

# RESEARCH

## Survey of Knowledge, Beliefs, and Behaviors of Migrant Vietnamese Parents Regarding Young Children's Oral Health

Uyen N. Nguyen, RDH, MS; Dorothy J. Rowe, RDH, PhD; Judith C. Barker, MA, MSc, PhD

### Abstract

**Purpose:** The purpose of this study was to investigate the oral health knowledge, beliefs, and behaviors of migrant Vietnamese parents of 1-5 year-olds in San Jose, California.

**Method:** A verbally-administered survey was conducted with a convenience sample of 45 Vietnamese parents recruited at San Jose public libraries. Following preliminary screening, written informed consent was obtained from eligible individuals. A pre-tested, structured 94-item questionnaire was used to collect information regarding parent demographics, and the parent's knowledge, beliefs, and behaviors about children's oral health. Simple descriptive statistics were used to analyze the data.

**Results:** Vietnamese parents acknowledged a number of basic concepts regarding early childhood caries (ECC), such as influences of sugar consumption, oral hygiene, and bottle use. Unlike other groups, they reported some familiarity with the role of bacteria in caries etiology. Oral health knowledge and beliefs, however, were not reflected in parental oral health behaviors such as supervision of children's brushing. Knowledge about the preventive role of fluoride was limited and varied among the population. Parental knowledge and behaviors did not vary by education level or length of residence in US.

**Conclusion:** Vietnamese parents demonstrated reasonably good oral health knowledge, but poor behavioral guidance of their children's oral health, indicating the need for continued parental education emphasizing age-appropriate oral care and the preventative role of fluoride.

This manuscript supports the NDHRA priority area, **Client level: Oral health care** (health promotion: treatments, behaviors, products)

### Introduction

Early childhood caries (ECC), the most common chronic infectious disease of childhood,<sup>1-2</sup> is defined as having at least one decayed, missing, or filled tooth in the primary maxillary anterior region before the age of 71 months.<sup>3</sup> In children younger than three years of age, any sign of dental decay is considered severe ECC (S-ECC). From age three through five, one or more cavitated, missing, or filled surface(s) in primary maxillary anterior teeth or a decayed, missing, or filled score of at least four (at age three), at least five (at age four), or at least six (at age five) surfaces constitutes S-ECC.<sup>3</sup>

In the short term, ECC not only impacts the child's ability to eat, play and sleep due to the pain associated with toothache, it can also cause systemic infection and abscesses.<sup>4-6</sup> Once the decay reaches the stage when the disease management becomes difficult in an out-patient clinic or dental office setting, hospital admission may be required for surgical treatment under general anesthesia.<sup>7,8</sup> In the longer term, children who chronically suffer from ECC are more likely to develop further dental

problems in adulthood.<sup>9-11</sup> In addition, poor oral health interferes with nutrition, concentration, and school participation; therefore affecting growth and cognitive development.<sup>3-4,6</sup> Left untreated, dental caries increasingly interferes with psychosocial functioning when it is associated with speech, communication problems and low self-confidence, hence diminishing a child's quality of life.<sup>2, 4,11,12.</sup>

ECC does not affect all populations equally.<sup>2, 13-17</sup> Among North American children in general, the prevalence of this condition was 28% for the two to five-year old age group in 2006.<sup>18</sup> The prevalence of ECC could be as high as 70% in young children from socio-economically disadvantaged populations, such as low-income, migrant or rural populations, even within developed countries.<sup>2,13-19</sup> Studies in the United States show that ECC and untreated tooth decay are especially prevalent in children of Asian and Latino/Hispanic descent.<sup>14,18-20</sup>

Over fifty percent of the children from families living below the federal poverty level in Santa Clara County, California, entered kindergarten with a history of cavities, and more than 30% had untreated

decay as shown in the 2010 county health profile.<sup>21</sup> This high prevalence of caries and untreated decay observed among 5 year olds entering kindergarten can be attributed, in part, to the large Vietnamese population in Santa Clara County. In 2010, the Vietnamese population, comprising more than 1.5 million people of all ages, was the fourth largest among all Asian population groups in the United States.<sup>22-23</sup> Vietnamese populations are predominantly concentrated in large metropolitan areas such as San Jose, the largest city in Santa Clara County.<sup>22,24</sup> This county has the second largest Vietnamese population in the U.S., and 8 percent of the total 134,525 Vietnamese population in San Jose were aged five or under when the last census was taken in 2010.<sup>23-24</sup> High rates of ECC are not unique to the Vietnamese children in Santa Clara County. Studies of other immigrant Vietnamese populations in Australia and Canada,<sup>25-27</sup> in addition to a survey completed in Vietnam,<sup>28</sup> also documented high caries rates among children.

