DENTAL CARIES PREVALENCE, EXPERIENCE AND TREATMENT NEEDS OF 5-6-YEAR-OLD, 12-13-YEAR-OLD AND 15-YEAR-OLD SCHOOLCHILDREN OF SUNSARI DISTRICT, NEPAL

Professor Shekhar Koirala MD
Vice Chancellor, B.P. Koirala Institute of Health Sciences

Jamil David BDS, MSc Dental Public Health

Rajib Khadka BDS
Department of Community and Preventive Dentistry
College of Dentistry, B.P. Koirala Institute of Health Sciences

Robert Yee BSc, DDS, MSc Dental Public Health
Department of Community and Preventive Dentistry
College of Dentistry, B.P. Koirala Institute of Health Sciences
United Mission to Nepal

ABSTRACT

Objectives: To describe and analyse the caries prevalence, caries experience and treatment needs in the deciduous dentition of 5-6-year-old schoolchildren, and in the permanent dentition of 12-13-year-old and 15-year-old schoolchildren in the District of Sunsari; and to analyse the drinking water for fluoride content. **Design and method:** Multi-stage random sampling oral epidemiological survey conducted by trained and calibrated examiners using WHO Pathfinder methodology. Water samples were analysed with a calibrated Orion Expandable Ion Analyser Model EA 920. Setting: Surveys were conducted in private and government; rural town, rural village and urban schools in 15 Illakas in Sunsari District, Eastern Nepal. **Subjects:** A total of 600 5-6-year-old, 600 12-13-year-old and 600 15-year-old schoolchildren were examined between April and September, 2001. **Outcome measures:** Prevalence of caries and dental caries experience (dmft/DMFT); and fluoride content of the drinking water in mg/l (ppm). **Results:** Caries prevalence and mean dmft score of 5-6-year-olds was 52% and 1.99. Caries prevalence and mean DMFT score of 12-13-year-olds was 24% and 0.49. Caries prevalence and mean DMFT score of 15-year-olds was 26% and 0.67. The d/D-component constituted almost the entire dmft/DMFT index. In the 5-6-year-old age group, 36% of the treatment required could be met through one surface restorations, 33% through two or more surface restorations and 18% through extraction. For the 12-13-year-olds and the 15-year-olds, the major treatment need was for single surface fillings (47% and 48% respectively) followed by the need for extractions (13% for both) and two or more surface fillings (9% and 8% respectively). The mean fluoride level of the drinking water sampled was 0.27 ppm and the fluoride content ranged from 0.3 to 0.83 ppm. **Conclusion:** The prevalence and mean dmft of 5-6-year-old schoolchildren was high. The prevalence and mean DMFT of 12-13-year-olds and 15-year-olds was low. The recorded prevalence of untreated dental caries in schoolchildren requires an appropriate oral health response based primarily on oral health promotion. Foremost in this regime would be the promotion and use of affordable fluoridated toothpaste. The treatment needs of the schoolchildren can be met in the school setting using appropriate cost-effective technology such as ART and ACT.

INTRODUCTION

Sunsari district in the Terai region of Eastern Nepal has a total population of 628,405 (males: 315,819; females: 312,586)[1]. Life expectancy of this area averages 60.5 years, which is above the national average for Nepal. Adult literacy rate is 45.18% and the per capita income is Rs. 8,130[2].

Caste system exists with 46 upper castes and 26 lower castes. The prominent castes include Tharus, Muslims, Brahmin Pahadis, Chettris, Rais, Yadavs, Newars and Mushers. Farming is the main occupation of this region.

