for the study, and we acknowledge that extrapolation of the results is not possible to individuals outside the sample. In our favor, the participants in this study were contacted from a non-clinical setting, as in other studies. Therefore, we believe that the allocation bias was reduced, minimizing the possibility of favoring selection of participants with high oral health needs. Regarding the adopted

instrument, although it has not been validated for homeless individuals, a recent systematic review of methods for evaluating outcomes in disadvantaged populations found that OHIP-14 is considered an applicable instrument for this population.[9]

Our study adds to the evidence on the well-being and living conditions of homeless persons and we recognize the need for further studies to confirm the directions of the effects signaled by our findings. The main contribution of our findings is showing that the oral health needs of homeless individuals are mostly not complex. Furthermore, although homeless people have physical and mental limitations, they are willing to receive most dental treatments.[15]

Conclusion

The negative impact on the OHRQoL of homeless persons was associated with low schooling, the presence of decayed teeth, gingival bleeding, and dental calculus.

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