Efficacy of Oral Health Promotion in Early Childhood

A Dissertation Submitted to the Graduate Division of the University of Hawai‘i at Mānoa in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

In

Nursing

May 2013

By

Deborah Mattheus

Dissertation Committee:

Maureen Shannon, Chairperson
Karen Tessier
Jay Maddock
Alice Tse
Frank Catalanotto
Acknowledgements

I gratefully acknowledge all of those who helped me along the way in completing my research and this dissertation. Dr. Maureen Shannon was eager to take on the role as my advisor and committee chairperson with the leave of Dr. Victoria Niederhauser and provided me with needed support and guidance to persevere through the rigors of this doctoral research. I want to thank the remaining members of my dissertation committee, Dr. Karen Tessier, Dr. Alice Tse and Dr. Jay Maddock for their input, patience and ability to improve my skills as a researcher and to Dr. Frank Catalanotto for all the critical knowledge and inspiration you provided to me on the topic of prevention of early childhood caries. Lastly, thank you Dr. Dongmei Li for assisting me with my statistical analysis and interpretation of the results.

This research would not have been possible without the assistance from all the staff of North Florida Pediatrics. Thanks to Dr. Sam Santelices and Dr. Pam Santelices, owners of North Florida Pediatrics, for their eagerness to be part of this research and to make an impact on the oral health of the children in Lake City, Florida. Special thanks to the front staff at North Florida Pediatrics who were diligent in scheduling enrollment appointments, as well as follow-up visits for the duration of the study.

This study was supported by the funds granted by the (ARCS) Achievement Rewards for College Scientists. These funds allowed me to provide the participants with sufficient incentives to continue in the study for the duration of the study.

Lastly, I must thank my family. Thanks mom for your support and love through this journey, “O’poppa” for believing in me and giving me the support to make my dreams come true, and to Charl, Carl and Rhea, my wonderful husband and children, who inspire me every day with your energy and creativity.

Most of all thank you to all the participants of this study. I learned so very much from this experience and without you, it would not have been possible.
Abstract

Dental caries are the most common chronic childhood disease, occurring 5 times more frequently than asthma. One out of every four preschoolers in the United States has tooth decay. The consequences of poor oral health in children extend beyond the development of dental decay and include negative systemic health as well as quality of life outcomes.

Children rely on parents and caregivers to protect them and provide for their most basic needs, including their oral health care needs. A parent’s knowledge and beliefs can directly impact the oral health care their children receive at home and their access to professional dental services.

A major limitation to decreasing childhood dental disease includes shortages in pediatric dental services. Integrating dental education and care into primary care practice by nurse practitioners during well child care visits is one alternative that allows for easy access to care for many high risk families.

The purpose of the study was to investigate the impact of oral health promotion visits in a primary care practice on parental oral health beliefs and behaviors for their children ages 6 to 15 months. The specific objectives included determining if changes in parents’ oral health beliefs and behaviors for their children would occur based on whether they received standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits or standard oral health care during their well child care visits without enhanced oral health promotion visits. At the completion of the study participants who received the additional enhanced oral health promotion visits were also asked to describe the quality of their experiences.

One hundred parents or guardians of children who were 6 or 9 months of age, seen at North Florida Pediatrics for primary care, and receiving Medicaid services at time of enrollment entered the study, with a total of 84 of the 100 parents/guardians completing the study. The control group received standard oral care during their routine well child care visits. The intervention group received standard oral care during their well child care visits in addition to two enhanced oral health promotion visits. Both groups completed an early childhood oral health questionnaire at the time of enrollment and again at the completion of the study.

Results of the study revealed significant changes in parent’s perception of the importance of oral care for their children’s primary teeth compared to general healthcare needs (p<.05), parent’s confidence in knowing how to properly brush their children’s teeth (p<.05), parent’s responses to whether they were brushing their children’s teeth (p<.0001), as well as the frequency of tooth brushing for their children (p<.0001) in both the control and intervention groups. There were no significant differences found between the two groups.

This study demonstrates how pediatric nurse practitioners can assist in filling the void that currently exists in providing basic dental healthcare services to high-risk children. This small but significant study also shows that standard oral health programs during well child care visits in pediatric primary care clinics with or without enhanced oral health promotion visits can produce significant changes over time in parent’s oral health beliefs and behaviors which are critical to improving oral health outcomes.
Keywords: standard oral health care, enhanced oral health promotion, early childhood caries, health belief model, social ecology model, nursing
# Table of Contents

<table>
<thead>
<tr>
<th>Acknowledgements</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>ii</td>
</tr>
<tr>
<td>List of Tables</td>
<td>vii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>viii</td>
</tr>
<tr>
<td>List of Appendices</td>
<td>ix</td>
</tr>
</tbody>
</table>

## Chapter

1. Introduction
   * Background of the Study                                      1
   * Study Aims                                                   3
   * Significance of the Study                                    5

2. Review of the Literature and Theoretical Frameworks
   * Incidence of Early Childhood Caries                          7
   * Etiology of Early Childhood Caries                           7
   * Risk Factors of Early Childhood Caries                       9
   * Consequences of Early Childhood Caries                       12
   * Prevention of Early Childhood Caries                         13
   * Theoretical Frameworks of the Study                          16
     * Social Ecology                                            16
     * Health Belief Model                                      19
   * Hypothesis                                                  20
   * Research Questions                                          21

3. Methodology
   * Specific Aims                                               23
   * Research Questions                                          24
## List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operational Definitions</td>
<td>28</td>
</tr>
<tr>
<td>3. Changes in Perception of Oral Status and Care (Intervention Group)</td>
<td>44</td>
</tr>
<tr>
<td>4. Changes in Confidence in Oral Care (Intervention Group)</td>
<td>45</td>
</tr>
<tr>
<td>5. Changes in Perception of Oral Status and Care (Control Group)</td>
<td>47</td>
</tr>
<tr>
<td>6. Changes in Confidence in Oral Care (Control Group)</td>
<td>47</td>
</tr>
<tr>
<td>7. Content Analysis of Responses to Open-Ended Questions (Enhanced Oral Health Visits [EOHV])</td>
<td>64</td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Concept Map of Early Childhood Oral Health</td>
<td>17</td>
</tr>
<tr>
<td>2. Efficacy of Oral Health Promotion Visits</td>
<td>65</td>
</tr>
<tr>
<td>3. A Healthy Smile for Your Child</td>
<td>66</td>
</tr>
<tr>
<td>4. Pathway for Oral Health Care (entering at 6 month)</td>
<td>35</td>
</tr>
<tr>
<td>5. Pathway for Oral Health Care (entering at 9 month)</td>
<td>36</td>
</tr>
<tr>
<td>6. Participants Relationship to the Child</td>
<td>67</td>
</tr>
<tr>
<td>7. Child’s Race and Ethnicity</td>
<td>68</td>
</tr>
<tr>
<td>8. Marital Status</td>
<td>69</td>
</tr>
<tr>
<td>9. Major Caregiver of the Child</td>
<td>70</td>
</tr>
<tr>
<td>10. Education Status of Parents</td>
<td>71</td>
</tr>
<tr>
<td>11. Working Status of Parents</td>
<td>72</td>
</tr>
<tr>
<td>12. Household Income</td>
<td>73</td>
</tr>
</tbody>
</table>
## List of Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Sample Size and Power Analysis</td>
<td>74</td>
</tr>
<tr>
<td>B. Early Childhood Oral Health Questionnaire</td>
<td>75</td>
</tr>
<tr>
<td>C. Informed Consent</td>
<td>82</td>
</tr>
<tr>
<td>D. Post - Questionnaire (Intervention Group Only)</td>
<td>86</td>
</tr>
<tr>
<td>E. Checklist for Standard Oral Health Care Visits</td>
<td>87</td>
</tr>
<tr>
<td>F. Enhanced Oral Health Visit Form</td>
<td>88</td>
</tr>
<tr>
<td>G. Pictures of ECC</td>
<td>90</td>
</tr>
</tbody>
</table>
Chapter 1: Introduction

Background of the Study

Oral health is a major public health issue affecting today’s children and families. Conditions that foster poor oral health are found in all regions of the world, with oral diseases having the greatest burden on vulnerable populations. The occurrence of caries in the pediatric population is currently at epidemic proportions. It is the most common chronic childhood disease, occurring 5 to 8 times more frequently than asthma (United States Department of Health and Human Services, [USDHHS], 2000). The consequences of negative oral health in children reaches beyond the dental area, with oral health associated with overall systemic health as well as quality of life (USDHHS, 2000). Due to the magnitude of dental disease across the U.S., Healthy People 2020 has identified oral health as one of the priority areas needing to be addressed by state, federal and professional organizations (USDHHS, 2010).

Poor oral health and the development of dental caries are directly related to a child’s vulnerability. Vulnerable populations are defined as social groups who have an increased susceptibility to adverse health outcomes (Flaskerud & Winslow, 1998). Children represent a vulnerable population since they generally have limited strength, education, resources and the ability to provide self-care. Children rely on their parents, caregivers and community to protect them and provide for their most basic needs, including their oral health care needs.