An emerging health problem amongst the child population in Nepal is dental caries. Caries data on children at 12 years of age in the 1980s revealed that the level of dental caries was low, ranging from a mean DMFT of 0.2 to 1.1[4-11]. The most recent published epidemiological survey, which was conducted in 1994 using the WHO pathfinder methodology, revealed that 36% of Nepalese 12-year-olds were affected by dental caries and reported a mean 12-year-old DMFT of 0.9[12]. A series of cross sectional surveys conducted on school children by the United Mission to Nepal Oral Health Programme between the period of 1999 and 2000 in Central and Western Nepal shows that the caries prevalence and mean dmft score of 5-6-year-olds (n=2,177) was 67% and 3.2 while the caries prevalence and mean DMFT score of 12-13-year-olds (n=3,323) was 41% and 1.1[13]. Another series of cross sectional surveys by Petersen, Mohr and Geddes[14] reveals very similar data for 5-6-year-olds (dmft = 3.3, prevalence of caries = 65%) and 12-13-year-olds (DMFT = 0.9, prevalence of caries = 33%). Analysis of data collected from cross-sectional surveys over the last twenty years reveals that the 12-year-old DMFT in Nepal is doubling almost every ten years since 1977[15,16].

AIM OF THE STUDY

Oral health survey information concerning the prevalence of caries and the caries experience of children is lacking at a district level throughout Nepal. Collection of such data in the District of Sunsari serves as a baseline to monitor the impact of oral health activities carried out by the College of Dental Surgery at the B.P. Koirala Institute of Health Sciences in Dharan, Sunsari. The aim of this study was to describe and analyse the caries prevalence, caries experience and treatment needs in the deciduous dentition of 5-6-year-old school children, and in the permanent dentition of 12-13-year-old and 15-year-old school children in the District of Sunsari. Water samples were also collected at various locations throughout the examination sites and analysed for the fluoride content.

MATERIALS AND METHOD FOR CARIES SURVEY

Sampling Methodology

Multi-stage random sampling method was used to select the subjects for the survey. The study population was selected from government schools and boarding schools from each of the 15 Illakas in Sunsari. The first stage units were all the government schools and boarding schools from each Illaka. From the two separate lists, one government school and one boarding school were selected at random from each Illaka. When boarding schools were not available in an Illaka, boarding schools were randomly selected from another Illaka. The second stage units were three separate lists of students of the age groups of interest from each of the selected government schools and a similar list compiled from each of the selected boarding schools. The required number of school children in each of the interested age groups was then selected at random by writing the names of all the students on separate pieces of paper, which were then placed in bucket. For each of the government schools and boarding schools there were three separate draws, one for each age group.

Calculation of Sample Size

The sample size for each age group was calculated using the following formula:

Sample size = $p(1-p)/e^2$

p = prevalence of disease in the population

e = required size of standard error = 0.02

Calculation of the sample size for the 5-6-year-old and 12-13-year-old population was based on the average prevalence of dental caries in the respective populations found in recent surveys conducted by the UMN Oral Health Programme[13] and by Petersen, Mohr and Geddes[14]. Sample size for the 15-year-old population was based on the average prevalence of disease in the 12-13-year-old population. It was assumed that the prevalence of dental caries in the 15-year-old population would be similar to that in the 12-13-year-old population. Prevalence (p) used for the calculation of sample

size for the both 12-13-year-olds and 15-year-olds was 40% while 65% was used to calculate the sample size in the 5-6-year-old age group.

Calculated sample size for each of the three age groups was 600. From each of the 15 government schools and each of the 15 boarding schools, 20 children from each of the three age groups were randomly selected.

Personnel and Instruments

Dental examinations were carried out by two dentists (Dr. Jamil David and Dr.

Rajib Khadka) from the B.P. Koirala Institute of Health Sciences College of dentistry using the criteria for caries outlined in Oral Health Surveys, Basic Methods[17]. Children between the age of 5 and 6 years, 12-13 years and at 15 years were examined in school during class hours in an orderly fashion. Since many children were not sure of their age, and because records kept at schools are not always accurate, children between the age of 5 and 6 years were screened to ensure that they were dentally 6-years old (all four permanent molars having erupted). 12-13 year old children were likewise screened to be sure that they were dentally 12 years old (all second permanent molars having erupted). Instruments used were outlined in Oral Health Surveys, Basic Methods[17]. Students were positioned supine on a bench or table and were examined by the gloved and masked dental examiners using either torchlight or natural light. All instruments were cleaned with soap and water before disinfecting in Virkon^{R} (Rakshak PVT. Ltd.). A trained assistant recorded the data on a standardised form.

