Social inequalities in oral health and in use of oral health care services among adolescents in Uganda

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Summary. *Objective.* The aim of this study was to describe clinical and self-perceived indicators of oral health status and the use of oral health care services by social and demographic characteristics.

Methods. In 2001, a cross-sectional random sample survey was conducted in urban and rural settings in Uganda (Kampala and Lira, respectively), and 1146 secondary school students with a mean age of 15.8 years completed questionnaires in school. Dental caries was recorded by one examiner on a random subsample of 372 students.

Results. Logistic regression analyses revealed that being an urban resident was associated with higher odds for having dental caries (dmft > 0), seeking care because of toothache (delayed treatment demand) and being dissatisfied with one's own oral health status [adjusted odds ratio (OR) = 1.5-2.1]. Being an urban resident was associated with lower odds for oral health care attendance generally and for having missing teeth in particular (adjusted OR = 0.6-0.4). Students who had parents with a higher education and those with weak social ties were, respectively, less and more likely to be dissatisfied with their oral health status. As compared to caries-free participants, the odds for being dissatisfied with an delayed treatment demand increased significantly with an increasing dmft score (adjusted OR = 2.1-3.2).

Conclusion. Urban students were most likely to have a dmft > 0 and to rate their oral health status negatively. Having received dental care and the prevalence of missing teeth, and delayed treatment demand were, respectively, most and least prevalent among rural students. Dental caries at different diagnostic cut-off points and weak social ties affected self-reported oral health negatively, independently of social and demographic characteristics.

Introduction

Consistent with observations made in developed countries, certain sectors of African society experience a high prevalence of dental caries, whereas others show low levels or are caries free [1-3]. One way to redress inequity in oral health is to target groups

of individuals who are at high risk, using social factors as predictors of dental caries [4].

The lower the material standard of living, as measured by income, social class and social network/support, the worse the level of oral health, whatever measures are used to assess this, be they clinical or self-reported indicators [5–7]. Social inequality in terms of relative rather than absolute poverty has also been found to predict the onset of dental caries; for instance, among 6-12-year-old Brazilian children [5]. Contemporary evidence from sub-Saharan Africa has shown a higher prevalence

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of dental caries in subjects from urban and upper socio-economic backgrounds [8–14]. In Uganda, previous studies of children and adolescents have not yet drawn any clear-cut conclusion regarding the relationship between social status and indicators for oral health [15–17].

Until recently, clinical indices, such as the dmft index, have been applied to assess the outcomes of oral disorders. Numerous authors, however, have advocated the use of subjective assessments to gain information about the impact of oral disorders on health-related quality of life [18]. Locker and Miller [18] maintained that subjective oral health indicators reflect the perceived need for oral health care, and that their use should be complementary to the clinical measures of oral health status, reflecting professionally defined needs [19]. Previous research concerning the psychosocial impacts of oral disorders have focused on tooth loss, oro-facial pain, oral cancer and dental fluorosis, whereas studies linking dental caries to self-perceived oral health are relatively scarce [19] and are virtually absent in an African cultural context.

The introduction of the Structural Adjustment Programmes (SAPs) in sub-Saharan Africa implies a reduction in government spending on social and public health services [20]. A decade ago, Uganda introduced user payments in a number of oral health care facilities to recover costs and to discourage unnecessary attendance. The beneficial effects of cost sharing have been challenged, however, and it is evident that user payment has led to a dramatic decline in the overall utilization of oral health care [20]. In Tanzania, the reduction in utilization of oral health care services has been more apparent than that reported for the medical services [21,22].

The association between social conditions and oral health is generally an understudied issue [5]. In Uganda, social predictors of oral health status and the use of oral health care services by children and adults have yet to be identified. This study describes the clinical and self-perceived aspects of oral health status and the use of oral health care services in relation to socio-economic conditions among secondary school students from Kampala and Lira where, respectively, a user-financed and a free-of-charge public oral health care service are currently being implemented. A supplementary objective was to assess the discriminant validity of the self-reported measures of oral health status in terms of their relationship with clinically recorded dmft scores at different cut-off points.

