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Parental Oral Health Beliefs and Practices toward Young Children's Dental Caries among
Chinese Immigrant Parents

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A dissertation

submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

University of Washington

2017

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School of Nursing

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Abstract

Parental Oral Health Beliefs and Practices toward Young Children's Dental Caries among Chinese Immigrant Parents

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Background. Dental caries is the most common chronic childhood disease. Chinese immigrant children have higher decayed and filled primary teeth than their US counterparts. There is limited information regarding Chinese American immigrant families' oral health beliefs and practices, which could influence their children's oral health outcomes. This study generated new knowledge about parental oral health beliefs and practices toward early childhood caries among Chinese immigrant parents toward the long-range goal of improving immigrant children's oral health. Aims. The overall goal of this cross-sectional descriptive study was to describe Chinese immigrant parents' Explanatory Model of dental caries

(etiology, onset of symptoms, pathophysiology, course of caries, treatment) and the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral-health care of their children. Methods. Purposive and modified respondent-driven samplings were used to recruit Chinese immigrant parents of children aged 0-6 years through Chinese immigrant agencies and participant referrals in King County, Washington. Participants completed in-person, semi-structured interviews that included perceived influencing factors in order to capture cultural and personal perspectives about early childhood caries and children's oral health care. Interviews were audio-recorded, transcribed verbatim in Chinese and analyzed using content analysis. Results. Forty-six parents participated in the study. Parents believed the causes of dental caries included diet and oral hygiene habits, biological and somatic factors (inheritance, genetic, inborn and transmission issues), children's biting fingers habit, and lack of routine dental visits. They held different understandings on the age of onset for dental caries. Most parents recognized the onset of disease through dental examinations, children's toothaches, and color changes on their children's teeth. Parents were familiar with dental caries through personal experiences and experiences with their friends' children. Parents believed childhood caries had the potential to have a short-term or lifelong negative impact on their children. Most parents would immediately seek professional help for caries treatment, but indicated that information about dental caries and its prevention was needed from dental professional. Furthermore, results from the analysis using a framework derived from a critical analysis of

Chinese culture revealed that 11 concepts were reflected in parents' oral-health beliefs and practices. Parents believed that they: (1) had an obligation for their children's oral care; (2) valued their children's training in oral care; (3) expected children to be independent in tooth brushing; (4) allowed children to receive sweets as gifts from relatives; (5) expressed fatalism regarding children's dental caries; (6) believed kinship contributed to children's dental caries; (7) obeyed dentists' authority; (8) avoided confrontation with dentists and family members; (9) demonstrated group orientation related to friends' dental knowledge and advice; (10) valued face related to children's physical facial appearance; and (11) were concerned dental caries would affect their children's school achievement. Results from the analysis using a framework derived from a critical analysis of Chinese health beliefs and behaviors revealed that eight domains were related to their oral-health beliefs and practices, including (1) belief regarding primary teeth; (2) belief regarding tooth worms; (3) belief regarding gum bleeding; (4) belief regarding sugary foods; (5) belief regarding a balanced diet; (6) belief regarding self-care; (7) belief regarding the need for dental care services; and (8) belief regarding tooth extraction. Implications. Explanatory Model of dental caries could be applied to assess parental beliefs and practices towards childhood dental caries. Understanding of Chinese culture, health beliefs and behaviors could be helpful in developing oral-health interventions in relation to family needs. Caries prevention intervention is needed to facilitate parents' daily assistance roles in children's oral hygiene behaviors, as well as healthy diet habits. The

knowledge served as a foundation for developing a conceptual framework for designing culturally relevant family-focused interventions to improve immigrant children's oral health.

TABLE OF CONTENTS

List of Figures	iii
List of Tables	iv
Chapter 1: Introduction to the Study	1
Introduction	1
Statement of the Problem.....	1
Purpose of the Study.....	3
Theoretical Perspective	5
Significance of the Study	6
Chapter 2: Literature Review.....	14
Introduction of Oral Health in Young Children.....	14
Oral Health Guidelines for Young Children	20
Anatomy of Teeth and Development of Occlusion.....	22
Pathophysiology of Dental Caries.....	24
Treatment and Prevention Related to Dental Caries in Young Children.....	27
Chinese Family System.....	30
Chinese Culture, Chinese Health Beliefs and Behaviors.....	35
Chapter 3: Research Method.....	47
Study Setting	48
Target Sample and Sampling Methods.....	48
Participant Recruitment.....	50
Data Collection Methods and Procedures	51
Data Management and Analysis.....	54
Chapter 4: Results	58

Parents’ Perceived Causes of Childhood Caries	62
Parents’ Perceived Timing and Reasons for the Start of the Symptoms.....	73
Parents’ Perceived Impact of Childhood Caries on the Children	76
Parents’ Perceived Duration of Impact of Childhood Caries.....	82
Parents’ Expectations of Treatment for Childhood Caries.....	83
The Impact of Chinese Culture, Chinese Health Beliefs and Behaviors.....	95
Chapter 5: Discussion and Recommendations.....	130
Discussion.....	130
Recommendations.....	159
References	164
Appendix A. Sampling Flow Chart.....	194
Appendix B. Interview Guide for the Explanatory Model.....	195
Appendix C. Parental Oral Health Belief and Practices Questionnaire.....	196
Appendix D. Cross-Checked Coding: Unitized Data.....	198
Appendix E. An Example of the Confirmability Audit.....	220
Appendix F. Explanatory Models of Etiology of Childhood Caries.....	252

LIST OF FIGURES

Figure 1. Flow Chart Showing the Results of the Search Process.....	38
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LIST OF TABLES

Table 1. Concepts and Definitions Based on Explanatory Model.....	6
Table 2. Search Algorithms of Chinese Culture, Chinese Health Beliefs and Behaviors.....	37
Table 3. Definitions of 24 Concepts Related to Chinese Culture.....	39
Table 4. Descriptions of 13 Concepts Related to Chinese Health Beliefs and Behaviors.....	44
Table 5. A Multi-Phased Process of Content Analysis.....	56
Table 6. Study Sample Characteristics.....	60
Table 7. A Summary Results of Aims 1-5.....	61
Table 8. Example Quotes of Chinese Culture.....	118
Table 9. Example Quotes of Chinese Health Beliefs and Behaviors.....	123

ACKNOWLEDGEMENTS

This dissertation would not have been possible without the support of

Committee Members: I would like to express my deepest gratitude to my Chair, Dr. Frances Marcus Lewis for her unlimited support, encouragement, and guidance throughout my dissertation process. She has shared her extensive knowledge and passion for scientific nursing research. I am extremely thankful to Dr. Donald Chi for his invaluable help and advice regarding oral-health care for young children. He always challenges me to think outside of the box and has shown me the excellence of an outstanding dental scientist. I am also grateful to Dr. Amy Walker for her discussions on health and wellbeing of children and parenting. Special appreciation also goes to Dr. Eunjung Kim, my ex-committee member, for her expertise and invaluable insights regarding cultural aspects that helped me in refining my work.

Study Participants and Community Partners: I would like to thank my anonymous participants for their willingness to participate in this study and staff of two Chinese community agencies who helped me in participants' recruitment. It was such a treasured experience of interviews with Chinese immigrant parents. They brought me joy and challenged me to be a better health science researcher.

Family and Friends: I am grateful to the most important people in my life, my dear family, for all their love and support from Taiwan. I wish to especially thank my colleagues in Fooying University, Ling-Hua Wang and Yu-Hsiang Liu, for their endless mental support and believing in me. For helpful comments, inspiring friendship and warm support, I would like to also thank the wonderful friends I made at the University of Washington including Steven Simpkins, Rita Ismail, Nai-Ching Chi, Musetta Fu, Shih-Yin Lin, and Sunny Cheng.

Funding Sources: I am greatly honored to receive several scholarships throughout my doctoral program from Hester McLaws Nursing Dissertation Scholarship, Sharma Nursing Fellowship, Dedicated Aid Fund, Todak and McCurdy Scholarships, Pascoe Scholarship Nursing Fund, Donna M. Fraser Endowed Scholarship, Robert L. and Catherine M. Zesbaugh Endowed Nursing Fund, and Fooyin University Scholarship. I appreciate all the donors and sponsors of these scholarships that have greatly facilitated my doctoral study.

Chapter 1: Introduction to the Study

Introduction

Dental caries is the most common chronic childhood disease in the United States, occurring five times more frequently than asthma (US Department of Health and Human Services, 2000). Notably, the prevalence of dental caries in children aged 2-5 years increased from 24% in 1988-1994 to 28% in 1999–2004 (Dye et al., 2007). In 2011-2012, about 37% of children aged 2-8 years had caries in their primary teeth with 14% having untreated caries (Dye, Thornton-Evans, Li, & Iafolla, 2015).

Oral health is essential to the general health and well-being of an individual. Untreated caries can lead to problems in eating, nutrition, speaking, sleeping and negative consequences for school performance and social interactions (Blumenshine, Vann, Gizlice, & Lee, 2008; Muirhead & Marcenes, 2004; Schroth, Levi, Kliewer, Friel, & Moffatt, 2013). It can further influence quality of life of children and their family members, and lead to expensive medical treatments (Acharya & Tandon, 2011; Martins-Júnior, et al., 2013; Wong, McGrath, King, & Lo, 2011). One of the Healthy People 2020 objectives is to reduce the proportion of children aged 3-5 years having dental caries in at least one primary tooth from 33.3% (baseline in 1999–2004) to 30% (US Department of Health and Human Services, 2015).

Statement of the Problem

Immigrant children have a higher caries prevalence rate than their US counterparts, and

oral health status is different across racial/ethnic groups. For instance, the prevalence rate of dental caries in primary teeth of 6- and 7-year-old recent immigrant children was twice as that of their US counterparts (Beltrán-Aguilar, et al., 2005; Pollick, Rice, & Echenberg, 1987; US Department of Health and Human Services, 2000). Further, young children with immigrant backgrounds have three times higher caries rates than non-immigrants (Nunn, Dietrich, Singh, Henshaw, & Kressin, 2009). In California, Asian American children enrolled in Head Start were more likely to have caries than those from non-Hispanic White origin (Shiboski, et al., 2003). In New York City, Chinese American children aged 2-5 years were found to have a higher mean number of decayed and filled primary teeth (3.25 dft) compared to non-Hispanic Whites (0.97 dft), Mexican Americans (1.7 dft), and non-Hispanic Blacks (1.14 dft) in the 1999-2002 National Health and Nutrition Examination Survey (Chinn, Cruz, & Chan, 2011).

Scholars have suggested that the most important factors for children oral health are family and child oral health-related behaviors (Caple & Schub, 2015; Harris, Nicoll, Adair, & Pine, 2004; Hooley, Skouteris, Boganin, Satur, & Kilpatrick, 2012). There is limited information regarding Chinese immigrant parents' oral health beliefs and practices in the US. To advance Healthy People 2020 objectives and to fill knowledge gaps in Asian American children's oral health, this research represented an endeavor to explore oral health among Chinese Americans, the largest subgroup of the Asian American population (US Bureau of

Census, 2010), focusing on parents' oral health beliefs and practices related to dental caries prevention in young children aged 0-6 years.

Purpose of the Study

Existing literature suggests that parents' oral health beliefs are related to their practices toward their children's oral care and oral health-related behaviors, which are subsequently associated with children's dental caries (Gao, Xu, Loh, Koh, & Hwang, 2012; Pine, et al., 2004). In addition, culture influences family health beliefs and the way parents practice oral care for their children (Adair, et al., 2004; Hilton, Stephen, Barker, & Weintraub, 2007). However, the majority of prior studies have used quantitative approaches that cannot clearly explain why parents of diverse cultures had different beliefs and behaviors toward children oral health (Adair, et al., 2004; Buunk-Werkhoven, Dijkstra, Bink, van Zanten, & van der Schans, 2011; Pine, et al., 2004). A recent systematic review concluded that few studies have explored parents' attributes and beliefs, and none have explored possible relationships between multiple influences of caries and individual, familial, and socio-cultural contexts (Hooley, et al., 2012). The Explanatory Model (EM) of health/illness (Kleinman, Eisenberg, & Good, 1978; Kleinman & Benson, 2006), developed to explore cultural beliefs of a specific disease/illness, was used to generate an open-ended interview schedule in order to better describe parental beliefs and behaviors toward childhood dental caries.

Overall Goal and Specific Aims

The overall goal of this cross-sectional descriptive study was to describe Chinese immigrant parents' Explanatory Model of dental caries (etiology, onset of symptoms, pathophysiology, course of caries, treatment) and the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral health care of their children. The specific aims were:

1. To describe parents' perceived causes of childhood caries (etiology)
2. To describe parents' perceived timing and reasons for the start of the symptoms (onset of symptoms)
3. To describe parents' perceived impact of childhood caries on the child (pathophysiology)
4. To describe parents' perceived duration of impact of childhood caries (course of caries)
5. To describe parents' expectations of treatment for childhood caries (treatment)
6. To describe the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral health care of their children

Using a qualitative design, this study provided detailed descriptions about Chinese immigrant parents' views regarding dental caries and the influences of Chinese cultural beliefs and health behaviors on their oral-health beliefs and practices in young children. The goal of such descriptions will be to lay a foundation from which to develop interventions to improve oral health-related behaviors in Chinese immigrant families, including the design of culturally sensitive care to improve oral-health to Chinese immigrant families.

Theoretical Perspective

Kleinman's Explanatory Model (EM) was chosen as a general theoretical framework to guide the dissertation (Kleinman and Benson, 2006). The model emphasizes understanding individuals' explanations and responses to disease/illness based on their lived experiences in their social worlds. The emphasis of the model is on illness, not on disease (Kleinman & Benson, 2006). Kleinman, Eisenberg and Good (1978) justified disease and illness as the following:

Disease in the Western medical paradigm is malfunctioning or maladaptation of biologic and psychophysiologic processes of in the individual; whereas illness represents personal, interpersonal, and cultural reactions to disease or discomfort... Because illness experience is an intimate part of social systems of meaning and rules for behavior, it is strongly influenced by culture. (p. 252)

The EM enables us to capture concepts or issues related to: etiology, onset of symptoms, pathophysiology, course of illness, and treatment and was primarily used to structure a clinical interview. Its goal is to start a conversation and to enable providers leave their expert knowledge behind the patient's own explanation. For instance, questions like "What do you call this problem?" and "What do you believe is the cause of this problem?" (Kleinman, et al., 1978; Kleinman & Benson, 2006). Also, the EM has been used to study phenomena such as diabetic patients' non-adherent behaviors; folk concepts/beliefs of mental disorders in

Chinese populations and Mexican-American mothers' views of caries (Hsiao, Klimidis, Minas, & Tan, 2006; Lai, Chie, & Lew-Ting, 2007; Lin, 2013; Nelson, Rogo, Boyd, & Cartwright, 2008). The studies with Chinese populations illustrated patients' beliefs and concerns of diabetes complications and treatment, and beliefs about causes, symptoms and stigma associated with mental illness (Hsiao, et al., 2006; Lai, et al., 2007; Lin, 2013). The study with Mexican mothers found that the mothers recognized the onset of dental caries through pain and used home remedies to reduce pain. However, the mothers were not aware of the cause of caries (Nelson, et al., 2008).

Concept Definitions

Table 1 summarizes concepts in study aims and the definitions of each concept relevant to this current study.

Table 1 Concepts and Definitions Based on Explanatory Model

Aims	Concepts	Definitions
Aim 1	Etiology	Perceived causes of childhood caries
Aim 2	Onset of Symptoms	Perceived timing and reasons for the start of the symptoms
Aim 3	Pathophysiology	Perceived impact of childhood caries on the child
Aim 4	Course of Caries	Perceived duration of impact of childhood caries
Aim 5	Treatment	Expectations of treatment for childhood caries

Significance of the Study

Oral Health in Children of Chinese Immigrant Parents

Between 2000 and 2010, the Asian population experienced the fastest growth rate in the US. About 14.7 million Americans (4.8% of the US population) identified themselves as Asian alone in the 2010 census (US Bureau of Census, 2010). Chinese is the largest Asian group in the US, accounting for four million or 23% of the Asian population. In the US, about 479,000 children resided with at least one Chinese-born parent in 2010. In Washington State, 93,809 (20%) of Asians were Chinese in 2010 (McCabe, 2012; US Bureau of Census, 2010).

Scant information is known about the oral health of children of Chinese immigrant parents in either in the dental or medical literature (Chinn, et al., 2011). The Smile Survey 2010 in Washington State showed that Asian kindergarteners had a higher caries rate (44.5%) and a untreated decays rate (20.3%), compared with those of Non-Hispanic White kindergarteners (33.5% and 11.6%, respectively) (Washington State Department of Health, 2010). In comparison with US White young children, US Chinese children have a higher dental caries rate (49% versus 21%) and a higher mean of caries experience in primary teeth (6.4 versus 5.0) (Pine, et al., 2004). Limited research makes identification of oral health-related problems in children of Chinese immigrants difficult, and may mask oral health needs in this population (Chinn, et al., 2011).

Relationships between Dental Caries and Child Oral Health-related Behaviors

Multiple factors are associated with young children's oral health outcomes, ranging from the child-level (e.g., age, gender, oral health-related behaviors), to family-level (e.g.,

socioeconomic status, family composition, parental oral health knowledge, beliefs and behaviors), to neighborhood-level (e.g., dental care system characteristics, access to fluoridated water) (Bramlett, et al., 2010; Finlayson, Siefert, Ismail, & Sohn, 2007; Harris, et al., 2004; Pine, et al., 2004; Wigen & Wang, 2014). According to recommendations by the American Academy of Pediatric Dentistry (AAPD), child oral health-related behaviors are crucial factors for preventing dental caries (American Academy of Pediatric Dentistry, 2013).

From the published literature, three main child oral health-related behaviors including sweet consumption, tooth brushing and dental visiting are associated with caries in young children. The frequency of sweet snacks/drinks consumption is known to be positively associated with dental caries in young children (Han, et al., 2014; Wong, Lu, & Lo, 2012). Tooth brushing frequency and fluoridated toothpaste brushings in young children are known to be negatively associated with dental caries (Levy, Warren, Broffitt, Hillis, & Kanellis, 2003; Vázquez-Nava, et al., 2008). Preschool children who initiate tooth brushing before 12 months of age are known to have significantly fewer dental caries than those who do not (Chu, Ho, & Lo, 2012). A 1999-2002 national data showed there was an association between not using routine dental visits within the last year and the risk for caries in children aged 2-5 (Iida, Auinger, Billings, & Weitzman, 2007). Preschool children in Hong Kong who had regular dental visits were less likely to have dental caries than those who did not (Chu, Fung, & Lo, 1999). Taken together, these three oral health-related behaviors play crucial roles in

caries prevention, but further exploration is needed to examine how these behaviors are related to parental beliefs and family context within a Chinese immigrant population.

Parental Factors Related to Child Oral Health-Related Behaviors

Among factors associated with young children's oral health-related behaviors (Adair, et al., 2004; Amin & Harrison, 2009; Finlayson, et al., 2007), parental and family factors are considered the most important immediate contextual factors because children usually live with their families and depend on parents for traditional caregiving functions, including oral health care (Caple & Schub, 2015; Chung, 2013; Harris, et al., 2004; Hooley, et al., 2012). Research indicates that children do not have adequate brushing ability until 5 years of age and most mothers help their children aged 6 to 60 months brush (Franzman, Levy, Warren, & Broffitt, 2004; Ogasawara, Watanabe, & Kasahara, 1992). Parents determine when to institute regular dental care (Finlayson, Siefert, Ismail, Delva, & Sohn, 2005). Children are likely to adapt health beliefs and behaviors from parents (Holley, et al., 2012).

Parental factors associated with young children's oral health-related behaviors include beliefs, attitudes, knowledge, self-efficacy, tooth brushing and routine dental visit behaviors, and socio-demographic factors. Research has revealed that parents' beliefs and attitudes towards oral health may enhance or prevent them from practicing preventive oral care such as diet, tooth brushing, and dental attendance, for their children (Adair, et al., 2004; Hilton, et al., 2007; Pine, et al., 2004; Wong, Perez-Spiess, & Julliard, 2005). Parents' lack of knowledge

and awareness of the importance of the primary teeth, dental fear, and perception about dental treatment create barriers to early preventive dental care of preschool children (Chhabra & Chhabra, 2012). Furthermore, mothers' knowledge about children's oral hygiene was positively associated with tooth brushing frequency (Finlayson, et al., 2007). Parents' perceived ability to control their children's sugar snacking and tooth brushing habits was the most significant predictor of children's oral health habits (Gao, et al., 2012). If mothers brushed their teeth at bedtime, their children's brushing frequency was expected to increase (Finlayson, et al., 2007). When parents had a dental visit, their children were more likely to have a dental visit (Isong, et al., 2010). Lower educational level of parents was related to a higher consumption of sugar drinks between meals, a lower brushing frequency, a less time of brushing, a longer time for toothbrush change, and a lower use of dental services of the child (Barrow, 2012; Finlayson, et al., 2007; Van den Branden, Van den Broucke, Leroy, Declerck, & Hoppenbrouwers, 2013).

Chinese parental oral health beliefs and behaviors

Cultural groups differ in the psychological factors that determine oral health-related behaviors, such as oral hygiene behaviors (Buunk-Werkhoven, et al., 2011). A systematic review assessed literature related to oral health-related cultural beliefs found limited information was available for specific racial/ethnic groups in the US, including Chinese population (Butani, Weintraub, & Barker, 2008). International cross-sectional studies showed

that in comparison with US White parents, US Chinese parents tended to be more negative about their abilities to prevent dental caries, control children's sugar snacking, and make their children brush teeth. They also tended to delay start brushing age and to be less involved with their children's brushing. Chinese parents also had the lowest mean score of perceived seriousness of tooth decay in children, compared to Whites, Mexican-Americans, and African-Americans (Adair, et al., 2004; Pine, et al., 2004). Few qualitative studies in the US explored Chinese immigrant parents' oral health beliefs and behaviors when their child experienced severe caries (Amin & Harrison, 2009; Wong, et al., 2005). Feeding habits (e.g., sleeping with a feeding bottle, high sugar diet), lack of oral hygiene knowledge (e.g., tooth brushing, dental checkups instructions), and beliefs (e.g., baby teeth are not important, children learn to brush on their own, preventive dental cleanings damage teeth, general anesthesia or sedation damages the child's brain) (Wong, et al., 2005) were found related to childhood caries and oral health-related behaviors. Chinese immigrant parents' cultural beliefs such as sugary foods playing an important role in their child's physical development, and relying on health professionals for children's caries prevention, were identified as barriers to healthy behavior change. Parents with more confidence in their ability to carry out oral health practices were more likely to maintain diet control and tooth brushing behaviors (Amin & Harrison, 2009).

Family Factors Related to Child Oral Health-Related Behaviors

An analysis of the published literature reveals three family factors that have the potential to influence young children's oral health-related behaviors: family income, family support, and family routines. For instance, increased family income was positively associated with a child's brushing frequency and having a previous year dental checkup (Finlayson, et al., 2007; Valencia, et al., 2012). Social support from extended family was reported as a facilitator for regular brushing (Huebner & Riedy, 2010); a lack of family support created barriers for US Chinese immigrant parents to seek dental treatment for their children (Wong, et al., 2005). Grandparents were known to influence children's access to preventive dental care such as making appointments and selecting providers across Chinese, Filipino, Latino, and African American families (Hilton, et al., 2007). Siblings were also identified as role models for tooth brushing for their younger siblings (Stokes, Ashcroft, & Platt, 2006). In addition, infants and preschoolers are healthier when their family has predictable routines (Fiese, et al., 2002). Although family routines have not been explored for oral health, gleaned from the literature (Fiese, et al., 2002; Spagnola & Fiese, 2007), young children's development of oral health practices could be influenced by their family routines around oral health care (Hooley, et al., 2012; Stokes, et al., 2006).

Studying family factors is particularly relevant and important to Chinese immigrant families. The family is considered the basic unit of a society (Goody, 1976; Hilton, et al., 2007; Wong, et al., 2005). One essential function of the family in Chinese culture is to train

children to be obedient, independent, excellent, caring, and sociable. For instance, independence is an important theme in Confucian tradition as well as in child socialization in many societies (Fong, 2007). Chinese parents usually want their children to develop independence, which can help them to endure hardship (Fong, 2007). In Chinese societies, Chinese believe that children aged less than six years are incapable of comprehending information; thus preschool children are treated with leniency and indulgence. Once children reach four to six years, disciplinary techniques such as threatening, scolding and shaming become acceptable (Ho, 1986; Ho, 1989). Grandparents often participate in childcare with the parents (Chang, 2007; Goh, 2009). It is unclear how Chinese family members are involved in training children's oral health behaviors in the current era and the barriers that they may encounter.

Cultural Factors Related to Parental Oral Health-Related Beliefs and Behaviors

Confucianism, Buddhism, and Taoism are three main philosophies or religions that strongly influence the Chinese way of living and thinking, including health-related beliefs and behaviors (Chen, 1996, 2001; Lai & Surood, 2009). The principles of Confucianism mainly influence Chinese socialization and behaviors (Chen, 2001). Buddhism addresses the cycle of life, and believes that illness, aging, and death are natural and inevitable life processes (Goss, et al., 2014). Taoism addresses that human beings should be in harmony

with nature. Human beings must modify themselves to fit the natural universe in order to reach peace mind and health (Chen, 2001).

Up to now, little attention has been paid to how Chinese culture might inform or influence oral health-related beliefs and behaviors (Smith, et al., 2013). Hence, we were motivated to review key concepts relevant to Chinese culture, health beliefs and behaviors among Chinese people and Chinese immigrants from literature.

Chapter 2: Literature Review

This section draws from the published literature to describe the key concepts and components of young children's oral health, the causes and prevention of dental caries, and Chinese cultural beliefs, Chinese health beliefs and behaviors about oral health care. The text includes an introduction of oral health in young children; oral health guidelines for young children; the anatomy of teeth, development of occlusion, pathophysiology of dental caries, treatment and prevention related to dental caries in young children; Chinese family system; and Chinese culture, Chinese health beliefs and behaviors.

Introduction of Oral Health in Young Children

Definition of oral health

The broad definition of oral health was offered by Yewe-Dwyer (1993): "Oral health is the state of the mouth and associated structures where disease is contained, future disease is inhibited, the occlusion is sufficient to masticate food and the teeth are of a socially

acceptable appearance” (p. 225)

In 2000, the Surgeon General further addressed that oral health is integral to general health. In general, oral health refers to the health of the craniofacial complex which comprises the oral, dental and craniofacial tissues. Recently, members of the dental profession claimed that the oral cavity is an important part of the body. It can affect many systems of human body (Mattheus, 2010). According to the statement of World Health Organization (WHO) in 2012, oral health is a state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects, periodontal disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity. In addition, the Healthy People 2020 has emphasized that good oral health can improve a person’s ability to speak, smile, smell, taste, and make facial expressions. Furthermore, each person’s description about his/her oral health could be different based on age, education, socioeconomic status, ethnicity, and culture (Mattheus, 2010).

Factors related to young children’s oral health

Multilevel factors are related to children’s oral health outcomes, including (1) child-level factors (e.g., age, gender, ethnicity, dental insurance, last dental visit time, ever breastfed, diet, oral hygiene practices), (2) family-level factors (e.g., parent’s health status, family structure, number of adults/children in household, socioeconomic status, parental health knowledge and behaviors, parental health beliefs and attitudes, language spoken at

home, child's born country, parent's years of residence in the US, parental oral health status), and (3) community-level factors (e.g., fluoridated water, neighborhood status, Metropolitan Statistical Area status). Furthermore, the evolution of oral health and influences on the child over time (Bramlett, et al., 2010; Dye, Vargas, Lee, Magder, & Tinanoff, 2011; Harris, et al., 2004; Hooley, et al., 2012; Kawashita, et al., 2009; Pine, et al., 2004). Oral health is dynamic. Each child has a unique developmental trajectory when he/she encounters different risk factors with age change (Fisher-Owens, et al., 2007). These combinations of risk factors can lead to poor outcomes of oral health.

There are multiple known risk factors for dental caries for children in the US. These are (1) low-income; (2) infants from families of low socioeconomic status, whose mothers have low educational levels, and whose diets are high in sugar; (3) frequent consumption of foods that are high in refined carbohydrates; (4) use of unfluoridated water; (5) high levels of mutans streptococci (MS) in the oral cavity that commonly occur by sharing utensils; (6) lack of or irregular dental visits and delay in professional teeth cleanings, (7) ineffective tooth brushing (e.g. infrequent), and using unfluoridated toothpaste; (8) untreated maternal caries, and (9) insufficient tooth enamel or saliva due to medical conditions (American Academy of Pediatric Dentistry, 2013; 2014; Chinn, et al., 2011).

Oral health outcomes in young children

A variety of children's oral health outcomes has been used to study dental caries in young children. Most studies measured dental caries by describing the variation of the number of decayed (Dd), missing (Mm), filled (Ff) surfaces (Ss) or teeth (Tt) rates of primary (dmft) and permanent (DMFT) teeth or presence/absence of caries (e.g., DMFT/dmft >0); others reported caries prevalence based on parental report. The majority of studies identified caries at the cavity level adhered to World Health Organization examination methodology and diagnostic criteria, with few studies identifying caries at pre-cavity level (Hooley, et al., 2012). Other oral diseases outcomes include oral bacterial levels of mutans streptococci, enamel hypoplasia, the Periodontal Index, and dental admissions (Bullen, Rubenstein, Saravia, & Mourino, 1988; Quinonez, et al., 2001; Slack-Smith, et al., 2009). Further, numbers of studies examined the effects of early childhood caries on children's oral health-related quality of life, quality of life of parents and family members (Acharya & Tandon, 2011; Filstrup, et al., 2003; Wong, McGrath, King, & Lo, 2011). The Surgeon General's report documented numerous studies about the negative consequences of poor oral health, including eating, speaking, and developmental issues (e.g., social interaction, self-esteem) (US Department of Health and Human Services, 2000). Other oral health related outcomes include parent's report of child's oral health condition (Bramlett, et al., 2010), dental cleanliness (visible plaque) (Spitz, Weber-Gasparoni, Kanellis, & Fang, 2006),

parent's beliefs, attitudes and behaviors related to children's oral health (Adair, et al., 2004; Pine, et al., 2004), and parent's oral health knowledge (Finlayson, et al., 2007).

Oral health promotion in young children

Because being a child from a family with low socioeconomic status places a child at higher risk for poor oral health, scholars have suggested that promoting children's oral health requires the "will to act." Changes and interventions are needed at all levels as following: (1) distal/macro level: a "structural readjustment" in the political process allows all people, regardless of social status, equitable access to dental care. Programs that reduce discriminative practices and increase multicultural awareness are also needed (Patrick, et al., 2006; Watt, 2012); (2) intermediate/ community level: expanding the number of public dental clinics and primary care programs is essential. Health care providers (dental professionals and non-dental professionals) should provide oral health education to parents, be culturally sensitive, and prioritize disadvantaged groups. Structural changes include providing affordable healthy foods and drinks, appropriate hygiene and sanitation facilities, and safe play and recreational facilities (Patrick, et al., 2006; Watt, 2012); (3) proximal/individual level: individuals (parent and child) should know the importance of oral hygiene practices, health foods and limited sugar intake, and dental visits. Moreover, oral health literacy programs can strengthen individual's ability to cope with adversity (Patrick, et al., 2006; Watt, 2012).

A number of empirical studies have shown the positive impact of oral health-related interventions or programs on young children's oral health outcomes across countries. However, it appears that few studies have been conducted in the United States. For example, North Carolina implemented a program to reimburse physicians for up to six preventive oral health visits for Medicaid-enrolled children younger than age three. Analysis of physician and dentist Medicaid claims from 2000-2006 showed that the program greatly increased preventive oral health services (Rozier, Stearns, Pahel, Quinonez, & Park, 2010). Another study evaluated whether preschool children's oral hygiene would improve, if their parents received professional instruction. Study results indicated the advantage of parental participation in their child's dental care (Bullen, et al., 1988). Similarly, young children's mutans streptococci infection was decreased after their mothers were instructed about tooth brushing using a soft-scrub method (Seow, Cheng, & Wan, 2003). Another study examined if an individualized motivational interviewing (MI) approach to oral health education promoted positive changes in early childhood caries risk-related behaviors of mothers enrolled in a Women, Infants and Children (WIC) Program. Statistically significant positive changes were found in the number of times the children's teeth were cleaned or brushed and the use of shared eating utensils (Freudenthal & Bowen, 2010). The result suggested that motivational interviewing may improve parents' acceptance of dental recommendations of preventing caries in their children.

Oral Health Guidelines for Young Children

Aged 6 to 12 months

The AAPD emphasizes the importance of initiating professional oral health intervention in infancy. An individual anticipatory guidance/counseling, caries-risk assessment, clinical oral examination, and fluoride application should be equally important to carry out in clinical practices (American Academy of Pediatric Dentistry, 2013). There are numbers of important recommendations from AAPD as described below. Clinicians should complete the clinical oral examination in order to examine a child's oral growth and development, pathology and injuries, and provide diagnosis. Clinicians should provide treatment and/or appropriate referral for any oral diseases or injuries if needed. Clinicians should remove a child's stains or deposits as indicated. Clinician should assess each child's systemic and topical fluoride status (e.g., type of infant formula used, the use of fluoridated toothpaste) and provide counseling of fluoride. Clinicians should prescribe systemic fluoride supplements if needed. Clinicians should complete a caries risk assessment and provide anticipatory guidance. Clinicians should provide oral hygiene counseling for parents including oral health practices. Clinicians should assess a parent's feeding practices and provide counseling if needed. Clinicians should provide dietary counseling related to oral health (e.g., the frequent between-meal consumption of sugar-containing snacks or drinks increases the risk of caries, dietary analysis, dietary choices). Clinicians should provide counseling for nonnutritive oral

habits. At the end of each visit, the clinicians should determine the interval for periodic reevaluation (American Academy of Pediatric Dentistry, 2013).

Aged 12 to 24 months

There are four recommendations from guideline of AAPD as described below.

Clinicians should repeat the procedures for ages 6 to 12 months every six months or as indicated by individual patient's risk status. Children with higher risk of caries would benefit from recall appointments at more frequent intervals. Clinicians should assess feeding practices such as bottle, breast-feeding, and no-spill training cups and provide counseling as needed. Infants should not sleep with a bottle filled with milk or liquids containing sugar, and should be weaned from the bottle between 12 to 18 months of age. Clinicians should review patient's fluoride status including childcare arrangements that may affect systemic fluoride intake, and provide parental counseling. Clinicians should provide topical fluoride treatments every six months or as the individual patient's needs (American Academy of Pediatric Dentistry, 2013; 2014).

Aged 2 to 6 years

There are seven recommendations from guidelines of AAPD, such as (1) Repeat the procedures for 12 to 24 months every six months or as individual patient's risk status/susceptibility to disease. Provide oral hygiene instructions based on a child's age; (2) scale and clean the teeth every six months or as an individual patient needs; (3) provide pit

and fissure sealants for caries-susceptible primary molars and permanent molars, premolars, and anterior teeth; (4) provide required treatment and/or appropriate referral as needed; and so forth (American Academy of Pediatric Dentistry, 2013).

Dental home

The policy statement of AAPD recommends that a child should establish a dental home within six months of first tooth eruption and no later than 12 months of age (American Academy of Pediatric Dentistry, 2013; 2014). A dental home is defined as “the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way” (p. 12) (American Academy of Pediatric Dentistry, 2010). The important services provided by a dental home should include a caries risk assessment; education including anticipatory guidance about growth and development issues (e.g., teething, digit and pacifier habits); prevention of oral diseases, dietary counseling, education about proper care of children’s teeth and gingival, acute care and preventive services, and so forth (American Academy of Pediatric Dentistry, 2010; 2013; 2014).

Anatomy of Teeth and Development of Occlusion

Anatomy of teeth

The outside of the tooth is composed of enamel. Enamel may become yellow with age. The color change is due to the chronic staining and becoming thinner with age. As the result,

the darker dentin becomes visible through the thinning enamel. Dentin forms below the enamel and is a calcified tissue that is denser than bone. Normally, dentin is yellow color but it also can present as gray to black. The function of dentin is to protect the inner most part of the tooth and the pulp (Jablonski, Mertz, Featherstone, & Fulmer, 2014). The pulp contains blood vessels, nerves, and connective tissue all contained within the pulp chamber in the center of the tooth structure. The blood vessels and nerves exit the tooth via canals that extend into the roots or apex of the tooth. The tooth is anchored by a tissue called cementum, which covers the dentin under the gingival tissue. Cementum attaches to the periodontal ligament, which attaches to the alveolar bone lining the upper and lower jaws (Jablonski, et al., 2014; Watson, 2014).

Development of occlusion

The stages of occlusion development include: (1) Primary dentition: It occurs in infants when the first tooth appears at about six months of age and all primary teeth are erupted at around aged three and six. Typically, teeth erupt every few months in right and left pairs alternating between the upper and lower jaws, and proceeding from the front of the mouth to the back (American Academy of Pediatric Dentistry, 2014; American Academy of Pediatrics, 2011); (2) Mixed dentition: At around aged six to 13, mixed dentition occurs when both primary and permanent teeth are present in the mouth at the same time. Most children begin to lose their primary teeth and their permanent teeth begin to erupt; and (3) Adolescent

dentition: It occurs when all primary teeth have exfoliated and second permanent molars are erupted or erupting but not third molars (American Academy of Pediatric Dentistry, 2014).

Pathophysiology of Dental Caries

Classifications

Early childhood caries (ECC) is the presence of one or more decayed (noncavitated or cavitated lesions), missing, or filled tooth surfaces in any primary tooth in children less than six of age. In children aged less than three years old, any indication of smooth-surface caries suggests severe early childhood caries (S-ECC). From aged three to five years old, one or more cavitated, missing, or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of four or more (aged 3), five or more (aged 4), or six or more (aged 5) surfaces also constitutes severe early childhood caries (American Academy of Pediatric Dentistry, 2014).

Pathophysiology

Dental caries is a common chronic transmissible and multifactorial disease that occurs when there is an imbalance between pathologic factors and preventive factors. Infants and young children have a higher risk for developing caries due to their unique caries-risk factors like the constant establishment of oral flora, susceptibility of new erupted teeth, and the development of dietary habits (American Academy of Pediatric Dentistry, 2014; Patrick, et al., 2006). Bacteria that produce acid by fermenting carbohydrates, frequent intake of

fermentable carbohydrates, and salivary dysfunction are pathologic factors that lead to dental caries. Saliva is critical for caries control because it neutralizes acids, and provides needed minerals and proteins that protect the teeth (American Academy of Pediatric Dentistry, 2014; Jablonski, et al., 2014). Dental plaque is a collection of microorganisms that form a biofilm and adhere to tooth surfaces. When a person consumes high quantities of simple sugars, the fermentable sugar encourages the growth of mutans streptococci and lactobacillus species in the plaque. These bacteria create acid as they metabolize the simple sugars and produce acid to erode tooth enamel, which cause pits and grooves in the enamel. Children with white spot lesions should be considered at high risk for caries activity since these are precavitated lesions. In young children, cavities usually occur initially in the upper incisors because these teeth erupt the earliest and are not protected by saliva (Jablonski, et al., 2014). Foods high in sucrose, fructose, and glucose increase the risk of dental caries, such as candy, cookies, cake, sweetened beverages, and dried fruit. Consuming foods such as plain milk, cheese, meats, legumes, and raw vegetables can reduce the risk of caries, as well as enhance systemic health. For these cariogenic foods, they contain fermentable carbohydrates. These sugars could be metabolized by oral bacteria and bacteria produce acids that lead to a decrease in dental plaque pH. When the plaque pH drops below 5.5 can cause demineralization or loss of the tooth's mineral structure. Furthermore, caries activity is affected by the retentiveness and frequent consumption of fermentable carbohydrates, such as more than four times a day.

Complex carbohydrates such as whole grains prevent plaque formation and stimulate salivary flow, which promotes dental and periodontal health (American Academy of Pediatrics, 2011).

Dental caries is a transmissible infectious disease but understanding the acquisition of cariogenic microbes can improve preventive strategies. The mutans streptococci could be transmitted vertically from a caregiver to a child through salivary contact. It is affected by the frequency and amount of exposure. Infants whose mothers have high levels of mutans streptococci due to untreated caries are at higher risk of being infected earlier than children whose mothers have low levels. Horizontal transmission can occur in between family members and children in daycare. Thus, it will be important to stop saliva-sharing activities like sharing utensils, which can help reduce the risk of caries in infants and young children (American Academy of Pediatric Dentistry, 2013; 2014). New teeth are especially risk for developing caries due to their immature enamel and also teeth with enamel hypoplasia (American Academy of Pediatric Dentistry, 2013; 2014).

Consequences of dental caries

Untreated childhood oral disease can lead to pain, dentofacial anomalies and other potential serious health problems, such as severe toothache, dental abscess, bone destruction, and spread infection into other parts of body through the bloodstream. In addition, pain, infection and early loss of teeth can lead to problems in eating, speaking, and learning. Consequently, dental caries can affect a child's eating habits, nutritional intake (e.g.,

malnutrition), sleep quality, growth and development, communication, and school readiness and performance (Bagramian, Garcia-Godoy, & Volpe, 2009; Blumenshine, et al., 2008; Muirhead & Marcenés, 2004; Schroth, et al., 2013). Moreover, dental caries and its complications can affect oral health-related quality of life of children and their family members in both physical and psychosocial aspects, such as premature loss of primary teeth can cause gastro-intestinal disorders, esthetic and psychological issues. Parents may feel upset and guilty regarding their children's caries. Family members have to take time off from work. Further, dental treatment may lead to a financial impact on families (Acharya & Tandon, 2011; Bagramian, et al., 2009; Martins-Júnior, et al., 2013; Wong, et al., 2011).

Course of dental caries

Early childhood caries can be a particularly aggressive form of caries, and it progresses rapidly. It can lead to a higher risk of new lesions in the primary and permanent dentitions, hospitalizations and emergency room visits, increased expenses for treatment, loss of school days, increased days with restricted activity, and reduced oral health-related quality of life (American Academy of Pediatric Dentistry, 2012; 2013). Therefore, untreated caries may affect a child for a lifelong influence.

Treatment and Prevention Related to Dental Caries in Young Children

Treatment of dental caries in young children

Immediate treatment of children with dental caries is suggested to prevent further dental damage and future health problems. Delayed treatment can result in exacerbated problems, which could lead to more extensive care and healthcare cost (American Academy of Pediatric Dentistry, 2013). The Affordable Care Act (ACA), the employer mandate and the individual mandate, were scheduled to be effective on January 1, 2014 in order to help access to dental care (Essling & Litch, 2013). According to the policy statement of AAPD, non-dental health care providers who identify a child with early children caries should provide therapies or refer the child to a dentist and establishment of a dental home. Because children who experience ECC are at higher risk for developing subsequent caries, preventive and therapeutic measures are needed. These could include appropriate home care (e.g., tooth brushing with fluoridated toothpaste twice per day), more frequent visits to apply topical fluoride, interim therapeutic restorations using materials such as glass ionomers that release fluoride, and full crown coverage. Stainless steel crowns (SSCs) are often used to restore teeth with extensive white spot lesions and large carious lesions. For the application of SSCs, children and parents have reported both positive (e.g., last longer, cost) and negative feedbacks about SSCs (e.g., appearance, discomfort) (Page, et al., 2014). The dentist should assess the patient's developmental level, comprehension skills and the disease process to decide the need for advanced behavior guidance techniques such as protective stabilization, sedation, or even general anesthesia (American Academy of Pediatric Dentistry, 2014).

Moreover, caries management protocols are based on an individual child's risk level, age, and compliance with preventive strategies (American Academy of Pediatric Dentistry, 2013).

Prevention of dental caries in young children

Dental caries is considered a preventable disease. Current one of the best practices is brushing with fluoridated toothpaste for all children twice a day. Toothpaste should be dispensed onto a soft, age-appropriate sized toothbrush. For children under age three, a "smear" or "rice-size" amount of fluoridated toothpaste (approximately 0.1 mg fluoride) should be used. For children three to six years old, a "pea-size" amount of fluoridated toothpaste (approximately 0.25 mg fluoride) is appropriate. Parents should perform or assist with tooth brushing for preschool-aged children. Rinsing after brushing should be minimized or eliminated in order to maximize the beneficial effect of fluoride (American Academy of Pediatric Dentistry, 2014; 2016).

Currently, water fluoridation and school-based dental sealant programs have been shown to be helpful in caries prevention in children. Professional application of resin-based sealants on first molars was effective in preventing dental caries in children (Caple & Schub, 2015). Further, other prevention strategies suggested by the American Academy of Pediatrics (AAP) and AAPD include professional applications of topical fluoride varnish for children at risk for caries, diet modification for avoiding frequency consumption of foods and/or liquids containing sugar, twice daily brushing beginning as soon as teeth erupt, comprehensive

evaluation and treatment of expectant mothers, oral health counseling on the etiology of caries and how to prevent transmission of mutans streptococci to infants, establishing a dental home, and caries risk assessment based on developmental, biological, behavioral, and environmental factors. Moreover, children in higher risk of developing caries would benefit from recall appointments at greater frequency than every 6 months (American Academy of Pediatric Dentistry, 2013; 2014; Caple & Schub, 2015).

Chinese Family System

This section includes an introduction on family subsystems in Chinese families, information about parent-child conflict, and the relationship of the three-generational family within the Chinese immigrant context. Knowing the characteristics of the Chinese family system may help to assess its impact on children's oral health as well as develop cultural sensitive care for the family.

Family subsystems

The family plays an important role in influencing children's oral-health beliefs and behaviors, and provides assistance with children's oral care. The family commonly contains three interdependent family subsystems, including the parent-child subsystem, the marital subsystem, and the sibling subsystem (Cox & Paley, 2003; Parke, 2004). Research has showed familial factors (e.g., family composition, family culture) contribute to young children's oral health outcomes (Bramlett, et al., 2010). A lack of family support created

barriers for Chinese parents to seek dental treatments for their children (Wong, et al., 2005).

Regarding the parent-child relationship, there is an increasing focus on father and grandparents as important socializing agents in the family and the role of parents (e.g., advisors, coaches). For children's oral health, Chinese grandparents were known to influence children's access to preventive dental care such as making appointments and selecting providers (Hilton, et al., 2007). Through interactions with siblings, children develop social skills and interaction patterns that help them interact with other children or people. Older sibling could function as tutors or supervisors of their younger siblings during interactions (Cox & Paley, 2003; Parke, 2004).

Despite the importance of parenting styles for training children's oral-health care, there is limited information from the literature. Chinese parents traditionally tend to hold high expectations of their children and their parenting style is often characterized as authoritarian and strict (Ho, 1986). However, there is a declining authoritarianism within Asian American families as the impact of modernization and immigration increase (Wilkinson, 1993). Chinese immigrant mothers in the US endorsed training, authoritarian, and permissive parenting styles while also endorsing the importance of filial piety. Training involves children guidance, parental involvement and support in order to prevent inappropriate behaviors (Chao, 2000). Usually mothers have more opportunities to influence their children's attitudes compared to fathers, and provide an extra nurturing environment for their children by attending to

children's needs during children's early years (Tseng & Wu, 1985; Wolf, 1970). Furthermore, Chinese American mothers had higher levels of verbose parenting behavior and higher levels of laxness than did the European American mothers (Hulei, Zevenbergen, & Jacobs, 2006). Chinese immigrant mothers of preschoolers strongly endorsed the authoritative parenting style. This parenting style is characterized by high levels of warmth, reasoning induction, and autonomy granting. Moreover, authoritative parenting predicted increased children's behavioral/attention regulation abilities (lower hyperactivity/inattention), which then predicted decreased teacher rated child difficulties (Cheah, Leung, Tahseen, & Schultz, 2009).

For studies related to children's oral health, US Chinese parents tended to be more negative attitude about their ability to control their children's sugar snacking and make their children tooth brushing. Chinese parents' low self-efficacy was associated with their control in children's sweet snaking and tooth brushing behaviors (Adair, et al., 2004; Pine, et al., 2004). Chinese immigrant parents reported a child's temperament was also a barrier to manage children's daily oral hygiene (Amin & Harrison, 2009).

Parent-child conflict

One of Chinese parents' responsibilities is to train their child to be obedient, including following parents' guidance about oral-health care. However, such training may result in potential conflict between parents and children.

According to the principles of Confucianism, Chinese parents need to train their children to be obedient, independent, caring/sociable, and excellent (Fong, 2007; Lieber, Nihira, & Mink, 2004). However, soon after China's one-child policy was implemented in 1979, the Chinese media was filled with discussions of how children born under that policy had failed to develop those values (Fong, 2007). Fong (2007) argues that Chinese singletons' failure to satisfy their parents was not simply because of children's failings but also because of the complex context of teaching children to conform within all the social, political, economic, and demographic transformations that were occurring. This resulted in Chinese parents giving their children contradictory and inconsistent commands. For example, parents requiring children's obedience could stifle children's excellence and independence. This could, in turn, encourage children to refrain from maintaining family ties and social networks. Alternatively, children could choose one value and reject the other values, following one under certain occasions, and so forth. Consequently, there will be conflicts between parents and children.

Qin (2006) illustrated certain factors contributing to growing alienation in parent—child relations among Chinese immigrant families, including (1) immigration-related factors: parent-child separation, parents' increasing work demands outside the home, and language barriers exacerbated the emotional distance between parents and children; (2) cultural factors: although parents realized that they lived in a different cultural system with different values, they still tended to adhere to Chinese parenting values. Parents still had parental pressure

from training their children to be excellent and having good achievement in some Chinese immigrant families. Parents still kept high expectations for their children's education.

Although high expectations may contribute to children's educational achievement, they also may contribute to children's reluctance to communicate with parents; and (3) developmental factors: as children grew older, children shifted their focus outside of their families.

Consequently, parents and children spent less time together and communicated less and less (Qin, 2006).

The three-generational family

It has been the Chinese custom for extended families to live together (Chen, 2001). Since the mid-1950s, the three-generational family in urban China has arisen as a typical family system due to social changes, including women's employment and the one-child policy (Chen, 2006). In some occasions in Taiwan, grandparents raise grandchildren because of parents' job-related or marriage-related issues, such as unemployment, working job in different cities, divorce, or marital couples' separation (Chang, 2007). There are a number of difficulties that the grandparents encounter when providing child care, including deprivation of their personal time and social activities, lack of tangible rewards, increased financial burdens, and adverse impact on physical, mental, social and spiritual health. Furthermore, there are numerous intergenerational parenting conflicts about differences of belief in

child-rearing methods, including uncoordinated disciplinary strategies and bilateral influences (Chang, 2007; Goh, 2009; Goh & Kuczynski, 2010).

Chinese Culture, Chinese Health Beliefs and Behaviors

Culture influences people in many ways (Jenkins, 1996), including their language, beliefs, behaviors, religion, rituals, family structure, and attitudes to illness (Helman, 2007).

In this section, important concepts related to Chinese culture, Chinese health beliefs and health behaviors are described along with their potential influence on parent's oral health beliefs and practices. Identifying the important concepts for oral health practices in Chinese culture required a systematic review of the literature which is next described.

