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Oral health behaviour of urban and semi-urban schoolchildren in the Lao PDR

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Objective: To describe the oral health related knowledge, behaviour, and attitude towards health of 12-year old Lao schoolchildren; analyse how health risk factors relate to socio-demographic background; and determine the relative effect of living conditions on health and risk behaviour. ***Methods:*** Cross sectional study of 12-year old schoolchildren chosen by multistage sampling to fit the objective of the study. The final sample comprised 621 children of 2nd grade of secondary schools in Vientiane, Lao Peoples Democratic Republic. Data were collected by structured questionnaire covering behaviour, attitudes and knowledge related to oral and general health and perception of own health. ***Results:*** 69% of the children reported toothache during the previous 12 months and 38% reported school absenteeism due to toothache. Nevertheless, 77% stated frequent brushing and 91% the use of fluoridated toothpaste. Only 29% reported dental visits for this period while 42% had never seen a dentist. Fear of pain, cost and distance were stated as barriers for dental visits. Knowledge on caries prevention was high, aetiology of oral disease less known, and intake of hidden sugar surprisingly frequent. Socio-economic position and attitude towards health were important predictors for oral health behaviour and risk behaviour. ***Conclusions:*** Despite regular tooth brushing practice and widespread use of fluoridated toothpaste school absenteeism due to toothache is high. Significant socio-demographic gradient exists in risk factors for oral health. To reduce oral health inequality systematic oral health promotion should be implemented through the existing school health platform strengthening healthy behaviour and focussing on risk factors for oral as well as general health.

Key words: *Laos, oral health, behaviour, attitude, knowledge, children, school, absence, toothache, health promotion*

Introduction

At a global level, patterns of oral diseases in children have changed markedly over the past decades. Particularly, this has been shown by a reduction in prevalence of dental caries of children in most industrialised countries, while caries experience and severity of caries now tend to increase in several low-and middle income countries (Petersen, 2003; Petersen *et al*., 2005). Concurrent to the increase of oral disease in low- and middle-income countries a rapid increase of other chronic diseases has occurred, including conditions such as diabetes and obesity, which may manifest in children (Joshi, 2006; WHO, 2005). Studies have identified multiple reasons for the increase of non-communicable chronic diseases. Many diseases relate to risk behaviour such as diet high in sugars, which is a common risk factor to oral disease. Moreover, the links between oral and general health behaviour have been shown in surveys of Chinese children and adolescents (Petersen *et al*., 2008). To improve the health of a population an insight into the determinants of both health behaviour and risk behaviour is fundamental. Recent reports by the World Health Organization (WHO) outlined the pattern of oral disease worldwide and emphasized the importance of socio-environmental and behavioural determinants to oral health (Petersen, 2003). Particularly poor living conditions are detrimental for oral health and studies show that poor oral health follows a social gradient (Petersen, 2005; Sabah, 2007). In addition, oral health status of populations also relates to oral health systems and preventive oral care programmes. Such programmes are not sufficiently available in most low-income countries, including South East Asia.

Several low-income Asian countries have experienced dramatic changes in living conditions and life styles which are anticipated to affect health status especially in urban and semi-urban areas. In the Lao Peoples Democratic Republic (hereafter Laos), sugar consumption has increased from 1.7 to 7.6 kg/person/year between 1991 and 2005 (International Sugar Organization, 2007) and is expected to grow rapidly (Ismael, 1997). Unless population-oriented prevention and health promotion programmes are established, an increase in dental caries and other non-communicable diseases is likely to occur in Laos.

Studies of oral health status and oral health behaviour have been conducted among children in Asia (Petersen *et al*., 1998; 2001) but not in the poorest countries of the region. Many children suffer pain or discomfort from poor dental health but rarely use oral health services and then mostly prompted by symptoms. Moreover, the tradition of self-care is weak.

Laos is a tropical, mountainous, one-party communist state in Southeast Asia ranked number 130 out of 177 countries on the 2007/08 Human Development Index. It has a population of 5.6 million of whom 0.7 million live

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in the capital, Vientiane. The majority of Lao people are engaged in subsistence farming while the public sector, tourism and a growing number of small scale industries such as garment factories provide work for people in and around urban settings. Laos struggles to provide basic health care to its population and public funding of oral health services is unlikely to increase in the near future**.** The dental health service is mainly organised through the public general health services, the majority of dentists being engaged in urban hospitals. Access to dental services in rural areas is limited if available at all. According to information by the Lao Ministry of Health the countrywide dentist to population ratio is 1:43,000 with major geographical variation from 1:25,000 in the capital to 1:195,000 in more remote provinces. While treatment such as extractions is within the financial capacity of most people the cost of restorative treatment is posing a barrier for the less affluent. The fluoride content of drinking water is well below the level of 0.5-1.0 F^- ppm recommended by the WHO (Tayanin, 1999) and an important caries preventive effect is hereby missing.

