

ORIGINAL ARTICLE

Community Dentistry

Pilot survey on dental health in 5–12-year-old school children in Laos

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Abstract

Aim: The burden of dental caries in young Lao children is high. As a result, these children suffer from toothache, and school absenteeism is high. There is a need for the Lao Government to develop a strategy to prevent dental disease, such as caries. The aim of this study was to collect data on the oral health status of PDR children in order to enable the Lao Government to develop strategies on dental health care.

Methods: An oral examination, following World Health Organization guidelines, was performed on 289 school children aged 5–12 years in Vientiane, Laos.

Results: Caries prevalence was high in the present sample (average = 85.4%), as well as mean decayed, missing, and filled teeth index (primary and secondary) levels. Nearly all caries were untreated. A trend was observed showing lower caries levels in children who brushed their teeth daily at school.

Conclusions: The burden of dental caries for Lao children is high, while the oral care index is nearly zero. Clearly, this has serious resource and management implications, and the strategy of the government must be on prevention (at a young age), awareness of oral diseases, pain relief. More than anything else, prompt action is required.

Introduction

Laos is a sparsely-populated (23.7/km²) country in South–East Asia. There are large interprovincial variations in the population density. The latest census in 2006 projected a population of 5.8 million, a population growth rate of 2.1%, and an average household size of 5.9 people.¹ The population is young, but the demographic structure is changing. The percentage of the population under 15 years of age decreased from 43.6% to 39% between 1995 and 2005. The nation is rural, with the beginnings of a rural-to-urban shift; the percentage of the population living in rural areas decreased from 83% to 72.9% from 1995 to 2005. The latest census identified 47 distinct ethnic groups. Ethnic Lao comprise 52.5% of the

total population and predominate in the lowlands.¹ Due to intensive migration from rural to (peri)urban areas, cities are expanding. Well-known problems of rapid urbanization, such as overcrowded housing, lack of clean water, and proper sanitation are encountered.

Oral health

Traditionally, dental caries prevalence in low-income countries is very low, and oral health receives little public attention. Low exposure to fluorides and low levels of oral hygiene are balanced by the low consumption of refined carbohydrates, resulting in low caries levels.² In low-income countries, a trend towards an increase of caries levels has been observed,^{3,4} probably due to a complicated

causal web related to the economic, demographic, and nutritional transition currently observed in many low-income countries. Today's low-income countries are not well prepared to deal with the new oral health challenges. Primary preventive programs have not been introduced. Systematic information on the current oral health status is fundamental to the planning of population-based preventive programs and health promotion.^{5–10} A recent study by Senesombath *et al.*¹¹ showed a high number of caries experience for 3–4-year-old children in Vientiane. In another study, Tayanin *et al.*⁷ reported high caries levels in 12-year-old children in the major cities, Vientiane and Luang Prabang. However, there have been no well-planned and systematically-conducted studies on dental health in Laos. A main goal of the present study was to collect systematic information on the current oral health status of young Lao children.

There is a need for the Lao Government to develop a strategy on dental health care for its population, for example, methods to implement fluorides. However, several problems have been encountered, such as a lack of appropriate strategies, clear priority, financial resources, effective preventive measures, and knowledge on oral health by the Lao people. The small amount of data recorded in Laos show a large range in decayed, missing, and filled teeth index (permanent [DMFT]) numbers for 12-year-old school children (1.6–4.6), recorded in urban and rural areas.^{7,12,13} A study on Lao school children reported a high consumption of sweets and soft drinks for children in (semi)urban areas. Toothache and resulting school absenteeism was found to be high for the children in Jürgensen and Petersen's study.¹³ Elective dental visits were reported by only a few children; the majority of visits were prompted by toothache.¹³ According to World Health Organization (WHO) methods,¹⁴ interventions aimed at improving oral health in Laos needs to start with a pilot survey on oral health. Past studies have not met the criteria of a pilot survey. Therefore, data recorded from this survey can be used to initiate further planning by decision makers. Thus, the aim of this study was to collect data on oral health of Lao children, which should enable the Lao Government to develop strategies on oral health care.