Methods

Sample and data collection

The study population consisted of students attending public secondary schools in Kampala and Lira. Kampala is the capital city and accounts for nearly 45% of all urban residents in Uganda. The Lira district is a rural area situated 350 km from Kampala. The fluoride concentration of the drinking water in Kampala is 0.3 mg/L [16]. The fluoride concentration in the water in Lira was unknown at the time of the survey. Water samples were subsequently collected in tight-lidded plastic bottles for fluoride analysis. The fluoride concentration in Lira ranged from 0.10 to 1.20 mg/L, with an average of 0.50 mg/L [23].

The estimated sample size allowing for design was about 1300. To obtain the necessary number of students, 10 secondary schools (five from Kampala and five from Lira) were selected by systematic random sampling. The eligible target group consisted of 1324 students, 1146 of whom participated. Fifty-two per cent of the subjects lived in the urban environment and their mean age was 15.8 years (SD = 1.6 years, range = 13-19 years). The response rate was 87%. Non-response was caused by absence from school on the day of the data collection. The students completed structured questionnaires administered in the schools by trained research staff during the autumn of 2001. The questionnaire was constructed and completed in English, which is the language of instruction in formal academic institutions in Uganda. The survey instrument was reviewed for content validity and pilot tested before use, and it assessed the students on self reported oral health, as well as a range of social and demographic characteristics. Three months after the main survey had been completed, 415 respondents from the main survey were selected for a follow-up survey using systematic random sampling. A total of 372 students completed a short version of the original questionnaire and were examined for dental caries. Fortyeight per cent of these subjects lived in an urban environment and their mean age was 16.3 years (SD = 1.7 years). The response rate was 90%. Written informed consent to participate in the study was obtained from students and their parents. Ethical clearance to conduct the study was granted by the Ministries of Health and Education in Uganda, the local administration authorities, and the Ethics Committee Norway.

Questionnaire

Social and demographic characteristics. Gender was measured as (1) male or (2) female. School location was assessed as (1) Kampala (urban) or (2) Lira (rural). Place of residence where raised was coded as (1) urban or (2) rural. Age was recorded as age at last birthday, and categorized as (1) 13-15 or (2) 16-19 years. The father's and mother's highest level of education were assessed on scales ranging from (1) 'have not gone to school' to (5) 'university'. Two dummy variables were constructed, yielding the categories (0) 'lower education' (including no education/primary school and adult education) and (1) 'higher education' (including secondary school, college and university), and added into a sum score of parental education, yielding the categories (1) low, (2) medium and (3) high. Religious affiliation was assessed to probe into culturally different lifestyles (e.g. eating habits) that are evident between the main religious groups, i.e. (1) Catholic, (2) Protestant and (3) Muslims/others. Thus, religious affiliation was used as a social marker in the analyses

A measure of social identification was used as a proxy for social network. This measure was adapted from a five-item inventory of group identification [25] with responses in the range from (1) 'strongly agree' to (5) 'strongly disagree' (Cronbach's alpha for the present study = 0.77). Self-assessed oral health status was measured by means of one question: 'How do you consider the present condition of your mouth and teeth?' A five-point response scale was used: (1) 'excellent', (2) 'good', (3) 'average' ('neither good nor bad'), (4) 'poor' and (5) 'very poor'. For analyses, a dummy variable was constructed yielding response alternatives (0) 'satisfied' (including original categories 1 and 2) and (1) 'dissatisfied' (including original categories 3-5). Received oral health care was assessed by one question: 'During the past 2 years, have you attended a dentist in order to receive advice or treatment?' The response categories were (1) 'yes' and (0) 'no'. The reason for seeking oral health care was assessed by asking, 'If you have attended a dentist during the past 2 years, what was the main reason for doing so?' Responses were coded (1) toothache or (0) other reasons (e.g. tartar, bad breath, information seeking or bleeding gums).

