ORIGINAL PAPER

Nagoya J. Med. Sci. **78**. 493 ~ 500, 2016
doi:10.18999/nagjms.78.4.493

Prevalence and correlates of perceived teeth health status and oral health behavior among school-going adolescents in Cambodia

Karl Peltzer[1,2,3], Chher Tepirou[4] and Supa Pengpid[1,2]

[1]*ASEAN Institute for Health Development, Mahidol University, Salaya, Thailand*
[2]*Department of Research Innovation and Development, University of Limpopo, Turfloop Campus, Sovenga, South Africa*
[3]*HIV/AIDS/STIs and TB (HAST), Human Sciences Research Council, Pretoria, South Africa*
[4]*Preventive Medicine Department, Ministry of Health, Phnom Penh, Cambodia*

ABSTRACT

The purpose of the study was to investigate perceived teeth health status and oral health behavior, as well as their correlates, among adolescents in Cambodia. The analysis included 3806 Cambodian school children (mean age 15.7 years, SD=1.8 years) who took part in the "Global School-based Student Health Survey" (GSHS) in 2013. Overall, 7.8% of the students reported poor perceived teeth status, 18.0% had missed school in the past year because of a toothache, 26.7% engaged in combined oral health behavior (brushing teeth twice daily or more often = 79.8%, using fluoride toothpaste = 59.9%, and drinking soft drinks less than once a day = 53.6%), and 59.9% had never visited a dentist for a routine examination or other dental work. In the multivariate logistic regression analysis, older age, being female, missing school because of a toothache, having a toothache in the past 12 months, poor oral health behavior and sedentary leisure time were associated with poor perceived teeth status. Older age, good perceived teeth status, having had a dental check-up, washing hands before eating and after toilet use, and not eating fast food were associated with a positive oral health behavior (brushing teeth twice daily or more often, using fluoride toothpaste, and drinking soft drinks less than once a day). Significant proportions of poor perceived teeth status and poor oral health behavior were found among school children in Cambodia. Various risk factors (sociodemographic, dental variables, general health risk behaviors) for perceived poor teeth status, oral health behavior and never having had a dental check-up were identified, which can be utilized for intervention programs.

Key Words: teeth health status, toothache, oral health behavior, adolescents, Cambodia

INTRODUCTION

Apart from using clinical examination to assess child oral health, there is increasing interest to assess psychosocial dimensions such as self-reported oral health.[1,2)] In terms of perceived teeth or oral health status or dental symptoms among adolescents, 12% in China rated their dental

Received: August 18, 2016; accepted: October 4, 2016
Corresponding author: Karl Peltzer, PhD, Dr. Habil
ASEAN Institute for Health Development, Mahidol University,
25/25 Phutthamonthon 4 Rd., Salaya, Phutthamonthon, Nakhon Pathom 73170, Thailand
E-mail: karl.pel@mahidol.ac.th

health (teeth) as "poor" or "very poor",[3] 23% in India reported that the state of their teeth was bad,[4] none of the surveyed children in rural districts Cambodia had healthy gums,[5] and one in five in Sri Lanka rated their perceived oral health as poor.[2] Further, 41% of adolescents in China,[3] 69% in Lao People's Democratic Republic (PDR)[6] and 68.6% in Cambodia reported a toothache during the previous 12 months.[7] Factors associated with poor perceived teeth or oral health include 1) sociodemographic items such as being female,[3] and low socioeconomic status;[2,3] 2) dental variables, including having poor oral hygiene practices,[3] caries,[4] having gingivitis,[2] awareness of oral illness,[2] having a toothache,[2] having bad breath,[4] dissatisfaction with the look of their teeth,[4] non-use of dental services,[2] dental care visits,[3,4] and feeling a need for dental health care,[2] and 3) general health behaviors such as living a healthy lifestyle (general hygiene);[3] having a high alcohol use,[3] having poor dietary habits,[3] and poor school performance.[4]