Training and Calibration of Dental Examiners

Calibration and training of the dentists using school children was accomplished over a two-day period in the B.P. Koirala Institute of Health Sciences prior to the survey. Procedure for quick selection and screening of the study subjects for entry into the study was also conducted. The calibration was repeated until extra- examiner and intra-examiner level of agreement gave a Kappa statistic of at least 0.75. Kappa was calculated for each tooth and each component of dmf or DMF. During the survey, each examiner performed a duplicate examine on every tenth subject which the recorder had arranged to be re-introduced into the survey. Inter-examiner unweighted Kappa was 0.77 while intra-examiner unweighted Kappa for all age groups was 0.98.

The survey was completed over six months (April-September, 2001). Consent for the survey was gained through the District Education Officer of Sunsari and the individual head masters of the selected schools.

MATERIALS AND METHOD FOR FLUORIDE ANALYSIS

Water from wells or other major sources of drinking water were sampled from the oral health survey sites. Water was collected in plastic film containers, and labeled with the date, the source (well or tap), and location.

All samples were clerked, given a sequential reference number and stored away from direct sunlight or sources of heat. Prior to analysis an ionic strength adjuster (Total Ionic Strength Adjustment Buffer - 'TISAB') was added to each sample. The two electrodes from a calibrated Orion Expandable Ion Analyser Model EA 920 (Orion Research Incorporated, USA) were then lowered into the solution and slowly agitated with a magnetic stirrer. Care was taken to avoid contact between them or with the container. A stable reading was obtained in most cases after 30 minutes. Samples not reaching stability after this period were agitated gently until the meter reading was constant between 6-minute intervals. An assistant was trained to perform the fluoride analysis.

DATA ANALYSIS

Data entry and data analysis was performed with SPSS Version 10.0. Differences in mean DMFT/ dmft scores were analysed using the Mann-Whitney non-parametric test for two independent samples

with the level of statistical significance set at 0.05.

RESULTS

The findings describing the caries disease experience and prevalence of the schoolchildren surveyed are illustrated in Tables 1-3. In the 5-6-year-old children the dental caries prevalence was 52% and the mean dmft was 1.99. The prevalence of caries for 12-13-year-olds surveyed was 24% and the mean DMFT was 0.49. Caries prevalence amongst the 15-year-olds was 26% and the mean DMFT was 0.67. The unmet treatment needs expressed as a ratio of the proportion of the mean decayed teeth (d or D) to the mean DMFT or dmft of the study population was 97% in the 5-6-year-olds, 96% in the 12-13-year-olds and 84% in the 15-year-olds.

The frequency distribution of mean dmft and mean DMFT for the respective age groups was non-parametric.

In the 5-6-year-olds, a lower mean dmft was observed in children attending government schools (mean dmft of 1.28) compared to those attending boarding schools (mean dmft of 2.71). The results were statistically different ($p<0.001$). Similar results were also noted in 12-13-year-olds and 15-year-olds, but the difference in the mean DMFT of 12-13-year-olds attending government schools and private schools was not statistically significant while the difference was significant for 15-year-olds ($P<0.001$).

Table 1

Mean decayed, missing and filled teeth, and dmft of 5-6-year-old schoolchildren in selected government and boarding schools in Sunsari District.

Type of school	Number of Schools	n	% caries	dt	mt	ft	dmft (SE)
Government	15	300	43	1.26	0.12	0	1.28 (0.12)*
Boarding	15	300	62	1.59	0.12	0	2.71 (0.19)*
Total	30	600	52	1.93	0.07	0	1.99 (0.11)

*Difference is satistically significant (P<0.001)

Table 2

Mean decayed, missing and filled teeth, and dmft of 12-13 years-old schoolchildren in selected government and boarding school in Sunsari District.

