Self-rated oral health status and social and health determinants among community dwelling adults in Kenya

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Abstract

Background: The aims of this study were to estimate the self-rated oral health status and its associated factors in a national community dwelling population in Kenya.

Methods: A cross-sectional study based on a stratified cluster random sampling was conducted in 2015. The total sample included 4,459 individuals 18-69 years (M=40.4 years, SD=13.9). Questionnaire interview, blood pressure and anthropometric measurements, and biochemistry tests were conducted, including questions on the oral health status, general health status, oral health behaviour and socio-demographic information.

Results: Overall, 13.7% of participants reported poor self-rated oral health. In adjusted logistic regression analysis, older age (Odds Ratio-OR: 1.70, Confidence Interval-CI: 1.07, 2.69), having a lower number lover number of teeth (OR: 0.19, CI: 0.06, 0.62), having dentures (OR: 1.92, CI: 1.22, 3.03), having pain in the mouth or teeth (OR: 5.62, CI: 3.58, 8.90), impaired Oral Health Related Quality of Life (OR: 3.01, CI: 2.03, 4.47) and frequent soft drink consumption (OR: 3.62, CI: 1.89, 6.97) were associated with poor self-rated oral health.

Conclusion: High unsatisfied self-rated oral health status was found and several risk factors for poor self-rated oral health were identified that can help in guiding oral health care programming in Kenya.

Keywords: Self-rated oral health status, oral conditions, oral health behaviour, general health status, general health behaviour, adults, Kenya.

Introduction

"Oral diseases are major public health problems worldwide and poor oral health has a profound effect on general health and quality of life."[1] With patient-centred health care, the assessment of the biopsychosocial dimension of oral health, such as self-rated oral health status, has become increasingly important, taking both physical and psychosocial dimension of health into account.[1] The perception of one's oral health status is relevant, since it is related to the utilization of dental services and the under-standing of its determinants can help in improving dental health care.[2] Self-perceived oral health has been found to be significantly associated with clinical oral health status.[3] There is scarce information on self-rated oral health and its determinants among community dwelling adults in Africa countries, including Kenya.[4-6] Perceptions of oral health status and its determinants such as oral health behaviours depend on their sociocultural context, which may differ in Kenya compared to high-income countries in other world regions.[1,2]

In a national survey among adults in Kenya (35-44 years and 65 years of more), 17.0% rated their gums as poor and 18.5% rated their teeth as poor,[6] in a general adult population in South Africa, 23.7% rated their oral health as neither good nor bad, poor or very poor,[4] in Nigeria 9% as poor or very poor,[5] in Australia 17.0% as fair or

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poor,[7] in USA 34.4% as "fair" or "poor."[8] Among adults (35-44 years) in North-Eastern Brazil, 63% reported a negative self-perception of oral health,[9] in Istanbul, Turkey, 65% poor oral health status,[10] and among adults in Qatar 5.9% and 4.6% rated their teeth and gums, respectively, as poor.[11]

Factors associated with self-rated oral health include sociodemographic factors, oral conditions, general health status variables, oral health behaviour, and general health behaviour.

Sociodemographic risk factors for poor self-rated oral health include, deceasing age,[10] older age,[7,12] being female or male[4,7,11-13] and low socioeconomic status.[4,7,9,11,13,14] Oral conditions increasing the risk for poor self-rated oral health include lesser number of teeth,[15] recent bleeding gum, tooth sensitivity, and recent bad breath,[4] dental caries,[16] toothache,[17] and dental pain.[18] General health status risk factors for poor self-rated oral health include comorbidity, chronic conditions,[14] overweight and obesity,[19,20] and diabetes.[11]

Oral health risk behaviour factors for poor self-rated oral health include inadequate tooth brushing,[4] low oral hygiene behaviours,[12] irregular dental attendance,[10] dentist visits > 3 years ago,[9] no past use of dental services,[4] no routine dental check,[21] dental attendance,[14] dental treatment, dental check-ups,[22] and frequent dental visiting.[23] General health risk behaviour factors for poor self-rated oral health include substance use such as current smoking,[4,7,14,24] smokeless tobacco use,[11] problem drinking[7,4] Khat use,[25] poor diets,[24] food avoidance (in particular, whole fruits and raw vegetables),[26] and physical inactivity.[27]

The aims of this study were to estimate the self-rated oral health status and its associated factors in a national adult community dwelling population in Kenya.