Early childhood caries (ECC) occurs in all socioeconomic and racial groups; however, children of low socioeconomic status, despite the availability of state funded insurance such as Medicaid, have a much higher incidence of caries and higher risk of poor oral health outcomes compared to more affluent populations (de la Fuente-Hernandez & Acosta-Gio, 2007; Locker, 2000).

Despite multiple public health initiatives and the use of fluoridated water, childhood caries are growing in epidemic proportions. A major limitation to decreasing childhood dental disease includes shortages in pediatric dental services and dental providers who are both willing
and able to provide services to uninsured children, as well as providing services to those children with Medicaid insurance. Fortunately, the current ECC model recognizes that this disease can and should now be primarily managed medically through early intervention programs (Stewart & Hale, 2003).

Currently there is an interest in demonstrating how dental education and care that has not been easily accessible to many high-risk families can now be accessed and integrated into primary care practice during well child care visits. This approach has the potential to improve dental and overall health outcomes (American Academy of Pediatrics, [AAP], 2003). In 2008 the Agency for Health Care Administration (AHCA) announced that they would reimburse Florida physicians, nurse practitioners (NPs) and physician assistants for certain limited oral health preventive procedures. The program was established to prevent ECC and to refer the child to a dentist if needed before severe decay occurs. Based on the National Academy for State Health Policy (NASHP) survey results in 2009, pediatric primary care providers in 34 states were being reimbursed by Medicaid for performing preventive oral health services (Cantrell, 2009).

Primary health care providers are in a key position to positively impact oral health and reduce ECC due to their frequent contacts with children and their families in the first few years of life. However, this unique opportunity to impact ECC may be prohibited by the health care provider’s lack of willingness to take on oral health guidance and responsibilities (Krol, 2004).

Time limitations in office visits can offer the provider a challenge. For example, a well child care visit currently includes topics such as injury prevention, nutrition, development, discipline, school readiness, immunizations and other important issues based on the age and development of the child. Including additional oral health screening, assessment and procedures into well child care visits may not be feasible.

To assure there is adequate time to address the oral health needs of children and families, today’s health care providers may chose to schedule separate enhanced oral health
promotion visits. These enhanced oral health promotion visits can be scheduled every 3 months and facilitated by NPs and nurses in primary care settings with a primary focus on the oral health of the infant or child. Enhanced oral health promotion visits can include a comprehensive oral health history, risk assessment, oral exam, patient specific education as well as application of fluoride varnish. If necessary, the family and child can be referred to a pediatric dentist for additional assessment or further care (AAP, 2008).

Nurse practitioners are well suited to play a critical role in addressing oral health issues. Currently, oral health is included in the pediatric NP (PNP) certification process and is part of the published core curriculum (Hallas & Shelley, 2009). Oral health care integrated into primary care practices by nurse practitioners can help fill the void caused by the shortage in dental providers, which is contributing to the current high rate of ECC. Standard oral health procedures including obtaining an oral health history, completing a caries risk assessment, providing oral health education, applying topical fluoride varnish to primary teeth and, if needed, referring the child to a dentist can be integrated into well child care visits or scheduled as separate enhanced oral health promotion visits.

There continue to be gaps in the existing literature identifying consistent and effective techniques that positively impact oral health outcomes in early childhood. Prior to this study, there were no studies conducted by NPs showing the usefulness of oral health promotion programs in primary care practices aimed at changing parent’s oral health beliefs and behaviors for their children during their first few years of life.

**Study Aims**

The overall objective of the study was to test the impact of oral health promotion visits in a primary care practice on parental oral health beliefs and behaviors for their children ages 6 to 15 months.

This objective was accomplished through exploring the following specific aims:
1. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits.

2. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health education care during their well child care visits without additional enhanced oral health promotion visits.

3. Determine the differences in parental oral health beliefs and behaviors for their children ages 6 to 15 months between: (a) the group of parents receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits; and (b) the group of parents receiving standard oral health care during their well child care visits without additional enhanced oral health promotion visits.

4. Describe the qualitative experiences of the parents of children ages 6 to 15 months who received enhanced oral health promotion visits in addition to standard oral health care during their well child care visits.

This study focused on the changes in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months based on participation in standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits performed by a NP in a primary care practice. This group of parents and children were compared to an equal number of parents of children that received only standard oral health care at the child’s well child care visit. The study participants were parents of children 6 to 15 months of age, who participated in the Medicaid program, lived in Florida, and were seen at the North Florida Pediatric Clinic for primary care. The study participants were asked to participate and enrolled into the study at the child’s 6 or 9 month well child care visit and completed the study in a 6 to 7
month time period with the final early childhood oral health (ECOH) questionnaire completed prior to the 12 or 15 month well child care visit. This age was chosen to demonstrate the importance of early oral health interventions and the role that NPs can play in improving early childhood oral health.

**Significance of the Study**

Poor oral health continues to be a major health concern for children worldwide. Dental caries are a significant oral health problem in most industrialized countries and currently affect 60–90% of school children as well as many adults (Petersen, 2005). According to the World Oral Health Report (2003) most children globally have signs of gingivitis. Currently, dental caries in the U.S. is the most common chronic childhood disease, occurring 5 to 8 times more frequently than asthma (USDHHS, 2000). Despite repeated efforts through programs aimed at improving oral health status, recent epidemiological data from several countries indicate a continued increase in the prevalence of dental caries (Bagramian, Garcia-Godoy & Volpe, 2009). The increase in caries appears to occur primarily in disadvantaged groups such as children, immigrants and those with lower socioeconomic status (Bagramian et al., 2009; Petersen, 2005; World Oral Health Report, 2003).

A direct relationship has been made between oral health and quality of life (American Academy of Pediatric Dentistry, [AAPD], 2011). The Surgeon General’s report documents numerous studies focusing on the negative consequences of poor oral health including difficulty eating, speech delays, and effects on children’s development including self esteem and social interaction (USDHHS, 2000). Children experiencing caries as infants or toddlers also have a greater chance of developing caries of primary and permanent teeth later during childhood (Li & Wang, 2002). Furthermore, children with poor oral health and dental diseases are noted to be at risk for adult heart disease, compromised pregnancy outcomes and immune, infectious and inflammatory diseases (The National Institute of Dental and Craniofacial Research [NIDCR], 2002). Dental professionals are considered by most as the individuals responsible for oral
health care. Due to the undersupply of dental providers worldwide, future plans to reduce caries in the pediatric population need to contain more creative interventions, including the use of oral health education and interventions in primary health care practices (AAP 2003; dela Cruz, Rozier & Slade, 2004; Krol, 2003; Nowak & Casamassimo, 2002; Rozier et al., 2003).

Traditional approaches to address parents’ and caregivers’ motivations for preventative oral health behaviors have been less than effective over the years, resulting in the continuous rise in the rate of ECC. Newer program models using motivational interviewing have demonstrated the benefits of establishing a rapport with parents, as well as providing support and encouragement through repeated contacts with parents, on children’s oral health (Weinstein, Harrison & Benton, 2006). Currently there is an interest in demonstrating how dental education and care that has not been easily accessible to many high risk families can now be accessed and integrated into well child care visits to improve dental and overall health outcomes (AAP, 2003). Based on the AAP guidelines (2000), a child should be scheduled for 11 to 12 well child care visits in their first 3 years of life. Nurse practitioners as primary health care providers have the potential to positively influence oral health and contribute to reducing ECC during these frequent contacts with children and their families.

Nurse practitioners are trained to provide anticipatory guidance and oral health promotion. With these skills, they are equipped to develop culturally sensitive programs that address the changes needed within families and the community to improve oral health outcomes. Increasing community awareness and assisting in policy changes that support children and families are two additional areas in need of firmly committed nursing professionals in order to optimize the future impact on early childhood oral health.
Chapter 2: Review of the Literature and Theoretical Frameworks

Incidence of Early Childhood Caries

Dental caries are the single most common chronic childhood disease, occurring 5 to 8 times more frequently than asthma (USDHHS, 2000). The Center for Disease Control and Prevention (CDC) reports that more than one in four (28%) preschoolers experience tooth decay (Beltran-Aguilar et al., 2005). This finding suggests that over 4 million children are affected by dental caries, which is a nationwide increase of over 600,000 additional preschoolers during the past decade. The racial disparity in the prevalence of caries formation is evident with non-Hispanic white children having the lowest prevalence (18.3%) of untreated tooth decay compared with non-Hispanic black children (27.2%) and Mexican American children (31.6%). Importantly, demographic trends in the U.S. predict that the number of low-income, minority and immigrant children will rise more rapidly than the general population of children. Despite the availability of state funded insurance such as Medicaid, this group of children has the highest dental caries rate and the lowest dental care utilization (Passel, 2002).