17 key articles relevant to Chinese culture, Chinese health beliefs and health behaviors, were analyzed. These articles were obtained from the independent studies during my Program of Study at University of Washington, including an independent study with Dr. Donald Chi, DDS, PhD who is a member of the supervisory committee of this dissertation. An additional systematic review of the literature was carried out to identify literature in English on Chinese culture, health-related beliefs and behaviors, and ethnic considerations applicable to oral health among Chinese. An electronic search was carried out that were published between 1 January 2006 and 29 February 2016 using the following databases: Medline, CINAHL Plus with Full Text, Web of Science, EMBASE and Google Scholar. Table 2 summarizes an overview of the search algorithms that were used. In phase 1, duplicated references were

removed. In phase 2, titles and abstracts were screened. Abstracts were excluded if they were not relevant to Chinese culture, general health or oral health, Chinese groups restricted to people from China, Hong Kong or Taiwan. Information was abstracted from studies conducted in China, Hong Kong and Taiwan, all considered “Chinese” for purposes of the current study. In phase 3, a partial gray literature search was conducted using Google Scholar to hand search reports, book chapters, and theses, The search was limiting to the first 100 most relevant hits, which obtained 20 references after searching. In phase 4, 22 retained references were obtained after a full-text review. Figure 1 is a summary of the flow chart showing the results of the search process. Based on the literature review, it should be acknowledged that information on the oral health-related cultural beliefs and behaviors among Chinese parents, Chinese immigrant parents, or different ethnic groups is scant.

Finally, we extracted total 37 important concepts from the independent studies and the systematic review for recent ten years, as showed in Table 3 Definitions of 24 Concepts related to Chinese Culture and Table 4 Descriptions of 13 Concepts related to Chinese Health Beliefs and Behaviors.

Table 2 Search Algorithms of Chinese Culture, Chinese Health Beliefs and Behaviors

Source	Search	Terms
Medline	1	(attitude to health OR health beliefs OR health knowledge, attitudes, practices) and (oral health) and (China OR Taiwan OR Hong Kong OR Asian continental ancestry group)
CINAHL Plus with Full Text	2	(attitude to health OR health beliefs OR health knowledge, attitudes, practices) and (oral health) and (Chinese immigrants OR Chinese)
Web of Science	3	(culture) and (Chinese OR China OR Taiwan OR Hong Kong OR Asian continental ancestry group)
EMBASE	1	(Chinese) and (health beliefs) and (oral health)
Google Scholar	2	(Chinese culture) and (beliefs)

*Limits: 01/2006-02/2016; English; Human/humans.

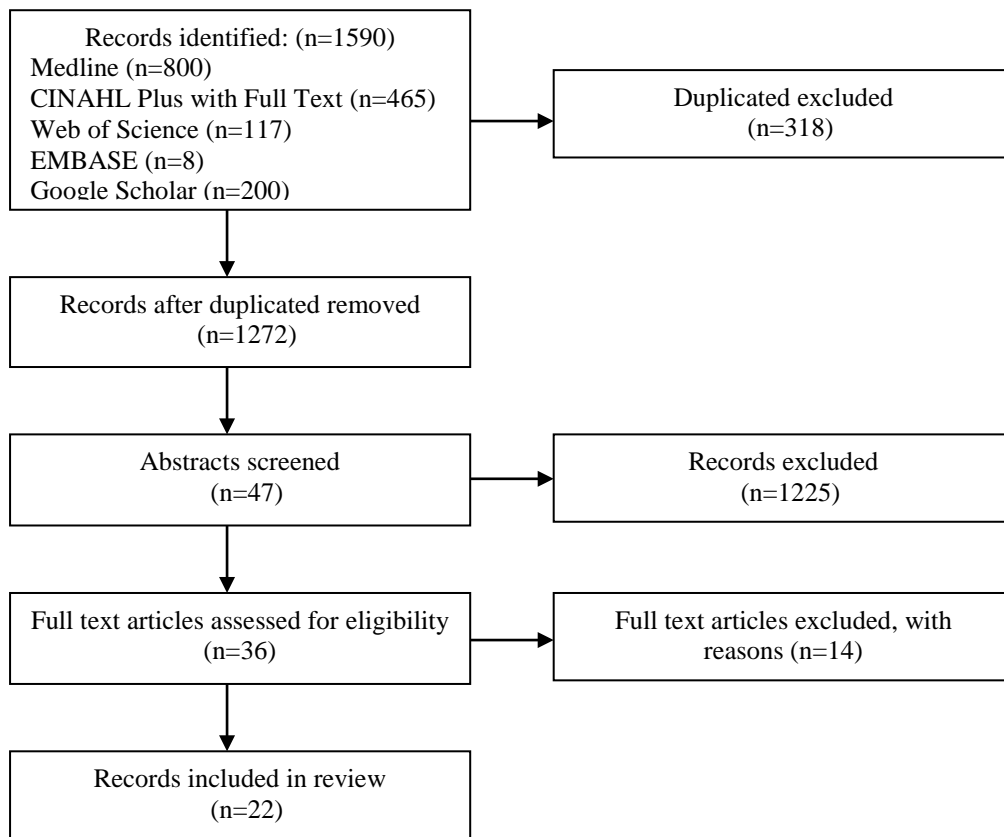


Figure 1 Flow chart showing the results of the search process.

Table 3 Definitions of 24 Concepts Related to Chinese Culture

Concepts	Definitions
Jen (Benevolence)	It is one of the important characteristics and concepts in Confucianism (Chen, 2001; Fan, 2000). Benevolence is defined as a desire to do good to others and as an act of kindness.
Yi (Righteousness)	It is one of the important characteristics and concepts in Confucianism (Chen, 2001; Fan, 2000). It is defined as a skill in crafting actions that have moral fitness according to a given concrete situation. "Attaching importance to long-lasting relationship not gains" (Fan, 2000).
Chung (Loyalty)	It is one of the important characteristics and concepts in Confucianism. It is defined as a state of faithfulness to commitments or to obligations, including loyalty to family and superiors (Chen, 2001; Fan, 2000).
Hsia (Filial piety)	<p>It is the core characteristic and concept in Confucianism (Chen, 2001; Fan, 2000). It is often considered as obedience, respect, and obligated care for one's parents (Lieber, et al., 2004). Obedience is supposed to last for life, even after the children have grown up (Hofstede, 1984).</p> <p>Chinese immigrant parents' in the US concern about their children's filial piety because their children's adoption of the American style, such as school does not teach children to respect parents and the elderly. Consequently, parents try to maintain cultural heritage, as well as respecting their children's unique point of view (Lieber, et al., 2004).</p> <p>Most Chinese elders in the US expect and perceive receipt on filial piety, including respects, cares, greetings, happiness, and obedience (Dong, et al., 2014). Chinese elders believe that receiving filial piety from their children affects their health and well-being (Chen, 2001; Dong, et al., 2014).</p>
Te (Virtue)	It is one of the important characteristics and concepts in Confucianism (Chen, 2001; Fan, 2000). It is defined as good moral behaviors or characters according to ethical principles.
Face	Face is one of the core values in Chinese culture (Fan, 2000). "Face" is the English translation of a Chinese term. It is defined as both the front part of the head and the dignity based on a correct relationship between a person and the collectivities to which one belongs. Loss of face can be more painful than physical maltreatment (Hofstede, 1984).
Harmony with others	<p>Harmony with others is one of the main principles of Confucianism (Chen, 2001; Fan, 2000). It is defined that a person maintains a harmony relationships with others and avoids anybody's loss of face (Hofstede, 1984).</p> <p>To promote health and to prevent illness, Chinese believe in and</p>

	<p>actually, they seek a satisfying social life, happiness, and peace. A satisfying social life is being in harmony with one's social environment (Chen, 2001).</p> <p>There are five basic human relationships for creating an ordered and harmonious society including father-son, emperor-subject, husband-wife, elder-younger, and friend-friend. For example, the father needs to behave kindly to his son and the son needs to respect the father in filial piety; the elder brother should treat the younger brother gently and the younger brother needs to show humility toward his elder sibling; elders show consideration toward younger peoples (Park, 2011).</p> <p>Chinese grandparents sometimes take care of their grandchildren (Chang, 2007; Goh, 2009). Chinese children usually avoid conflicts with parents to maintain family harmony (Lieber, et al., 2004).</p>
Avoiding confrontation	<p>It is one of the core values in Chinese culture (Fan, 2000). It is defined as an act of avoiding conflicts of opposing ideas or forces with others.</p> <p>To avoid confrontation with others, Chinese people tend to hold their views and say what the listeners desire to hear (Lo & Tan, 2014). Chinese parents express negative influences of significant others (grandparents or babysitters) on their children's oral health, primarily in relation to dietary practices; however, it was hard for parents to communicate this issue with them (Amin & Harrison, 2009).</p>
Obedience to authority	<p>It is one of the core values in Chinese culture (Fan, 2000). Confucianism emphasizes "obedience to authority" to achieve harmonious interpersonal relationships (Fan, 2000; Fong, 2007).</p> <p>People from China generally respect authority figures, such as physicians and dentists, and do not challenge or even seek clarifications of what those authorities explain to them (Kwan & Bedi, 2000).</p>
Lack of self centeredness	<p>It is one of the main principles of Confucianism (Chen, 2001; Fan, 2000). It is defined that people focus less on themselves and instead, they care about the needs or feelings of others. Furthermore, both Buddhism and Taoism deemphasize sense of self (Chen, 2001; Hwu, Coates, Boore, & Bunting, 2002).</p>
Reciprocation of greetings, favors, and gifts	<p>It is one of the core values in Chinese culture (Fan, 2000). It is defined as a reciprocal action or relation of a mutual exchange of greetings, favors, gifts, profits, and other privileges.</p>
Kinship	<p>Kinship is one of the core values in Chinese culture (Fan, 2000; Wolf, 1970). It is defined as a family relationship and it is a social system by genetic relatedness that is based on a set of common rules in a society (Lixing, 2010).</p> <p>Since decades ago, three-generation family in urban China has</p>

	<p>been a typical family style due to social changes, such as women's employment and the one-child policy (Chen, 2006). Despite there are some changes about one-child policy now. In Taiwan, grandparents raise grandchildren because of parents' job issues and parents' marriage issues (Chang, 2007).</p> <p>Literature has showed that the familial factors (e.g., family composition, family culture) contribute to the outcomes of young children's oral health (Bramlett, et al., 2010). A lack of family support creates barriers for Chinese parents to seek dental treatments for their children (Wong, et al., 2005). Chinese grandparents influence children's access to preventive dental care such as making appointments and selecting providers (Hilton, et al., 2007).</p>
Conformity/Group orientation	<p>It is one of the core values in Chinese culture (Fan, 2000). It is defined as a compliant action in accord with prevailing social standards, attitudes, and practices.</p> <p>In Chinese culture, social interactions influence one's beliefs and attitudes to oral health (Lo & Tan, 2014). Children often learn about oral health habits from the family and peers (Amin & Harrison, 2009).</p>
Collectivism	<p>It is one of the core Chinese cultural values (Fan, 2000). It is defined as a concern that is integrated with other people. Chinese society values the needs, goals, and views of the family and community more than those of the individual (Nelson, Badger, & Wu, 2004).</p>
Fatalism (fate)	<p>Fatalism is one of the core values in Chinese culture (Fan, 2000). It is a belief that health, illness and even death are predetermined and the individual does not have the control. Fatalism has been associated with non-adherence to health behaviors, and affects understanding of health and illness among Chinese (Chen, 1996; Heiniger, Sherman, Shaw, & Costa, 2013).</p> <p>Chinese parents believe that people could not keep their teeth for life, and dental caries is hereditary and not preventable (Esa, Razak, & Jalalludin, 1992). Some parents point out causes beyond their control such as genetics (Amin & Harrison, 2009).</p> <p>Chinese immigrants have a fatalistic view that dental caries is inherited conditions (Smith, et al., 2013).</p>
Obligation for one's family and nation	<p>It is one of the core Chinese cultural values (Fan, 2000). It is defined that a person is bound to do certain things for his or her family and country, which arises out of a duty from custom.</p>
Valuing Training	<p>The training of children has been considered as the family's basic function in the Chinese family (Wolf, 1970). It is defined as a parent's responsibility and social obligation to train the child to be sensitive to moral and social rules (Chao, 1994, 2001; Lieber, et al., 2004).</p>

	<p>Although once children reach four to six years, disciplinary techniques such as shaming, threatening and scolding become acceptable (Ho, 1986; Ho, 1989).</p> <p>Chinese parents give sweet foods as a reward when children behave well (Amin & Harrison, 2009).</p>
Sense of shame	<p>Having a sense of shame is one of the core Chinese cultural values (Fan, 2000). It is defined as the painful feeling is arising from the consciousness of something dishonorable, improper, or ridiculous done by oneself.</p> <p>In order to teach right from wrong and to motivate children to make corrections, caregivers manipulate children's development of the sense of shame (Chao, 1994, 2001; Fung, 1999; Lieber, et al., 2004).</p> <p>Chinese immigrant parents endorse the Chinese childrearing value of shaming in the US (Ho, et al., 2012).</p>
Excellent school achievement	<p>Confucianism also has a significant influence on educational practices of Chinese families. It is considered as a belief that helping children to perform excellent in school is a central part of child training. Chinese highly value education because education is associated with a person's social status and successful education can lead to a better life (Chen, 2001; Fan, 2000; Huang & Gove, 2012; Tseng & Wu, 1985).</p> <p>Chinese mothers usually value highly on educational practices. They believe that they need to invest, sacrifice, and provide direct intervention to their children's education. They think that they can play a significant role in their children's success in schools (Chao, 1996).</p> <p>The oral health status, oral health knowledge and behaviors among preschool children in western China are poor. Oral health education to improve oral health knowledge and to increase the frequency of tooth brushing should be undertaken (Gao, et al., 2014).</p>
Independence	<p>Independence is an important theme in Confucianism as well as in child socialization in many societies (Fong, 2007). It is defined as a state of free from support or no aid from others.</p> <p>Chinese parents usually want their children to develop independence that can help them to endure hardship (Fong, 2007).</p>
Bearing hardships	<p>It is one of the core Chinese cultural values (Fan, 2000). It is defined as a state of bearing a difficult situation.</p> <p>Chinese elders tend to tolerate or accept their poor oral health problem and not to raise a complaint (Lo& Tan, 2014).</p>
Inn and Ko (cause and effect)	<p>Inn and Ko (cause and effect) are the principles of Buddhism. It is defined as a relationship between Inn (cause) and Ko (effect).</p>

	<p>Health is mainly determined by Inn and Ko. Inn and Ko encourage people to do good and do right and to receive good in return (Chen, 1996, 2001).</p>
Unity of Yin and Yang	<p>Yin and Yang is one of the core values in Chinese culture (Fan, 2000). It is defined as a balance of Yin and Yang, in which are the opposite but complementary forces (Smith, et al., 2013). Yin and Yang have been dominating health and illness in traditional Chinese beliefs for a long time. Health is viewed as a balance of Yin and Yang (Chen, 2001).</p> <p>Chinese believe that dental health depends on the conditions of the kidneys, such as loosening of teeth is considered as an imbalance between Yin and Yang in the kidneys. Similarly, having excessive Yang (heat/fire) in the stomach can result in inflammation of gum and oral soft tissues, gum bleeding and halitosis (Butani, et al., 2008; Lo & Tan, 2014).</p>
Qi	<p>Qi is one of the important health values in Chinese culture (Chen, 2001). It is defined as the biological energy on which human life depends and which circulates throughout the body. Health is viewed as the enhancement of Qi. This system of Qi forms the basis for the diagnosis and treatment of illness, as well as for promoting health and preventing illness (Chen, 2001; Hwu, et al., 2002).</p> <p>The concepts of internal heat and eating hot food are considered as the causes of dental caries and gum disease in Southern China (Lin, Wong, Wang, & Lo, 2001). Chinese migrants believe that the hot Qi inside the bodies (rather than bacteria) is the cause of dental caries. This belief is particularly apparent among older migrants (Zhang, 2009).</p>

Table 4 Descriptions of 13 Concepts Related to Chinese Health Beliefs and Behaviors

Concepts	Descriptions
Traditional Chinese Medicine	<p>Traditional Chinese Medicine is influenced by Chinese religious and has been accepted as a Complementary and Alternative Medicine (CAM) to Western medicine among Chinese, other Asian peoples, and Americans. Common practices in Chinese medicine include herbal practice, acupuncture, balanced diet, and exercise (Park, 2011).</p> <p>Chinese people usually view it as a gentle, harmless and cost effective medicine, as well as a way to prevent diseases and maintain well-being (Butani, et al., 2008; Chen, Chiu, Chu, & Lan, 2015; Park, 2011). Many Chinese with conservative-minded consider Western medicine aggressive and in some instances used too extensively (Wong, et al., 2005).</p> <p>Most Chinese immigrants in North America use both TCM and Western medicine (Guo, 2000; Wade, Chao, & Kronenberg, 2007). Chinese immigrants prefer Western medicine for immediate symptom relief and life-threatening illnesses and prefer TCM for more chronic conditions, especially if they have tried Western medicine and found it ineffective or if they have experienced side-effects (Wade, et al., 2007).</p> <p>Chinese study in Hong Kong found increasing use of TCM for chronic disorders (e.g., periodontal disease and dental caries), and the interest for using TCM included treating disease rather than symptoms, costs, convenience, and dental anxiety (McGrath, 2005).</p> <p>Chinese people who fear going to the dentist or experience oral mucosal lesions often use TCM as a way of self-care (Butani, et al., 2008).</p>
Herbal practice	<p>It is defined as a practice of using herbs and herbal preparations to maintain health and to prevent, alleviate, or cure diseases.</p> <p>It is a common practice for Chinese to taking herbal medicine or cooling teas for gum disease (Butani, et al., 2008). Chinese immigrant parents use transitional herbs to medicate themselves when they have acute dental pain or swelling. Most parents would take their children for seeking western dentists or physicians, and only 5% of the parents would use herbs for their children (Wong, et al., 2005).</p>
Acupuncture	<p>It is a Chinese medical practice or procedure, in which treats illness or provides local anesthesia by the insertion of needles at specified sites of the body (Park, 2011).</p>

	Acupuncture is used for oral pain relief among Chinese immigrants, and is occasionally used for local dental anesthesia in China (Feng, Newton, & Robinson, 2001; Mao, Wu, & Chi, 2015).
A balanced diet	It is a common Chinese practice of TCM (Park, 2011). Chinese believe that a balanced diet of the yin and yang nature of the food is very important for maintaining general and oral health (Lo & Tan, 2014).
Exercise	It is a common Chinese practice of TCM (Park, 2011). It is defined as the use of moderate exercise to promote the compass of Qi, blood, and water in order to enhance good metabolism.
Brief regarding preventive practices/self-care	<p>Chinese caregivers of young children express the belief that preventive self-practices should control oral disease (Hilton, et al., 2007).</p> <p>Herbs and specific diets based on traditional Chinese medicine and saltwater rinsing are common used for prevention and remedy of oral health issues (e.g. caries, gums swelling, and chronic oral illness) among Chinese immigrants (Dong, et al., 2007; Lo & Tan, 2014; Mao, et al., 2015).</p> <p>Chinese immigrants prefer to use traditional self-care methods for oral health problems rather than to seek professional services (Lo& Tan, 2014).</p> <p>White wine or vinegar apply directly to the hurting tooth is believed to ease tooth pain temporarily (Wong, et al., 2005).</p>
Brief regarding the need for dental care services	<p>Teeth cleanings as part of routine dental visits would scratch or loosen the teeth (Wong, et al., 2005).</p> <p>Dental treatment for primary teeth is not important (Wong, et al., 2005).</p> <p>Parents would only take children to dental services in response to pain or trouble with teeth (Wong, et al., 2005).</p> <p>Chinese elders generally attach a higher value to the physical functions than to the appearance of their dentition (Lo & Tan, 2014). They tend to tolerate their oral health conditions and perceive needs for dental care services are generally low (Lo & Tan, 2014).</p>
Belief regarding primary teeth	<p>Chinese caregivers of young children believe that the primary teeth will fall out anyway so preventive care is not needed (Hilton, et al., 2007).</p> <p>Chinese parents agree that primary teeth are important for a child's eating, speaking, and appearance; however, only some parents acknowledge a relationship between primary teeth and permanent teeth (Amin & Harrison, 2009).</p>
Belief regarding gum	Chinese immigrants in Canada believe that gingival bleeding is

bleeding	common and normal while eating or brushing (Dong, et al., 2007).
Belief regarding tooth worms	There is a widespread belief that “tooth worms” cause dental caries in rural areas of Southern China (Lin, et al., 2001). Adult Chinese immigrant from China use traditional term “tooth worms” to name dental caries, and describe holes left by cavities as caused by “tooth worms.” (Dong, et al., 2007).
Belief regarding sugary foods	Chinese parents admit that sugary foods play an important role in their child’s life, such as treats, happiness, and needs of a child’s body organs (Amin & Harrison, 2009).
Belief regarding tooth extraction	Chinese immigrants believe the best time for tooth extraction is before breakfast, otherwise fatal bleeding might result (Kwan & Holmes, 1999). Chinese immigrants from China do not like their tooth extracted without giving specific reasons (Zhang, 2009).
Belief regarding natural teeth	Chinese immigrants believe that a complete set of natural teeth indicates honesty (Kwan & Holmes, 1999). From an oral health-related quality of life perspective, adult Chinese over 40 years old seem to prefer natural teeth above artificial teeth (Zhang, Witter, Gerritsen, Bronkhorst, & Creugers, 2013).

Summary

With the importance of oral health increasing, the definition has become broadened.

Factors related to children’s oral health come in many levels from the individual to the policy level. Known risk-factors can be used in health promotion and studies have shown they do reduce poor health outcomes. The AAPD guidelines provide recommendations for oral health care for children. While it is important to initiate professional oral health interventions, it’s equally important to provide personalized guidance/counseling. Imbalances between pathologic and preventative factors are what cause dental caries. Dental caries is an infectious disease that is communicable. Untreated dental caries can lead to serious and lifelong health problems. Immediate treatment is suggested to prevent further health issues and delay can

lead to worsening. Dental caries is preventable and the current best practice is brushing teeth twice a day with fluoridated toothpaste.

The family commonly contains three interdependent family subsystems, including the parent-child subsystem, the marital subsystem, and the sibling subsystem. Literature has showed familial factors play a role in young children's oral health outcomes, especially parental beliefs and practices for their children. However, parents may encounter interaction conflict with their children within the immigrant context.

Culture often provides life guidance for people and influences people in many ways. The important concepts related to Chinese culture, Chinese health beliefs and health behaviors are influenced by the three main philosophies and religions (Confucianism, Taoism and Buddhism). However, still unknown are the Chinese culturally embedded beliefs and behaviors of Chinese immigrant parents toward their young child's dental caries and oral-health practices. This population of children is particularly important because Chinese children commonly have a higher rate of dental caries compared to US White children. Prior limited research shows that Chinese parents' oral-health care for their children is not promoting oral health in their children. More information is needed about oral health beliefs and behaviors of Chinese immigrant parents and the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral-health care of their children.

Chapter 3: Research Method

Introduction

This chapter includes: a description of the study setting, target sample and sampling methods, participant recruitment, data collection methods and procedures, and data management and analysis.

Study Setting

Chinese families were first recruited from two Chinese community agencies that serve a high volume of Chinese immigrant families with children aged 0-6 years in King County, Washington. The Asian population comprises the second largest race/ethnic group (n=282,075, 15%) in King County. Chinese is the largest Asian subgroup (n=69,212, 3.6% of the King County population) (US Census Bureau, 2013).

Target Sample and Sampling Methods

Target Sample

The sample consisted of 46 Chinese immigrant parents of children aged 0-6 years. A Chinese immigrant family refers to both parents of the child are foreign-born Chinese with at least one child aged 0-6 years in the family. Only one parent from each family participated in the study. Eligible participants were parents who: (1) were at least 18 years of age; (2) self-identify as immigrants from China, Hong Kong or Taiwan; (3) were primary caregivers of their children aged 0-6 years; and (4) were able to speak, read and write (Mandarin) Chinese. Depending on the qualitative approaches, the sample size ranges from 10 or fewer

(e.g., a phenomenological sample) to 50 participants (e.g., an ethnographic sample) (Suh, Kagan, & Strumpf, 2009). The target sample size of 46 was decided upon based on two previous studies (30 and 46 participants) (Hilton, et al., 2007; Lin, 2013).

Sampling Methods

A combination of modified respondent-driven sampling (RDS) and purposive sampling were used to identify and recruit participants. Chinese immigrant families with young children in King County are considered to be a hard-to-reach population, and the sampling frame for this population is “poorly defined or difficult to construct” (p. 60) (Semaan, 2010). RDS has demonstrated efficiency in recruiting hard-to-reach populations in a limited timeline in HIV/AIDS research (Kendall, et al., 2008). Two unique features of RDS, a coupon system for a maximum number of referrals per participant and a double-incentive system (details in next section), were used to improve sampling efficiency (Heckathorn, 1997; Semaan, 2010). Moreover, it is often difficult to recruit a specific ethnic population within a limited timeframe (Kendall, et al., 2008). Thus, we followed the RDS procedure to provide additional incentives to participants when they referred eligible peers to the study.

Purposive sampling, in addition to RDS was also used. Purposive sampling involved selecting participants based on their experiences of participating in children’s oral care and research interest of demographic characteristics and asked them to refer prospective participants based on a range of demographic characteristics and experiences (Creswell, 2009;

Streubert & Carpenter, 2011). The combination of these two sampling methods enhanced recruitment efficiency as well as sample representativeness. A sampling flow chart in Appendix A illustrates how the RDS and purposive sampling methods were used together.

Participant Recruitment

After review and approval of the Human Subjects Division of University of Washington, an invitation letter in Chinese language and a recruitment flyer were mailed and emailed to the directors of two Chinese community agencies. A telephone explanation or face to face appointment was followed to further explain the study. Once the directors verbally agreed to assist with recruitment, the researcher discussed ways to recruit participants at the agency, such as flyer posting/distribution, study announcements, or information sessions (Kim, Choe, & Webster-Stratton, 2010). Furthermore, building a trust relationship with participants is crucial for proceeding with the qualitative interviews (Sperber, Devellis, & Boehlecke, 1994). The interview researcher has been volunteering at the target agencies, and invited the leader of each agency to introduce this study to the participants. When interested participants contacted the researcher, the researcher screened for eligibility, explained the study using talking points, answered questions, obtained verbal consent, and scheduled a data collection appointment. At the end of data collection, each participant was asked if she/he will be willing to refer up to three parents with the characteristics indicated for this study. For those who agreed, each participant received three specifically designed coupons for each

prospective referral and later received a 10-dollar gift card for each successful referral. The referred individuals were then being screened for interview. We recruited four study participants (“seeds”) in each agency, as recommended by RDS literature (Heckathorn, 1997; Semaan, 2010), to generate waves of referrals.

At the second wave of referrals based on the RDS approach, the researcher also purposively selected participants to acquire a mix of country of emigration, parental education, and family income. These factors were found associated with parental oral health perceptions, actions, and children oral health behaviors (Adair, et al., 2004; Finlayson, et al., 2007; Hilton, et al., 2007; Valencia, et al., 2012; Van den Branden, et al., 2013). Based on the population proportion of US census data, we anticipated there would be at (1) 26 parents from China and 20 parents from Hong Kong or Taiwan; (2) six parents with high school education or lower and 40 parents with college degree or higher; and (3) 10 parents with annual family income of \$50,000 or lower, 26 parents with income of \$50,001-100,000, and 10 parents with income of \$100,000 and higher (US Census Bureau, 2013).

Data Collection Methods and Procedures

Each participant was asked to participate in a qualitative semi-structured interview and completed a demographic information sheet. The interview focused on parents’ experiences and beliefs of etiology, onset of symptoms, pathophysiology, course of caries, and treatment of childhood caries. See Appendix B for the Interview Guide for the Explanatory Model. All

study materials were translated into Chinese by the researcher and checked for accuracy by the prior dissertation Chair. Both are bilingual, and the prior dissertation Chair was familiar with both cultures. A pilot test with two Chinese parents who were not to be part of the study was conducted to further refine the interview schedule (Sperber, et al., 1994).

Data Collection Methods

A semi-structured interview guide in Appendix B was used to explore the major concepts: etiology, onset of symptoms, pathophysiology, course of caries, and treatment related to childhood dental caries. Six questions were used in the actual interview schedule. Further, the interview guide consisted of a list of open-ended questions and probes that were modified iteratively during the interviews in order to explore emerging themes. The definition of each EM concept described in Table 1 was used to guide data analysis. Field notes were also written during each interview in order to document participants' verbal/nonverbal responses and the investigator's thoughts about the interview experience. These notes can assist with data interpretation (Streubert & Carpenter, 2011). The self-administered questionnaire in Appendix C asks about demographic information about the child, the participant, and the family. The six open-ended questions analyzed for the dissertation are listed below:

1. What do you believe to be the causes of childhood caries?
2. At what age do you think a child could start to have dental caries?

3. What would you expect to observe when a child has dental caries? In other words, what signs would you expect to see in the child when he or she has dental caries?
4. What do you think childhood caries could do to a child?
5. How long do you think childhood dental caries could last and affect a child?
6. What would you do to take care of childhood caries?

Procedures

Each parent was interviewed face-to-face at a time and place convenient to them. Each interview was conducted by the Chinese principal investigator (female doctoral student). Interviews lasted 20 to 45 minutes, including five minutes for explaining the study and obtaining written informed consent and demographic information sheet, and 40 minutes for interview. Interviews were audio recorded with permission and used dynamic interviewing approach (Glaser & Strauss, 1967; Krippendorff, 1980; Spradley, 1979; 1980; Strauss, 1987; Strauss & Corbin, 1990). Because Asians are known to provide socially desirable and short answers (Suh, et al., 2009), we attempted to minimize social desirability and self-enhancement biases by telling participants there were no right or wrong answers and all information would be treated confidentially. Each participant received a 20-dollar gift card for completing the interview. A follow-up telephone call was made within 15 days if a clarification was needed. All data were coded using CODE numbers and were accessible only to the dissertation supervisory committee.

Data Management and Analysis

All audio-recorded interviews were transcribed verbatim in Chinese by two trained assistants, and then verified 100% for accuracy against the audio-recordings by the research interviewer. Twenty-five percent of the interview data were translated into English and verified for accuracy in transcription by the secondary coder and the prior dissertation Chair. Field notes were also typed for additional analysis.

The transcribed interview data were analyzed based on the content analytic methods derived from Glaser and Strauss (1967) and extended for single-occasion interviews by Lewis and Deal (1995). Two types of analysis were involved: (1) deductive method using Kleinman's Explanatory Model (Appendix B) and concepts of Chinese culture, Chinese health beliefs and behaviors (Table 3 and Table 4); and (2) inductive method using open coding of units of analysis.

A multi-phased process of content analysis was carried out to analyze the interview data; see Table 5. First, the units of analysis were identified in the transcribed data. The unit of analysis was coded as the complete idea, not the complete sentence. A complete idea refers to a verbal expression that includes both an explicit or implicit verb and noun. As a result, compound sentences were coded as multiple units according to their component parts. All units of analysis were coded, and none of units were discarded. After unitizing data was completed, open coding was carried out. Open coding involved analyzing, comparing, and

categorizing data (Strauss & Corbin, 1990). Each unit of analysis was reviewed and organized into categories of units based on some common element. All questions initially were analyzed separately. The analyzed responses then were grouped together to develop the initial set of categories. This first level of categories was based on the manifest, not the latent, meaning of the words. Before coding the data, two coders read through each interview transcript three times in order to engage with the data. The primary investigator trained the secondary coder through cross-checking 25% of coding over four meetings. We were able to reach over 85% inter-rater reliability during each meeting.

Categories were labeled with emic, not etic, labels whenever possible (Lewis, Haberman, & Wallhagen, 1986). Emic labels are labels that use the words of the participants, not imposed words by the study coders. Emic categories are synonymous with "in vivo" codes or codes based on the words of the participants (Strauss, 1987). Constant comparative analysis was performed concurrently with the identification of the categories, which involved three comparisons (Haberman & Lewis, 1990). Three comparisons included (1) each unit of data to be coded was compared with each category to maximize the fit of the unit with the category; (2) units of analysis also were compared with each other within each category to maximize the consistency of the grouped units; and (3) finally, all categories and units of analysis were compared with the other categories and units to maximize their unique and non-overlapping quality (Lewis, et al., 1986).

During the entire process, definitions of the categories were developed and refined to better reflect the distinctions being made both within and across categories. Coding decisions were based on 100% consensus between the two coders, the investigator and the Chair of the dissertation committee. Any disagreement about any aspect of the coding was resolved through discussion. Discussions resulted in either a refinement in the definition of the category, a reassignment of the unit of data, or the identification of a new category. During the analysis process, memos and reflexive notes were also documented to describe the coders' thinking and synthesizing processes (Miles, Huberman, & Saldana, 2014).

Table 5 A Multi-Phased Process of Content Analysis

Steps	Descriptions
Step 1	Establishing units of analysis of transcribed data
Step 2	Open coding of units of analysis by coders; identification of initial categories; constant comparative analysis
Step 3	Refinement of open coding and initial categories; refinement of definitions of categories; constant comparative analyses
Step 4	Identification of the core categories; reorganization of initial set of categories around core construct; development of initial version of explanatory theory

The trustworthiness criteria suggested by Lincoln and Guba (1985) were followed in order to evaluate the rigor of the study: (a) Credibility (i.e., internal validity): this study was conducted by a doctoral student with qualitative data analysis experience and supervised by a team of experienced researchers with different but complementary academic backgrounds (triangulation of investigators). In order to learn the “culture” and build a trust with the participants, the investigator had volunteered at target agencies for 6 months to one year prior

to carrying out the study (Lincoln & Guba, 1985). Twenty-five percent of coding was cross-checked by two coders (Appendix D. Cross-Checked Coding: Unitized Data) and then the primary coder completed the rest of coding. Further, the dissertation Chair functioned as a peer debriefer and verified: (1) completeness and thoroughness of unitized data; (2) categories' definitions and uniqueness of each category; (3) the fit of each emic with each category; and (4) carried out constant comparative analysis (Lewis & Deal, 1995). Reflexive notes were used to track the researcher's ideas and thoughts throughout the process. As a member check method, the researcher paraphrased her understanding of what the interviewee said during the interview and validated the preliminary findings with the next participant. Field notes were also used to validate data interpretation. (b) Dependability (i.e., reliability) "seeks means for taking into account both factors of instability and factors of phenomena or design induced changes" (Lincoln & Guba, 1985, p. 299). There are known factors that may influence the data collection and results. Data, analysis notes, and quotes for the preliminary findings (translated into English by a trained bilingual and bicultural researcher) (Krueger, 2006) were shared with the dissertation Chair for input and audits. (c) Confirmability (i.e., objectivity): Detailed documents (e.g., data analysis sheets, memos, coders' agreement sheets, summaries of meetings with the dissertation Chair) were also available for readers' inquiry. An example of one audit is shown in Appendix E. (d) Transferability (i.e., external validity) was achieved using purposive sampling that recruited participants with diverse demographic

characteristics and experiences. A range of different realities was presented with appropriate quotations to allow readers to judge the results (Lincoln & Guba, 1985).

Statistical Analysis of Demographic Data

Data obtained on the demographic data sheet were analyzed using SPSS 20.0 statistical software. There was no missing data and data entering was double checked by a trained assistant before performing analysis. Descriptive statistics (e.g., mean, standard deviation, range, frequency, and percentage) were used to describe the distributions of demographic data.

Chapter 4: Results

Introduction

This chapter includes: a description of study participants and results from the elicitation interviews of study participants, including: (1) perceived causes of childhood caries; (2) perceived timing and reasons for the start of the symptoms; (3) perceived impact of childhood caries on the child; (4) perceived duration of impact of childhood caries; (5) expectations of treatment for childhood caries; and (6) the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral health care of their children.

Participants

Forty-six parents completed the interviews, aged 30 to 48 years (Mean=38, SD=4.60).

The majority of participants were mothers (n=41, 89%) because they were the primary

caregivers for their children. Ten parents (22%) had junior high school education; nine parents (20%) had high school education; 14 (30%) parents had college education; 13 parents (28%) had master or above education. In total, 57% of participants came from China, 28% from Taiwan, and 15% from Hong Kong. Most parents (n=34, 74%) self-reported their English ability was poor or fair and only two parents (4%) mentioned their English ability was excellent. Parents have lived in the US for 1 to 30 years (Mean=10, SD=6.86).

Children were aged between 0 and 6 years (Mean=3, SD=2.00). Fifty-nine percent of children (n=27) were boys and forty-one percent were girls (n=19). The majority of children (94%) were born in the US. Thirty children (65%) had public dental insurance; 15 children (33%) had private dental insurance; one child (2%) did not have dental insurance.

Seventeen families (37%) had 0-6 aged children with dental caries. Most families had two children in the household. Most families (n=36, 78%) were nuclear families consisting of parents and their children. Most families (n=21, 46%) did not report their household income in the past 12 months while another half of the families reported that their household income in the past 12 months was \$50,000 or less (Table 6. Study Sample Characteristics).

See Table 7 for a summary of aims 1-5, concepts, interview questions, categories, and sub-categories that derived from the coded data. Analyses from the interviews yielded 11 categories and 39 sub-categories. Study results relevant to each Study Aim are summarized in detail according to the prevalence of parental perceptions below after Table 7.

Table 6 Study Sample Characteristics

Parent, child, and family characteristics	n (%)
Parent Characteristics	
Gender	
Father	5(11)
Mother	41(89)
Age group (years)	
30-40	31(67)
41-50	15(33)
Country	
China	26(57)
Hong Kong	7(15)
Taiwan	13(28)
Education level	
Junior high school	10(22)
High school	9(20)
College	14(30)
Master and above	13(28)
Years live in U.S.	
1-5	18(39)
6-10	9(20)
> 10	19(41)
Self-report of English ability	
Poor or fair	34(74)
Good, very good	10(22)
Excellent	2(4)
Child Characteristics	
Age group (years)	
0-3	22(48)
4-6	24(52)
Gender	
Male	27(59)
Female	19(41)
Place of birth	
U.S.	43(94)
Taiwan	2(4)
Hong Kong	1(2)
Insurance status	
Public	30(65)
Private	15(33)
Self-pay	1(2)
Family Characteristics	
Family has 0-6 aged children with dental caries	17(37)
Number of children in the household	
1	13(28)
2	26(57)
3-5	7(15)
Number of adults in the household	
2	36(78)
3	5(11)
4	5(11)
Average household income in past 12 months	
I don't know	9(20)
I don't want to answer	12(26)
≤\$50,000	21(46)
\$50,001-100,000	1(2)
≥\$100,000	3(6)

Table 7 A Summary Results of Aims 1-5, Concepts, Interview Questions, Categories, and Sub-Categories of Kleinman's Explanatory Model

Aims	Concepts	Interview Question	Categories	Sub-Categories
1	Etiology	-What do you believe to be the causes of childhood caries?	-Causes of childhood caries	-Dietary habit -Oral hygiene habit -Biological and somatic issues -Biting fingers habit -Lack of regular dental visits
2	Onset of symptoms	-At what age do you think a child could start to have dental caries? -What would you expect to observe when a child has dental caries? In other words, what signs would you expect to see in the child when he or she has dental caries?	-Age of start of dental caries -Reasons for start of the symptoms of caries - Initial symptoms that suggested onset of childhood caries	-Aged 0-7 years -As soon as their teeth erupted -Once children started to have sweets -Improper dietary habit -Need time to develop caries -Improper oral hygiene habits -Sleep with feeding bottles -Lack of regular dental visits -Mouth or teeth-related symptoms -Eating-related symptoms -Speaking-related symptoms -Emotional problems -Body-related symptoms
3	Pathophysiology	-What do you think childhood caries could do to a child?	-Perceived impact of childhood caries on the children -Perceived impact of childhood caries on the parents	-Negative impact on the children -Positive impact on children's tooth brushing behaviors -Negative impact on parents regarding children's dental treatment
4	Course of caries	-How long do you think childhood dental caries could last and affect a child?	-Duration of impact of childhood caries	-Lasting for a lifelong when caries affects the permanent teeth -Lasting until having permanent teeth -Lasting until receiving treatment -Unknown of the duration
5	Treatment	-What would you do to take care of childhood caries?	-Parents' care for their children's dental caries -Parents' expectations of treatment for childhood caries -Satisfactions with the dental professionals -Negative experiences related to professional's technical help	-Immediately seek dentists' help -Pay more attention to children's tooth brushing at home -Maintain routine dental visits -Add dental floss into children's oral hygiene routine -Control their children's sweets intake -Expectations related to caries treatment -Expectations related to caries information from dental professional -Expectations related to caries education to their children -Expectations related to professionals' characteristics - Skills and characteristics -No treatment for their children -Tooth filling and brace issues -Use of anesthesia -Dental professionals' lack of treatment experience

Aim 1: Parents' Perceived Causes of Childhood Caries

Causes of Childhood Caries

Participants identified numerous causes related to childhood caries, including dietary habit, oral hygiene habit, biological and somatic issues, children's biting fingers habit, and lack of routine dental visits.

Dietary habit

All participants (100%) reported that children's daily dietary habit caused childhood caries, including the intake of sweet foods, sweet drinks, milk, breast milk, meals, and the use of feeding bottles and sippy cups.

The intake of sweet foods

All participants believed sweet foods could cause dental caries. Participants identified certain sweet foods that are very sweet or too sweet, such as candy, US cookies, donut, and ice cream. Sweeter foods are more likely to cause childhood caries. For example, a 43-year-old mother from China who has a 5-year-old girl stated, "*You know many foods in America are so sweet. Sweets are the majority. My daughter often says [there is] too much sugar in every kind of foods... every kind. Everything sold in the store is sweet stuff, such as donut and bread. She told us that. Those are more likely to cause tooth decay.*" Another 34-year-old mother from Hong Kong with a 4-year-old boy also mentioned, "*Cookies, the ones are very, very sweet cookies in the US.*" Parents identified certain types of sweets that

easily lead to childhood caries, such as soft, sticky, and refined foods. For example, a 38-year-old mother with a 2-year-old son from Taiwan mentioned, “*He [participant’s son] likes to eat sweet stuffs. He really likes Hi-Chew, one kind of soft fruit candies. To me, it is more likely to cause dental cavity because it is sticky.*” They also stated that the amount, frequency, and timing of sweets intake are associated with dental caries. For example, a 36-year-old mother who has a 4-year-old daughter with caries from Hong Kong stated, “*She [participant’s daughter] was eating too much candy (laugh). She probably had it more than 4 or 5 times a day. I think that is why she had tooth decay.*” Another 38-year-old mother from Taiwan said, “*His grandma allows him to have candies before bed time when she comes to visit us. For example, he has some snacks after dinner around 7 or 8 o’clock. Then, he probably goes to bed around 9 o’clock.*”

The intake of sweet drinks

Nine participants (20%) mentioned that sweet drinks could cause dental caries. Participants identified certain kinds of sweet drinks as causes of childhood caries, such as juice and soda. They also stated that the amount and frequency of sweet drinks intake are associated with caries. For example, a 34-year-old mother with a 4-year-old son from China stated, “*I think this is the difference between him [participant’s son] and my friend’s child. The age difference of these two children is 4 days. My friend’s child likes juice. I can recall that he [friend’s child] drank too much juice so he had caries (laugh).*”

The intake of milk and breast milk

Seven participants (15%) stated that milk contains lots of sugar. If children have milk at midnight or drink and sleep without cleaning their teeth, they will easily develop dental caries.

Two participants (4%) stated that breast milk contains little sugar, so there is a chance to develop caries if children are fed while sleeping or without cleaning. For example, a 32-year-old mother with a high-school education from China who has a 2-year-old daughter with caries shared, *“If you feed her the breast milk, because breast milk contains sugar, even it is not too sweet. But, having breast milk during sleep will worsen her bad teeth [caries].*

Because you feed her the breast milk without cleaning, the milk will penetrate into the teeth.

Ah, the sweet will cause decayed teeth.”

The use of feeding bottles and Sippy cups

Five participants (11%) believed that sucking feeding bottles or Sippy cups during sleep, for a long time, and the frequency of sucking are associated with dental caries. For example, a 34-year-old mother with a 4-year-old son without caries from China expressed, *“When he [participant’s friend] drives his car, he likes to let his child having a juice cup to drink. A Sippy cup... His son always sucks on the cup. I think this is why he has caries.”*

The intake of meals

Four participants (9%) mentioned that having meals could cause dental caries. Participants believed that food left in the mouth after meals will lead to caries. Two

participants stated that meat stuck between the teeth will cause caries. For example, a 32-year-old mother with a high-school education from China who has a 4-year-old boy without caries said, *“There is something looks like meat residue. It gets stuck in the tooth, if you don’t brush clean. If you don’t take it off at the time, it will breed bacteria slowly, and slowly. The cavity’s temperature in his mouth is easy to breed bacteria. Human’s body temperature is ideal to breed bacteria.”*

Oral hygiene habit

Forty-five participants (98%) referred to the habit of children’s tooth brushing, rinsing mouth and drinking water after having sweets, flossing, and parents’ role in assisting children’s oral hygiene practices (tooth brushing and flossing) as causes for childhood caries.

Tooth brushing habit

Forty-five participants (98%) stated that the frequency of tooth brushing (how many times a day), timing of tooth brushing (when the child has his/her teeth brushed), the method of tooth brushing (brushing method, brushing duration, whether use fluoridated toothpaste/dental floss, parents’ assistance role) are associated with childhood caries. Some parents were concerned that their child did not have proper frequency for tooth brushing. As a 38-year-old mother from Taiwan who has a 5-year-old son with caries said, *“Maybe the number of times for brushing is not adequate. So far he only brushes teeth once a day. We only ask him to brush teeth by himself once in the morning.”* In terms of timing of tooth

brushing, most parents believed brushing before bedtime and right after having sweets or meals is important to prevent dental caries. For example, a 38-year-old mother with a 6-year-old son from Taiwan shared, *“I think if he does not brush teeth before going to bed, the germs inside of the mouth will grow more and more all night long”*. Regarding the method of brushing, many parents indicated that children might not brush their teeth thoroughly or not in a correct way. Furthermore, some parents pointed out the importance of parents’ involvement in children’s tooth brushing, such as children insist to brush their own, parents do not help the child with tooth brushing, or supervise children. For example, a 38-year-old mother from Taiwan who has a 3-year-old son with caries stated, *“He insisted he wanted to brush teeth by himself, so he brushed his teeth for a period of time.”* Another 36-year-old mother from Hong Kong who has a 5-year-old daughter with caries stated *“She knows how to brush her teeth, but maybe she is still incapable of doing it properly. She cannot clean it thoroughly. I think this must be the main cause for her [caries], as cavities usually happen on those teeth which are inside the mouth and harder to reach.”* A 42-year-old mother from China who has a 4-year-old daughter with caries stated *“I also helped her to brush her teeth, maybe I do not do a good job so she had cavities.”* Another 32-year-old mother with a 1-year-old daughter from Hong Kong mentioned, *“Hygiene habits....What I mean is that parents should check their children’s teeth even though children are old enough to brush their teeth themselves.”*

Not rinsing mouth after having sweets

Ten participants (22%) stated that not rinsing mouth after having sweets can result in caries. For example, a 35-year-old mother from China who has a 4-year-old son with caries stated *“Candies contain more sugar. He [participant’s son] did not gargle right after taking sweets. So, it is more likely that he gets tooth decay.”*

Tooth flossing habit

Nine participants (20%) stated that not flossing teeth is a cause of childhood caries. For example, a 38-year-old mother from Taiwan who has a 3-year-old son with caries said, *“For my second kid, maybe we did not help him to use dental floss very well. So, there were foods left over and sticky in between teeth gaps. Yes, I think it was the reason for him to have cavities.”* Although parents believed flossing is important for caries prevention after their child experienced caries, they stated that their child does not regularly floss teeth, they do not floss their child’s teeth or detailed enough, they just learned flossing concept after they came to the US, and it is difficult to floss a child’s teeth because the gaps between teeth are tight and small. For example, a 38-year-old mother from Taiwan who has a 3-year-old son with caries expressed, *“Because the spaces between teeth are very tight and small, it is not easy for me to clean. If I do not use dental floss to clean the spaces, he must get dental decay. After the experience of his cavity, now I am being more aware of flossing.”*

The parents' role in assisting children's oral hygiene practices (tooth brushing and flossing)

Five participants (11%) stated that childhood caries is related to whether parents help or examine the quality which the children brush their teeth. Further, whether parents floss children's teeth or help children floss teeth is associated with childhood caries.

Not drinking water after having sweets

Two participants (4%) stated that not drinking water after having sweets can result in caries. For example, a 34-year-old mother from China who has a 2-year-old son with caries stated, "*It seems like he [participant's son] had sweets, and he did not drink water after having it... So, he had cavities.*"

Biological and somatic issues

Twelve participants (26%) indicated that childhood caries could be caused by inheritance, genetic, inborn, bacteria, and transmission issues.

Inheritance, genetic, and inborn issues

Nine participants (20%) referred to childhood caries as an inheritance, the result of parents' genetic or inborn issues. Participants believed that the condition of parents' teeth contributed to their child's teeth condition. For example, a 39-year-old mother from Taiwan who has a 4-year-old boy with caries stated "*Well... If parents have good teeth, their child will not have caries even though they do not take good care of their children's teeth (laugh).*"

Well, caries is related to inheritance.” Moreover, another 36-year-old mother from Taiwan said, “I think the genetic issue also contributes to this problem [dental caries]. Some people are born with weaker tooth enamel, and I think it affects the teeth too.” A 38-year-old mother with a 4-year-old daughter from Hong Kong shared, “My friend’s daughter... All of her teeth were decayed when she was only 2-years-old. One of the teeth was broken into half when she was 4-years-old. The color of her tooth was turning to black, too. So, I think her natural inborn problem is more severe than my child.”

