
Caries Occurrence among 12-year-old Urban Children in Kinondoni District, Dar es Salaam, Tanzania

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Abstract:

Objectives: The aims of this study were to describe the occurrence of dental caries among 12-year-old schoolchildren in Kinondoni district, Dar es Salaam, Tanzania and to determine whether DMFT-score was associated with oral hygiene habits, knowledge of oral health-related questions, consumption of items containing sugar or occupation of the family. **Study participants and methods:** The study sample consisted of 12-year-old schoolchildren (n=182) from two primary schools in Kinondoni district. Oral health status of all participants was determined by visual examination. Of the children, 90 filled out a questionnaire on oral health habits and knowledge. The remaining participants were interviewed by asking them the same questions. Results were analyzed by cross-tabulations. Statistical significances were evaluated by Chi-square tests. **Results:** The mean DMFT-score was 0.24 (SD 0.61). Only 3.8% of the subjects had two or more carious teeth. No significant differences in DMFT-score were found between the groups. Girls (96.8%) more often than boys (87.4%) reported brushing their teeth at least daily. Children of parent with high occupation less often reported brushing their teeth daily (87%) compared to children of parents with low (98%) and middle (97.5%) occupation. Of these, 77-98% had satisfactory oral health-related knowledge even though only 42% reported that they had received oral health education. Oral hygiene habits or knowledge, consumption of items containing sugar and occupation of the parents were not associated with caries experience. **Conclusion:** Despite that caries occurrence among 12-year-old schoolchildren in Kinondoni district, Dar es Salaam, Tanzania was low and not associated with oral hygiene habits, knowledge, consumption of items containing sugar or occupation of their parents, there is need to pay attention to the oral health habits of the children and guiding their awareness for reinforcing positive oral health practices and behaviors with active parent/guardian support.

Keywords: caries, children, oral habits, knowledge, occupation

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Introduction

During the early 1980's some review reports suggested that the prevalence of dental caries in African countries was increasing (1-2). More recently, several studies have reported that caries occurrence in Tanzania was low; and no increase has been observed over the last 20 years (3-15). Between the years 1973 and 2002 the mean DMFT-score of 12-year-old children has varied between 0.22 and 1.05 in Dar es Salaam and other parts of Tanzania (3-8, 10, 12-15). Girls were reported to have slightly higher caries occurrence than boys (5, 11, 13, 16). Restorations were found among only a few participants (15). A recent study (17) has found

that DMFT index of the primary school children in Kinondoni district, Dar es Salaam to be 0 for 78.3% and >0 for 21.7%. The corresponding values in Temeke district was 77.6% and 22.4% respectively.

In Tanzania, there is some information about oral health habits, knowledge, consumption of items containing sugar and dental treatment of 12-year-old children (4, 18-21). Previously, tooth-cleaning daily or more often has been reported by 59-92% of the study participants depending on the area and study population (4, 18, 20-21). Girls more frequently than boys have reported brushing their teeth

daily (18, 20). When reasons for cleaning the teeth were asked, 27% of the rural children answered "to keep the teeth healthy"; 60% of the children brushed their teeth in order to remove food particles and dirt, and 11% of the children did not know why they were brushing (20). Use of toothpaste was reported by 81% of the urban children who reported brushing their teeth with a toothbrush. Of those who used toothpaste, 42% stated that they used fluoridated toothpaste (4). Consumption of items containing sugar has been reported to be low in Tanzania (4, 18-20). Tea with sugar was the most commonly used sweet drink; mostly consumed both with meals and as a snack/refreshment between meals. Daily consumption of soft drinks has been variously reported by 10-19% of the population studied (4, 18). Girls more often than boys have reported daily use of items containing sugar (18). Of these, 15% believed that sugar makes teeth stronger (20). A dental visit during the preceding year has been reported by 30% of the subjects (4). In a study (21) done in 2006 on formerly institutionalized and street children in Dar es salaam, statically significant differences were observed when children's use of sweets (22% versus 44%) and sodas or sweetened juices (6% versus 32-36%) was paired between institutional life against street life. In another study parents of the mentally retarded children were interviewed about the oral health care of the children. Of these children 65% were able to brush their teeth by themselves and the others (35%) were assisted by a family member (22).

In a study (23) done in 1988 to assess dental caries among Tanzanian children, the population under study was divided into three socio-economic groups: low, middle and high socio-economic status (SES) group, according to parents' occupation and housing conditions. The study found that caries development was influenced by socio economic status in a way that children from middle and high SES groups had significantly more cavities than children of low SES group.