Methods
Study design and participants
A multi-stage cluster sampling method (200, 100 urban and 100 rural clusters, 30 households and one adult per household) was used to select adults aged 18 to 69 years for the Kenya STEPS Survey in 2015, more details of sample design.[28] A total of 4,459 individuals had complete oral health measurements. The response rate for STEP 1 was 95%, STEP 2 and 3 was 93%.

The protocol of the STEPS survey was reviewed and approved by the Kenya Ministry of Health Ethics Committee. Prior to study participation, respondents had to provide informed consent.

Measures
Following WHO STEPS methodology,[28] two steps were taken: "step 1, questionnaire interview, and step 2, anthropometric measurements. For step 1, handheld devices loaded with eSTEPS software and WHO STEPS questionnaire were used by trained data collectors at respondents' residences. Questions included tobacco use, Khat use (chewing), alcohol consumption, dietary habits, and the amount of physical activity (PA), raised total cholesterol (TC), cardiovascular diseases, and sociodemographic profiles. Show cards on different types of tobacco products, alcohol, physical activities, and servings of fruits and vegetables were used to facilitate understanding of the questions by the respondents."[28]

Self-rated oral health status was assessed with two questions, 1) "How would you describe the state of your teeth, and 2) gums?" Response options ranged from 1=excellent to 6=very poor.[28] (Cronbach alpha 0.70). Poor self-rated oral health status was classified as having poor or very poor status of teeth and/or gums, and good oral health as having average to excellent status of teeth and/or gums.

Oral conditions
Tooth loss was assessed with the question, "How many natural teeth do you have?" (Response options: 1=no natural teeth, 2=1-9 teeth, 10-19 teeth, and 20 teeth or more).[28] Responses were classified into having 0-19 teeth and 20 or more teeth.

Dentures. "Do you have any removable dentures?" (Yes, No).[28]

Oral health related quality of life was assessed with 10 items, e.g., "Difficulty in chewing foods?"(Yes, No) (Cronbach alpha 0.89).

Physical symptoms were asked with the question, "During the past 12 months, did your teeth or mouth cause any pain or discomfort?" (Yes, No)[28]

Oral health behaviours were assessed with seven questions:[28]

1) "What is the main source of your home drinking water?" (Responses were grouped into 1=piped supply and 0=well or underground water, rain water, spring water, surface water);

2) "How often do you clean your teeth?" (Response options: 1=never to 7 twice or more a day); 3) "Do you use

toothpaste containing fluoride?"(Yes or No); 3) "How long has it been since you last saw a dentist?" (Response options: 1=less than 6 months to 6=never received dental care); 4) "How long has it been since you last saw a dentist?" (Responses ranged from 1=less than 6 month ago to 6=never); 5) "Consumption of soft drinks (like Fanta, coca cola, 7-up, Aya, Softa, Vimto or other sugary drinks?"(Responses: Number of days in a week and number of servings in one day); 6) "Consumption of processed food high in sugar (biscuits, wafers, cakes, candy, sweets and chocolate?" Responses ranged from 1=always (every meal) to 5=never; and 7) "Adding sugar to your beverages?" (Responses ranged from 1=always (every drink) to 5=never).

Daily fruit and vegetable consumption were calculated from the number of servings consumed per day in a typical week (Cronbach's alpha 0.76).28 Physical activity level was measured based on the duration of moderate and vigorous physical activities (at work, transport and recreation) in a typical day and week. Physical activity levels were calculated into low, moderate or high, as per WHO Global Physical Activity Questionnaire (GPAQ).[29] Past month binge drinking was assessed by asking participants how many times they had "six or more standard alcoholic drinks in a single drinking occasion during the past 30 days."[28]

Steps 2 and 3 were conducted at the village; the field survey team coordinated with the village authority for selecting the appropriate place for steps 2 and 3. It involved "taking anthropometric measurements, fasting blood samples, by trained health staff and research assistants using WHO STEPS standard methodology.[30] Participants' heights and weights were assessed with standard measures. Body mass index (BMI) was calculated according to World Health Organization31 criteria: underweight < 18 50 (BMI kg/m²), normal weight (18.50 to 24.99 kg/m2), overweight and obese (≥ 25.00 kg/m²).