Bacteria, germs, and tooth worms in the mouth

Two participants (4%) reported that usually there are bacteria or tooth germs in the mouth. If children do not have good oral hygiene, the bacteria or germs will destroy the teeth. For instance, a 35-year-old father from China expressed, *“The tooth germs will destroy all of the teeth, just like those in the photo images. Those pictures show a lot of germs inside of the teeth.”* On the other hand, four participants (9%) from China mentioned tooth worms could lead to caries. However, the ways they believed how tooth worms led to caries were different. One 45-year-old mother with a college education used “worms” and “bacteria” interchangeable. She said, *“In the old days in China, people would certainly not understand if you mention it as bacteria (laugh). People use the term “worms” in the common statement.”* One 43-year-old mother with a high school education said, *“If people do not clean their teeth, worms would grow up inside the teeth.”* A 33-year-old mother with a junior

high education said, *“Having candies without teeth clean will produce worms. Teeth would be eaten by the worms.”* Another 42-year-old mother with a high school education stated, *“Having sweets would lead to germs growing inside the teeth. Then, the germs produce worms.”*

Be infected through others

Three participants (7%) reported that caries were contagious and could be acquired from infected others through shared eating behaviors and a shared toothbrush. For example, a 35-year-old mother with a 4-year-old daughter from China expressed her worry about disease transmission, as she mentioned *“She [participant’s older daughter] and my younger one are eating food together at home, and there is a chance that the younger one will get caries from her sister. I worry about this too...”* On the other hand, a 35-year-old father from China shared, *“If you find out you have dental caries, you cannot share the toothbrush with your kids. They need to use a separate toothbrush; otherwise they will get tooth decay from the germs.”*

Biting fingers habit

Two participants (4%) believed that children biting their fingers all day or during their sleep could result in dental caries. For example, a 42-year-old mother from China mentioned, *“My second child was...I suspected she bit her fingers and [this] led to caries [when she was 4 years old]. My fifth one didn’t do that. No...both my third and fifth children didn’t do that.”*

They didn't bite their fingers. So, I told the dentist about this. And the dentist said it was possible...possible to have caries." Another 46-year-old mother from China who has a 6-year-old son stated, *"He still has the habit to bite his fingers every night. So, he can fall asleep."*

Lack of regular dental visits

Two participants (4%) reported that not having routine teeth cleanings, teeth care, or checkups at a dental clinic could cause childhood caries. For example, a 42-year-old mother from Taiwan stated, *"When she [older daughter] was 3-years-old staying in Taiwan for one year, I think she did not have regular checkups. So, she had many decayed teeth. My younger son was born in the US, so regular checkup is so helpful to find out something I could not see. Like an X-ray, we only could know whether a child has a cavity until an X-ray is taken."* A 35-year-old mother with a 2-year-old daughter from China also shared, *"Not visiting the dentists often...the child does not go to the clinic for teeth washing [teeth cleaning] and teeth care. If I know she has tooth decay from the dentist, I definitely will do a better job on her teeth care."*

Explanatory Models of Etiology of Childhood Caries

When the researcher probed parents about the question of *"How could caries affect a child's body and health?"* their responses showed variable explanatory models related to each cause and its mechanisms linked to dental caries (Appendix F. Explanatory Models of

Etiology of Childhood Caries). For example, when the interviewer asked parents how taking sweet foods led to dental caries, most parents stated that taking sweet foods without tooth brushing, rinsing, or drinking water would lead to caries. Some parents mentioned sweet foods will stick to the teeth. If children do not have their teeth brushed, tooth worms will grow inside the teeth. In addition, the residual food on the children's teeth will rot. Rotting teeth will cause bad teeth. For example, a 43-year-old mother with a high school education from China stated, *"If you do not clean it, it [sweets] will stay inside for a long time. Just like the dirty water, worms will grow up there. I told my son [2-years-old] that you have to learn how to clean your teeth, then the worms will not coming out from your teeth."* Some participants described sweet foods will produce acidified material on the teeth that will facilitate bacteria growth or erode the teeth. For example, a 38-year-old mother with a college education from Taiwan stated, *"I think...better not to keep eating candies. Sugar in the mouth will produce acid! I am not sure about this...some sort of acid reaction. If your teeth will be in an acidized environment, that is good for bacteria to attach on the teeth, and then cause tooth decay."* From the diet habit diagram, participants indicated diverse pathways on how sweet foods lead to dental caries. Furthermore, 11% of parents pointed out that the longer time sweets are left on the teeth, the greater chance there is to develop dental caries. A 37-year-old mother with a Master degree from China stated, *"For we as Asian, we like rice. Rice is the sticky kind one and it will sticky on the teeth. For kids, it is not easy for them to*

clean the teeth. It may be left on their teeth for a longer time, so it will erode their teeth.”

When the interviewer asked participants how tooth brushing habit leads to dental caries, most participants directly linked not having proper tooth brushing habit to childhood caries. Some parents mentioned that improper tooth brushing can cause either acidified material on the teeth or sugar acidifies the tooth enamel after a period of time, which result in bacteria or germs to grow more and faster inside the teeth, and then teeth erosion happened. For example, a 38-year-old mother from Taiwan said, *“After having sweets, a child does not deeply brush the teeth. The sweet stuffs will stick or attach on the teeth... It is also possible that it [sugar] will acidify. After acidifying, the bacteria will grow up. Then, the bacteria will erode the teeth.”* Some parents emphasized the importance of brushing before bedtime, as the bacteria are easier to grow more and faster at night, as well as when no air in the mouth.

Aim 2: Parents’ Perceived Timing and Reasons for the Start of the Symptoms

Age of Start of Dental Caries

Participants held different understandings on the age of onset for dental caries. Their responses included: (1) children could have caries at aged 0-7 years (n=34, 74%); (2) children could have caries as soon as their teeth eruption (n=10, 22%); and (3) children could have caries once they start to have sweets (n=1, 2%). Most participants believed that children could develop dental caries once their teeth erupted or at aged 3 years. The majority of parents learned such ideas from their experiences or experiences of friends’ children. For

instance, a 32-year-old mother from Taiwan shared, *“As long as you have teeth, you may have the chance of having caries. Six months, most children have their first tooth at aged 6-month.”* A 38-year-old mother from Taiwan said, *“My oldest one is 4 years old now. Ah...let me think... He probably got caries around aged 3.”* In terms of taking sweets, a 41-year-old father from Hong Kong said, *“I think the cavity starts to exist ever since parents start to give their children candies. Her parents always let her consume candies every day, and she must be consuming more and more candies. This should be one of the causes.”* Notably, a 36-year-old mother from Taiwan mentioned children usually have caries at aged 7 and she learned this idea from her friends. Moreover, three participants (7%) indicated that they were not sure or did not know the answer.

Reasons for the Start of the Symptoms of Caries

Reasons parents believed children started to develop caries included: (1) improper dietary habit (n=13, 28%): children start to having sugary foods and drinks, parents cannot control their child’s sweets intake, and children do not build up a healthy dietary habit; (2) improper oral hygiene habits (n=12, 26%): children do not build up an oral hygiene habit, children cannot brush teeth thoroughly, and parents do not help children to brush teeth; (3) caries needs time to develop (n=3, 6%); (4) children sleep with feeding bottles (n=1, 2%); and (5) children do not have regular dental visits (n=1, 2%). For instance, a 37-year-old mother with a 4-year-old boy from China stated, *“Parents can control children and don’t let*

children eat candies now! But after aged 6, you can't control your children. When children want to eat something, they just eat it." Another 33-year-old mother with a 1-year-old boy from China said, *"Well, it depends on how the caregivers clean their oral hygiene. If they do not care about it or do not clean it well, then caries may develop earlier."* Moreover, Participants learned age of start dental caries from their personal experience, including their children's caries experience (n=20, 43%), caries experience from their friends' children (n=9, 20%), experience from children met at dental clinic (n=1, 2%), and information from the dentist (n=1, 2%). For instance, a 33-year-old mother from China said, *"My personal experience... When I was in my hometown, I saw some children having too many candies or cookies. These children had caries when they were 1 or 2 years old."*

Initial Symptoms that Suggested Onset of Childhood Caries

Parents believed that children with caries may experience mouth or teeth-related symptoms, eating-related symptoms, speaking-related symptoms, body-related symptoms, and emotional problems. Common symptoms of dental caries that parents reported included: color changes on the teeth (n=31, 67%), toothache (n=30, 65%), loss of appetite (n=9, 20%), difficulty speaking (n=4, 9%), sleep problems (n=3, 7%), and being irritated and crying (n=4, 9%). In terms of color changes on the teeth, most parents mentioned that caries would cause their child's teeth turn into black. A few parents (n=4, 9%) stated that children's teeth would change to white, yellowish, or coffee color. Some parents mentioned that parents would not

realize their child had caries if their child was too young to express the pain. On the other hand, five parents (11%) indicated that the condition of caries would be serious once their children complained of pain. When the researcher asked parents about how they realized their child had caries, most parents said the dentist identified the caries during routine checkups. The majority of parents claimed it was the dentists' responsibility to examine whether a child had caries because they, the parents, could not tell whether their children had caries. Furthermore, five parents (11%) expressed that they only knew certain symptoms of childhood caries or did not know any of the symptoms.

Aim 3: Parents' Perceived Impact of Childhood Caries on the Children

Parents believed dental caries could negatively impact both children and parents. The negative impact on the children included mouth, body, routine activities and emotional impact. Fortunately, dental caries also had a positive impact on promotion of children's tooth brushing behavior from their caries experience. The negative impact on parents included concerns about dental treatment and disease transmission.

Negative Impact on the Children

Mouth impact of childhood caries

Forty-two participants (91%) reported that the impact of childhood caries on the oral cavity included pain and uncomfortable, oral problems and diseases, including those that affected the child's permanent teeth, appearance and attractiveness, and change of dietary

habit (e.g., chewing ability, food choices, and appetite). Most participants (46%) mentioned that toothache and uncomfortable feeling were common symptoms of childhood caries, which could be very painful to children. For instance, a 34-year-old mother from China shared, *“Toothache is not a disease, but it is very, very painful. It can almost kill you.”* When children experience toothache, their condition must be serious. A 43-year-old mother from Taiwan expressed, *“I think if it hurts, it will be very serious.”* There were some common oral problems and diseases that participants believed as negative impact on children, including halitosis, inflammation, gum and tooth root issues, losing teeth, and periodontal diseases.

Twenty participants (43%) mentioned that caries could affect a child’s dietary habits including chewing ability, food choices, and appetite. For example, a 35-year-old mother from China shared, *“Certainly, if a child has caries, she cannot eat well because the teeth are decayed. She bites...when she eats food, her chewing ability will not be good.”* About one third of participants (35%) concerned about caries may affect the development of permanent teeth. A 35-year-old mother from China who has a 5-year-old son said, *“If my child has tooth decay, his teeth will fall out. I will worry the new teeth won’t grow well, will be crooked, or it won’t be so strong.”* On the other hand, a 32-year-old mother from Taiwan worried that the permanent teeth may take longer time to get completed change and also become decayed teeth. Six participants (13%) reported dental caries would affect a child’s appearance and attractiveness. For example, a 36-year-old mother with a 6-year-old daughter from Hong

Kong said, *“You know...girls care about being pretty or not pretty. So...whenever she sees her own silvery teeth [stainless steel crown], she knows that she has to keep them clean by brushing them.”* Four participants (9%) indicated that they only knew certain symptoms, as a 37-year-old mother from China stated, *“I never have tooth decay, so I don’t know. Basically ...I just know these symptoms.”* Moreover, one participant (2%) stated a lack of knowledge of caries symptom because his daughter never has caries experience. He stated, *“I really don’t know about it coz my daughter does not have caries yet.”*

Body impact of childhood caries

Twenty-six participants (57%) reported that the impact of childhood caries on the child’s body could include gastrointestinal problems, nutritional imbalance, growth issues, impact on function and the development of organs, diseases, and unhealthy issues. Nine participants (20%) mentioned that gastrointestinal problems involved digestion issues, increased pressure in stomach, and bacteria in the stomach. A 35-year-old mother from China stated, *“Teeth’s function is for us to eat stuffs. If we cannot chew well, it could influence the stomach. If we do not chew the food well, and are forced to swallow the food to the stomach. It increases the pressure for the stomach to digest the food.”* Another 38-year-old mother from Hong Kong offered, *“When there’re a lot of bacteria in the oral cavity, I guess it will affect the digestive system negatively too. I’m just guessing, this is what I think and how I feel.”* Seven participants (15%) reported caries could decrease the amount of nutritional

intake and lead to nutritional imbalance or malnutrition. For example, a 36-year-old mother with a 9-month-old son from Hong Kong shared, *“The problem would result in imbalance food consumption. After he lost his teeth because of cavities, he couldn’t chew solid food. In some ways, this would indirectly cause nutritional imbalance, or in another way of malnutrition.”* Seven participants (15%) reported caries could affect a child’s growth including weight and height. For example, a 38-year-old mother from Hong Kong stated, *“What I worry is... For example, if children do not eat balance foods, they may not grow tall!”* Seven participants (15%) believed that children with decayed teeth would tend to be sick often or have an unhealthy life. For example, a 33-year-old mother with a 3-year-old son from Hong Kong expressed, *“The bacteria will get into his body because he eats food...eats food...the bacteria will get into his body, which is bad for his body. He will get sick often.”* Six participants (13%) reported caries could influence function and development of organs including heart, lung, stomach, liver, spleen, and brain. For example, a 48-year-old mother from China said, *“Lung may also be affected because the lung passes through the mouth, right? Lung’s function is about breathing, so symptoms like difficulty breathing.”* Another 40-year-old mother with a 4-year-old daughter from China said, *“I think teeth have many nerves connected with the brain. So, I worry...worry about caries may affect her intelligence... memory, those kinds of stuffs.”* Four participants (9%) stated that caries could link to certain diseases, such as heart diseases, hypertension, and diabetic. A 48-year-old

mother from China said, *“There are many nerves within the teeth. So... Maybe it will affect blood vessel, maybe it also affects the heart. Heart will develop heart diseases.”* However, 15 participants (33%) indicated that they did not know the body impact of dental caries or there was no impact on a child’s body. For example, a 45-year-old father from China shared, *“Like us coming from China, we do not quite understand this [how caries affects a child’s mouth and body]. No ideas about how it affects other aspects. I really don’t understand.”*

Impact of caries on children’s daily routine activities

Fourteen participants (30%) reported that childhood caries could affect children’s daily routine including the frequency of dental visits, the child’s learning conditions in school, concentration, sleep, play, and teeth-cleaning practices. For example, a 33-year-old mother with a 18-month-old son from China said, *“If he [participant’s son] does not protect them [his teeth] now, maybe he will have bad teeth [dental caries] at 2 or 3 years old. Then, he has to visit a dentist all day in order to remove the caries.”* Another 31-year-old mother with a 18-month-old son from China expressed, *“If my child has toothaches, he cannot learn anything. Just like when you suffer pain over the whole body, you cannot think. You will have a bad mood, too. So when he has toothaches, he cannot learn anything even though you ask him to learn.”* A 42-year-old mother with a 4-year-old son from China shared, *“Tooth decay, for example... If it is serious, it will affect his sleep.”* A 43-year-old mother with a 4-year-old son from Taiwan stated, *“If a child feels uncomfortable, he will probably not want to play.”* A

32-year-old mother with a 14-month-old daughter from Taiwan shared, *“It affects tooth cleaning as there would be uneven surfaces on the teeth, and it’s even harder to clean uneven surfaces on the teeth.”*

Impact of caries on children’s emotion

Six participants (13%) reported that childhood caries could lead to children’s emotional distress due to the pain and dental treatment, such as crying and being irritated, being in a bad mood, and dental fear from the dental treatment. A 33-year-old mother with a 16-month-old son from China expressed, *“Because of severe pain, he [participant’s son] cannot eat anything and maybe cry and be irritated all day long.”* Another 35-year-old mother with a 3-year-old son from Hong Kong mentioned, *“As visiting a dentist for caries treatment, the child might have dental fear. So, I have to prepare him for visiting a dentist.”*

Positive Impact on Children’s Tooth brushing Behaviors

In contrast, one participant (2%) stated that childhood caries could be a positive influence on children’s tooth brushing behaviors because children might be learning the importance of caries prevention through caries experience. A 36-year-old mother with a 6-year-old daughter from Hong Kong expressed, *“I keep on reminding her of what she has now, a silvery tooth [stainless steel crown]. The dentist said, ‘It is because you did not brush your teeth accordingly to how you should. Now you have to do all these things [to prevent more cavities]’. When she knows what’s going on, she will spend more time to clean her*

teeth. Therefore, I think this [having a stainless steel crown] does something good to her.”

Negative Impact on Parents Regarding Children’s Dental Treatment

Five participants (11%) mentioned that dental caries could also have a negative impact on parents. Parents expressed concerns related to dental treatment including side effects of anesthesia, guilty about children’s pain during dental treatment, and filling cost. A 35-year-old mother with a 3-year-old son from Hong Kong stated, *“If your tooth decay is very severe, you may need to pull out the teeth. And, have dentures done. For the kids, they may need anesthesia for whole body. I would worry (laugh). The size [body weight] of child is so small. So, I would worry about the amount of anesthesia the dentist will use because it is not like adults... only have local anesthesia. The whole body anesthesia [general anesthesia] has risk.”* A 38-year-old mother who has a 5-year-old son with caries from Taiwan shared, *“Because I had caries experiences, I know how painful for drawing the teeth nerves [canal therapy]. So, my...when my child was found a cavity, I was so...so guilty.”* A 44-year-old mother who has a 6-year-old son with caries from Taiwan stated, *“Also, I worry... It is very expensive to fill a tooth here.”*

Aim 4: To Describe Parents’ Perceived Duration of Impact of Childhood Caries

Participants believed that dental caries could have a short-term or long-term impact on their child. The durations of caries’ impact could last life-long when caries affects the permanent teeth, last until having permanent teeth, last until receiving a treatment, or last for

an unknown period of time. Most participants (43%) stated that caries could last life-long, especially when caries affects the permanent teeth. A 44-year-old father with a 2-year-old daughter from Hong Kong shared, *“If the cavity happens when she [participant’s daughter] had already had her adult teeth replaced, then it would affect her for a lifetime, because it wouldn’t grow any new teeth anymore.”* Twenty participants (26%) felt that childhood caries would only last until having permanent teeth, since the decayed teeth will be replaced by the adult teeth. For example, a 46-year-old father from China stated, *“I think it [caries] should last until the replacement of milk teeth [baby teeth] to permanent teeth, and then the decayed teeth would be replaced. Teeth replacement usually takes place around aged six years old.”* Nine participants (20%) mentioned that dental caries would be lasting until a child receives a dental treatment, since the problem will be taken care of by the dentist. However, nine participants (20%) expressed that they were not sure about caries’ duration including a participant who identified self as a general dentist. A 32-year-old dentist with a 1-year-old daughter from Taiwan stated, *“If you do not take good care of the teeth, the replacement process would happen later. There will still be baby teeth inside your oral cavity even when you’re already twelve years old. I know exactly what it is because I’m a dentist (laugh). Actually, there are some mistakes in my previous statements (laugh).”*

Aim 5: Parents’ Expectations of Treatment for Childhood Caries

Parents’ Care for Their Children’s Dental Caries

When the researcher asked parents about their care for their children's dental caries, parents' responses included: immediately seek dentists' help; pay more attention to children's tooth brushing at home; maintain routine dental visits; add dental floss into the children's oral hygiene routine; and control their children's sweets intake.

Immediately seek dentists' help

Forty-two participants (91%) stated that they would immediately seek for dentists' help for their children's caries treatment. Parents believed caries could have a great impact on their children and counted on dentists' help because there was nothing they can deal with decayed teeth. Therefore, parents would cooperate with dentists to get the decayed teeth restored. For instance, a 42-year-old mother with a child aged 6 years from Taiwan shared, *“When the dentist asked us to fill our child's teeth, we did it right away. If we did not take care of the problem immediately, tooth decay could affect other teeth. So, we said okay and got the thing done. The dentist cleaned the area. The treatment only took less than 30 minutes.”* Moreover, one participant expressed that parents need to prepare a child's psychological construction before visiting a dentist. Another participant addressed that children need to visit the pediatric dentists because the treatment should be different between primary teeth and permanent teeth. Two participants mentioned that they would manage children's pain first by using ice packing or teeth cleaning with water, and then seek professional help. Another 30-year-old mother from China stated that she would use a

toothpick to clean food residue in the hole, and then seek for the dentist's help. A 44-year-old father found his son had caries when visited the dentist in Taiwan. But, he waited for six months to confirm caries with the dentist in the US. Moreover, one participant did not take the child for dental treatment straightaway, instead of addressing sweets control and oral hygiene care at home. Notable, one parent thought few decayed teeth were not severe so the parent postponed the treatment. Also, one parent found out caries on her child without taking child for dental treatment. The parent thought the dentist would take care of the problem at next routine visit.

Ninety-eight percent of children in present study had dental insurance; however, two parents expressed concerns related to dental expense. For instance, one parent mentioned that she had treatment conflicts with her husband due to the expensive dental expense. Because her 3-year-old son's caries was minor as a tiny hole on the tooth, her husband suggested getting the tooth fixed when they return to Taiwan. The parent also admitted that the cost would be much cheaper in Taiwan. Given the serious effects of dental caries, the mother insisted that their child should receive the filling in the US immediately. Another mother from Taiwan with a Master degree also expressed concern about expensive cost for tooth filling. Nevertheless, tooth filling was still a financial burden to the family even the child had dental insurance.

Pay more attention to children's tooth brushing at home

In addition to seeking for dental treatment immediately, 20 participants (43%) expressed they would pay more attention to children's tooth brushing at home, including: (1) spending more time to brush children's teeth, (2) helping children with each step of cleaning, (3) watching children brush, (4) reminding children tooth brushing, (5) increasing times of tooth brushing, (6) increasing duration for each tooth brushing, (7) using non-sensitive toothbrush, and (8) adding mouth rinse to children's oral hygiene. For example, a 33-year-old mother with a high school education from China shared, *"If my child has tooth decay, I feel it is my responsibility is to frequently clean his mouth, brush his teeth, and use cloth to wipe his teeth more often every day."* Another 45-year-old father from China mentioned, *"Usually he has only 2 times of tooth brushing when there is no school day. At school, everybody needs to brush tooth after lunch. But if you have cavities, you should brush intensely, at least brush teeth 3 times a day, in the morning, noon and night."* One participant mentioned she would ask her child to brush tooth for a longer time compared to before. Another 35-year-old mother from China stated, *"Before discovering the caries...I did not want him [participant's son] to use mouth rinse because I think it contains chemical stuffs... And the dentist suggested it will be better to use mouth rinse but not a must. So, we start to use mouth rinse but not too often."*

Maintain routine dental visits

Eleven participants (24%) mentioned that it was very important to have routine dental visits; hence caries would be found through dental examinations and treated by the dentist without any delay. A 33-year-old mother with an 18-month-old son from China stated, *“Most important thing is dental aspect. You have to take children for regular dental checkups, so you know whether there are any cavities.”* Another mother with a 2-year-old daughter from China shared, *“She [participant’s daughter] only needs fluoride every 3 months to prevent cavities.”* Moreover, one participant complained that routine dental visiting was not required for children who live in a village in China, thus she had caries when she was a child.

Add dental floss into children’s oral hygiene routine

Nine participants (20%) mentioned that they used dental floss as part of their children’s current oral hygiene. Among those parents, most of them (67%) were from China. Six participants (13%) stated that they asked their child to start using dental floss according to the dentist’s suggestion; 2 participants (4%) mentioned they flossed their child’s teeth for caries prevention; 1 participant (2%) expressed that she started to supervise her child while flossing teeth. For example, a 35-year-old mother from Hong Kong stated, *“Before discovering the cavity, my child did not use dental floss. The dentist suggested that he must use dental floss.”* Another participant from Taiwan also mentioned, *“After that event, I take it very seriously to floss my child’s teeth after three meals.”*

Control their children’s sweets intake

Eight participants (17%) mentioned that they would control their children's sweets intake once the child has dental caries. The way to control sweets intake included giving less sweet snacks (n=7, 15%), giving less sweet drinks (n=2, 4%), not offering children sweets (n=2, 4%), and purchasing less sweets (n=1, 2%). For example, a 43-year-old mother from China stated, *"Do not give him so many candies! If I know he has caries, I will try to control his sweets taking."* Another 46-year-old mother from China expressed, *"After my kid had cavities, we seldom buy candies now. Sometimes he said 'Mommy, I want the bubble tea.'... Although he likes it and asks me to buy it for him sometimes, I always refuse him."*

Parents' Expectations of Treatment for Childhood Caries

Participants were asked to share their experiences or expectations regarding professional help when their child had dental caries. If they did not have relevant experiences, they were encouraged to share their potential expectations toward professional help. Participants identified several expectations regarding seeking dentists' help, including caries treatment, caries information, dental education for their children, and professionals' characteristics.

Parents' expectations related to caries treatment

Thirty-nine participants (85%) indicated expectations regarding caries treatment including: (1) treating the caries in a correct way to prevent caries progress (n=12, 26%); (2) filling the teeth instead of teeth extraction (n=12, 26%); (3) answering my questions regarding dental caries, such as causes and consequences of caries (n=9, 20%); (4) discussing

the treatment, such as treatment procedures and treatment options (n=9, 20%); (5) detailed descriptions about child's condition (n=4, 9%); (6) releasing the pain (n=3, 7%); and (7) shortening the interval of regular checkups (n=2, 4%). Regarding the proper treatment, a 35-year-old father from China said, "*They [dentists] have more experience than me. I don't know [how to deal with the caries]. They know what should be done and have more knowledge about it. So, I only hope they could do their best.*" About one fourth of participants hoped the dentists could try to repair the teeth using tooth filling first if it is applicable.

Parents concerned tooth extraction could affect a child's tooth arrangement, appearance, and eating ability. A 33-year-old mother with a 5-year-old daughter from China mentioned, "*If the tooth is pulled out, I am afraid that the new tooth won't grow in the space properly. Also, it may not look good for a girl.*" Especially, parents from China complained that usually dentists in their country would not easily extract a child's teeth like America dentists do.

Moreover, one parent initially did not trust the Chinese dentist in the Chinatown area because that dentist also suggested tooth extraction. After transferring her son to the children hospital, she found that the same treatment was suggested. After that event, she concluded that the pediatric dentistry may be more advanced than that in China. A 38-year-old mother with a 4-year-old daughter from Hong Kong said, "*I hope that the dentist would briefly tell us the progress of the cavity and also how serious it is. The dentist could run an entire body checkup along the way and make sure that there are no any other problems happened that*

are caused by the oral problem. For example, check whether the cavity has affected the digestion.” Another 38-year-old mother with a 6-year-old son from Taiwan stated, “I expect the dentist to tell me how to treat the cavity problem..., and then how to ensure that it doesn’t affect the other teeth...and permanent teeth.” Two participants hoped they could visit the dentist more frequently; therefore the dentist could remove the stains on the teeth, as well as find any caries in early stage. A 46-year-old mother from China said, “Surely, it will be better to examine the teeth every 3 months because he does not have any teeth yet. We can find if anything goes wrong, like knowing caries earlier. It will be better if the exam waiting time is shorter.”

Parents’ expectations related to caries information from dental professional

Eighteen participants (39%) indicated that information about dental caries and its prevention was needed from dental professionals, including pain management (n=1, 2%), caries prevention (n=12, 26%), healthy food (n=4, 9%), tooth brushing methods for children (n=4, 9%), and flossing methods for children (n=3, 7%). Most parents expressed they lacked of knowledge regarding caries prevention, such as how to brush, floss, and prepare foods for their children. For instance, a 35-year-old mother with a 2-year-old daughter from China said, “Dentist could teach me the correct way to prevent caries. We have no common sense on how to take care a child’s teeth. We will ask the dentist when we have the appointment, such as...what kind of methods to take care of teeth, how to properly clean teeth.” Another mother

from China said, *“I would like to know what she should eat to prevent bad teeth [dental caries] (laugh), to prevent decayed teeth.”*

Parents’ expectations related to caries education to their children

Eight participants (17%) expected the dentists to educate their children about the importance of oral health and oral care, including limited amount of sweets (n=3, 7%), tooth brushing methods (n=4, 9%), flossing methods (n=1, 2%), and lecturing the child about the importance of caries prevention (n=6, 13%). Most parents believed that dental professionals have sufficient dental knowledge to educate their children. In addition, children usually respect dental professionals more than their parents. A 38-year-old mother from Hong Kong who has an age 4 daughter said frustrated that, *“We hope that the dentist and parents can together remind the children on what their current teeth condition is. The children would only listen to the dentist’s suggestions. They think that the parent is always nagging. They would do immediately what the dentist had told them, but wouldn’t listen to us.”* Moreover, two participants indicated that educating children is dentist’s routine work. A 36-year-old mother with a 6-year-old daughter from Hong Kong stated, *“The dentist usually would educate kids by asking the children show me how to brush your teeth, and later teach them the right way to brush it. The dentist would also remind them not to be lazy to brush their teeth every day and night.”*

Parents’ expectations related to professionals’ characteristics

Seven participants (15%) pointed out expectations related to professionals' characteristics including being patient, being kind, and having comforting skills for children. Parents concerned about professionals' skills in caring children, especially when children underwent the dental procedures. Two parents mentioned that they encountered dentists and nurses who were not patient to their children, thus they had to transfer their children to different clinics. For example, a 37-year-old mother with a 3-year-old daughter from China stated, *"There was one dental clinic that requested parents not to be around their children when they filled the teeth. They thought in this way that kids would obey the dentist's instruction. But, my kid did not like that. If I am not around, she won't cooperate. We then changed to a clinic. I was around her and plus the dentists and nurses were so patient. So, she had no problem to get the examination and tooth filling done."*

Satisfaction with the Dental Professionals

Ten participants (22%) expressed that they were satisfied with the dental professionals because their skills and characteristics. For example, a 38-year-old mother with a 2-year-old son said, *"The nurses in Taiwan only told kids not to be scared. But, they won't play with the kids as nurses do in the US. When the kids are nervous, they [nurses in Taiwan] usually ask parents to hold the kid... In Taiwan, dentists usually will ask us to make a following appointment if my child is crying during the oral appointment. I thought they should have the patience and spend more time to know the kid."* Among ten participants, six participants

mentioned dental service in the US is better than that in their origins. A 45-year-old father with a 5-year-old son from China stated *“I don’t have any expectations... because we do not visit a dentist regularly in China. Now we have routine dental examination every six months. This could find out my kid’s problems early, and then take care of the problem early if there is any. Kid’s dental care service is way better in the US.”*

Negative Experiences Related to Professional’s Technical Help

In contrast, 5 participants (11%) reported their negative experiences were related to professional’s technical help. Those experiences included: (1) their children did not receive any treatment, (2) tooth filling and brace issues, (3) some dental professionals were lacking of treatment experience, and (4) the issue of use anesthesia. One participant complained that there was no any treatment for her 4-year-old child when the child first time had caries. The parent expected to have treatment for the child, such as filling the decayed teeth. Two participants (4%) complained problems related to tooth filling and braces. A 36-year-old mother with a daughter aged 6 from Hong Kong said, *“I still don’t know why the dentist gave the silvery-filling stuff [stainless steel crown] in my daughter’s teeth (laugh). I think that children who are under the age of six should not go for such treatment as they haven’t gone through the process of teeth replacement [eruption of permanent teeth]. Sometimes I even think that they do so to earn money from the patient.”* Another 38-year-old mother with a 6-year-old son from Taiwan stated, *“The young kid’s brace is easy to fall off. It is not what I*

expected. I thought that the brace could last until he gets permanent teeth, and his teeth would be pretty... Dentists explained it happened on the young kids more often. My kid also complains why he needs to redo so often.” Moreover, a mother with a 4-year-old son from China complained that some interns did not have sufficient experience in tooth filling, so her son suffered pain and had to redo the treatment. She said, *“I usually took my young son to the children’s clinic. Most of the dental professionals there were interns with their professors. They did not have enough experience... The intern pointed out it was only a tiny cavity. Removing the decayed part and filling could cure it. When we revisited for removing the cavity, they discovered it was not that simple. They had to dig deeper, but they did not inject the anesthesia. My kid felt pain and refused the treatment, so the dentist asked us to continue the treatment in next appointment.”*

Parents expressed negative experiences related to the use of anesthesia. One participant complained the dentist did not give her child anesthesia while receiving dental treatment. A 42-year-old mother from China said, *“When my kid had tooth filling, the dentist grinded the tooth... But, he didn’t give my child any anesthetic. So, my child refused to continue and began to cry.”* In contrast, another 35-year-old mother from Taiwan, lived in the US for 7 years, stated that children usually are too young to receive general anesthesia because the dosage must be different than adults’ local anesthesia. Also, another 33-year-old mother from China, lived in the US for 7 years, thought general anesthesia is dangerous to young children

as she witnessed her friend's 3-year-old child experience of unconscious, nose bleedings, and be fed by the parent. Another 35-year-old mother from China, lived in the US for 9 years, refused dental treatment for three decayed teeth due to the general anesthesia.

**Aim 6: The Impact of Chinese Culture, Chinese Health Beliefs and Behaviors on
Parents' Oral Health Care of Their Children**

Study results can be ordered as domains of concepts related to Chinese culture, health beliefs and their relationship to parents' oral-health care practices for their children. Based on the Concepts related to Chinese Culture that are listed in Table 3, an analysis of the interview data revealed that 11 of these concepts were reflected in parents' oral-health beliefs and practices in the interviews. See Table 8. Parents believed that they: (1) had an obligation for their children's oral care; (2) valued their children's training in oral care; (3) expected children to be independent in tooth brushing; (4) allowed children to receive sweets as gifts from relatives; (5) expressed fatalism regarding children's dental caries; (6) believed kinship contributed to children's dental caries; (7) obeyed dentists' authority; (8) avoided confrontation with dentists and family members; (9) demonstrated group orientation related to friends' dental knowledge and advice; (10) valued face related to children's physical facial appearance; and (11) were concerned dental caries would affect their children's school achievement. See Table 8 for a summary of the 11 domains within Chinese cultural beliefs and example quotations from the interview data that represented the concepts. Note that 13

concepts related to Chinese culture that were extracted from the literature were not contained or represented in the parent's interview data, including (1) Jen (Benevolence), (2) Yi (Righteousness), (3) Chung (Loyalty), (4) Hsia (Filial piety), (5) Te (Virtue), (6) Harmony with others, (7) Lack of self centeredness, (8) Collectivism; (9) Sense of shame; (10) Bearing hardships; (11) Inn and Ko (cause and effect), (12) Unity of Yin and Yang, and (13) Qi.

Domain 1: Had An Obligation for Their Children's Oral Care

Parents believed that it was their obligation to take care of children's oral health in order to prevent childhood caries. Parental obligation involved participation in children's daily oral-health care and contributed their time for caries prevention. This domain involved two categories: (1) Believing children's oral-health care is parents' responsibility; and (2) Expressing children's caries is associated with parents' oral-health care.

Daily oral hygiene included brush checking, teeth examination, teeth cleaning, brush assistance, and flossing. As a 32-year-old mother with a 1-year-old daughter from Hong Kong mentioned, "*Hygiene habits.... What I mean is that parents should check their children's teeth even children are old enough to brush their teeth themselves.*" However, some parents expressed that they were not bound to children's oral-hygiene duty well. Therefore, they believed that their poor oral-health care contributed to children's caries. Those parents claimed that sometimes they were too busy to do a good job or to assist their children timely (e.g., brushing and flossing). A 38-year-old mother from Taiwan who had a

3-year-old son with caries said, *“For my second kid, maybe we did not help him to use dental floss very well. So, there were foods left over and sticky in between teeth gaps. Yeah, I think it was the reason for him to have cavities.”*

Domain 2: Valued Their Children’s Training in Oral Care

Child training appeared to be an important responsibility in our study families. Valuing training involved the parents applying various strategies to train their children’s oral care, encountering barriers for children’s oral care training, and expressing elder generation less valued children’s oral care training. Three categories were identified: (1) Applying various strategies to train children oral care; (2) Expressing barriers for children’s oral care training; and (3) Expressing elder generation less valued children’s oral care training.

Chinese parents valued oral care training as a daily matter since their children were little. They applied various strategies to train their children for sweets control and oral hygiene, such as parent demonstration, sibling demonstration, playing, teaching, reasoning, reminding, and threatening. As a 33-year-old mother with a one-year-old son stated, *“Often I would give him a toothbrush to play with, or let him watch me brushing teeth. Sometimes he would slowly play with the brusher. I think that we just let him keep watching us brushing every day, and then he would develop the sense of brushing.”* As the use of threatening strategy, a 44-year-old mother who had a 6-year-old daughter from Taiwan stated *“I am looking forward that the dentist would threaten the child, threaten...(laugh). Threaten him the seriousness of*

dental caries! Ha ha ha ... That is to remind children the seriousness of caries. And, teach him something.”

Some parents said they learned the importance of oral-care training from the last generation. A 37-year-old mother from China stated, *“In my memory, when I was a child, my parents taught me this. They asked me to assess my teeth and mouth. I had to rinse with water after each meal and cleaned teeth with a dental floss.”* In contrast, some parents expressed that they encountered training barriers from the grandparents. A 38-year-old mother from Taiwan mentioned, *“Actually, I would not let him have candies. But, sometimes we need to live with grandpa and grandma. They would provide him candies under the table.”*

Furthermore, some parents complained that the elder generation held less value for their children’s oral health and that contributed to the child’s caries. A 38-year-old mother from Taiwan mentioned, *“I feel that parents from elder generation do not really care about children’s teeth. So, most of people in our generation have dental caries.”*

Domain 3: Expected Children to Be Independent in Tooth Brushing

Training children to be independent was a responsibility identified by some parents. Independence involved expecting children to be independent in their own tooth brushing and allowing children to independently brush their own teeth without any assistance from parents. This domain involved two categories: (1) Expecting children to be independent in tooth brushing; and (2) Allowing children to brush independently.

Some parents expected children to develop an independent ability in toothbrushing, therefore they rarely provided brushing assistance to their children. Moreover, parents permitted young children who wanted to brush their own teeth alone. As a 35-year-old mother with a 3-year-old son from China stated, *“I often do not help him brush because I want him to brush by himself. At that time, he started to brush and can customize the brush. Then, I just let him do it alone. Now, I still do not pay attention to his brushing.”* Another 38-year-old mother with a 2-year-old son from Taiwan shared, *“He insisted he wanted to brush teeth by himself. So, I allowed him to brush his teeth alone for a period.”*

Domain 4: Allowed Children to Receive Sweets as Gifts from Relatives

Chinese people tend to mutually exchange gifts, especially from significant others who come to visit from overseas. This domain involved one category: Allowed children to receive sweets as gifts from relatives. Habitually, parents accepted children to receive some sweets as gifts from relatives but they assumed that receiving such sweets from relatives contributed to their children’s dental caries. A 38-year-old mother from Taiwan said, *“My relatives from Taiwan would give us some milk candies, when they came to visit. In that case, we would let my child have it.”* Another 38-year-old mother from Taiwan also mentioned, *“I was shocked when my child had a decayed tooth. And, later on I found it was due to maltose which his grandma brought him from Taiwan.”*

Domain 5: Expressed Fatalism Regarding Children’s Dental Caries

Fatalism played a substantial role in relation to childhood caries in study participants.

Fatalism involved believing inheritance contributed to childhood dental caries and believing every child would have caries as part of a natural process. This domain involved two categories: (1) Believing inheritance contributed to childhood dental caries; and (2) Believing every child would develop caries as a natural process.

Although some parents learned this idea from friends, some held the belief that caries was inherited across generations regardless of the oral care carried out on the child's teeth. Chinese parents believed inheritance contributed to dental caries. For that reason, children would have a higher chance in developing caries if they were from a high-risk family, no matter how parents took care of the children's teeth. As a 39-year-old mother from Taiwan expressed, "*Well... If parents have good teeth, their child will not have caries even though they do not take good care of their children's teeth (laugh). Well, caries is related to inheritance.*" Furthermore, some parents believed each child would eventually develop caries by a natural process if they consumed sweets. They also believed that children are incapable in tooth brushing carefully. As a 31-year-old mother from China stated, "*Every child should have caries. It is not possible to avoid it because every child eats sweet stuff. If they have sweets, they sometimes do not brush their teeth in the morning or at night. Their teeth must be bad.*"

Domain 6: Believed Kinship Contributed to Children's Dental Caries

Kinship played a significant role in Chinese immigrant families. Some Chinese families showed a tight family relationship. Family members based on genetic or marital relatedness ordinarily helped parents to take care of their children's oral-health care, especially the grandparents. Kinship involved receiving grandparents' assistance of children care and believing grandparents' care contributed to children's dental caries. Two categories were identified: (1) Receiving grandparents' assistance of children care; and (2) Believing grandparents' care contributed to children's dental caries.

Parents received assistance from family members, especially the grandparents. However, parents expressed their concern related to dental caries. They believed grandparents' care contributed to children's caries, such as disease transmission, sweets control, and caries treatment. As a 34-year-old mother from China stated, *"When some elders take care of their grandchildren, I mean eating foods together. They would take a bite of the food, and then also feed the grandchild. Let the child take a bite too, and then the child will be infected. The child will not only have teeth diseases but also illness."* Another 42-year-old mother from Taiwan stated, *"She probably had sweets more than once a day, but I did not know how much sweets she took because I went to work. The grandma let her have sweets, but she told me just once a day. I think that is why she had tooth decay."* Additionally, she complained that grandparents refused to take notice of caries treatment, and stated that *"During that period of time, grandpa and grandma were taking care of my child. They know*

caries is a problem, but they tend to not to deal with it. They just let it be, kind of that.”

Domain 7: Obeyed Dentists’ Authority

Parents viewed the dentists as professional authorities. Parents’ obedience to authority involved following dentists’ advice for children’s oral-health care and dental treatments, changing thoughts regarding childhood caries’ impact, and believing that their children respect the dentists more than them. However, few parents ignored the dentist’s advice for dental treatment because of their lack of dental knowledge. Four categories were identified: (1) Following dentists’ advice for children’s oral-health care; (2) Following dentists’ advice for dental treatments; (3) Changing thoughts regarding caries’ impact; and (4) Believing children respect dentists more than their parents.

Parents believed that dentists are knowledgeable and followed their advice regarding daily oral-health care for their children, such as sweet control, oral hygiene, and watching early signs of dental caries. Especially for those parents who had children with caries, they showed more respect to the dentist’s advices about caries prevention. As a 35-year-old father from China stated, *“They [dentists] know more about how to care for the teeth than us. They know what to do. They told me what to do at home, and then we followed the doctor’s words.”* Another 38-year-old mother from Taiwan shared, *“He had tooth decayed at age around 3. After that, we followed the dentist’s advice to care for his teeth.”* Furthermore, most parents respected dentists’ caries treatment and received it timely (e.g., tooth filling and

extraction), in order to prevent further damage on other teeth. A 34-year-old mother from China offered, *“The dentist told me that my child’s teeth needed to be extracted, and then I just followed it.”* Another 42-year-old mother from Taiwan mentioned, *“According to the signs of tooth decay, the dentist said that it was probably in the early stage. But if we did not treat it right away, it will affect other teeth. Then, we said okay at that time and did the treatment.”* With respect to the dentists, some parents eventually changed their thoughts regarding caries’ impacts, such as duration of caries impact. As a 33-year-old mother from China stated, *“However, after I came to US, some doctors here said that ‘caries will have life-long impacts’ Now, I believe caries will affect a child life-long.”*

Parents also believed that children in general give more respect to dental professionals’ suggestions than to their parents do. As the result, parents hoped the dental professionals could lecture or remind their children about caries prevention (e.g., sweet control and tooth brushing). As a 46-year-old mother from China stated, *“Of course, I hope the dentist can tell him. Sometimes, he would listen to the dentist, but not to the mother. He told me that you were not a doctor (laugh). He feels that the doctor is more professional. Mother would not know much about it.”*

In contrast, few parents considered childhood caries was not a serious health issue and ignored the dentist’s advice for treatment. As a 35-year-old mother from China expressed, *“He [dentist] told us my child had only three or four decayed teeth. I thought it was not*

severe, so we did not fill the teeth. We went back home and asked him to brush teeth carefully.

Also, we used the rinsing.”

Domain 8: Avoided Confrontation with Dentists and Family Members

Avoiding confrontation with others was an important value in our study participants.

Avoiding confrontation involved avoiding conflict with dentists about caries treatment and avoiding conflict with family members about sweets control. However, few parents disagreed with family members regarding different views of caries treatments. Two categories were identified: (1) Avoiding conflict with dentists about caries treatment; and (2) Avoiding conflict with family members about sweets control.

In order to avoid confrontation with dentists’ authority, parents accepted the dentist’s treatment even though they sometimes held different thoughts about the treatment. As a 36-year-old mother from Hong Kong shared, *“Actually, I don’t agree her filling because I never see a 6-year-old child with a silver stuff on the tooth [stainless steel crown]. But, the dentist said it was needed. So, I just let the dentist do it. I still don’t understand why the dentist filled the teeth with a silver stuff in my daughter’s mouth (laugh). Maybe sometimes...you know...earn money from the patient.”* Furthermore, parents tried to control children’s intake of sweets. However, some parents who occasionally lived with grandparents or received their help complained that grandparents provided sweets to their children. They tended to ignore those issues in order to maintain the family harmony. As a 42-year-old

mother from Taiwan stated, *“She [participant’s daughter] was eating too much candy. She probably had sweets more than once a day. But, I did not know how much sweets she took because I went to work. The grandma let her have sweets, but she told me just once a day. I think that is why she had tooth decay.”*

In contrast, few parents expressed confrontation with family members regarding caries treatment due to expensive treatment cost in the US. As a 38-year-old mother from Taiwan offered, *“Filling that tooth costs about three hundred without insurance coverage. Even with insurance coverage, we need to pay half, which is about 175 dollars. So, his dad thought we should just wait until we return to Taiwan... But, I told him” No! I cannot accept your opinion.” Then, I spent money and got the tooth fixed.”*

Domain 9: Demonstrated Group Orientation Related to Friends’ Dental Knowledge and Advice

Group orientation played a role in Chinese immigrant parents’ life in the US. Social interaction influences Chinese parents’ oral-health beliefs and practices for their children. Group orientation involved accepting dental knowledge and following dental advice from friends. Two categories were identified: (1) Accepting dental knowledge from friends; and (2) Following dental advices from friends.

Parents accepted new dental knowledge from friends or people who met in the US and obeyed their advice. A 33-year-old mother from China stated, *“Since I came to America, I*

agree people say caries will affect baby teeth. And, decayed baby teeth will affect adult teeth.” However, some of the gained information was incorrect. As a 39-year-old mother from Taiwan stated, *“I learn that statement from friends. Well, they said, “If parents have good teeth, their children will not have caries even though they do not take good care of their teeth.”* Moreover, parents followed incorrect oral-health practices according to other parents’ advice. As a 34-year-old mother from China mentioned, *“I asked parents that I met at my child’s school. I told them that my child’s front tooth was shaking and asked them what to do. They told me that the dentist would not extract the tooth for my child because they had the same experience. You just do it yourself. They visited the dentist, and the dentist told them that ‘you just pull it out yourself’. This morning, they told me the same thing again. So, I will follow their advice.”*

Domain 10: Valued Face Related to Children’s Physical Facial Appearance

Chinese parents highly valued their children’s face issue in relation to physical appearance and were committed to protecting their children’s physical attractiveness. Saving face included parental concerns about dental treatment affecting children’s facial appearance and parents accepting dental treatment to protect children’s facial appearance. Two categories were identified: (1) Concerning about dental treatment affecting children’s facial appearance; and (2) Accepting dental treatment to protect children’s facial appearance.

Parents worried that dentists' treatment recommendations (e.g., tooth filling and tooth extraction) would affect their children's facial attractiveness, especially the daughters. A 33-year-old mother with a 5-year-old daughter from China expressed, *"If the dentist pulls out the teeth, I am afraid that the teeth won't grow in properly space. Also, it may not look good for a girl."* On the other hand, some parents accepted dental treatment to protect their children's facial appearance. Parents appeared to have the responsibility to avoid their child's face loss in children's social life. As a 35-year-old mother from China stated, *"We got the teeth fixed because one of his classmates had a broken tooth. And, that is very ugly. The most important thing is that tooth decay affects the appearance."*

Domain 11: Concerned Dental Caries Would Affect Their Children's School

Achievement

Chinese parents appeared to value excellence in school achievement of their children and worried dental caries would influence their children's school performance. One category was identified: Concerning about caries affecting children's school performance.

Parents expressed concern that childhood caries would have an effect on children's learning and concentration at school due to its physical and emotional impact (e.g., toothache, crying, and mood status). As a 31-year-old mother from China shared, *"You see...If he suffers from a toothache, he cannot hear what teachers say in classes. He will not have the mood in learning. He will be just crying and hearing nothing from the teacher."* Another 43-year-old

mother from Taiwan expressed, “*Caries could affect schooling. I am thinking that it could also affect school achievement. If children feel uncomfortable, they will not want to read or study.*”

In the next analysis of the interview data based on concepts in Table 4, the interview data yielded eight domains of Chinese health beliefs and behaviors that reflected parents’ oral-health beliefs and practices. These are summarized in Table 9. Eight domains of Chinese health beliefs and behaviors were: (1) Belief regarding primary teeth; (2) Belief regarding tooth worms; (3) Belief regarding gum bleeding; (4) Belief regarding sugary foods; (5) Belief regarding a balanced diet; (6) Belief regarding self-care; (7) Belief regarding the need for dental care services; and (8) Belief regarding tooth extraction. These eight domains involved 24 categories; see Table 9. Five concepts identified in the literature on cultural health beliefs and oral health practices were not contained in the parents’ interviews: (1) Traditional Chinese Medicine, (2) Herbal practice, (3) Acupuncture, (4) Exercise, and (5) Belief regarding natural teeth.

Domain 1: Belief Regarding Primary Teeth

Parents held different perspectives about their children’s primary teeth. Beliefs included parents valuing primary teeth less than permanent teeth, believing primary-tooth decay did not affect permanent teeth, believing primary-tooth decay would affect permanent teeth and the parents’ changed beliefs about primary teeth after their immigration. This domain

involved four categories: (1) Valuing primary teeth less than permanent teeth; (2) Believing primary-tooth decay would not affect permanent teeth; (3) Believing primary-tooth decay would affect permanent teeth; and (4) Changing belief regarding primary teeth after immigration.

Some parents valued primary teeth less than the child's permanent teeth because parents believed eventually permanent teeth would replace them. They thought that primary-tooth decay would not affect permanent teeth. For that reason, parents paid less attention to primary-tooth decay. A 38-year-old mother from Taiwan stated, "*For baby-tooth cavities, I ... I am not worried because they are not permanent teeth. If there are cavities in permanent teeth, there is no second chance to have a new set of teeth.*" Another 46-year-old father from China mentioned, "*Cavities would last until changing teeth [permanent teeth]. It will replace the bad teeth.*" In contrast, A 38-year-old mother from Taiwan shared, "*According to the dentist, that if a child has tooth decay without receiving treatment; it would later affect his normal growth of adult teeth.*" Although some parents changed their belief about the importance of primary teeth since immigrating to the US, some parents still held false knowledge regarding caries' impact of primary teeth and less valued primary teeth. Most parents received dental knowledge and developed new concepts about primary teeth from dental professionals. A 33-year-old mother from China shared, "*I am saying since I came to US, and I heard dentists say so. We didn't have this sense in China. Since I came to America,*

I agree people say caries will affect baby teeth. In addition, decayed baby teeth will affect adult teeth.”

Domain 2: Belief Regarding Tooth Worms

Tooth worm was an important concept in parents’ understandings of what contributed to dental caries. Parents believed that tooth worms caused dental caries. Chinese people used worms and bacteria interchangeably. This domain involved two categories: (1) Believing tooth worms causing dental caries; and (2) Believing people using worms and bacteria interchangeably.

Parents had different understandings about how tooth worms caused dental caries, but they all mentioned that sweet foods or drinks were associated with caries. Some parents believed that sweet foods produced tooth worms and tooth worms grew inside the teeth when the teeth were not cleaned carefully. Once the worms stay inside the teeth, the worms will eat the teeth. A 43-year-old mother with a high school education summarized, *“If you leave the sweet stuff in the mouth for a long time, you would smell really bad odor. If you do not clean it, it will hide inside for a long time. Just like the dirty water. Worms will grow up inside the teeth. It seems like the worm will eat the teeth.”* Moreover, a 45-year-old mother with a college education mentioned people used worms and bacteria interchangeably in the old days in order to make communication easier. She shared, *“In the old days in China, people would*

certainly not understand if you mention it as bacteria (laugh). People use the term “worms” in the common statement.”

Domain 3: Belief Regarding Gum Bleeding

Parents held diverse beliefs and meanings about gum bleeding. Parents believed gum bleeding was associated with dental caries, periodontal disease, or the use of dental flossing. This domain involved three categories: (1) Relating to dental caries; (2) Relating to periodontal disease; and (3) Relating to dental flossing.

Some parents recognized that gum bleeding could be a sign for caries or oral diseases. Conversely, some parents regarded gum bleeding as a normal consequence of dental flossing. A 43-year-old mother from Taiwan stated, *“Probably, I think if tooth decay is severe, it may cause bleeding while brushing because tooth decay may affect the gum health.”* Another 34-year-old mother from Hong Kong mentioned, *“Sometimes the gum would be bleeding, if we use...what that is called. Oh, it’s dental floss! Using floss will cause bleeding while flossing our teeth.”*

Domain 4: Belief Regarding Sugary Foods

Sugary foods appeared to play a significant role in children’s life in our study, Especially candies. Parents believed that children loved sweets by natural instincts, and expressed those sugary foods and/or drinks were contributing to childhood caries. Two

categories identified within this domain were: (1) Believing children loving sweets by natural instincts; and (2) Believing sugary foods and/or drinks contributed to childhood caries.