While the etiology of ECC includes biological,<sup>29,30</sup> behavioral and psychosocial<sup>2,4,15,16,31</sup> mechanisms, interventions to prevent or arrest caries are diet modification,<sup>32</sup> exposure to fluoride,<sup>33-34</sup> and suppression of oral microflora.<sup>35,36</sup> Caries development depends on interactions between biological, behavioral, cultural, social and environmental factors.<sup>37</sup> Children's oral health status is greatly impacted by their parents' oral health knowledge and beliefs. Previous studies suggest that parents' oral health knowledge and behaviors are associated with children's oral health status and well-being.<sup>38-39</sup> Parents, particularly mothers, are the main source of the early education that will influence and promote good oral health, and play a key role in establishing children's diet and oral care behaviors.<sup>40-46</sup>

Little research has been directed to exploring the knowledge, beliefs, and behaviors of Vietnamese parents that may be affecting their children's oral health. A better understanding of the oral health beliefs and values of Vietnamese parents is essential in order to develop the strategies to alleviate oral health disparities in this population. The purpose of this study was to survey Vietnamese parents of 1-5 year-olds in the San Jose, California metropolitan area, to determine their knowledge, beliefs, and behaviors regarding children's oral health.

## Methods

A quantitative survey was used to gain understanding of migrant Vietnamese parents' knowledge, beliefs, and behaviors surrounding children's oral health. This approach consisted of a verbally-administered questionnaire to identify parents' oral health understanding, opinions, and oral health practices. The study was conducted in a primarily low-income Vietnamese community in San Jose, California and was given Institutional Review Board approval from

the University of California, San Francisco. Following an initial face-to-face meeting with the principal investigator, the San Jose public library system granted written permission to conduct the survey research in their libraries. By conducting the study at four different library locations, a mixture of Vietnamese participants living in San Jose was ensured.

This study used the Basic Risk Factors Questionnaire (BRFQ) developed by a team of oral health researchers from three universities with expert opinions on dentistry, dental hygiene and dental public health. It had been pre-tested on parents with similar socio-economic backgrounds to the Vietnamese population in this study. The questionnaire was modified based on peer feedback, relevant literature review and pre-testing. For this study, the BRFQ was translated from English to Vietnamese, back-translated and reviewed to ensure content validity. It was then piloted using a small sample of 10 Vietnamese individuals in similar circumstances to those intended to be enrolled in the formal study, to ensure that the survey was comprehensible and feasible to administer. Questions addressed family socio-demographic details, and parental oral health knowledge, beliefs, and behaviors.

The complete BRFQ questionnaire consisted of 94 closed-ended questions with multiple, fixed-choices for participants to select as the option he/she felt best answered the question posed. The options were available for the participant to read as well as to hear as the interviewer conducted the study. The survey questions were designed to be able to be answered by a person with a fifth grade education. A single, bilingual interviewer, the principal investigator was used throughout the study. On occasion, the interviewer made note of spontaneous comments by participants when they elaborated on or discussed pertinent issues not otherwise directly addressed in the BRFQ question.

This standardized question-answer format reduced potential biases arising from the interviewer posing a question and recording a verbal answer in its entirety. Potential biases could come from the interviewer mishearing or misunderstanding a verbal response or becoming fatigued or only partially noting responses during the relatively long time it took to administer the BRFQ (30-50 minutes). As only one interviewer was involved, inter-rater calibration was not necessary. Intra-rater reliability was also addressed. The interviewer was thoroughly trained to ensure familiarity with the instrument, question and answer formats, and study purpose. Periodic checks were done to ensure uniformity in administering the BRFQ across a range of locations and occasions. The instrument itself did not influence responses as the participants were not provided with the correct answers from a dental science perspective until the survey had been completed.