Etiology of Early Childhood Caries

The word caries comes from the Latin word meaning rotten or decayed (Caries, 2010). This disease process is sometimes referred to as tooth decay and when it occurs in very young children it has been referred to as ECC, baby bottle decay or nursing caries (Krol, 2003).

A child’s primary teeth begin forming at approximately 6 weeks in utero, and they continue to form until the roots of the tooth are completely established at 2 to 3 years of age. During this time any oral or systemic health problem including nutritional deficiencies, systemic illness or syndrome can adversely affect tooth development (Field, Stenger & Kamat, 2008).

The AAPD defines ECC as the presence of one or more decayed (noncavitated or cavituated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. In children younger than 3 years of age, any sign of smooth
surface caries is indicative of severe ECC (S-ECC). From ages 3 through 5 years, one or more cavitated, missing (due to caries), filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of ≥4 (age 3), ≥5 (age 4), or ≥6 (age 5) surfaces of any of the child’s teeth constitutes S-ECC (AAPD, 2008).

The process of caries formation is based on localized destruction and demineralization of the tooth. Demineralization occurs through the attack of acids produced by transmitted bacteria such as *Mutan Streptococci* (MS), usually transmitted from the primary caregiver to the infant or toddler (Featherstone, 2003; Li & Caufield, 1995). These bacteria adhere to the teeth and produce acids that demineralize tooth enamel, which may be first noticed as white spots on the labial surfaces (side of a tooth adjacent to the inside of the lip) of the primary incisors (Kagihara, Niederhauser & Stark, 2009). The presence of decay in the mother, who most likely harbors high titers of MS in her saliva, is an important risk factor associated with ECC. Warren et al. (2008) identified that high levels of MS in mothers and evidence of plaque in one year-old children was closely associated with caries. The time between infection of the child and expression of a visible cavity depends upon factors such as frequency of carbohydrate intake in a child’s diet, oral hygiene and exposure to fluoride (Boggess & Edelstein, 2006).

Remineralization is a process where minerals, such as fluoride from the saliva, diffuse into the caries lesion resulting in repair on the surface of the tooth. Whether a caries lesion will be reversed by remineralization, stay the same or progress is determined by what Featherstone (2003) describes as the caries balance, where there is an interaction between protective factors and pathological factors. The pathological factors include acidogenic bacteria, reduced salivary function and frequent ingestion of fermentable carbohydrates, while protective factors include salivary components that maintain saturation of the minerals in the saliva, as well as antibacterial substances such as fluoride and substances that stimulate salivary function (Featherstone, 2003). Several common preventable practices have been noted in children with a high incidence of ECC, including use of nighttime bottles that contain sweetened liquids,
frequent consumption of sugary drinks including juices and frequent daytime snacking (Douglass, Douglass & Silk, 2004; Harris, Nicholl, Adair & Pine, 2004; Krol, 2003).

Risk Factors for Early Childhood Caries

Dental caries is a multi-factorial infectious disease where there is interaction among various risk factors including low socioeconomic status (SES), limited parental education, maternal caries, previous caries experience, low exposure to fluorides, certain dietary and feeding practices, poor oral hygiene, poor oral health knowledge and beliefs, and specific medical conditions (Douglass et al., 2004; Harris et al., 2004; Krol, 2003).

Household income is not only a significant factor contributing to health risks for children, but it can be the most important one associated with both oral and systemic health. Younger children living in families with incomes of less than $10,000 have a much greater risk of higher caries rates compared with children in families with incomes greater than or equal to $20,000 (Reisine, Tellez, Willem & Ismail, 2008). In children of low SES there is also a higher ratio of sugar ingestion due to ease and lower cost of foods containing sugar. In addition, the utilization of fluoride and preventive dental measures are decreased due to the high expense associated with these activities, thereby further increasing the risk for caries development (Sgan-Cohen & Mann, 2007). A recent study by Plutzer and Keirse (2011) identified marital status as a significant factor in predicting caries rate. Results indicated that children residing in one-parent families had an incidence of ECC 2.3 times higher than children from two parent families.

Family income and the educational level of the primary caregiver have been shown to affect the dental care that children receive. Based on data collected from the 1997 National Survey of American Families (NSAF), 30% of low income children were found to be receiving no dental care in the previous year and nearly 60% failed to receive the minimum level of care (Kenney, Ko & Ormond, 2000). Additional findings from the NSAF indicated that children whose primary caregiver had not completed high school were more likely to have no dental visits than children whose caregiver had completed high school or were college educated. The three main
factors found impeding the utilization of dental services by children included: (a) the lack of caregiver’s knowledge about or low priority given to meeting recommended dental care standards; (b) a lack of access to dental care providers; and (c) the inability to pay for care (Kenney, McFeeters & Yee, 2000). A survey of dentists in 2003 revealed that although 90% provide services to children in their practice, very few will see children under 4 years of age or those who are covered by Medicaid (Seale & Casamassimo, 2003).

Children rely on parents and their community to provide protection and care for their most basic health needs, which includes their oral health care. Previous research studies have investigated the relationship between parents’ oral health perceptions, beliefs and behaviors and the development of ECC (Declerck et al., 2008; Finlayson, Siefert, Ismail & Sohn, 2007; Habibian, Roberts, Lawson, Stevenson & Harris, 2001; Litt, Reisine & Tinanoff, 1995; Nunn et al., 2009; Vachirarojpisan, Kawaguchi, Laungwechakan, Somokote & Detsomboonrat, 2004; Warren et al., 2008). Caregivers who are lacking proper oral health knowledge and oral health beliefs and behaviors may unknowingly encourage similar unhealthy behaviors in their children. Higher prevalence of caries among caregivers significantly increases the risk of caries prevalence among their children (Reisine et al., 2008). Results from a study in 2010 demonstrated an association between low oral health literacy of female caregivers and poor oral health behaviors for their children including night time bottle use and lack of daily tooth brushing (Vann, Lee, Baker & Divaris, 2010). Finlayson et al. (2007) discovered that mothers’ knowledge about children’s oral health (KCOH) was a significant predictor of their child’s tooth brushing frequency; for each unit increase on the KCOH scale, 1 to 3 year old children were found to brush 22% more frequently (95% CI 1.10-1.35; p<0.001) and 4 to 5 year old children were found to brush 13% more frequently (95% CI 1.02-1.26; p<0.05). This study also found that if a mother brushed her own teeth at bedtime during the week, her 1 to 3 year old child’s brushing frequency was found to increase by one-third (95% CI 1.12-1.60; p<0.01) and her 4 to 5 year old child’s brushing frequency was found to increase one-quarter (95% CI 1.12-1.42; p<0.001).
Dietary practices in a family can contribute to caries development. Habibian, Roberts, Lawson, Stevenson and Harris (2001) found a statistical significant positive correlation between visible plaque on dental examination at 12 months and the frequency of a child’s eating and drinking during the day at 6 months ($r=0.25$, $p=0.001$) and 12 months ($r=0.15$, $p=0.05$) and a significant positive correlation between visible plaque at 18 months and the frequency of a child’s eating and drinking at 12 month ($r=0.19$, $p=0.04$) and 18 months ($r=0.18$, $p=0.02$).

Additionally, the presence of visible plaque and a child’s reported consumption of sugar-containing drinks at night or between meals have been associated with a high prevalence of dental caries (Declerck et al., 2007). A study by Ji et al. (2006) revealed several related risk factors associated with eating and drinking. Children who had not yet been weaned from breastfeeding or bottle feeding by 18 months of age had a higher risk for developing caries than those who were weaned earlier. Pieper et al. (2011) identified long term use of bottles at night as the most significant factor related to the development of ECC. The children in the study who were reported to have repeated night feedings had twice the risk of developing ECC. Moreover, children who ate snacks while playing compared with those who did not snack during playtime have a higher risk for dental caries (Ji et al., 2006). Drinking juice has also been associated with increased decayed, missing, or filled surfaces-primary teeth (dmfs) and decayed missing or filled surface of permanent teeth (DMFS) (Cook et al., 2008). This study further revealed a significant association between DMFS in children who frequently drank soda ($p=0.01$). The use of the Health Eating Index, which is an instrument included within the Third National Health and Nutritional Examination Survey (NHANES III), has been demonstrated to be capable of predicting the development of ECC (Nunn et al., 2009). The Health Eating Index is a measurement of dietary quality and conformance with federal guidelines. The results from the completed Health Eating Index and dental records of 3912 children, ages 2 to 5 years of age, indicated that children with the best dietary practices were 44% less likely to have severe ECC.
compared with children with the worst dietary practices as measured by the health eating index (Nunn et al., 2009).

Consequences of Early Childhood Caries

A direct relationship has been made between oral health and quality of life (AAPD, 2011). The US Surgeon General’s report about oral health documents numerous studies focusing on the negative consequences of poor oral health, including impaired eating, difficulty speaking and adversely impacting the development of self esteem and social interaction (USDHHS, 2000). Primary teeth that are removed prematurely due to caries can also increase the incidence of misalignment of secondary teeth.