In a "National Oral Health Survey" conducted in 2011,[8] a high prevalence of dental caries among children 15–17 years old (84.5%) was found in Cambodia.[8] Various oral health behaviours such as dental hygiene, diet and preventive dental care visit have been identified as significant factors in the prevention of childhood caries.[9,10] In Cambodia[8] and in the region different inadequate oral health behaviours among adolescents have been identified such as not brushing their teeth twice or more times a day (e.g., in China >55%[3,11] and in four Southeast Asian countries 22.4%,[12] and not using fluoridated toothpaste (e.g., in China 52%–83%[3,11] and in Lao PDR 9%.[6] Factors associated with oral health behavior (i.e., brushing teeth and using fluoride toothpaste) include female or male gender,1[2-14] older age,[13] other health behaviors,[12] tobacco use,[14] and general hygiene behavior.[15] In terms of dental health care visits, a large proportion of adolescents had not visited a dentist in the past year, e.g., 74% in China[3,11] and in Lao PDR, 42% of the children had never consulted a dentist,[6] Students who had never consulted a dentist were more likely having a lower socioeconomic status and engaged in infrequent tooth brushing.[16]

Perceived oral or dental health status is an essential outcome measure in dentistry since it is related to dental care utilization and the understanding of different factors of perceived oral health status can be used to improve dental care utilization behavior.[2] Little information exists about factors contributing to the oral health perception among adolescents in Southeast Asian countries.[2] Since such oral health perceptions are influenced by sociocultural aspects, factors may be different in Cambodia than found in previous studies in other countries.[1,2] Further, increased uptake of preventive oral health care in adolescents is paramount in achieving WHO's goal of oral self-care by 2020.[17] In order to promote oral health care it is important to understand the current preventive oral health practices of adolescents and its influencing factors in Southeast Asian countries such as Cambodia.

Therefore, the aim of the investigation was to study perceived teeth health status and oral health behavior, as well as their correlates, among adolescents in Cambodia.

METHODS

This study included a secondary analysis of data from the 2013 "Global School-based Health Survey" (GSHS) from Cambodia.[18] Details and data of the GSHS can be obtained online.[18] A two-stage cluster sample design that selected schools and then classes was utilized to gather data to represent all pupils in grades 6 to 12 of Cambodia.[19] Participants self-completed a questionnaire, which was supervised by trained research assistants.[19]

The study proposal was approved by the "National Ethics Committee for Health Research, Ministry of Health" (No: 273 NECHR), Kingdom of Cambodia, and written informed consent and consent for publication was obtained from the pupils, parents and/or school authorities.[19]

Measures

The study measures used were from the GSHS[18] and are illustrated in Table 1. "Self-reported oral health describes how an individual perceives his/her own oral health and can be considered as an indicator of wellbeing."[2] Poor perceived teeth and gum status were defined as responses of "poor" and "very poor". Oral health behavior was defined as a combination of brushing teeth twice or more daily, using fluoridated toothpaste, and the consumption of soft drinks less than once a day.[13] Sufficient consumption of fruit was defined as at least 2 servings a day, and sufficient consumption of vegetable was defined as at least 3 servings a day.[20] Positive oral