Therefore, the aims of this study were to describe the current occurrence of dental caries among 12-year-old schoolchildren in Kinondoni district, Dar es Salaam, Tanzania and to determine whether a DMFT-score was associated with oral hygiene habits or knowledge, consumption of items containing sugar or socio-economic status of the family.

Study participants and methods

Study participants

This study was conducted in the area of Kinondoni district, in two primary schools: Ndugumbi and Hananasif. The schools were conveniently selected. All 12-year-old children present at the schools on the day of examination were recruited. A total of 182 subjects were examined, 70 from Ndugumbi Primary School and 112 from Hananasif Primary School. The percentage of boys was 47.8% and that of girls 52.2% (Table 1). Children from Ndugumbi were in standard V and children from Hananasif were in standards IV (n = 71) and V (n = 41).

Questionnaire

Of these children, 90 (30 in Ndugumbi and 60 in Hananasif) filled out a questionnaire on oral health habits and knowledge. The remaining study participants were interviewed by asking them the same questions. There were no statistically significant differences between the groups in their DMFT scores, habits or gender. For background information, the children were asked about their gender, home village, religion, school, class and the working background of their parents. The questions were in Swahili, and close ended questions were presented in such a way that the participants could not guess the correct answer. There were 13 questions about oral habits, 4 questions about oral diseases and treatment, and 6 about oral health education and knowledge. Multiple-choice questions had 2 to 4 reply alternatives. The sugar consumption of the children was determined by asking how many times a day they consumed the following items containing sugar: sugar in a drink or in porridge, juice or soda, sweet cakes, ice cream, candy or fruits. In the education and knowledge part of the questionnaire the children were asked whether each statement was true or false.

Clinical examination

The teeth of the participants were examined by two examiners (J.H. and M.H.), 94 of them by J.H. and 88 by M.H. The examiners were calibrated by cross-examination according to WHO criteria (24). In the calibration the inter-examiner kappa-value for the presence of caries conducted on five patients was 1.0 indicating perfect agreement. Intra-examiner calibration

was, however, not done. The children's teeth were examined visually utilizing head lamps, no instruments were used. Examiners wore disposable vinyl examination gloves throughout. Caries was registered according to WHO recommendations (24-25) using a DMFT score. Caries was detected tooth by tooth, and the affected surfaces were not counted. Only teeth with clear carious dentinal lesions were counted. If there was doubt, no caries was recorded. Because of the examination methods, possible enamel lesions could not be counted. Carious lesions in primary teeth were recorded separately and were not included in the DMFT score. If there was any uncertainty about the diagnosis, both examiners examined the subject and a joint decision was made. Periodontal health status was not assessed. At the end of the study participants were given toothbrushes, and the class received information leaflets on dental health.

Statistical analyses

For comparison between groups, caries experience was dichotomized into: those with DMFT=0 and those with DMFT ≥ 1 . Tooth brushing was dichotomized into: brushing daily or more often and brushing less than daily. Occupation of the parents was divided into three categories: low (unemployed and housewives), middle (employed and farmers) and high (business persons such as salesmen). Statistical package for social sciences (SPSS) 10.1 program for Windows was used for data analysis. Differences between groups were

analyzed by cross-tabulations; and statistical significances were evaluated by Chi-square tests, with p-values lower than 0.05 being considered significant.

An ethical clearance certificate was obtained from the Ministry of Education in Tanzania. The ethical requirements of the research were met by referring children who had caries lesions to the Dental School at the Muhimbili University College of Health Sciences in Dar es Salaam for further management.

Results

The number of children examined according to school and gender are shown in Table 1. The mean number of permanent teeth observed per child was 25.2 (SD 3.8), and the average number of remaining deciduous teeth was 0.85 (SD 2.22). In this study, 8.8% (n=16) of the subjects had one decayed deciduous teeth, and only two of the subjects had carious lesions on two deciduous teeth.

The distribution of the 12-year-old schoolchildren in Kinondoni according to their DMFT score and according to the D-, M- and F-scores are shown in Table 2. The mean DMFT score in the whole group was 0.24 (SD 0.61). Of the DMFT score, a vast majority of the subjects (77.3%) were scored for the D-component. The M-component accounted for 20.5% of the DMFT, but in this study only one filling was found.