Early childhood caries can turn into S-ECC within a few months and can potentially progress to severe local and systemic infection which can be life threatening. For example, in 2007 the media reported that a 12 year-old boy died of complications of an untreated dental abscess that spread to the brain causing an overwhelming infection (Otto, 2007).

Children experiencing caries as infants or toddlers also have a greater chance of developing caries of primary and permanent teeth later during childhood and adulthood (Li & Wang, 2002). Not only is childhood dental disease a risk for future dental problems, but dental disease is also now considered a risk factor for adult heart disease (e.g., coronary artery disease, myocardial infarction), compromised pregnancy outcomes, and immune, infectious and inflammatory diseases (Kuo, Polson & Kang, 2008; NIDCR, 2002). The effect of dental caries lasts a lifetime because once the tooth is destroyed it will usually need restoration and additional maintenance throughout life.

Failure to prevent dental problems has several long-term adverse effects that are costly not only to the child and family but also to society. Absence from work and school, as well the high cost of dental repairs are only a few of the negative outcomes of poor oral health habits that can be significantly reduced through oral health promotion and prevention started early in a child’s life (Gift, 1992; Mouradian, 2001).
Prevention of Early Childhood Caries

There have been many interventions attempting to decrease the incidence of ECC. Fluoride has a protective effect against development of caries. Fluoride not only inhibits demineralization of the teeth but also has been found to enhance remineralization of early caries lesions (Featherstone, 1999; Jones, 2008; Kaminsky, Mahoney, Leach, Melius & Miller, 1990; Selwitz, Ismail & Pitts, 2007). Fluoride can occur naturally or by means of adding fluoride into a community’s water supply. Fluoridation of water is consistently regarded as the most cost-effective method for caries prevention on a community level basis. For most U.S. communities, every dollar spent on community water fluoridation results in a savings of $38 in costs to repair (fill) a decayed tooth (American Dental Association, [ADA], 2005). The use of fluoride toothpastes is another source of fluoride for children and continues to be a common way to reduce caries for all children and most important for those children that may not benefit from community water fluoridation.

The best opportunity for the prevention of caries by reducing risk factors is in infants and toddlers because caries are established as an active disease process before 2 years of age (Douglass et al., 2004; Gussy, Waters, Walsh & Kilpatrick, 2006; Krol, 2003; Selwitz et al., 2007; Yost & Li, 2008). The risk of ECC and long-term consequences of poor oral health increases when these opportunities are missed (AAPD, 2011; Guzman-Armstrong, 2005; Li & Wang, 2002; Plutzer & Spencer, 2007; Selwitz et al., 2007; USDHHS, 2000). The AAP (2003) recommends that all children have oral health risk assessments by 6 months of age, and see a dentist between 6 and 12 months of age if they are in a high-risk category for dental decay. Unfortunately, barriers exist which prevent adequate access to dental care for this young and vulnerable population, making this an unrealistic expectation.

Barriers to access of proper dental care, such as lack of providers in rural areas, cost and inadequate insurance coverage, all play key roles in the development ECC (Crall, 2006; Edelstein, 2002; Kenney, Ko & Ormond, 2000; Kenney, McFeeters & Yee, 2005; Seale &
Casamassimo, 2003). Current and future dental care trends indicate that there will be a continued lack of access to dental services by the uninsured as well as those underprivileged children with Medicaid insurance. These groups are in greatest need of oral health services (Lieberman & Paul, 2002).

Due to the undersupply of dental providers, there has become an increased professional and political interest in determining how dental education and care can be more easily accessed beyond the traditional dental offices for high-risk populations (AAP, 2003). Plans to reduce caries in the pediatric population are attempting to include more diverse interventions such as the use of oral assessment, oral health education and interventions as part of primary health care practices (AAP, 2003; dela Cruz et al., 2004; Krol, 2003; Nowak & Casamassimo, 2002; Rozier et al., 2003). Based on the National Academy for State Health Policy (NASHP) survey results in 2009, pediatric primary care providers in 34 states were being reimbursed by Medicaid for preventive oral health services, with 33 states reimbursing for application of fluoride varnish (Cantrell, 2009).

Innovative oral health programs in recent years are beginning to reveal their abilities to positively impact the oral health outcomes for parents and children. The study conducted by Kowash, Pinfield, Smith and Curzon (2000) identified the benefits of home visitation and dental health education delivered to mothers of infants. The study used a variety of dental health education modalities including diet education, oral education or a combination of both oral health and diet instruction. Three of the five groups received interviewing and counseling for at least 15 minutes at home every three months for the first two years and twice a year in the third year. The fourth group was given dental health education once a year only and the final group received no dental health education and was only examined in the third year. At the completion of the study there was a statistically significant difference (p<.001) in caries levels and caries risk factors between the study and control groups, demonstrating the benefits of combining education with home visitation for the prevention of ECC (Kowash et al., 2000). Weinstein et al.
(2006) found the motivational counseling about oral health to mothers of infants more beneficial compared to the utilization of traditional oral health education. Two hundred and forty mothers and infants ages 6 to 18 months were assigned to either a motivational counseling group or traditional health education group. After two years, only 35.2% of children in the motivational interviewing group had new caries compared with 52% of children in traditional oral health education group ($p<.02$). A recent study by Plutzer and Spencer (2007) demonstrated the efficacy of repeated oral health guidance targeting first time mothers. Mothers in the test group received oral health promotion information during pregnancy and again when the child was 6 and 12 months of age while the mothers in the control group had no contact after their initial enrollment in the study. When the children reached 20 months they were examined by a dentist. The examinations revealed a statistically significance reduction ($p<0.001$) in S-ECC in those children of mothers who received repeated oral health guidance compared to the mothers who did not receive any guidance.

A community based approach used by Harrison and Wong (2003) considered the unique attributes of the community and culture prior to the implementation of a dental program. The study used both formal individual counseling and a community-wide initiative that included educational handouts and presentations in various community settings. Results demonstrated that dental counseling was well received when delivered in community settings, including well baby clinics, with a long term outcome of reduced caries in those families that participated. The concept of “one stop” medical and dental care has the benefits of providing continuity in care while further building the trust in high-risk families who may have poor experience with dental access and care.

Assisting high-risk families in the prevention of ECC requires an understanding of the multifactorial nature of the condition. Child, family and community factors that affect the rate of ECC all require equal consideration in the development of any prevention programs. In addition, health promotion and anticipatory guidance included in an oral health promotion
program should emphasize the value of a child’s primary teeth as well as the identification of factors that increase the child’s risks for caries. The education provided in an oral health promotion program can contribute not only to decreasing ECC but also may assist in changing the parent’s own personal oral health behaviors and desire to seek preventative dental services.

**Theoretical Frameworks of the Study**

The theoretical frameworks that were essential to the research study are the social ecology model and health belief model (HBM). The social ecology model examines the complex interaction between the environment and the person (Bronfenbrenner, 1979), while the health belief model evaluates the prediction of behavior changes based on a person’s beliefs and perceptions (Becker, 1974), which in this study are the oral health beliefs and behaviors of parents of children approximately 6 to 15 months of age during the study period. The individual child who may be susceptible to ECC is dependent on multiple factors and interactions, which include community support and parental support that are all predictors of future oral health behavior, beliefs of parents, as well as physiologic oral outcomes in the child.

**Social ecology model.** Mattheus (2010) used a social ecology model to emphasize the complexity of early childhood caries in the creation of the concept map of early childhood oral health (Figure 1).
Figure 1

CONCEPT MAP OF EARLY CHILDHOOD ORAL HEALTH

Suboptimal Oral Health

COMMUNITY FACTORS FOR CARIES DEVELOPMENT
- Community oral health
- Dental care
- Health care
- Social environment
- Culture

FAMILY FACTORS FOR CARIES DEVELOPMENT
- Family composition
- Family function
- Socioeconomic status
- Health status parents
- Health behaviors
- Coping skills
- Social support

CHILD FACTORS FOR CARIES DEVELOPMENT
- Biologic / genetic effects
- Physical demographic
- Health behaviors
- Development
- Dental insurance

High poverty rate
Non-fluoridated water
No public dental programs for children
Limited medical care providers
Diverse cultures

Single parent
Lack family/friends support
Low socio-economic status
Poor parental health
Limited social support
Cultural belief and behaviors related to poor oral habits

Reduced salivary flow
Low birth weight
Poor nutrition
No medical insurance
No dental insurance

Caries

Optimal Oral Health

Supportive social environment
Fluoridation in water
Healthy food options
Transportation resources
Community dental programs for children
Effective health care system
Culture: positive oral beliefs & behaviors

Stable parent relationship
Social and religious support
Middle to high income
Healthy parents
Positive health beliefs and habits
Family and friends support
Culture supports prevention

Normal salivary flow
No dental defects
Normal wt/ht
Good oral habits
Medical Insurance
Dental insurance

No Caries
Social ecology is the study of the interaction between people and their environment (Hawley, 1950). This framework has been very useful for examining health problems such as dental disease in the contexts of life span development, socio-demographics and societal circumstances that influence the susceptibility to disease (Stokols, 2000). The social ecological model was derived from scholarly work that included the fields of medicine, public health, and the behavioral and social sciences (Stokols, 1992).