Table 1 Variable descriptions

Variables	Question	Response options
Sociodemographics		
Age	"How old are you?"	1=11 years old or younger to 8=18 years old or older (coded as 1–4=13 years or younger to 14 years, 5–6=15 to 16 years, and 7–8=17 to 18 years or older)
Sex	"What is your sex?"	1=Male, 2=Female (coded as 1=1 and 2=0)
Hunger	"During the past 30 days, how often did you go hungry because there was not enough food in your home?"	1=Never to 5=Always (coded as 1–3=0 and 4–5=1)
Dental variables		
Perceived teeth status	"How would you describe the health of your teeth?"	1=Excellent to 6=Very poor (coded as 1–4=0 and 5–6=1)
Perceived gum status	"How would you describe the health of your gums?"	1=Excellent to 6=Very poor (coded as 1–4=0 and 5–6=1)
Dental symptoms	"During the past 12 months, did a toothache cause you to miss classes or school?"	1=Yes, 2=No (coded as 1=1 and 2=0)
	"During the past 12 months, how often did you have a toothache or feel discomfort because of your teeth?"	1=Never to 5=Always (coded as 1–2=never or rarely, 3=sometimes, and 4–5=mostly or always)
Dental check-up	"When was the last time you saw a dentist for a check-up, exam, teeth cleaning, or other dental work?"	1=During the past 12 months to 4=Never (coded as 1–3=0 and 4=1)
Oral health behavior	"During the past 30 days, how many times per day did you usually clean or brush your teeth?"	1=I did not clean or brush my teeth during the past 30 days to 6=4 or more times per day (coded as 1–3=0 and 4–6=1)
	"Do you use toothpaste that contains fluoride?"	1=Yes, 2=No (codes as 1=1 and 2=0)
	"During the past 30 days, how many times per day did you usually drink carbonated soft drinks, such as Coca Cola, Pepsi, Fanta, 7-Up, Sprite, Mirinda, or Sarsi?"	1=I did not drink carbonated soft drinks during the past 30 days to 7= 5 or more times per day (coded as 1–3=0 and 4–7=1)
General health behavior		
General hygiene behavior	"During the past 30 days, how often did you wash your hands before eating?"	1=Never to 5=Always (coded 1–4=0 and 5=1)
	"During the past 30 days, how often did you wash your hands after using the toilet or latrine?"	1=Never to 5=Always (coded 1–4=0 and 5=1)
	"During the past 30 days, how often did you use soap when washing your hands?"	1=Never to 5=Always (coded 1–4=0 and 5=1)
Dietary behavior	"During the past 30 days, how many times per day did you usually eat fruit, such as bananas?"	1=I did not eat fruit during the past 30 days to 7=5 or more times per day (coded as 1–3=0 and 4–7=1)
	"During the past 30 days, how many times per day did you usually eat vegetables, such as water spinach?"	1= I did not eat vegetables during the past 30 days to 7=5 or more times per day (coded as 1–4=0 and 5–7=1)
	"During the past 7 days, on how many days did you eat food from a fast food restaurant, such as KFC?"	1=0 days to 8=7 days (coded as 1=0 and 2–8=1)
Current cigarette smoking	"During the past 30 days, on how many days did you smoke cigarettes?"	1=0 days to 7=All 30 days (coded as 1=0 and 2–7=1)
Current other tobacco use	"During the past 30 days, on how many days did you use any other form of tobacco, such as chewing tobacco leaves?"	1=0 days to 7=All 30 days (coded as 1=0 and 2–7=1)
Current alcohol use	"During the past 30 days, on how many days did you have at least one drink containing alcohol?"	1=0 days to 7=All 30 days (coded as 1=0 and 2–7=1)
Leisure time sedentary behavior	"How much time do you spend during a typical or usual day sitting and watching television, playing computer games, talking with friends, or doing other sitting activities, such as playing games or talking on the phone or computer?"	1=Less than 1 hour per day to 6=More than 8 hours per day (coded as 1–2=0 and 3–6=1)

health behavior was defined as a combination of twice or more times tooth brushing daily, using fluoridated toothpaste, and drinking soft drinks less than once a day.[13] (see Table 1).

Data analysis

Using STATA software version 13.0 (Stata Corporation, College Station, Texas, USA), the data were analyzed while taking into account the sampling design. Frequencies, percentages, means and standard deviations were used to describe the sample. Multivariate logistic regression was used to estimate the impact of independent variables (sociodemographic, dental and general health variables) on dental indicators (poor teeth status, oral health behavior, and never dental check-up; binary dependent variables). In the results, weighted percentages are reported. A p-value of less than 5% was used to indicate statistical significance. Both the p-value and the reported 95% confidence intervals are adjusted for the multistage stratified cluster sample design of the survey.