Parents held contradictory thoughts about the impact of sweet foods and drinks on the child's health. They believed that no child could resist candies. It seemed sweets are one source of children's happiness. As a 45-year-old father from China said, *"In general, kids all love to have candies. Sometimes, they have lots of candies, like 4 to 5 candies a day."* On the other hand, they were concerned that sugary foods and drinks could cause childhood caries. A 36-year-old mother from Hong Kong reflected on this, *"Rice contains lots of sugar, also like candy, bread. They all contain too much sugar. If children take sweet items too much, I worry that children will be easier to have caries."* Some parents further mentioned that they are in a difficult family situation. If one child has candies, the other one must have candies as well. As a 33-year-old mother from China stated, *"His older brother is a child too. Children like to have candies. Sometimes I let him have candies but sometimes I don't allow. If the younger one sees his brother having candies, he likes to have some candies (laugh)."*

Domain 5: Belief Regarding a Balanced Diet

A balanced diet appeared to play a role in caries prevention and tooth-health maintenance. A balanced diet involved parents believing healthy foods could prevent dental caries and avoiding certain foods to maintain tooth condition. This domain involved two categories: (1) Believing healthy foods can prevent caries; and (2) Avoiding certain foods to maintain tooth

condition.

Some parents believed that healthy foods can prevent caries and only consumed certain foods. However, some parents expected dentists to educate them about what to eat to prevent caries. As a 43-year-old mother from Taiwan stated, *“I am sure that the dentist would tell me to make sure I do not give him foods that cause cavities.”* Few parents expressed their desire to know what foods can prevent caries. Some parents mentioned they avoided certain foods to maintain tooth health, such as fried foods and hard foods. As a 43-year-old mother from China shared, *“We will not have fried foods. Do not eat the hard stuff because the hard stuff is not good for teeth. I personally think it is no good!”* (laugh) *I also will cook foods and make it softer to eat. I think it is a little bit helpful for the child.”*

Domain 6: Brief Regarding Self-Care

Some parents expressed sometimes they applied home care to take care of their children’s oral problems. Self-care involved parents practicing home care for their children’s toothaches and dental problems. Two categories identified were: (1) Practicing home care for children’s toothaches; and (2) Practicing home care for children’s dental problems.

Despite their beliefs that dental service in the US was more advanced than that in their original counties, parents still applied home care to take care of their children’s toothaches. The methods of pain control included ice packing and tooth washing. A 30-year-old mother from China stated, *“When he felt pain, we would wash his teeth and use an ice pack to reduce*

the pain.” Some parents did not accept dental treatments because they believed that their children’s caries condition was not serious. Instead of seeking professional help, they preferred to practice home care for their children, such as extracting teeth themselves, tooth brushing more carefully, and adding mouth rinse to daily routine. As a 35-year-old mother from China shared, *“When we visited the dentist the first time, he told us that there were only three or four decayed teeth. I thought it was not severe, so we did not fill the teeth. We went back home and I asked him to brush teeth carefully. Also, we used the rinse.”*

Domain 7: Brief Regarding the Need for Dental Care Services

Dental care services played an important role in promoting children oral health and preventing childhood caries. Perceived need for dental care services involved parents expecting regular dental visits more often for their children, to follow dentist’ advice for regular checkups, to receive regular checkups, hoping dentists to lecture their children about the importance of oral-health care, and expressing dental-service difference among US, China, and Taiwan. This domain involved six categories: (1) Expecting frequency of regular dental visits; (2) Following dentist’ advice for regular checkups; (3) Receiving regular checkups; (4) Receiving routine management; (5) Hoping dentists to lecture their children about the importance of oral-health care; and (6) Expressing dental-service difference among US, China, and Taiwan.

Parents held different beliefs regarding the frequency of regular dental checkups. Most parents followed their dentist's recommendation dates for checkups. However, some parents hoped that the interval of regular checkups could be shorter. Therefore, their children's teeth could be cleaned and be examined for any dental problems. As a 46-year-old mother from China expressed, *"Of course, it will be better to examine the teeth every 3 months, because he does not have any teeth yet. We can find if anything goes wrong, like knowing caries earlier. It will be better if the exam waiting time is shorter."* In general, parents believed that the regular checkup was important because their children could have caries examination and received routine managements. A 33-year-old mother with an 18-month-old son from China stated, *"Regular dental care is the most important thing. You have to take children in for regular dental checkups. So, you know whether there are any cavities."* Some parents hoped the dentist could educate their child about the importance of oral-health care during the regular checkups. A 41-year-old father from Taiwan shared, *"I hope that the dentist could personally remind my daughter to protect her own teeth, because she knows he is a professional. So, she can listen to him. Yeah, she only listens to the professional."* Furthermore, parents believed that the dental services in the US were better than that in their original countries. As a 45-year-old father from China stated, *"The dental service in China is not like the service here in the US. Here, each child has a checkup every six months. Therefore, if there were any problems, you would know and could solve the problem right away. The*

dental service here for children is much better than that in China.” However, some parents expressed the dental cost was much higher in the US. A 38-year-old mother from Taiwan shared, *“His dad said that we could go either back to Taiwan because treatment there is cheaper or not to deal with it. We could just wait until he changes his natural teeth [permanent teeth].”*

Domain 8: Belief Regarding Tooth Extraction

Tooth extraction caused parents big concern in relation to children’s oral-health. Parents worried about the negative influences of tooth extraction on children’s bodies and mind, and discussed differences in treatment regarding tooth extraction between China and US. Parents accepted tooth extraction according to the severity of caries. Three categories were identified within this domain: (1) Worrying the impact of tooth extraction; (2) Expressing treatment differences regarding tooth extraction between China and US; and (3) Accepting tooth extraction based on the severity of caries.

Most parents preferred to avoid tooth extraction because they worried about the impact of extraction, such as the effects of general anesthesia, food-intake ability and children’s facial appearance. A 35-year-old mother with a 3-year-old son from Hong Kong stated, *“For the kids, they may need anesthesia for whole body. I would be worried (laugh). The size of child is so small [body weight]. So, I would be worried about the amount of anesthesia the dentist will use. It is not like adults... only local anesthesia is needed. The whole body*

anesthesia [general anesthesia] has a risk.” Another parent worried that the extraction would affect a child’s eating ability, as she expressed “This [tooth extraction] will not be good for him to eat. In addition, the new tooth coming out will not be pretty.” Further, they complained tooth extraction was not a common dental treatment for caries in their original countries.

Therefore, they hoped the dentist could try their best to reserve the teeth for their children. As a 46-year-old mother from China said, *“Initially, he has a...a little bit black spot. The doctor said that his tooth needed to be extracted. But, we doubt about it. In China, dentists only extract the loosen tooth.”* They accepted tooth extraction only when their children suffered serious toothache and severe caries. However, parents held different views about the meaning of severe caries. For example, a 33-year-old mother from China stated *“If the toothache is very bad, it is very painful! I would consider having the tooth extracted. What I mean serious decayed tooth is a tooth with 1/2 or 2/3 decayed. This is very serious to me. Then, I would bring the child to a clinic for tooth extraction.”* Another mother from Hong Kong shared, *“Severe caries means a child has several decayed teeth. It affects eating, body growth, and speech ability of a child.”*

Table 8 Example Quotes of 11 Domains from Interview Data that Represent Concepts
Related to Chinese Culture

Domains/Concepts	Example Quotes
<p>1. An obligation for their children's oral care</p>	<p>Believing children's oral-health care is parents' responsibility Hygiene habits.... What I mean is that parents should check their children's teeth even children are old enough to brush their teeth themselves. (code 46)</p> <p>I feel that my responsibility is to frequently clean his mouth, brush his teeth, and use cloth to wipe his teeth more often every day. (code 05)</p> <p>I don't think that there is a magic way for caries prevention. Like the doctors in the US say "It's parents' responsibility to brush their children's teeth and examine their teeth!" In our family, my husband and I would examine our children's teeth after they brush at night daily. Recently, we add flossing their teeth before my children go to bed. (code 21)</p> <p>I know how painful for drawing the teeth nerves [canal therapy] because I had caries experiences. So, I was so...so guilty when my child was found having a cavity. I questioned myself how this could happen. (code 28)</p> <p>Most important is that I must take children for regular dental visits. So, you can know whether there are any tooth problems. (code 05)</p> <p>Expressing children's caries is associated with parents' oral-health care For my second kid, maybe we did not help him to use dental floss very well. So, there were foods left over and sticky in between teeth gaps. Yeah, I think it was the reason for him to have cavities. (code 45)</p> <p>I also helped her to brush her teeth. Maybe I do not do a good job, so she had cavities. (code 20).</p> <p>At that time, there was a little big caries between his teeth. Sometimes I was busy and did not floss his teeth. Sometimes I asked his dad to help him brush. Maybe his dad did not brush carefully. (code 28)</p>
<p>2. Valued their children's training in oral care</p>	<p>Applying various strategies to train children oral care I wiped his mouth during that period of time. I mean when he did not have any teeth. Let him learn and get used to it. Now he has teeth, we give him a brush to use day and night while we are brushing. So he watches us brushing and now he wants to brush just like us. (code 12)</p> <p>Often I would give him a toothbrush to play with, or let him watch me brushing teeth. Sometimes he would slowly play with the brusher. I think that we just let him keep watching us brushing every day, and then he would develop the sense of brushing. Yeah, Mom and Dad are brushing and his brother is brushing too, eventually he learns how to brush. (code 01)</p> <p>I asked his older brother to demonstrate to him. I said to him "Look! Your brother is brushing teeth. Could you also open your mouth and let me wipe it?" Then, he would just let me do it (laugh). But, he would not let me do it the second time. He wanted to do whatever his brother was doing. (code 02)</p> <p>I keep on reminding her of what she has now, a silvery teeth [stainless steel crown]. The dentist said, "It is because you did not brush your teeth accordingly to how you should. Now you have to do all these things [to prevent more cavities]". When she knows what's going on, she will spend more time to clean her teeth. (code 43)</p> <p>I am looking forward that the dentist would threaten the child, threaten... (laugh). Threaten him the seriousness of dental caries! Ha ha ha ... That is to remind children the seriousness of caries. And, teach him something. (code 14)</p> <p>If children could have a good habit for brushing, they will not have caries. I taught my daughter</p>

	<p>to brush teeth after having candies since she was little. My goal is to let her develop a good habit. When she wants to have some candies, I tell her that it is okay but you have to brush teeth afterwards. I keep reminding her same thing repeatedly. (code 24)</p> <p>Right now, I ask him to brush teeth at least once a day. Actually, we ask him to brush in the morning by himself... And, we only help him brush after dinner. (code 28)</p> <p>I told my daughter that caries would cause uncomfortable and her teeth look not good. Therefore, she does not want to have caries. (code 39)</p> <p>In my memory, when I was a child, my parents taught me this. They asked me to assess my teeth and mouth. I had to rinse with water after each meal and cleaned teeth with a dental floss. (code 13)</p> <p>Expressing barriers for children’s oral care training Actually, I would not let him have candies. But, sometimes we need to live with grandpa and grandma. They would provide him candies under the table. (code 28)</p> <p>His older brother is a child too. Children like to have candies. Sometimes I let him have candies but sometimes I don’t allow. If the younger one sees his brother having candies, he likes to have some candies (laugh). (code 01)</p> <p>Expressing elder generation less valued children’s oral care training I feel that parents from elder generation do not really care about children’s teeth. So, most of people in our generation have dental caries. I would say as nine of ten children have caries. Just like my mom did not remind me to clean the teeth carefully. In addition, she did not examine whether I had decayed teeth. (code 28)</p>
<p>3. Expected children to be independent in tooth brushing</p>	<p>Expecting children to be independent in tooth brushing I often do not help him brush because I want him to brush by himself. At that time, he started to brush and can customize the brush. Then, I just let him do it alone. Now, I still do not pay attention to his brushing. (code 26)</p> <p>Maybe the number of times for brushing is not adequate. So far he only brushes teeth once a day. (code 28)</p> <p>Allowing children to brush independently He insisted he wanted to brush teeth by himself. So, I allowed him to brush his teeth alone for a period. (code 35)</p>
<p>4. Allowed children to receive sweets as gifts from relatives</p>	<p>Allowed children to receive sweets as gifts from relatives My relatives from Taiwan would give us some milk candies, when they came to visit. In that case, we would let my child have it. (code 28)</p> <p>I was shocked when my child had a decayed tooth. And, later on I found it was due to maltose which his grandma brought him from Taiwan. (code 35)</p>
<p>5. Expressed fatalism regarding children’s dental caries</p>	<p>Believing inheritance contributed to childhood dental caries It seems caries relates to parents themselves. I’m saying it relates to teeth. I feel that if parents or family members have caries, it seems that children will easily have caries, too. (code 08)</p> <p>Well... If parents have good teeth, their child will not have caries even though they do not take good care of their children’s teeth (laugh). Well, caries is related to inheritance. (code 08)</p> <p>In my opinion, my husband and I do not have good teeth so our children easily have caries. (code 08)</p> <p>It should be associated with inheritance. It does relate to inheritance. The bad teeth come from last generation. Caries can pass to the next generation too. It seems like someone would say, “Oh, your child’s teeth look not good. Is it just like the father or mother?” (code 12)</p> <p>It is due to my inheritance. I am thinking that if parents’ teeth condition is not good. Their children would have higher chance in getting caries (laugh). (code 16)</p>

	<p>Believing every child would develop caries as a natural process Every child should have caries. It is not possible to avoid it because every child eats sweet stuff. If they have sweets, they sometimes do not brush their teeth in the morning or at night. Their teeth must be bad. (code 02)</p>
<p>6. Believed kinship contributed to children's dental caries</p>	<p>Receiving grandparents' assistance of children care She probably had sweets more than once a day, but I did not know how much sweets she took because I went to work. The grandma let her have sweets, but she told me just once a day. I think that is why she had tooth decay. (code 21)</p> <p>During that period, grandpa and grandma were taking care of my child. They know caries is a problem, but they tend to not to deal with it. They just let it be, kind of that. (code 21)</p> <p>Believing grandparents' care contributed to children's dental caries When some elders take care of their grandchildren, I mean eating foods together. They would take a bite of the food, and then also feed the grandchild. Let the child take one bite too, and then the child will be infected. The child will not only have teeth diseases but also illness. (code 11)</p> <p>She probably had sweets more than once a day, but I did not know how much sweets she took because I went to work. The grandma let her have sweets, but she told me just once a day. I think that is why she had tooth decay. (code 21)</p> <p>During that period, grandpa and grandma were taking care of my child. They know caries is a problem, but they tend to not to deal with it. They just let it be, kind of that. (code 21)</p>
<p>7. Obeyed dentists' authority</p>	<p>Following dentists' advice for children's oral-health care They [dentists] know more about how to care for the teeth than us. They know what to do. They told me what to do at home, and then we followed the doctor's words. (code24)</p> <p>Let me think...he had tooth decay at age around 3. After that, we followed the dentist's advice to care for his teeth. (code 35)</p> <p>There was a hole on her tooth. Uh ... But then, the doctor checked and said no tooth filling was needed because the condition was not serious. The dentist told us to maintain cleanness of her teeth, such as brushing and flossing. That will be okay. So...uh...I followed it. Now, I help her to brash teeth once in the morning and once at night. Most important is brushing at night. Therefore, I also floss her teeth after brushing. (code 23)</p> <p>The doctor said not to have too much sugar stuff and brush his teeth each time after having sweets. Brush his teeth more often everyday... So, I brush his teeth many times a day. (code 05)</p> <p>The dentist told me that for children under the age of 10... It will be better for the parents to brush their children's teeth. So, I want to do it that way. (code 09)</p> <p>The doctor also told us to look for the color of the teeth. If there are any black spots on the teeth or around the teeth, that could be the beginning signs of dental caries. Therefore, I pay special attention to the color. (code 05)</p> <p>Following dentists' advices for dental treatments The dentist told me that my child's teeth needed to be extracted, and then I just followed it. (code 06)</p> <p>We feel that if tooth filling or removing teeth is necessary, then we will follow the ordinary routines. (code 08)</p> <p>The children's hospital ... there, they also suggested to extract the teeth. Therefore, I discussed with my husband. I said, "This doctor said so and that doctor said the same too." Then, we decided to extract it." (code 09)</p> <p>According to the signs of tooth decay, the dentist said that it was probably in the early stage.</p>

	<p>But if we did not treat it right away, it will affect other teeth. Then, we said okay at that time and did the treatment. In fact, the treatment probably only took less than 30 minutes to fill the teeth. (code 21)</p> <p>The dentist said there were some cavities, must deal with them. At that time, he was about three-years-old. He had five decayed teeth. We treated the cavities at the dental office and now his teeth are okay. (code 27)</p> <p>When we took my daughter for a regular checkup, the dentist told us that she had some cavities and must fill the teeth. Then, we did the filling. (code 43)</p> <p>Changing thoughts regarding caries' impact However, after I came to US, some doctors here said that "caries will have life-long impacts." Now, I believe caries will affect a child life-long. (code 01)</p> <p>When we visited the second dentist, the dentist told us the same that she must have a filling. Then, we realized that the baby teeth will affect the adult teeth. So, we did the filling at that time. (code 25)</p> <p>Believing children respect dentists more than their parents I hope he can teach me how to clean the child's mouth. And, teach the child not to take too much sweets or soft drinks because every child won't listen to their parents. They only follow doctors' or teachers' words. (code 02)</p> <p>Of course, I hope the dentist can tell him. Sometimes, he would listen to the dentist, but not to the mother. He told me that you were not a doctor (laugh). He feels that the doctor is more professional. Mother would not know much about it. (code 09)</p> <p>I hope he could tell my daughter to protect her teeth because she knows he is professional. So, she would listen to him. Yeah, she just listens to the professionals. (code 39)</p> <p>We hope that the dentist and parents can together remind the children about what their current teeth conditions are. Most of the time, children would only listen to the dentist. They will follow the dentist's' advices. They think that their parents are always nagging. (code 41)</p> <p>It will be more powerful for the dentist to remind the child tooth brushing and to have less candy than parents do. Children usually would listen to the dentists. (code 26)</p> <p>Ignoring the dentist's treatment advices He [dentist] told us my child had only three or four decayed teeth. I thought it was not severe, so we did not fill the teeth. We went back home and asked him to brush teeth carefully. Also, we used the rinsing. (code 26)</p>
8. Avoided confrontation with dentists and family members	<p>Avoiding conflict with dentists about caries treatment Actually, I don't agree her filling because I never see a 6-year-old child with a silver stuff on the tooth [stainless steel crown]. But, the dentist said it was needed. So, I just let the dentist do it. I still don't understand why the dentist filled the teeth with silver stuff in my daughter's mouth (laugh). Maybe sometimes...you know...earn money from the patient. (code 43)</p> <p>Avoiding conflict with family members about sweets control She [participant's daughter] was eating too much candy. She probably had sweets more than once a day, but I did not know how much sweets she took because I went to work. The grandma let her have sweets, but she told me just once a day. I think that is why she had tooth decay. (code 21)</p> <p>Actually, I would not let him have candies. But, sometimes we need to live with grandpa and grandma. They would provide him candies under the table. (code 28)</p> <p>Conflicting with family members about caries treatment Filling that tooth costs about three hundred without insurance coverage. Even with insurance</p>

	<p>coverage, we need to pay half, which is about 175 dollars. So, his dad thought we should just wait until we return to Taiwan... But, I told him” No! I cannot accept your opinion.” Then, I spent money and got the tooth fixed. (code 35)</p>
9. Demonstrated group orientation related to friends’ dental knowledge and advice	<p>Accepting dental knowledge from friends Since I came to America, I agree people say caries will affect baby teeth. And, decayed baby teeth will affect adult teeth. (code 01)</p> <p>I learn that statement from friends. Well, they said, “If parents have good teeth, their children will not have caries even though they do not take good care of their teeth.” Therefore, I have that impression. (code 08)</p> <p>Following dental advice from friends I asked parents that I met at my child’s school. I told them that my child’s front tooth was shaking and asked them what to do. They told me that the dentist would not extract the tooth for my child because they had the same experience. You just do it yourself. They visited the dentist, and the dentist told them that “you just pull it out yourself”. This morning, they told me the same thing again. So, I would follow their advice. (code 11)</p>
10. Valued face related to children’s physical facial appearance	<p>Concerning about dental treatment affecting children’s facial appearance If the dentist pulls out the teeth, I am afraid that the teeth won’t grow in properly space. Also, it may not look good for a girl. (code 34)</p> <p>You know...girls care about being pretty or not pretty. So... whenever she sees her own silvery teeth [stainless steel crown], she knows that she has to keep them clean by brushing them. (code 43)</p> <p>Accepting dental treatment to protect children’s facial appearance We got the teeth fixed because one of his classmates had a broken tooth. And, that is very ugly. The most important thing is that tooth decay affects the appearance. (code 26)</p>
11. Concerned dental caries would affect their children’s school achievement	<p>Concerning about caries affecting children’s school performance Caries makes him crying, and this would affect every aspect of him, such as learning at school. He cannot concentrate in classes. (code 01)</p> <p>You see...If he suffers from a toothache, he cannot hear what teachers say in classes. He will not have the mood in learning. He will be just crying and hearing nothing from the teacher. (code 02)</p> <p>If she has a toothache, this will influence her school performance. (code 25)</p> <p>Caries could affect schooling. I am thinking that it could also affect school achievement. If children feel uncomfortable, they will not want to read or study. (code 30)</p>

Table 9 Example Quotes of 8 Domains from Interview Data that Represent Concepts Related to Chinese Health Beliefs and Behaviors

Domains/Concepts	Example Quotes
<p>1. Belief regarding primary teeth</p>	<p>Valuing primary teeth less than permanent teeth For baby-tooth cavities, I ... I am not worried because they are not permanent teeth. If there are cavities in permanent teeth, there is no second chance to have a new set of teeth. (code 31)</p> <p>For kids, I think caries is not a big deal before changing [permanent] teeth. It would be an issue if caries happens after changing [permanent] teeth. It would influence the growth of new teeth. (code 40)</p> <p>Believing primary-tooth decay would not affect permanent teeth When a child has new teeth, the decayed teeth would not influence the child anymore. (code 17)</p> <p>Caries would last until he changes [permanent] teeth. (code 07)</p> <p>Cavities would last until changing teeth [permanent teeth]. It will replace the bad teeth. (code 38)</p> <p>She will have her [permanent] teeth changed around age 5 or 6. Even if she has caries now, the new teeth will replace her decayed teeth at age 6 or 7 (laugh). (code 04)</p> <p>Believing primary-tooth decay would affect permanent teeth I think if you do not take good care of the teeth, I mean the first phase of teeth, there will have bacteria on the teeth. It will certainly affect the development of phase II of the teeth, right? (code 05)</p> <p>After six or seven years, he would change to a new set of [permanent] teeth. The caries will affect the new teeth and makes them not pretty. At that time, you have to deal with the teeth. I guess you have to take care of the teeth more than eight or ten years. (code 05)</p> <p>According to the dentist, that if a child has tooth decay without receiving treatment; it would later affect his normal growth of adult teeth. (code 08)</p> <p>He had tooth decay. This would affect his adult teeth because his nerves are around the gum! That would affect his adult teeth. If the new teeth were coming out, they would not stand for long. (code 16)</p> <p>That is... If he has baby-tooth decay, the new teeth will be affected later on. It should be this way. (code 20)</p> <p>Certainly, if the baby teeth are not growing well, it would affect the growth of permanent teeth. (code 22)</p> <p>After the entire replacement process ends, the cavity could also occur on the permanent teeth. (code 46)</p> <p>Changing belief regarding primary teeth after immigration I am saying since I came to US, and I heard dentists say so. We didn't have this sense in China. Since I came to America, I agree people say caries will affect baby teeth. In addition, decayed baby teeth will affect adult teeth. (code 01)</p> <p>Since I came here, the dentist filled her teeth and told me that if the baby teeth are not filled, it would affect the adult teeth. (code 25)</p>
<p>2. Belief regarding tooth worms</p>	<p>Believing tooth worms causing dental caries Having candies without teeth clean will produce worms. Teeth would be eaten by the worms. (code 01)</p>

	<p>It seems that that people from my hometown said that if children eat too many candies, their teeth will be eaten by the worms. Also, the teeth will turn black color. People say the worms will eat the teeth. (code 01)</p> <p>If you leave the sweet stuff in the mouth for a long time, you would smell really bad odor. If you do not clean it, it will hide inside for a long time. Just like the dirty water. Worms will grow up inside the teeth. It seems like the worm will eat the teeth. (code 12)</p> <p>Having sweets would lead to germs growing inside the teeth. Then, the germs produce worms. (code 25)</p> <p>Believing people using worms and bacteria interchangeably In the old days in China, people would certainly not understand if you mention it as bacteria (laugh). People use the term “worms” in the common statement. (code 10)</p>
3.Belief regarding gum bleeding	<p>Relating to dental caries Probably, I think if tooth decay is severe, it may cause bleeding while brushing because tooth decay may affect the gum health. (code 30)</p> <p>Relating to periodontal disease Sometimes he had something like bleeding while brushing, a little bit pink color, maybe that is what we call periodontal disease, if he had bleeding. (code26)</p> <p>Relating to dental flossing Sometimes the gum would be bleeding, if we use...what that is called. Oh, it’s dental floss! Using floss will cause bleeding while flossing our teeth. (code 33)</p>
4.Belief regarding sugary foods	<p>Believing children loving sweets by natural instincts In general, kids all love to have candies. Sometimes, they have many candies, like 4 to 5 candies a day. (code27)</p> <p>His older brother is a child too. Children like to have candies. Sometimes I let him have candies but sometimes I don’t allow. If the younger one sees his brother having candies, he likes to have some candies (laugh). (code 01)</p> <p>Believing sugary foods and/or drinks contributed to childhood caries Rice contains lots of sugar, also like candy, bread. They all contain too much sugar. If children take sweet items too much, I worry that children will be easier to have caries. (code 42)</p> <p>My friend’s child likes to have juice a lot. I can recall that he drank too much juice so he had caries (laugh). (code 11)</p> <p>If a child takes too many sweets like soft drinks, it will result in caries. (code 02)</p>
5.Belief regarding a balanced diet	<p>Believing healthy foods can prevent caries There are no sweet foods in our family. As adults, we do not take any sweets. We only have healthy foods in the family to prevent cavities. (code 13)</p> <p>I am sure that the dentist would tell me to make sure I do not give him foods that cause cavities. (code 30)</p> <p>I would like to know what she should eat to prevent bad teeth (laugh). Prevent decayed teeth. (code 25)</p> <p>Avoiding certain foods to maintain tooth condition We will not have fried foods. Do not eat the hard stuff because the hard stuff is not good for teeth. I personally think it is no good! (laugh) I also well cook foods and make it softer to eat. I think it is a little bit helpful for the child. (code 12)</p> <p>There are no sweet foods in our family. As adults, we do not take any sweets. We only have healthy foods in the family to prevent cavities. (code 13)</p>

	<p>If a child has tooth decay, it would affect a child's eating ability. If a child cannot eat well... not have a balanced diet, he or she may not grow tall. (code 13)</p>
<p>6. Belief regarding self-care</p>	<p>Practicing home care for children's toothaches If he feels pain, I will use the ice packing, use ice. I will give him an ice bag. (code 29)</p> <p>When he felt pain, we would wash his teeth and use an ice pack to reduce the pain. (code 03)</p> <p>Practicing home care for children's dental problems When we visited the dentist the first time, he told us that there were only three or four decayed teeth. I thought it was not severe, so we did not fill the teeth. We went back home and I asked him to brush teeth carefully. Also, we used the rinse. (code 26)</p> <p>If there were something in the caries hole, then I would use a toothpick to remove it. (code 03)</p> <p>These days he said to me, "Mom, I have a loose tooth." I said to him not to be worried. You put it swaying, and then lose it. Mom would help you to pull it out, and then... a new tooth will come out (laugh). (code 11)</p>
<p>7. Belief regarding the need for dental care services</p>	<p>Expecting frequency of regular dental visits Surely, it will be better to examine the teeth every 3 months because he does not have any teeth yet. We can find if anything goes wrong, like knowing caries earlier. It will be better if the exam waiting time is shorter. (code 09)</p> <p>Now they ask us to visit them every 3 months. I feel that if it can be shorter, maybe 1 month, it will be better. I think 3-month is too long. He visited the dentist 2 months ago and now he has many teeth stains accumulated on the teeth. However, his appointment is every 3 months. I feel that 3-month interval is too long. (code 05)</p> <p>Her dentist is the one who determines if there is any dental caries. We will wait six months for the next checkup with the American dentist, and see whether there is a dental cavity. (code 40)</p> <p>Following dentist' advice for regular checkups Around one-year-old, about 12-months, that was the first time I took him to visit a dentist. When we visited the dentist, he told us that there were not many teeth now. So, he asked us to come back three months later to check the teeth again. (code 01)</p> <p>Now I am not worried because we have the examination every three months. The dentist says nothing is wrong. The dentist asks us to maintain her mouth clean and back to check up every three months. So, we always know her teeth condition. (code 23)</p> <p>In the U.S. here, he has to visit the dentist every half a year. If the dentist finds caries, he can take care of it. (code 27)</p> <p>Receiving regular checkups Regular dental care is the most important thing. You have to take children in for regular dental checkups. So, you know whether there are any cavities. (code 01)</p> <p>The most important thing is regular dental examination. If there is tooth decay, the dentist will remove it. Thus, the tooth next to it won't be affected. It will not expand. (code 05)</p> <p>The dentist can examine his teeth through regular checkups. (code10)</p> <p>His caries was not severe and did not cause any pain because he had an examination every six months. The dentist only found a little bit caries. That is it. (code 14)</p> <p>Receiving routine management The dentist puts some vitamin on his teeth and nourishes the teeth. (code 01)</p> <p>She [participant's daughter] only needs fluoride every 3 months to prevent cavities. (code 22)</p>

	<p>Hoping dentists to lecture their children about the importance of oral-health care Teach him not to take too many sweets or soft drink. (code 02)</p> <p>During the semi-annual inspection, I hope the doctor will tell him something oral health. Surely, sometimes he would listen to what the doctor says, but not what I say. (code 09)</p> <p>I hope that the dentist could personally remind my daughter to protect her own teeth, because she knows he is a professional. So, she can listen to him. Yeah, she only listens to the professional. (code 39)</p> <p>Expressing dental-service difference among US, China, and Taiwan Maybe in the US, doctors can treat tooth problems better than the Chinese doctors can do in China. I trust doctors in the US. (code 09)</p> <p>Here in the US, the dental service is very good. She has regular checkups. In China, no such service. It does not go this way. Kids in China do not usually visit the dentists, and neither do adults. (code 17)</p> <p>In China, children are not required to visit a dentist. However, children here, each child has to visit a dentist before going to school. In China, you do not visit a dentist even in a whole life, and nobody would say a word to you about this. (code 01)</p> <p>The dental service in China is not like the service here in the US. Here, each child has a checkup every six months. Therefore, if there were any problems, you would know and could solve the problem right away. The dental service here for children is much better than that in China. (code 27)</p> <p>Here in America, they would help you take care of the decayed teeth. So, I think the services here are good. (code 34)</p> <p>Our oldest son has many missing teeth. His teeth are rotten badly. Our second child was born in the US. So, he has been staying in America for a long time. We think the regular checkup is very helpful because it can find something we cannot find out. For example, we knew he had tooth decay when he had the X-ray done. I don't think we have regular checkups in Taiwan when I was a child in Taiwan. (code 21)</p> <p>His dad believed that we could wait because his caries was just a little hole on it. His dad said that we could go either back to Taiwan because treatment there is cheaper or not to deal with it. We could just wait until he changes his natural teeth [permanent teeth]. (code 35)</p>
8. Belief regarding tooth extraction	<p>Worrying the impact of tooth extraction For the kids, they may need anesthesia for whole body. I would be worried (laugh). The size of child is so small [body weight]. So, I would be worried about the amount of anesthesia the dentist will use. It is not like adults... only local anesthesia is needed. The whole body anesthesia [general anesthesia] has a risk. (code 44)</p> <p>This [tooth extraction] will not be good for him to eat. In addition, the new tooth coming out will not be pretty. For example, if the dentist extracts the tooth in the middle, and then the upper tooth will fall, then it will not be pretty. In addition, the new tooth will not fit the space in between these two teeth. (code 02)</p> <p>If the tooth is pulled out, I am afraid the new tooth will not grow in the space properly. Also, it may not look good for a girl. (code 34)</p> <p>Expressing treatment differences regarding tooth extraction between China and US Initially, he has a...a little bit black spot. The doctor said that his tooth needed to be extracted. But, we doubt about it. In China, dentists only extract the loosen tooth. Why do they extract that tooth? We feel that ... in China, we just wait until the tooth looses. They only extract the very loosen tooth. He acts like in American, and these are different methods. (code 09)</p> <p>In China, the dentists would give you some drugs to treat inflammation. You do not need to</p>

	<p>extract the teeth. However, it is not the same here in the US. They will extract the tooth even when a child only has an inflammation. (code 02)</p> <p>Accepting tooth extraction based on the severity of caries If my son's tooth decay is very severe, he may need to have it pulled out and have dentures done. Severe caries means a child has several decayed teeth. It affects eating, body growth, and speech ability of a child. (code 44)</p> <p>If the toothache is very bad, it is very painful! I would consider having the tooth extracted. What I mean serious decayed tooth is a tooth with 1/2 or 2/3 decayed. This is very serious to me. Then, I would bring the child to a clinic for tooth extraction. (code 01)</p> <p>If the caries is severe, it would require the dentist to extract the bad teeth. Yeah, if it is severe...A severe cavity...such as the cavity affects his eating and body. (code10)</p>
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Summary of Results

The purpose of this dissertation was to describe Chinese immigrant parents' Explanatory Model of dental caries (etiology, onset of symptoms, pathophysiology, course of caries, treatment) and the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral-health care of their children. Findings were derived from two separate analyses of elicitation interviews of 46 study participants. Both a Western theoretical framework of Kleinman's model and a framework derived from a critical analysis of Chinese culture, cultural health beliefs and behaviors guided the deductive content analysis of the 46 elicitation interviews.

Analysis of Kleinman's model

Results from the analysis utilizing Kleinman's framework revealed that parents believed in a myriad of causative factors for dental decay ranging from dietary and oral hygiene habits, to biological and somatic factors (inheritance, genetic, inborn and transmission issues), as well as finger biting habits, and lack of regular dental visits. The parents had different understandings of what the initial age of onset for dental caries was, including (1) ages 0-7

years; (2) as soon as their teeth erupted; and (3) once they start consuming sweets. Reasons parents believed children started to develop caries included: (1) improper dietary habits; (2) improper oral hygiene habits; (3) the time necessary for caries to develop; (4) children sleeping with feeding bottles; and (5) children not having regular dental visits. The parents believed that children with caries may experience initial symptoms including mouth or teeth-related symptoms, eating-related symptoms, speaking-related symptoms, body-related symptoms, and emotional problems. They recognized the onset of disease through dental examinations, their children having a toothache, and color changes on their children's teeth. The parents were familiar with dental decay through personal experience and experiences with their friends' children. They believed dental caries could negatively impact both children and parents. The negative impact on children included effects to the mouth, the body, the child's routine activities and their emotional status. The negative impact on parents included concerns about dental treatment and disease transmission. Dental caries, alternatively, had a positive impact on promotion of the children's tooth brushing behaviors because of their experience with caries. The parents believed that dental caries could have a short-term or long-term impact on their child. They spoke of how the impact of having caries could last a lifetime when the caries affects the permanent teeth, it could last until the children go their permanent teeth, or it might only impact the children until they are able to receive treatment; some were uncertain of how long the child would be affected. The parents

expressed their care for children's dental caries, including seeking the help of a dentist, paying more attention to the child's tooth brushing at home, maintaining routine dental visits, introducing dental floss into the child's oral hygiene routine, and controlling their intake of sweets. The parents' expectations for treatment of their child's caries included treatment of the caries, more information regarding caries, dental education specifically for their children, and specific characteristics of the professionals caring for their children. Parents were found to be satisfied with their dental professionals based on their skills and characteristics. Parents were unsatisfied and/or had negative experiences with their providers when their children did not receive any treatment, when there was an issue with a tooth filling and braces, when the dental professional was lacking treatment experience, and when there was an issue regarding the use of anesthesia.

Critical analysis of Chinese culture

Results from the analysis using a framework derived from a critical analysis of Chinese culture revealed that 11 domains were reflected in the parents' oral-health beliefs and practices. Parents believed that they: (1) had an obligation for their children's oral care; (2) valued their children's training in oral care; (3) expected children to be independent in tooth brushing; (4) allowed children to receive sweets as gifts from relatives; (5) expressed fatalism regarding children's dental caries; (6) believed kinship contributed to children's dental caries; (7) obeyed dentists' authority; (8) avoided confrontation with dentists and family members;

(9) demonstrated group orientation related to friends' dental knowledge and advice; (10) valued face related to children's physical facial appearance; and (11) were concerned dental caries would affect their children's school achievement.

Critical analysis of Chinese health beliefs and behaviors

Results from the analysis using a framework derived from a critical analysis of Chinese health beliefs and behaviors revealed that eight domains were related to their oral-health beliefs and cares, including (1) belief regarding primary teeth; (2) belief regarding tooth worms; (3) belief regarding gum bleeding; (4) belief regarding sugary foods; (5) belief regarding a balanced diet; (6) belief regarding self-care; (7) belief regarding the need for dental care services; and (8) belief regarding tooth extraction.

Chapter 5: Discussion and Recommendations

Discussion

This chapter highlights major findings of the study; compares findings with prior published studies and literature, including recommended dental practices in Western dentistry; recommends future needed research; identifies study limitations; and offers clinical implications from study findings.

Major Findings of the Study

The following discussion focuses on key findings of the study and discusses the reasons for convergent or divergent results with existing literature. The discussion includes major

findings related to the concepts of etiology, onset of symptoms, pathophysiology, course of caries, and treatment. Additionally, the impact of Chinese culture, Chinese health beliefs and behaviors on parents' oral health care of their children is also discussed. Finally, the identification of parental, familial and cultural factors which may potentially affect parental oral-health care is discussed.

Etiology

Causes of childhood caries

Chinese immigrant parents identified five major causes of childhood caries: dietary habits, oral hygiene habits, lack of routine dental visits, biological and somatic issues, and children's habit of biting fingers. Among those causes, biological and somatic issues (e.g., inheritance and inborn issues, tooth worms) and biting fingers are not causes that are traditional western views of what causes caries. Even when study participants identified western views of more traditional risk factors for caries, such as sweet foods and drinks and breastfeeding, parents appeared to hold myths and concerns about them.

Childhood caries attributed to an inherited genetic or inborn issue

Some parents believed that childhood caries could be an inheritance, genetic or inborn issue. These impressions were based on past experiences; for example, they had known children who had healthy teeth without proper daily tooth brushing. If parents think there is a biological tendency, they may not think caries prevention is important. Although genes play a

role in affecting dental caries risk (Opal, Garg, Jain, & Walia, 2015), dental caries is considered a multifactor disease (Bramlett, et al., 2010; Harris, et al., 2004). The most important prevention is parents can provide their child daily oral hygiene and dietary control (American Academy of Pediatric Dentistry, 2013; 2014; American Academy of Pediatrics, 2011; Hagan, Shaw, & Duncan, 2008). Therefore, health care providers should assess each parent's view about the causes of caries, as well as educate parents about risk factors during dental care visits. It would be unwise to allow parents to attribute childhood caries to an inherited, genetic or inborn issue. This would enable them to abrogate responsibility to a cause they could erroneously believe in non-mutable. By informing them of their misunderstandings, parents could remain active participants in their children's daily oral care.

Tooth worm belief as a cause of childhood caries

Some mothers in the study who were from Guangdong province in southern China held a "tooth worm" belief as a cause of caries as well as a protective factor for childhood caries prevention. It is worth noting that this belief was common to all these study participants (n=4) and unrelated to the mothers' age and educational level. Children of these mothers did not have dental caries. The "tooth worm" was a common word used in their daily life. For example, using "tooth worm" makes it easier for children and others to understand the cause of bacteria. Parents used the tooth worms to communicate with their children about how tooth worms in the mouth would lead to tooth decay. Some parents admitted that the reason they

used this word to explain to their child was because most children are afraid of worms.

Consequently, they hope their child may obey their guidance on oral hygiene. Thus, children could get the worms out of their mouths through routine oral hygiene.

Although the way mothers believed how tooth worms led to childhood caries was different, their beliefs demonstrated positive views toward caries prevention. Some parents appeared to believe that there will be actual growth or production of real worms on the teeth if children did not clean their teeth after consuming sweets. As a result, the teeth would be eaten by the worms. Parents who held such belief showed that dental caries is preventable. It leads them to pay more attention to their children's oral care. Therefore, health care providers should assess each parent's view of the etiology of caries and their understanding of illness mechanism. Technically, using the term "tooth worm" may be an effective way to communicate with parents who hold such belief.

Myths and concerns about sweet foods and drinks as a cause of childhood caries

Some parents believed that controlling the amount of sweets intake was more important than controlling the frequency of sweet intake. A small proportion of parents attributed caries to the intake of sweet drinks. Parents also identified environmental barriers related to their child's sweets control, such as US snacks containing lots of sugar and easy access to sweets for children in the US.

Studies have shown that frequent consumption of sugary or carbohydrate-rich snacks or

drinks increases the risk of caries in young children (Han, et al., 2014; Wong, et al., 2012).

Based on the results of this study, it showed that Chinese immigrant parents had insufficient knowledge regarding healthy diet for caries prevention. According to the AAPD in 2013, topics such as dietary analysis and dietary choices should be addressed through nutritional and preventive oral health counseling during periodic visits (American Academy of Pediatric Dentistry, 2013). It is possible that parents in the present study may not have had exposure to oral health education. Consequently, they may not properly understand the relationship between healthy diet (including sweet drinks) and caries development.

Another remarkable barrier to controlling the intake of sweets reported by Chinese immigrant parents was easy access to sweets in the US. Although the literature includes environmental-level factors as important influences for caries prevention, the major focus of literature is on the availability of fluoridated water and access to dental care (Bramlett, et al., 2010). Therefore, the current study's finding of this "US sweet-snacks" issue brings a new area requiring further study. Although parents in this study have identified certain external factors related to sweets control, parents still need to be responsible for guiding their children within this environmental context. Health care providers could assess how mainstream diets affect the dietary intake of immigrant families, as well as how each immigrant family adapts to the mainstream cultural diet.

Breastfeeding viewed as a cause of childhood caries

A small number of parents in the current study expressed concern that breast feeding children at night without cleaning the child's teeth could cause dental caries because the milk penetrates the teeth. If parents continue to hold such a belief, they may not continue to breastfeed their child at night. This belief is contradictive to the "breastfeeding guide" recommended by WHO, which encourages mothers to breastfeed their babies as often as they want day and night (World of Health Organization, 2009). Even though feeding practices (such as types of infant feeding, the use of pacifiers, nocturnal breastfeeding) in early childhood is an important risk factor in early childhood caries (American Academy of Pediatric Dentistry, 2014; Hong, Levy, Warren, & Broffitt, 2014; Hooley, et al., 2012; Wong, et al., 2005), it is still important to encourage mothers to breastfeed their children. Thus, health care providers should encourage mothers to maintain breastfeeding, at the same time addressing the importance of oral hygiene for young children. Even when some infants without teeth erupted, they should have their gums and mouths cleaned with a moist washcloth or a soft-bristled toothbrush twice a day.

Onset of Symptoms

Age of start of dental caries

Parents held different understandings of the age of onset for children's dental caries. Parents' responses to the age of initiation of caries ranged from 0-7 years. Some parents knew caries could develop as early as tooth eruption. However, most parents believed that children

would not develop dental caries before age 3. Results of this current study may help explain why Chinese immigrant children delayed tooth brushing behaviors and had a higher rate of early childhood caries. If parents believe that caries onset is later in a child's life, we speculate that parents might ignore their child's daily oral hygiene until the child already has caries. According to Pine and colleagues' study (2004), US Chinese children delayed in age for initiating tooth brushing compared to US White children. Wong and colleagues' study (2005) also reported that 65% of Chinese immigrant parents did not regularly brush their children's teeth before age 4. This further indicates that Chinese immigrant parents need more education about the onset of childhood caries.

Initial symptoms that suggested onset of childhood caries

Most parents could not recognize the early signs of childhood caries, and they did not realize their children had dental caries until after the child had a routine dental checkup. Parents believed that they were incapable of identifying the early signs of caries. Further, the majority of parents thought it was the dentist's responsibility to determine whether a child has caries. For example, the most common signs of caries that parents could identify based on their best knowledge were toothache and black lesions on the teeth. However, those indicators are late signs of dental caries. In fact, it is more important for parents to recognize early signs of caries before the illness is manifest. Children with white spot lesions should be identified early as being at high risk for caries (Jablonski, et al., 2014). These results indicate

that parents need more education about the symptoms of caries, as well as to inform them that it is parent's responsibility to check their child's teeth on a daily basis.

Pathophysiology

Perceived impact of childhood caries on the child

Most parents realized the negative impact of caries in the child's mouth. However, only a small portion of parents were concerned about the impact of early childhood caries on the permanent teeth. In addition, some parents admitted their lack of knowledge of how caries impacted the rest of the body. These findings suggest that some Chinese parents have insufficient knowledge about the impact of caries on permanent dentition and general health. Thus, they may underestimate the impact of childhood caries. Our finding may help explain the finding of a prior study that found Chinese parents had a lowest mean score of perceived seriousness of childhood caries compared to Whites, Mexican-Americans, and African-Americans (Adair, et al., 2004). Because dental caries can affect a child's oral health and general health, parents need to be aware of the severity of childhood caries. In the current study, 37% of the families interviewed had children under the age of six who had dental caries. However, the objective of Healthy People 2020 is to reduce the proportion of children aged 3-5 years with dental caries from 33% to 30% (US Department of Health and Human Services, 2015). Although our sample was not randomly selected, the percentage of children with tooth decay seemed to be behind the objective. Chinese immigrant children should be

considered a high risk population. Therefore, health care providers should assess parents' understanding of caries impact, especially focusing on the impact of permanent teeth and the health of the child overall.

Perceived impact of childhood caries on the parent

Childhood caries had a negative psychological impact on the parents in this study. Parents expressed concern about their child's dental treatment (e.g., use of anesthesia, treatment related pain) and worried caries transmission between children at home. For children with severe caries, parents were concerned about the risks of using large amounts of anesthesia on their child. Although parents were not exactly sure what the impact of anesthesia was, they acquired this fear from the experiences of their friends' children. As such, clinicians should fully explain the potential impact of anesthesia. If parents have beliefs about the use of anesthesia that are not accurate, they may not take their child in for the dental treatment. Some parents were also overly concerned about the pain or discomfort induced by dental treatment and worried that their child may not be able to cope with it. These parents may be less likely to bring their child in for the treatment right away. It is important that health care providers discuss possible discomforts related to dental treatment with each parent before making treatment plans. Some parents recognized that dental caries is a transmissible illness; however, they felt powerless to control the transmission between

children at home. Again, this result indicated it is essential to promote parents' oral health specific parenting skills.

Course of Caries

Duration of impact of childhood caries

Parents held different beliefs about the length of time that a child could be influenced by dental caries. Many parents believed that childhood caries would only affect a child until eruption of permanent teeth, and expressed that decayed teeth would be replaced by permanent teeth. This finding is similar to Wong et al.'s study that indicated Chinese immigrant parents in New York City believed primary teeth were not important because decayed primary teeth will eventually fall out anyway (Wong, et al., 2005). For parents holding such belief, they may not think childhood caries is a serious health issue because their child will eventually gain a new set of teeth. Our study also found one parent delayed her child's dental treatment due to this misunderstanding. Similarly, a prior study noted parents' lack of awareness of the importance of primary teeth created a barrier to dental care (Chhabra & Chhabra, 2012). As a result, a delayed diagnosis of dental caries could increase the severity of oral problems that can further lead to more extensive and costly care (Patrick, et al., 2006). Moreover, many parents, including a general dentist, admitted their lack of knowledge of caries duration. Therefore, parents should be well-informed that carious lesions could be cumulative and progressive in the primary dentition (American Academy of

Pediatric Dentistry, 2013), when a child cannot receive timely dental treatment. Consequently, early childhood caries could also cause problems in the permanent dentition.

Treatment

Parents' care for their children's dental caries

Most parents in the current study would immediately seek for dentists' help when their child encountered dental caries. Parents believed that they were incapable of dealing with dental caries and claimed they would prevent caries getting serious by counting on dental professionals. Parents in the current study did not report the use of any cultural remedies as a cure for childhood caries. This is different from the findings of Wong et al.'s study, which showed some parents used Chinese herbs as the first option for caries treatment for their children (Wong, et al., 2005). As most parents in both studies were recent immigrants, lived in the US for less than 10 years, a possible explanation about this care difference could be origin of countries. Parents in the prior study all came from mainland China, where people usually apply more traditional Chinese medicine into their daily life compared to some parents from Hong Kong or Taiwan who were in the current study. Also, in previous study most parents brought their children to the health professionals in response to pain. The barriers preventing them to dental treatment included cost of treatment and lack of support from family members and friends. However, most parents in our study would take their children for dental care right away. Only two parents tried to solve their children's toothache

by using ice packing, which is a western practice for acute pain relief. This phenomenon is consistent to literature that Chinese immigrants prefer Western medicine practices for immediate symptom relief (Wade, et al., 2007). Our finding also indicates that parents in current study residing in urban cities may have their practices shaped by modern health knowledge.

Although parents would bring their child straightaway for professional help, obtaining dental treatment appeared to be a financial burden to some families. In current study, 98% of children had dental insurance. However, there was still a financial barrier for the families when their child needed to receive caries treatment in the US. This finding is similar to Wong et al.'s study, which showed most parents admitted having dental insurance made seeking caries treatment less burden (Wong, et al., 2005). Although the Affordable Care Act (ACA) was scheduled to be effective on January 1, 2014 (Essling & Litch, 2013), 74% of Chinese parents in the current study indicated their English ability was fair or poor. Few parents expressed they did not exactly understand the current insurant plans. The literature also indicates that the parents' language spoken at home is associated with their young children's oral health outcomes (Bramlett, et al., 2010). Similarly, parents in the current study may not understand the various dental plans available to them and how they would benefit from these plans, if they did not have proper ability of English.

Parents' expectations of treatment for childhood caries

Expectations related to caries treatment

Parents in the current study expected dentists to provide detailed descriptions about their child's condition, to answer their questions regarding dental caries, and to discuss the treatment procedures and options with them. This finding is different to Wong et al.'s study that indicated the Chinese parents in the US were satisfied with their children's dental treatment and trusted health providers in Western medicine (Wong, et al., 2005). However, in our study, parents tended to hold more questions about dentist' treatment options and expected the health providers to clarify all their questions before the treatment. Although the prior study was not able to provide parents' age or educational level, most parents in present study had college and above education levels, which may explain their desire to actively involve with treatment process.