Type of school	Number of Schools	n	% caries	dt	mt	ft	dmft (SE)
Government	15	300	21	0.46	0.01	0.01	0.48 (0.06)
Boarding	15	300	26	0.46	0.02	0.02	0.51 (0.06)
Total	30	600	24	0.46	0.01	0.01	0.49 (0.04)

Table 3

Mean decayed, missing and filled teeth, and DMFT of 15-year-old schoolchildren in selected government and boarding schools in Sunsari District.

Type of school	Number of Schools	n	% caries	dt	mt	ft	dmft (SE)
Government	15	300	23	0.50	0.03	0.01	0.54 (0.07)*
Boarding	15	300	30	0.61	0.06	0.13	0.80 (0.08)*
Total	30	600	26	0.55	0.04	0.07	0.67 (0.05)

*Difference is satistically significant (P<0.001)

Although 5-6-year-old males have a higher mean dmft than the females of this age group, the results were not statistically significant (Table 4). In the 12-13-year-old and 15-year-old age group females had a statistically higher mean DMFT than the males (P<0.001 and P<0.05) (Table 5 and 6).

Table 4

Dental caries prevalence and experience of 5-6-year-old schoolchildren according to gender.

Gender	n (%)	% caries	dt	mt	ft	dmft (SE)
Males	348 (58.0)	53	2.00	0.07	0	2.07 (0.15)
Females	252 (42.0)	51	1.82	0.05	0	1.88 (0.17)
Total	600	52	1.93	0.07	0	1.99 (0.11)

Table 5

Dental caries prevalence and experience of 12-13 year-old schoolchildren according to gender.

Gender	n (%)	% caries	dt	mt	ft	dmft (SE)
Males	324 (54)	19	0.33	0.02	0.02	0.36 (0.05)*
Females	276 (46)	29	0.62	0.01	0.01	0.65 (0.07)*
Total	600	24	0.46	0.01	0.01	0.49 (0.04)

*Difference is satistically significant (P<0.001)

Table 6

Dental caries prevalence and experience of 12-13 year-old schoolchildren according to gender.

Gender	n (%)	% caries	dt	mt	ft	dmft (SE)
Males	362 (60.3)	24	0.46	0.05	0.04	0.55 (0.06)*
Females	238 (46)	29	0.70	0.04	0.13	0.86 (0.10)*
Total	600	26	0.55	0.04	0.07	0.67 (0.05)

*Difference is satistically significant (P<0.001)

A comparison of caries prevalence and caries experience between schoolchildren attending private schools and government schools and based on location (urban, rural town, rural villages) is presented in Tables 7-9. Private schools are situated mainly in urban settings and rural town settings. Rural towns are situated along paved roads while rural villages are accessed along dirt roads. In all three age groups, schoolchildren attending urban schools had a higher caries prevalence and mean dmft/DMFT than those living in the rural setting. In all three age groups a statistical difference in mean DMFT between schoolchildren in urban settings and rural settings was noted (P<0.05).

Table 7

Dental caries prevalence and experience of 5-6 year-old schoolchildren according to location and type of school.

Location and type of school	n (%)	% caries	dt	mt	ft	dmft (SE)
Private urban	120	64	2.87	0.13	0	3.00 (0.30)
Government urban	80	49	1.61	0.03	0	1.64 (0.27)
Total urban	200 (33.3)	58	2.37	0.09	0	2.46 (0.22)*
Private rural town	60	52	1.77	0.15	0	1.92 (0.33)
Government rural town	20	60	1.55	0	0	1.55 (0.41)
Total rural town	80 (13.3)	54	1.71	0.11	0	1.83 (0.27)
Private rural town	120	65	2.72	0.11	0	2.81 (0.31)
Government rural village	200	38	1.10	0.01	0	1.11 (0.13)
Total rural village	320 (53.3)	48	1.70	0.05	0	1.74 (0.15)
Total	600	52	1.93	0.07	0	1.99 (0.15)