There were 30 questions most centrally relevant to early childhood caries and the oral health of young children. Scoring was based on a Likert-scale (four to six points e.g. "strongly disagree to "strongly agree"). Examples of main questions that generated the data analyzed in this article are: "Cavities are caused by germs"; "My child is less likely to get cavities if a dentist or other care provider puts fluoride on his/her teeth"; and "How often do you or another adult help your child brush his/her teeth?"

Potential Vietnamese-speaking study participants were recruited from four different San Jose public libraries via convenience and snowball samplings. To participate in the study, subjects had to be at least 18 years of age, self-identify as Vietnamese, be a parent who regularly cared for a child/children 1-5 years old, be able to speak Vietnamese and provide written informed consent. The bilingual investigator (U.N.) approached people who looked as if they met these criteria, asked in Vietnamese if they spoke Vietnamese, if they had a child/children 1-5 years old and would like to participate in the study. The investigator explained the study purpose in Vietnamese, answered questions and indicated the approximate time involvement in addition to assuring confidentiality.

A total of 189 potential participants were screened for eligibility; 37 did not meet the criteria. Forty-five (29%) eligible parents met the inclusion criteria and gave written informed consent. Participants who completed the survey received five dollars cash compensation for their time and assistance.

The data were collected from January to April 2012. Each interview took approximately 40 minutes. In a private room at the library, the investigator verbally administered the questionnaire with each participant, making sure the subject understood the meaning of each question and could read as well as hear the answer options. The investigator marked the answers on a coded paper copy of the questionnaire during the interview process. At the end of the day, data were then entered into a computer, encrypted with passwords. Hard copies of the surveys were kept in a locked cabinet in the researcher's private office.

Data analysis involved simple descriptive statistics, mean, frequency and proportions, to describe the study population.

Table I: Descriptions of participants' oral health knowledge (N=45)

Statements/Questions	Responses N (%)				
	Strongly Disagree	Disagree	Neutral/ Don't Know	Agree	Strongly Agree
Cavities are caused by germs in the mouth	5(11)	2(5)	4(9)	3(7)	31(69)
Going to bed with a cup or bottle with anything in it but water can hurt a child's teeth *	4(9)	3(7)	3(7)	15(34)	19(43)
Children can get cavities as soon as their first tooth comes in *	6(14)	4(9)	7(16)	8(18)	19(43)
Fluoride varnish helps fight cavities	6(13)	1(2)	13(29)	15(33)	10(22)
At what age should a child stop being fed from a baby bottle?	<b>N (%)</b>				
Age ≤ 1	21(46)				
Age 1.5	4(9)				
Age 2	12(27)				
Age 3	4(9)				
Age 4-5	4(9)				

\*N=44

## Results

The demographics of the study population indicated that although all participants were born in Vietnam, they had resided in the United States, from 1 to 22 years. Approximately 50% of the study population had finished grade 12 or had earned a General Education Diploma; about a 25% finished a four-year college degree or higher. Despite the high education level, approximately 24% were from households living below the Federal Poverty Level. This coincides with the percentage who participated in the Women Infant Children (WIC) supplemental nutrition program for low-income mothers.

### Oral Health Knowledge

The Vietnamese participants demonstrated a range of oral health knowledge (Table I). The majority of the participants knew about the etiology of dental caries; that cavities are caused by germs, and that putting a child to bed with a bottle of sugary liquid is harmful. Almost two-thirds (62%) of the participants agreed that children could develop cavities as soon as the tooth erupts, and the same proportion of participants knew that they should stop bottle feeding at 1 year old. However, 45% of the participants, did not acknowledge the role of fluoride varnish played in preventing cavities.

### Oral Health Beliefs

While a majority (77%) perceived dental problems to be serious for a child and felt that children should see the dentist even when there is no problem, almost half of the survey population thought that primary teeth were not as important as permanent teeth (Table II). Sugary snacks and drinks were deemed harmful by a substantial majority of participants (81%). On the other hand, beliefs about the preventive role of fluoride widely varied; almost half of the participants felt positive about fluoride and half felt negative.

### Oral Health Behaviors

About half of the participants reported that their children brush their own teeth twice a day while 23% of the respondents reported that their children never brushed their own teeth (Table III). None of the participants reported assisting his or her child with tooth brushing on a regular basis. More than

half of the participants reported that their children did not frequently consume sugary drinks and/or snacks before going to bed. Almost a third of the participants did not know if their child's toothpaste contained fluoride. Two of the study respondents reported the practice of pre-mastication.