Over the years, popular theoretical models used in nursing research of vulnerable populations, such as children, have included social cognitive theory, the theory of reasoned action, and the HBM. These models, while useful, do not take into consideration availability of resources from a community perspective and their relationship to health outcomes for the family, which directly and indirectly affects the health outcomes of children.

The concept map of early childhood oral health (Figure 1) was developed using current oral health literature to identify key factors in the child, family and community found to significantly impact a child’s vulnerability to early childhood adverse oral health outcomes. The concept map was created to facilitate a better understanding of vulnerability related to oral health for future use in nursing practice and research (Mattheus, 2010).

The social ecology model, which was applied to the early childhood oral health concept map, focuses on three main categories: community, family, and child. Each category has specific factors that have been identified in the literature as determinants of the child’s state of oral health (Fischer-Owen et al., 2007). A child with a greater chance for positive oral health would have the following factors: (a) Community: This consists of supportive social environment, fluoridated community water, available healthy food choices, transportation resources, community dental programs, dentists willing to treat children with limited funds, community medical care providers; (b) Family: This includes married couples, extended family and social support, middle to high socioeconomic status, positive health beliefs and habits, healthy parents, culture supporting health prevention; and (c) Child: This includes the
physiologic (e.g., normal salivary flow, no dental defects), developmental and behavioral (normal height and weight, good oral habits), and access to medical and dental benefits and services (Fischer-Owen et al., 2007; Mattheus, 2010).

Nurses in primary care practices can utilize this concept map in order to identify those factors that can be modified through health prevention programs. Successful nursing interventions involving the child and family should include educating caregivers on the prevention of bacterial transmission to the infant/child, reduction of liquids that promote acid production, encouraging the use of a cup by a year of age, decreasing frequent snacking, daily tooth brushing with fluoride toothpaste and regular use of dental care (AAP, 2008). Although parent education is critical, prevention strategies for this complex chronic condition require a multifocal approach that needs to also include community efforts to bolster support for children and families. Community efforts endorsed by nursing that can provide the added protection and decrease vulnerability and poor oral health outcomes include provision of low or no cost dental and health services and the inclusion of fluoridation to the water supply (Mattheus, 2010).

Maintaining healthy behaviors in vulnerable individuals and populations requires a unique understanding of the responsibility of communities to provide the needed resources to maintain health. The social ecology model assumes that appropriate community changes will then produce positive changes in individuals within the community. The goal of using this concept map is to facilitate early in a child’s life an ECC prevention strategy that can be facilitated by nurses who are likely to be the first health contacts for the child and the child’s caregivers (Mattheus, 2010).

Health belief model. Identification of parental knowledge, cultural beliefs and behaviors are important prior to providing education and clinical interventions. Appropriately increasing parents’ awareness of oral health issues related to their community and cultural knowledge and beliefs allows high-risk families to self identify the perceived threat of poor oral health and provides reasons to accept educational interventions based on known benefits to both the child.
and family. Implementing oral educational interventions by a health care provider during well child care appointments can further enhance the probability of the parent’s acceptance of the perceived benefits of oral health education. Limiting the barriers of cost and inconvenience further increases the chance of positive behavior changes in parent’s oral health beliefs and behaviors, which directly and indirectly affect their infant’s and children’s oral health for their lifetime (Mattheus, 2010).

The HBM is based on the concepts of value and expectancy and has been useful in predicting an individual’s compliance with recommended oral health prevention behaviors (Overton Dickinson, 2005). It includes the premise that behaviors are driven by perceptions and beliefs (Becker, 1974). Therefore, changes in health behaviors are more likely to occur when an individual acknowledges their own susceptibility or risk of illness, desires to avoid illness, and believes that certain activities will prevent illness.

Parents of a newborn are eager for information and open to education that will increase the chances of optimal health for their baby. The first year of life is an ideal time to educate families about the risk factors associated with dental caries, consequences of poor oral health for the child and family, and actions that can be taken to optimize the child’s oral health and prevent caries. Every missed opportunity to educate families about critical oral health issues early in the child’s life significantly increases the probability of future poor health outcomes.

Both the HBM and the social ecology model were used as frameworks for this research study in order to better understand parent oral health beliefs for their children, and to determine whether parental beliefs and behaviors will change over time based on their participation in standard oral health care during well child care visits with or without the addition of enhanced oral health promotion visits.

**Hypotheses**

This study focused on the effectiveness of oral health promotion visits, conducted in a primary care practice, by creating positive changes in parent’s oral health beliefs and behaviors
for their children. The oral health promotion program, facilitated by a PNP explored the following hypotheses:

1. Parents of children ages 6 to 15 months who receive standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group) will demonstrate a significant positive change in their oral health beliefs and behaviors for their children.

2. Parents of children ages 6 to 15 months who receive standard oral health care during their well child care visits without the additional enhanced oral health promotion visits (control group) will demonstrate a positive change in oral health beliefs and behaviors for their children.

3. Parents of children ages 6 to 15 months receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group) will have a significantly greater change in their oral health beliefs and behaviors for their children compared to parents of children receiving standard oral health care during their well child care visits without additional enhanced oral health promotion visits (control group).

4. Parents of children ages 6 to 15 months who received the additional enhanced oral health promotion visits will describe their experience of the enhanced visits as positive by identifying learned oral health information and recommending the program to others.

**Research Questions**

In order to test the hypotheses of the study and address the study’s aims, the following research questions were posed:

1. What are the differences in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months prior to and after receiving standard oral health care
during their well child care visits with the addition of two enhanced oral health promotion visits?

2. What are the differences in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months prior to and after receiving standard oral health care during their well child care visits without the additional enhanced oral health promotion visits?

3. What are the differences in parental oral health beliefs and behaviors for their children ages 6 to 15 months between (a) the group of parents receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits and (b) the group of parents receiving standard oral health care during their well child care visits without additional enhanced oral health promotion visits?

4. What are the personal experiences of the parents of children ages 6 to 15 months who participated in the enhanced oral health promotion visits?
Chapter 3: Methodology

The extensive literature review that was conducted highlighted the need for further study in the area of prevention of ECC in primary care practices. The mixed methods design developed for this study was based on the literature review, the researcher’s extensive clinical experience as a PNP, and the results of a pilot qualitative study investigating knowledge, beliefs, practices and experiences of the parents of children who had developed ECC that was completed previously by the researcher (Mattheus, 2008).

The current mixed methods study focused on the changes in parents’ oral health beliefs and behaviors for their children based on their participation in standard oral health care during their children’s well child care visits with the addition of two enhanced oral health promotion visits conducted by a PNP in a primary care practice setting. This group of parents and children were also compared to an equal number of parents and children at the same primary care practice setting that received only standard oral health care during the child’s routine well child visits without additional enhanced oral health promotion visits.

Specific Aims

The overall aim of the study was to test the impact of oral health promotion visits in a primary care practice on parental oral health beliefs and behaviors for children 6 to 15 months of age. This was accomplished by exploring the following specific aims:

1. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group).

2. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health education care during their well child care visits without additional enhanced oral health promotion visits (control group).
3. Determine the differences in parental oral health beliefs and behaviors for their children ages 6 to 15 months between (a) the group of parents receiving standard oral health care during their well child care visits with two additional enhanced oral health promotion visits (intervention group) and (b) the group of parents receiving standard oral health care during their well child care visits without the addition of enhanced oral health promotion visits (control group).

4. Describe the qualitative experiences of the parents of children ages 6 to 15 months who received enhanced oral health promotion visits in addition to standard oral health care during their well child care visits.

Research Questions

The following are the research questions that were addressed by the study:

1. What are the differences in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months prior to and after receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits?

2. What are the differences in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months prior to and after receiving standard oral health care during their well child care visits without the additional enhanced oral health promotion visits?

3. What are the differences in parental oral health beliefs and behaviors for their children ages 6 to 15 months between (a) the group of parents receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits and (b) the group of parents receiving standard oral health care during their well child care visits without additional enhanced oral health promotion visits?
4. What are the personal experiences of the parents of children ages 6 to 15 months who participated in the enhanced oral health promotion visits?

**Research Design**

This study used a mixed-methods approach to answer the research questions and achieve the study’s aims. An experimental research design involving participants, randomly assigned to either the intervention group or control group, was employed. In addition, the intervention group participated in a qualitative part of the study, describing their experiences with the enhanced oral health promotion visits.