*Difference is satistically significant (P<0.001)

Table 8

Dental caries prevalence and experience of 12-13-year-old schoolchildren according to location and type of school

Location and type of school	n (%)	% caries	dt	mt	ft	dmft (SE)
Private urban	260	28	0.50	0.02	0.03	0.55 (0.07)
Government urban	20	20	0.65	0	0.05	0.70 (0.38)
Total urban	280 (46.6)	27	0.51	0.02	0.03	0.56 (0.07)*
Private rural town	40	15	0.12	0	0	0.25 (0.21)
Government rural town	80	17	0.34	0.01	0	0.35 (0.10)
Total rural town	120 (20.0)	17	0.31	0.01	0	0.32 (0.08)*
Private rural town	0	0	0	0	0	0
Government rural village	200	22	0.50	0.01	0.01	0.51 (0.07)
Total rural village	200 (33.3)	22	0.50	0.01	0.01	0.51 (0.07)
Total	600	24	0.46	0.01	0.01	0.49 (0.04)

*Difference is satistically significant (P<0.001)

Table 9

Dental caries prevalence and experience of 15-year-old schoolchildren according to location and type of school

Location and type of school	n (%)	% caries	dt	mt	ft	dmft (SE)
Private urban	260	31	0.62	0.06	0.15	0.83 (0.09)
Government urban	20	30	0.55	0	0	0.55 (0.21)
Total urban	280 (46.6)	31	0.62	0.05	0.14	0.81 (0.09)*
Private rural town	40	17	0.50	0.05	0.03	0.60 (0.24)
Government rural town	60	28	0.63	0.02	0	0.65 (0.17)
Total rural town	100 (16.7)	24	0.58	0.04	0.01	0.63 (0.14)*
Private rural town	0	0	0	0	0	0
Government rural village	220	21	0.46	0.03	0.02	0.51 (0.08)
Total rural village	220 (36.7)	21	0.46	0.03	0.02	0.51 (0.08)*
Total	600	26	0.55	0.04	0.07	0.67 (0.05)

*Difference is satistically significant (P<0.001)

Table 10 presents the treatment needs of the schoolchildren. The category 'teeth with arrested decay' means that no treatment is required. In the 5-6-year-old age group, 36% of the treatment required could be met through one surface restorations, 33% through two or more surface restorations and 18% through extraction. For the 12-13-year-olds and the 15-year-olds, the major treatment need is for single surface fillings (47% and 48% respectively) followed by the need for extractions (13% for both) and two or more surface fillings (9% and 8% respectively).

Table 10

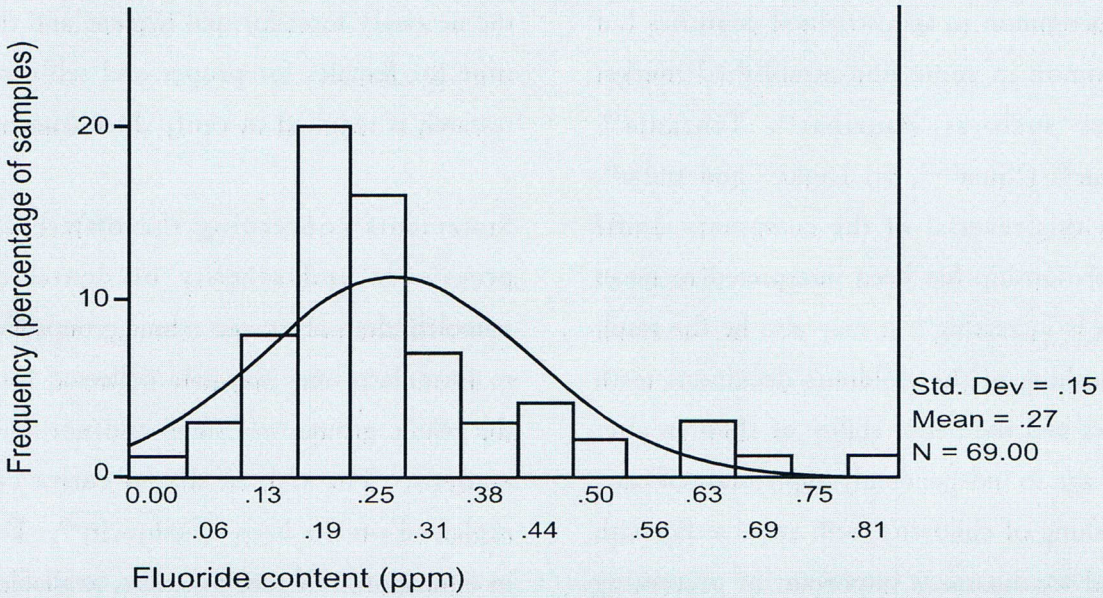
Dental caries prevalence and experience of 15-year-old schoolchildren according to location and type of school