Materials and methods

Participants

A pilot pathfinder survey was performed in Laos in January 2010, according to WHO methods.¹⁴ Cluster sampling was used to match the objectives of this study. Three primary schools were chosen in Vientiane. One school, located in the city center, was defined as urban. At this

school, a daily tooth-brushing procedure is performed. The other two schools are located in the suburbs of Vientiane (classified as peri-urban), and did not have a tooth-brushing program. Initially, the desired age groups were 5- and 12-year old children. This should have enabled comparisons with reference groups of the WHO. However, only limited numbers of children in Lao primary schools match this exact age criteria. Therefore, larger age groups were chosen, rather than using more schools, primarily due to logistic and organizational reasons. So the age groups in this study were 5–7-year olds, 8–10-year olds, and 11–12-year olds. All children of the three schools who matched the targeted age groups were included in this study.

Oral health

Data collection was based on a clinical examination of the mouth. Data were collected on caries, missing and filled teeth, and treatment need, according to the WHO protocol.¹⁴ Data collection was carried out outside the schools; headlamps and daylight were used in this situation. The weather on both data collection days was bright and clear. The examination was carried out by two calibrated Lao dentists (Tik and Mo), and the Cohen's kappa value of interexaminer agreement on caries was good (0.86). Data were collected on data-collection forms and transferred to SPSS software (version 18.0; SPSS, Chicago, IL, USA) for statistical analysis. Caries prevalence was defined as the percentage of children with one or more teeth affected by caries relative to the total number of children. The decayed, missing, and filled teeth index was specified for both primary (dmft) and DMFT teeth.

Statistical analysis

Standard descriptive statistics were used to characterize the sample. The χ^2 -test was used to examine associations between categorical variables. The independent-samples *t* test was used to compare mean scores between independent groups.

Results

A total of 294 children were eligible for inclusion in this study. Four children were absent for unknown reasons, and one child was too afraid to be examined. Therefore, the final sample consisted of 289 children. The distribution of children across age groups, urban/peri-urban area, sex, and associated caries prevalence are presented in Table 1. There were 125 children in the 11–12-year-old age group (78 urban and 47 peri-urban), 109 children in the 5–7-year-old age group (68 urban and 41 peri-urban),

Table 1. Descriptive statistics across age groups, sex, and location

| | 5–7-year olds | | | 8–10-year olds | | | 11–12-year olds | | |
|------------------------|------------------------|-----------------------------|-------------------------|-----------------------|-----------------------------|------------------------|------------------------|-----------------------------|-------------------------|
| | Urban <i>n</i> = 68 | Peri-urban <i>n</i> = 41 | Total <i>n</i> = 109 | Urban <i>n</i> = 6 | Peri-urban <i>n</i> = 55 | Total <i>n</i> = 61 | Urban <i>n</i> = 78 | Peri-urban <i>n</i> = 47 | Total <i>n</i> = 125 |
| Boys/girls | 36/32 | 20/21 | 56/53 | 1/5 | 27/28 | 28/33 | 42/36 | 29/18 | 71/54 |
| Caries prevalence (%)† | 92.6 | 96.1 | 93.6 | 50.0 | 92.7 | 88.5 | 74.4 | 80.9 | 76.8 |
| Mean decay (SD)‡ | 7.28 (4.2) | 9.17 (4.8) | 7.99 (4.5) | 2.00 (3.5) | 5.71 (3.8) | 5.34 (3.9) | 2.62 (2.6) | 3.21 (2.7) | 2.84 (2.6) |
| Mean dt (SD) | 7.22 (4.2) | 8.93 (4.7) | 7.86 (4.4) | 1.67 (2.7) | 4.24 (3.5) | 3.89 (3.5) | 1.46 (2.2) | 1.45 (2.0) | 1.46 (2.1) |
| Mean dfmt (SD) | 7.34 (4.3) | 9.49 (5.0) | 8.15 (4.7) | 1.67 (2.7) | 4.67 (3.8) | 4.38 (3.8) | 1.65 (2.6) | 1.89 (3.0) | 1.74 (2.7) |
| Mean DT (SD) | 0.06 (0.3) | 0.24 (0.6) | 0.13 (0.5) | 0.33 (0.8) | 1.47 (1.6) | 1.36 (1.5) | 1.15 (1.5) | 1.77 (2.1) | 1.38 (1.8) |
| Mean DMFT (SD) | 0.06 (0.06) | 0.29 (0.7) | 0.15 (0.5) | 0.33 (0.8) | 1.49 (1.6) | 1.38 (1.5) | 1.22 (1.5) | 1.81 (2.1) | 1.44 (1.8) |