Expectations related to caries information from dental professionals

The most notable findings included discovering that parents lacked caries-related knowledge and wanted to learn about caries prevention, regardless of the parent's country of origin or socioeconomic level. The parents' absence of knowledge and caries prevention is similar to a prior study of Chinese immigrant parents which also showed parental lack of knowledge about children's caries prevention (Wong, et al., 2005). Although all of the parents in our study regularly brought their children to routine checkups and preventive dental services, they seemed to receive insufficient information about caries prevention from

the services of anticipatory guidance or individual counseling. Some parents appreciated information received from health care providers (e.g., nurses and dentists in dental clinics and WIC programs); however, the information was not detailed or comprehensive. For instance, the dentists often asked parents to control the intake of sweets for their children without telling them specifics, such as how often sweets should be allowed. Another example of this is how dentists are persistent in reminding parents to brush or floss their child's teeth; however, what parents really wanted was to learn the techniques of brushing and flossing for young children. Instead of continuously being told to prevent caries, parents in this study need to better understand the exact impacts of childhood caries. This finding is similar to a prior study that indicated Chinese-speaking parents would welcome encouragement from health professionals to motivate them to practice oral health care for their children. Parents also expected health professionals to provide them accurate health information (Amin & Harrison, 2009). Additionally, this study identified Chinese immigrant parents lacked knowledge and skills of dental caries and caries prevention. Future study could expand interview questions to deeply cover whether each child has established a dental home, which promises to provide family-centered services including prevention of oral diseases, dietary counseling, and education about proper care of children's teeth and gingival and so forth.

Satisfaction with the dental professionals

Parental satisfaction with professional help could be a protective factor for children's access to dental services. While some parents indicated dissatisfaction with their professional services, even more parents expressed satisfaction with dental professionals. The parents appreciated professionals who were patient and comforting towards their children because they worried that their children may experience anxiety and fear. Two parents in this study were so concerned about their child's fear of preventive dental services and caries treatment that they kept postponing their children's appointments. Parents from China believed dental services in the US are much better than that in origin country, while parents from Taiwan expressed professionals in the US spent more time to comfort or play with their child compared with dental professionals in Taiwan. Our finding seemed to show parents were more likely to take their child for dental intervention if they were satisfied with professional help. These findings from our study support the literature that the characteristics of dental care system may contribute to children's oral health outcomes (Bramlett, et al., 2010). Moreover, our findings are similar to a prior study that showed Chinese immigrant parents from China trusted health providers and were satisfied with dental treatment in the US (Wong, et al., 2005).

Negative experiences related to professional's technical help

Parents expressed negative experiences related to caries treatment due to divergent expectations between parents and dental professionals. For instance, the use of anesthesia

contributed to parental negative experience with dental professionals. Parents held different expectations about the use of anesthesia. For the use of local anesthesia, it was acceptable for parents when their child had either routine dental services or caries treatment. But for the use of general anesthesia, parents tended to be more conservative and terrified because its side effects on their child, such as brain development, memory, and other body functions. This finding is similar to Wong et al.'s study that showed Chinese parents believed that anesthesia could affect a child's brain development and other physical problems (Wong, et al., 2005). For parents holding such beliefs, they may withdraw their child's professional dental intervention. This finding suggests that Chinese parents may have myths about the use of anesthesia. Dental professionals should attempt to assuage parents' fear regarding the use of anesthesia with adequate information.

In summary, the results of this study provide important new knowledge in showing how parents' beliefs about childhood caries are associated with their practices of oral-health care and dental caries for their children. This study also found similarity and variation in parental beliefs and oral-health practices among different countries and socio-economic groups. This study also indicates caries prevention education is needed to facilitate parents' daily assistance roles in children's oral hygiene, healthy dietary and dental visiting behaviors. Furthermore, this study identifies certain variables that could contribute to risk factors of caries. Health care providers (dental professionals and non-dental professionals) could apply

this knowledge as a foundation for developing a conceptual framework for designing culturally relevant family-focused interventions to improve immigrant children's oral health.

Chinese Culture

Had an obligation for their children's oral care

Valued their children's training in oral care

Child training was an important responsibility in some families of our study. Some parents valued oral-care training by using various strategies since their children were little.

One of the training strategies was using sibling demonstration. Similarly, Siblings were identified as role models for tooth brushing for their younger siblings (Stokes, et al., 2006).

On the other hand, some parents admitted their weakness to train their child for building oral hygiene habits and sweets-intake habits. For those parents, some complained they

encountered training barrier from grandparents and believed that elder generation less valued children' oral-care training. Although one of the Chinese parents' responsibilities is to train

children to be obedient in order to adhere to socially desirable behaviors (Chao, 2001), some parents in our study had difficult in achieving this goal. There might be three ways to explain

this phenomenon: (1) oral-care practice is not an essential training theme in Chinese family life: as a central part of child training in Chinese family focuses on a child's ability to

perform well in school (Tseng & Wu, 1985), parents may not train their children to perform oral-care practices as rigorous as academic training. Consequently, children may not build a

daily habit of oral hygiene and sweets-intake practices during early years. (2) parents' unaware of the impact of childhood caries on the child: as many parents in our study showed lack of knowledge of impact of childhood caries, they may not insist to train or control their children's sweets intake as well as to make their children brush, and (3) parents' lack of dental-specific parenting skills: as the evidence from the interview data. This also can explain why some parents in our study mentioned they cannot control their children after they reached aged 6 years or later.

To achieve the goal of children's oral health prevention, health care providers should address the importance of children's oral health, assess parents' skills and integrate those relevant trainings into their plans if it is applicable.

Expected children to be independent in tooth brushing

Parents believed that children's oral-health care is parents' responsibility and children's caries is associated with parents' oral-health care. This obligation belief seems to play as a protective factor for promoting children's oral health. Especially for parents who had children with caries experiences, caries influenced more parental attentiveness to children's oral hygiene practices at home. As respect to childhood caries, most parents were willing to modify their oral health behaviors in order to promote their child's oral health. Although, parents in current study held an obligation for children's oral-health care, evidence showed that some parents less involved with their child's tooth brushing or flossing behaviors.

Similarly, Adair et al.'s international study showed Chinese parents tended to be less involved with their children's tooth brushing compared to US Whites, Mexican-Americans, and African-Americans (Adair, et al., 2004). Some barriers identified from our study may contribute to parental involvements with children's daily oral care: (1) parents intended to train their child to be more independent on brushing; (2) children wanted to brush by themselves; (3) parents' lack of brushing or flossing skills; and (4) parents' lack of time. For the barrier of lack of brushing or flossing skills, many parents in current study recalled they were unable to clean their child's teeth and mouth thoroughly because their child bitted their fingers badly at aged less than 12 months. This finding indicated that parents need guidance on specific oral hygiene techniques especially for young children. For the barrier of lack of time, it prevented parents to implement regular tooth brushing practices for their children. Because about 50% of parents with a paid job and only 22% of parents lived with relatives, this economic and family context may make parents' fully involvement in children's oral hygiene more challenging. As children wanted to brush alone, it is consistent with the development need of toddlers. As toddlers developing autonomy characteristic, they may want to brush by themselves (Erikson, 1963). Thus, parents should be informed the important of letting toddlers brushing independently but at the same time educating them the need of parents' assistance. For parents wanted to early train their child for brushing independent, this finding is similar to Finlayson and colleagues' study, which showed that Chinese parents

expected their children aged 4 to 5 years to start brushing on their own (Finlayson, et al., 2005). Independence is an important theme in Confucian tradition. Chinese parents usually desire their children to develop independence, which can help them to endure hardship (Fong, 2007). However, parents in the current study did not realize that their children were not physically developing well enough to perform hygiene techniques alone. As a result, this oral-hygiene independence training may partially explain why Chinese immigrant children had higher caries prevalence. Thus, health care providers can inform parents that it is parents' responsibility to brush or help with children brush until children reach aged 7 or 8 years old (American Academy of Pediatrics, 2014; Hagan, et al., 2008).

Allowed children to receive sweets as gifts from relatives

Avoided confrontation with family members

Avoiding confrontation with others was an important value in our study participants. Some parents voiced their concern that family members and relatives tended to provide young children sweet foods as treats or gifts. For traditional Chinese families, there is a tendency for grandparents to offer their grandchildren foods as a way to express their love and care or to shape children's behaviors through snacks reward or deprivation (Jiang, et al., 2007). It is also common for relatives to provide families foods (including sugary foods) as gifts when they come to visit, especially during Chinese New Year (Qian, Abdur Razzaque, & Ah Keng, 2007). Even, parents realized sweet snacks are risky for their children to develop

childhood caries. We were hypothesizing that they were afraid to communicate this issue with grandparents. We speculated that this is because Chinese parents are required to avoid confrontation with others in order to maintain a family harmony. Parents may also have difficulties in rejecting their relatives' sweet treats for their children because offering foods as a gift is part of cultural traditions. Furthermore, we considered that Chinese parents may try to maintain the family harmony so they may accept relatives' sweet gifts. This finding is similar to the literature indicating how family-level influences (e.g., family composition, culture) contribute to young children's oral health outcomes (Bramlett, et al., 2010). Further, another study found that it was hard for Chinese parents to communicate dietary practices with grandparents (Amin & Harrison, 2009). In order to promote young children's oral health and family relationship, Bowman (2012) suggested that parents and grandparents need to maintain open communication, setting boundaries, and respect the differences between generations.

Believed kinship contributed to children's dental caries

Kinship played a significant role in Chinese immigrant families. Some of the families in our study had a very strong family bonds. This often meant that households included multiple generations of family members, allowing grandparents, for example, to provide childcare assistance. However, a few of the parents from China reported that caries was contagious and could be acquired from infected family members through shared eating

behaviors or a shared toothbrush. For Chinese people, it is common for family members or friends to share food plates together at home or at restaurants. Some parents and grandparents will feed young children from the same bowl from which they are eating. Similarly, a study which enrolled Chinese, Korean, Filipino, Chamorro, Carolinian, Palauan and Chuukese found that 28% of the caregivers reported pre-chewing food for their children and 45% reported sharing utensils with children (Milgrom, et al., 2000). Children whose mothers had shared utensils had a higher cavitation rate than those without cavitation (Milgrom, et al., 2000). Feeding prechewed food is a traditional practice by some Chinese grandparents and parents (Qin, Li, Zhang, & Ma, 2008). Therefore, health care providers across settings (e.g., prenatal clinics, pediatric clinics, and dental clinics) should assess if parents hold a contagion belief and their oral health-related practices, such as family's dietary habits, whether each member has his/her own toothbrush.

Expressed fatalism regarding children's dental caries

Fatalism appeared to play a substantial role in relation to childhood caries in our study participants. Some parents believed that inheritance contributed to childhood caries and every child would develop caries by a natural process because of sweets consumption and children's poor tooth brushing skills. If parents think there is a biological tendency, they may not think caries prevention is important. They believe that, no matter what they do, their children will eventually have dental caries. This finding is consistent with the literature that

Chinese immigrants have a fatalistic view that dental caries is inherited conditions (Smith, et al., 2013). Further, some parents believed children all love to have sweets and they were incapable in brushing carefully. Again, this seems to showing some parents less involved with their child's oral hygiene even they knew children may not brush thoroughly. Therefore, health care providers should assess each parent's beliefs about causes of children caries, as well as to remind parents about their responsibility in caries prevention and children's oral-hygiene assistance.

Demonstrated group orientation related to friends' dental knowledge and advice

Group orientation played a role in Chinese immigrant parents' life in the US. Social interaction influences Chinese parents' oral-health beliefs and practices for their children. Most parents referred their dental knowledge acquired either from personal experiences or experiences of their friends. Often they accepted dental knowledge from friends and followed their dental advice. However, many parents admitted that people in origin countries often do not regard childhood caries as an important health matter. Routines dental visits are not a regular health practices until recent years, particularly in mainland China. In addition, many parents from China expressed that dental flossing is a new concept to them but they were willing to learn how to floss their children's teeth. Therefore, the dental information that parents learned from their friends may not be totally accurate. Although some parents from Hong Kong recalled they received some caries information from the elementary school, their

knowledge regarding dental caries is not up-to-date. The AAPD also emphasizes the importance of an individual anticipatory guidance or counseling in clinical practices (American Academy of Pediatric Dentistry, 2013). Thus, our study claimed that parental oral health knowledge was affected by social influences and health professionals. Similarly, a Chinese study also concluded that social interactions influence Chinese people's beliefs and attitudes to oral health (Lo, et al., 2014). Hence, health care providers in cross settings must rethink topics to be covered during routines checkups, such as causes, early symptoms, caries duration of childhood caries.

Valued face related to children's physical facial appearance

Chinese parents highly valued the appearance of their children's face in relation to how dental treatments might alter their features. Consequently, parents were committed to protecting their children's physical attraction. As a parent unexpectedly to see her daughter with stainless steel crowns, the parent complained that the crowns looked funny on her child. Especially for girls who were to receive a crown; the parents expressed grave concerns that it could affect their child's appearance and psychological health. Although crowns have been widely used in children as a way to protect primary teeth, parents may not understand dental treatments for young children. This finding is similar to Page et al.'s study in 2014 that many parents concerned their children would be teased by their peers because of how the crown looked. If the dentist could provide more detailed explanations to the parent, the parent might

be appreciated the use of crowns. Moreover, many parents in this study hoped dentists could explain their child's condition in detail and discuss treatment options with them. In addition to parent-dentist communication issue, most parents in present study indicated that they had insufficient knowledge about oral health. Those factors may also contribute to their acceptance of dental treatments.

Chinese Health Beliefs and Behaviors

Belief regarding tooth worms

Tooth worms appeared to be an important concept in parents' understandings of what contributes to dental caries. This conceptual belief of a tooth worm in China is consistent with the literature, which indicated that tooth worm belief was found in some countries, including China, India, Japan, Egypt, and Brazil (Dong, et al., 2007; Lin, et al., 2001; Nations & Nuto, 2002; Suddick & Norman, 1990). Furthermore, this finding is similar to the findings from Gao and colleagues' study including Chinese, Malays, Indian parents with children aged 3-6 years in Singapore. In their study, there was a reduced chance of high caries rate (more than two affected teeth) among children whose parents held the "tooth worm" belief. For parents with such belief, their children brushed teeth more often (Gao, et al., 2012).

Remarkably, it could be a coincidence that none of the children in our study, whose mothers held the tooth worm belief, had caries. While dental caries is a multifactor disease, the tooth worm belief in our study seemed to have a positive effect on their child's oral care. When

parents used the word either to teach or threaten their child about the importance of daily tooth brushing, the child might increase the frequency of brushing. Furthermore, the threatening technique that parents used is consistent with the literature that Chinese parents apply threatening, scolding and shaming approaches to teach children when they reach aged 4 to 6 years (Ho, 1986; Ho, 1989). However, the link between tooth worm belief and parents' increased oral hygiene practice for their child and changes in children's behaviors requires further explorations.

Belief regarding the need for dental care services

Most parents in our study held positive beliefs about the value of regular dental checkups as a way to identify decayed teeth. Parents also appreciated fluoride application on primary teeth as a way to prevent childhood caries. However, these findings seem to be saying that parents overly relied on professional help for caries prevention. Notably, one mother who was from China even blamed the absence of routine dental visits in her village as the cause of her caries as a child. Furthermore, some parents believed that the dental services are more advanced in the US. In contrast, a prior study indicated that most Chinese parents took their children for dental examinations only when pain was present. People in China believed that teeth cleanings would loosen or damage the surface of teeth (Wong, et al., 2005). Based on parent's dental care behaviors in the prior study, it explains the reasons that all of their children had dental caries. In fact, lack of regular dental visits can put children at risk

for dental caries (Chu, et al., 1999; Iida, et al., 2007). However, in the current study, no parents mentioned this teeth cleaning issue. There are three possible ways to explain those different beliefs. In ten years ago, routine dentist visits and its benefit may not be disseminated well in newly immigrant families because of potential language barrier. Secondly, oral health and preventive dental care may not be an important health focus in mainland China as many parents in our study commended. Lastly, most parents in our study had college or above educational levels, which might be a foster factor for attending routine dental visits. This finding is similar to Barrow's study in 2012, which indicated that the caregivers' education had a significant effect on Asian and Pacific Islander children's use of dental services (Barrow, 2012). However, the mechanism between use of routine dental visits and educational level requires further exploration.

Some parents in our study expected their child to have dental visits more frequently; therefore the dentist can remove the stains on the teeth. This finding seems to indicate parents overly relied on professional teeth cleanings. This behavior is similar to a prior study that found Chinese-speaking parents depended on health professionals for caries prevention. Parents over emphasized the importance of the dentist's responsibilities rather than their duty on children's oral care (Amin & Harrison, 2009). In fact, the most common interval of routine dental visits is six months. However, some patients may be called for less or more times of examinations or preventive services based on their clinical conditions (American

Academy of Pediatric Dentistry, 2013). Although preventive services could promote a child's oral health, it is more essential for parents to offer oral hygiene care for their child. Thus, health care providers (dental professionals and non-dental professionals) should remind parents about the importance of proper oral hygiene techniques at home for caries prevention.

Some parents expected the dentists to educate their children about the importance of oral health behaviors, including the importance of caries prevention, limited amount of sweets intake, tooth brushing methods, and flossing methods. Most parents believed that dental professionals had sufficient dental knowledge to educate their children and their children usually respect professionals more than their parents. Our findings are similar to those of two international studies, both of which showed that compared to US White parents, the US Chinese parents tended to be more negative attitude toward caries prevention, control their children's sugar snacking, and make their children tooth brushing. Chinese parents' low self-efficacy was associated with their control in children's sweet snaking and tooth brushing behaviors (Adair, et al., 2004; Pine, et al., 2004). Another study also showed Chinese immigrant mothers in the US demonstrated permissive parenting style (Chao, 2000). Although, traditional Chinese family and Confucianism emphasize training children to be responsible and be obedient, it seems not the current phenomenon of parent-child interaction in the US. As 94% of children in present study were born in the US and have received Western education, they may not obey their parents' guidance simply as children in origins

would do, especially when parents indicated lack of knowledge about oral health and dental caries. Some parents in current study also admitted it was quite challenge to make their child brush their teeth due to a child's temperament. A prior study involving Chinese-speaking immigrant parents also reported a child's temperament was a major barrier to manage children's daily oral hygiene (Amin & Harrison, 2009). Therefore, our findings suggests that Chinese parents should receive detailed information regarding oral health, as well as learning parenting skills in order to promote their children's oral health in current era.

Belief regarding tooth extraction

Tooth extraction caused Chinese parents a big concern in relation to children's oral-health. Many parents preferred their child to have tooth filing instead of tooth extraction, whenever possible. Even when their child was not afraid of receiving the dental treatment, the parents worried about the potential impact of extracting teeth, such as the use of anesthesia, teeth arrangement, appearance, and eating ability. Parents accepted tooth extraction only when their children suffered serious toothache and severe caries. In fact, caries management depends on a child's risk level, age, and compliance with preventive strategies (American Academy of Pediatric Dentistry, 2013). However, parents may not understand these. If parents cannot understand or agree with the caries treatments suggested by the dentists, they may refuse the treatment. Consequently, it may result in severer dental problems. Similarly, Chinese immigrants from China do not like their tooth extracted without giving specific

reasons (Zhang, 2009). Accordingly, dental professionals should carefully discuss treatment plans and its reasons with each individual family in order to have them engaged in decision-making process.

Recommendations

Recommendations for Future Study

The results of this study add new knowledge on how Chinese parents perceive childhood caries and its relationship to their children's oral-health care within the familial and cultural context. This study identified several variables that could contribute to childhood caries development: (1) child factors: biting parental fingers, brushing alone; (2) parental factors: educational level, occupational status, beliefs of childhood caries, knowledge of childhood caries, knowledge of sweet control/oral hygiene techniques/routine dental visits, parenting skills, self-efficacy, treatment expectations, satisfaction with dental/non-dental professionals; (3) family factors: ethnicity, family composition, family income; (4) community factors: social influence, characteristics of dental care systems, access to sweet foods and drinks; and (5) cultural factors: Chinese culture, Chinese health beliefs and behaviors, mainstream cultural diet. Future studies should consider the development and use of a quantitative attitudinal scale that would enable testing the relationships between these factors and parents' attitudes, beliefs and practices with a standardized measure.

Results of this study could serve as basis for questionnaire development or hypothesis testing in future studies. For example, the future study could examine whether parental inheritance/genetic beliefs are associated with parental oral-health behaviors for their children; to what extent the parental “tooth worm” beliefs would affect the parent’s and the child’s tooth brushing frequency and sweets control; whether mainstream cultural diet and access to sweets would affect parental sweet control, children’s oral health-related behaviors, or the family’s dietary habits. Additionally, this study identified Chinese immigrant parents lacked knowledge and skills of dental caries and caries prevention. Future study could expand interview questions to deeply cover whether each child has established a dental home, which promises to provide family-centered services including prevention of oral diseases, dietary counseling, and education about proper care of children’s teeth and gingival and so forth. Since parents in the current study held a number of expectations of dental professionals, future study could expand interview questions to cover parent-professional interaction, communication barriers within the parent-dentist conversation, and the types of dental information provided, and educational materials that parents need. As this study identified certain Chinese cultural and health beliefs that influenced parental oral-health care of their children, future study could expand interview questions to deeply cover these cultural concepts.

Study Limitations

Study results should be cautiously interpreted and may not generalize to other immigrant Chinese families from China, Hong Kong or Taiwan. Recruiting was based on both modified respondent-driven sampling and purposive sampling. This means that many participants came into the study from friends' referrals, especially participants living in the Chinatown area. Since most families are low-income families, future study should make efforts to recruit immigrant families with income greater than \$50,000 US dollars. In order to not over burden the interviewees, the researcher had limited time to elicit their elaborated responses to questions.

Clinical Implications

Oral health is essential to general health and has been considered as one of unmet needs of young children. Our study is one of few studies that have been conducted with Chinese immigrant families with children aged 0-6. There are five clinical recommendations that can be identified from current results: (1) Many parents in the current study show a lack of knowledge of early childhood caries and preventive oral at-home care. Health care providers from medical, nursing and dental fields should explicitly assess the oral-health knowledge of parents and children in different settings, and provide an individual guidance according to each family's needs. As suggestions from AAPD, topics could include oral hygiene (e.g., frequency of tooth brushing, methods of clean/tooth brushing/flossing for young children), dietary habits (e.g., breastfeeding/formula/bottle feeding, frequency consumption of sugary

snacks and drinks), nonnutritive oral habits (e.g., stop sucking habits by age three years or younger). In addition, health care providers could develop new educational materials specifically for Chinese immigrant families, such as an introduction of flossing concept, the way to deal with infants' behaviors of finger biting while brushing, stop of saliva-sharing activities like sharing foods, and the way to adapt the impact of mainstream cultural dietary;

(2) Since many Chinese parents do not actively participate in their children's oral hygiene practices due to the belief of oral-hygiene independence training, clinicians must emphasize it's parents' responsibilities to brush or to help their children brush at least twice a day and rethink new ways to engage the parents in children's oral health care as a daily routine.

Furthermore, addressing oral health is related to children's general health and well-being for a lifelong, as many parents are not familiar with impact of childhood caries. Clinicians could also demonstrate techniques of proper oral hygiene to parents and children according to their child's age, meanwhile teach them to look for any early signs of caries (e.g., white spots

lesions); (3) Although preventive dental care is necessary to maintain children's oral health, parents should be educated about the importance of oral-health care at home. For parents who indicate lack of parenting skills to control their child's snacking or tooth brushing behaviors, clinicians could discuss basic parenting skills with parents or refer them to parenting clinics.

At the end of each visit, the clinicians should determine and discuss with parents about the interval for periodic reevaluation; (4) Since parents have different expectations toward dental

professionals, clinicians could invite parents and children for treatment discussion or provide them sufficient time for questions, especially when treatments involve tooth extraction or the use of anesthesia. Professionals with comfort-child skills and patient characteristic will also be appreciated by the parents; and (5) Clinicians may encounter different families with diverse backgrounds, cultural beliefs, health beliefs and behaviors; therefore, it is very important to assess each family's health beliefs, practices, and needs. For instance, parents who hold a tooth worm belief, health care providers should respect the way parents recognize the cause or etiology of caries and use their cultural language to promote their children's oral health. For parents having a fatalism belief that childhood caries is caused by genes, clinicians should emphasize that dental caries is a multifactor and preventive disease. As some parents concern about children's face and school performance, clinicians could address that untreated caries may lead to problems in facial appearance, learning and school performance, social interactions and so forth. For parents holding the avoiding confrontation brief, clinicians could suggest that parents, grandparents and relatives need to maintain open communication about children's sweets control and mutually respect the differences between generations. If there is a cultural or language barrier, clinician could arrange a consultation with the medical anthropologist or medical interpreter. In short, an appreciation of parental cultural beliefs and oral-health practices is important to build a trust therapeutic relationship with diverse immigrant families in order to promote young children's oral health.

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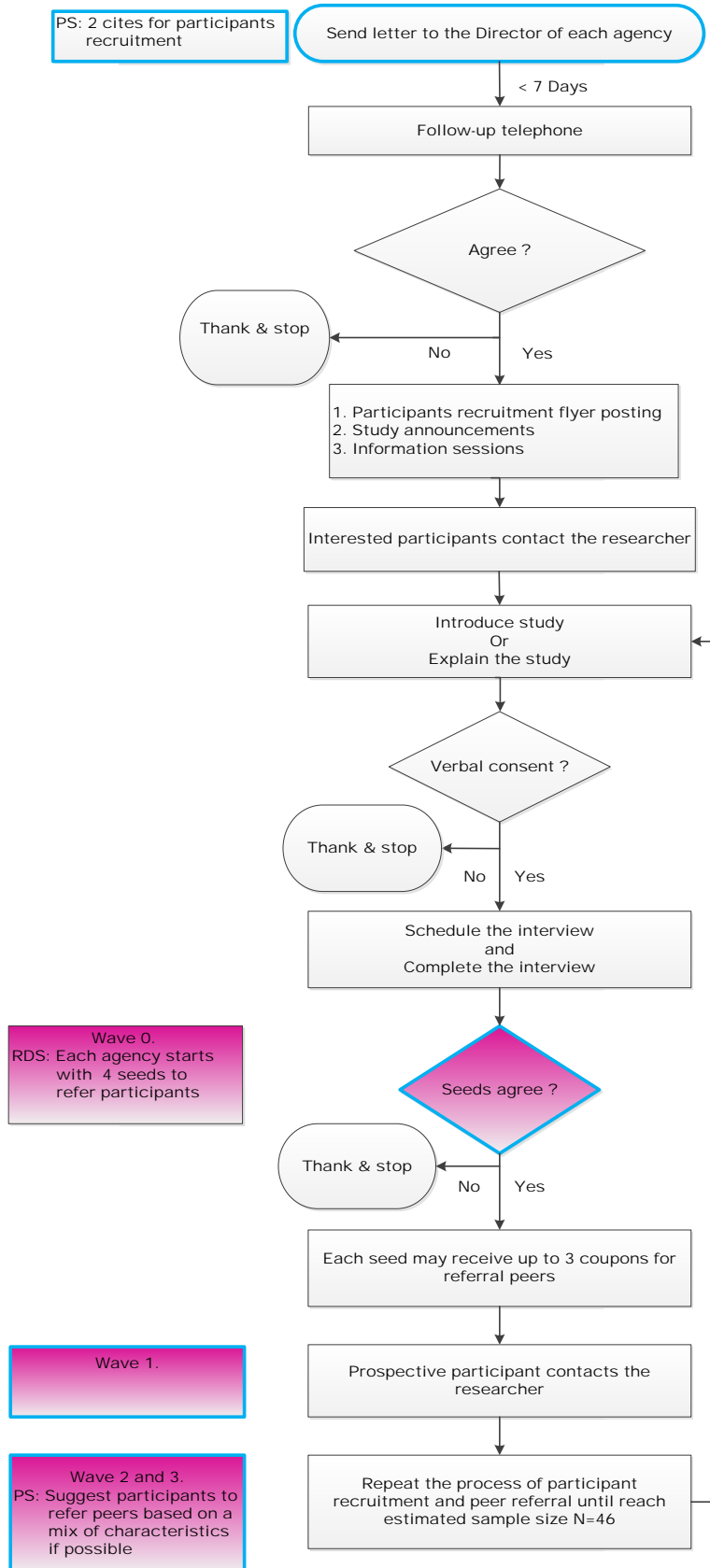
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Appendix A. Sampling Flow Chart: Respondent-Driven Sampling (RDS) and Purposive Sampling (PS)



Appendix B. Interview Guide for the Explanatory Model (Aim 1-5)

This model captures five major concepts: Etiology, onset of symptoms, pathophysiology, course of caries, treatment. Six questions were developed based on the original EM questions and modified questions from the EM of mental disorders used with Chinese Australians.

Introduction: I will ask you questions about your views about childhood caries. Please keep in mind when you answer the questions that we are asking about your child who is between aged 0 and 6 years, not just any of your children.

First, do any of your children between aged 0 and 6 years have dental caries?

If Yes, ask the following questions:	If No, ask the following questions:
1. What do you believe to be the causes of childhood caries? (<i>etiology</i>)	1. What do you believe to be the causes of childhood caries? (<i>etiology</i>)
2. When did you recognize the problem in your child? (<i>onset of symptoms</i>)	2. At what age do you think a child could start to have dental caries? (<i>onset of symptoms</i>)
3. How did you realize there may be a dental problem in your child? <i>Probe: For example, did your child experience pain; had difficulty in eating, speaking or sleeping that made you think there may be a problem in her /his teeth?</i>	3. What would you expect to observe when a child has dental caries? In other words, what signs would you expect to see in the child when he or she has dental caries? <i>Probe: For example, signs like experiencing pain, having difficulty in eating, speaking or sleeping.</i>
4. What do you think childhood caries does to your child? (<i>pathophysiology</i>) <i>Probe: How does it affect your child's body and health?</i>	4. What do you think childhood caries could do to a child? (<i>pathophysiology</i>) <i>Probe: How could it affect a child's body and health?</i>
5. How long do you think your child's dental caries will last and affect your child? (<i>course of caries</i>)	5. How long do you think childhood dental caries could last and affect a child? (<i>course of caries</i>)
6. What have you done to take care of your child's dental caries? (<i>treatment</i>) <i>Probe: IF they mention seeking professional help, ask what they expect to receive from the professional.</i>	6. What would you do to take care of childhood caries? (<i>treatment</i>) <i>Probe: IF they mention seeking professional help, ask what they expect to receive from the professional.</i>

Appendix C. Parental Oral Health Belief and Practices Questionnaire

CODE No :

--	--	--

Date : _____

Thank you for agreeing to participate in this study. We are interested in understanding oral health beliefs and behaviors of Chinese immigrant parents related to their child's oral health.

Your participation is completely voluntary. You are free to omit answering any questions. There will be no harmful consequences to you. All information given in this questionnaire will be kept confidential.

SECTION A: BASIC INFORMATION

The first part of this questionnaire is about general information of your child, you, and your family.

Child Information: Please note that we are asking only about your child **who is between 0 and 6 years old**, not any of your children. If you have two or more children aged 0-6 years, please refer to the one the researcher suggested when you arranged the interview appointment.

1. Age: _____
2. Gender: _0 Female _1 Male
3. Dental insurance:
_0 No
_1 Yes, what kind?
_(1) Have private dental insurance plan in the US (specify: _____)
_(2) Have public dental insurance plan in the US (specify: _____)
_(3) Other (specify: _____)
4. Birth place of your child:
_1 USA _2 China _3 Hong Kong _4 Taiwan _5 Other (specify: _____)
5. Check one answer that best describes the condition of your child's teeth?
_5 Excellent _4 Very good _3 Good _2 Fair _1 Poor _99 Do not have teeth yet

Your Information

1. Age: _____
2. Gender: _0 Female _1 Male
3. Do you currently have a paid job (or jobs): _0 No _1 Yes (describe your job or jobs: _____)
4. Years of formal education you have completed:
_____ year (including in your home country: _____years; in the US: _____years; in other countries: _____years)
5. Country that you originally come from: _1 China _2 Hong Kong _3 Taiwan
6. How many years have you lived in the US? _____years

7. Check one answer that best describes your ability to speak English:

- ₅ Excellent ₄ Very good ₃ Good ₂ Fair ₁ Poor

8. Check one answer that best describes the condition of your teeth?

- ₅ Excellent ₄ Very good ₃ Good ₂ Fair ₁ Poor

Family Information

1. Number of people living together in your household:

_____ (including aged 0-18 years: _____; aged 19 years and above: _____)

2. Relatives who live with you in the same household:

- No
- Your spouse (or partner)
- Your parents
- Your spouse's/partner's parents
- Your siblings
- Your spouse's/partner's siblings
- Your uncles or aunts
- Your spouse's/partner's uncles or aunts
- Others (specify: _____)

3. Relatives who live nearby you and your family, only limit to King County area:

- No
- Your spouse (or partner)
- Your parents
- Your spouse's/partner's parents
- Your siblings
- Your spouse's/partner's siblings
- Your uncles or aunts
- Your spouse's/partner's uncles or aunts
- Others (specify: _____)

4. Average household income in the last 12 months. Please include income from you, your spouse (or partner), and other individuals who are living with you and contributing to the total household income:

\$ _____

₉₈ Don't know

₁₀₁ I don't want to answer

Please take a moment to ensure that you have answered all the questions that you wish to answer.
Thank you very much for your help!!

Appendix D. Cross-Checked Coding: Unitized Data

Question 1: What do you believe to be the causes of childhood caries?

P 1: 我覺得吃糖吧，哎就是說吃那些糖啊，糖果啊！

I think taking sugars. Well, I mean eating sugars and candies!

P 1: 我鄰居小孩吃太多糖了，牙都爛了，黑黑的。

My neighbor's child took too many candies, and then the teeth were decayed and turning black color.

P 1: 甜食那一些，那些甜食吃得太多。

Taking sweets that kind of stuffs and taking too many sweets.

P 1: 主要是甜食了。

The majority is sugary food.

P 1: 甜食容易黏牙，很多會造成爛牙的。

Sweets are easily stuck on the teeth and lead to bad teeth.

P 1: 妳吃了糖之後沒有清潔衛生牙齒會生牙蟲。

If you do not clean your teeth after taking candies, latter on you will have "tooth worms".

P 1: 我們那邊的人都這樣說，牙裡面有蟲。好像我們那裡有的人就說，就是吃糖多了就會爛牙齒，被蟲吃了，我們那邊有人這麼說。

We say "there are worms in the teeth". It seems like people in our area saying "because you eat too many candies, your teeth were be eaten by the worms". People in our area said that.

P 1: 但是細菌的話譬如說妳吃水果時不洗手，手髒了沒洗吃下去細菌，像是一般人說的"病從口入"，這樣子。

For example, if you do not wash your hands before taking fruits, you will eat the bacteria.

Just like what we say "diseases come from the mouth".

P 1: 還有一點就是說欸，刷牙了。就是說擦牙...口腔...因為我可能剛從大陸那邊過來，一般我們那邊就是說刷牙好像沒有說這邊呢，用...美國這樣用牙線什麼的。還...還沒有這種概念！

Another cause is brushing teeth. I'm saying tooth brushing...[brush] the mouth... I just came to here from China, and people in my area usually do not floss their teeth like Americans. We don't have such [flossing] concept yet.

P 1: 我覺得可能...因為你...吃零食吃得太多，經常吃零食，因為你沒有說天天...就是說去刷牙。

I think maybe...you...eat too much sweet snacks or eating snack frequently, and you don't brush teeth...every day.

P 2: 吃那個糖呀，太甜的東西。

Taking candies or something is too sweet.

P 2: 太甜的東西，喝那個飲料呀之類就會引起那個蛀牙。

Taking something too sweet, like drinking soft drinks. It will result in dental caries.

P 2: 他如果吃那個甜的，有時候晚上又不刷牙呀，早上又不刷牙呀，什麼都不刷，那個牙齒當然會壞掉了。

If he takes those sweets and sometimes he does not brush his teeth at all during nighttime and daytime. His teeth will definitely be bad.

P 3: 就好像吃些甜的東西啊！糖果啊之類的甜的東西啊！會對小孩蛀牙。

Just like taking sweet stuffs or candies that kind of sweet stuffs. They will cause childhood caries.

P 3: 老大那時候就是吃糖太多所以蛀牙，第二這個就沒有。

My older child ate too many candies at that time so he had caries. But, my second child does

not have caries.

P 3: 好像含住奶瓶啊！當然會蛀牙啊...吸奶瓶太多啊！

It's like sucking on the feeding bottle. Surely, you will have caries...if sucking on the bottle for a long time.

P 3: 沒有刷牙！

[The child] does not brush tooth.

P 3: 不跟她刷牙都有可能會造成蛀牙囉。

Not brushing her teeth might lead to caries.

P 4: 就是吃糖太多啦！

Taking too many candies!

P 4: 沒有刷牙！

[The child] does not brush tooth.

P 4: 睡覺沒有刷牙瞞。

[The child] does not brush tooth before going to bed.

P 4: 因為我第二個那時候就是咬手指嘛！但第三、第四、這、三個都沒有！他們不咬。

My second had caries because she was biting her fingers at that time! But, my third one, fourth one, and this one did have caries because they didn't bite their fingers.

P 4: 第二個就是...我懷疑就是她咬手指蛀牙，就是我第五個...第...不是第三個、第四個都沒有！沒有咬手指的嘛！她就是這裡這裡，我知道我就說啦！妳就是咬手指就蛀牙啦！醫師啊！有可能、有可能啊！

My second child was...I suspected she bit her fingers and led to caries. My first one didn't do that. No...both my third and fifth children didn't do that. They didn't bite their fingers. So, I told to the dentist about this. And the dentist said it was possible...possible to have caries.

P 5: 就是我不想給他吃太多甜的東西呀。

I do not want to give him too many sweets.

P 5: 不要整天給他們吃黏會甜的東西啊，特別留意一點呀。

Do not give them something sticking and sweet all day long. You have to be caution about it.

P 5: 還有每次吃完甜食給他刷牙，每天給他刷很多幾次牙。

Also, I have to brush his teeth each time after having sweets. I Brush his teeth many times per day.

P 6: 例如喝那個果汁。

Such as drinking juice.

P 6: 那個糖。

Candies.

P 6: 好像是甜的他都吃完東西，就沒有那個喝水啊！

It seems like he ate sweets, and he did not drink water after eating something!

P 6: 那個糖，喝果汁，喝完以後勒，就沒有喝水。

Candies and juice. Did not drink water after drinking juice.

P 6: 沒有刷牙。

Without brushing teeth.

P 6: 只有刷牙，沒有用牙線。

Only brush the teeth, and do not use floss.

P 7: 吃很多甜食、餅乾。

Taking too many desserts and cookies.

P 7: 其實喝母乳也很容易，蠻容易會蛀牙的，這是主要有糖的成份在裡面。

Actually, taking breast milk also easily results in caries. It is mainly because there is sugar in

the milk.

P 7: 沒有刷牙。

Do not brush tooth.

P 7: 沒有使用牙線，我覺得...用牙線，沒有用牙線也蠻容易蛀牙。

Do not use floss...I think...using floss, Not flossing easily leads to caries.

P 7: 我可能不知道耶，跟遺傳有關係嗎？

I do not know. Is it associated with inheritance?

P 8: 吃甜食。

Having sweets.

P 8: 你吃甜食之後就是沒有馬上清潔，可能就間隔太久。

After taking sweets, you do not immediately clean your teeth.

P 8: 清潔的方式...我覺得，我覺得也是有，可是我覺得好像...就是啊，maybe我們也沒做到perfect。

I think...the method of cleaning. I think maybe it is. I think maybe we do not do it perfectly, either.

P 8: 沒有刷得仔細啊，刷牙的時間不夠長啊！

Do not brush it thoroughly and do not brush tooth long enough.

P 8: 因為沒有floss呀！

Because do not floss!

P 8: 好像跟父母本身的，就是說牙齒也有關係，所以好像如果說父母親，就是家族的成員容易蛀牙，好像小孩子感覺容易蛀牙，我的感覺是這樣子的。

It seems relate to parents themselves. I'm saying it is related to teeth. I feel that if parents or family members have caries, it seems that children will easily have caries, too.

P 8: 因為我就聽過那種說法就是說，欸！父母親牙齒很好啊，就是他平常沒有怎麼樣好好看牙齒（笑聲），也是基本上不怎麼蛀牙（笑聲）所以我就有那種impression就是說，欸！這孩子跟遺傳有點關係。

I know that statement. Well, if the parents have good teeth even though they do not take good care of their teeth (laugh), their child will not have caries. Therefore, I have that impression.

Well, this is related to inheritance.

P 8: 我覺得...我跟我先生的牙齒都沒有特別好，所以我覺得就是我們家小朋友也比較容易蛀牙。

In my opinion, my husband and I do not have good teeth so our children would easily have caries.

P 9: 可能他比較喜歡吃糖啊！

Maybe he likes candies!

P 9: 還有喝...喝奶啊。他三歲、兩歲的...兩歲的時候就是，睡覺到半夜，他說：「起床！我要喝奶。」我覺得可能是半夜起床喝奶，可能對那個...牙齒沒那麼好。

And drinking milk. When he was two or three years old, he woke up in the midnight and asked for milk. He said "Get up, I want milk". I think it was due to drinking milk in the midnight. Maybe that is not good to the teeth.

P 9: 他每天晚上都要喝奶的，可能對牙齒沒那麼好，我不知道是不是這樣。他習慣了，都是一直這樣。

He asks for milk every night which may not be good to his teeth. I am not sure if this is the reason. However, he used to it. Always like that.

P 9: 可能喝了奶以後，又沒有用水沖一口，他說...：「我不要刷牙...刷牙!嗯...我...我要睡覺了」。

Maybe after drinking milk, he did not clean his mouth with water. He said "I do not want

to... brush my teeth and I...I want to sleep”.

P9: 還有他不知道他用這個手指...用...現在還這樣的，他改不了，有咬著那個，吸那個...手指頭才睡覺的，每天晚上都...是這樣。

And he still has the habit to bite his fingers every night when he is sleeping.

P9: 我...我也覺得那個牙齒，跟那個遺傳有...有影響，牙齒...。

I think the teeth's condition is related to inheritance too...the teeth...

P9: 就是爸爸媽媽的牙啊，好不好啊，應該有...會有...會不會有影響？遺傳的牙齒，會不會遺傳啊？什麼的，跟著爸爸媽媽的，應該會是吧？

Whether parents' teeth are good or not good, it might affect...or might not affect? Is it related to inheritance? I think so, it that right?

P10: 我覺得就是吃那些sugar比較多的，像candy啊，巧克力啊！

I think taking too many sweets, such as candies, chocolate.

P10: 要吃糖也不能吃太多（笑聲）。

You cannot take too much sugar (laugh).

P10: 然後甚至喝牛奶什麼以後...

Even drinking milk or something else, then...[it can cause tooth decay].

P10: 也不是說人家不能吃糖，吃糖可以，吃了糖一般就得刷牙。

It does not forbid taking sweets. Of course you can eat sweets. However, after that, you have to brush your teeth.

P10: 不刷牙，有些是睡覺之前，嗯...把牙刷乾淨。

Someone does not brush his/her teeth before going to bed. Um...you have to brush your teeth cleanly.

P10: 尤其是睡前！如果說晚上睡覺之前，那就...要刷得比較徹底。因為...因為那個牙齒，如果太髒的話，痾...人家睡覺嘴巴閉上的，沒有空氣，那個細菌繁殖得比較多，比較快嘛。

Especially before sleeping, if you are going to bed, you should brush your teeth thoroughly. It is because... if your mouth is too dirty...and you close your mouth during sleep, there is no air in your mouth and then the bacteria will be growing faster.

P10: 太髒就是說很多糖，或者是像那些牛奶，這些容易...容易...痾...植成細菌的東西。

Too dirty means too much sugar or something like milk. Those stuffs will make bacteria easier.

P10: 細菌它可以...它繁殖很快嘛，它可以...（笑聲），蛀牙應該都是由細菌引起的嘛。

Bacteria...it can...it can grow very fast. It can...(laugh). Caries should be caused by bacteria.

P10: 他們說得比較通俗，因為在中國那時候語言講細菌的嘛，肯定聽不懂（笑聲）。

People state it in the common statement. It is because in the old days in China, people will certainly not understand if you mention it [worm] as bacteria (laugh).

P10: 蛀牙也是細菌什麼的，是吧？不可能有蟲子在裡面（笑聲）。

Caries is kind of bacteria, right? It is impossible to have worms inside the mouth (laugh).

P10: 我覺得就是刷牙，最重要的。

I think brushing the teeth is most important.

P10: 或者刷牙不是很正確（笑聲）。

Or incorrectly brush the teeth (laugh).

P11: 就吃糖啊！就是糖分很多嘛...含糖...含糖量很高嘛！

That is taking candies. Those candies have much sugar inside!

P11: 喝果汁啊！

Drinking juice!

P11: 我想可能這就是因為他跟我...跟我那朋友的孩子的區別嘛。他就，他跟我啊，我

孩子就差四天，他就很喜歡喝果汁，然後所以我在我的印象當中就是，他果汁喝太多了所以就蛀牙（笑聲）。

I think this is the difference between him and my friend's child. The age difference of these two children is 4 days. My friend's child likes juice. I can recall that he drank too much juice so he had caries (laugh).

P11: 而且因為他就是比如說，在車上嘛，在車上他就喜歡就是有那個杯，一杯的...（跟小孩說話）就是在車上就會有拿果汁給他喝嘛，然後他喝了，然後就一直這樣子，這樣子含著，我想可能所以他的牙齒就很容易蛀牙。

For example, when he drives his car, he likes to let his child having a juice cup to drink. A bottle...(talking to the child sound). His child always sucks on the cup. I think this is why he has caries easily.

P11: 不刷牙啊...就會蛀牙嘛。

Without brushing tooth ...It will lead to caries.

P11: 就好像有的老人照顧小孩的，就是吃東西啊，就大人吃一口，小孩子吃一口，這樣子就會傳染嘛。

For example, when some elders take care of their grandchildren, I mean eating food together. They will take a bite of the food, and then also feed the child. Let the child take a bite too. Then, the child will be infected.

P11: 別說是傳染牙病了，如果要是生病的話，那也是會傳染啊，對吧！

The child will not only have dental diseases but also illness. Is it right?

P12: 應該是吃糖。

It should be taking candies.

P12: 吃糖太多。

Taking too many candies.

P12: 跟不刷牙嘛。

And not brushing tooth.

P12: 我們中文就是說...你為什麼牙齒壞掉啦？就是吃糖太多啦！老一輩這麼說，呵呵。

The Chinese elders always say that "Why your teeth are bad? That is because you have too many candies", ha ha.

P12: 應該吃甜的東西多一點嘛，甜的。

It should be taking sweets a little bit more, something sweet.

P12: 你知道美國很多東西都是甜的。

You know many kinds of foods in the America are sweet.

P12: 以甜為主嘛，很多東西就是我女兒就是說too much sugar每一個...每一個商店買的東西就是，甜，好像那個多拿啊，麵包都甜的，她就是這樣給我們說。

Sweets are the majority. My daughter often says too much sugar in every kind of foods...every kind. Everything sale in the store is sweet stuff, such as donut and bread. She told us that.

P12: 所以...那個東西塞在那個牙齒裡面，就會蛀牙啦。

So...if something is stuck inside your teeth, then you will have caries.

P12: 如果不刷牙齒的話，就會，慢慢就會...那個牙齒就變壞了。

If you do not brush your teeth, and then...your teeth will be bad gradually.

P12: 久了你就會...聞到一個不好的味道，應該是這樣，這個原因引起的吧？不好的味道，如果你不洗掉它，它就藏在裡面很久啦，可能就是...好像那個污水啊...那個蟲啊...就會成長。

You can smell a bad odor after a period of time. It should be this way. I think it is the reason? A bad odor. If you do not wash it out, it [sweets] will stay inside for a long time. Just like the

dirty water, and the worms will grow up there.

P12: 我說小弟弟，你得自己學會刷牙齒啦，那個蟲就不跑出來啦。

I told my son that “you have to learn how to brush tooth, then the worms will not coming out from your teeth”.

P12: 應該有遺傳的吧！他們是有遺傳的，那個牙齒不好是...上一代留下來的。蛀牙也會遺傳，那個牙齒不好也是會遺傳。

It should be associated with inheritance. They do have inheritance. The bad teeth come from last generation. Caries can pass to next generation too.

P12:好像有的人就是說，噢～你的小孩那個牙齒不太好啊，是不是像爸爸啊，還是像媽媽一樣的。

It seems like someone would say “Oh, your child’s teeth looks not good. Is it just like his father or mother?”.

P12: 現在還沒有看到蛀牙，因為他的牙齒出來不是太久。

I have not seen any caries so far. It is because he just has his teeth recently.

Question 2: When did you recognize the problem in your child? At what age do you think a child could start to have dental caries?

P 1: 可能會有蛀牙應該一歲多兩歲已經有蛀牙了。

Children may have caries when they are one or two years old.

P 1: 我個人...因為我可能就是說以前在家有的時候看一些小孩可能吃的糖啊、餅乾那些東西比較多咧。一兩歲已經有蛀牙了。

From my personal experience...When I was in my hometown, I saw some children having too many candies or cookies. These children had caries when they were one or two years old.

P 2: 兩到三歲這段時間。

Between age two to three this period of time.

P 2: 如果到兩到三歲，他自己會去拿那個東西來吃，就不知道了嘛，因為他太小現在就不會去拿嘛。

When he is two or three years old, he can get those sweets by himself. Now, he is too young to get it.

P 2: 吃的多，他喜歡那個糖呀。

He takes a lot of candies. He likes candies.

P 3: 蛀牙都是從三歲開始吧。

Children always have caries since 3 years old.

P 3: 因為我大的是三歲開始蛀牙啦！

My elder child had caries at 3 years old!

P 4: 幾歲都有！

It could be happened at any age!

P 4: 但是這看妳有沒有幫他...幫他刷牙了。

However, it depends on whether you brush or not brush his teeth.

P 4: 六歲，六歲，就是六歲。

Six years old. Six, it is 6.

P 4: 我第二個女兒就是六歲，那一年是有一點在這裡，這裡一點，門牙有一點！去洗牙，她醫生：有一點蛀牙啦！後來補...補...補好！補好之後勒~現在換了，換牙了！

My second daughter had caries at 6 years old. When we took her to visit the dentist for tooth cleaning, her doctor pointed out there was caries a bit on the front tooth. Then, he filled the tooth.

P 5: 那個時間我也不肯定呀。因為看，可能看就好像大人一樣，就好像看你幫他清潔

那個衛生搞得怎麼樣吧！如果你不太理，清潔的不太好，可能會蛀得早一點。

I was not sure at the time point. Well, it depends on how the caregivers clean their oral hygiene. If they do not care about it or not clean it well, then caries may be happened earlier.

P 5: 好像我留意有的朋友他們說，他們的牙出完以後，現在他的牙齒都，剛剛都完全出齊了。或者一年以後或者還是半年以後。

I know that some friends said that their children had caries after one year or a half year when their children had all the teeth.

P 5: 誰知道是他吃糖以後黏在裡面啊，就有那個蛀牙了，對不對？所以我就覺得盡量就幫他那個，搞那個，口腔衛生好一點可能會遲一點吧。

You may not know whether candies are stuck in the teeth and then children will have caries, right? So, I think I should clean his teeth as many times as possible. Having better oral health may delay caries happening.

P 6: 一年前了，他三歲十一多個月。

One year ago, he was 3 years and 11 months old.

P 6: 他去那個..這牙齒檢查半年檢查一次了嘛，他檢查出來就發現他牙齒蛀牙了。

He visited...the dentist every half a year. He was found to have caries after the examination.