A clinical examination was carried out by one dentist (I.O.) under field conditions during the spring

of 2002. Caries was assessed using a modification of the decayed, missing and filled tooth index (dmft), as described by the World Health Organization [24]. The child was seated on a chair in the shade outside the school building. Cotton rolls were used to clean the teeth and to control saliva. Natural light was the source of illumination. Sharp dental probes and plane mouth mirrors were employed to assess carious lesions. Except third molars, teeth with any part visible through the gum were examined. Caries was recorded as being present when a lesion in a pit or fissure, or on a smooth surface, had a detectable softened floor, undermined enamel, softened wall or a temporary filling. On proximal surfaces, the probe had to enter a lesion with certainty. In order to get a more detailed assessment of caries experience, pre-cavitated lesions were included in the dmft scores. A tooth was considered missing if there was a history of extraction because of pain and/or the presence of a cavity. An assistant recorded the scores.

Reproducibility and validity. As a check of the stability in responding, Cohen's kappa was calculated for the socio-economic characteristics assessed both in the main and the follow-up studies. The agreement was satisfactory with kappa values of 0.61, 0.77, 0.81 and 0.91 regarding age, area mostly lived in, religious affiliation and gender. Approximately 10% (n = 47) of the respondents from the follow-up survey had their teeth reexamined clinically for dental caries after a period of one week. The agreement was satisfactory with a Cohen's kappa of 0.82. There was no evidence of systematic errors in the recording of dental caries, as assessed by the Wilcoxon signed-rank test (P > 0.74).

Statistical analyses

The SPSS Version 10.0 computer program was used to analyse the data. Cohen's kappa was used to test for reliability of categorical data and the Wilcoxon signed-ranks test was applied to check for systematic errors in the dmft scores. Univariate and multiple logistic regression analyses were applied to test for unadjusted and adjusted relationships, respectively. All possible two-way interactions were checked in a multiple logistic regression analysis. The 95% confidence intervals (95% CIs) were estimated for the odds ratios (ORs) to determine the significance of the predictor variables. The intra-class correlation coefficients [26] were rather modest, varying from 0.01 for the reason for dental attendance to 0.05 for perceived oral impacts. This implies that between 1% and 5% of the variance in the data may be explained by the characteristics of being a student in a particular school. To correct for potential effects of the cluster design, logistic regression analyses were re-analysed with the STATA Version 7.0 computer program using the 'svylogit' command. The initial results provided by unadjusted analyses were left essentially unchanged.

Results

Table 1 gives the percentage distribution of participants in the main and follow-up surveys in relation to their socio-demographic characteristics. In both surveys, the students from Kampala and Lira differed with regard to gender, age, parental education and religious affiliation (P < 0.05). For this reason, all the social and demographic variables were included in the multivariate analyses to control for confounding. In the main and follow-up surveys, respectively, 8% and 16% of the participants in Kampala, and 22% and 17% of their counterparts in Lira were not lifetime residents of the respective areas. All available data were used in the analysis to improve precision because a re-analysis of data restricted to only lifetime residents, revealed results that were identical to those presented in this paper.

Self-assessed oral health status

Twenty-eight per cent were reportedly dissatisfied with their oral health status (Table 2). Compared to students in the other groups, being a Kampala student, an older student and perceiving oneself to have low social ties were associated with higher odds for being dissatisfied with oral health status (adjusted OR = 1.7-1.9) (Table 3). Students with parents who had been educated to a medium level (one low and one high) had lower odds for being dissatisfied than their counterparts with parents who had a low level of education (adjusted OR = 0.4).

Oral health care services

A total of 44% of subjects reported having received oral health care and gave toothache as the main reason for seeking oral health care services (delayed treatment demand) (Table 2). Being a Kampala student or a male was associated with

Table 1. Socio-demographic characteristics of the participants of the main and the follow-up surveys (number of participants in parenthesis)*.

	Main	n survey	Follow-up		
Variable	Number	Percentage	Number	Percentage	
Place of school:					
Kampala (urban)	591	51	180	48	
Lira (rural)	555	49	192	52	
Gender:					
male	667	60	202	53	
female	450	40	181	47	
Age (years):					
13–15	515	45	131	34	
16–19	631	55	253	66	
Social cohesion:					
low	573	51	193	54	
high	541	49	168	47	
Parental level of education:					
low	321	28	105	28	
medium	352	31	135	37	
high	454	41	130	35	
Religious affiliation:					
Catholic	376	33	119	32	
Protestant	504	44	174	47	
Muslims/others	256	23	77	21	

*The totals of the numbers in the different categories do not add up to 1146 and 372 because of missing values.