Data analysis
Post stratification adjustments were done to align with the population projections according to age-sex categories. Descriptive statistics on frequency, weighted prevalence and 95% confidence intervals (CI) was performed for sociodemographic, behavioural, health and oral health variables. Multivariable logistic regression was conducted to assess associations between sociodemographic factors, oral and general health variables and poor oral health

status. Variables from bivariate analysis with a significant level of p < 0.05 were included in the multivariable logistic model. Multi-collinearity was checked with variance inflation factor; none exceeded a value of 2.3. P < 0.05 was considered significant. Missing values (<5%) were excluded from the analysis. All analyses were adjusted for the multi-stage sample design and conducted with STATA software version 13.0 (Stata Corporation, College Station, TX, USA).

Results
Sample characteristics
The sample included 4.459 adults (40% males and 60% females) aged 18 to 69 years, mean age 40.4 years (SD=13.9). More than half of the participants (58.8%) had completed primary or more education, and 51.2% were residing in rural areas. Regarding oral conditions, 2.2% reported to have 0-19 natural teeth, 4.6% removable dentures, 31.6% experienced pain in the teeth of mouth in the past 12 months, and 35.5% had impaired Oral Health Related Quality of Life (yes, on any of the 10 items). In terms of general health status, 5.6% of the participants reported to have been diagnosed with stroke, angina or heart attack, 27.8% were overweight or had obesity, and 2.6% were measured to have diabetes. In relation to oral health behaviour, 38.1% used piped water as a source of home drinking water, 35.8% cleaned their teeth twice or more times a day, 72.0% used a toothpaste with fluoride, 10.5% had seen a dentist in the past year, 4.1% consumed soft drinks 6-7 days a week, 6.1% ate processed food high in sugar daily, and 35.7% added sugar to beverages daily. Regarding general health behaviour, 8% of particiants were current Khat users, 8.3% current smokers, 3.6% current smokeless tobacco users, 13.5% were past month binge drinkers, 10.9% were physically inactive, and 80.1% ate insufficient fruit and vegetables and. Overall, 13.7% of participants reported poor self-rated oral health.

In bivariate analysis, having oral conditions (tooth loss, dentures, pain in teeth or mouth, and impaired Oral Health Related Quality of Life), poorer general health status (having stroke, angina or heart attack), lack of fluoride toothpaste use, dental care attendance, and soft drink consumption were associated with poor self-rated oral health. General health risk behaviours were not found significantly associated with poor self-rated oral health (see Table 1).

Table 1: Sample characteristics

Variable		Sample N (%)	Self-rated poor oral health n (%)	Chi-square P-value
Sociodemographic variables				
All		4459	13.7	
Age in years	18-29 years	1486 (33.3)	11.2	<0.001
	30-44	1705 (38.2)	15.0	
	45-59	871 (19.5)	14.9	
	60-69	397 (8.9)	24.3	
Sex	Female	2675 (60.0)	16.7	<0.001
	Male	1784 (40.0)	10.5	
Education	No formal schooling	746 (16.7)	16.5	0.311
	Primary school incomplete	1090 (24.4)	15.7	
	Primary school complete	1415 (31.7)	13.6	
	Secondary school and above	1208 (27.1)	11.1	
Wealth quintile	Poorest	894 (19.0)	15.1	0.162
	Second	891 (20.8)	17.1	
	Middle	892 (18.2)	14.3	
	Fourth	892 (18.7)	10.5	
	Richest	890 (23.3)	11.7	
Geolocality	Rural	2289	14.1	0.633
	Urban	2174	13.1	
Oral conditions				
Number of teeth	≥20	4342 (97.8)	12.7	<0.001
	0-19	110 (2.2)	62.7	
Dentures (removable)	No	4140 (95.4)	13.1	<0.001
	Yes	316 (4.6)	24.8	
Pain in teeth or mouth in the past 12 months	No	2952 (68.4)	4.2	<0.001
	Yes	1504 (31.6)	34.2	
Impaired Oral Health Related Quality of Life	No	3060 (71.8)	5.1	<0.001
	Yes	1395 (28.2)	35.5	
General health status				
Overweight or obesity	No	2932 (72.2)	13.1	0.093
	Yes	1324 (27.8)	15.9	
Diabetes	No	4000 (97.4)	13.6	0.140
	Yes	148 (2.6)	19.2	
Stroke, angina or heart attack	No	4163 (94.4)	12.9	0.002
	Yes	293 (5.6)	26.3	
Oral health behaviour				
Home drinking water source	Other sources (spring, well)	2705 (61.9)	12.2	0.943
	Piped water	1502 (38.1)	13.3	
Tooth cleaning	<twice a day	2771 (64.2)	14.2	0.520
	twice or more/day	1684 (35.8)	12.7	
Uses toothpaste	without fluoride	1425 (28.0)	16.9	0.039
	with fluoride	2905 (72.0)	12.2	
Saw dentist within the past 12 month	No	3953 (89.5)	12.1	<0.001
	Yes	502 (10.5)	27.2	
Soft drinks	<6-7 days/week	4275 (95.9)	13.0	0.003
	6-7 days/week	181 (4.1)	31.0	
Processed food high in sugar	Less than daily or never	4192 (93.9)	13.6	0.634
	Daily, every meal	261 (6.1)	15.3	
Add sugar to beverages	< Every day/every drink	2488 (64.3)	12.9	0.283
	Every day/every drink	1666 (35.7)	15.0	
General health behaviour				
Current Khat user	No	4173 (93.1)	13.7	0.796
	Yes	286 (6.9)	12.9	
Current daily smoker	No	4135 (91.7)	13.6	0.837
	Yes	324 (8.3)	14.2	
Past daily smoker	No	3882 (95.0)	13.6	0.427
	Yes	195 (5.0)	16.0	
Current smokeless tobacco user	No	4275 (96.4)	13.6	0.671
	Yes	181 (3.6)	15.2	
Past daily smokeless tobacco user	No	4225 (99.0)	15.4	0.138
	Yes	49 (1.0)	23.4	
Binge drinking (past month)	No	3979 (86.5)	14.0	0.291
	Yes	480 (13.5)	11.5	
Physically inactive	No	3834 (10.9)	13.6	0.456
	Yes	527 (89.1)	11.6	
Inadequate fruit and vegetable consumption	No	1031 (19.9)	13.5	0.890
	Yes	3424 (80.1)	13.7	