The purposes of this paper are 1) to describe the level of oral health related knowledge, attitudes and behaviour of 12-year-old schoolchildren living in urban and semi-urban areas of Laos, 2) to analyze how potential behavioural risk factors relate to family background of the children, and 3) to determine the effect of the socio-economic environment on health related behaviour. It is the intention of the study to provide useful information to the health authorities on how programmes for primary prevention of oral disease and health promotion might be strengthened.

Method

The survey was carried out in September and October 2006 in Vientiane across a cross-section of 12-year old schoolchildren. The sample size was based on results from the 1991 survey data. The children were selected from 10 secondary schools chosen by multistage sampling in order to match the categories of population groups mentioned in the objective of the survey. Lacking reliable population data, urban and semi-urban areas were defined using available data on road conditions and distance to nearest hospital. Within the schools, 2nd grade classes were randomly chosen and all 11-13 year olds in the classes were asked to participate. Schools and parents were informed about the survey in advance and the response rate was 94%. No specific attempt was made to include the non-attenders; however, each school was visited at least twice depending on the number of eligible children. The final study population comprised 621 11-13 year olds (mean age 12), 47% were boys.

All children were invited to answer a structured questionnaire then have a clinical oral examination. Children completed the questionnaire themselves in classrooms supervised by trained local staff. The following principal variables were included: knowledge, attitudes and practices related to oral health; use of fluoridated toothpaste; dietary habits; experience of pain and discomfort; physical exercise; residential area; literacy of mothers and socio-economic background of parents. Oral health knowledge and attitudes were measured by using standardised questions and by positive or negative responses to loaded statements (Petersen, 1989). The construction of questionnaires was based on experiences gained from surveys carried out by the WHO Collaborating Centre for Community Oral Health Programmes and Research, University of Copenhagen. The questionnaires were formulated in English, translated into Lao and pre-tested among children not included in the study to control the reliability and validity. The research project was approved by the Ethical Committee of the Faculty of Medical Sciences, National University of Laos.

As it was difficult to define the socio-economic background of the family using education or occupation of the parents, a socio-economic index was constructed from information on assets owned by the family, including means of transportation, housing facilities and electronic goods. Several other additive indices were created on dietary habits, knowledge on items harmful to oral health, and attitude to health. The indices were categorised into three or five levels on the basis of the empirical distributions of the summed scores.

Data processing, analyses and statistical evaluation were performed using to give performed using SPSS 16.0. The data were described by uni- or bivariate frequency distributions and the Chi square test was used to evaluate the differences of proportions. Correlation analysis of knowledge, attitude and behavioural variables were carried out and the Spearman Rho was calculated. Finally, the effect of independent variables on health related behaviour was studied by means of multivariate logistic regression analysis. For the discrete dependent variables the odds ratio (OR) was evaluated by Wald statistics.

Results

Toothache had been experienced by 69% of the children during the past 12 months (Table 1). Toothache led to missed classes for more than a third of the children with considerable difference across socio-economic backgrounds. While 41% of the children with a disadvantaged economic backgrounds: 41% with a disadvantaged economic background had missed classes cf 23% from an advantaged background.. Also children living in semi-urban areas and children with an illiterate mother had significantly more absenteeism from school compared to their peers.