Oral health indicator	Number	Percentage		
Self-rated oral health status:				
satisfied	808	72		
dissatisfied	319	28		
Dental care:				
not received in the past 2 years	630	56		
received in the past 2 years	496	44		
care because of toothache	365	44		
care because of other reasons	458	56		
Clinical dental status:				
DMFT > 0	294	80		
caries-free	73	20		
missing teeth > 0	104	28		
no missing teeth	263	72		

 Table 2. Percentage distribution of students according to oral health indicators.

*The totals of the numbers in the different categories do not add up to 1146 and 372 because of missing values.

Table 3. Self-reported oral health status (0 =satisfied; 1 =dissatisfied) regressed upon socio-demographic variables: (OR) odds ratio; and (95% CI) 95% confidence interval (n = 1146).

	Dissatisfied with oral health					
	Un	adjusted	А	djusted		
Variable (reference category*)	OR	95% CI	OR	95% CI		
School (Lira):						
Kampala <i>versus</i> Lira	1.2	1.0 - 1.6	1.9**	1.4 - 2.6 **		
Age (13–15 years):						
16-19 versus 13-15 years	1.6	$1 \cdot 2 - 2 \cdot 1$	1.7**	1.3-2.3**		
Sex (female):						
male versus female	$1 \cdot 1$	0.8 - 1.4	1.0	0.8 - 1.4		
Social cohesion (high):						
low versus high	1.2	1.0 - 1.6	1.2**	1.0-1.6**		
Religion (Muslim):						
Catholic versus Muslim	1.0	0.7 - 1.5	1.3	0.9-1.9		
Protestant versus Muslim	0.9	0.6 - 1.2	1.0	0.7 - 1.5		
Educational level (low):						
both high versus both low	0.8	0.5 - 1.1	0.8	0.5 - 1.1		
one high versus both low	0.5	0.3-0.7	0.4**	0.3-0.6**		

*For the reference categories of the social predictors, the OR = 1. **Statistically significant adjusted ORs and 95% CIs.

higher odds, whereas being an older student and having parents with medium and higher levels of education were associated with reduced odds for reporting delayed treatment demand (adjusted OR = 0.7-1.5) (Table 4). A significant second-order effect in terms of the regression coefficient (*B*) was shown for age with regard to place of school (*B* = 0.705, *P* < 0.05). Among 13–15-year-old, 54% and 40% (*P* < 0.05) of Kampala and Lira students reported toothache as their main reason for seeking dental care. Among the 16–19-year-olds, there was no difference between urban and rural students in this respect. The odds for having received oral health care were lower in Kampala than in Lira, lower in males than in females and higher among Catholics than among Muslims (adjusted OR = 0.6-1.4) (Table 4).

Clinical indicators of oral health

A total of 80% and 28% had, respectively, dmft > 0and missing teeth (MT) > 0. Only one child had filled teeth FT > 0. The mean DMFT and MT were 2.9(SD = 2.3) and 0.5 (SD = 0.9), respectively. The odds of having dental caries (DMFT > 0) were higher in Kampala than in Lira and higher among Catholics than Muslims (adjusted OR = $2 \cdot 2 - 2 \cdot 4$) (Table 5). The MT component was statistically significantly lower in Kampala than in Lira (OR = 0.4). Those who confirmed having received oral health care were more likely to have missing teeth than their counterparts who did not after all other variables were controlled for in the analyses (adjusted OR = 3.1, not shown in Table 5). A significant second-order effect in terms of the regression coefficient (B) was shown for place of school by religious affiliation (B = 2.04, P < 0.05). The caries prevalence in Kampala was 96%, 82% and 78% (P < 0.05) among Catholics, Protestants and Muslims, whereas the corresponding figures in Lira were 82%, 71% and 84% (P > 0.05).