**Setting**

The study was conducted at North Florida Pediatrics (NFP) which is a rural health clinic in Lake City, Florida. Rural health clinics are defined as clinics that are located in a designated rural county. Lake City is located in Columbia County, at 30°11′N 82°38′W (30.1896, -82.6397) with a size of 175.33 square miles (City of Lake City, 2012). Columbia County and Lake City are known as “The Gateway to Florida” because Interstate 75 runs through them, carrying a large percentage of Florida’s tourist and commercial traffic. Lake City is approximately 107 miles from Tallahassee, the state capital of Florida and 287 miles from Atlanta the state capital of Georgia. The city relies on travelers for a considerable part of its economy. The agricultural products of the area are tobacco, corn, peanuts, cotton, melon, timber and pulpwood (City of Lake City, 2012).

Based on census data from 2010, the total population of Lake City was 12,046 with a racial make-up of 56.6% White, 37.3% African American, 0.4% Native American, 1.6% Asian, 0.0% Pacific Islander, and 2.7% from two or more races. Hispanic or Latino of any race was 5.4% of the population (U.S. Census Bureau, 2010). The number of children under 5 years of age was 8% and under the age of 18 years was 25.2%. The median household income for Lake City in 2010 was $39,133 with 20.5% of the total population living below the poverty level (U.S. Census Bureau, 2010).
Health care located in Lake City include two main hospitals providing emergency and inpatient care at Lake City Medical Center and Shands at Lake Shore Hospital. In addition, the Veterans Affairs (VA) Medical Center provides outpatient and inpatient health care services to veterans. Shands at Lake Shore Hospital is the only facility with an inpatient pediatric service, with the closest tertiary facility for adults and children located approximately 47 miles away in Gainesville, Florida. There are currently six pediatric primary care offices in Lake City Florida with NFP being the largest practice. The NFP currently services 11,496 pediatric patients in Lake City and surrounding communities. NFP had been caring for children from birth to 21 years of age for over 20 years with the majority of patients enrolled in Florida Medicaid (n=6,292), followed by private insurance holders (n=4,180), self pay patients (n=1,004) and 20 patients with Medicare. The practice currently has three full-time and one half-time pediatricians and seven full-time NPs.

Providers of dental care in Lake City include nineteen dentists, two orthodontists and two oral surgeons. There is one pedodontist (pediatric dentist) in Lake City who is trained and willing to provide care to children under the age of 2 years. Unfortunately, this dentist does not accept Florida Medicaid patients. Currently there are no dentists in Lake City to provide dental care to children less than 2 years of age with Medicaid insurance. The closest facility available to serve these patients is located in Gainesville Florida which is 47 miles away. Furthermore, based on 2009 data from the Florida Department of Health (FDOH), only 25.6% of the city population in Columbia County benefit by receiving fluoridated water from the community water system.

Sample

The sample was comprised of 100 subjects, consisting of parents or guardians of children 6 or 9 months of age at the time of study enrollment. The sample included both males and females of any racial/ethnic background meeting the study criteria. It was anticipated that there would be a diverse group of participants based on 2010 census data for Lake City and
known demographic characteristics of NFP. The study inclusion criteria were as follows: (a) participants must be parents or guardians of children ages 6 or 9 months at the time of enrollment who receive primary care services at the NFP Clinic; (b) participants must be enrolled in the Florida Medicaid insurance program; and (c) the parent(s) must be able to speak English. The enrollment of only Medicaid patients allows for the study results to be generalized to a specific group of individuals who are considered to be at a high-risk for developing ECC.

Participants were excluded from the study if: (a) their child had an acute or chronic condition or craniofacial abnormality that requires various dietary restrictions or dental care beyond what is normally expected for children 6 to 15 months of age; (b) the child has a history of chronic illness that may affect dental development; (c) the parents or guardians were non-English speaking; and (d) the child was not currently receiving Florida Medicaid insurance.

**Sample Size and Power Analysis**

A power of .80, alpha of .05 and medium effect size was used to determine sample size (Appendix A). Based on the power calculations, 341 participants in each group (for a total of 682) would be required to ascertain a statistically significant difference between the groups. Due to the feasibility of completing the study in a reasonable period of time, a sample of 50 participants in each arm of the study (for a total of 100 participants) was chosen as the maximum enrollment. Therefore, based on the current study sample of 100 participants, a reduction in power would be required to reach significance, increasing the chance of creating type II errors. The study was extended from the anticipated 9 to 12 months to 17 months in order to allow for the completion of all of the visits required by the study for participants in both the standard oral health and enhanced oral health promotion groups.
**Operational Definitions**

The operational definitions for this study are described in Table 1.

Table 1: Operational Definitions

<table>
<thead>
<tr>
<th>Operational Variable</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early childhood caries</td>
<td>The presence of 1 or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger (AAPD, 2011b)</td>
</tr>
<tr>
<td>Parent</td>
<td>Mother, father or legal guardian.</td>
</tr>
<tr>
<td>Oral health promotion</td>
<td>Public health actions to protect or improve oral health and promote oral well-being through behavioral, educational and enabling socio-economic, legal, fiscal, environmental, and social measures (Sheiham, 2005).</td>
</tr>
<tr>
<td>Standard oral health care</td>
<td>The oral health care that is delivered at the time of a well child visit (Table 2) and that is currently reimbursable by Florida Medicaid for high-risk children. Standard oral health care includes the following: screening exam, caries risk assessment, fluoride varnish application, anticipatory guidance and attempt to refer to a dental practice or a dental home. The time allotted for a well child visit is approximately 30-minutes, limiting the time spent specifically on the child’s oral health.</td>
</tr>
<tr>
<td>Enhanced oral health promotion</td>
<td>The care that is provided as a separate 20-minute visit with a primary care provider focusing specifically on the oral health of the child. Oral health promotion visits consist of an oral health history with caries risk assessment, medical history, oral health examination and child and family specific education focusing on those child family risk factors that are known to increase the likelihood of caries formation (Table 2). Dental clinic information is then provided and referrals made as needed.</td>
</tr>
<tr>
<td>Medicaid Insurance</td>
<td>A program of medical aid, financed by the state and federal governments, and designed for individuals unable to afford regular medical care. Florida Medicaid eligibility is based on several factors including family income and number of children in household.</td>
</tr>
</tbody>
</table>
Oral health beliefs

Parental or guardians’ thoughts, feelings or views regarding oral health that pertain to their child or children. Oral health beliefs will be determined by responses to the early childhood oral health (ECOH) questionnaire.

Oral health behaviors

Those actions a parent or guardian perform pertaining to the oral health of their child and/or themselves. Oral health behaviors will be measured by responses to the ECOH questionnaire.

Demographics

The characteristics of the population in the study. Characteristics will be determined by responses to the ECOH questionnaire and compared statistically between the two study groups.

Measurement of Variables

Early childhood oral health (ECOH) questionnaire development. The structured ECOH questionnaire was adapted, with permission from the work of Mohebbi, Virtanen, Vahid-Golpayegani and Vehkalahti (2009). It utilized questions to obtain information regarding demographics, socioeconomic status of the family, feeding history, dietary habits, dental health and oral hygiene practices. Mohebbi et al. (2009) reported that the questionnaire used in their study was valid and reliable; however, the exact reliability and validity statistics were not reported or available for review.

The questions included in the ECOH questionnaire were based on the HBM, to assess the participations’ perceptions of their beliefs in certain activities that might prevent illness, perceived threats of ECC in their children as well as perceived benefits, and barriers to preventative actions (Figure 2). Additionally, the ECOH questionnaire maintained a socio-ecological focus, including relevant questions that pertain not only to the child but also the family and community, emphasizing the complexity of ECC caries as noted in the concept map of early childhood oral health (Figure 1).
The ECOH questionnaire was first tested for content validity by the researcher in 2009. According to Lynn (1986), the content validity index (CVI) for a questionnaire is determined by computing the CVI for each item within the questionnaire, and then calculating the average individual content validity across all items. Items with values close to or equal to “1” are considered to be valid. The seven content experts and reviewers of the ECOH questionnaire were familiar with ECC and the current literature including programs developed to decrease ECC. These seven content experts consisted of four NPs with experience in pediatrics, one pediatrician, one dental hygienist / educator and one dentist / professor of dentistry. Reviewers were asked to update terms, to clarify confusing items, and to comment on the apparent validity of each item in the ECOH questionnaire. The CVI for each item in the ECOH questionnaire was calculated based on the content expert’s response to a Likert scale. The scale ranged from 1 (meaning the question was irrelevant) up to 4 (representing an extremely relevant question). Those questions not rated as a 3 or 4 by all of the seven content experts were reviewed by the researcher for relevance. After reviewing the scores and additional comments from the experts the retained questions (total = 37) revealed 36 items with a CVI of 1.0 and one item with a CVI of 0.86. The content validity for the entire ECOH questionnaire was then calculated as 36.86/37 or 0.996 and the ECOH questionnaire was determined to have content validity.

The ECOH questionnaire was then administered to five parents of children between the age of 6 months and 36 months of age. Parents were asked to comment and clarify items that were not easily understood. Minor changes to improve in the understanding of some terminology were made based on this feedback.