Treatment needs	5-6 year-olds Number of teeth n (%)	12-13-year-olds Number of teeth n (%)	15-year-olds Number of teeth n (%)
Arrested decay	8 (1)	30 (11)	21 (8)
One surface fillings	197 (36)	123 (47)	134 (48)
Two or more surface fillings	184 (33)	24 (9)	23 (8)
Extractions	100 (18)	33 (13)	37 (13)
Pulp treatment	57 (10)	37 (10)	33 (12)
Other care	10 (2)	27 (10)	30 (11)
Total teeth	556 (100)	264 (100)	278 (100)

*Difference is satistically significant (P<0.001)

Figure 1 presents the results of the fluoride analysis of 69 water samples collected from water sources near vicinity of the schools visited. The mean fluoride level of the drinking water sampled was 0.27 ppm and the fluoride content ranged from 0.3 to 0.83 ppm. 51 of the 69 water samples (74%) were collected from tube wells.

Figure1. Fluoride content (ppm) of drinking water



DISCUSSION OF THE RESULTS

Caution must be used in comparing the results with other studies due to variations in sampling technique, length of time taken to complete the study and examination conditions. The current study used a multi-stage random sampling method for the selection of subjects while past surveys in Nepal have used the stratified cluster sampling method[12,13,14]. The sample size at each site for the current study was limited to 20 subjects which may be smaller than desired. However, examiner consistency was good (Kappa = 0.98) and the variability between examiners was low (Kappa = 0.77).

The reported 5-6-year-old caries prevalence (52%) and mean dmft (1.99) was lower than what was reported by Yee and McDonald[13] in Central and Western Nepal, while the 12-13-year-old caries prevalence (24%) and mean DMFT (0.49) was almost half that reported in Central and Western Nepal and in a WHO National Pathfinder survey conducted by Milsom et al. in 1994[12]. The high unmet treatment needs in all age groups, expressed as a ratio of the proportion of the mean decayed teeth (d or D) to the mean DMFT or dmft of the study population, shows that dental caries is not being treated in these age groups. Although a greater percentage of the 15-year-olds (16%) received some treatment in the form of extractions or restorations, all age groups received relatively little in the way of treatment. 12-13-year-old schoolchildren and 15-year-old schoolchildren attending school in urban areas received relatively more treatment than their counterparts attending school in the rural setting. High unmet treatment needs may be due to low felt need for treatment, low priority placed on oral health care in relation

to other more pressing needs, or inaccessibility to affordable dental services.