†Caries prevalence defined as decayed teeth (permanent [DT]) + decayed teeth (primary [dt]) >0.

‡Decay = DT + dt.

and 55 children in the 8–10-year-old age group (all 55 peri-urban). There was an equal distribution of boys and girls across the age groups ($\chi^2 [2] = 2.05$, $P = 0.36$). The caries prevalence of the total sample was 85.4%. Respectively, 76.8% and 93.6% of the 11–12-year-old and 5–7-year-old children suffered from caries. For the 8–10-year-old peri-urban group, this was 92.7%.

Caries prevalence and mean dfmt/DMFT levels compared between urban and peri-urban groups per age group are also presented in Table 1. There was a marginally-significant difference in caries prevalence found for the urban or peri-urban groups ($\chi^2 [2] = 3.72$, $P = 0.054$), resulting from relatively more children in the urban group with no caries (28/124) than the peri-urban group (15/128). This result was confirmed by the *t*-test, which showed a significantly higher mean score on total decay for the peri-urban group (mean = 5.88, standard deviation [SD] = 4.42) relative to the urban group (mean = 4.68, SD = 4.17, $t [293] = 2.41$, $P = 0.017$).

The mean DMFT score for the entire 11–12-year-old age group was 1.44 (SD = 1.78); the urban group had a mean DMFT of 1.22 (SD = 1.54), and the peri-urban group had a mean DMFT of 1.81 (SD = 2.09). Almost the entire DMFT score can be ascribed to the number of decayed teeth (permanent). The difference in decayed teeth (permanent) between the peri-urban and urban group was marginally significant ($t [123] = 1.91$, $P = 0.06$). The total number of decayed teeth (primary and permanent) for this entire group was 2.84 (SD = 2.63). For the entire 5–7-year-old group, the mean dmft score was 8.15 (SD = 4.69); the urban group had a mean dmft of 7.34 (SD = 4.32), and the peri-urban group had a mean dmft of 9.49 (SD = 5.01). Again, almost the entire dmft numbers can be ascribed to the number of decayed teeth (primary). The differences in dmft and decayed teeth (primary) between the urban and peri-urban group were both significant, respectively

($t [107] = 2.37$, $P = 0.02$ and $t [107] = 1.97$, $P = 0.05$). For the 8–10-year-old peri-urban group, the mean DMFT was 1.52 (SD = 1.53), and the mean dmft was 4.38 (SD = 3.79).

Nearly all decay was untreated (Figure 1), and the restorative level of dental care was less than 0.7% for all age groups. The dental treatment need of all age groups was very high. This needs consisted of fillings, extractions, and preventive actions.

Discussion

The present study was performed to collect data on oral health of Lao children in order to enable the Lao Government to develop strategies on oral health care. The results clearly show high levels of caries in the study sample. The 5–7-year-old children had very high numbers of teeth

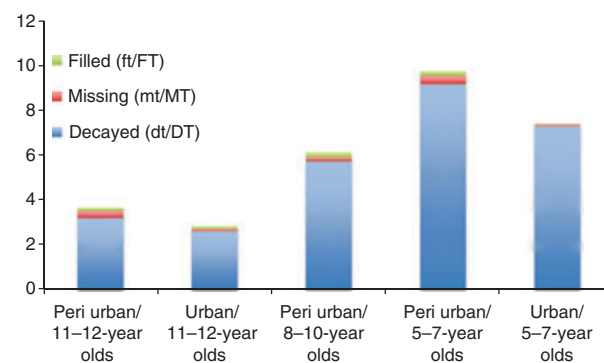


Figure 1. Distribution of decayed, missing, and filled teeth index was specified for both primary (dmft) and permanent (DMFT), and the relative contribution of decayed teeth for both primary (dt) and permanent (DT) by age group and location. dt, decayed teeth (primary); DT, decayed teeth (permanent); ft, filled teeth (primary); FT, filled teeth (permanent); mt, missing teeth (primary); MT, missing teeth (permanent).