Routine dental care for children was reported by 75% of the study population (Table IV). Of the proportion of children who received routine dental care, more than one third had accessed care during the past year due to tooth decay or pain.

## Discussion

This study presents an overview of the knowledge, beliefs, and behaviors of a population of urban, migrant Vietnamese parents regarding their young children's oral health. Generally, these findings are consistent with previous studies conducted on the perceptions of caregivers from similar populations.<sup>38-46</sup> Specifically, that parents acknowledge a number of the basic concepts of ECC etiology including the influences of sugar consumption, oral hygiene, and bottle use; that knowledge about the preventive role of fluoride is limited and varied among the population; and, that oral health knowledge and beliefs of parents were not reflected in certain aspects of child-focused oral health behaviors, such as supervision of brushing.

Contrary to some previous findings,<sup>43,46</sup> these results indicate that a high proportion of parents know about the biological mechanisms of caries etiology. These findings, however, do not necessarily imply that the parents in the study population possess in-depth

Table II: Descriptions of participants' oral health beliefs (N=44)

Statements	Responses N (%)				
	Strongly Disagree	Disagree	Neutral/ Don't Know	Agree	Strongly Agree
Dental problems can be serious for a child	3(7)	4(9)	3(7)	10(22)	24(55)
There's no need to go to the dentist unless children have a problem	23(52)	11(25)	2(5)	3(7)	5(11)
There's no need to worry about baby teeth because they will just fall out	15(35)	5(11)	5(11)	13(30)	6(13)
Sugary snacks and drinks can hurt children's teeth	2(5)	4(9)	2(5)	5(11)	31(70)
My child is less likely to get cavities if a dentist or other care provider puts fluoride on his/her teeth	4(9)	5(11)	17(39)	8(18)	10(23)

Table III: Descriptions of participants' oral health behaviors (N=44)

Questions	Response N (%)
How many time does your child brush his/her own teeth a day?	
Never	10(23)
Rarely	3(7)
Once	4(9)
Twice	23(52)
> Twice	4(9)
Don't know	0
How often does your child drink sweet or sugary drinks? (For example: juice, soda, pop, lemonade, Coke, Pepsi, Mountain Dew, Kool-Aid, Gatorade, etc.) Exclude any diet drinks	
Never	6(14)
Rarely	19(36)
Once	29(46)
Twice	1(2)
Don't know	1(2)
How often do you or another adult help your child brush his/her teeth	
Never	11(25)
Rarely	4(9)
Sometimes	29(66)
Always	0
Don't know	0
When your child's teeth are brushed, is fluoride toothpaste used?	
Yes	27(59)
No	5(11)
Don't know	12(27)
Does anyone else pre-chew food to feed child?	
Yes	1(2)
Starting Age (years)	0.5
Stopping Age (years)	3

knowledge about the role of bacteria in caries etiology and mechanism of transmission of dental caries.

Two participants reported the practice of pre-mastication to feed their child. Pre-mastication is pre-chewing of food for the purpose of physically breaking it down in order to feed another who is incapable of chewing the food. This is sometimes done by parents, relatives, or possibly caregivers to produce baby food during the weaning period.<sup>47-49</sup> These participants also reported that their child had received pre-masticated food until they were two and three years of age, respectively. Length of residence in the United States appeared to have little impact on this practice as there was a considerable difference in the length of time that these two participants had spent in the United States: one having been here for only two years and the other for 16 years. The latter participant, however, did not pre-masticate herself but rather knew someone who did that for her child while the other participant pre-masticated the food herself. Although this occurred in a very small percentage of the study population, it is interesting that this phenomenon still exists within a developed country. Furthermore, this practice could be detrimental for a child with a high risk for ECC, if the parents were experiencing active dental caries.

Table IV: Descriptions of dental access behaviors (N=44)

Questions	Mean or N (%)
How old was your child when he/she first saw someone for dental care?	2.5
During the past year, has your child been to the dentist for routine check-up?	
Yes	33(75)
During the past year, did your child see a dentist due to cavities or toothache?	
Yes	12(27)

This study demonstrates that the vast majority of parents seek routine dental care for their children. This finding is confirmed by the oral health beliefs which shows that the proportion of participants who perceived dental problems to be serious for a child was the same proportion of participants who opposed the statement: "There's no need to go to the dentist unless children have a problem." Of the proportion of children who received routine dental care, more than one third stated that they had accessed care during the past year due to cavities or toothache.