Reliability for the ECOH questionnaire was then established through a pilot test performed by the researcher in 2009. The ECOH questionnaire was administered to 10 subjects in a private pediatric practice. Five of the parents in this pilot test had received one enhanced oral health promotion visit with fluoride application and five parents had received only standard oral health care without fluoride application during their well child care visits in the same
The data collected was analyzed using Statistical Package for Social Sciences (SPSS®) version 16.0. Based on the descriptive statistic calculated by SPSS, the parent’s responses to the ECOH questionnaire showed consistency, however due to the small size of the sample a Cronbach alpha was not calculated.

Readability of the final ECOH questionnaire was determined using Flesch reading ease and Flesch-Kincaid grade level. The reading ease was 83.1 and grade level of the questionnaire was found to be 4.2.

**ECOH: conceptual model.** Efficacy of oral health promotion visits (Figure 2), based on the HBM demonstrates how the ECOH questionnaire can assist in determining whether changes will occur in parents’ oral health beliefs and behaviors. The demographic variables in the ECOH questionnaire, questions 1 through 13 on pages 5 and 6 of the questionnaire, provide background data about the parents’, child’s and family’s socioeconomic status. Socioeconomic status is a known determinant of oral health outcomes and modifying factors for preventive health behaviors. Feeding habits and oral habits (questions 1 through 10 on pages 1 and 2; 1 through 3 on page 2), provide a basis for determining current knowledge of the parent as well as perceived susceptibility of poor oral health outcomes for their child. Comparing parent’s initial and final ECOH questionnaire responses about the feeding habits and oral habits of their child assisted the researcher in determining changes in behaviors in the intervention and control group. Determining the parent’s perception of the importance of their child’s primary teeth versus their permanent teeth (questions 6 and 7 on page 3); importance of permanent teeth compared to general health (question 8 on page 3); dental care visits for the child (questions 1 and 2 on page 4) and parents’ frequency of preventive dental care for themselves (question 3 on page 4), assists in determining the perceived benefits of preventive action. The parent’s confidence in their ability to maintain their child’s dental care (questions 1, 2 and 3 on page 4) ascertained perceived barriers to preventative action. Cues to action include advice and a toothbrush during standard oral health care while performing the well child care visits, dental
posters in the pediatric office and providing a toothbrush, tooth paste, sippy cups and educational handouts to parents during enhanced oral health promotion visits.

**Human Subject Protection**

**Risk level assessment.** This study was low risk (with no serious adverse events anticipated). This study involved the collection of data through the use of the ECOH questionnaire that captured demographics, SES of the family, feeding history and dietary habits, dental health and oral hygiene practices, and perceptions of oral health and the risk of the development of caries. For those participants receiving the additional enhanced oral health promotion visits, responses to four open ended questions were collected at the end of the study period. All children in the study received application of 5% sodium fluoride varnish at their well child care visits which included standard oral health care. Fluoride varnishes have shown to be easy to use, safe and effective for infants and toddlers (Milgrom, Zero & Tanzer, 2009).

Extensive review of the literature by Miller and Vann (2008) concluded that fluoride varnish has limited risk to the child. The authors noted that based on the scientific evidence, fluoride varnish is not only safe but should be the only topical fluoride modality used for those children under 3 years of age. In the statewide program in North Carolina, started in 2000, more than 480,000 fluoride varnish treatments for children 0 to 36 months of age have been performed with no adverse outcomes (Miller & Vann, 2009).

Potential benefits to the participants and their children were to: a) increase family oral health awareness; b) improve oral health habits for the child and family; and c) reduce future dental caries. Unanticipated but potential risks included feelings of guilt as parents realize that caries are preventable and recognize that their behaviors may contribute to the development of their child’s poor oral health status. Children receiving fluoride varnish may have improved oral health outcomes with the absence or decrease in caries. Every effort was made to provide positive feedback at the completion of the ECOH questionnaire, during standard oral health care provided during the well child care visits as well as throughout the enhanced oral health.
promotion visits. Maintaining privacy and confidentiality of information shared with researchers was of utmost importance.

**Adequacy of protection against risks.** To protect against psychological risks, subjects were told the following: a) their participation in the study was entirely voluntary; b) they were free to refuse to participate and to withdraw from the study or any portion of the study at any time; and c) they had the right to refuse to answer any question that they felt uncomfortable addressing without penalty or loss of benefits to which they were entitled. The psychological risks of participants to personal questions were partially relieved by telling the participants that they did not have to answer any questions that made them uncomfortable.

All research material obtained from the participants was used specifically and exclusively for research purposes and only identified with the study identification (ID) number of each participant. All questionnaires were collected using standardized paper forms and only identified with a study ID number for each participant. The codes that link the participant names and study ID numbers were kept in a secured cabinet and locked data storage room. The University of Hawaii at Manoa (UHM) School of Nursing and Dental Hygiene (SONDH) faculty statistician assisted the researcher in conducting appropriate statistical tests using SPSS®, version 20.0 and SAS®, version 9.3. Assisting with review of the statistical analysis and interpretation of the data was the researcher’s doctoral advisor and UHM SONDH faculty statistician. Participant information (e.g., participant identification, questionnaires) will be destroyed seven years from the date of study completion.

**Safety monitoring plan.** A committee of experts was established to ensure the monitoring of data safety. The committee consisted of two experts in research of infants, infants’ caregivers and community members. Their primary goal was to determine potential risks and consequences related to subject participation.

The committee met monthly to discuss the progress of the study. There were no adverse events noted throughout the study period of 17 months. Adverse events were defined
as any serious and/or unexpected adverse health effect (illness, injury, accident, death), or problem involving the conduct of the study or subject participation (including recruitment, consent, screening, or deviation from the treatment protocol).

**Subject Recruitment**

The research proposal was submitted to the UHM Committee on Human Subjects (CHS) and to NFP. A letter approving the study for subject enrollment was obtained from both parties. After the UHM CHS and NFP clinic approvals for the study had been obtained, subject recruitment was initiated in March of 2010. The researcher identified potential participants by identifying those children scheduled for a 6 month or 9 month well child care visits with the researcher (a PNP). Prior to their child’s 6 or 9 month well child visit at the NFP clinic, parents who met the eligibility criteria were asked by the researcher to participate in this study. If parents agreed to participate they were informed that their child’s next well child care visit and enhanced oral health promotion visits (intervention group) would be conducted solely by the PNP researcher.

**Study Procedures**

After the study was presented to the parents and they agreed to participate in the study, a patient consent form (Appendix D) was reviewed and signed. Parents then completed the ECOH questionnaire. This was followed by the PNP researcher conducting the well child care examination including standard oral health care. To avoid bias, the participants were randomized into the control group or intervention group after completion of the first well child care visit. Block randomization was used to assure an equal number of participants in the control and intervention groups. Once the well child care visit was complete, the children were scheduled for their next well child care visit (control group) or their enhanced oral care visit (intervention group) according to the pathways for oral health care (Figures 4 and 5). If parents failed to attend any of their scheduled appointments and did not reschedule an appointment for their children within a six-week period of time the participants were eliminated from the study.
Figure 4: Pathway for Oral Health Care (entering at 6 months)

Key:
I: Intervention Group
C: Control Group
ECOH: Early Childhood Oral Health Questionnaire
Figure 5: Pathway for Oral Health Care (entering at 9 months)

Key:
I: Intervention Group
C: Control Group
ECOH: Early Childhood Oral Health Questionnaire
The entire well child care visit, including standard oral health care, was limited to approximately 30 minutes. To maintain consistency and reduce bias, the researcher used a checklist for standard oral health care (Appendix E). However, the order of questions, assessment and guidance within the checklist varied slightly among participants. The approximate time required for the additional enhanced oral health visits was 20 minutes and consisted of an extensive oral health history and caries risk assessment, medical history, and an oral health examination. In addition, detailed family specific oral health education was discussed and a handout was distributed at each visit which focused on common child and family risk factors known to increase the likelihood of caries formation, with the option for additional hand written instructions by the researcher (Figure 3). Dental clinic information was then provided and referrals made as needed. To maintain consistency and reduce bias the researcher utilized an enhanced oral health promotion form to guide the conversation and care that was provided at each visit (Appendix F). A toothbrush and toothpaste were distributed during the child’s first enhanced oral health promotion visit and a sippy cup at the second visit to reinforce proper oral health beliefs and behaviors. At each visit the researcher discussed and demonstrated proper care of the teeth and the importance of fluoride toothpaste to help reduce the formation of caries. Pictures of ECC (Appendix G) as well as an educational handout were used during each enhanced oral health visit. At the end of each enhanced oral health promotion visit the parents were asked if they had any further questions.

At the end of the study (i.e., at the 12 month well child care visit, for those children enrolled at the 6 months of age well child care visit or at the 15 month well child care visit for those children enrolled at the 9 month of age well child care visit) all participants completed the ECOH questionnaire for the second time; the intervention group also responded to four open-ended questions in writing about their experiences during the enhanced oral health promotion visits (Appendix D). All participants received $20 for their time and travel at the completion of the initial ECOH questionnaire and $20 at the completion of their final ECOH questionnaire. The
interval between the completion of the first study visit and to the completion of the final study visit was approximately six to seven months.