As shown in Table 6, the odds for being dissatisfied with oral health status and reporting delayed treatment demand were statistically significantly higher at dmft 5–14 (adjusted OR = 2.3, 3.2) compared to students being caries-free (DMFT = 0). To check whether the grouping of the DMFT variable influenced the outcome of the statistical analyses, data were re-analysed with DMFT as a continuous variable, using general linear models analysis of variance. The statistically significant associations remained essentially unchanged.

Follow-up versus baseline-only participants

To assess whether the subsample, i.e. the 372 students who participated on both occasions, were representative of the study group as a whole, a comparison was made with the 774 students who only completed assessments in the main survey. There were no statistically significant differences between the two groups of participants with regard to the socio-demographic variables and the non-clinical variables utilized in this study. When a re-analysis

Table 4. Dental attendance because of toothache (0 =other reasons; 1 =toothache), dental care received last year (0 =no; 1 =yes) regressed upon socio-demographic variables: (OR) odds ratio; and (95% CI) 95% confidence interval (n = 1146).

	Attendance because of toothache				Received oral health care				
Variable (reference category*)	Un	Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	
School (Lira):									
Kampala versus Lira	1.3	1.0 - 1.8	1.5**	$1 \cdot 1 - 2 \cdot 0^{**}$	0.7	0.5 - 0.7	0.6**	0.5 - 0.8 * *	
Age (13–15 years):									
16-19 versus 13-15 years	0.7	0.5 - 0.9	0.7**	0.5-0.9**	1.0	0.8 - 1.2	0.9	0.7 - 1.2	
Sex (female):									
male versus female	1.2	1.0 - 1.6	1.4**	1.0 - 1.9 **	0.8	0.6 - 1.0	0.7**	0.5-0.9**	
Social cohesion (high):									
low versus high	1.1	0.9 - 1.4	1.0	0.7-1.4	1.2	1.0 - 1.5	0.9	0.7 - 1.2	
Religion (Muslim):									
Catholic versus Muslim	0.8	0.5 - 1.2	0.9	0.6-1.4	1.6	$1 \cdot 2 - 2 \cdot 2$	1.4**	1.0 - 1.9 * *	
Protestant versus Muslim	1.0	0.7 - 1.5	1.1	0.7-1.6	1.3	1.0 - 1.8	1.2	0.9 - 1.7	
Educational level (low):									
both high versus both low	0.7	0.4 - 1.0	0.7**	0.5 - 1.0 **	1.0	0.8 - 1.4	0.8	0.6 - 1.3	
one high versus both low	0.8	0.6–1.2	0.7**	0.7 - 1.0 **	1.1	0.8 - 1.4	1.1	0.8 - 1.5	

*For the reference categories of the social predictors, the OR = 1.

**Statistically significant adjusted ORs and 95% CIs.

Table 5. Caries prevalence (0 = caries free; 1 = DMFT > 0) and MT (0 = no missing teeth; 1 = missing teeth > 0) regressed upon socio-demographic variables: (OR) odds ratio; and (95% CI) 95% confidence interval (n = 372).

Variable (reference category*)	Dental caries				Missing teeth			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
School (Lira):								
Kampala versus Lira	1.8	1.0 - 3.0	2.2**	1.2-3.9**	0.4	0.3 - 0.7	0.4**	0.2 - 0.7 **
Age (13–15 years):								
16-19 versus 13-15 years	$1 \cdot 1$	0.6 - 1.8	1.4	0.8 - 2.4	1.5	1.0 - 2.4	1.3	0.8 - 2.3
Sex (female):								
male versus female	0.8	0.4-1.3	0.8	0.5 - 1.3	0.8	0.5 - 1.3	0.7	0.4 - 1.1
Cohesion (high):								
low versus high	1.2	0.7 - 2.0	0.7	0.4-1.3	0.7	0.5 - 1.1	1.4	0.9-2.3
Religion (Muslims):								
Catholic versus Muslims	1.9	0.9 - 4.2	2.4**	1.1-5.3**	1.0	0.5 - 1.9	0.7	0.3-1.4
Protestants versus Muslims	0.8	0.4 - 1.5	1.0	0.5 - 1.9	1.0	0.5 - 1.9	0.7	0.3 - 1.2
Education (low):								
both high versus both low	1.0	0.5 - 1.9	0.9	0.4 - 1.8	0.8	0.5 - 1.4	0.8	0.4 - 1.5
one high versus both low	$1 \cdot 0$	0.5-1.9	0.8	0.4-1.6	0.7	0.4-1.3	0.9	0.5 - 1.8

*For the reference categories of the social predictors, the OR = 1.