Table 2 Sample characteristics

Variable	Sample N (%)	Poor teeth health status N (%)	Oral health behavior N (%)	Never dental check-up N (%)
Sociodemographics				
All	3,806	340 (7.8)	1,015 (26.7)	2,160 (59.9)
Age in years				
≤13–14	1,184 (33.0)	50 (4.1)	284 (23.3)	696 (54.7)
15–16	1,161 (33.4)	83 (6.7)	278 (25.6)	677 (61.1)
17–18 or older	1,453 (33.6)	205 (13.7)	451 (31.2)	87.2 (63.8)
Sex				
Female	2,003 (52.3)	202 (9.3)	562 (27.3)	1,125 (59.6)
Male	1,791 (47.7)	136 (7.3)	450 (26.2)	1,027 (60.1)
Hungry (mostly/always)	230 (6.3)	28 (11.5)	42 (18.8)	130 (59.0)
Dental variables				
Teeth (poor status)	340 (8.3)	—	70 (17.9)	211 (65.9)
Gum (poor status)	301 (7.8)	164 (53.1)	67 (20.8)	192 (68.0)
Missed school because of a toothache	669 (18.0)	134 (18.4)	150 (24.0)	340 (52.3)
Toothache (in the past 12 months)				
Never or rarely	2,202 (58.8)	85 (3.5)	638 (29.0)	1,270 (61.6)
Sometimes	1,445 (37.7)	199 (13.0)	347 (24.0)	809 (58.6)
Mostly or always	141 (3.5)	54 (34.5)	23 (14.4)	73 (50.6)
Dental check-up (never)	2,160 (59.9)	211 (9.0)	543 (24.8)	—
Brush teeth 2 or more times/day	3,151 (79.8)	254 (7.4)	—	1,725 (57.3)
Uses fluoride toothpaste	2,335 (59.9)	161 (5.8)	—	1,251 (55.7)
Soft drinks less than once a day	2,078 (53.6)	219 (9.4)	—	1,250 (64.0)
Oral health behavior index	1,015 (26.7)	70 (5.6)	—	543 (55.8)
General health behaviors				
Washing hands before eating (always)	1,506 (39.5)	109 (6.9)	484 (32.2)	828 (59.1)
Washing hands after toilet (always)	1,926 (48.7)	176 (8.2)	593 (31.1)	1,029 (57.1)
Using soap when washing hands (always)	1,276 (31.5)	93 (6.5)	384 (29.9)	645 (53.6)
Fruits: 2 or more servings/day	862 (21.6)	60 (7.0)	179 (20.1)	418 (51.2)
Vegetables: 3 or more servings/day	500 (11.9)	25 (3.7)	141 (26.7)	231 (47.7)
Fast food: 1 or more times a week	974 (21.9)	56 (6.0)	205 (19.8)	402 (44.8)
Current alcohol use	411 (9.8)	57 (13.3)	93 (23.1)	224 (55.8)
Current tobacco use	127 (3.6)	17 (11.2)	25 (21.3)	67 (55.0)
Sedentary leisure time (3 or more hours)	552 (12.0)	82 (14.3)	119 (21.6)	296 (58.7)

RESULTS

Sample characteristics

The total sample included 3806 students who had a mean age of 15.7 years (SD=1.8 years), of which 47.7% were girls and 52.3% were boys. The data were collected in 2013, and the overall response rate was 85%. Overall, 8.3% of the students reported poor perceived teeth status, 26.7% engaged in oral health behavior (brushing teeth twice or more often daily=79.8%, using fluoride toothpaste=59.9% and drinking soft drinks less than once a day=53.6%), and 59.9% never visited a dentist for a routine examination or other dental work. Furthermore, 7.8% of students reported poor perceived gums status, 18.0% had missed school in the past year because of a toothache, and 3.5% mostly or always had a toothache in the past 12 months (see Table 2).

Associations with dental indicators (self-reported teeth status, positive oral health behavior and dental service utilization)

In the multivariate logistic regression analysis, sociodemographic factors (older age and being female), dental variables (missed school because of toothache; sometimes, mostly or always

Table 3 Associations between sociodemographic factors, dental variables, general health behaviors and oral health status and behavior among school-going adolescents from Cambodia, 2013