Of all children, 29% had seen a dentist during the previous 12 months (Table 1). Dental visits were relatively often reported by urban children, children with a high socio-economic background, and those with a literate mother. A total of 42% of the children had never been to a dentist. Planned visits such as regular check-ups or follow ups of treatment accounted for only 37% of all visits while 63% were prompted by acute problems. The single most reported reason for not visiting a dentist was the fear of pain (34%), which was stated equally often by children across all groups. However, distance to the clinic (14%) and the cost of treatment (10%) were also considered barriers to dental visits particularly by disadvantaged children. Most of children (77%) reported tooth brushing twice or more daily (Table 2) with those of very high socio-economic background or living in urban areas brushing more regularly ($p<0.01$); 91% claimed the use

Table 1. Distribution of Lao children (%) stating recent episodes of toothache, school absenteeism and dental visits in relation to gender and socio-demographic factors

	n	*Toothache within the last 12 months*	*Missed classes during last 12 months*	*Dental visit during the last 12 months*	*Never been to a dentist*
Total	621	69.4	37.5	29.1	42.3
Gender					
Boys	293	66.9	38.9	29.4	39.2
Girls	328	71.6	36.3	28.8	45.1
Residential location					
Urban	297	66.9	33.0	31.2*	36.3
Semi-urban	324	71.7	41.7*	27.2	47.8*
Mothers' literacy					
Illiterate	143	75.7*	49.7**	21.8	56.3**
Literate	469	67.6	33.9	31.2**	38.5
Socio-economic position					
Very low	115	71.6	40.9	20.9	65.2***
Low	117	75.0*	52.2***	25.0	49.1
Medium	130	74.0	40.0	30.8	43.8
High	136	67.7	33.1	30.9	38.2
Very high	123	59.0	22.8	36.9***	17.2

* p<0.05 **p<0.01 ***p<0.001

Table 2. Distribution of Lao children (%) stating certain oral health practices in relation to gender and socio-demographic factors

	n	*Tooth brushing twice daily or more often*	*Preferably consuming sugary drinks at school*	*High expenditure on snacks and sweets*
All	621	76.9	48.3	21.5
Gender				
Boys	293	75.7	40.7	18.1
Girls	328	78.1	55.0***	24.7*
Residential location				
Urban	297	80.3*	43.8	29.8***
Semi-urban	324	73.9	52.5*	13.9
Mothers literacy				
Illiterate	143	73.2	52.5	17.9
Literate	469	78.3	47.3	22.9
Socio-economic position				
Very low	115	74.3	51.8	6.4
Low	117	70.7	49.6	15.0
Medium	130	73.6	50.4	17.2
High	136	77.2	47.4	25.9
Very high	123	88.5**	42.6	41.0***

*p<0.05, **p<0.01, ***p<0.001

of fluoride toothpaste, 16% the use of toothpick while only 3% reported the use of dental floss. The use of salt for oral hygiene was indicated by 12%.

In total, 48% stated sugary drinks (mainly soft drinks) as the most frequently consumed drink at school. As shown in Table 2, this habit was especially widespread among girls and children from semi-urban areas. Sweets were consumed at least once daily by 31%, while daily consumption of sweet milk and ice-cream was reported by 26% and 22% respectively. High expenditure on sweets and snacks was seen more frequent among urban and better off children but also among girls. Only 1.6% of the children had tried smoking while 37% reported having at least one smoking parent (37% of fathers and 1% of mothers smoked). Highly significant differences across groups were seen in parental smoking habits with this habit predominating among the socio-economic disadvantaged and the semi-urban families.

Oral health knowledge was significantly higher among children with a literate mother, for children living in ur-

ban areas and partly among children with high standard of living (Table 3). The specific questions revealed that only 60% of the children knew of the cariogenic effect of consuming sweet foods while the rest either disagreed with this (17%) or did not know (22%). In addition most children knew of the preventive effect of tooth brushing (90%), toothpaste (87%) and fluoride (67%). As regards attitudes, a high level of positive attitude to health was seen among urban children, children with literate mothers and children with an advantaged socio-economic position.

Of all children 53% first received oral health information from a dentist, 31% from a physician, while schoolteachers were only mentioned as a source by 22%. Other sources indicated were mothers (47%), fathers (33%) and television (34%). However, these sources of information were reported more often by urban children compared to their semi-urban peers. Advantaged children reported receiving more oral health information than their disadvantaged peers.

Table 4 illustrates the multivariate relationship of health behaviour and risk behaviour with gender, socio-behavioural and demographic factors and knowledge and attitude towards health. Only significant associations are presented. Other factors being equal tooth cleaning twice daily was related to high socio-economic position and knowledge about risks to oral health while dental visits were highly related to high socio-economic position. Controlling for other factors high expenditure on sweets and snacks was related to urban residence and high socio-economic background of the child. Intake of sugary drinks was related to being a girl, low knowledge about risks to oral health and low attitude towards health .