**Statistically significant adjusted ORs and 95% CIs.

considering the restricted sample size of 372 students were performed for all non-clinical variables, the findings presented in this paper were left essentially unchanged.

Discussion

This study indicates that there are social and demographic differences regarding various aspects of oral health status and the use of oral health care services among secondary school students in Uganda. It is not possible to assert that the present results demonstrate the crude impact of each sociodemographic characteristic considered, since they could be biased by background confounding factors. Although the two locations, i.e. Kampala and Lira, are typical Ugandan urban and rural communities, attendance at public secondary schools is voluntary and many students leave school early for different reasons. Thus, the participants of this study are not representative of the general population of 13–19year-olds in Kampala and Lira. Because of the

Table 6. Self-reported oral health (0 = satisfied; 1 = dissatisfied) and delayed treatment demand (0 = dental attendance for other reasons; 1 = dental attendance because of toothache) regressed upon DMFT status. The models are adjusted for socio-demographic variables: (OR) odds ratio; and (95% CI) 95% confidence interval (n = 372).

Variable	OR	95% CI
Dependent: dissatisfied with dental health:		
DMFT 0	1.0	_
DMFT 1-4	0.8	0.5 - 1.4
DMFT 5-14	2.3	$1 \cdot 3 - 4 \cdot 1$
Dependent: delayed demand for oral care:		
DMFT 0	1.0	_
DMFT 1-4 versus caries-free	1.5	0.8-3.1
DMFT 5-14	3.2	1.5 - 6.8

realities of life in Uganda, general population surveys of adolescents are difficult to conduct, and even a national survey of 12-year-old children was confined to children attending school [17].

The high caries prevalence and the low mean dmft scores reported in this study are consistent with the trends reported in various age groups in Africa [17,22,27]. One of the seven social markers applied, i.e. place of school (i.e. urban or rural), had a statistically significantly association with caries prevalence (DMFT > 0), a relationship that was confined to the multivariate analysis only. Consistent with what has been reported previously, urban students and Catholics experienced higher caries prevalence than their rural and Muslim counterparts [8,12,28]. This accords with the suggested positive relationship between dental caries and the level of social development in countries and local communities [3]. Although dental caries has been reported to be worse in higher social classes (e.g. in Sierra Leone [11] and Ghana [12]), no significant association with parental education was found in this study -afinding that parallels reports from South Africa [13], Namibia [28] and Saudi Arabia [29]. Different social markers occurred, however, for dental caries in Kampala and Lira. Caries prevalence varied systematically with religious affiliation in the urban community, but not in the rural one, being higher in Catholics than in Protestants and Muslims. Possible reasons for these relationships are not known.

Social markers in terms of international classifications of occupational status are not easily applied in Africa, although modifications have been proposed [11]. Classifications have generally been based on occupation both in earlier and more recent studies, although some authors have based their grouping solely on education [13]. Since the participants in this study were considered to be able and willing to state the educational level of their parents, social grouping was based on a combined measure of parental education. It was assumed that the general milieu of the family in Uganda was more important than the educational level of the head of the household.

Urban students appeared to be dissatisfied with their oral health status more often than their rural counterparts. Dissatisfaction with oral health tended to decline with increasing family education and with strengthened social ties, which are typical Western findings [7,14] and inconsistent with the results of other African studies (for a review, see Åstrøm and Mashoto [30]). The urban-rural gradient with regard to students' perceived oral health status parallels the finding of higher disease prevalence in Kampala than in Lira, showing age-gender standardized rates of 85% and 73%, respectively. This is supported by the results shown in Table 6, suggesting a positive relationship between dental caries and unfavourable evaluation of own oral health, although dissatisfaction with oral health status was moderate (28%) in the sample as a whole.