affected by caries, and almost every child suffered from dental decay. For the 11–12-year-old children, the caries levels were not as high as those of comparable countries. This could have resulted from the lower mean age in this study group after including the 11-year olds. Nevertheless, caries levels are high, and also in this age group, nearly all children suffer from dental decay. The children from the school with the daily tooth-brushing procedure showed less decay than their peer group who did not have this procedure, and this result was expected. An alternative explanation to this finding might be a higher socioeconomic status; the school is located in the city center and is regarded as one of the best primary schools in Laos.

The Lao Government is facing a challenge in finding a strategy on oral health care for the future. According to WHO protocols, the strategy of governments must be targeted at prevention, awareness of oral diseases, and pain relief. The fact that the Lao population is relatively young can be considered an advantage. The behavior of large groups of young children can easily be influenced, for example, within the schools. The burden of dental caries in 5–7-year olds, the age at which the children enter the primary school system, is already high; the restorative level of dental care is almost zero for those children. These facts have serious resource and management implications. Intervention in primary schools is necessary to lower the number of teeth affected by caries, and therefore lower the risk of toothache and resulting school absenteeism.

Intervening at a young age, and educating parents and teachers of the problem, might be even more important than the above-mentioned intervention at primary schools. The idea of the Lao Government to implement dental preventive strategies in the Mother and Child Health (MCH) project will be particularly helpful. Making dental care part of the MCH project for the prevention of other diseases is an interesting strategy, because the children are very young when they first come in contact with the program, and it increases parents' awareness of preventive dental strategies, and young children's eating and drinking habits. By means of preventive strategies, and instructions for parents by (dental) health-care workers, the prevalence of caries can be reduced. As well as this, a program can be started at preschool. Here, the focus must be on preventive strategies and awareness of dental prob-

lems by teachers. Programs, such as the essential health care package, the Fit for School program (started in the Philippines),¹⁵ and/or appropriate and affordable fluoride programs in Nepal,¹⁶ can also work in Laos, and therefore need to be considered. These interventions will be far more cost-efficient than curative strategies by dental health-care workers.

Research shows that exposure to fluoride is the most effective way to reduce the prevalence of caries. Proper implementation can be achieved by the fluoridation of drinking water, milk, salt, and/or appropriate toothpaste. Further research is necessary to determine the best strategy for different parts of the country. High-quality fluoride toothpaste is important in this regard.¹⁷ The WHO Oral Health Programme could provide technical assistance to the Lao Government.¹⁸

Pain relief is covered in a framework of the WHO Basic Package of Oral Care (BPOC).¹⁹ The guidelines on oral urgent treatment, as defined in the BPOC, can be worked out by the Faculty of Dentistry of the University of Health Sciences of Laos (the dental school). For restorative treatment, atraumatic restorative treatment, as defined in the BPOC, and the recently reintroduced use of 38% silver diamine fluoride, can be of great use in arresting active caries in primary teeth (arresting caries treatment).^{20–22} As arresting caries treatment is atraumatic, low-cost, and non-invasive, it meets the treatment demands.

It is advisable to run a national pathfinder survey on different strategies. The recently-introduced Pulpal, Ulcerations, Fistula, and Abscess (PUFA) index is of interest.²³ The PUFA index complements classical caries indices and provides relevant information for health-care planners. The PUFA index scores the prevalence and severity of oral conditions resulting from untreated caries, and the clinical consequences of untreated dental caries become clear. There is an important role for the dental school in the thinking, planning, and coordination. The Lao Government needs to take a directive and supportive role, especially by developing a sustainable funding system. Because of the rapid expansion of dental problems due to intensive migration from rural to (peri)urban areas, and the observed trend in low-income countries towards an increase of caries levels, prompt action is required.

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