P 7: 所以大概一歲以後應該就很容易蛀牙。

Probably after 1 year old, children may have caries easily.

P 7: 可能開始吃副食品就有可能會蛀牙。有吃到甜，跟甜有關係的。

It may be associated with initiated baby food. They may have something sweet. It is related to sweet.

P 8: 應該是四歲半吧。

It should be 4.5 years old.

P 8: Wilson第一次發現。

It was the first found for Wilson.

P 9: 應該是...他五歲。

Probably... he was 5 years old.

P10: 四歲多吧。

Probably more than 4 years old.

P10: 四歲多，因為小孩可能接觸到糖類比較多。

More than 4 years old. It is because children may have sugars more frequently.

P10: 我看到小孩就是說好像吃，四歲多有的就...就開始了...就開始要有蛀牙了。

I know that because of eating habit, some children have caries when they are four years old.

P10: 2到3歲的小孩開始接觸糖類及各種食物嘛!那蛀牙也需要一點時間，所以可能到4歲就會發生蛀牙。

Children begin to have sugars and all kinds of foods when they are two or three years old.

Well because it takes time to develop caries, hence caries may be happened at age 4.

P10: 那個時候[四歲]可能刷牙比較少...有的小孩比較...抗...抗拒。然後我自己好像，看到那些小孩蛀牙得也比較多（笑聲）。

At age 4, maybe brushing less often...Some children tend...to refuse...tooth brushing. I saw those children having caries easily (laugh).

P11: 我朋友的孩子就三歲還是兩歲就開始蛀牙了（笑聲）。

My friend's children had caries when they were 2 or 3 years old (laugh).

P12: 應該是三歲左右吧。

It should be around 3-year-old.

P12: 我的小孩之中，我就知道三歲，三歲時看牙醫的時候他們就說有一點點，不是太多。

I know my children had caries when they were 3 years old. At that time, the dentists pointed out caries a bit. But, there were not too many.

Question 3: How did you realize there may be a dental problem in your child?

What would you expect to observe when a child has dental caries? In other words, what signs would you expect to see in the child when he or she has dental caries?

P 1: 一般有的會是牙痛呀，牙痛比較多一點（小孩聲音）。

Children usually would have toothaches, more toothache (child sounds).

P 1: 好像自己...自己有這個經歷吧。就是說有時候會牙痛...在...這個就是我自己的經歷吧。（笑聲）

Just like my experience. Sometimes I have toothaches...in...my mouth. This is my own experience (laugh).

P 1: 有的已經我看那個牙齒滿口已經變的是黑色，看不到白色的牙齒了，都是那些黑色被蟲蛀過變成黑色的。那牙齒已經被那個蟲蛀了。就是黑色的那個...上邊一點點。I saw some children having all the teeth black color. I cannot find a white tooth. Those black teeth were bitten by “worms”. Just like the black spot on the top of the tooth.

P 2: 我小孩就...那個大的沒看到他蛀牙，那時候他的牙齒我看不出來，他要去醫院照照那個鏡來看才看得到。

My child...I did not see my elder son having any signs of caries at that time. I will not be able to see it until he took the X-ray in the hospital.

P 2: 又不會說牙疼呀，什麼疼呀，他都不覺得這些。

He didn't say any pains, any kinds of pains. He did not feel those pains.

P 2: 牙疼呀。

Toothaches.

P 2: [牙齦]又腫呀。

[Gum] swelling.

P 2: [牙齦]又發紅呀。

And [gum] redness.

P 2: 他蛀牙時，也會呀，因為他疼呀，就說話的時候。

When he has caries, he could feel pain while talking.

P 2: 有的小孩子的牙齒，蛀牙就黑色的，或者有一點白色的。

Some children have caries, and caries makes the teeth black, or a little bit white.

P 3: 他的牙齒會有黑點啊，蛀牙的啊!會出現黑點啊。

His teeth will have black spots caused by caries. Caries will have black spots.

P 3: 為什麼有一點黑黑在牙裡面，我還以為是吃東西阿，沾了黑黑的東西，我拿那個牙簽去撩，噢，原來有個洞啊。

I do not know why there is a black spot inside the tooth. I thought it was food stuck on the tooth. Therefore, I tried to use a toothpick to remove it. And then I found there was a hole.

P 3: 黑到程度太深的話，它會痛啊。哭鬧啊...這些之類的事。

If it is too deep, it hurts a lot. Children will be crying and be irritated...that sore of things will happen.

P 3: 痛會影響到他好像不想吃東西啊。

Pain will affect him, so it seems reduce his appetite.

P 3: 他口腔會講話阿，會那個嘴呀會發出來臭味啊。

When he talks, I can smell the bad odor from his mouth.

P 4: 她蛀牙那個時間我沒有，我沒有看見。

I did not see anything signs when she had caries.

P 4: 就是去檢查醫生發現，醫生說她有蛀牙！就是一點白白，一點！

The dentist said she had caries when she went for routine examination. There were a little white spots, a little bit spots.

P 4: 牙痛嘍！我看到我的朋友的牙，蛀得很深就說牙痛！

Toothache! I saw my friend suffering lots of pain, when the caries led to a deeper hold on his teeth.

P 4: 發燒啊！就是我聽我的朋友，她說她的女兒，十幾個牙蛀了。

Fever! My friend told me that her daughter had fever when she has ten decayed teeth.

P 5: 就好像醫生叫我們留意牙齒裡面有沒有黑色的那個...顏色在裡面啊。他說如果就牙齒周圍，或是邊啊，或者牙齒裡面如果有發現有什麼黑色的又刷不掉的，可能就是蛀牙的開始啦。

The doctor asks us to pay attention to any black spots on the teeth. He said if black spots are around the teeth or inside the teeth and you cannot clean them, then it should be caries.

P 6: 沒有[症狀]。

No [symptoms].

P 6: 去看牙醫。這牙齒檢查半年檢查一次了嘛，他檢查出來就發現他牙齒蛀牙了。

He visited the dentist. He found he had caries during the every six-month examination.

P 7: 蛀牙，看程度吧。

Dental caries. It depends on its condition.

P 7: 你可以看到顏色不一樣啊。黑色... (停頓一下) 應該是這樣吧!

You can see the color different. Black color... (pause). I thought so!

P 7: 剛開始蛀牙的時候，小孩子可能不會講，不會覺得痛。可是，如果真的是蛀牙很嚴重的話，可能就會說牙齒痛。

At the beginning of having caries, the child may not complain any pain, may not feel the pain. However, if it is very severe, children may complain of toothache.

P 7: 可能平常不會吧！如果很嚴重的話才會說話、睡覺、吃東西有困難。

Probably not! If it is severe, it can lead to difficulty in talking, sleeping, and eating.

P 8: 就是檢查的時候啊。

Caries was found during the dental examination.

P 8: 就是有些很minor，你不見得看得出來嘛。就是你表面上看不出來說是，一個，蛀了一個黑的洞啊！（笑聲）但是它X-ray檢查就是說，肯定這個地方有些蛀牙。

Some caries are very "minor". You may not find it. You may not see there is a black hole on the surface of the tooth (laugh). But, X-ray examination confirms caries. It shows there are certain places with caries.

P 9: 不是我發現的，因為...他沒說疼啊。

I did not notice it [caries] because he did not complain any pain.

P 9: 去到醫院檢查，半年一次檢查嘛，現在小孩嘛都是，他說照的...照那個...牙齒的照片，他說：「妳這個牙齒...小孩牙齒有點黑，要拔掉嗎？」他這樣說。

We went to the hospital for the examination, the one every half a year for every child. The dentist took the picture of the teeth, and he said "your child has some black spots on the tooth. Do you want to extract the tooth?" He said so.

P 10: 像變黑啊，那些都是不對的，變顏色。

It's like turning into black color. Those colors are not right, changing color.

P 10: 有的牙齒變薄。

Some teeth become thinner.

P 10: 甚至有的是鋸齒型。

Even some teeth become saw tooth type.

P11: 應該會看得到有那個黑點啊，之類的吧！在牙齒上面吧。

You should find the black spots. Something looks like that on the teeth.

P11: 應該會痛吧（笑聲）！

It should be painful (laugh)!

P12: 看他那個牙根啊...紅紅的啊...應該是開始是這樣吧！

Look at his tooth root. Redness...Caries should be starting like that!

P12: 有時候去...去看那個醫生，那個...因為小孩...半年就可以要看那個牙醫嘛，他幫小孩看牙齒的時候他就說...有時候我們都不知道那個牙齒蛀牙啦，但是，他是一點點他就看出來了。

Sometimes we have to visit a dentist because children have to visit the dentist every half a year for checkups. The dentist will find caries. Sometimes we cannot tell there is caries, but the dentist can easily recognize the caries even just a little bit.

P12: 哭啦，可能是痛引起哭啦！

Crying, and maybe it was caused by pain!

P12: 不想吃東西啦！

Do not want to take food.

P12: 那個牙齒裡面有一點白白的，好像是...那個顏色也不一樣、白白的。

There were a little bit white spots on the teeth. It seems like different colors, white color.

Question 4: What do you think childhood caries affect your child's mouth and body?

P 1: 在吃東西沒辦法吃。

Unable to eat.

P 1: 拒絕吃東西，吃東西吃...吃不到咧，他最主要就是那個好像就是吃肉要用牙齒。

Refuse to eat and cannot eat. It is because he has to use his teeth while eating means.

P 1: 在吃東西沒辦法吃，欸...吃東西吃不了呀。

Unable to eat stuffs, um...cannot eat any more.

P 1: 他如果是吃不到就身體吸收不了這個營養吧。可能...因為他牙齒沒辦法咬嘛。哎就是說營養就會吸收的少一點。

If he cannot eat anything, his body cannot absorb nutrition. Maybe... Because he cannot use his teeth to bite, then he will take less nutrition into his body.

P 1: 因為他痛呀痛得厲害吃東西吃不了，可能會整天地哭呀鬧這樣。

Because of severe pain, he cannot eat anything and maybe cry and be irritated all day long.

P 1: 美觀...沒那麼...沒那麼漂亮呀。

Beauty ... well...not that pretty.

P 1: 就是說到了美國這邊來，就是說聽醫生才這樣說。以前我們在大陸沒有這種意識，不會說...欸現在換了現在牙齒...變...就被蟲吃了欸怎麼樣，再換過一批新的牙齒出來會很漂亮，不會說影響。

I am saying since I come to U.S., I heard dentists say so. We don't have this sense in China. Usually people in China believe that even the teeth were eaten by the worms, we still can have a new set of pretty teeth. The new teeth won't be affected by caries.

P 1: 到了美國這邊來了，就覺得他們說現在乳牙會影響以後成人齒。

Since I come to America, I agree people say caries will affect baby teeth. And, decayed baby teeth will affect adult teeth.

P 2: 他牙齒蛀牙，有時候牙疼什麼之類的。

He has caries and sometimes complains about toothache sore of things.

P 2: 他就在那裡哭，是吧！

He will be crying, right!

P 2: 好像...那個口、舌頭呀起那個泡泡呀什麼之類的。

Probably... you will have blisters in your mouth and tongue.

P 2: 吃一下又說疼呀什麼之類的，他就不想吃東西。

When he eats, he will complain of pain and sore of things. Then, he does not want to eat.

P 2: 你就吃不了東西。

You cannot eat anything.

P 2: 影響他那個身體的發育。

This will affect his body development.

P 2: 他的大腦發育了。

[Caries] can affect his brain development.

P 2: 因為妳看，他牙疼，好像你學什麼，他都聽不到。好像你每個部位疼你都想不到什麼東西是吧，好像你都沒心情那樣。到時候你叫他學什麼，他都沒心機（笑聲）。

You see, when he has toothache, he cannot learn anything. Just like when you feel pain over the whole body, you cannot think and you will have bad mood. So when he has toothache, he cannot learn anything even though you ask him to learn.

P 3: 他口腔會講話啊，會那個嘴呀會發出來臭味啊之類的，細菌就會帶到身體裡面，會影響他的成長。

When he talks, you can smell the bad odor coming from the mouth. Then, bacteria will enter into his body and affect his growth.

P 3: 我就是害怕他就是那個牙齒啊，會影響到細菌他就吃到肚子啦，會給他身體各方面會造成影響。

I am afraid that his teeth! He swallows the bacteria into his belly, and then affects every aspect of his body.

P 4: 痛得很深，有一個就是我的女兒，三歲就有12個牙蛀啊！12個！

It hurts a lot when the caries gets deeper the teeth. I have a daughter, and she had 12 decayed teeth when she was 3-year-old! 12 decayed teeth!

P 4: 她嘴唇...她牙，就知道，有一點，有一點不...不好像跟平時不一樣。

Her lips ... her teeth... felt something different, a little bit different, she said felt different compared to before.

P 4: 她吃東西，吃東西就鑿在裡面啦！有的東西鑿進去牙的裡面。

When she eats, food will be stuck in the teeth. Something will be stuck into the teeth.

P 4: 就是鑿進去啊！她...她又不、不、不整理，就是有...一股...鑿的味道啊！

Stuck in the teeth! If she does not clean it, there will be a...stuck like...odor!

P 4: 毒跑到裡面就是不好的嘛！跑到腸胃裡面不好啦！

The "poison" will enter your body and to your gastrointestinal tract. It will be bad!

P 4: 蛀牙就是對身體造成影響的有，我聽醫生說她，就是不衛生啦！就是西款吃下毒，裡面就是不好，這個口空上面裡面的西款啊！

Yes, caries can cause influences on the body. I heard doctor said that...it was due to poor oral hygiene. That is if you swallow the bacteria and poison, it is not good to have bacteria in your body. There are bacteria in the mouth!

P 5: 他現在如果保護的不好，可能兩歲或三歲以後牙齒就壞了，那就整天看醫生，看牙醫呀，把那個蛀牙去除掉呀。

If he does not protect them now, maybe he will have bad teeth at 2 or 3 years old. Then he has to visit a dentist all day in order to remove the caries.

P 5: 因為還有哭牙呀。

Crying because the toothache.

P 5: 他也會有牙齦流血啊。

Also he will have gum bleeding.

P 5: [流牙血]然後可能又會影響到身體裡面啊！跟他健康上都有很大的問題。

Then it [gum bleeding] may affect his body! And, he will have a big healthy problem.

P 5: 當我自己去看牙醫的時候呢，因為他說，如果你把牙齒保護的好一點啊，多用牙線呀，還，還是半年洗一次牙呀，會保潔你看上去年輕一點。

When I visited a dentist, he told me that “if you can protect your teeth better, use more dental floss, wash your teeth every half a year, and then you can look younger”.

P 5: 因為可能會對血液的問題吧，所以我也覺得小孩可能口腔健康一點啊，可能對他那個發育會好一點，沒有細菌在身體裡面吧，我就這樣覺得。

It may lead to “blood problem”. Therefore, I feel that if a child can have better oral health, then it will be good to his development, and there will be no bacteria in his body. I think so.

P 5: 我覺得如果牙齒弄得不夠好，第一期牙齒弄得不夠好，肯定會影響第二期牙齒的發育吧？

I think if the first stage teeth are not good, it must affect the development of second stage teeth, right?

P 5: 六七年以後他會換牙呀，幾年以後長牙齒出來，那個牙齒會長得不漂亮對不對？

He will change teeth 6 or 7 years later. A few years later, when his teeth are grown up, they will be not pretty, right?

P 6: 蛀牙以後那個口腔啊，好容易就是口臭。

When you have caries, you will easily have bad odor from the mouth.

P 6: 口腔那個裡面那發炎。

There are inflammations inside the mouth.

P 6: 口腔裡面有那個泡泡。

There are blisters in the oral cavity.

P 6: 這個我就不太清楚身體的影響。

I am not sure about effects on the body.

P 7: 當家長看到小朋友蛀牙，你可能就會要求他們要多刷牙啊（笑聲）或者是禁止他們吃這些東西啊！所以他們就心情不好。

When parents know children have caries, they will ask their children to brush their teeth more frequently (laugh) or forbid them to eat something! So their children will have bad mood.

P 7: 牙痛。

Toothache.

P 7: 你就沒辦法吃很多種東西嘛。

You cannot eat many kinds of foods.

P 7: 可能咬合方面吧，可能就不能咬得密合。

Maybe have malocclusion problem. You cannot close teeth tightly.

P 7: 他們可能就要麻醉啊，什麼的。

They may need anesthesia, something like that.

P 7: 如果是很嚴重的話，你就要常常去看醫生呀，看牙科，可能小孩子會恐懼吧。

If it is very severe, you have to visit a dentist frequently. See a dentist and maybe the child will have dental fear.

P 7: 可能要到他懂事，不需要我陪著去看牙醫吧（笑聲）。就是他可以自己跟醫生溝通、可以自己乖乖地坐在診療椅上。可能也要...差不多也是九歲、十歲。

Probably I have to go to the dentist clinic with him until he is old enough (laugh). That is he can communicate with the doctor and sit on the chair. At that time, he should be about 9 or 10 years old.

P 7: 你蛀牙很嚴重的話，你可能牙齒就要拔掉還是什麼的，而且蛀牙對小朋友來講要

治療。

If you have very severe problems of caries, dentist may remove your teeth and sore of things. Also, for children, it is necessary to treat their caries.

P 7: 或者是做假牙，可能應該都會有影響吧。

Or have artificial tooth. It should have some impacts.

P 7: 我比較不曉得欸...看蛀牙...我覺得可能要看蛀牙的嚴重程度吧。

I do not know...about caries... I think it depends on its severity.

P 7: 呃...不曉得[蛀牙會造成什麼身體或其他部位的影響]。

Uhm. I do not know [caries' impacts on the body or other parts of body].

P 8: 可能就間隔太久，那...就是會有酸性的物質就在牙齒上面，就容易蛀牙嘛。

Maybe it is too long apart. That is...some acidic materials will be on the teeth and easily lead to caries.

P 8: 嘴唇會怪怪的。

You will feel something strange on your lips.

P 8: 嘴巴會臭啊。

Bad mouth odor.

P 8: 牙齦會腫啊。

Gum swelling.

P 8: 如果蛀牙沒有去治療它的話，他說他以後影響到他以後牙齒正常的生長這樣子，就怕他以後牙齒長不好嘛。

If you do not treat his caries, it will affect the growth of his teeth. I am afraid of bad development of his teeth.

P 8: 但是我的knowledge，我不知道會有什麼其他的影響（笑聲）。

However, to my knowledge, I do not know any other influences (laugh).

P 9: 有時候，他的嘴...牙又痛。

Sometimes his mouth ... toothache.

P 9: 可能會喉嚨痛。

May have sore throat.

P 9: 他說那個...那個牙，這個唇。

He said that... the tooth, the lip.

P 9: 我看他吃東西，可能沒有幾個牙齒，肯定吃東西，肯定沒那麼好。

I watch him eating. Maybe he does not have many teeth, I am sure that he cannot eat properly.

P 9: 不太清楚對身體的影響。

I am not sure the influences of the body.

P 10: 影響吃飯啦。

It influences eating meals.

P 10: 影響美觀（笑聲）。

It affects appearance (laugh).

P 10: 現在那個不控制的話，不治療的話，那就會越來越厲害嘛，什麼到牙床啊，牙根處啊。

Now if you don't control the caries or do not treat it, it will be more severe. It will affect the base of the tooth and the roots.

P 10: 對於身體的影響，這個不是很懂（笑聲）。

I do not understand its effects on the body. Don't understand this (laugh).

P 10: 應該對身體也有影響。

It should have some impacts on the body.

P11: 不知道（笑聲），蛀牙會有什麼影響？

I don't know (laugh). Is there any influence of caries?

P11: 就像別人說的 牙疼不是病，痛死要人...痛的什麼啊，要人命啊。（笑聲）

Just like people say, "Toothache is not a disease, but very, very painful. It almost kills you." (laugh).

P11: 會影響...吃不了東西啊（笑聲）。

It will affect...unable to eat (laugh).

P12: 因為那個腐壞的那個東西在裡面呀，變成另外一個不好的味道，我們就是看不到的，但是可以聞一下就知道那個口腔裡面有異樣的味道。

Because something bad is stuck inside, it will have bad odor. Although we do not see it, we can know there it is. Smell the bad odor in the mouth, and then you will know it.

P12: 那個什麼東西都藏在裡面的話，它就會腐爛啊，腐爛的就會影響那個牙齒了嘛。

If anything is hidden inside the teeth, it will be rotten which will affect the teeth.

P12: 不好的味道，如果你不洗掉它，它就藏在裡面很久啦，可能就是好像那個污水啊...那個蟲啊就會成長啊，好像那個蟲一樣，吃掉那個牙齒啦。

Bad odor. If you do not clean it, it will hide inside for a long time. Just like the dirty water....

Worms will grow inside. It seems like that worm will eat the teeth.

P12: 容易引起那個牙齦發炎。

Easily induce gum inflammation.

P12: 牙齦發炎啊，不舒服

Gum inflammation. Feel uncomfortable.

P12: 那個，那個，牙根會腫起來啦。

Well, well, the gum will be swelling.

P12: 會爛呀，還是痛啊！

It will be rotten and you will feel pain.

P12: 你自己也覺得不舒服，有東西在裡面，也覺得不舒服。

You will also feel uncomfortable because something inside your mouth. Feel uncomfortable.

Question 5: How long do you think your child's dental caries will last and affect your child? How long do you think childhood dental caries could last and affect a child?

P 1: 因為會影響他第二次長牙，第二次的換牙，因為現在是乳牙嘛。

It is because it may affect his second set of teeth, the second changing teeth. Now he has baby teeth.

P 1: 但是到了美國這邊就會因為有醫生說呀，就會覺得它會有影響，可能影響人的一生嘛這樣。

However, after I come to U.S., some doctors here say "it will have lifelong impact." Now, I think caries may affect for a lifelong.

P 2: 好像兩三歲那蛀牙，你到六歲、六七歲才換牙齒，才沒那麼...。

For example, when you have caries at 2 or 3 years old and you will have new changing teeth at 6 or 7. Then, caries seems not so affective...

P 3: 如果是三歲開始蛀牙，一蛀牙的話你應該等到六歲換牙齒的時候，那個蛀的牙才能會有新的牙齒出來嘛。

If you have caries at 3 years old, then you have to wait until 6 years old to have new teeth. At that time, the new teeth will come out.

P 3: 可能那個大的牙齒可能那個到九歲才換，那可能會會影響他五六年的時間啊。

Well, the biggest tooth may change at 9 years old, thus it may affect him for 5 to 6 years.

P 3: 所以可能會影響他很多年的時間。

Therefore, it might influence him for many years.

P 4: 到六七歲換牙，那時候就是換掉。

Change teeth at age 6 or 7 years old. That is the time for the replacement.

P 4: 她就是換牙，換牙現在就沒有了！

Her teeth changed over. After changing over, now she does not have caries.

P 4: 就是蛀牙醫生發現，就說叫她補牙，補好之後就說沒事！就沒事了她。

When the dentist found caries, he said she had to have the tooth filled. After tooth filling, she is okay.

P 5: 我看一下，他們六七歲的時候換牙吧，對不對？一直可以到六七歲，那換完牙以後，還一直會影響。

Let me think. They change teeth at age 6 or 7 years old. Am I correct? Well, after having permanent teeth, the influence can continue.

P 5: 換牙以後，幾年以後長牙出來，那個牙長得不漂亮對不對，還要去護呀，弄牙呀，起碼是超過十年八年的時間。

A couple years after having permanent teeth, the new teeth will not be pretty, right? You have to take care of it. So, at least more than 8 to 10 years.

P 6: 這個應該很久吧..蛀牙以後呢就是一直以後一直蛀牙。

Caries should be lasting for a long time...If you have caries, it will last and continue.

P 6: 應該到他老吧。

Maybe last until he gets old.

P 7: 直到他換牙的時候吧。

Until he has changing teeth.

P 7: 看是蛀哪裡吧。如果是後面的牙齒，可能要...後面牙齒可能要比較久，可能要到九歲十歲以後。

It depends on where the caries is. If you have caries in the back teeth, maybe the influence will be lasting longer. It may even last after 9 or 10 years old.

P 7: 前面牙齒大概早，早一點，五歲、六歲就會換吧。

The front teeth may be coming earlier, earlier a bit. So, change teeth at age 5 or 6 years old.

P 7: 看蛀牙嚴重度；如果他是蛀牙到每次痛，常常要去診所報到的話，可能會影響比較久一點。

It depends on the severity. If he complains of toothache each time and has to frequently visit a dentist, then the influence may be longer.

P 8: 沒有治療，它不就是會一直惡化下去，或者就是...它不會自己不見啊（笑聲），所以那個影響會一直持續嘛。

Without treatment, it will be exacerbated. It will not disappear itself (laugh), so the impact will be persistent.

P 9: 起碼他發了一個牙，一直要等到那個牙齒出來，應該有幾年嘛，那醫生說，哦～這麼小，我聽他說，這到十一、二歲才長出那個大牙出來，都要幾年啊！

At least until he has a tooth. The dentist said, "He is so young" I remembered that he said at least until 11, 12 years old. It takes time.

P 10: 換牙齒的那個時候。

When his teeth changed

P 10: 一般最開始了，一般是六歲左右，然後小孩...我看十歲的也會換牙，換...換旁邊那樣子...可能要十二歲（笑聲）。

Generally speaking, changing teeth starts at age 6 years old. For some kids, I saw maybe at 10 years old, even up to 12 years old to change the lateral teeth (laugh).

P 11: 如果不處理的話，嗯...一輩子都會影響吧。

If you do not take care of it [caries], well...it affects [the child] lifelong.

P11: 我覺得是這樣，你看我，有蛀牙（笑聲）。

I think so. Look at me! I have caries (laugh).

P12: 影響小孩很久的時間，應該...應該是一輩子的時間吧！

It affects children for a long time. Maybe...maybe for a lifelong!

P12: 那個牙齒蛀牙啦，慢慢蛀牙啦，慢慢他就壞掉啦，那個牙齒壞掉啦，就不能吃東西了嘛，那個牙齒壞掉了你吃東西也吃得不好嘛。

Caries is slowly progressed. Slowly, the tooth is broken and you cannot eat. When you have broken teeth, you cannot eat stuffs well.

Question 6: What have you done to take care of your child's dental caries? What would you do to take care of childhood caries?

P 1: 看他什麼程度。如果是嚴重的話，可能要拔牙。

It depends on his severity. If it is very severe, you might have to remove it.

P 1: 就是一般的牙痛得比較厲害啊！會很痛啊！因為牙齒可能會爛了一半或是三分之二，這樣就很嚴重。

Usually, it will be severe toothache! Very painful! It is because you may have 1/2 or 2/3 bad teeth. In this case, caries will be very severe.

P 2: 他蛀牙我就帶他去給醫生看，看完他如果是要補一下。

When he had caries, I took him to visit a dentist and see if he needs a filling.

P 2: 自己不懂牙齒...因為對牙齒那些不是太懂。

I don't know...about teeth and don't know such things.

P 2: 補完之後就要把他好好保啊！天天要保持那個口腔清潔呢，應該多點時間幫他刷牙，清潔那個口腔。

After filling the teeth, you have to take care of his oral hygiene. You should spend more time to brush his teeth and clean his mouth.

P 3: 看到大的就是從莫名其妙就看到，為什麼有一點黑黑在裡面，我還以為是吃東西呀，沾了黑黑的東西，我拿那個牙籤去撩，噢，原來有個洞，然後我就趕緊帶他去牙醫看，那第一個時間會帶她去看。

When I saw a black spot in the mouth of my eldest child, I wondered why a black spot was there. I thought that he ate something black color and I took a toothpick to try to remove it.

Then, I found there was a hole. Therefore, I took him to visit a dentist right away.

P 3: 如果是那個蛀牙裡面沾有東西，就拿那個牙籤把它撩出來就可以啦！

If there is something in the hole of caries, I would use a toothpick to remove it. That will be okay!

P 3: 蛀牙的時候如果是他沒有痛的情況下，就是當然是約個時間然後去看牙醫囉。

If he has caries and does not complain any pain, I will make an appointment with a dentist.

Then, take him to the dentist.

P 3: 如果是他當時痛的時候呢，我們會跟他清洗一下啊。

When he feels pain, we will wash his teeth.

P 4: 就不給她糖、甜食不給！少一點不是不給，少一點給她吃！

We will not give her candies or sweets. No, I will give her less. Give her less [candies or sweets] to eat!

P 4: 我就是天天叫她早上刷牙、下午刷牙，就叫她自己認真擦好的牙齒。

I will ask her to brush her teeth every morning and afternoon. Ask her to brush her own teeth thoroughly.

P 4: 叫她用牙線！

Ask her to use dental floss.

P 4: 去給醫生看一下。

Bring her to visit a dentist.

P 5: 第一時間肯定看牙醫了喔！

Of course, first, I would take my child to the dentist!

P 5: 因為蛀牙我們不能做什麼。

It is because we cannot do anything about the caries.

P 5: 最重要的還是牙醫方面，幫他們定期的檢查。

Most important is dental aspect. You have to take children for regular dental checkups.

P 5: 我的責任我覺得就是每天給他多那個口腔清潔多幾次、多刷幾次牙，用那個布擦那個牙。

I feel my responsibility is to frequently clean his mouth, brush his teeth, and use cloth to wipe his teeth more times every day.

P 6: 就是糖啊，果汁啊！要求小孩那要少吃。

Ask my child to take less candies and juice!

P 6: 吃完[糖、果汁]要他喝水。

After having candies or juices, ask him to drink water.

P 6: 然後自己可以的話，能控制的食物就不給他吃。

If I could, I will control his foods. Do not give him certain foods.

P 6: 就是要牙醫幫忙啊，幫他補牙。

I will need the dentist's help for tooth filling.

P 6: 配合醫生啊。

I would cooperate with the dentist.

P 7: 趕快去帶去給牙醫檢查啊（笑聲）！

Take him to the dentist for examination as soon as possible (laugh).

P 7: 還有就是你要跟小孩子做很多的心理建設，就是去看牙醫這件事情。

Also, you have to prepare your child for psychological construction t before visiting the dentist.

P 7: 可能就會限制他吃很多的零食。

I may limit his amount of sweet snacks.

P 7: 特別注意幫他做口腔清潔的步驟。

Pay more attention to help him maintaining each step of oral hygiene.

P 8: 我就是帶去看醫生。

Take my child to a dentist.

P 8: 我們覺得是，如果該要補牙，該要拔牙，該要怎麼樣治療，就是按照正規的方式處理，這樣子。

We feel that if filling the teeth or removing them is necessary, and then we will follow the ordinary routines.

P 9: 少吃糖，還有很重要，少吃糖。

It is very important to eat less candies.

P 9: 很少買糖了，現在。有時候他說：「媽媽，我要買那個，bobble tea。」那個，珍珠奶茶，但是看他哥哥吃啊，他這個...買回來不...這給他喝兩口，他覺得好...好喝，他有時候叫我買，我盡量不買，不買給他，如果妳...每次問妳每次不買，他又很生氣的，盡量少吃，少給他買（笑聲）。

We seldom buy candies now. Sometimes he said, "Mommy, I want that, bubble tea". When his elder brother has bubble tea, I would let him to have some. Although he likes it and asks me to buy it for him sometimes, I usually refuse. If you refuse him every time, he will be very

angry. So, ask him to eat less and buy less (laugh).

P 9: 有時候幾個星期就買一次，盡量不買飲料給他。

Sometimes I buy the drinks for him every couple weeks, and I try not to buy him drinks.

P 9: 現在應該...多點幫他刷牙，我跟他說，就...刷牙一定要刷的時間長一點。

Now I should...help him brush tooth more frequently. I told him that he had to brush tooth longer.

P 9: 還要教他正確的刷牙...方法呀。

Also, I taught him the correct method to...brush his teeth.

P10: 首先，可能說帶去看醫生，聽醫生的建議。

First, I may take him to visit a dentist and listen to doctor's suggestions.

P10: 然後就是要改變他的飲食，少吃糖，少吃那些對牙齒，像那時候有一次，有就是那種酸性的糖，sour candy，像lemon那種味道的。

Then, I will change his eating habit, less candies, such as sour candy, lemon-favor candies.

P10: 改變他的衛生習慣。

Change his hygiene habit.

P10: 然後我自己可以監督他刷牙、用牙線（笑聲）。

And then I will supervise him when he brushes tooth or uses floss (laugh).

P10: 就是定期（笑聲）...定期幫他檢查牙齒。

That is regular dental examination (laugh). [The dentist] will regularly exam his teeth.

P11: 帶他去看醫生囉（笑聲），當然是看牙科醫生啦，專業一點吧。

Take him to a doctor (laugh). Of course, visit a dentist. Dentists are much more professional.

P12: 不要給他吃這麼多的糖，如果我知道他們蛀牙了，就是儘量不要吃那麼甜的東西。

Do not give him so many candies. If I know they have caries, I will try to control his sweets taking.

P12: 就是叫他們用那個牙線啊...刷牙之後。

Ask them to use the dental floss ... after brushing their teeth.

P12: 知道了那個牙齒有問題之後，去看牙科醫生。

If I know there are some tooth problems, I will take my child to a dentist

P12: 記得刷牙齒啊！

Remind children to brush tooth !

What have you expected to receive from the professional? What would you expect to receive from the professional?

P 1: 最主要...這前...眼前的咧就是說減輕他的痛苦咯。（笑聲）

The majority now... is ... to relieve his pain (laugh).

P 1: 因為小孩子那牙痛好像...整個人那邊的一句話：「牙痛不是病，痛起來真要命」。所以會很痛（笑聲），因為自己有過牙痛、也...也拔過牙這樣。

The toothache seems like...The Chinese often say, "Toothache is not a disease. However, it can kill you." So, it must be very painful (laugh). Besides, I also had the experience of toothaches and tooth extraction.

P 1: 肯定是...如果能不拔最好。

Certainly... If you do not have to extract a tooth, that will be the best.

P 1: 可以說補牙呀，還是怎麼樣呀。

Well, [the dentist] can fill the teeth or do something else.

P 1: 再可以在他們那邊教多我一點，因為以他們的專業知識教多我一點。

They can also teach me more because they have more professional knowledge to show me.

P 1: 怎樣去護理這個牙齒呀？好像是一些什麼東西去減...減去他的疼痛呀。

How to care the teeth? For example, what I can do to relieve...relieve his pain.

P 2: 好像大陸那樣，就沒有這個，因為很小就如果發炎呀，就給一點什麼消炎呀之類的給你吃哦，吃完那個牙齒沒事就不用拔。好像發炎呀，你就給它消炎呀，用其他方法來把它搞一下，儘量可以把他治好的就治好，治不好才可以這樣拔掉就可以了。

In China, they do not have such problems because they will give you some drugs to treat inflammation. You do not have to extract the tooth. Just like inflammation, you can do something else and try your best to treat it. Only when the treatment fails, you extract the tooth.

P 2: 美國這裡不是，一發炎就把它拔掉，對他的吃東西那個又不好。

However, it is not the same here in the U.S. They will extract the tooth when he has an inflammation. This will not be good for him to eat.

P 2: 因為你這邊的處理方法，因為小孩子你拔掉一個牙齒，它沒那麼快出來的嘛！你到時候比如你中間這個牙齒拔掉了，你上面那個牙齒又掉了哦，不是拔掉，掉了，你出來那個牙齒那個位置，兩個牙齒一出來就不符合了，就不好了，那個牙齒出的不漂亮了。The practice here is extracting the tooth. The teeth cannot grow soon because the dentist extracts the child's tooth. For example, if the dentist extracts the tooth in the middle, the upper tooth will be falling. Then, it will not be pretty. Also, the new tooth will not fit the space in between these two teeth.

P 2: 希望他幫我教那個小孩呀怎麼清潔呀，教他不要吃太多甜的或者那飲料之類的。I hope he can teach my child how to clean, and teach him not to take too many sweets or soft drink.

P 2: 每個小孩子不會聽爸媽的話，只會聽醫生或者老師的話。

Every child won't listen to their parents, and they only follow doctors or teachers' words.

P 3: 可以得到他會幫我小孩解決不痛啊（小孩子咳嗽）！

I hope he can solve the pain problem for my child (child coughing)!

P 3: 還有幫他補好那個牙齒啊，免得增加他的痛苦啊！

Also, he can fill his tooth in order to prevent more pain!

P 4: 想辦法補就補好了，就是補好了！看她...等她，不要再擴大蛀牙的範圍了！

Just try to fill the tooth. After that... wait and see ... if this can prevent the area of caries getting larger!

P 4: 教小孩怎樣擦牙！怎樣用牙線！她...叫她不要吃這麼多的零食！

Teach children how to brush tooth. How to use floss? Ask her not to take too many snacks!

P 4: 就是叫他教我方法，教她！

Ask the dentist to teach me how to teach my child and how to teach her!

P 5: 把那個蛀牙的那個地方弄掉了啊，它就不會聯繫另外一顆牙，不會擴散的那麼大喔。

[The dentist] removes the caries. Thus, the tooth next to it will not be infected. It will not be expanding.

P 5: 可能因為他們現在給我們的時間是每隔三個月才去一次，我就覺得如果時間可以弄短一點，一個月呀就會覺得會好一點了，我覺得三個月太長時間了。好像現在他已經看了兩個月了，那個牙積越來越多，我就覺得想快點去看一下，但是他那個時間是三個月嘛，我就覺得三個月好像太長了唄。

Now they ask us to visit them every three months. I feel if it can be shorter, maybe like one month, it will be better. I think that three-month interval is too long. He visited the dentist two months ago but now he has many stains accumulated on the teeth. However, the appointment is every three months. I feel three-month is too long.

P 5: 詳細一點關於要怎樣去保護那個牙，我們就每一次去看，就說給他們多刷幾次牙

囉，而這樣就會好一點，就這麼簡單。我們想知道多一點詳細一點的，我們不知道的(小孩聲)，詳細一點，對，他們每次那麼簡單，我都不知道詳細到什麼程度，因為我們不知道嘛，所以可以教我們更詳細的，如何更好的保護小孩的牙齒就更好。

More detail about how to protect the teeth. Each time we visit the dentist, he always says “brush your children’s teeth more times. So, your children would have better teeth”. That is too simple to us. We want to know more detail because we don’t know (child sounds). We don’t how detail we can do for our child. Hence, I wish he can teach us more detail and how to better protect my child’s teeth.

P 6: 就是要牙醫幫忙啊，通常就是補牙了。

That is asking the dentist for help. Usually it is to fill the tooth.

P 7: 依他蛀牙的情況是多嚴重啊？需要什麼？是不是只要補起來就好了呢？還是需要根管啊？或者是就差不多，差不多就這樣吧！然後一起討論看看要怎麼樣補救牙齒。

It depends on the caries severity to decide which procedure is necessary. I would like to know if he needs a root canal treatment or something else. Then, we can discuss the treatment for saving teeth with the dentist.

P 7: 如果很嚴重，需要補。然後，預防惡化這樣子。

If it is very severe, [the dentist] has to fill tooth. Then, [the dentist] has to prevent exacerbation.

P 7: 就...這麼小的小朋友應該都是要麻醉吧。

Anesthesia should be necessary for such a small...small child.

P 7: 可以處理好蛀牙。

[The dentist] could take good care of the caries.

P 7: 然後看有什麼措施我們可以在家裡做，這樣子。

Then [the dentist] checks what interventions we can do at home. That’s it.

P 7: 就是希望可以解答我的問題嘛！

[I hope the dentist] could answer my questions!

P 8: 就是希望他把他治，就是應該做怎麼樣正確的treatment，他們就是會很professional了吧。

I hope he could treat him in a correct way. They should be very professional.

P 8: 然後跟我們講說之後要注意什麼這樣子，就是要floss啊！什麼啊！要make sure...然後刷牙要刷仔細啊。

Then tell us what we have to watch out, such as using floss or something like that. Also, we have to make sure ... that we do brush tooth thoroughly.

P 9: 他有一個大的[點黑]...本來是一點點黑，那個醫生說：「這個牙齒要拔了！」我們說：「欸？我們中國這...這...要鬆了才拔，為什麼要...在這裡...要拔呢？」。我覺得...覺得在中國就是等...鬆了，很鬆了才把它拔掉嘛，他的作法像美國。

He had a big black spot... in the beginning just a little bit. The doctor said his tooth had to be extracted. We said “What? In China, the dentist only extracts the loosen tooth”. Why did they extract that tooth? I feel that ... in China, we just wait until the teeth loosen. They only extract the loosening tooth. He acts like the way in the America.

P 9: 我在中國，還不會，那個牙齒不會把它拔掉的，我那大兒子都沒有，那個牙爛的很厲害醫生才拔...幫他拔。在這兒，一點點兒，一點點黑點，醫生就建議拔，把他那個牙齒拔掉了。

In China, the dentist would not extract the tooth. My eldest son had very bad teeth and then the dentist extracted them. But here, when there is a little black spot, the dentist suggested tooth extraction and then extracted it.

P 9: 我們覺得...本來在國際診所這個[醫生]，我們不...不放心就讓那個...，那你們...介

紹你們到那兒童醫院去吧？我們說好啊，在什麼二十，忘記是在幾街那個...兒童醫院，介紹那個兒童醫院，他一樣說...他呀！是要把它拔掉。

We did not trust the dentist in the “International Clinic”. Then they introduced us to the Children’s hospital. We said okay. The Children hospital was located in street 20 something and I forgot where it was. The dentist in the Children’s hospital ..., he also suggested to extract it.

P 9: 所以我們，嗯...我跟我老公商量，我說：「這個醫生，這間診所醫生這樣說，那間也這樣說，嗯...好，那就把它拔掉吧。」

Therefore, I discussed with my husband. I said, “This doctor said so and that doctor said the same, too. Well...okay! We decided to extract it.”

P 9: 或者在美國這個對於牙齒的，可能比中國好一點，好像。

Maybe in the US, the dental treatment is better than that in China, probably.

P 9: 嗯...信任...信任...美國的[醫師]（笑聲）。

Ah...I trust...trust America’s [dentists] (laugh).

P 9: 然後我小孩，他很...他...他不怕，他很乖呀，我...我都怕，他不怕，他那個助理呀，說他挺乖的。

And my child, he was not afraid and behaved very well. I was afraid, but he was not. The dental assistant said he was very good.

P 9: [他有]一點點蛀牙，牙沒有鬆啊，就是一點點黑...一點點他就說要拔掉，然後放那個...那個...這個線，好像，那個鐵的，應該是不鏽鋼的那個，套著的那個位置，那他說大的牙齒要很久，要十一、二歲才生出來，現在就放個東西撐著那個位位置，他說。

[He had] a little bit caries. The tooth was not loosening and just with a little bit black spot... For that little bit spot, he had to extract it and then put a... a line. The line seems like metal made. It should be stainless and put in that area. The [dentist] also said that it may take a longer time for the big tooth to grow up, maybe wait until 11 or 12 years old. He told us to put something to support that area.

P 9: [年紀]這麼小，嗯...把那個大牙拔掉，我挺擔心，他說它要幾年才長出來嘛，我挺擔心，唉...那會不會對他身體啊，那個以後長出來的牙啊，會不會影響？我...我挺擔心的，所以都要半年去一次[回診]，那剛拔出來的那個牙齒，他說如果有什麼問題啊，那個線呢套著那個牙，那個線如果鬆了，妳就打電話或者直接帶他來看我，妳...妳要留意他這個...這個東西他說，放的那個位置...那個東西，所以我要多放點心看他這個東西（笑聲）。

He was so young so I worried about extracting the bit tooth. He said that it may take years for that tooth to grow up. I was very worried. Well...did it have any impact to his body or the new tooth? I worried about it. So, we had to visit the dentist every six-month. He told us to call him if there was any problem on the extracted tooth. You have to watch the line on the tooth. If it was loosening, take him to the clinic. You have to pay more attention on this (laugh).

P 9: 我當然希望醫生跟他說，有時候醫生說的話他會聽，媽媽說的話他不...不一定聽，他說妳不是醫生（笑聲），他覺得...沒...那個...可能醫生說得或是有力，媽媽不會應該，不會知道這麼多的東西（笑聲）。

Of course, I hope the dentist can tell him. Sometimes, he will listen to the dentist but not the mother. He told me that you were not a doctor (laugh). He feels that ... maybe the doctor is more professional. Mother would not know much about it (laugh).

P 9: 我當然...如果三個月檢一次可能會比較好一點。因為...那個，他沒有一個牙齒嘛，時間短一點，就檢查可能早發現那個牙齒有什麼其他的變化呀！

Surely, it will be better to exam the teeth every 3 months because he does not have any teeth

yet. We can find anything wrong earlier if the waiting time of exams is shorter.

P10: 要幫她制止，這進一步發展。

Help her to stop the caries, to prevent further progress.

P10: 期待就是看能不能，有辦法把它修復啊！（笑聲）能補的補上！

I expect if there is any way to fix it (laugh)! Try to fill it if the dentist can!

P10: 她小...牙齒壞了的話，他再把它拔掉了是吧？是拔牙的嘛。

She is so young. If her tooth is broken, and then he can extract the tooth, right?

P10: 就是有必要的話...就是把那個壞的牙齒，如果太厲害的就拔掉。

If it is necessary...to remove the bad tooth, the dentist can extract the tooth if it is too severe.

P11: 就這樣吧，把他治好就好啦（笑聲）。

That is to cure his caries. That will be all (laugh).

P12: 什麼期待啊...希望那個牙齒不會再壞啦。不會蛀牙啦，不會再蛀牙啦！

My expectation ... um, I hope the tooth will not be bad again. No more caries. No more new caries!

P12: 我們去看那個醫生也告訴我們怎麼辦，學會怎麼...怎麼樣去...處理那個蛀牙，怎麼樣去...保護那個牙齒。

The dentist we visited told us what to do. We learned how to care the caries and how to protect the teeth.

Appendix E: An Example of the Confirmability Audit

Aim 1, 3, 4 (Questions1, 4, 5), Categories, Sub-categories, and Explanations

※NOTE: *Red-color texts*: change made or new text. *Green-color texts*: questions to ask/clarify.

Categories	Sub-categories	n (%)	Explanations
Aim 1_Etiology: Parents' perceived causes of childhood caries			
Dietary habits (N=46) Forty-six participants (100%) reported children's daily diet habit as a cause for childhood caries, including the intake of sweet foods, sugar drinks, milk, breast milk, meals, meat, and usage of feeding bottle and cup.	Sweet foods Page 19	46(100%)	Participants identified certain sugary foods that are very sweet or too sweet, such as candy, U.S. cookies, and ice cream. Parents identified certain kinds of sweets that lead easily to childhood caries, such as soft, sticky, and refined food. They also stated that the amount, frequency, and timing of sweets intake are associated with caries.
	Sweet drinks Page 23	9(20%)	Participants identified certain kinds of sweet drinks could cause childhood caries, such as juice, soda and soft drinks. They also stated that the amount and frequency of the intake of sweet drinks are associated with caries.
	Milk Page 23	7(15%)	Participants stated that milk contains lots of sugar. If children have milk in the midnight or drink and sleep without cleaning their teeth, the children can more easily get tooth decay.
	Breast milk Page 23	2(4%)	Participants stated that although breast milk contains little sugar, there is still a chance for the children to get caries if the children are fed breast milk while sleeping or without cleaning.
	Meals: P33, 44 Meat: P13, 17 Page 24	4(9%)	Two participants stated that meat that sticks between the teeth will cause caries. Two participants stated that food left in the mouth after meals will lead to caries.
	Sucking a feeding bottle or sippy cup P3,11,15,16,30 Page 24	5(11%)	Participants stated that sucking feeding bottles or sippy cups for a long time, during sleep, or the frequency of sucking are associated with dental caries.

	<p>Family members' role (grandparents, relatives) P28, 35, 43</p> <p>Question: Although we got this category "family role" from Q1,4,5, we do have asked all participants to answer questions related to family factors and barriers for oral-health practice [Original Aim 3]. So, shall we just move those data to where they should belong to?</p> <p>Answer: Yes! This data will not be coded for the dissertation.</p>	3(7%)	<p>Three participants (7%) reported that family members contributed to the amount and frequency of children's sweet intake.</p> <p>P28: We sometimes live with grandpa and grandma. So when the grandparents live with us, they give the grandkids candy without telling us. So...then we did not pay attention to that.</p> <p>P28: My relatives from Taiwan would give us some milk candies, when they come to visit. In that case, we would let my child have it.</p> <p>P35: I was shocked when my child had a decayed tooth. And, later on I found it was due to maltose which his grandma brought him from Taiwan.</p> <p>P35: His grandma allows him to have candies before bed time when she comes to visit us. For example, he has some snacks after dinner around 7 or 8 o'clock. Then, he probably goes to bed around 9 o'clock.</p> <p>P43: "She probably had sweets once a day, but I did not know how much sweets she took because I went to work. Her grandma lets her eat sweets and she told me maybe just once a day."</p>
<p>Oral hygiene habit (n=45)</p> <p>Forty-five participants (98%) referred to the habit of children's tooth cleaning and brushing, rinsing mouth and drinking water after sweets, flossing, and parents' role in assisting children's oral hygiene practices (toothbrushing and flossing) as causes for childhood caries.</p>	<p>Toothbrushing habit Page 24</p> <p>Not rinsing mouth after having sweets Page 26</p> <p>Not drinking water after having sweets Page 26</p> <p>Tooth flossing habit Page 26</p> <p>Parents' role in assisting children's oral hygiene practices</p>	<p>45(98%)</p> <p>10(22%)</p> <p>2(4%)</p> <p>9(20%)</p> <p>5(11%)</p>	<p>Forty-five participants (98%) stated that the frequency of toothbrushing (how many times a day), timing of toothbrushing (when the child has his/her teeth brushed), the method of toothbrushing (brush method, brushing duration, whether using fluoridated toothpaste, parents' assistance role) of children's toothbrushing are associated with childhood caries.</p> <p>Participants stated that the child not rinsing his/her mouth after having sweets can result in caries.</p> <p>Participants stated that not drinking water after having sweets can result in caries.</p> <p>Participants stated that not flossing is a cause of caries.</p> <p>Participants stated that childhood caries was related to whether parents helped or examined the quality with which the children brushed their teeth. Further,</p>

			whether parents floss children's teeth or help children floss teeth is associated with childhood caries.
Biological and somatic issues (n=9) Nine participants (20%) referred to childhood caries as genetic, an inheritance, or inborn.	Inheritance, genetic, and inborn issues Page 27	9(20%)	Participants referred to childhood caries as an inheritance, the result of parents' genetic or inborn issues.
Bacteria	Bacteria/Germs in the mouth P24,46 Page 28	2(4%)	Two participants (4%) reported that normally there are tooth germs in the mouth. If children do not have good oral hygiene, the germs will destroy the teeth.
Transmission issues	Be infected through others P11,24 Page 28	2(4%)	Two participants (4%) reported that caries are contagious from infected others as a cause for childhood caries, such as shared foods and shared toothbrush. For example, a 34-year-old mother from China stated, <i>"when some elders take care of their grandchildren, I mean eating food together. They will have the food one bite, and then also feed the child. Let the child has one bite too, and then the child will be infected."</i> The child will not only have teeth diseases but also other illness. Is it right? On the other hand, a 35-year-old father from China said, "If you find out you have caries, the kids could not share the toothbrush, they need to separate toothbrush, and otherwise they will got tooth decay from the germs."
Children's oral behavior (n=2)	*Biting fingers habit Note: Clarify the causes of childhood caries (or make a booklet) Page 32	2(4%)	Two participants (4%) reported children's biting-fingers habits can lead to caries. P4: My second child was...I suspected she bit her fingers and leaded to caries. My fifth one didn't do that. No...both my third and fifth children didn't do that. They didn't bite their fingers. So, I told to the dentist about this. And the dentist said it is possible...possible to have caries.