Variable	Poor perceived teeth health status AOR (95% CI)	Oral health behavior AOR (95% CI)	Never dental check-up AOR (95% CI)
Sociodemographics			
Age in years			
≤13–14	1 (Reference)	1 (Reference)	1 (Reference)
15–16	1.43 (0.83–2.45)	1.10 (0.81–1.51)	1.34 (1.01–1.77)*
17–18 or older	3.40 (2.69–4.31)***	1.52 (1.10–2.10)*	1.40 (1.02–1.92)*
Sex			
Female	1 (Reference)	1 (Reference)	1 (Reference)
Male	0.65 (0.42–0.99)*	0.92 (0.76–1.11)	0.98 (0.82–1.17)
Hungry (mostly/always)	1.55 (0.95–2.53)	0.76 (0.43–1.34)	1.03 (0.63–1.68)
Dental variables			
Perceived poor teeth status	—	0.65 (0.45–0.94)*	1.06 (0.81–1.40)
Perceived poor gum status	—	0.86 (0.53–1.38)	1.52 (1.09–2.13)*
Missed school because of a toothache	1.79 (1.31–2.44)***	0.98 (0.65–1.47)	0.69 (0.54–0.88)**
Toothache (past 12 months)			
Never or rarely	1 (Reference)	1 (Reference)	1 (Reference)
Sometimes	3.85 (2.26–6.55)***	0.83 (0.66–1.06)	0.83 (0.70–0.99)*
Mostly or always	10.75 (6.02–19.19)***	0.56 (0.30–1.06)	0.74 (0.44–1.32)
Dental check-up (never)	1.28 (0.93–1.75)	0.67 (0.54–0.82)***	—
Oral health behavior index	0.58 (0.42–0.80)**	—	0.66 (0.53–0.82)***
General health behaviors			
Washing hands before eating (always)	0.77 (0.54–1.11)	1.35 (1.03–1.75)*	1.20 (0.97–1.48)
Washing hands after toilet (always)	1.35 (0.97–1.88)	1.24 (1.04–1.47)*	0.83 (0.73–0.96)*
Using soap when washing hands (always)	0.79 (0.51–1.24)	0.96 (0.73–1.26)	0.66 (0.49–0.88)**
Fruits: 2 or more servings/day	0.95 (0.59–1.52)	0.64 (0.51–0.80)***	0.75 (0.60–0.93)*
Vegetables: 3 or more servings/day	0.58 (0.33–1.04)	1.13 (0.88–1.46)	0.73 (0.55–0.97)*
Fast food: 1 or more times a week	0.70 (0.46–1.07)	0.62 (0.46–0.83)**	0.50 (0.40–0.62)***
Current alcohol use	1.29 (0.81–2.06)	0.83 (0.59–1.11)	0.82 (0.57–1.18)
Current tobacco use	1.43 (0.56–3.64)	0.91 (0.45–1.82)	1.20 (0.90–1.96)
Sedentary leisure time (3 or more hours sitting)	1.96 (1.23–3.13)**	0.76 (0.53–1.10)	1.01 (0.78–1.31)

AOR=Adjusted Odds Ratio; CI=Confidence Interval; ***P<0.001; **P<0.01; *P<0.05

having toothache in the past 12 months; and poor oral health behavior) and general health behaviors (sedentary leisure time) were found to be associated with poor perceived teeth status. Furthermore, older age, good perceived teeth status, having had a dental check-up, and general health behaviors (washing hands before eating, washing hands after toilet use, not eating fast food) were associated with a positive oral health behavior (brushing teeth twice or more, using fluoride toothpaste, and drinking soft drinks less than once a day). Eating two or more servings of fruits a day was negatively associated with oral health behavior. Regarding "never having had a dental check-up", associations were found with older age, dental variables (poor perceived gum status, not having missed school because of toothache, not having toothache in the past 12 months, and poor oral health behavior) and general health behaviors (poor hygiene behavior in terms of not always washing hands with soap and washing hands after toilet, inadequate fruit and vegetable consumption, and not having had fast food) (see Table 3).

DISCUSSION

The study investigated the prevalence and correlates of dental indicators (self-reported teeth status and positive oral health care behavior) in a nationally representative sample of school-going pupils in Cambodia. Compared with previous studies among adolescents on perceived oral health status in Asia,[2-4,6] this study found that students rated their oral health status better than students in those previous studies. Compared with the reported dental symptoms (toothache, missing school because of toothache) in this study, a previous study in China[3] found similar rates of reported toothaches, a local study in Cambodia[7] found a higher prevalence of toothaches, and a study in Lao PDR[6] reported higher rates of toothache and absenteeism from school because of a toothache. Nevertheless, these findings should be of concern to educators as children may be distracted or absent from school due to dental pain. This investigation found that older adolescents and being female were correlated with poor perceived teeth health status, as was also found in a previous study.[3] Contrary to some previous studies,[2,3] this investigation did not find a correlation between low socioeconomic status (here assessed as experiencing hunger) and poor perceived oral health status. Furthermore, in accordance with previous studies,[2,4] this study found that experiencing a toothache and missing school because of a toothache were associated with poor perceived teeth or oral health status. This finding confirms that school children assess their teeth or oral health status based on oral symptoms.[2,16] Unlike some previous investigations that found either a positive or negative correlation between dental attendance and perceived poor oral health,[2-4] this investigation did not find any correlation between never attending a dental check-up and poor perceived teeth or oral health status. Poor oral health behavior was also associated with poor perceived teeth or oral health status, as found in previous studies.[3] Regarding general health behaviors, this study found an association between sedentary leisure time and poor perceived teeth status. While another study[3] also found a positive association of poor perceived oral health status with other health risk behaviors, such as high alcohol use, poor dietary habits, oral hygiene practices,[3] this study did not find such an association.

