Research Article

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Oral Health-Related Quality of Life in Adults in Mbouda/Cameroon 2020

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ABSTRACT

Aim or Purpose: The aim of this study was to investigate the factors associated with oral health-related quality Of life (OHRQOL) in adults in Mbouda (Cameroon) in 2020.

Materials and Methods: A descriptive cross-sectional survey with nonprobability sampling was used in this study from March to November 2020. A sample of 238 adults aged from 18 to 65 years residing in Mbouda completed an oral health survey to assess the factors associated to OHRQOL. The means and standard deviations of the OHIP-14 index were calculated and associated to individual and environmental factors and biological functions. Normality test, Mann-Whitney U-test, Kruskal-Wallis test and the coefficient of spearman correlation were used for data analysis. The level of significance was set at $p < 0.05$. An approval to conduct the study was obtained from the institutional research ethics committee for human health.

Results: The most affected domains of the OHIP-14 index score among adults were physical pain (42.6%) and psychological discomfort (39.2%). Age group, level of education, number of daily brushes, fixed salary, accessibility, periodontal disease and tooth decay were significantly associated with OHRQOL. After multiple linear regression, periodontal disease, accessibility and dental caries were retained as predictors of OHRQOL in adults of Mbouda.

Conclusions: The establishment of an oral health program, the strengthening of an effective oral hygiene, the promotion of oral health and the reduction of geographic and financial barriers are necessary to finally improve OHRQOL among adults in Mbouda.

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Introduction

Oral health defined by WHO as freedom from oral or facial pain, oral cancer, oral infection or injury, periodontal disease and tooth loss is closely related to the general health and quality of life (QOL) of adults; as it is implicated in impaired oral function, affects social interaction and reduces self-esteem [1]. Research in this area shows that periodontal disease; edentulism; tooth decay; environmental and individual factors can lead to poor chewing, appetite, sleep problems and poor school or work performance. Tools for assessing oral health and health care needs are mainly based on clinical indicators. However, these indicators do not take a biopsychosocial approach to oral health and therefore do not always coincide with the perception and expectations of adults regarding their oral health [2]. It is therefore conceptually necessary to develop subjective measures of oral health in order to take into account the biopsychosocial approach. For this reason, a number of indicators, such as the "Oral Health Related Quality of Life" (OHRQL), have been developed to measure the extent to which oral health conditions impact on an adult's behavior and

social functioning. These indicators complement conventional clinical assessments of oral health [3].

In Cameroon in general and in the Mbouda Health District in particular, most studies done in oral health are clinical and do not always take into account the biopsychosocial dimension. With this in mind, we wanted to integrate individual, environmental and biological factors in our study, with the objective of determining the individual, environmental and biological factors that influence oral health-related quality of life in adults in the Mbouda health district. The revised Wilson and Cleary model was used to meet these objectives [4].

Methodology

Design and Study Population

We conducted an observational, cross-sectional, analytical study using non-probability convenience sampling from July to October 2021. This study was done in the Mbouda health district, among adults aged 18 to 65 years and residing in this district; having no systemic disease influencing oral health and having signed the informed consent.

Variables of Interest

The dependent variable in this study was oral health-related quality of life. The French version of the Oral Health Impact Profile (OHIP-14) was used during our collection to assess oral health-related quality of life. Regarding the independent variables, dental caries was assessed using the DMFT (Decay, Missing, Filled Teeth) index; periodontal status assessed using the new periodontal disease classification proposed in 201; participants classified into those with less than 20 (inclusive) teeth and those with more than 20 (exclusive) teeth; individual and environmental factors were age, gender, religion, education, income, marital status, number of tooth brushing, smoking history, and geographic and financial accessibility [5-9].

Sampling and Selection of Subjects

The sample size for the mean was calculated with the following formula [10]:

$$n = \frac{Z^2 SD^2}{e^2}$$

n: minimum sample size; Z: 1.96; SD: standard deviation; e: precision level

In a study conducted in Nigeria in a rural area, the mean OHIP-14 score was 11.2 (±9.8) [11]. This standard deviation allowed us to calculate the following minimum sample size:

Numerical application:

$$n = \frac{(1,96)^2 (9,8)^2}{1,5^2}$$

n=163,97

Our minimum sample size was 164 participants. To absorb losses due to refusal to participate in the study, we maximized our sample size to n = 294 participants. However, we retained 238 inhabitants of the Mbouda health district.