Discussion

The present study has concentrated on oral health related knowledge, attitudes and behaviours among 12-year old schoolchildren. The transition in diet and lifestyles seen in many low-income countries set off in urban settings; therefore, participants for the present study were selected in urban and semi-urban areas in order to highlight how lifestyles may affect oral health. As enrolment rates in urban and semi-urban settings of Laos are high for both genders the school approach for sampling this study population is justified. Although the sample cannot be seen as representative of the country the data may provide essential information about the health behaviour situation of 12-year-olds relevant to planning and evaluating community-oriented health promotion and oral disease prevention.

Data collection by self-administered questionnaires gave a highly satisfactory response rate. However, this method of data-collection has limitations. Recall bias in regards to oral problems encountered, dental visits and food consumptions should be considered. Also an under-reporting of negative behaviour such as consumption of sugary foods and an over-reporting of socially acceptable attitudes and habits such as tooth brushing probably occurred. It is also worth noting that for practical reasons it was not feasible to take account of the effect of clustering of classes in the statistical analyses adopted hence some caution is required when interpreting the results.

A surprisingly high experience of recent toothache was found in this study. In studies from neighbouring countries such as Thailand, 53% of the children reported toothache (Petersen *et al*., 2001), and 41% in China (Jiang *et al*., 2005). Also absenteeism from school due to toothache was frequent. This finding should be of great concern for the education authorities as the children do not receive the full benefit of their basic education if absent or distracted by dental pain. Although experiencing more frequent episodes of toothache than the Thai children, the Lao children claimed to perform preventive oral health measures very much in line with the Thais where 77% stated they brushed regularly and 90% used fluoridated toothpaste. An over reporting in favour of oral self-care and use of the most advertised brands must be assumed. Fluoridated toothpaste does however seem to be widely available and is on display in shops and markets in both urban and semi-urban settings.

Some studies have found tooth brushing to be more frequently performed by urban children compared to their rural peers (Varenne *et al*., 2006; Zhu *et al*., 2003). This was confirmed by this study. Also the health behaviours of drinking non-sugary drinks and dental visits were relatively often stated by urban children. These differences in behaviours might reflect different levels in education, sources of information or access to dental health services between urban and semi-urban populations.

Numerous studies have shown oral health behaviour and oral health status to be positively influenced by favourable socio-economic background of the parents (Petersen, 1992, 2005; Petersen *et al*., 2008). In the present study this was observed for behaviour such as tooth brushing, dental visits and healthy dietary habits. A socio-economically advantaged background alone does however not guarantee healthy behaviour since advantaged living conditions also have been reported linked with risk behaviour such as high intake of alcohol, sedentary activities and intake of sugary foods and drinks (Petersen *et al*., 2008). In the present study such linkage could be confirmed as regards high expenditure on sweets and snacks. Frequent intake of sweet foods and drinks was observed among the Lao children and this corresponds to findings from Thailand (Petersen *et al*., 2001). In both Laos and Thailand widely available cheap sweets and soft drinks combined with the hot climate are likely to stimulate high intake of “energizing” sugary drinks. While associations between behaviour related to oral disease and chronic diseases in general have been identified in several populations (Petersen *et al*., 2008; Tada *et al*., 2003) this study showed only weak correlations.Between girls and boys small but consistent differences were noticed regarding knowledge on prevention, consumption of sugary drinks and high expenditure on snacks and sweets. More research is needed to shed light on possible explanations for these gender differences.

Access to dental health services is a general problem in low-income countries mainly due to problems related to availability, affordability and acceptability of services (Petersen, 2003). In the present study few children had visited a dentist within the last 12 months especially when compared to the two-thirds in neighbouring Thailand. However, the attendance rate for Lao children corresponds to observations in China and low-income countries elsewhere (Varenne *et al*., 2006; David *et al*., 2005; Du et

Table 3. Percentage distribution of Lao children with high level of knowledge on oral health and high attitude to health in relation to gender and socio-demographic factors

Socio-demographic factors	*n*	*High knowledge on risks for oral health*	*High knowledge on oral disease prevention*	*High level of attitudes to health*
Total	621	20.6	33.7	16.8
Gender				
Boys	293	21.2	40.1**	16.8
Girls	328	20.1	28.0	16.9
Residential location				
Urban	297	25.3**	38.7*	21.4**
Semi-urban	324	16.4	29.1	12.6
Mothers literacy				
Illiterate	143	14.7	24.3	10.9
Literate	469	22.2**	36.8**	18.7***
Socio-economic position				
Very low	115	7.0	28.0	13.7
Low	117	17.9	28.1	12.3
Medium	130	20.8	32.5	9.9
High	136	25.0	39.4	24.4*
Very high	123	30.9**	39.2	22.9