Regarding specific oral hygiene behavior, this study found that 79.8% had brushed their teeth at least twice a day (96% once or more times a day), which was a little lower than that reported in the last Cambodian "National Oral Health Survey" in 2011.[8] The prevalence of having used fluoride toothpaste (59.9%) was much lower (98.5%) than that in the last Cambodian "National Oral Health Survey" in 2011.[8] However, the prevalence of brushing teeth at least twice per day and/or using fluoride paste in this study was higher than that in several other previous studies in Asia [3,11,12] and similar to a study among Lao PDR school children.[6] The low use of

fluoride toothpaste in this study may be attributed to insufficient awareness (29.6% reported not knowing whether the toothpaste they used contains fluoride) and the lack of accessibility and affordability. Moreover, this study found a combined oral health behavior prevalence (brushing teeth twice or more often daily, using fluoride toothpaste and drinking soft drinks less than once a day) of 26.7%, which was higher than that in a previous study in Nigeria, where only 8% of the school children engage in oral self-care as recommended (a combination of brushing teeth at least twice daily, using fluoridated toothpaste, and limited intake of sugary snacks).[13] Combination approaches, i.e., brushing teeth with fluoridated toothpaste and limiting intake of refined carbohydrate, need to be more emphasized for successful oral health behavior interventions in children.[13]

This study found that a high proportion (59.9%) of adolescents had never visited a dentist for a routine examination or other dental work, which was higher or similar to previous studies.[3,6,11,13,16] The lack of dental visits in this study may be explained by high cost, a lack of knowledge, a lack of oral health importance conveyed by parents, and limited access to dental services in the low-income country Cambodia.[16] In line with previous investigations,[16,21,22] this study found associations between not having toothache, poor oral health behavior and never having been to a dental check-up. This finding may be explained by a pattern seen in low-income settings, where dental care visits are initiated by a toothache rather than a preventive dental check-up.[3,6,21,22] Furthermore, this study also found other health risk behaviors (poor oral hygiene, inadequate fruit and vegetable consumption, and not having had fast food) to be associated with never having been to a dental check-up. Jiang *et al.*[3] also found a correlation between oral health behavior and general health behavior among Chinese school children. This finding also shows that multiple risk behaviors co-occur and should be targeted in interventions simultaneously.

The study limitations include the cross-sectional design of the study and that the study includes only school-going adolescents. The prevalence of dental indicators may differ between non-school-going and school-going adolescents. Moreover, the data on oral health status and behavior were collected by self-report, which may have biased the results, and future studies should include a dental examination.

CONCLUSION

Using a large and representative sample of adolescents in Cambodia, this study found a significant proportion of poor perceived teeth health status and poor oral health behavior. Several sociodemographic factors and a number of clustering health risk factors were identified, which can help guide interventions to promote oral health in this school population.