Data Analysis

The data collected by CSPRO 7.0 were then exported for analysis to IBM SPSS version 23.0 (Statistical Package for Social Science). The mean and standard deviation of the OHIP-14 score were calculated and associated with individual, environmental and biological function factors. The Kolmogorov-Smirnov normality test was performed to see the nature of the dependent variable. The difference of OHIP-14 index score in dichotomous variables was studied with Mann-Whitney U test, the difference for categorical variables was evaluated with Kruskal-Wallis test, the difference in continuous variables was done with spearman correlation coefficient test and multiple linear regression was performed for data analysis. The significance level was set at p < 0.05.

Ethical Considerations

This study was conducted as part of a master's thesis in public health. We obtained authorization for the study from the Institutional Ethics and Research Committee of the Catholic University of Central Africa and the Chief of the Mbouda Health District after drafting a research protocol. Informed consent (consent to participate) was sent to all participants; the purpose and objectives of the study were also explained to the participants in order to facilitate their understanding and therefore their participation. The strict confidentiality of the data collected was respected both in their collection and in their analysis.

Results

Table I: Distribution of Responses to the OHIP-14 Questionnaire in the Mbouda Health District (Mbouda Health District, 2020)

Domains of the OHIP-14 questionnaire	Participants' response				
	Never n (%)	Almost never n (%)	Occasionally n (%)	Quite often n (%)	Very often n (%)
Functional limitation					
Difficulty with pronunciation	223 (93,7)	3 (1,3)	6 (2,5)	2 (0,8)	4 (1,7)
Decreased sense of taste	226 (95,0)	4 (1,7)	5 (2,1)	0 (0)	3 (1,3)
Physical pain					
Pain present	108 (45,4)	0 (0)	29 (12,2)	19 (8,0)	82 (34,5)
Discomfort during feeding	110 (46,2)	0 (0)	28 (11,8)	18 (7,6)	82 (34,5)
Psychological discomfort					
Discomfort of the present teeth	108 (45,4)	1 (0,4)	31 (13,0)	21 (8,8)	77 (32,4)
Nervousness due to the presence of teeth	116 (48,7)	1 (0,4)	32 (13,4)	19 (8,0)	70 (29,4)
Physical disability					
Unsatisfactory nutrition	113 (47,5)	2 (0,8)	29 (12,2)	22 (9,2)	72 (30,3)
Interrupting the meal	113 (47,5)	2 (0,8)	29 (12,2)	22 (9,2)	72 (30,3)
Psychological disability					
Difficulty in being relaxed	130 (54,6)	11 (4,6)	54 (22,7)	14 (5,9)	29 (12,2)
Have been a little embarrassed	131 (55,0)	11 (4,6)	59 (24,8)	14 (5,9)	23 (9,7)

Social disability					
Irritable in the company of others	186 (78,2)	17 (7,1)	27 (11,3)	3 (1,3)	5 (2,1)
Difficulty performing routine work	180 (75,6)	16 (6,7)	24 (10,1)	3 (1,3)	15 (6,3)
Disability					
Life in general is less satisfying	228 (95,8)	2 (0,8)	4 (1,7)	2 (0,8)	2 (0,8)
Total functional disability	215 (90,3)	2 (0,8)	7 (2,9)	4 (1,7)	10 (4,2)

OHIP = Oral Health Impact Profile; n = number of participants; % = percentage; missing data = 0

During our interview with adults in the Mbouda health district, the most common problems encountered were pain, discomfort during eating, discomfort and discomfort with present teeth, dissatisfaction with food consumed, and interruption of meals due to present teeth problems (Table I). Few participants had problems with functional limitation, social disability and handicap. The overall mean OHIP-14 score was 14.59 points (SD $\pm$ 15.06).

Table II: Mean and standard deviation of OHIP-14 index according to periodontal disease and teeth present in adults in Mbouda district (Mbouda Health District, 2020)

Variables	n	OHIP-14 ^a	Value p ^b	η^2
Periodontal disease				
Stage 1 (1 to 2 mm)	88	4,32 $\pm$ 9,75	0,000***	0,413
Stage 2 (3 to 4 mm)	87	14,62 $\pm$ 13,93		
Stage 3 (over 5 mm)	63	28,90 $\pm$ 10,35		
Number of remained teeth				
> 21 teeth	234	14,13 $\pm$ 14,70	0,004	0,055
< 21 teeth	4	41,50 $\pm$ 12,79		

n = number of participants; % = percentage; OHIP = Oral Health Impact Profile; η^2 = eta squared (size effect estimate); missing data = 0