Commented [a1]: These are amazing models of explanation!

			P9: And he still has the habit to bite his fingers every night. So, he can fall in sleep.
Lack of routine dental visits (n=2) Page 33	No teeth washing and routine checkups at dental clinics	2(4%)	Two participants (4%) reported not having regular teeth washing and checkups as causes for childhood caries. A 42-year-old mother from Taiwan stated, "When she [older daughter] was 3-years-old staying in Taiwan for one year, I think she did not have regular checkups. So, she had many decayed teeth. My younger son was born in U.S., so regular checkup is so helpful to find out something I cannot see. Like X-ray, we only can know if a child has a cavity until taking an X-ray." A 35-year-old mother from China also said, "Not visiting the dentists often...do not go to the clinic for teeth washing and teeth care. If I know she has a cavity ahead, I will do a better job on her teeth care."
Aim 3_Pathophysiology: Parents' perceived impact of childhood caries on the child			
Mouth impact (n=42) Page 40 Forty-two participants (91%) reported mouth impact of childhood caries, including pain and uncomfortable, oral problems and diseases, affecting permanent teeth, appearance and attractiveness, and diet-habit change.	Oral problems and diseases: Bad odor in the mouth n=8 Inflammation n=7 Gum health n=7 Tooth root problem n=6 Teeth fall out n=4 Affecting other teeth n=4 Oral diseases n=3 Food stuck inside the teeth n=3 Blister n=2 Germ n=2 Occlusion problem n=2	29(63%)	There were some common oral problems and diseases that participants believed as negative impact on children, including halitosis, inflammation, gum and tooth root issues, losing teeth, and periodontal diseases.
	Pain/Uncomfortable: Toothache n=18 Uncomfortable n=3 Feel weird on the lips n=3	21(46%)	Twenty-one participants (46%) mentioned that toothache and uncomfortable is a common impact of childhood caries, which could be very painful. For example, a 34-year-old mother from China stated, "Toothache is not a disease, but it is very, very

Commented [F2]: Cleaning?

Yes, but I thought I should use "emic" text.

Commented [F3]:

Do you mean teeth cleaning by a professional? Or, do they say "washing"?

I mean teeth cleaning by a professional, but usually people say it as "washing" in a common way.

	Sore throat n=1 Pain from root canal therapy n=1 Knowing toothache from personal experience: n=2		<i>painful. It can almost kill you.”</i> When children experience toothache, their condition must be serious. A 43-year-old mother from Taiwan stated, “I think if it is hurt, it will be very serious.”
	Changing diet habits: Chewing ability n=14 Cannot eat certain foods n=9 Do not want to eat/appetite change n=6	20(43%)	P22: Certainly, if a child has caries, she cannot eat well because the teeth are decayed. She bites...when she eats food, her chewing ability will not be good. P40: Not chewing well! I think kids will have the same chewing problem as adults! Probably, she cannot easy eat stuff. If the caries is very severe, her chewing ability will be affected, maybe.
	Affecting second set of teeth/Adult teeth	16(35%)	Move to “Oral problems and diseases”? Sixteen participants (35%) reported that primary teeth decay could affect the development of permanent teeth. A 35-year-old mother from China said, “If my child has tooth decay, his teeth will fall out. I will worry the new teeth won’t grow well, will be crooked, or it won’t be so strong.” On the other hand, a 32-year-old mother from Taiwan was worry the permanent teeth may take longer time to get change completed and also become decayed teeth.
	Appearance and attractiveness P1,5,10,22,26,43	6(13%)	Six participants (13%) reported dental caries would affect a child’s appearance and attractiveness.
Body impact (n=26) Page 44 Twenty-six participants (57%) reported body impact of childhood caries, including gastrointestinal problems, nutrition imbalance, growth issues, affecting function and development of organs, diseases, and unhealthy issues.	Gastrointestinal problems n=9 Body development n=7 Every aspect of body n=2 Nutrition imbalance n=7 Organs: brain, heart, lung, liver, stomach, Spleen n=6 Diseases: heart disease(P18,37), hypertension(P13), diabetic (P13,30) n=4	26(57%)	Body development → Growth (Height and weight)? P2: He cannot eat anything. This will affect his body development. P3: When he talks, you can smell the bad odor coming from the mouth. And bacteria will enter into his body and affect his growth. P5: When I visited a dentist, he told me that, “if you can protect your teeth better, use more dental floss, wash your teeth every half a year, and then you can look younger.” P5: It may lead to “blood problem”. Therefore, I feel

Commented [F4]: Negatively affects chewing ability?
Yes!! So, change to “Negatively affects chewing ability”?

Commented [F5]: Try to clarify this; it is too broad as stated here. Does Body Development the same as “every aspect of the body”?

No, they are different. See quotes!

How about “growth (height and weight)” that will be more specific?

Commented [F6]: What does it do to these body parts?
Listing the organs is not the issue; it is the impact on the organs that is the issue. Try to re-state. Okay.

	<p>Often sick and unhealthy</p> <p>n=7</p>	<p>that if a child can have a better oral health, then it will be good to his development, and there will be no bacteria in his body. I think so.</p> <p>P20: Probably caries will affect their... uh... sleep not well, so that he won't grow up well.</p> <p>P45: What I worry is...for example, if children do not eat balance, they may not grow tall!</p> <p>P41: Growth, growth is not well!</p> <p>P41: Then the nutrition cannot be absorbed well, so the bones must be affected!</p> <p>P43: If a child does not want to eat, he or she will lose weight.</p> <p>Every aspect of body:</p> <p>P3: I am afraid that his teeth! He swallows the bacteria into his belly, and then affects every aspect of his body.</p> <p>P16: Well...affects all the body, must be all body! Because...he...his teeth have blood vessels, blood vessels are going over the whole body, I mean when the caries is serious (laugh).</p> <p>Organs → Affecting function and development of organs?</p> <p>Note: [P18: And he may...Because you eat food but you don't brush teeth. The germs left inside the mouth will be multiplying, multiplying.]</p> <p>P18: The five internal organs could be affected. The five internal organs, isn't it! The heart, liver, lung, stomach, and spleen, and spleen [could be affected], aren't they? It could be affected.</p> <p>P18: That...that...lung may also be affected because the lung passes through the mouth, right? Lung is about breathing, so like difficulty breathing.</p> <p>P41: Not having a good digestion may affect everything!</p> <p>P41: When the digestive system has problems, the absorption of the nutrient would be affected. In this</p>
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			<p>period of time where the growth is rapid, your blood, your bones, and your internal organs would be affected.</p> <p>P13: A decayed tooth can cause problems with the brain and cerebrovascular!</p> <p>P2: And affects his brain development.</p> <p>P32: I think teeth have many nerves connected with the brain. So, I worry...worry about caries may affect her intelligence... memory, those kinds of stuffs.</p> <p>P13: A decayed tooth can cause problems with cerebrovascular! Have problems with the heart. It is a big relationship with the heart.</p> <p>P33: because your oral cavity is not healthy, you would eat many bacterial into your body. It may influence the heart.</p>
<p>Affecting daily routine (n=14) Page 47</p>	<p>Visit a dentist often n=7</p> <p>Affecting learning and cannot concentrate n=4</p> <p>Not sleep well n=2</p> <p>Not easy to clean teeth n=1</p> <p>Do not want to play n=1</p>	14(30%)	<p>Fourteen participants (30%) reported that caries could affect children's daily routine, such as visiting a dentist, affecting learning and concentration, sleep, teeth clean, and play.</p> <p>P5: If he does not protect them now, maybe he will have bad teeth at 2 or 3 years old. Then he has to visit a dentist all day in order to remove the caries.</p> <p>P7: If it is very severe, you have to visit a dentist frequently.</p> <p>P2: You see, If my child has toothache, he cannot learn anything. Just like when you suffer pain over the whole body, you cannot think and you will have a bad mood. So when he has toothache, he cannot learn anything even though you ask him to learn.</p> <p>P20: Tooth decayed, if it is serious, it will affect his sleep.</p> <p>P46: Caries also affects teeth clean because it becomes concave with some holes. So, it becomes more difficult to clean.</p> <p>P30: If a child feel uncomfortable...he will probably not want to play.</p>
<p>Emotional problems (n=6)</p>	<p>Crying and being irritable n=3</p>	6(13%)	<p>P1: Because of severe pain, he cannot eat anything and maybe cry and be irritated all day long.</p>

Page 48	Being in a bad mood n=3 Dental fear n=1		P19: But if he really has dental decay and just like adult....toothache. I believe that emotion will be affected by toothache. Get angry. P7: Seeing a dentist for caries treatment; maybe the child will have dental fear. So, I have prepared him for seeing a dentist.
Negative impact on parents (n=5) Page 49	Concerns about side effects of anesthesia n=2 Filling is very expensive n=1 Parent feel guilty when children suffer pain from dental treatment n=1 Worry about passing caries to other children n=1	5(11%)	Page 56
Positive impact on children (n=1) Page 50	Remind children to brush their teeth thoroughly n=1	1(2%)	P43: Whenever she sees her own silvery Teeth [stainless steel crown], she knows that she has to keep them clean by brushing them. P43: I keep on reminding her of what she has now: silvery teeth. [The dentist said, "It is because you did not brush your teeth accordingly to how you should. Now you have to do all these things [to prevent more cavities]". When she knows what's going on, she will spend more time to clean the rear teeth [molars]. Therefore, I think this [having a stainless steel crown] does something good to her.
Mechanism of childhood caries			
	Having sweet foods/drinks P1,12,18,25-31,36,37,39,40,41,42,44,45,46	19(42%)	
	Food or sweets stick to the teeth or left in the mouth P1,12,25,28,31,35,36,40,41,42,44	11(24%)	P31: After having sweets and do not deeply clean the teeth, the sweet stuff will sticky or attach on the teeth... P42: Because the sugar sticks on the teeth, and then it will decade into it. P44: Possibly...let me guess... (laugh). It could be the sugar that sticks on the surface of the teeth. Stays on the outer layer of the teeth if you do not clean it

Commented [a7]: Please edit so it makes sense...Reread the transcript; there is something that is missing or needs to be rewritten. EX: Because you didn't brush your teeth according to how you should, now you need to do all these things [to protect against more cavities?] like brushing and keeping oral cavity [did parent say this OR did the parent say "mouth" clean? Revised.

			away. It will start to penetrate and penetrate into the wall of your teeth. Then, you will have decayed teeth later on. I think it should be like this (laugh).
	Not cleaning or /brushing teeth (esp. before bed time) P12,14,18,26-30,31,36,40-42,44,46	15(33%)	
	The time sweet foods/drinks are left on the teeth or in the mouth P8,23,26,27,31,36,42	7(15%)	
	Germs/bacteria/tooth worms grow P10,12,14, 18,24,25,28-31,41,45,46	14(30%)	<p>Tooth worms: P1, 10,12,25</p> <p>Four participants (9%) mentioned that tooth worms lead to childhood caries.</p> <p>P10 used “worms” and “bacteria” interchangeable. People use the term “worms” in the common statement. In the old days in China, people will certainly not understand if you mention bacteria. P12 mentioned if people do not clean their teeth, worms will grow up inside the teeth. P1 stated having candies without teeth clean will produce worms. Teeth will be eaten the worms. P25 stated that sweets will lead to germs growing inside the teeth. Then, the germs produce worms.</p> <p>Backgrounds of participants: came from Guangdong province</p> <p>P1: 33 y/o mother from China, completed 9 years education in China.</p> <p>P10: 45 y/o mother from China, completed 15 years education in China.</p> <p>P12: 43 y/o mother from China, completed 12 years education in China.</p> <p>P25: 42 y/o mother from China, completed 12 years education in China.</p>
	Sweets/sugar will be acidified and then erode/penetrate the teeth P8,12,20,28,31,35,36,37,39,40,42,44,45,46	14(30%)	

Commented [F8]: This phrase is VERY interesting. What is a tooth worm? Did all these parents say there were “tooth worms”?

Only 4 parents

Aim 4_Course of caries: Parents' perceived severity of childhood caries and duration of its impact			
Until grown up/ Long-term/Lifetime (n=20)		20(43%)	Page 52
Until having permanent teeth (n=12)	(1) Children would start to have their front teeth changed at aged 5-7 years old. (2) Children would have their molars change completed at aged 9-12 years old.	12(26%)	Page 51
Continually affect children even after having permanent teeth (n=9)	IF children do not received dental treatment IF children do not have good oral hygiene habit	9 (20%)	Page 51
Until a dental treatment (n=9)		9 (20%)	Page 52
I am not sure/never thought about this (n=9)		9 (20%)	Page 53
Until teeth fall out (n=3)		3 (7%)	Page 53
Until routine dental checkups (n=2)	The dentist will find it out We cannot tell if there is any caries in the early stage	2 (4%)	Page 52
Depending on severity of dental caries (n=1)		1 (2%)	Page 53
Until the time for school enrollment (n=1)	Healthy teeth is required for school enrollment	1 (2%)	Page 51
Culture			
	Tooth worms P1,10,12,25	4 (9%)	P1: If you don't clean your teeth after having sugar, the teeth would grow "tooth worms". P1: We say "worms in the teeth". People in our area are saying "because you eat too many candies, your teeth were eaten by the worms". People in our area said that. P1: For example, when you do not wash your hands before taking fruits, you will swallow the bacteria. Just like what we say "a disease comes from the mouth". P10: Especially before sleeping, if you are going to bed, you should brush your teeth thoroughly. It is because... if your mouth is too dirty...and you close

Commented [F9]: Not clear what you are stating here...does this mean there are 2 junctures in which teeth change?
Yes!

Commented [a10]: This idea of worms eating teeth is a **RICH quote!** This is a culturally embedded result. Be sure and do a specific count of this idea in your data.

			<p>your mouth during sleeping, there is no air in your mouth and then you bacteria will be growing faster.</p> <p>P10: Too dirty means too much sugar or something like milk. Those stuffs will produce bacteria easier.</p> <p>P10: Bacteria...it can...it can grow very fast (laugh).</p> <p>Dental caries could be caused by bacteria.</p> <p>P10: People state it in the common statement. It is because in the old days in China, people will certainly not understand if you mention it [worm] as bacteria (laugh).</p> <p>P10: Dental caries is kind of bacteria, right? It is impossible to have worms inside the mouth (laugh).</p> <p>P12: You can smell a bad odor. Is it the reason? A bad odor. If you do not clean it, it [sweets] will stay inside for a long time. Just like the dirty water, worms will grow up there.</p> <p>P12: I told my son that "you have to learn how to clean your teeth, then the worms will not coming out from your teeth".</p> <p>P25: Sweet, too sweet, the sweet stuff left inside the teeth and the worm likes the sweet stuff, maybe.</p> <p>P25: Teeth itself has no worm, sweet stuff will lead to germ grow inside the teeth. The germ produces the worms.</p> <p>P25: When I saw food spoiled, they have worms inside. So I think it is the same about the decay. I do not know. I did not do any research about it (laugh). Let you do the research, and then tell me what you find out.</p>
	<p>Asians like to eat rice</p>	<p>2 (4%)</p>	<p>P36: For example, we are Asians, we like to have rice.</p> <p>P36: Rice is soft and a sticky kind of food. It will stick on the teeth.</p> <p>P36: For kids, rice is not...easy to clean on the teeth. It may leftover on their teeth for a longer time, so it will erode their teeth.</p> <p>P42: Rice contains lots of sugar...When children have too much sweet; they are likely to get decayed teeth.</p>

<p>Note: This concern has been raised by many parents in other sections. Keep them for coding for post-PhD work. This data will not be coded for the dissertation.</p>	<p>Parents' thought regarding dental floss</p>	<p>2 (4%)</p>	<p>P1: One more thing is brushing teeth. I'm saying tooth brushing...mouth...Because I just came from China, people in my area usually do not floss their teeth like Americans. We don't have such concept yet. P34: The meat will stick in between teeth, I find out many parents think kids do not need dental floss, including parents of my kid's classmates... <u>not just Chinese [parents think children do not need to floss their teeth]</u>. P34: Actually, there are many <u>Mexican parents</u> and other parents in the US. All of them do not pay an attention to floss usage.</p>
	<p>Snacks are very sweet in U.S. Note: Move to etiology section: <u>What types of foods parents think is sweeter in the US compared to the food in their origins?</u></p>	<p>2 (4%)</p>	<p>P12: You know much food <u>in America</u> is sweet. P12: Sweets are the majority. My daughter often says too much sugar in every kind of food...every kind. Everything sold in the store is sweet stuff, such as donuts and breads. She told us that. P33: Cookies, the ones are very, very sweet cookies <u>in the US</u>.</p>
	<p>Healthy teeth for school enrollment</p>	<p>2 (4%)</p>	<p>P15: The doctor said you must protect your child's teeth when the time child gets into school. If your child's tooth condition is not good, you must have the teeth filled. So, the child can get into school. The school requires your child to have teeth record renewed each year. P15: It is different from China! In China...China, we don't have such a serious rule. P26: My oldest one was also discovered caries via dental examination around aged 4 years, when he was ready to go to preschool.</p>
<p>Knowledge about childhood caries</p>			
<p>The way of knowing about childhood caries (n=25) Participants were familiar with dental decay through personal experience, family members' experience, friends'</p>	<p>Personal experience n=12(26%) P4,20,21,23,25,26,28,31,38,40,43,44 Friends' experience n=9 (2%)</p>	<p>25(54%)</p>	<p>Personal experience: ● The causes: P23: I was breast fed her when she was little, she fall asleep, and she still had breast milk at the same time, and this causes her bad teeth.</p>

Commented [F11]: Not sure what quote is saying...what is meant by "not only Chinese"?

Commented [F12]: Re-do this section of coding. This section is VERY rich but you have clustered all the quotes under this "way of knowing about childhood caries" but the quotes are MUCH MORE than ways of knowing....make MORE categories....You have collapsed too many different ideas into this one section.
Question:
Could you show me an example about creating more categories? Thanks!

<p>experience, and dentists.</p>	<p>P1,11,15,30,34,35,37,39,46</p> <p>From dentists n=6 (13%) P1,4,26,27,35,38</p> <p>Family members' experience n=4 (9%) P15,24,29,42</p>	<p>P28: He ate too much candy, so it was the reason for him to have dental cavity.</p> <p>P21: The youngest boy in our family, he had caries. I think when he brushed the teeth, sometime he did not brush the space he should or he did not brush in enough detail. Anyway, I think he was not brushing carefully.</p> <p>P43: I think the main reason is she did not clean thoroughly, especially the back teeth.</p> <p>P26 : I want him to brush his teeth by himself. So, he does not need help from me all the time. So I started to let him do it, just let him brushing by himself. I did not pay attention to him. That leads to his not doing well by himself.</p> <p>P25: I did not floss her teeth, so this lead to more teeth being decayed.</p> <p>P31: For the second kid, maybe we did not help him to use dental floss very well, so there were foods left over and sticky in between teeth gaps. Yes, it was the reason for him to have caries.</p> <p>● The impact:</p> <p>P4: It hurts a lot when the caries gets deeper into the teeth. I have a daughter, and she had 12 decayed teeth when she was 3-years-old! 12 decayed teeth!</p> <p>P20 : If dental decay is serious, it is just... like my experience. We also have this circumstance at childhood. When I had a toothache, I was not able to eat, cannot eat.</p> <p>P38: Maybe it's still an early stage cavity, you still don't feel the pain, but when it becomes more serious, the decay happens much deeper, and then the pain starts to arise. When I was a kid, I felt that cavities could cause a lot of pain.</p> <p>P40: I experienced the pain produced by the cavity when I was still a kid.</p> <p>P44: Fever is the initial signal of caries in my child, usually we can stop it right there and we should be okay.</p>
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		<p>P28: When I was little, I had tooth decay too. So, I did the same thing...I ate so fast because the toothache. Therefore, tooth decay may be damage to the stomach.</p> <p>Friends' experience: The causes:</p> <p>P1: My neighbor's child took too many candies; teeth were decayed and turning a black color.</p> <p>P11: I think this is the difference between him and my friend's child. The age difference of these two children is 4 days. My friend's child likes juice. I can recall that he drank too much juice so he had caries (laugh).</p> <p>P15: I remember I have a friend. Her child used feeding bottle for drinking milk. Because my friend was lazy, she did not quit the feeding bottle so her kid had caries.</p> <p>P41: So last time I thought that my son would easily get a cavity, but I controlled his intake of sugary foods, so he does not get any cavities. The other kids who have cavities had easy contact with sugary foods, one of the reasons is their grandparents. They usually spoil these kids by letting them eat whatever they want, including these sugary foods like candies and drinking juice a lot that are their favorite.</p> <p>P41: The one from Hong Kong, his grandparents are from China, I don't know whether there is a little bit difference from us, but it's really a little too extreme. Their grandchildren have ten decayed teeth.</p> <p>P30: I know somebody...a friend of mine. She was giving kids a bottle before going to bed in the night. That will cause tooth decay too, yeah.</p> <p>P39: I saw my friend's kids, they ate candy very few in the beginning, but they gave candy to the kids more and more, and then the kids starts to get bad teeth.</p> <p>P41: My friend son's daughter, maybe they don't</p>
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Commented [F13]: Not sure of idea here; is 'their grandchildren' referring to study participant's grand children?
No. Participant told about her friend's story. I am thinking this could be a cultural quote?

		<p>have good oral hygiene habit! Her whole teeth got caries when she was only 2-years-old. One of the teeth was also broken to half when she was 4-years-old, it turns to black color, so I think her natural inborn problem is severer than my child.</p> <p>Age child starts to have caries: P34: Most often I saw my friend's children getting caries at aged 2-3 years. P37: I often saw children having caries at aged 7. Yeah...Most kids from my friends had caris at around aged 7.</p> <p>The impacts: P35: Like some parents I know, they would say bad breath from dental caries. P39: My friend is afraid that the permanent teeth wouldn't grow out when their child lost the baby tooth. P46: I know my friend's kid, her decay is very serious, and so she would not be able to bite solid food.</p> <p>From dentists: The causes: P26: I heard from the dentist that milk contains higher sugar. P38 : I hear from the dentist saying if there are sugary residues inside the oral cavity, the bacteria would grow more easily, and this could result in easier cavity formation. P27: Every 6 month we have a dental appointment, that doctor remained us that drinking milk have higher chance to get dental decay. P35: I do believe if they [her friends' kids] had proper oral care, they should not get tooth decay (laugh). This is what I learned from the pediatric dentist.</p>
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			<p>The impact: P1: I am saying since I come to U.S., I heard dentists say so. We don't have this sense in China. Usually people in China believe that even if the teeth were eaten by the worms, we still can have a new set of pretty teeth. The new teeth won't be affected by caries.</p> <p>Family members' experience: The causes/impact: P42: I got this kind of concept by observing my nephew. After he ate too much sugary foods and didn't do the clean up properly, didn't brush his teeth, cavity happened. P15: I saw many elders they don't have teeth, they eat... hardly, they want to eat but they can't. P29: I often hear my mother said that "if you don't take good care of your teeth when you are little, it will not good for your new changing teeth [permanent teeth]!"</p>
Indicating lack of knowledge regarding childhood caries (n=27)	<p>Do not know caries' impact on the mouth n=5</p> <p>Do not know caries' impact on the body n=13</p> <p>Caries has no impact on a child's body n=3</p> <p>Do not know how sweet food can cause caries n=2</p> <p>Caries will only last and affect a child until changing second set of teeth n=10</p> <p>Caries will only last and affect a child until teeth fall out n=3</p> <p>Times of having candy is not a problem n=1</p>	27(59%)	<p>Twenty-seven participants (59%) showed lack of knowledge from interview questions 1, 4, and 5.</p> <p>P27: Like us coming from China, we do not quite understand this [how caries affect a child's mouth and body], right? No ideas about how it affects other aspects, I don't understand.</p> <p>P46: Because I am a dentist, I roughly know (laugh) how long caries will last or affect a child. But, what I just mention may not be correct.</p>
Knowledge/care changed after coming to U.S. (n=2)	<p>The length that caries can affect a child n=1</p> <p>Childhood caries can affect adult teeth n=1</p> <p>Taking child for routine dental checkups n=1</p>	2(4%)	<p>P1: However, after I come to U.S., some doctors here say "it will have lifelong impact." Now, I think caries may affect for a lifelong.</p>

Commented [F14]: This is another example of a VERY different model of caries...VERY important.

			<p>Note: [P1: I am saying since I come to U.S., I heard dentists say so. We don't have this sense in China. Usually people in China believe that even if the teeth were eaten by the worms, we still can have a new set of pretty teeth. The new teeth won't be affected by caries].</p> <p>P1: Since I come to America, I agree people saying caries will affect baby teeth. And, decayed baby teeth will affect adult teeth.</p> <p>Note: [P29: Because I am an example coz I was growing in the village, and my mother she did not take me to the dentist each year like the kids do in the U.S. In the clinic, the dentist will clean...clean the teeth for the kids. So, that's why I got toothache all the time when I was a kid] °</p> <p>P29: But after I came to US, I often protect my teeth [by visiting the dentist]. So, I don't have any pain right now.</p>
<p>The way parents recognize caries in their children (n=13)</p>	<p>Regular checkups P4,6,12,19,20,21,25,27,28,38,43 n=11</p> <p>Dental examination P26 n=1</p> <p>Found caries but no action about it: P23, 27 n=2</p>	13(28%)	

Aim 1-2 (Questions 1~2), Responses, and quotes

Overall Aim: To describe Chinese immigrant parents' Explanatory Model of dental caries (etiology, onset of symptoms, pathophysiology, course of caries, treatment).

Aim 1: To describe parents' perceived causes of childhood caries (Etiology)

Specific Aims/Questions/Responses	Quotes (Note: only list quotes giving more detail and special!)
<p>Question 1: What do you believe to be the causes of childhood caries?</p>	
<p>Sweet snacks: sugar, candy, etc.</p> <p>All parents (N=46) mentioned that taking sweet snacks is one of the causes. Participants: 1-46</p> <p>Note: (1) Diet Habit:</p> <p>Food and drink intake that parents believe can cause children caries includes sweet snacks (100%), sugar drinks (20%), milk (20%), breast milk (4%), and calcium (2%).</p> <p>I think those responses can be categorized as "Diet habit" because they are all related to children's daily food intake. Moreover, diet habit was from participant 45's word (emic label).</p> <p>(2) Children factor: brush by themselves, don't brush, upset about brushing</p>	<p>The type of sweets: too sweet snacks</p> <p>P28: To me, the soft fruit candy is very sweet; it is easier to cause tooth decay P28: We sometimes live with grandpa and grandma. So when the grandparents live with us, they give the grandkids candy without telling us. So...then we did not pay attention to that. P12: You know much food in America is sweet. P12: Sweets are the majority. My daughter often says too much sugar in every kind of foods...every kind. Everything sale in the store is sweet stuff, such as donut and bread. She told us that. P33: Cookies, the ones are very very sweet cookies in U.S. P38: also like eating candy that kind of stuff. P42: General speaking, all the food is very sweet, including fruit. Some fruit is very sweet. I mean all too sweet. The food taking is too sweet! P42: My son, he has not tried every kind of food yet, he only gets fruit. But, I think fruit contains sugar that is a lot of sugar. P42: Rice contains lots of sugar, also like candy, bread; they all contain too much sugar. If children take sweet items too much, they will be easier to have caries. P43: Having sweet items are easier to get tooth decay.</p> <p>The type of sweets: sticky, soft, refined items</p> <p>P16: Taking candy...taking candy...like Snickers, that kind of sticky candies (laugh). P23: For my options, that is sweet item. Chocolates are the easiest one for caries. P45: Sweet snacks such as candies! P43: She sometimes would eat candies, ice cream. Those are associated with dental caries. P37: I think it could be those refined food but I am not quite sure about it. Anyways, I feel that refined foods should be easier to have caries, such as cakes and candies.</p>

	<p>P28: He likes to eat sweet stuff. My relatives from Taiwan would give us some milk candy, when they come to visit.</p> <p>P 28: Also, he really likes Hi-Chew, one kind of soft fruit candies.</p> <p>P36: The soft and sticky items like rice, ah...it will cause tooth bacteria grow that erodes the teeth</p> <p>P35: Then I discover that grandma brought something... from Taiwan. That is called maltose.</p> <p>The amount of taking sweets: too much:</p> <p>P18: Usually eats sugar stuff, and eat a lot of candies.</p> <p>P28: Ate too much candy, can cause decay.</p> <p>P33: Eat too much sweet items, like candy, chocolate, and ice cream. Those kinds of stuff.</p> <p>P39: Eat too much candy, too much candy.</p> <p>P38: But we don't usually let her eat a lot of candies, we'll try to minimize the intake of candies.</p> <p>P40: Taking too much sugary food...too much snacks, I think would also cause dental caries.</p> <p>P41: Having too much candy.</p> <p>P43: She was eating too much candy (laugh).</p> <p>P44: Eating too much candy!</p> <p>P45: Diet aspect means...for example, eating too much sugary food. Some sort like this.</p> <p>P46: Having too much sweet food.</p> <p>Timing of taking sweets:</p> <p>P40: Often have candies.</p> <p>P43: She probably had sweets once a day, but I did not know how much sweets she took because I went to work. Her grandma let her ate sweets and she told me maybe just once a day.</p> <p>P38: But we try not to give her too many candies to eat, try our best not to give often.</p> <p>P41: Last time I thought that my son would easily get a cavity. So, I controlled his intake of sugary foods, and now he does not get any cavities. The other kids who have cavities had easy contact with sugary foods. One of the reasons is their grandparents. They usually spoil these kids by letting them eat whatever they want, including these sugary foods like candies and drinking juice a lot. Those are their favorites.</p> <p>P45: Besides, dietary habits can also be the cause of childhood carries. For example, whether the child only takes these snacks or food during a particular time, or having a rest after having these foods.</p> <p>P44: I heard from someone else that often having sugar items will cause decayed teeth, am I right?</p> <p>P35: Let him having candies before bed time when grandma was visiting. For example, after dinner around 7 or 8 pm, he took some snacks, and then he probably went to bed around 9 o'clock.</p> <p>P42: Well...sleep...eat too much [sugar] before sleep.</p> <p style="text-align: center;">Mechanism of caries:</p> <p>Sticking to the teeth:</p> <p>P1: Sweet is easily stick to the teeth and leads to bad teeth.</p> <p>P12: So...if something is stuck in your teeth, then you will have caries.</p>
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P31: After having sweets and do not deeply brush the teeth, the sweet stuff will sticky or attach on the teeth...
 P35: Some food stuck on the teeth, those eroded stuff causes teeth decay.
 P41: The candies would stick to the teeth and then cause tooth decay (laugh)! This is base on my general knowledge. Moreover, the child doesn't brush the teeth afterwards. I even think if consumes too much sugary food; the saliva would turn a little sweeter. The higher the glucose level, the easier the cavity happens, I think it should be like this.
 P42: Eat too much [sugar] before sleep. Because these sugary residues would stick to the teeth, and then these residues would decay into it.
 P44: Possibly...let me guess... (laugh). It could be the sugar sticks on the surface of the teeth. Stays on the outer layer of the teeth if you do not clean it away. It will start to penetrate and penetrate into the wall of your teeth. Then, you will have decayed teeth later. I think it should be like this (laugh).

The time sweet foods/drinks left on the teeth or inside the mouth:

P12: You can smell a bad odor. Is it the reason? A bad odor. If you do not clean it, it [sweets] will stay inside for a long time. Just like the dirty water, worms will grow up there.
 P23: Anyway sweet item is not good for the teeth (laugh), such as chocolate and candy. If the longer the time left in the mouth, it is more likely to cause bad teeth. It leads to her bad teeth.
 P27: The milk inside the mouth too long and without dilute by water. Children will have greater chances for getting teeth decayed.
 P36: Sometimes, after kids ate, she would not rinse the mouth immediately or rinse the mouth carefully, the stuffs she ate will sticky on her teeth [soft, sticky food].
 P42: I think if the sweet item lefts inside the mouth too long, and then the child do not cleanup well. It will cause cavities.

Germ/bacteria/worms grow inside the teeth:

Germ: P24, 31

P24: (Silence) The tooth germ will destroy all of the teeth, just like in the photo images; those pictures showing a lot of germ inside of teeth.
 P31: I think if he does not brush teeth before going to bed, the germ inside of the mouth will grow more and more at all night long.

Bacteria: P10, 30, 45, 46

P10: People state it in the common statement. It is because in the old days in China, people will certainly not understand if you mention it as bacteria (laugh).
 P30: If my child has candy, cookies or drinks juice, usually I would provide him some water to drink after he eats his snacks. But if don't brush teeth or rinse off the food particle after eating, I am thinking it could be developing bacteria!
 P30: there's a name of bacteria um...I forget the bacteria's name. Anyways, the bacteria left there will cause tooth decay. I really forget its name...

Commented [F15]: Are they distinguishing b/t worms and germs? Very important distinction! Return to the transcripts to verify WHICH TERM they are stating OR if you need to have these transcripts with these terms RETRANSLATED to be sure of what you choose to write: germs or worms? OR, are they the SAME terms being used in the transcript? Check the transcripts. **Changes made!**

	<p>P46: I should say there are bacteria in the mouth, but if you don't have good oral hygiene, the...the germs will cause teeth decay.</p> <p>P45: How candies and drinks affect the teeth...? It seems like they will form something on the surface of the teeth? Is it called dental plaque or something else?</p> <p>Worms: P10,12,25</p> <p>P10: People state it in the common statement. It is because in the old days in China, people will certainly not understand if you mention it as bacteria (laugh).</p> <p>P10: Caries is kind of bacteria, right? It is impossible to have worms inside the mouth (laugh).</p> <p>P12: If you do not clean your teeth, then your teeth will be bad gradually.</p> <p>P12: You can smell a bad odor. Is it the reason? A bad odor. If you do not clean it, it will stay inside for a long time. Just like the dirty water, worms will grow up there.</p> <p>P12: I told my son that "you have to learn how to clean your teeth, then the worms will not coming out from your teeth".</p> <p>P25: Sweet, too sweet, the sweet stuffs left inside the teeth and the worms may like the sweet stuffs.</p> <p>P25: Teeth itself has no worms, but sweet stuffs will lead to germs growing inside the teeth. The germs produce the worms. (Sweet—germs--worms)</p> <p>Acidifying/eroding the teeth:</p> <p>P31: It is possible that it [sugar] will acidify. After acidifying, the bacteria will grow up, right? Then, the bacteria will erode the teeth.</p> <p>P37: Sweet food will become acid, right! So, it will erode the tooth enamel. Yes, it is.</p> <p>P39: That is sugar will ferment, then the following process I am not very sure about it. But, I do know taking too much candies at most time does make she had decayed teeth.</p> <p>P40: I only know that it could be the sweet food attaches to the teeth, and then it erodes the enamel.</p> <p>P46: Bacteria would use sweet food as..., they will decompose it into a certain type of material. I forgot the name of the material. Then, that material would cause decay on the surface of the enamel, and the enamel would start to decay and cause cavities.</p> <p>P45: It seems like candies and soft drinks would promote cavity formation on the surface of the teeth, am I right? Is it the dental plaque? Or is it other problem?</p> <p>P45: The dental plaque would attach to the surface of the teeth. Anyways, and then decalcification would occur. After the decalcification, the lack of calcium would result in a weaker protection of the teeth, and then caries occurs.</p> <p>P46: Bacteria would use sweet food as..., they will decompose it into a certain type of material. I forgot the name of the material. Then, that material would erode the surface of the enamel, and the enamel would start to decompose, and then cause a cavity.</p> <p>I don't know:</p> <p>P43: I do not know how the candy can cause dental decay. That is probably not clean teeth well.</p>
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Commented [F16]: Major quote: worms will not come out from your teeth! Does this mean this parent thinks worms LIVE IN the teeth?
From the last quote, it seems YES!

Commented [F17]: WOW! Does this mean this parent thinks that decayed teeth will erode ADDITIONAL teeth? There is a total model in this, Flora....WRITE UP THE DIFFERENT MODELS OF CAUSATION that the parents are reporting.
Question: After checking with transcripts, change made. I do hand-draw causation model for EACH participant, do I need to do that?
Answer: Generate diagrams that represent the results.

<p>Sugar drinks</p> <p>Nine parents (20%) mentioned that having sweet drinks is one of the causes. Participants: 2, 6, 11, 16, 20, 30, 31, 37, 45</p>	<p>P45: This is all I know; I have no ideas about others (laugh).</p> <p>Types of drinks: P37: soda, I think soda is kind of refined food! (laugh). But, I am really not sure if it is or not. P45: sweet food or juice. ◦</p> <p>Drinking too much: P2: Taking too many sweets, like soft drinks, will result in caries. P11: I think this is the difference between him and my friend's child. The age difference of these two children is 4 days. My friend's child likes juice. I can recall that he drank too much juice so he had caries (laugh).</p> <p>Times of drinking: P30: Drink juices often.</p>
<p>Milk</p> <p>Seven parents (15%) mentioned drinking milk is one of the causes. Participants: 9,10,13,18, 21, 26, 27</p>	<p>Timing of drinking: P9: And drinking milk. When he was two or three years old, he woke up in the midnight and asked for milk: "Get up, I want milk". I think it was due to drinking milk in the midnight. Maybe that is not good to teeth. P21: When she was a baby, she drank milk and sleep; she sucked the bottle while sleeping. P21: Her grandma who's the one taking care when she was young in Taiwan. When she was 4 and half years old, she came to America. When she was a little baby, she would fall asleep when the grandma fed her milk.</p> <p>Having a lot of sugar: P26: Drinking milk is a problem too. Milk itself has a lot of sugar. If he did not rinse the mouth right after taking milk, it will get teeth decay easier.</p>
<p>Breast milk</p> <p>Two parents (4%) mentioned that having breast milk could be a cause. Participants: 7, 23</p>	<p>Having sugar: P7: Actually, taking breast milk also easily results in caries. It is mainly because there is sugar in the milk. P23: The mom's milk contains sweet, even it is not too sweet, but when she is in asleep and sucking at the same time, it is a great chance for her to get caries.</p> <p>Timing of drinking: P23: Because she...she...especially during sleeping, if you feed her the breast milk, because breast milk contains sugar, even it is not too sweet. But, having breast milk during sleep will worsen her bad teeth. Because you feed her the breast milk without cleaning, the milk will penetrate into the teeth. P23: If kids have breast feeding, they are in the great chances to get teeth decay. P23: When you breast feed and she falls in sleep, the mom's milk contains sweet, even it is not too sweet, but when she is in asleep and sucking at the same time, it is great a chance for her to get caries, because you feed her, she does not get teeth clean, ah, the sweet will cause decayed teeth.</p>
<p>Meals P33, 44</p>	<p>P33: Because there is a lot of foods still stick in between teeth after meals, so I think we must brush teeth after meals.</p>

Commented [F18]: Interesting model of explanation of how breast milk results in caries

<p>Meat Two parents (4%) mentioned that meat stuck in the tooth is one of the causes. Participants: 13,15</p>	<p>P44: Did not clean up the teeth after having meals.</p> <p>P13: There is something looks like meat residue, gets stuck in the tooth, if you didn't brush clear, if you didn't take it off at the time, it will breed bacteria slowly, slowly, his mouth cavity's temperature is easy to breed bacteria, human's temperature is easy to breed bacteria.</p> <p>P15: Something we eat, like meat, candies, will decayed tooth. Because if you eat meat, vegetables. The meat can stuck between the teeth. If not brushing will easy to rot the teeth. I think if we don't brush them, when we eat cookies, will damage the teeth, either, because it is food, too, the things you eat in the mouth.</p>
<p>Sucking feeding bottles</p> <p>Four parents (9%) mentioned that sucking feeding bottles is one of the causes. Participants: 3, 15, 16, 30(Sleep)</p> <p>Note: Move to "diet habit"</p>	<p>Sucking too long:</p> <p>P3: It's like sucking at the feeding bottle. Of course you will... if you sucking at the bottle for too long.</p> <p>P15: A one-year-old kid needs to stop to suck the bottle, but she does not wean him from a bottle. She just lets his two-year old son sucking it, so that his tooth is broken. Then I feel weird, she said she didn't give candies to her kid, but why his tooth has broken, she said that because he still does not stop sucking on the bottle.</p> <p>P15: when a child sucks on the bottle while sleeping, the milk will stay on the teeth, and then broken a child's teeth.</p> <p>Times of sucking:</p> <p>P16: When children often use the feeding bottle, it makes them have dental decay.</p> <p>P30: I do know giving kids a bottle before going to bed in the night will get tooth decay too. Yeah.</p>
<p>Using sippy cups</p> <p>One parent (2%) mentioned this as a cause. Participants:11</p> <p>Note: Move to "diet habit"</p>	<p>Times of sucking:</p> <p>P11: When he drives his car, he likes to let his child having a juice sippy cup to drink. A sippy cup... His child always sucks on the cup. I think this is why he has caries.</p>
<p>Toothbrushing/cleaning habit</p> <p>Forty-five parents (98%) mentioned that tooth clean or brush is one of the causes. Participants: 1-19, 21-46</p> <p>Note: Category "oral hygiene" draws from: good oral hygiene (P46), clean habit (P14), brush habit (P45).</p>	<p>Times of brushing/cleaning:</p> <p>P14: His clean habit is not good. So, I need to ask him... ask him to brush his teeth day and night. But it's difficult to him to carry out.</p> <p>P16: Not brushing teeth.</p> <p>P28: Maybe the number of times for brushing is not adequate. So far he only brushes teeth once a day.</p> <p>P38: Maybe brush teeth not often!</p> <p>P38: For example, she does not brush her teeth regularly in the morning and night. I ask her to brush but she just doesn't want to do it.</p> <p>P38: When she is frustrated, she won't brush teeth.</p> <p>P39: And didn't wash...I mean brush teeth.</p> <p>P42: I got this kind of concept by observing my nephew. After he ate too much sugary foods and didn't clean up properly, didn't brush his teeth, and cavity happened.</p>

	<p>P45: Hygiene habits, for examples, brush habits, how many times a day you brush? P46: If have too much sweet food, and then... does not brush teeth.</p> <p>Timing of brushing: P29: Without brush teeth and go to bed. P29: If you did not brush teeth before going to bed, the germ will get into the teeth, and that is not good for the teeth, because the germ will be hiding inside of the teeth. P31: I think if he does not brush teeth before going to bed, the germs inside of the mouth will grow more and more in all night long. P44: After having sugar items, and then does not brush teeth! P44: Does not brush after meals. P42: Not clean well before sleep. P31: After having sweets and do not deeply clean the teeth, the sweet stuff will sticky or attach on the teeth. P40: Does not perform cleaning actions right after eating. P42: I think if the sweet item left inside the mouth too long, it does not cleanup well. It will cause decayed teeth.</p> <p>The method of toothbrushing(brush incorrect, brush themselves, parents' assistance role): P16: Brushing teeth... brushing in the wrong way. P21: Maybe...he did not brush long enough or did not brush some teeth. P26: Should be, he did not brush very well. P28: Oral clean is not detail enough. P28: Form my option; the primary reason is not detailed enough. P13: Brushing teeth without toothpaste. P26 : I want him to brush his teeth by himself. So, he does not need help from me all the time. So I start to let him do it, just let him brushing himself. I did not pay attention to him. That leads to he did not do well by himself. P35: He insists he wants to brush teeth by himself, so he brushes his teeth persist for a period of time. P25: I also help her to brush her teeth; maybe I do not do the good job. P45: Hygiene habits, for examples, Who is the one helping him to brush? And, whether he brushes by himself? These kinds of questions! P23: I believe breast fed her may associate with dental caries. When she was a baby, I did not help her with clean so...she got dental cavity. P46: Hygiene habits...such as the parents do not help kids to clean up the mouth. P46: Hygiene habits...or the parents do not check on their children [after they brush their teeth]. P46: What I mean is that the parents should check their children's teeth although they are old enough to brush their teeth themselves. P37: Brushing with the incorrect method or do it not thorough enough. P38: Or even sometimes she would just simply brush her teeth.</p>
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	<p>P40: And then...clean, clean not thoroughly. P41: [Children] brush their teeth not thoroughly. P42: P42: When children do their cleaning, they do not clean the food properly. P42: Because when there are any residues that are trapped in between the teeth, tooth decay starts to happen. P43: She knows how to brush her teeth, but maybe she is still incapable of doing it properly...She cannot clean it thoroughly. P43: I think cleaning not thorough should be the main cause for her, as cavity usually happens in those teeth which are deeper inside the mouth and harder to reach.</p>
<p>Not rinsing OR drinking water after having sweets</p> <p>Rinsing, participants: 9, 13, 26, 27, 29, 30, 32, 35, 36, 44 (n=10) Water, participants: 6, 34 (n=2)</p>	<p>P6: It seems like he [participant's son] ate sweets, and he did not drink water after eating something... [Therefore, he had cavities]. P9: Maybe after drinking milk, he did not clean his mouth with water. He said "I do not want to brush my teeth and I want to sleep". P26: Also he ate candies is more likely to have caries. Candies have more sugar.... if he [participant's son] does not gargle right after taking sweets. He will... get teeth decay easier. If my child has candy, cookies or drinks juice, usually I would provide him some water to drink after he eats his snacks. But if don't brush teeth or rinse off the food particle after eating, I am thinking it could be <u>developing bacteria!</u></p>
<p>Tooth flossing habit</p> <p>Nine parents (20%) mentioned that not flossing is one of the causes. Participants: 6, 19, 22, 25, 28, 30, 31, 34, 35</p>	<p>Do not use floss: P6: Only brush the teeth, and do not use floss. P19: The dental floss is also a need and vital. P22: Does not use floss to clean the teeth. P30: Do not dental floss also will get tooth cavity.</p> <p>Parents' assistance role: P25: I did not floss her teeth, so this led to more teeth decayed. P28: About dental floss part, it is used between teeth. When I was busy, I then will ask child's dad to help him brush teeth. Maybe...his dad did not floss thoroughly. I think it is. P31: For the second kid, maybe we did not help him to use dental floss very well, so there were foods left over and sticky in between teeth gaps, yes, it was the reason for him to have cavities. P35: I did not floss his teeth, so that he got tooth decay in a short period of time.</p> <p>Parents' thought regarding dental floss: P1: One more thing is brushing teeth. I'm saying tooth brushing...mouth...Because I just came from China, people in my area usually do not floss their teeth like Americans. We don't have such concept yet. P34: The meat will stuck in between teeth, I find out many parents think kids do not need dental floss, including parents of my kid's classmates... not only Chinese. P34: Actually, in US many Mexicans and other people, they all do not pay attention to floss usage. P35: Because the spaces between teeth are very tight and small, it is not easy for me to clean. If I do not use dental floss to clean the spaces, he must get dental decay. After the experience of his cavity, now I am be</p>

<p>Inheritance/Genetic/Inborn</p> <p>Nine parents (20%) mentioned that this is one of the causes. Participants: 7, 8, 12, 16, 19, 21, 37, 41, 45</p> <p>Note: If parent think there is a biological tendency, they may not think caries prevention is important. Because no matter what they do, their children will get dental caries.</p>	<p>more aware about flossing.</p> <p>Inheritance/Genetic issues: P8: Well, if the parents have good teeth even though they do not take good care of their teeth (laugh), their child will not have caries. Therefore, I have that impression. Well, this is related to inheritance. P12: It should be associated with the inheritance. They do have the inheritance. The bad teeth come from last generation. Caries can be passed to the next generation too. P12: It seems like someone will say, "Oh, your child's teeth looks not good. Is it just like his father or mother?" P45: An inheritance is also a cause I think...For example, if parents' teeth are no good, their children would most likely be the same. P45: If we speak in scientific way, according to what I know, I think the structure of the bone affects the width of the spaces in between the teeth, and the structure of the bone is partially hereditary, so the chances of getting cavity would vary. So I think hereditary aspect should be considered. P16: It's also possible related to genetic. I think that if your parents' teeth...are not good, are not good, the changes he gets the dental decay is higher than others (laugh). P37: I think the genetic issue also contributes to this problem [dental caries]. Some people are born with weaker tooth enamel, and I think it affects too.</p> <p>Inborn tooth issues: P19: I think his teeth...the inborn spaces or sizes of teeth. If his occlusion...occlusion of his teeth is great, it will cause dental decay. In other words, you don't use the dental floss, and some of your teeth are bigger, such as our family, me or my son. His mouth is smaller but the teeth are bigger, and the spaces between bigger teeth are not even. So, it may cause...tooth decay because he can't brush the inside of those teeth. P21: I think caries...some people tend to be more vulnerable, they easier get invaded by teeth bacteria, and then lead to caries. Some people tend not to have caries, when they born. I think this is the difference that some people tend to be vulnerable for plague...that is bacterium type of caries. P41: It should also be inborn problem too! P41: My friend's daughter... Her whole teeth were decayed when she was only 2 years old. One of the teeth was broken into half when she was 4 years old; the color was turning to black too. So, I think her natural inborn problem is severer than my child.</p>
<p>Bacteria/Germs in the mouth</p> <p>Two parents (4%) mentioned that germ is one of the causes. Participants: 24,46</p>	<p>P24: (Silence) The tooth germs will destroy all of the teeth, just like in the photo images; those pictures showing a lot of germs inside of teeth. P46: Um...germs. P46: I should say there are bacteria in the mouth, but if you don't have good oral hygiene, the...the germs will cause tooth decay.</p>
<p>Be infected through others</p> <p>Two parents (4%) mentioned germ is one of the causes. Participants: 11, 24</p>	<p>Share foods: P11: For example, when some elders take care of their grandchildren, I mean eating food together. They will have the food one bite, and then also feed the child. Let the child has one bite too. Then the child will be infected.</p>

Commented [F19]: These are amazing models of explanation!