ACKNOWLEDGEMENTS

The World Health Organization and the Centers for Disease Control and Prevention are thanked for making the data for this analysis publicly available. We acknowledge the Ministries of Education and Health and the study participants in the GSHS. The government of the study country and the World Health Organization did not influence this analysis nor the decision to publish these findings. The study did not receive any financial support.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1) McGrath C, Broder H, Wilson-Genderson M. Assessing the impact of oral health on the life quality of children: implications for research and practice. *Community Dent Oral Epidemiol*, 2004; 32: 81–85.
2) Perera I, Ekanayake L. Factors influencing perception of oral health among adolescents in Sri Lanka. *Int Dent J*, 2008; 58: 349–355.
3) Jiang H, Petersen PE, Peng B, Tai B, Bian Z. Self-assessed dental health, oral health practices, and general health behaviors in Chinese urban adolescents. *Acta Odontol Scand*, 2005; 63: 343–352.
4) David J, Astrøm AN, Wang NJ. Prevalence and correlates of self-reported state of teeth among school children in Kerala, India. *BMC Oral Health,* 2006; 6: 10. DOI: 10.1186/1472-6831-6-10
5) Chu CH, Wong AW, Lo EC, Courtel F. Oral health status and behaviours of children in rural districts of Cambodia. *Int Dent J*, 2008; 58: 15–22.
6) Jürgensen N, Petersen PE. Oral health behaviour of urban and semi-urban school children in the Lao PDR. *Community Dent Health,* 2011; 28: 280–285.
7) Shidara EK, McGlothlin JD, Kobayashi S. A vicious cycle in the oral health status of schoolchildren in a primary school in rural Cambodia. *Int J Dent Hyg*, 2007; 5: 165–173.
8) Chher T, Turton BJ, Hak S, Beltran E, Courtel F, Durward C, *et al.* Dental caries experience in Cambodia: Findings from the 2011 Cambodia National Oral Health Survey. *J Int Oral Health*, 2016; 8: 1–7.
9) Harris R, Nicoll AD, Adair PM, Pine CM. Risk factors for dental caries in young children: a systematic review of the literature. *Community Dent Health,* 2004; 21(1 Suppl): 71–85.
10) Albino J, Tiwari T. Preventing childhood caries: A review of recent behavioral research. *J Dent Res,* 2016; 95: 35–42.
11) Zhu L, Petersen PE, Wang HY, Bian JY, Zhang BX. Oral health knowledge, attitudes and behaviour of children and adolescents in China. *Int Dent J,* 2003; 53: 289–298.
12) Peltzer K, Pengpid S. Oral and hand hygiene behaviour and risk factors among in-school adolescents in four Southeast Asian countries. *Int J Environ Res Public Health*, 2014; 11: 2780–2792.
13) Folayan MO, Khami MR, Onyejaka N, Popoola BO, Adeyemo YI. Preventive oral health practices of school pupils in Southern Nigeria. *BMC Oral Health,* 2014; 14: 83. DOI:10.1186/1472-6831-14-83
14) Shaikh MA. Prevalence and correlates of oral hygiene among school attending adolescents in Pakistan. *J Pak Med Assoc*, 2013; 63: 1564–1565.
15) Dorri M, Sheiham A, Watt RG. Relationship between general hygiene behaviours and oral hygiene behaviours in Iranian adolescents. *Eur J Oral Sci*, 2009; 117: 407–412.
16) Lopez R, Baelum V. Factors associated with dental attendance among adolescents in Santiago, Chile. *BMC Oral Health,* 2007; 7: 4. DOI: 10.1186/1472-6831-7-4
17) World Health Organization. Global Action Plan for the Prevention and Control of NCDs 2013–2020. 2013 Available online: http://www.who.int/nmh/events/ncd_action_plan/en/. (Accessed 1 May 2016)
18) Centers for Disease Control (CDC). *The Global School and Health Survey background, 2015*. Available online: http://www.cdc.gov/gshs/background/index. (Accessed 10 April 2016)
19) Ministry of Health, Cambodia. *Global School Based Student Health Survey (GSHS), 2013, Cambodia report 2014*. Phnom Penh, Cambodia: Department of Preventive Medicine, Ministry of Health.
20) Centers for Disease Control (CDC) State indicator report on fruits and vegetables, 2013. Available online: http://www.cdc.gov/nutrition/downloads/state-indicator-reportfruits-vegetables-2013.pdf. (Accessed 10 April 2016).
21) Petersen PE, Hoerup N, Poomviset N, Prommajan J, Watanapa A. Oral health status and oral health behaviour of urban and rural schoolchildren in SouthernThailand. *Int Dent J*, 2001; 51: 95–102.
22) Petersen PE, Jiang H, Peng B, Tai BJ, Bian Z. Oral and general health behaviours among Chinese urban adolescents. *Community Dent Oral Epidemiol*, 2008; 36: 76–84.