In the deciduous dentition caries prevalence and experience was higher than in permanent teeth. This is uncommon in industrialised countries but more common in some non-established market economies such as Zanzibar[18], Tanzania[19], Madagascar[20], China[21,22], Sri Lanka[23] and India[24]. Although this reversal of the customary dmft/ DMFT relationship has been interpreted to mean that caries is increasing[14], it may also be the result of late brushing of the children's deciduous teeth by mothers and the better ability of children after 6 years of age to independently apply oral self-care. Early brushing of children's teeth twice a day with fluoridated toothpaste is important in preventing and reducing dental caries in young children[25]. In comparison to the prevalence and caries experience reported in the 12-13-year-old age group, the 15-year-old schoolchildren have a higher prevalence and DMFT. This trend is consistent with caries epidemiological principles. For a specific age, prevalence and severity of dental caries increases with time for the age cohort if there is no effective intervention[26,27].

Male 5-6-year-old schoolchildren had a higher dmft (2.07) compared to females of the same age (dmft of 1.88) which was not statistically significant. Yee and McDonald[13] found a statistically significant higher dmft for males compared to females for this age group. They attributed this difference to cultural determinants. In Nepali society, young males are generally favoured over females and are often indulged with more sweets than the females. The data from Sunsari indicates that female 12-13-year-olds and 15-year-olds experience significantly more dental decay than males of the same age (Table 5 and Table 6). Again, this gender difference in dental caries experience may be due to favoritism towards males over females in receiving the necessary tools for oral hygiene and the lack of time for females for proper oral self-care. More research is required to verify these conclusions.

Statements concerning the difference in the prevalence and severity of dental caries of schoolchildren of various ethnic groups are difficult to formulate since the data collected for some of the ethnic groups was small and not amenable to analysis. The risk of dental caries cannot be explained on the basis of ethnicity[28]. Differences in education, self-care practices, available income, availability of fluoridated water and toothpaste, and gender equality appear to be the more important determinants[29].

Rapid urbanisation is a major determinant of dental caries in Nepal[30]. Rapid urbanisation characterised by the change in diet from more traditional foods to frequent snacks high in sugar content may be evident amongst the higher socio-economic class in urban centres who have more disposable income to spend on sweets. In Sunsari, similar to other parts of Nepal, only the upper and upper middle socio-economic class have income to send their children to private boarding schools and analysis of data shows a significant difference ($p<0.001$) in the 5-6 year-old dmft and 15-year-old DMFT of children attending private schools versus government schools (Table 1 and 3). In all three age groups, a comparison of the caries experience of schoolchildren attending urban schools to their counterparts in

rural schools shows that schoolchildren attending urban schools have significantly higher dmft/DMFT (Table 7, 8 and 9).

Rapid urbanisation and inadequate levels of fluoride in the drinking water throughout most of Sunsari poses a major challenge to the oral health of the people of Sunsari. The appropriate and efficacious amount of fluoride in the drinking water is 0.7mg/l in hot climates and 1-1.2mg/l in moderate climates[31]. Of the water sampled and analysed for the fluoride content, only two samples from Prakashpur (0.70 ppm and 0.83 ppm) had adequate levels of fluoride to prevent decay of teeth. Although the prevalence and severity of dental caries in the permanent dentition of 12-13-year old and 15-year-old schoolchildren is low, the combination of rapid urbanisation and lack of efficacious fluoride in the drinking water will lead eventually to higher incidence and prevalence of dental caries in Sunsari. Due to the low level of dental caries amongst the adolescents in Sunsari (12-13-year-old DMFT of 0.49 and 15-year-old DMFT of 0.67), approximately 48% of the carious teeth required one surface restorations and 8-9% of the carious teeth required two surface restorations, while 13% of the teeth needed to be extracted (Table 10). Since the severity of dental caries is higher in the deciduous dentition of the younger children, 36% of the carious teeth were amenable to one surface restorations and another 33% to two surface restorations. 18% needed extraction and 10% needed pulp care, which may ultimately necessitate extraction treatment due to the low priority placed by parents on expensive dental treatment for deciduous teeth.