	<p>Share toothbrush: P24: If you find out you have caries, the kids could not share the toothbrush, they need to separate toothbrush, and otherwise they will get teeth decay from the germ.</p>
<p>Children's biting their fingers</p> <p>Two parents (4%) mentioned biting fingers is one of the causes. Participants: 4, 9</p>	<p>P4: My second child was...I suspected she bit her fingers and led to caries. My fifth one didn't do that. No...both my third and fifth children didn't do that. They didn't bite their fingers. So, I told the dentist about this. And the dentist said it was possible...possible to have caries. P9: And he still has the habit to bite his fingers every night. So, he can fall in sleep.</p>
<p>No teeth washing and routine checkups at dental clinic</p> <p>Two parents (4%) mentioned this as cause. Participants: 21,22</p>	<p>P21: Also when she was little staying in Taiwan, I think she did not have regular checkups. P22: Not visiting the dentists often...do not go to the clinic for teeth washing and teeth care.</p>

Aim 2: To describe parents' perceived timing and reasons for the start of the symptoms (Onset of symptoms)

Question 2:	
When did you recognize the problem in your child? At what age do you think a child could start to have dental caries?	
<p>As soon as their teeth erupted</p> <p>22% of parents (n=10) stated children could start to have caries as early as they have their first tooth. Participants: 4,16,23,24,30,41,42,44,45,46</p>	<p>P16: When there is a tooth coming out, a child will have changes for dental decay. It is about aged 6 months. P23: Very early! Since she had a teeth, it was 1-year-old. P41: You could start to have caries once the first tooth grows out! So roughly around 1-2 year old. P44: I think there is a possibility of getting dental cavity once the teeth starts to grow. I think at aged a half year, there is a chance of getting dental cavities. P45: How old? Very young! Ever since his tooth starts to grow, there is a possibility of getting dental cavities. P46: As long as you have teeth, you may have chance having caries. Six months, most children have their first tooth at age 6-month.</p>
<p>Aged 1-2 years</p> <p>9% of parents (n=4) stated children aged 1-2 years could start to have dental caries. Participants: 1,7,15, 18</p>	<p>P1: Children may have caries when they are one or two years old. P18: I saw little child, very little, a few months. It seems like around one-year-old children who had teeth decay. I saw some children.</p>
<p>Aged 2-3 years</p> <p>11% of parents (n=5) stated children aged 2-3 years could start to have dental caries. Participants: 2,22,27,29,34</p>	<p>P2: Between age 2-3 years old. P22: Maybe when their baby teeth were small, children [friends' children] at aged 2 years have already had dental decay.</p>
<p>Aged 3 years</p> <p>22% of parents (n=10) stated children aged 3 years could start to have dental caries. Participants: 3,6,11,12,20,31,35,36, 37,38</p>	<p>P3: Children always have caries since 3 years old. P6: One year ago, was 3 years and 11 months old. P35: My oldest one is 4 years old now. Ah...let me think... He maybe get caries around 3-years-old. P37: I guess it is about age 3 or 4! P38: It happened at last month when my child was 3-years-old.</p>
<p>Aged 4 years</p> <p>13% of parents (n=6) stated children aged 4 years could start to have dental caries. Participants: 8,10,19,25,26,32</p>	<p>P8: It should be 4.5 years old. P10: Probably more than 4 years old. P26: Because my oldest son was found he had caries at aged 4 years, when he received the examination for school enrollment. P19: Let's talk about age at four first, almost four years old. He had caries.</p>
<p>Aged 5 years</p> <p>17% of parents (n=8) stated children aged 5 years could start to have dental caries.</p>	<p>P17: It is possible...about five or six years old starting to have dental decay. P21: Probably, it was happened recently. My child now is 5 and half years old. P40: 5 years old. P43: 5 years old.</p>

Participants: 9,14,17,21,28,33,40,43	
Aged 6 years 4% of parents (n=2) stated children aged 6 years could start to have dental caries. Participants: 13,25	P13: About after 6-years-old! P25: We had a dental checkup, and then discovered she had a lot teeth problem. P25: Oh, six years old. Just happened last month, last month she had a checkup. P25: This is her second time for tooth decay. P25: When she was young around 4 or 5 years old, that was the first time we discovered she had two decayed teeth. P25: Also, it was found by the dentist.
Aged 7 years 2% of parents (n=1) stated children aged 6 years could start to have dental caries. Participants: 37	P37: I often saw children having caries at aged 7. Yeah...Most kids from my friends had caries at around aged 7.
Once children started to have sweets 2% of parents (n=1) stated. Participants: 39	P39: I think the cavity starts to exist ever since parents started to give her candies. P39: Her parents always let her consume candies every day, and she must be consuming more and more candies. This should be one of the causes. P39: I ever witness, my friend initially let them consume only a little, but soon, they start to take in more and more candies, then her teeth started to decay. P39: He [friend's child] lost all his frontal teeth when he was around six to seven years old, not even one tooth is in good condition.
Knowledge	
I am not sure/I don't know 7% of parents (n=3) stated I am not sure the age. Participants: 5, 26, 37	P5: I am not sure the time point. P26: Regarding this question...I am really not sure about it. P37: Actually, I don't know.
Reasons for age start to have dental caries?	
Diet Habit	
Once children started to have sweets 24% of parents (n=11) stated this reason. Participants: 1,2,7,10,15,22,23,29,34,36,39	P1: My personal experience...When I was in my hometown, I saw some children having too many candies or cookies. These children had caries when they were 1 or 2 years old. P7: It may be associated with initiated baby food. They may have something sweet. It is related to sweet. P23: I was feeding her breast milk at that time. Ah, so she should be get the... (laugh) P29: What we eat as adults, he eats the same things after 2 years old. P29: Usually children drink milk after 2 years old. P29: Drink juice, homemade kind of juice. P36: The other one, it is related to what kinds of food they are taking, like soft food and sticky food. P36: For we as Asian, we like rice, it is sticky kind one, it will sticky on the teeth. For kids, it is not easy to

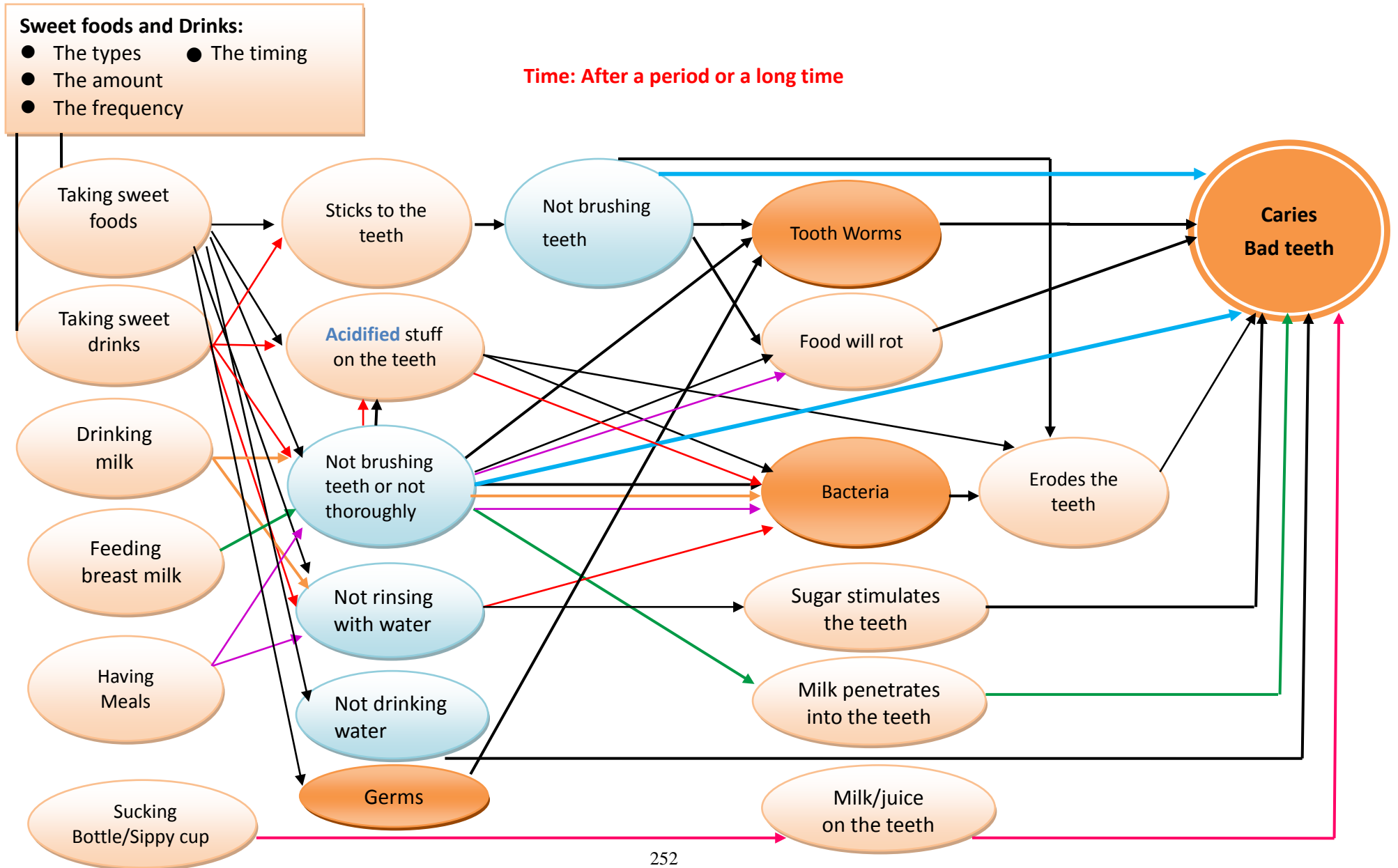
	clean the teeth. <u>It may be left on their teeth for a longer time, so it will erode their teeth.</u>
Do not have a healthy diet habit 2% of parents (n=1) stated this reason. Participants: 24	P24: If you have a good dental care method, especial a good habit for the kids. She would not eat too much candy when she was young.
Cannot control children taking sweets 4% of parents (n=2) stated this reason. Participants: 2,13	P13: Parents can control children and don't let children eat candies now! But after age 6, you can't control children. When children want to eat something, they just eat it. P13: He can buy some candies himself and drinks cola that he shouldn't drink and so on. P2: When he is 2 or 3 years old, he can get those sweets by himself. Now, he is too young to get it.
Oral Hygiene Habit	
Do not have an oral hygiene habit 2% of parents (n=1) stated this reason. Participants: 24	P24: If you have a good dental care method, especial a good habit for the kids. She would rinse the mouth after having candy, so she has a good habit for her own teeth.
Children refuse to brush teeth 2% of parents (n=1) stated this reason. Participants: 10 Note: move to "do not have an oral hygiene habit"	P10: At age 4, maybe brushing...Some 4-year-old children refuse to teeth brushing...tend to refuse...I saw those children having caries easily (laugh).
Not clean or brush thoroughly 7% of parents (n=3) stated this reason. Participants: 17,36,46	P17: She had her first tooth at age 1, so that now she has the teeth for 5-6 years. She does not brush her teeth thoroughly...She may have dental caries. P36: I think it is related to kids' teeth clean. If the teeth is not clean enough, that is about if she is not cleaning the teeth well enough. P46: <u>Once you got your teeth, there is a possibility of getting dental cavities, if you do not clean thoroughly.</u>
Do not clean or brush children's teeth 15% of parents (n=7) stated this reason. Participants: 4,5,15,30,33,35,44	P4: However, it depends on whether you brush or not brush his teeth. P5: Well, it depends on how the caregivers' clean their oral hygiene. If they do not care about it or not clean it well, then caries may be happened earlier. P44: Also I think before the teeth even start to grow, we should start to keep the gum and teeth clean. P44: Last time when I finished feeding him rice cereal, I would provide him some water to rinse his oral cavity, sometimes his gum would inflame.
Others	
Sucking feeding bottle while sleeping 2% of parents (n=1) stated this reason. Participants: 16	P16: Because they usually... [I meant] parents often gave the milk bottle to him in sleeping time and...let him suck...gave to him. Hum... and not taking it out while sleeping. The milk contains sweet and stays inside his mouth. So, he got tooth decay.
Do not have regular dental visits	P42: Because he already has teeth inside his mouth, so if he does not have dentist's maintenance, he will have

Commented [F20]: Again, here is an example of an explanatory model: food sticking on the teeth erodes the teeth.

2% of parents (n=1) stated this reason. Participants: 42	decayed teeth! Also, gum needs maintenance, needs clean up, and well clean up.
Need time to develop caries 7% of parents (n=3) stated this reason. Participants: 17,33, 37	P17: At age five or six probably. Generally, children have their first tooth at age one. The teeth have already been developed for few years, so that the teeth start to have dental caries. P33: Before age 5, the teeth still grow up. I think the teeth are still growing, should be this way. P33: So, in this period, if the parents and kids do not handle well, such as leaving the sweet stuff and rice stick in between teeth gap and not get cleanout. After a period of time, it will cause tooth decay, this is what I thought. P37: I think should be around the age of three or four. Because when he's still one year old, the teeth just grew out for a short period of time. So (laugh), I think it should take some time for the cavities to take form after taking sweet food. I am just guessing, not very sure about it.
The Way of Knowing about Caries	
Experiences from my children 43% of parents (n=20) stated this reason. Participants: 3,4,6,8,9,12,17,19,21,23,26,27,28,31,32,35,36,38,40,43	P12: I know my children had caries when they were 3 years old. At that time, the dentists pointed out caries a bit. Not too many. P17: When she was 5 or 6-year-old, she had her teeth for couple years. And, she did not brush her teeth well every day. She got caries. P23: I was breast fed her when she was little, she fall asleep, and she still ate milk at the same time, this causes her teeth decay, and I believe breast fed her may relate with dental caries. When she was a baby, I did not help her with clean so she got caries. P26: My oldest one was also discovered caries via dental examination around 4 years old, when he was ready to go to preschool. P38: Last month and my child was 3-years-od. P40: 5-years-old.
Experiences from my friends' children 20% of parents (n=9) stated this reason. Participants: 5,10,11,15,22,34, 37, 39, 41	P11: My friend's children had caries when they were 2 or 3 years old. P15: I remember I have a friend. Her child used feeding bottle for drinking milk. Because my friend was lazy, she did not quit the feeding bottle so her kid had caries. P22: Some of the children I know, some of them may have too many candies. Their baby teeth were small, but they already had teeth decay. P37: I often saw children having caries at aged 7. Yeah...Most kids from my friends had caries at around aged 7. P39: I ever witness, my friend initially let them consume only a little, but soon, they start to take in more and more candies, then her teeth started to decay. P39: He [friend's child] lost all his frontal teeth when he was around six to seven years old, not even one that is good. P41: Last time I didn't know that childhood caries could start as early as age one-year-old, after I saw their child, then I know.
Children I don't know	P18: I don't know the children. I visited the dentist at the international clinic. At the supermarket, I saw

<p>2% of parents (n=1) stated this reason. Participants: 18</p>	<p>children with bad teeth. They should have dental decay perhaps.</p>
<p>Dentist told me 2% of parents (n=1) stated this reason. Participants: 44</p>	<p>P44: That was the dentist told us (laugh). He asked us to pay attention to the [caries] issue, and also asked us to help him brush the teeth.</p>

Appendix F. Explanatory Models of Etiology of Childhood Caries
Explanatory Model of Etiology of Childhood Caries: Diet Habit



Explanatory Model of Etiology of Childhood Caries: Diet Habit

46 participants (100%) reported children's daily diet habit caused childhood caries, including the intake of sweet foods, sweet drinks, milk, breast milk, meals, meat, and usage of feeding bottle and sippy cup.

The intake of sweet foods

All participants believed sweet foods could cause dental caries. Participants identified certain sweet foods that are very sweet or too sweet, such as candy, U.S. cookies, donut, and ice cream. Sweet foods with higher sugar level are easy for children to develop dental caries. For example, a 43-year-old mother from China stated, *"You know much food in America is sweet. Sweets are the majority. My daughter often says [there is] too much sugar in every kind of foods...every kind. Everything sale in the store is sweet stuff, such as donut and bread. She told us that. Those are easier to cause tooth decay."* Parents identified certain types of sweets that easily lead to childhood caries, such as soft, sticky, and refined food. For example, a 38-year-old mother from Taiwan mentioned, *"He [participant's son] likes to eat sweet stuff. My relatives from Taiwan would give us some milk candy, when they come to visit. Also, he really likes Hi-Chew, one kind of soft fruit candies. To me, it is easier to cause dental cavity."* They also stated that the amount, frequency, and timing of sweets intake are associated with caries. For example, a 36-year-old mother from Hong Kong stated, *"She [participant's daughter] was eating too much candy (laugh). She probably had sweets once a day, but I did not know how much sweets she took because I went to work. Her grandma let her eat sweets and she told me maybe just once a day. I think that is why she had tooth decay."*

When the interviewer asked participants how taking sweet foods led to dental caries, most participants stated that taking sweet foods without toothbrushing, rinsing, or drinking water will lead to caries. Some participants mentioned sweet foods will stick to the teeth. If children

do not have their teeth brushed, tooth worms will grow inside the teeth. In addition, the residual food on the children's teeth will rot. Rotting teeth will cause bad teeth. For example, a 43-year-old mother with a high school education from China stated, *"If you do not clean it, it [sweets] will stay inside for a long time. Just like the dirty water, worms will grow up there. I told my son that you have to learn how to clean your teeth, then the worms will not coming out from your teeth."* Some participants described sweet foods will produce acidified material on the teeth that will facilitate bacteria growth or erode the teeth. For example, a 38-year-old mother with a college education from Taiwan stated, *"I think...better not to keep eating candies. Sugar in the mouth will produce acid! I am not sure about this...some sort of acid reaction. If your teeth will be in an acidized environment, that is good for bacteria to attach on the teeth, and then cause tooth decay."* From the diet habit diagram, participants indicated diverse pathways on how sweet foods lead to dental caries. Furthermore, 5 participants (11%) pointed out that the longer time sweets are left on the teeth, the greater chance there is to develop dental caries. A 37-year-old mother with a Masters education from China stated, *"For we as Asian, we like rice, it is the sticky kind one, it will sticky on the teeth. For kids, it is not easy to clean the teeth. It may be left on their teeth for a longer time, so it will erode their teeth."* Also, a 32-year-old mother from China stated, *"Anyway, sweet item is not good for the teeth (laugh), such as chocolate and candy. If the longer the time left in the mouth, it is more likely to cause bad teeth. It leads to her [participant's daughter] bad teeth."*

The intake of sweet drinks

Nine participants (20%) mentioned that sweet drinks could cause dental caries. Participants identified certain kinds of sweet drinks as causes of childhood caries, such as juice and soda. They also stated that the amount and frequency of sweet drinks intake are associated with caries. For example, a 34-year-old mother from China stated, *"I think this is the difference between him [participant's son] and my friend's child."*

The age difference of these two children is 4 days. My friend's child likes juice. I can recall that he [friend's child] drank too much juice so he had caries (laugh)."

When the interviewer asked participants in what ways having sweet drinks led to dental caries, most participants stated that either taking sweet drinks directly led to bad teeth, or sweet drinks will acidify the teeth or produce acid material on the teeth, which cause dental caries. One participant stated that not rinsing with water after sweet drinks will produce bacteria that cause caries. A 43-year-old mother from Taiwan mentioned, *"If my child has candies, cookies or drinks juice, usually I would provide him some water to rinse. But if [you] don't brush teeth or rinse off the food particles after eating, I am thinking it could be developing bacteria."* One participant stated if children do not brush teeth after taking sweet drinks at bedtime, sugar will acidify the teeth, thereby fostering bacterial growth and then eroding the teeth.

The intake of milk and breast milk

Seven participants (15%) stated that milk contains lots of sugar. If children have milk at midnight or drink and sleep without cleaning their teeth, they will more easily get teeth decay. Two participants (4%) stated that breast milk still contains little sugar, so there is a chance to get caries if children are fed while sleeping or without cleaning.

When the interviewer asked participants how having milk and breast milk led to dental caries, participants stated drinking milk without brushing teeth or rinsing mouth would cause bacteria to grow, leading to dental caries. For example, a 45-year-old mother from China stated, *"Even drink milk or something else...especially before sleep, if you are going to bed, you should brush your teeth thoroughly. It is because...if your mouth is too dirty...and you close your mouth during sleep, there is no air in your mouth and then the bacteria will be growing faster."* Moreover, one participant indicated that nursing children at night without cleaning the child's teeth will cause dental caries because the milk penetrates the teeth, the 32-year-old mother with high-school education from China said, *"If you feed her the breast milk, because breast milk*

contains sugar, even it is not too sweet. But, having breast milk during sleep will worsen her bad teeth. Because you feed her the breast milk without cleaning, the milk will penetrate into the teeth. Ah, the sweet will cause decayed teeth.”

The intake of meals

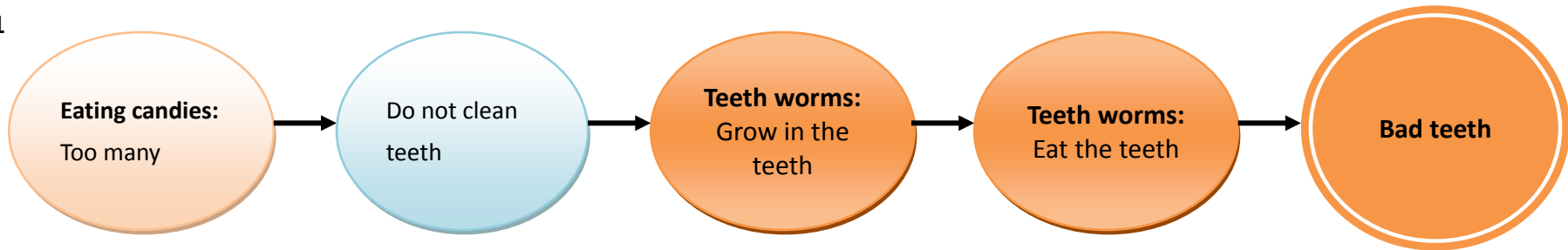
Four participants (9%) mentioned that having meals could cause dental caries. Participants believed that food left in the mouth after meals will lead to caries. Two participants stated that meat stuck between the teeth will cause caries. When the interviewer asked participants how having meals lead to dental caries, participants stated that having meals without brushing teeth or rinsing with water could lead to food rotten or bacteria produced. Consequently, it leads to dental caries. For example, a 32-year-old mother with a high-school education from China said, *“There is something looks like meat residue, gets stuck in the tooth, if you didn’t brush clean, if you didn’t take it off at the time, it will breed bacteria slowly, slowly, his mouth cavity’s temperature is easy to breed bacteria, human’s temperature is easy to breed bacteria.”*

The use of feeding bottles and sippy cups

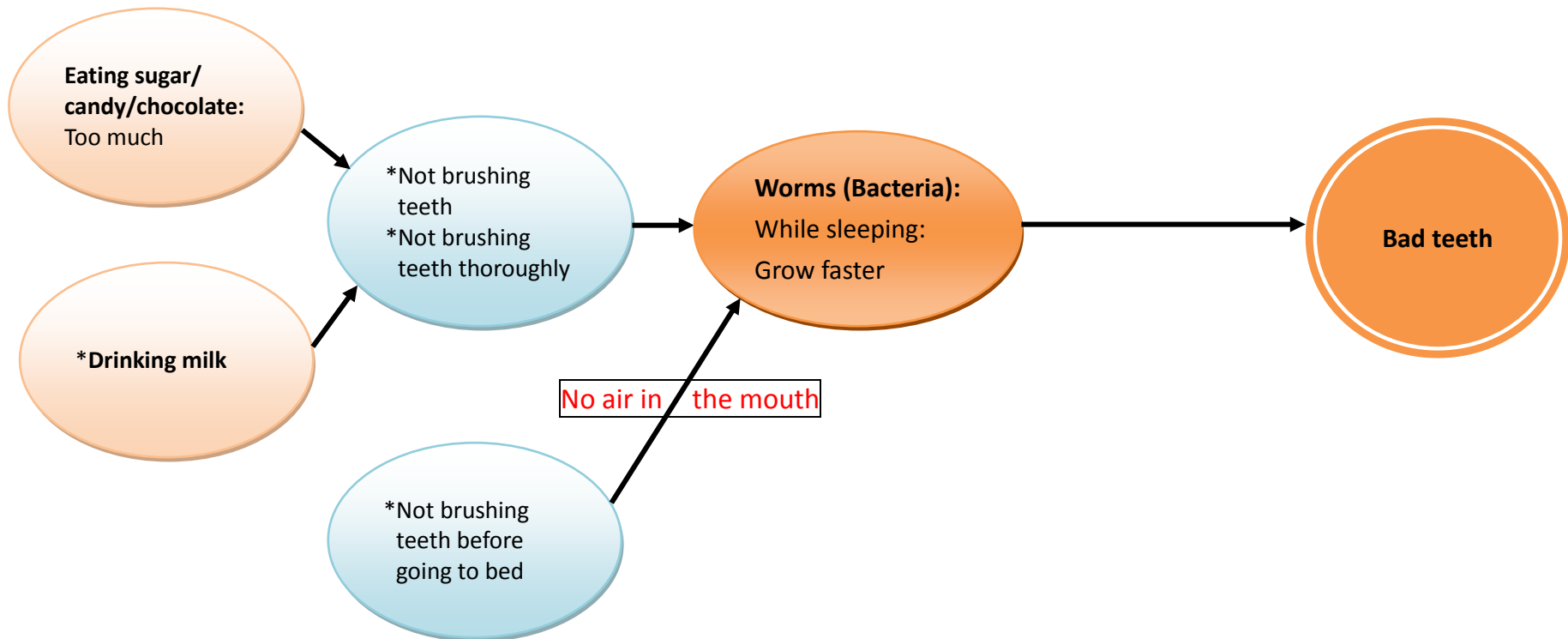
Five participants (11%) stated that sucking feeding bottles or sippy cups during sleep, for a long time, and the frequency of sucking are associated with dental caries. For example, a 34-year-old mother from China said, *“When he [participant’s friend] drives his car, he likes to let his child having a juice cup to drink. A sippy cup... His child always sucks on the cup. I think this is why he has caries.”* When the interviewer asked participants how children use a bottle or sippy cup lead to dental caries, most participants mentioned that milk and juice left on the teeth directly lead to dental caries. For example, a 33-year-old mother with a University education from China said, *“A one-year-old kid needs to stop to suck the bottle, but she [participant’s friend] does not wean him from a bottle. She just lets his two-years-old son sucking on it, so that his tooth is broken. When a child sucks on the bottle while sleeping, the milk will stay on the teeth, and then broken a child’s teeth.”*

Explanatory Model of Etiology of Childhood Caries: Tooth Worm Model

P1

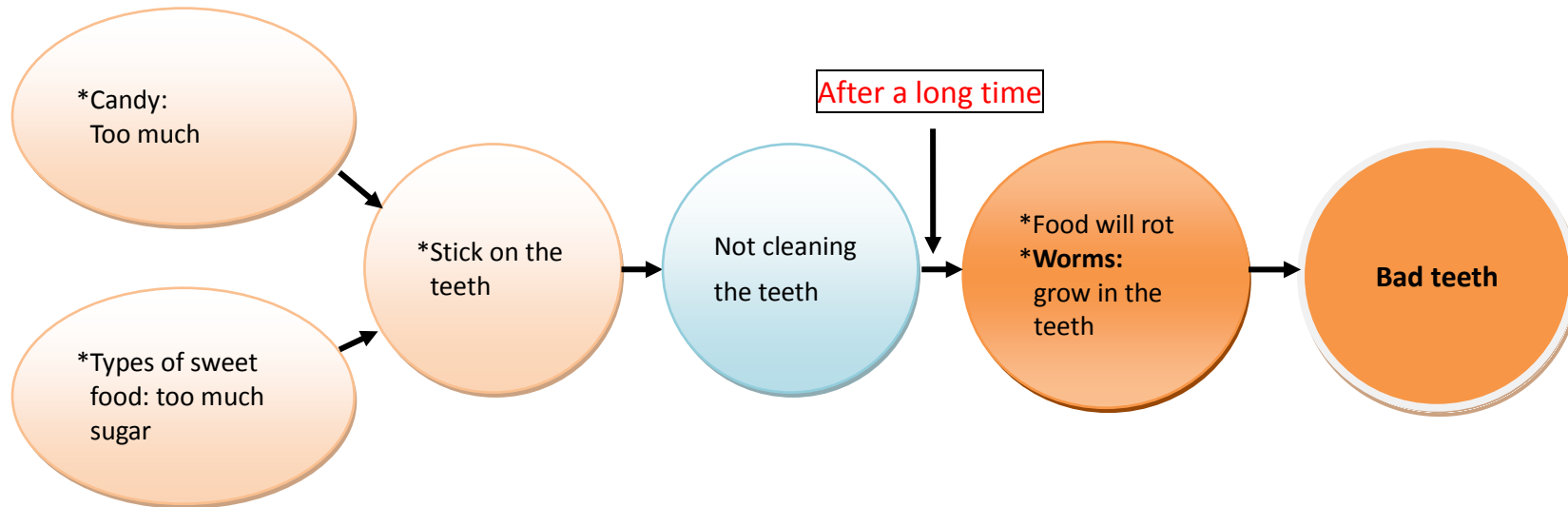


P10

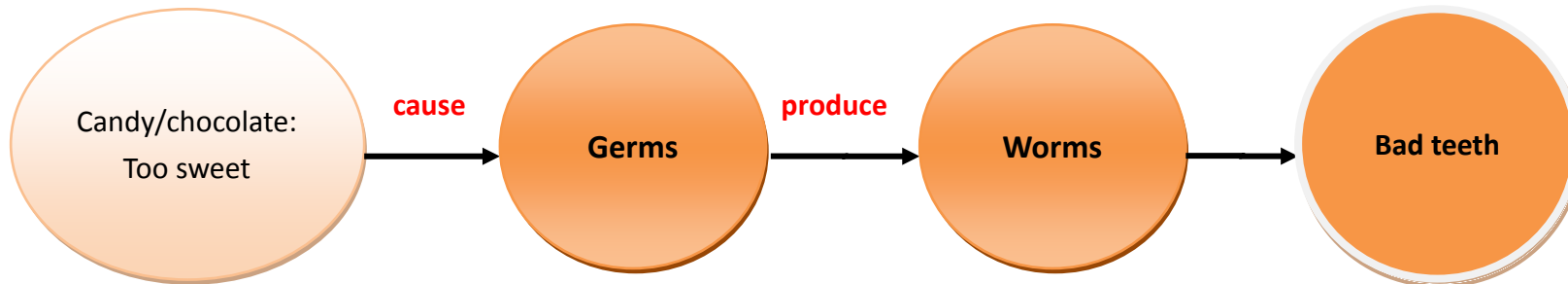


Explanatory Model of Etiology of Childhood Caries: Tooth Worm Model (con't)

P12



P25



Explanatory Model of Etiology of Childhood Caries: Tooth Worm Model

Four participants (9%) from China mentioned tooth worms could lead to caries. However, the ways they believed how tooth worm led to caries were different. One 45-year-old mother with a college education used “worms” and “bacteria” interchangeable. She said, “In the old days in China, people would certainly not understand if you mention bacteria. People use the term “worms” in the common statement.” One 43-year-old mother with a high school education said, “If people do not clean their teeth, worms would grow up inside the teeth.” A 33-year-old mother with a junior high education said, “Having candies without teeth clean will produce worms. Teeth would be eaten by the worms.” Another 42-year-old mother with a high school education stated, “Having sweets would lead to germs growing inside the teeth. Then, the germs produce worms.”

Explanatory Model of Etiology of Childhood Caries: Oral Hygiene Habit

Forty-five participants (98%) referred to the habit of children's toothbrushing, rinsing mouth and drinking water after having sweets, flossing, and parents' role in assisting children's oral hygiene practices (toothbrushing and flossing) as causes for childhood caries.

Toothbrushing habit

Forty-five participants (98%) stated that the frequency of toothbrushing (how many times a day), timing of toothbrushing (when the child has his/her teeth brushed), the method of toothbrushing (brushing method, brushing duration, whether use fluoridated toothpaste/dental floss, parents' assistance role) of children's toothbrushing are associated with childhood caries. Some parents concerned their child not having proper times of brushing, as a 38-year-old mother from Taiwan said, *"Maybe the times of brush are too less, because so far he only brushes teeth once a day. We ask him to brush teeth by himself once in the morning."* In terms of timing of toothbrushing, most parents believed brushing before bedtime, right after having sweets and meals is important to prevent dental caries. For example, a 38-year-old mother from Taiwan said, *"I think if he does not brush teeth before going to bed, the germs inside of the mouth will grow more and more in all night long"*. Regarding the method of brushing, many parents indicated children might not brush their teeth thoroughly or not in a correct way. Furthermore, most parents pointed out the importance of parent's involvement in children's toothbrushing, such as children insists to brush their own, parents do not help the child with toothbrushing, or supervise children. For example, a 36-year-old mother from Hong Kong stated, *"She knows how to brush her teeth, but maybe she is still incapable of doing it properly...She cannot clean it thoroughly. I think this should be the main cause for her, as cavities usually happen in those teeth which are deeper inside the mouth and harder to reach."* Another 32-year-old mother from Hong Kong mentioned, *"Hygiene habits... What I mean is that the parents should check their children's teeth although they are old enough to brush their teeth themselves."*

When the interviewer asked participants how toothbrushing habit leads to dental caries, most participants directly linked not having proper toothbrushing habit to childhood caries. Some parents mentioned that non proper toothbrushing can cause either acidified material on the teeth or sugar acidifies the tooth enamel after a period of time, which result in bacteria or germs to grow more and faster inside the teeth, and then teeth erosion happened. For example, a 38-year-old mother from Taiwan said, *“After having sweets and do not deeply brush the teeth, the sweet stuffs will sticky or attach on the teeth... It is also possible that it [sugar] will acidify. After acidifying, the bacteria will grow up, right? Then, the bacteria will erode the teeth.”* Some parents emphasized the important of brushing before bedtime, as the bacteria are easier to grow more and fast at night, as well as once no air in the mouth.

Not rinsing mouth after having sweets

Ten participants (22%) stated that not rinsing mouth after having sweets can result in caries. For example, a 35-year-old mother from China said, *“Candies have more sugar... He [participant’s son] does gargle right after taking sweets. He will... get teeth decay easier.”* When the interviewer asked participants how not rinsing mouth leads to dental caries, most participants directly linked not rinsing to childhood caries without any further explanations. Some parents mentioned that non rinsing mouth can cause acidified material on the teeth or sugar acidifies the tooth enamel after a period of time, which result in bacteria or germs to grow more and faster inside the teeth, and then teeth erosion happened. Alternatively, non rinsing mouth can lead to sugar attach to the teeth, which directly links to dental caries. For example, a 37-year-old mother from China stated, *“Sometimes, after kids eat, she would not rinse the mouth immediately or rinse the mouth carefully, the sugar stuffs she ate will sticky on her teeth. The soft and sticky items like rice, ah...it will cause tooth bacteria to grow that erodes the teeth.”*

Not drinking water after having sweets

Two participants (4%) stated that not drinking water after having sweets can result in caries. For example, a 34-year-old mother from China

stated, *“It seems like he [participant’s son] ate sweets, and he did not drink water after eating something... [Therefore, he had cavities].”* When the interviewer asked participants how not drinking water leads to dental caries, two participants directly linked it to childhood caries without any further explanations.

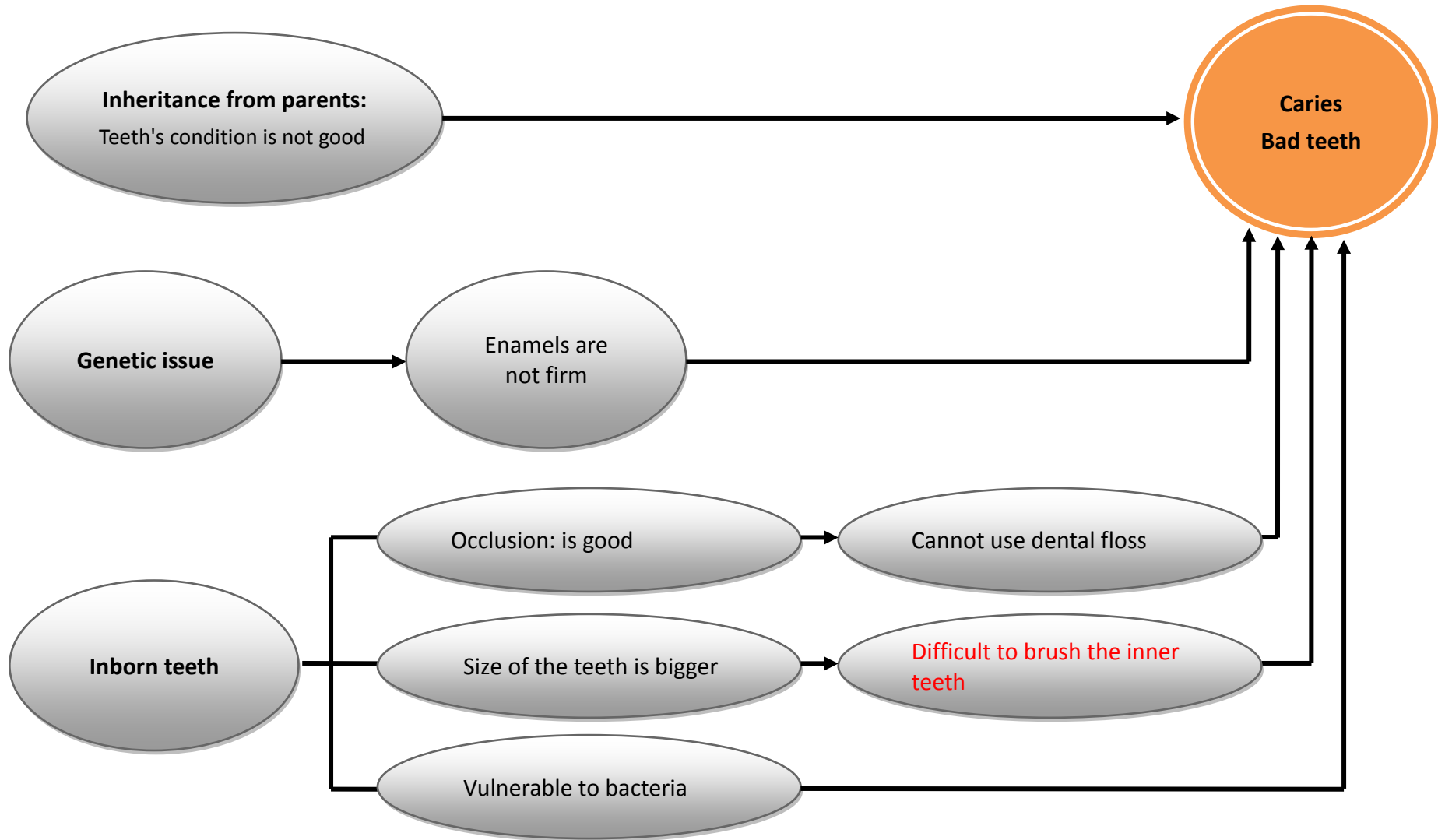
Tooth flossing habit

Nine participants (20%) stated that not flossing teeth is a cause of childhood caries. For example, a 38-year-old mother from Taiwan said, *“For the second kid, maybe we did not help him to use dental floss very well, so there were foods left over and sticky in between teeth gaps, yes, it was the reason for him to have cavities.”* Although parents believed flossing is important for caries prevention after their child experienced caries, they stated that their child does not regularly floss teeth, they do not floss their child’s teeth or detailed enough, they just learned flossing concept since they came to U.S., and it is difficult to floss a child’s teeth because the gaps between teeth are tight and small. For example, a 38-year-old mother from Taiwan said, *“Because the spaces between teeth are very tight and small, it is not easy for me to clean. If I do not use dental floss to clean the spaces, he must get dental decay. After the experience of his cavity, now I am being more aware about flossing.”*

When the interviewer asked participants how not flossing teeth leads to caries, most participants directly linked it to childhood caries without any further explanations. Two participants (4%) mentioned that not flossing teeth can make the foods left on the gaps or eroded food stuck on the teeth, which result in dental caries. For example, a 38-year-old mother from Taiwan said, *“I discover that grandma brought something... from Taiwan. That is called maltose. Also, during that period of time, he insists to brush teeth by himself, so I did not floss his teeth, so that he got tooth decay in a short period of time. I think some food stuck on the teeth, those eroded stuff causes teeth decay.”*

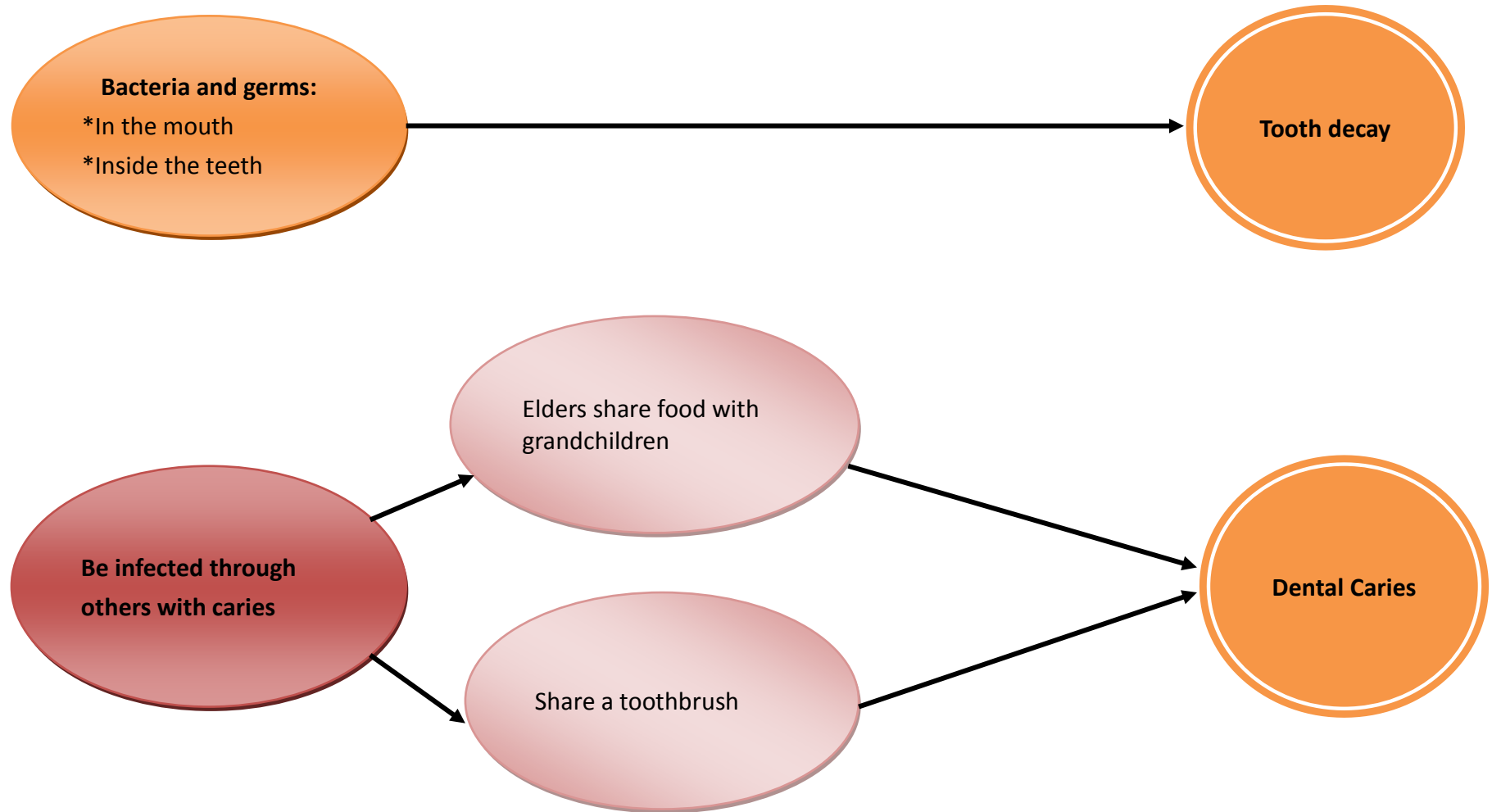
Explanatory Model of Etiology of Childhood Caries:

Inheritance/Genetic/Inborn Issues of Biological and Somatic issues



Explanatory Model of Etiology of Childhood Caries:

Tooth Germs and Be Infected Through Others of Biological and Somatic issues



Explanatory Model of Etiology of Childhood Caries: Biological and Somatic Issues

Twelve participants (26%) indicated that childhood caries could be caused by genetic, inheritance, inborn, bacteria, and transmission issues.

Inheritance, genetic, and inborn issues

Nine participants (20%) referred to childhood caries as an inheritance, the result of parents' genetic or inborn issues. Participants believed that the condition of parents' teeth contributed to their child's teeth condition. For example, a 39-year-old mother from Taiwan stated, "*Well, if the parents have good teeth, even though they do not take good care of their teeth (laugh), their child will not have caries. Therefore, I have that impression. Well, this is related to inheritance.*" Moreover, another 36-year-old mother from Taiwan said, "*I think the genetic issue also contributes to this problem [dental caries]; some people are born with weaker tooth enamel, I think it affects too.*" When the researcher asked the participant how inheritance leads to childhood caries, most participants indicated that parent's teeth's condition results in their child's risk in developing caries. For example, a 43-year-old mother from China said, "*It should be associated with the inheritance. They do have the inheritance. The bad teeth come from the last generation. Caries can be passed to the next generation too.*" In terms of the genetic issue, the gene can cause weaker tooth enamel that can result in caries. Moreover, children's inborn teeth issues could be: (1) if the occlusion of a child's teeth is good, parents thought there is no need for the child to floss his or her teeth; (2) the size of the teeth attributes to whether it is easy for the child to brush his or her teeth in a limited oral space; (3) some children might be have an inborn vulnerability to bacteria. For example, a 37-year-old mother from Taiwan stated, "*I think his teeth...the inborn spaces or sizes of teeth. If his occlusion...occlusion of his teeth is good, it will cause dental decay. In other words, you don't use the dental floss, and some of the teeth are bigger, such as in our family, like me and my son. My son's mouth is smaller but the teeth are bigger. So, it may cause...tooth decay because he can't brush the inner surfaces of those teeth.*"

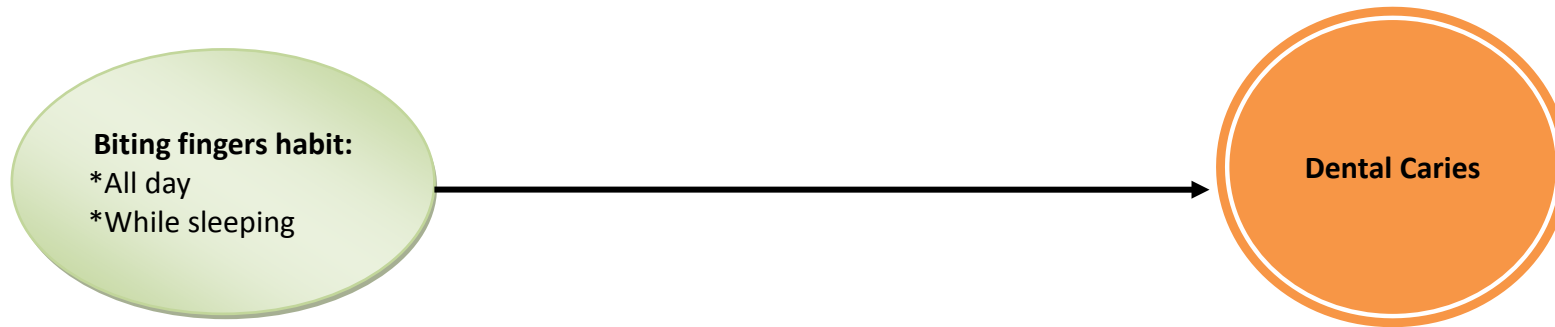
Bacteria/germs in the mouth

Two participants (4%) reported that normally there are tooth germs in the mouth. If children do not have good oral hygiene, the germs will destroy the teeth. When the interviewer asked participants how bacteria or germs in the mouth lead to dental caries, all participants directly linked it to childhood caries without any further explanations. For example, a 35-year-old father from China said, *“The tooth germs will destroy all of the teeth, just like in the photo images; those pictures showing a lot of germs inside of teeth.”*

Be infected through others

Two participants (4%) reported that caries are contagious and can be acquired from infected others through shared foods and a shared toothbrush. For example, a 34-year-old mother who came from China stated, *“When some elders take care of their grandchildren, I mean eating food together. They would take a bite of the food, and then also feed the child. Let the child take a bite too, and then the child will be infected”. The child will not only have teeth diseases but also illness. Is it right?”* On the other hand, a 35-year-old father who came from China said, *“If you find out you have caries, the kids could not share the toothbrush. They need to use a separate toothbrush; otherwise they will get tooth decay from the germs.”*

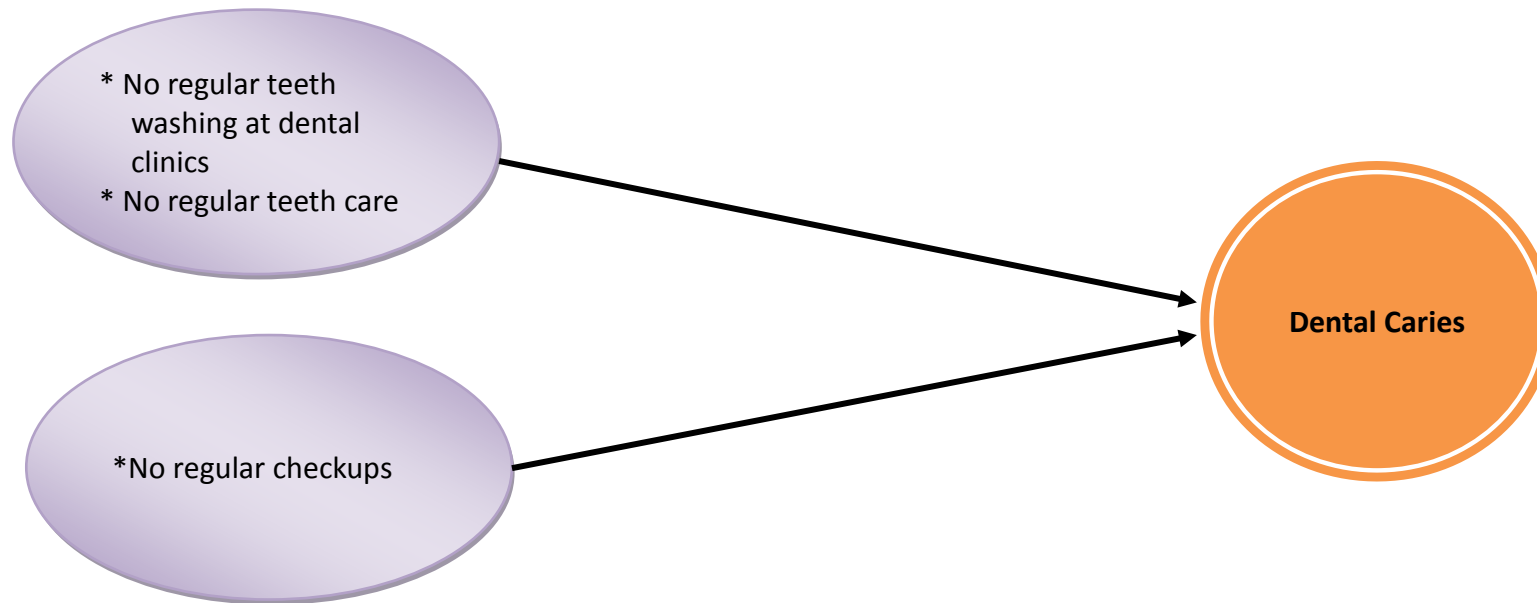
Explanatory Model of Etiology of Childhood Caries: Biting Fingers Habit



Explanatory Model of Etiology of Childhood Caries: Biting Fingers Habit

Two participants (4%) believed that children biting their fingers all day or during their sleep could result in dental caries. For example, a 42-year-old mother from China mentioned, “*My second child was...I suspected she bit her fingers and [this] led to caries. My fifth one didn't do that. No...both my third and fifth children didn't do that. They didn't bite their fingers. So, I told to the dentist about this. And the dentist said it was possible...possible to have caries.*” Another 46-year-old mother from China also stated, “*And he still has the habit to bite his fingers every night. So, he can fall in sleep.*”

Explanatory Model of Etiology of Childhood Caries: Lack of Regular Dental Visits



Explanatory Model of Etiology of Childhood Caries: Lack of Regular Dental Visits

Two participants (4%) reported that not having routine teeth cleanings, teeth care, or checkups at a dental clinic could cause childhood caries. For example, a 42-year-old mother from Taiwan stated, *“When she [older daughter] was 3-years-old staying in Taiwan for one year, I think she did not have regular checkups. So, she had many decayed teeth. My younger son was born in U.S., so regular checkup is so helpful to find out something I could not see. Like an X-ray, we only can know whether a child has a cavity until he or she is taking an X-ray”*. A 35-year-old mother from China also said, *“Not visiting the dentists often...do not go to the clinic for teeth washing [teeth cleaning] and dental care. If I could know my child has a cavity in advance, I will do a better job on her teeth care.”*