Vietnamese parents in this study tended to first seek dental care for their children around 2.5 years of age, which is similar to the results from the 2009 Delta Dental Children's Oral Health Survey from the general population.<sup>50</sup> This is much later than the recommendation of the American Association of Pediatric Dentistry (AAPD), which states that a dental home should be established for infants and young children six months after the first tooth erupts or by 12 months.<sup>51</sup> Early dental visits with a specialized primary dental care provider who performs oral health care and examination, provide an opportunity to implement preventive dental health habits that meet each child's unique needs and keeps the child free from dental or oral disease. However, almost half of the parents in this study agreed that there's no need to worry about baby teeth, a similar result reported in other studies in which caregivers agreed that concern for the deciduous dentition was unnecessary.<sup>52</sup>

The AAPD also recommended that tooth brushing should be performed for children by a parent twice daily<sup>3</sup> and it is generally accepted that this should continue until the child is at least six years of age. The data from this study indicate a lack of compliance with this recommendation. No respondent reported assisting their children with tooth brushing on a regular basis, and a third of the sample reported that they never or rarely assisted their child. This strongly indicates a lack of parental involvement and the need for parental education and behavioral skill-building in this aspect of oral self-care.

Overall, parents showed mixed knowledge and beliefs in the role of fluoride in caries prevention. The topical effect of fluoride in reducing caries from toothpastes, mouth-rinses, professionally applied fluoride varnish and gels is well established.<sup>53-55</sup> However, almost half these participants either didn't know or disagreed with the statement that "fluoride varnish helps fight cavities". This finding is confirmed by similar results to the survey question "my child is less likely to get cavities if a dentist or other care provider puts fluoride on his/her teeth". Furthermore, almost one-third of the parents did not know if their child's toothpaste contained fluoride. These findings provide evidence that Vietnamese parents have limited knowledge on the role of fluoride.

### Limitations

One limitation of this exploratory study is the small and non-random sample, which makes it unfeasible to calculate statistical significance among variables. The use of a single interviewer is also a limitation. There could also be sample selection bias as participants were recruited from one type of location—public libraries. It is not known whether the Vietnamese population who visit the library would have similar knowledge, beliefs, and behaviors to the Vietnamese population at-large in San Jose. Gathering data on several occasions and across different locations

partially mitigates these issues. Generalization to other Vietnamese populations in different regional settings or with different socioeconomic backgrounds should be undertaken with caution. Recall bias could be another possible limitation, as participants were asked to respond to questions regarding past behaviors; for example, "In the past week, how often did you child eat or drink something other than water after brushing and before going to bed?" Social desirability may also affect the responses since this was a verbally administered questionnaire. It is possible that participants responded in ways they feel that they should, rather than reporting how they actually behave. For example, they may have been heard or seen on the public media that people should brush their teeth twice a day. It is also possible that they wished to make a good impression with the interviewer and so provided answers that they knew were ideals to aim for rather than actual behaviors or goals they had achieved. While social desirability is a possibility, the pattern of mixed responses to many items suggests that this did not occur in this particular study.

Currently, clinical oral health data on the status of Vietnamese children aged 5 and under has not been reported in the literature. This is a unique study in that it investigates characteristics of immigrant Vietnamese parents concerning their young children's oral health and as such, it makes a contribution to the literature despite its limitations.

### Recommendations

Further research is required to identify strategies for targeting Vietnamese parents to receive appropriate oral health education and advice. Public health advocates and oral health professionals should focus on parent education that will increase parental oral health behaviors necessary for caries prevention when implementing oral health promotion strategies to lessen oral health disparities.

### Conclusions

In general, most Vietnamese parents had reasonably good knowledge and beliefs about the etiology of dental caries, but this was not adequately reflected in their behaviors, as evidenced by delay in seeking initial oral health care and lack of parental guidance of their children's daily oral hygiene care. Parents exhibited limited knowledge of the preventive role of fluoride. There is a need for parental education emphasizing the preventive role of fluoride and the development of age-appropriate oral care behavior aimed at assisting their young children to acquire and maintain good oral care habits.