Table 1: Distribution of the participants in the study by primary school and gender

Sex	Ndugumbi		Hananasif		Total	
	n	%	n	%	n	%
Male	30	42.9	57	50.9	87	47.8
Female	40	57.1	55	49.1	95	52.2
Total	70	38.5	112	61.5	182	100

Caries was most common in the mandible; 73.5% (n = 25) of the lesions were on mandibular teeth and 26.5% (n = 9) were on maxillary teeth. Of the carious lesions, 73.5% (n = 25) were on first molars in both jaws (n = 20 in the mandible and n = 5 in the maxilla). In the mandible, about twice as many caries lesions were located on the left side compared to the right side (n=14 and n=6, respectively). Of the subjects, 4.4% (n = 8) had teeth missing due to caries. Most commonly the missing tooth was the mandibular first molar on the left side: 40%

(n = 4) of all missing teeth. Altogether 22 subjects had teeth missing for reasons other than caries. No statistically significant differences in gender were found in the caries experience of the children studied.

No statistically significant relation was found between the DMFT-score of the children and the three occupational levels of their mothers or fathers. However, with increasing occupation, there was a trend toward increasing DMFT score. The percentage of children with DMFT

≥1 was 13.7% for mothers with low occupation, 17.5% for those with middle level occupation and 23.9% for those with high occupation. The percentage of children with DMFT ≥1 was 0%

for fathers with low occupational level, 15.8% for those with middle and 17.9% for those with high occupational level.

Table 2: Distribution of the 12-year-old children according to their DMFT score and to the D-, M- and F- scores

DMFT Score	Decayed teeth (D)		Missing teeth (M)		Filled teeth (F)		Total DMFT	
	n	%	n	%	n	%	n	%
0	155	85.2	175	96.2	181	99.5	151	83.0
1	20	11.0	5	2.7	1	0.5	21	11.5
2	7	3.8	2	1.1	0	0	8	4.4
3	0	0	0	0	0	0	1	0.5
4	0	0	0	0	0	0	1	0.5
Total	182	100	182	100	182	100	182	100

All participants reported that they clean their teeth by brushing. Of the subjects (n = 182), 92.3% reported brushing their teeth daily and 7.7 % less often. Only two participants cleaned their teeth less than 1-4 times per week. For those who brushed their teeth daily, the percentage of children with DMFT ≥1 was 17.3% and for those who brushed their teeth less than daily it was 14.3%. This difference was not statistically significant. Of the subjects, 96.7% (n = 176) reported using fluoridated toothpaste for brushing their teeth. Besides brushing,

rinsing was reported by 7.7% (n = 14) of the subjects as a means of cleaning teeth.

Table 3 shows, according to gender and their mothers' occupation, the percentages of 12-year-old children who brush their teeth daily or less often. Girls more often than boys reported brushing their teeth at least daily. Children whose mothers belonged to the high occupation group less often brushed daily than did children whose mothers belonged to the low or middle occupation groups. These differences were statistically significant at p < 0.05 level.

Table 3: Percentages of the 12-year-old children brushing at least daily or less than daily according to gender and their mothers' occupational status.

	Gender		Occupational Status		
	Boys (n = 87)	Girls (n = 95)	Low (n = 51)	Middle (n = 40)	High (n = 46)
Brushing daily	87.4	96.8	98	97.5	87
Brushing less than daily	12.6	3.2	2	3.5	13

Table 4 shows the frequency of certain oral habits, knowledge, symptoms and treatment experience for boys and girls according DMFT. No statistically significant differences were found between the groups. Of the subjects, 65.9% (n = 120) ate snacks between meals. At least daily consumption of sugar in drink or porridge, juice or soda, sweet cakes ("vitumbua"

and "maandazi"), sweets and fruits was reported by 67% (n = 122) of the subjects. About one third of the subjects reported that they consume some of these items containing sugar items 1-5 times per day and one third eight or more times per day. No statistically significant differences were found between DMFT score and consumption of items containing sugar.