The present rate of delayed treatment demand is generally in line with that reported among 11-20year-old Tanzanians [31], indicating a need for emergency care for the later stages of dental caries. Students in Kampala had a higher rate of delayed treatment demand than their counterparts in Lira, whereas both the number of missing teeth, reflecting oral health care received, and the attendance rate were highest in Lira. Studies from industrialized countries have shown that an increase in price is often associated with a decrease in the utilization of oral health care services and vice versa [7]. The introduction of cost-sharing in Kampala, the travelling distance or the low importance placed on oral health in daily life might be responsible for the urban-rural gradient in oral health care utilization and the treatment patterns observed in this study. Recently, Lalloo et al. [22] reported that there had been a decrease in the prevalence of caries-free 5-7-year-olds in Tanzania and Uganda since the introduction of SAPs [20]. Consistent with the above, Matee and Simon [21] reported a 33% reduction in the number of Tanzanians (children as well as adults) utilizing public oral health care services after the introduction of the user fees.

The positive associations between dmft status on the one hand, and perceived need for oral health care and delayed treatment demand on the other (Table 6), provide evidence for the validity of the self-report data used in the present study. Studies from Western societies suggest that adolescents are able to provide valid proxy reports of their parents' socio-economic status [32]. In terms of reliability, the kappa values provided for some of the social indicators as well as the reproducibility of the recording of dental caries were within the interval of good and very good values according to Altman [33].

A decade after the introduction of cost sharing in the Ugandan public oral health care services, there are socio-economic inequalities with respect to adolescents' oral health status and use of oral health care services. In comparison to students in rural Lira, those in urban Kampala were more likely to have dental caries and to report delayed treatment demand, but less likely to have received oral health care. This might reflect the presence or absence of cost sharing because it cannot be explained by other socio-economic differences between students in Kampala and Lira. Notably, socio-economic factors are not causal factors per se, but influence caries experience through other variables. Knowledge of those mediating variables is important in understanding how to reduce existing social inequality in oral health.

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Résumé. *Objectif.* Décrire les indicateurs cliniques et auto-perçus de l'état de santé buccale et l'utilisation de services de santé buccale par des caractéristiques sociales et démographiques

Méthodes. Une étude transversale a été menée à Kampala (zone urbaine) et Lira (zone rurale) en 2001. Le questionnaire a été rempli à l'école par 1146 enfants scolarisés âgés de 15,8 ans. La recherche des caries a été effectuée par un examinateur dans un sous-échantillon de 372 enfants choisi au hasard.

Résultats. Les analyses de régression logistique ont révélé que les résidents urbains avaient un risque plus élevé d'avoir des caries (CAOD > 0), d'avoir besoin de soins pour des douleurs dentaires (demande de traitement retardée) et d'être insatisfait de sa santé buccale (probabilités ajustées de 1,5-2,1). Etre un résident urbain était associé à des probabilités plus faibles de suivre des soins dentaires et d'avoir des dents manquantes (probabilités ajustées de 0,6-0,4). Les étudiants dont les parents étaient de plus grand niveau d'éducation et ceux avec des liens sociaux faibles étaient respectivement moins et plus susceptibles d'être insatisfaits de leur état buccal. Par comparaison aux participants indemnes de caries, les probabilités d'être insatisfait de sa santé buccale et la demande retardée de traitement augmentait significativement avec un score CAOD important (probabilités ajustées de 2,1-3,2).

Conclusion. Les étudiants urbains étaient plus susceptibles d'avoir un CAOD > 0 et d'être insatisfaits de leur état de santé buccal. Chez les étudiants de zone rurale, il y avait plus de soins dentaires effectués, plus de dents absentes, mais moins de demandes de soins retardées. Les caries dentaires à différents niveaux diagnostics et de faibles liens sociaux avaient des répercussions négatives sur la santé buccale auto-évaluée, indépendamment des caractéristiques sociales et démographiques.

Zusammenfassung. *Ziel.* Beschreibung klinischer und selbstempfundener Indikatoren des Mundgesundheitszustandes und die Inanspruchnahme von Mundgesundheitseinrichtungen in Abhängigkeit von demographischen Charakteristika.