### Acknowledgements

The Oral Health Survey instrument, also known as the Behavioral Research Factors Questionnaire (BRFQ), was developed by the NIDCR Early Childhood

Caries Collaborative Centers (EC4) through cooperative agreements with Boston University, the University of California San Francisco, and the University of Colorado Denver, from the National Institute of Dental and Craniofacial Research, National Institutes of Health. We especially thank Eric Trieu for translating the bulk of the survey instrument into Vietnamese. We also thank the San Jose public library system, community members, and the University of California San Francisco Dental Hygiene program for their support.

**Uyen N. Nguyen, RDH, MS** is a graduate of the Master of Science in Dental Hygiene Program at the University of California, San Francisco.

**Dorothy J. Rowe, MS, PhD** is an associate professor emerita, Department of Preventive and Restorative Dental Science; **Judith C. Barker, MA, MSc, PhD** is a professor, Department of Anthropology, History and Social Medicine and associate director, Center to Address Disparities in Children's Oral Health; both at the University of California San Francisco, California.

## References

1. Mouradian WE. The face of a child: children's oral health and dental education. *J Dent Educ.* 2001 Sep;65(9):821-31.
2. US Department of Health and Human Services. Oral health in America: a report of the surgeon general. Rockville: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000. 308p.
3. American Academy of Pediatric Dentistry. Policy on early childhood caries (ECC): classifications, consequences, and preventive strategies. *Pediatr Dent.* 2016 Oct; 38(6):52-54.
4. Casamassimo PS, Thikkurissy S, Edelstein BL, et al. Beyond the dmft: the human and economic cost of early childhood caries. *J Am Dent Assoc.* 2009 Jun;140(6):650-7.
5. Alaki SM, Burt BA, Garetz SL. Middle ear and respiratory infections in early childhood and their association with early childhood caries. *Pediatr Dent.* 2008 Mar-Apr;30(2):105-10.
6. Hallett KB, O'Rourke PK. Pattern and severity of early childhood caries. *Community Dent Oral Epidemiol.* 2006 Feb;34(1):25-35.
7. Tennant M, Namjoshi D, Silva D, Codde J. Oral health and hospitalization in Western Australian children. *Aust Dent J.* 2000 Sep;45(3):204-7.
8. Sheller B, Williams BJ, Lombardi SM. Diagnosis and treatment of dental caries-related emergencies in a children's hospital. *Pediatr Dent.* 1997 Nov-Dec;19(8):470-5.
9. Li Y, Wang W. Predicting caries in permanent teeth from caries in primary teeth: an eight-year cohort study. *J Dent Res.* 2002 Aug;81(8):561-6.
10. Heller KE, Eklund SA, Pittman J, Ismail AA, et al. Associations between dental treatment in the primary and permanent dentitions using insurance claims data. *Pediatr Dent.* 2000 Nov-Dec;22(6):469-74.
11. Peretz B, Ram D, Azo E, et al. Preschool caries as an indicator of future caries: a longitudinal study. *Pediatr Dent.* 2003 Mar-Apr;25(2):114-8.
12. Thomas CW, Primosch RE. Changes in incremental weight and well-being of children with rampant caries following complete dental rehabilitation. *Pediatr Dent.* 2002 Mar-Apr;24(2):109-13.
13. Vargas CM, Ronzio CR. Disparities in early childhood caries. *BMC Oral Health.* 2006 Jun 15;6 Suppl 1:S3.
14. Dye BA, Li X, Thorton-Evans G. Oral health disparities as determined by selected healthy people 2020 oral health objectives for the United States, 2009-2010. *NCHS Data Brief.* 2012 Aug;(104):1-8.
15. Flores G, Tomany-Korman SC. Racial and ethnic disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics.* 2008 Feb;121(2):e286-98.
16. Edelstein BL. Disparities in oral health and access to care: findings of national surveys. *Ambul Pediatr.* 2002 Mar-Apr;2(2 Suppl):141-7.
17. Gibson S, Williams S. Dental caries in pre-school children: associations with social class, tooth-brushing habit and consumption of sugars and sugar-containing foods. Further analysis of data from the National Diet and Nutrition Survey of children aged 1.5-4.5 years. *Caries Res.* 1999;33(2):101-13.
18. Chung LH, Shain SG, Stephen SM, et al. Oral health status of San Francisco public school kindergarteners 2000-2005. *J Public Health Dent.* 2006 Fall;66(4):235-41.