^aData presented as Mean $\pm$ standard deviation; ^bthe difference in OHIP-14 index score and the dichotomous variable was investigated with the Mann-Whitney U test, and with the Kruskal-Wallis test for the ordinal variable

***p < 0,001

The OHIP-14 index score is more significant (p < 0.001) in participants with stage 3 periodontal disease (28 $\pm$ 10.35) (Table II). There was also a large size effect (η^2 = 0.413). Regarding the number of teeth present, the OHIP-14 index score was more significant (p = 0.004) in participants with less than 21 teeth present (41.50 $\pm$ 12.79). On the other hand, there was a small size effect (η^2 = 0.055).

Table III: Correlation Matrix between the OHIP-14 Index and the DMFT Index (Mbouda Health District, 2020)

Variable	n	M	AND	1	2
OHIP-14	238	14,59	15,06	-	
DMFT Index	238	4,66	5,01	0,671**	-

OHIP = Oral Health Impact Profile; DMFT = decay, Missing, Filled; n = number; M = mean; SD = standard deviation

**spearman correlation coefficient is significant at the 0.01 level (two-tailed); degree of freedom (ddl) = 236

The spearman correlation coefficient (rho) was calculated for the relationship between the OHIP-14 index score and the DMFT index score among participants in the Mbouda health district (Table III). A moderate and positive correlation was obtained (rho (236) = 0.671, p < 0.01), indicating a significant relationship between the two variables. Participants with a high DMFT score also had a high OHIP-14 score.

Table IV: Mean and Standard Deviation of the OHIP-14 Index According To Individual Factors in the Mbouda Health District (Mbouda Health District, 2020)

Variables	n	OHIP-14 ^a	Value p ^b	η ²
Gender				
Male	122	13,67 ± 15,07	0,37	0,004
Female	116	15,56 ± 15,07		
Religion				
Catholic	116	13,36 ± 14,61	0,56	0,016
Protestant	93	14,66 ± 15,75		
Muslim woman	7	18,86 ± 11,54		
Other	2	15,00 ± 21,21		
No religion	20	19,90 ± 15,071		
Academic level				
No	1	36,00 ± 00	0,025	0,05
Primary	42	17,98 ± 16,52		
Secondary	128	15,83 ± 15,81		
Superior	67	9,79 ± 11,13		
Marital status				
Married	141	15,69 ± 15,64	0,134	0,023
Single	95	12,87 ± 13,96		
Divorced	1	38,00 ± 00		
Widow(er)	1	00		
Daily number of toothbrushing				
Twice a day	112	11,03 ± 14,02	0,01	0,077
Once a day	125	17,46 ± 14,98		
Once a week	1	56,00 ± 00		
Active smoker				
Yes	20	16,65 ± 15,82	0,523	0,002
No	218	14,40 ± 15,02		
History of smoking				
Yes	24	17,54 ± 15,47	0,326	0,004
No	214	14,26 ± 15,02		
Age group				
18 to 25 years	79	13,22 ± 14,25	0,021	0,074
26 to 30 years	34	9,76 ± 13,71		
31 to 35 years	17	12,53 ± 13,63		
36 to 40 years	23	15,48 ± 17,10		
41 to 45 years	9	13,78 ± 16,78		
46 to 50 years	22	11,09 ± 15,27		
51 to 55 years	18	20,72 ± 15,15		
56 to 60 years	16	20,00 ± 12,92		
61 to 65 years	20	23,35 ± 15,90		

n = number of participants; % = percentage; OHIP = Oral Health Impact Profile; η² = eta squared (size effect estimate); missing data = 0

^aData presented as Mean ± standard deviation; ^bthe difference in OHIP-14 index score and the dichotomous variable was investigated with the Mann-Whitney U test, and with the Kruskal-Wallis test for ordinal and nominal variables

The OHIP-14 score is better significant (p = 0.025) in participants with primary education (17.98 ± 16.52), but there is a small size effect (η² = 0.05). This score is also better significant (p = 0.01) in participants who brush their teeth once a day (17.46 ± 14.98) with a medium size effect (η² = 0.077). It is also better significant (0.021) at the age group of 61-65 years (23.35 ± 15.90) with an average height effect (Table IV).