Methoden. Eine Querschnitts-Zufallsstichprobe von 1146 Schülern der Sekundarstife (mittleres Alter 15.8 Jahre) wurde im Jahr 2001 untersucht in Uganda in Kampala (urban) und Lira (ländlich) unter Zuhilfenahme von Fragebögen. Der Zahnbefund wurde hinsichtlich Karies durch einen einzelnen Untersucher bei einer zufällig ermittelten Untergruppe von 372 Schülern erhoben.

Ergebnisse. Eine logistische Regressionsanalyse ergab, dass urbane Kinder ein höheres Risiko hatten, einen DMFT > 0 aufzuweisen, Zahnbehandlung aufgrund von Schmerzen aufzusuchen (als Ausdruck eines verschleppten Behandlungbedarfs) sowie der Unzufriedenheit mit der eigenen Mundgesundheit (Odds Ratio korrigiert zwischen 1.5 und 2.1). Ein urbanes Kind zu sein bedeutete eine geringere Wahrscheinlichkeit der Inanspruchnahme von Mundgesundheitsförderung sowie von Fehlen von Zähnen Schüler mit Eltern von höherem Bildungsgrad und solche mit schwächerem familiären Bildungshintergrund unterschieden sich hinsichtlich der Zufriedenheit mit der eigenen.

Mundgesundheit. die Erstgenannten waren zufriedener. Im Vergleich zu kariesfreien Teilnehmern nahm die Zufriedenheit mit der eigenen Mundgesundheit mit zunehmendem DMFT-Wert ab.

Schlussfolgerung. Urbane Kinder waren in dieser Untersuchung seltener kariesfrei, sie beurteilten ihre eigene Mundgesundheit negativer. Die Inanspruchnahme von Zahnbehandlung und die Prävalenz fehlender Zähne war bei Kindern aus dem ländlichen Untersuchungsgebiet häufiger, dafür verschleppter Behandlungsbedarf geringer als bei urbanen Kindern. Das Vorhandensein von Karies beeinträchtigte die selbsteingeschätzte Mundgesundheit ebenso wie ungünstiger bildungsbezogener Hintergrund, unabhängig von sozialen und demographischen Einflüssen.

Resumen. *Objetivo.* Describir indicadores clínicos y de autopercepción del estado de su salud bucal y el uso de servicios de cuidados sobre salud bucal por características sociales y demográficas.

Métodos. Un estudio de una muestra aleatoria transversal realizado en Kampala (urbano) y Lira (rural) en el 2001 y 1146 estudiantes de escuela secundaria, edad media 15,8 completaron cuestionarios en la escuela. La caries se registró por un examinador en una sub-muestra aleatoria de 372 estudiantes.

Resultados. Análisis de regresión logística revelaron que ser un residente urbano estaba asociado con odds más altas de tener caries (CAOD > 0), buscar tratamiento debido a dolor dental (demanda de tratamiento retrasada) y estar insatisfecho con su propio estado de salud oral (odds ajustada 1.5-2.1). Ser un residente urbano estaba asociado con una odds menor para asistencia a cuidados generales de salud oral y para tener dientes ausentes (odds ajustada 0.6-0.4). Estudiantes de padres de estudios altos y aquellos con lazos sociales débiles tenían respectivamente, menos y más probabilidad de estar insatisfechos con su estado de salud oral. Cuando se comparó con los participantes libres de caries, la odds de estar insatisfecho con la salud oral y el retraso de demanda de tratamiento aumentó significativamente con el aumento del índice de CAOD (odds ajustada 2.1-3.2).

Conclusión. Los estudiantes urbanos tenían más probabilidad de tener CAOD > 0 y de valorar su

estado de salud oral negativamente. El tratamiento dental recibido y la prevalencia de dientes ausentes era mayor y el retraso en la demanda de tratamiento menos prevalente entre los estudiantes rurales. La caries en diferentes puntos de corte diagnósticos y los lazos sociales débiles afectaron en la autopercepción de la salud oral negativamente, independientemente de las características sociales y demográficas.

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