19. Dietrich T, Culler C, Garcia RI, et al. Racial and ethnic disparities in children's oral health: the National Survey of Children's Health. *J Am Dent Assoc.* 2008 Nov;139(11):1507-17.
20. Shiboski CH, Gansky SA, Ramos-Gomez F, et al. The association of early childhood caries and race/ethnicity among California preschool children. *J Public Health Dent.* 2003 Winter;63(1):38-46.
21. Santa Clara County Public Health Department. Santa Clara County health profile report 2010[Internet] Santa Clara: The County of Santa Clara. [cited 2015 Sept 21]. Available from: [https://www.sccgov.org/sites/phd/en-us/Partners/Data/Documents/SCC\\_Health\\_Profile\\_Report\\_online-final\\_.pdf](https://www.sccgov.org/sites/phd/en-us/Partners/Data/Documents/SCC_Health_Profile_Report_online-final_.pdf)
22. Hoeffle EM, Rastogi S, Shahid H. The Asian population:2010 [Internet] United States Census Bureau.[cited 2015 Sept 18] Available from: <https://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf>
23. Bills, M San Jose demographic findings and trends, census 2010 [Internet]. San Jose: City of San Jose;2010 [Cited 2015 Sept18]. 41p. Available from <http://www.sanjoseca.gov/document-center/view/5249>.
24. Santa Clara County Public Health Department. Status of Vietnamese health. [Internet]. Santa Clara County: Santa Clara County Board of Supervisors; 2011Dec 12. [cited 2015 Sept 18].113p Available from <https://www.sccgov.org>
25. Finney Lamb C, Phelan C. Cultural observations on Vietnamese children's oral health practices and use of the child oral health services in Central Sydney: A qualitative study. *Aust J Prim Health.* 2008;14 Apr (1):75-81.
26. Harrison RL, Wong T. An oral health promotion program for an urban minority population of preschool children. *Community Dent Oral Epidemiol.* 2003 Oct;31(5):392-9.
27. Harrison R, Wong T, Ewan C, et al. Feeding practices and dental caries in an urban Canadian population of Vietnamese preschool children. *ASDC J Dent Child.* 1997 Mar-Apr;64(2):112-7.
28. Loc Giang Do, Spencer AJ, Roberts-Thomson KF, et al. Oral health status of Vietnamese children: findings from the National Oral Health Survey of Vietnam 1999. *Asia Pac J Public Health.* 2011 Apr;23(2):217-27.
29. Tanzer JM, Livingston J, Thompson AM. The microbiology of primary dental caries in humans. *J Dent Educ.* 2001 Oct;65(10):1028-37.
30. Wan AK, Seow WK, Walsh LJ, et al. Association of *Streptococcus mutans* infection and oral developmental nodules in pre-dentate infants. *J Dent Res.* 2001 Oct;80(10):1945-8.
31. Reisine ST, Psoter W. Socioeconomic status and selected behavioral determinants as risk factors for dental caries. *J Dent Educ.* 2001 Oct;65(10):1009-16.
32. Rong WS, Bian JY, Wang WJ, et al. Effectiveness of an oral health education and caries prevention program in kindergartens in China. *Community Dent Oral Epidemiol.* 2003 Dec;31(6):412-6.
33. Treasure ET, Chestnutt IG, Whiting P, et al. The York review--a systematic review of public water fluoridation: a commentary. *Br Dent J.* 2002 May 11;192(9):495-7.
34. Griffin SO, Jones K, Tomar SL. An economic evaluation of community water fluoridation. *J Public Health Dent.* 2001 Spring;61(2):78-86.
35. Söderling E, Isokangas P, Pienihäkkinen K, et al. Influence of maternal xylitol consumption on mother-child transmission of mutans streptococci: 6-year follow-up. *Caries Res.* 2001 May-Jun;35(3):173-7.
36. Gripp VC, Schlagenhauf U. Prevention of early mutans streptococci transmission in infants by professional tooth cleaning and chlorhexidine varnish treatment of the mother. *Caries Res.* 2002 Sep-Oct;36(5):366-72.
37. Fisher-Owens SA, Gansky SA, Platt LJ, et al. Influences on children's oral health: a conceptual model. *Pediatrics.* 2007 Sep;120(3):e510-20.
38. Okada M, Kawamura M, Kaihara Y, et al. Influence of parents' oral health behaviour on oral health status of their school children: an exploratory study employing a causal modelling technique. *Int J Paediatr Dent.* 2002 Mar;12(2):101-8.
39. Chhabra N, Chhabra A. Parental knowledge, attitudes and cultural beliefs regarding oral health and dental care of preschool children in an Indian population: a quantitative study. *Eur Arch Paediatr Dent.* 2012 Apr;13(2):76-82.