Table V: Mean and Standard Deviation of the OHIP-14 Index According To Environmental Factors in Adults in the Mbouda Health District (Mbouda Health District, 2020)

Variables	n	OHIP-14 ^a	Value p ^b	η ²
Do you have a fixed income?				
Yes	101	12,00 ± 14,45	0,032	0,02
No	137	16,50 ± 15,28		
Visited a dentist in the last 6 months				
Yes	56	10,62 ± 11,18	0,102	0,021
No	182	15,81 ± 15,90		
If NO, why not?				
Financial barrier	60	29,88 ± 9,86	0,000***	0,71
Hospital structure not available	24	26,29 ± 10,63		
Use of traditional therapy	19	20,21 ± 13,63		
No problem	79	0,89 ± 4,54		

n = number of participants; % = percentage; OHIP = Oral Health Impact Profile; η² = eta squared (size effect estimate); missing data = 0

^aData presented as Mean ± standard deviation; ^bthe difference in OHIP-14 index score and the dichotomous variable was investigated with the Mann-Whitney U test, and with the Kruskal-Wallis test for categorical variables

***p < 0,001

The OHIP-14 index score is more significant (p = 0.032) in participants with a non-fixed salary (16.50 ± 15.28) and a small size effect (η² = 0.02) (Table V). This score is also better significant (p < 0.001) in those who experience financial difficulty with an oral health consultation with a large effect size (η² = 0.71).

Table VI: Multiple Logistic Regression with the Dependent Variable OHIP-14 (Mbouda Health District, 2020)

Predictor	Estimated	Standard error	95% CI		p-value
			BI	BS	
Level of study	-0,277	0,899	-2,05	1,49	0,758
Fixed salary	-0,364	1,220	-2,77	2,04	0,766
Number of daily brushings	1,220	1,162	-1,07	3,51	0,295
Accessibility	-6,441	0,570	-7,57	-5,32	0,000***
Periodontal disease	3,996	0,927	2,17	5,83	0,000***
CAO Index	0,887	0,137	0,62	1,16	0,000***
Age	-0,012	0,226	-0,46	0,44	0,959

CI: confidence interval; LB: lower bound; UB: upper bound

*** P < 0,001

A multiple linear regression was calculated to predict the OHIP-14 score of adults in the Mbouda health district based on fixed salary, number of daily tooth brushing, accessibility, periodontal disease, CAD and age (Table VI). A significant regression equation was obtained (F (7,174) = 91.354, p < 0.001), with an R² (coefficient of determination) of 0.786.

The significant predictors were CAD, periodontal disease and accessibility. These variables can predict 78.6% of the OHIP-14 score (R = 0.887, R² = 0.786, adjusted R² = 0.777). The prediction of the OHIP-14 score of adults in the Mbouda health district is equal to 20.336 + 0.887(CAD Index) + 3.996(Periodontal Disease) - 6.441(Accessibility).

Discussion

Oral hygiene-related quality of life was assessed using the OHIP-14 index. The score of this index in our study ranged from 0 to 56. The results of the univariate analysis showed that the most

affected areas of this index were physical pain and psychological discomfort affecting 42.6% and 39.2% of adults in the Mbouda health district respectively. A study similar to ours done in Saudi Arabia shows that the most affected domains of the OHIP-14 index in this population are also physical pain and psychological discomfort with a percentage of 17.1% and 7.5% respectively [12]. This observed difference may be due to the fact that this study was conducted in a hospital setting in patients covered by health insurance.

revised model of Wilson and Cleary [4], an impairment of biological function (presence of dental caries) has an adverse effect on quality of life. Khosrozadeh et al in 2017 showed a weak, significant but negative correlation (r = -0.127, p = 0.004) between dental caries and oral hygiene-related quality of life [13]. This difference can be explained by the age difference of the study population which was mainly made up of old people. It can also be noted that our study was subject to memory bias as

many participants could not recall the main cause (caries or not) of missing teeth in their mouths. From a clinical point of view, our study showed how primary prevention (good oral hygiene) is to be taken into consideration in order to prevent dental caries and subsequently improve the quality of life related to oral health among adults in the Mbouda health district. Despite these findings, we cannot still give the exact threshold at which dental caries would impact oral health-related quality of life.