Oral health related quality of life and self-rated oral health status

Significantly higher proportions of individuals who rated their oral health as poor reported impacts for all the ten items than those who rated their oral health as average or good. All the differences were significant at p<0.001 (see Table 2).

Table 2: Oral health related quality of life by self-rated oral health status

Oral Health Related Quality of Life	Overall N (%)	Poor oral health %	Average or good oral gealth %
Difficulty in chewing/biting	1187 (23.4)	62.8	17.2
Sleep often interrupted	791 (15.9)	46.3	11.2
Doing usual activities	581 (12.2)	38.2	8.1
Days taken off work	518 (10.8)	32.7	7.4
Feel tense	449 (9.2)	31.1	5.8
Reduced social activities	337 (7.2)	24.2	4.6
Difficulty with speech	298 (6.0)	18.3	4.0
Avoid smiling	280 (5.6)	21.2	3.2
Embarrassed about teeth	221 (4.9)	19.1	2.7
Less tolerant of spouse or someone close with	159 (3.1)	12.5	1.6
Overall impact	1402 (28.2)	73.5	21.1

Associations with poor self-rated oral health

In multivariable logistic regression analysis, older age (Odds Ratio=OR: 1.70, Confidence Interval=CI: 1.07, 2.69), having a lover number of teeth (OR: 0.19, CI: 0.06, 0.62), having dentures (OR: 1.92, CI: 1.22, 3.03), having pain in the mouth or teeth (OR: 5.62, CI: 3.58, 8.90), impaired Oral Health Related Quality of Life (OR: 3.01, CI: 2.03, 4.47) and frequent soft drink consumption (OR: 3.62, CI: 1.89, 6.97) were associated with poor self-rated oral health (see Table 3).

Table 3: Associations with poor self-rated oral health status

Variables	AOR (95% CI)	P-value
Age		
18-29 years	1 (Reference)	
30-44	1.25 (0.94, 1.66)	0.123
45-59	1.10 (0.72, 1.69)	0.658
60-69	1.70 (1.07, 2.69)	0.025
Sex		
Female	1 (Reference)	
Male	0.82 (1.60, 1.13)	0.231
Stroke, angina or heart attack		
No	1 (Reference)	
Yes	1.70 (0.99, 2.92)	0.054
Number of teeth		
0-19	1 (Reference)	
20 or more	0.19 (0.06, 0.62)	0.006
Dentures (removable)		
No	1 (Reference)	
Yes	1.92 (1.22, 3.03)	0.005
Pain in teeth or mouth in the past 12 months		
No	1 (Reference)	
Yes	5.62 (3.58, 8.90)	<0.001
Impaired Oral Health Related Quality of Life		
No	1 (Reference)	
Yes	3.01 (2.03, 4.47)	<0.001
Soft drinks		
<6-7 days/week	1 (Reference)	
6-7 days/week	3.62 (1.89, 6.97)	<0.001
Uses toothpaste		
without fluoride	1 (Reference)	
with fluoride	0.76 (0.56, 1.05)	0.097
Saw dentist within the past 12 month		
No	1 (Reference)	
Yes	0.77 (0.55, 1.07)	0.124