40. Saied-Moallemi Z, Virtanen JI, Ghofranipour F, et al. Influence of mothers' oral health knowledge and attitudes on their children's dental health. *Eur Arch Paediatr Dent*. 2008 Jun;9(2):79-83.
41. Rajab LD, Petersen PE, Bakaeen G, et al. Oral health behaviour of schoolchildren and parents in Jordan. *Int J Paediatr Dent*. 2002 May;12(3):168-76.
42. Amin MS, Harrison RL. Understanding parents' oral health behaviors for their young children. *Qual Health Res*. 2009 Jan;19(1):116-27.
43. Horton S, Barker JC. Rural Latino immigrant caregivers' conceptions of their children's oral disease. *J Public Health Dent*. 2008 Winter;68(1):22-9.
44. Szatko F, Wierzbicka M, Dybizbanska E, et al. Oral health of Polish three-year-olds and mothers' oral health-related knowledge. *Community Dent Health*. 2004 Jun;21(2):175-80.
45. Mani SA, Aziz AA, John J, et al. Knowledge, attitude and practice of oral health promoting factors among caretakers of children attending day-care centers in Kubang Kerian, Malaysia: a preliminary study. *J Indian Soc Pedod Prev Dent*. 2010 Apr-Jun;28(2):78-83.
46. Gussy MG, Waters EB, Riggs EM, Lo SK, Kilpatrick NM et al. Parental knowledge, beliefs and behaviours for oral health of toddlers residing in rural Victoria. *Aust Dent J*. 2008 Mar;53(1):52-60.
47. Imong SM, Jackson DA, Rungruengthanakit K, et al. Maternal behaviour and socio-economic influences on the bacterial content of infant weaning foods in rural northern Thailand. *J Trop Pediatr*. 1995 Aug;41(4):234-40.
48. Radbill SX. Infant feeding through the ages. *Clin Pediatr (Phila)*. 1981 Oct;20(10):613-21.
49. Lewis CW, Riedy CA, Grossman DC, et al. Oral health of young Alaska Native children and their caregivers in Southwestern Alaska. *Alaska Med*. 2002 Oct-Dec;44(4):83-7.
50. New survey from Delta Dental finds kids need brushing up on oral health. [Internet] Delta Dental [cited 2015 Sept 20] Available from <https://www.deltadental.com/Public/NewsMedia/News-ReleaseKidsNeedBrushingUp201302.jsp>.
51. American Academy of Pediatric Dentistry. Guideline on caries risk assessment and management for infants, children and adolescents. [Internet] Clinical Practice Guidelines. 2014; 38;(6) 142-149-34.[cited 2015 Sept 21] Available from: [http://www.aapd.org/media/Policies\\_Guidelines/G\\_CariesRiskAssessment7.pdf](http://www.aapd.org/media/Policies_Guidelines/G_CariesRiskAssessment7.pdf). A
52. Hilton IV, Stephen S, Barker JC, et al. Cultural factors and children's oral health care: a qualitative study of carers of young children. *Community Dent Oral Epidemiol*. 2007 Dec;35(6):429-38.
53. Weintraub JA, Ramos-Gomez F, Jue B, et al. Fluoride varnish efficacy in preventing early childhood caries. *J Dent Res*. 2006 Feb;85(2):172-6.
54. Marinho VC, Higgins JP, Logan S, et al. Fluoride gels for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2015;6:CD002280.
55. Twetman S. Prevention of early childhood caries (ECC)--review of literature published 1998-2007. *Eur Arch Paediatr Dent*. 2008 Mar;9(1):12-8.