Table 4: Percentage of 12-year-old children who had the stated habit, correct knowledge or had experienced the symptoms or treatment, according to gender and DMFT-score

		n	Gender (%)		DMFT Score (%)		All (%)
			Boys	Girls	DMF T=0	DMFT≤1	
Habits	Used teeth as a tool	72	43.1	56.9	83.3	16.7	40.4
	Reported to chew fingernails, pen or wood stick	124	63.2	72.6	80.6	19.4	68.1
Knowledge	Teeth will get dirty if you don't brush them.	134	46.3	53.7	82.1	17.9	77
	Carious teeth can be filled or healed without extraction	57	54.4	45.6	73.7	26.3	31.3
	Holes in the teeth are made by bacteria that use sugar for it.	167	49.1	50.9	82.6	17.4	91.8
	Juice, candy and cakes contain sugar.	175	46.9	53.1	82.3	17.7	96.7
	By cleaning teeth daily one won't get any holes in teeth.	160	49.4	50.6	82.5	17.5	88.9
Symptoms	Has had dental education	76	50	50	78.9	21.1	41.8
	Has experienced toothache	108	46.3	53.7	76.9	23.1	59.3
	Has had gingival bleeding after tooth brushing	55	49.1	50.9	80	20	30.2
Treatment	Has been treated in a dental clinic	62	41.9	58.1	74.2	25.8	34.3
	Has had a tooth extracted	52	42.3	57.7	71.2	28.8	81.3

Discussion

The data were collected under field conditions, using cavitation as the criterion for caries. Visual examination does not necessarily give the same results as an examination with probes and mouth-mirrors. This can cause systematic under-scoring compared with examination under optimal clinical conditions. Caries on the approximal surfaces was most likely underestimated. Even though two dentists who were fluent in Swahili language were assisting the children to fill out the questionnaire, some children seemed to have writing difficulties and therefore these children were interviewed instead and no differences were observed in their oral habits or DMFT scores compared to those who were able to fill the questionnaire. However, among the children in the interviewed group the mother was more often unemployed or housewife than among the children who were able to fill out the questionnaires.

In this study the mean DMFT score was low but was on a better level than the goal set in the Tanzania National Plan for Oral Health 1988-2002 (25), i.e. Twelve-year-old children are to have no more than 0.8 DMF teeth (1.0 DMFT for urban areas and 0.6 DMFT for rural areas).

Within the WHO classification (23) caries occurrence is considered to be low if more than 20% of the children are caries-free. In this study 83% of the subjects were caries-free. The secondary goal of the National Plan for reduction of untreated dental disease was: 80% of the DMFT will be composed of the D-component, 15% of the M-component and 5% of the F-component in the urban area. This goal was almost reached in the studied area as scores of the DMFT index were 77.3%, 20.5% and 2.3% for D-, M- and F-component respectively.

The frequencies of consumption of items containing sugar were unexpectedly high. Occupation of the parents was also determined based on information given by the children. Thus, the reliability of the results obtained from the questionnaire might be limited.

In this study the reported oral health-related knowledge of the children was good. The level of knowledge seemed to be better than in a study conducted in a rural area 20 years ago (20). The oral hygiene habits in Tanzania were compared to previous studies at different times and among different populations (4, 18-19). In our study, the percentage of girls who brushed their teeth frequently was slightly higher than that of boys.

Similar results have been reported previously (18). In terms of caries occurrence, however, there was no difference between boys and girls. In this study a higher percentage of subjects reported using fluoridated toothpaste than in previous studies. However, in this study, we did not evaluate if the fluoridated toothpaste children stated to use actually contained adequate amounts of bio-available fluoride. With the current level of sugar consumption, increased use of fluoride toothpaste may provide an appropriate supply of fluoride for caries prevention.

The findings of this study demonstrated that, in particular, the children whose mothers' had higher occupational level were more likely to have poorer tooth brushing habits; and there was a similar trend for the association between occupation of the parents and their child's DMFT. The relationship between parental SES and their child's oral health behaviour has been reported previously, but it has not been consistent in all studies (27-29). The fact that in this study high occupational level of mother indicated poorer habits may suggest that working mothers did not have sufficient time to supervise their children's tooth brushing. Thus, the findings of this study imply that, when oral health is promoted, parents of young children should be targeted with correct health messages.

When interpreting the results of this study the following limitations should be observed. This study included only a small urban population, and the results cannot be generalized to other parts of the capital city or the country as a whole. The sample was relatively small and the subjects came from the same area. Caries was scored by visual inspection without probing. The lack of statistically significant differences between groups might be due to the fact that the population was rather homogenous.

Conclusions

Despite the caries occurrence of the 12-year-old children in Kinondoni district, Dar es Salaam, Tanzania was low and not associated with oral hygiene habits or knowledge, consumption of items containing sugar or occupational status of the parents there is need to pay attention to the oral health habits of the children and increasing awareness about them among their parents.

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