CONCLUSIONS

The results of this baseline study have led to the following conclusions:

- The prevalence and severity of dental caries is high in the deciduous dentition of 5-6-year-old schoolchildren in Sunsari.
- The prevalence and severity of dental caries in 12-13-year-old and 15-year-old schoolchildren in Sunsari is low.
- The high unmet treatment needs in all age groups, expressed as a ratio of the proportion of the mean decayed teeth (d or D) to the mean dmft or DMFT of the study population, shows that dental caries is not being treated in schoolchildren.
- The majority of the decayed deciduous and permanent teeth can be restored. In the permanent dentition approximately 48% of the treatment needs can be met through one surface restorations.
- 5-6-year-old males experience more decay in the deciduous teeth than females, while 12-13-year-old females and 15-year-old females experience more decay in the permanent dentition than males.
- Schoolchildren attending urban schools and boarding schools have significantly higher prevalence and severity of dental caries than their counterparts attending rural schools and government schools, and this difference is likely due to the dietary effects of rapid urbanisation in Sunsari.
- The drinking water sampled from various sites in Sunsari does not contain efficacious amounts of fluoride necessary for the prevention of dental caries.

RECOMMENDATIONS

To prevent the incidence of dental caries from rising and to treat existing caries in children the following recommendations are made:

- The promotion of twice-daily use of fluoridated toothpaste through oral self-care has been effective in the control of dental caries in established market economies and non-established market economies[32,33] and should be promoted in Sunsari . School oral health education and school brushing programmes using fluoridated toothpaste are cost-effective methods of preventing dental caries provided fluoridated toothpaste is affordable and available to the people. A multi-sectoral approach, partnering with school authorities, manufacturers of fluoridated toothpaste, parents, health institutions and communities in Sunsari is essential to oral health promotion. Emphasis should be given to improve the oral health of young females.

- To prevent dental caries in the deciduous dentition of young children, mothers should be educated to commence brushing their children's teeth at an early age, twice-daily with pea-sized amount of fluoridated toothpaste. Expectant mothers attending ante natal clinics and mothers with young children attending post natal mother-child health clinics can be taught oral hygiene skills through appropriate personnel such as nurses, auxiliary nurse midwives, female community health volunteers, traditional birth attendants and volunteer health workers in their respective settings. Oral health care training should be provided for these health care workers as well as nursery school teachers who are in contact with mothers and young children. The College of Dental Surgery in the B.P. Koirala Institute of Health, Sciences has a major role to play in the education of appropriate personnel and oral health promotion in Eastern Nepal.

- Advocacy to promote the fluoridation of salt on a national scale. Due to the poor infrastructure in Nepal and the varied sources of drinking water, fluoridation of salt is considered to be the most appropriate and socially equitable method of fluoridating the mouth without having to alter people's behaviour. Fluoridated toothpaste may not be affordable nor available nor utilised by the whole population of Sunsari and Nepal. Salt fluoridated to 200-250 ppm has been a proven public health measure in many countries in Europe and the Americas[34].

- Approximately 35% of the decay deciduous teeth and 48% of the decayed permanent teeth can be treated in the community or school setting with the Atraumatic Restorative Treatment technique (ART)[35]. For decayed teeth requiring multi-surface restorations, the Arrest of Caries Treatment technique (ACT)[36] can be used to stop the decay until the deciduous teeth exfoliate or until the patient can receive treatment for the decayed deciduous or permanent teeth at a referral centre. Dentists and dental students at the College of Dental Surgery, B.P. Koirala Institute of Health Sciences utilise both ART and ACT in the community programmes. Community medical assistants in health posts and district hospitals can also be taught to perform ART[37,38] and provide oral

urgent care (extraction of teeth). Both community medical assistants and auxiliary nurse midwives have also been trained to utilise the ACT technique on young children. Both ART and ACT are cost-effective community and clinical methods for treating dental caries without the use of expensive dental equipment such as dental chairs, lights, compressors, vacuum and dental drills. Pit and fissure sealants should also be considered to prevent decay on high risk teeth.

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Correspondence: Dr. Robert Yee, United Mission to Nepal Oral Health Programme, P.O. Box 126, Kathmandu, Nepal. Email: robyee@wlink.com.np.

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