*p<0.05 **p<0.01 ***p<0.001

Table 4. Multivariate logistic regression analysis (Odds Ratio) of certain risk factors by gender, socio-demographic factors, knowledge on items harmful for oral health and attitudes towards health (n=621)

Independent variable	*Category*	*High expenditure on sweets and snacks*	*High intake of sugary drinks*	*Diet high in sugar*	*Toothache within the last 12 months*	*Tooth-cleaning at least once daily*	*Ever visited a dentist*
Gender	Boys	0.71	0.50***	1.19	0.75	0.98	1.26
	Girls	-	-	-	-	-	-
Location	Semi-urban	0.49**	1.24	1.12	1.00	0.92	0.90
	Urban	-	-	-	-	-	-
Socio-economic position	Very low	0.10***	1.08	0.74	1.58	0.44*	0.12***
	Low	0.28***	0.97	0.57	1.98*	0.34**	0.19***
	Moderate	0.38**	0.97	0.84	1.65	0.41**	0.27***
	High	0.53*	1.06	0.90	1.55	0.49*	0.34**
	Very high	-	-	-	-	-	-
Knowledge on risks for oral health	Very low	0.91	1.70	0.80	1.44	0.70	0.60
	Low	1.04	1.92*	0.92	0.87	0.45*	0.41**
	Moderate	1.31	2.33**	1.45	1.21	0.45*	0.78
	High	1.16	1.24	1.44	0.79	1.00	0.67
	Very high	-	-	-	-	-	-
Attitude towards health	Very low	1.87	2.39**	2.31*	1.46	0.61	1.15
	Low	1.39	1.90	2.48*	1.19	0.66	0.72
	Moderate	1.84	2.07*	2.70**	1.99*	0.97	1.71
	High	1.12	1.75*	2.44**	1.40	0.52	1.15
	Very high	-	-	-	-	-	-

*p<0.05, **p<0.01, ***p<0.001

al., 2000; Petersen *et al*., 1998; 2003).. The Lao public oral health system is oriented towards dental treatment and pain relief rather than health promotion, which is mirrored in the dental treatment seeking behaviour of the children in this study. Several health systems related barriers such as distance and treatment costs seem to hinder equal access to dental services in Laos.

Conclusion

The majority of determinants for health and ill health lay beyond the health system and this survey has shown the importance of socio-behavioural factors on oral health. Moreover, the need for implementation of systematic health promotion has been underlined in relation to children in Laos. The study revealed the presence of significant socio-economic and demographic gradients in regards to health and risk behaviour, knowledge and attitude to health, as well as negative impact on the life of the children. Factors, which not only will be reflected in inequality of oral health between the advantaged and disadvantaged parts of this population but will also result in unequal prevalence of general chronic disease in the future. School provides a remarkably efficient setting to reach children and youth, parents and the community at large to promote healthy lifestyles. In the urban and semi-urban areas of Laos, enrolment rates are high and the schools thereby provide an effective way to reach the majority of these children regardless of their socio-demographic background. However, the present study also shows that surprisingly few children received oral health information from teachers, fewer still among children from semi-urban schools.

Recommendations: Special efforts should therefore be aimed at raising the skills of teachers in relation to health communication and stimulating the interests of teachers in the health promoting role of schools. Further, Schools should be aware of their responsibility of assuring a health promoting environment with a focus on factors such as clean water and sanitation for oral self-care and hygiene, restriction of school-based sale of sweets and sweetened drinks for prevention of dental caries, school nutrition programmes for health, and a safe physical environment for prevention of oro-facial trauma. Health education implemented at class-room level should aim to improve oral health and general health related knowledge and attitudes and emphasise of translating knowledge and attitudes into practice. School health education has already been established in Laos. Oral health in general health education should not be purely theoretical but health promotion and healthy lifestyles should be encouraged by empowerment strategies and the active involvement of children, parents, school personnel, and the community at large. The present study of oral health in a low-income country of Asia will provide important information for the evaluation of future school oral health promotion activities.

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