AOR=Adjusted Odds Ratio, CI=Confidence Interval

Discussion

This study assessed self-rated oral health and its correlates in a nationally representative adult community dwelling population in Kenya. High reports of poor (13.7%) self-rated oral health were found in this study, which seem to be higher than in several previous surveys in different countries,[4,5,7,8,11] and similar to a previous national survey among adults (35-44 years and 65 years of more) in Kenya.[6] The high prevalence of self-rated poor oral health in this study may be an indication of a high burden of oral health problems and unmet treatment need in this population in Kenya. Responding to the question, what they did when they had any pain or discomfort with their teeth or mouth the last time, 27.9% said "nothing", 46.3% self-medication or pharmacy/dispensary, and only 20.8% consulted a public or private medical institution (analysis not shown).

In agreement with several previous studies,[7,12] this study found that older age was associated with poorer self-rated oral health. Although in bivariate analysis the prevalence of poor self-rated oral health was higher in women than in men in this study, but this became non-significant in the multivariable model. Previous studies[4,7,11-13] also found mixed results regarding gender differences in the prevalence of self-rated oral health. In contrast to previous studies,[4,7,9,11,13,14] this study did not find an association between socioeconomic status risk factors and poor self-rated oral health.

Consistent with previous studies,[15,17,18,32] this study found that having various oral conditions (tooth loss, dentures, pain in teeth or mouth and impaired Oral Health Related Quality of Life), increased the risk for poor self-rated oral health. In bivariate analysis, this study found an association between having chronic conditions (stroke, angina or heart attack) and poor self-rated oral health. Previous studies,[14] also found an association with chronic conditions and poor oral health status. In contrast to some previous studies,[11,19,20] this study did not find an association between overweight and obesity, diabetes and self-rated oral health.

In bivariate analysis, lack of fluoride toothpaste use was associated with poor self-rated oral health, while no association was found between poor tooth cleaning practices and poor self-rated oral health. It is possible that because of the overall low prevalence of adequate tooth cleaning (38.1%), no such differences were found in terms of oral health status. Inadequate tooth brushing and poor oral hygiene practices have been found associated with poor

self-rated oral health in previous studies.[4,12] Previous studies found mixed results in relation to low or high dental attendance and poor self-rated oral health status,[4,9,10,14,21-23] while this study, in agreement with some studies,[14,22,23] found a positive relationship between dental attendance and poor self-rated oral health status in bivariate but not multivariable analysis. Among our study participants who had consulted a dentist, the majority (92.8%) consulted a dentist the last time because of pain or treatment and only 3.4% had gone for a preventative check-up (analysis not shown). This may explain as to why dental attendance was correlated with poor self-rated oral health status in bivariate analysis. Further, the frequent consumption of soft drinks was significantly associated with poor self-rated oral health in this study. Previous studies,[33] have found an association between soft drink consumption and oral disease.

A number of studies[4,7,11,14,24-27] found an association between substance use, problem drinking, inadequate fruit and vegetable consumption, physical inactivity and poor self-rated oral health, while in this study did not find any such association. This finding seems to show a lack of clustering pattern of oral and general health-risk behaviours, except for high sugar intake in the form of soft drink consumption.[34]

Study limitations

The study design was cross-sectional; therefore, no causative conclusions can be drawn. All oral health assessment measures used in this study were by self-report, which may have biased responses. "Generally, patients are less likely to adequately assess their periodontal status and the presence of caries than they are to assess the number of their teeth, restorations, and the presence of fixed and removable prosthetics."[35] In future studies oral examinations should be performed, in addition to self-reported oral health measures. Furthermore, the reference period for asking about pain or discomfort in teeth or mouth was 12 months, which may have caused a recall bias.

Conclusion

High unsatisfied self-rated oral health status was found and several risk factors (various oral conditions, and oral health risk behaviour) were identified that can help in guiding oral health care programming in Kenya.

Competing interests

The authors declare that they have no competing interest.

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