Severe (stage 3) and moderate (stage 2) periodontitis were encountered in 26.5% and 36.6% of our study participants, respectively. These 2 stages significantly affect with a large effect size ($p < 0.001$, $\eta^2 = 0.413$) the oral health related quality of life of adults in Mbouda health district, which is in line with our research hypothesis. Our results are similar to studies done in India ($p < 0.002$) [14], USA (1.70 (95% CI: 1.40-2.07), $p < 0.001$) [15] and China (1.63 (95% CI: 1.41-1.98), $p < 0.01$) [16]. A comparison with the revised model of Wilson and Cleary (2005) suggests that impaired biological function (advanced periodontal disease) has an adverse effect on quality of life. From a clinical point of view, this shows us the importance of good dental hygiene in order to limit the formation of dental plaque which is at the origin of periodontal disease and thus improve the quality of life related to oral health.

In 2003, the World Dental Federation endorsed the maintenance of at least 21 teeth in the mouth as a prerequisite for functional dentition. At the same time, 98.3% of the adults in our sample had more than 21 teeth present compared to 1.7% with less than 21 teeth. This makes our result insignificant between the number of teeth present and oral health related quality of life. In another study conducted with a larger sample and over a longer period of time [17], there was an impact (1.23 (95% CI: 1.01-1.51), $p < 0.03$) of the number of teeth present in the mouth on quality of life and oral health. The overall incidence in 2010 of tooth loss (less than 21 teeth present) is 205 cases per 100,000 person-years [18]. Since the mean OHIP-14 score was high in participants with less than 21 teeth present (41.50 ± 12.79), oral health education to promote the use of dentures should be implemented.

The individual factors that go in favor of our research hypothesis are education level ($p = 0.025$, $\eta^2 = 0.05$), number of daily brushing ($p = 0.01$, $\eta^2 = 0.077$) and age class ($p = 0.021$, $\eta^2 = 0.074$). Kamimura et al in 2017 also show a significant influence ($p < 0.01$) of the number of daily tooth brushing on oral health related quality of life [19]. Khosrozadeh et al on their part identify the influence of educational level ($p < 0.001$), number of daily tooth brushing ($p < 0.0001$) and age ($r = -0.353$, $p = 0.0001$) on oral health related quality of life [13]. A comparison with the revised model of Wilson and Cleary (2005) suggests that individual factors have an influence (positive or negative) on quality of life.

In England, Bakri et al did not show an association between smoking history and oral health-related quality of life, which is in line with our result [20]. On the other hand, they show a significant association (1.6 (95% CI: 1.4-1.8), $p < 0.01$) between active smoking and oral health-related quality of life [20]. A similar result (2.73 (95% CI: 1.59-4.71), $p < 0.001$) was also found for Brazil [9]. The difference between these results and ours can be explained by the sample size and the type of sampling (sampling frame available). Regarding gender, Bastos et al show no significant association between gender and oral health-related quality of life, which is in the same direction with our result [17]. As a result of the individual factors impacting on quality of life and oral health in our study, it would be important to promote oral health in schools and in the community, and in all the different

age groups in order to improve the quality of life related to oral health of adults in the health district of Mbouda.

Regarding monthly income, there was a significant association but with a small effect size ($p = 0.032$, $\eta^2 = 0.032$) to oral health-related quality of life. Our result corroborates with that of Gabardo et al (1.80 (95% CI: 1.12 - 2.90), $p = 0.042$) and Rebelo et al ($p < 0.01$) [9, 21]. However, the result obtained in our study presents a limitation on the quantification of the perceived income in low, medium and high or from a defined threshold following. This quantification could bring more precision in the association between the type of income and the quality of life related to oral health. Regarding accessibility, our result shows a significant association ($p < 0.001$) between financial, geographical and traditional therapy barriers and quality of life. Bastos et al find a similar relationship between accessibility and oral health related quality of life (1.17 (95% CI: 1.05-1.37) [17]. Our study considers this accessibility to oral health consultation as a health behavior. Some authors suggest that access is an indicator of the level of ease or difficulty by which people access health services and that the use of these services is determined by complex factors that we could not explain.

Multiple linear regression in our study shows that OHIP-14 score has a positive relationship with dental caries and periodontal disease, and a negative relationship with accessibility. These variables are also well reported in other studies [9, 13]. Accessibility has a great contribution on the prediction of OHIP-14 score. The importance of this accessibility can be observed in other studies [17].

Conclusions

Tooth decay, periodontal disease, geographical and financial accessibility are the main factors that influence the quality of life related to oral health of adults in the Mbouda health district. The implementation of an oral health programme, the reinforcement of effective oral hygiene, the promotion of oral health and the reduction of geographical and financial barriers are necessary to improve the oral health-related quality of life of adults in the Mbouda health district.

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