Data Analysis

**Quantitative data analysis.** Quantitative data analyses utilized both SPSS®, version 20, and SAS® software programs. Using the statistical package SPSS®, version 20, descriptive statistics on the demographic data for the sample were calculated. This included frequencies and percentages for all nominal and ordinal data, and means and standard deviations for all interval and ratio level data. Baseline comparisons were completed on the demographic variables between the control group and the intervention groups using Fisher’s exact test to identify differences between the groups.

Below is a list of the study aims with the specific quantitative data analysis plan for each of these aims.

1. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits.

   Bi-variate analysis using descriptive statistics for nominal variables, Fisher’s exact test for count data, as well as the generalized mixed effect model through the PROC GENMOD procedure in SAS® were used for examining the differences between the parent’s oral health beliefs and behaviors before and after their child received two standard oral care visits during their well child care visits and two enhanced oral health promotion visits. In addition, analyses to determine the changes in the continuous variables over time were completed.

2. Determine the differences in parent’s oral health beliefs and behaviors for their children ages 6 to 15 months before and after receiving standard oral health care during their well child care visits without additional enhanced oral health promotion visits.

   Bi-variate analysis using descriptive statistics for nominal variables, Fisher’s exact test for count data, as well as the generalized mixed effect model through the PROC GENMOD procedure in
SAS® were used for examining the differences between the oral health beliefs and behaviors before and after two standard oral care visits for the control group. In addition, analyses were conducted to explore the changes in the continuous variables over time.

3. Determine the differences in parental oral health beliefs and behaviors for their children ages 6 to 15 months between: (a) the group of parents receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group); and (b) the group of parents receiving standard oral health care during their well child care visits without additional oral health promotion visits (control group).

To explore the differences between the variables in the intervention and the control groups, descriptive statistics and the generalized mixed effect model through the PROC GENMOD procedure in SAS® were used to analyze nominal variables and to explore the changes in continuous variables over time.

**Qualitative data analysis.** The fourth study aim was to describe the qualitative experiences of the parents of children ages 6 to 15 months who participated in the enhanced oral health promotion visits. Content analysis was used to explore the subjects’ responses to the four open-ended questions (Appendix D) asked before their final well child care visit with standard oral health care was completed (Burns & Groves, 2009; Graneheim & Lundman, 2004). The researcher began the process of data analysis by reading the participant’s written responses to each of the four questions. During the second reading of responses to each question, the researcher began highlighting text that appeared to describe the participant’s experiences during the enhanced oral health promotion visits. Memos were written by the researcher to reflect on the themes that were emerging from the data to provide an audit trail. Through this repeated process of reading the responses to the four open-ended questions preliminary categories were developed. Once these categories were created then each comment was coded into one of the categories. When coding was complete the researcher
examined all data with a particular code. During the analysis process, some codes were merged into one category due to redundancy of the content of those codes, while others were split into subcategories due to distinct differences in the content that emerged as the analysis proceeded. Independent coding of the responses was also completed by a colleague known to have qualitative experience, to be sure of proper identification of categories and themes. The final categories and themes were then organized into a hierarchical structure and reviewed with the colleague experienced in qualitative methods as well as the dissertation chair. This final process assisted in establishing reliability and confirmability of the study findings.
Chapter 4: Results

This chapter will present the results of the analysis of the data. The initial hypothesis of the study stated that parents of children who receive standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits would demonstrate a significant change in their oral health beliefs and behaviors for their children. The second hypothesis stated the parents who receive only standard oral health care during their child’s well child care visits would demonstrate a significant change in oral health beliefs and behaviors for their children. For the third hypothesis, it was posited that the parents of children receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group) would have a significantly greater change in their oral health beliefs and behaviors for their children compared to the parents of children receiving only standard oral health care during their well child visits (control group). Finally, for those parents who participated in the enhanced oral health promotion visits, four open-ended questions were asked to assist in qualitatively describing their experiences.

Study Participants

One hundred participants were enrolled in the study, 50 in the intervention group and 50 in the control group. Sixteen participants, ten in the control group and six in the intervention group were lost to follow-up. Four participants moved out of the state, leaving their current pediatric practice. Two participants had a change or loss of their insurance. One participant was disqualified from further participation due to their inability to have a parent or guardian available at their well child care visits. One participant was seen by other providers for their well child care visits and, therefore, was disqualified from the study. The other eight could not be scheduled for their follow-up visit for a variety of reasons including incorrect or disconnected phone numbers, and lack of returned calls from the participants. There were 84 participants remaining, 44 in the intervention group and 40 in the control group, and data analysis from these two groups are included in the results.
Data Analysis

Demographics. The demographic characteristics for the intervention group and control group were compared using SPSS® version 20. There were no statistically significant differences found between the intervention group and control group based on the responses to the ECOH questionnaire. As depicted in Figure 6, the majority of the participants completing the questionnaire (95.2%, n=80) stated they were the child’s mother followed by fathers (2.4%, n=2) and legal guardians (2.4%, n=2). The mean age of the participants was 24.7 years (SD = 5.8) with a median of 24.72 years and a range of 16 to 48 years. The race and ethnicity of the children participating in the study are documented in Figure 7. The majority of the children’s ethnicity was noted to be non-Hispanic or Latino 97.6% (n=82). Data collected about the children’s race indicated that the majority identified as being White or Caucasian (70.2%, n=59), followed by Black or African American (28.6%, n=24), and (1.2%, n=1) American Indian or Alaskan Native. Figure 8 depicts the marital status of the 84 subjects completing the study with 56% (n=47) stating that they were never married, 34.5% (n=29) were married, 7.1% (n=6) were divorced, and 2.4% (n=2) were separated. The main caregiver during most days of the week was the mother (63.1%, n=53), followed by grandparents (15.5%, n=13), daycare center staff (9.5%, n=8), fathers (7.1%, n=6), and 4.8% (n=4) answering other (Figure 9).

Education levels for the parents (Figure 10) were similar for both the intervention and control group. Mother’s education level showed the highest percentage 66.7% (n=56) in the high school degree category followed by 20.2% (n=17) with less than a high school education. A total of ten mothers did have a college degree ranging from an Associates degree (9.5%, n=8), Bachelors degree (1.2%, n=1), Masters degree (1.2%, n=1), and 1.2% (n=1) stating they did not have a mother involved with the child. The education data for fathers was similar to mothers with the highest percentage (59.5%, n=50) with a high school degree, followed by 15.5% (n=13) with less than high school education, 7.1% (n=6) with an Associate degree, 1.2% (n=1) with a Bachelor degree and the remaining stating (16.7%, n=14) they did
not have a father involved with the child. Of those listed as guardians (n=3), one had less than a high school education and two had a high school education.

The working status of the parents (Figure 11) was similar for both the intervention and control groups. Over one-half of the mothers (58.3%, n=49) were not currently employed, 20.2% (n=17) worked full-time and 19% (n=16) worked part-time with 2.4% (n=2) stating they did not have a mother involved with the child. Forty-four percent (n=37) of fathers were currently working full-time, followed by 21.4% (n=18) stating the child did not have a father involved with the child, 20.2% (n=17) working part-time and 14.3% (n=12) indicated they were not employed. Of those three participants who identified themselves as being the guardian of the child, two worked part-time and one was not employed. Yearly income for the participants was reflected by their Medicaid status because this is based on income. Figure 12 reveals annual income for the participants with 41.7% (n=35) having earned less than $10,000, 32.1% (n=27) earned a yearly income of $10,000 to $19,000, 21.4%, n=18 earned $20,000 to $40,000, 3.6% (n=3) earned $40,000 to $60,000, and the smallest group (1.2%, n=1) had an income greater than $60,000.

Hypothesis Testing

Descriptive statistics were used to analyze nominal variables and Fisher's exact test for count data. A generalized mixed effect model using the PROC GENMOD procedure was employed to examine the differences between the parents’ oral health beliefs and behaviors for their children before and after receiving two standard oral care visits during well child care visits with two additional enhanced oral health promotion visits (the intervention group), as well as the differences between parents’ oral health beliefs and behaviors before and after receiving two standard oral care visits during well child care visits without enhanced oral health promotion visits (the control group). To measure the differences between the intervention group and control group descriptive statistics were used to analyze nominal variables and the generalized mixed effect model using the PROC GENMOD procedure for continuous variables.
Hypothesis 1. Hypothesis number one of the study stated that parents of children ages 6 to 15 months who received standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits will demonstrate a significant positive change in oral health beliefs and behaviors for their children.

Oral health beliefs. Parents’ perceptions of the importance of oral care for their children’s primary teeth compared to their general health needs improved significantly ($p<.05$); however, the other two questions about parents’ perception of oral health care did not significantly change (Table 3). Parents’ confidence in their knowledge about how to brush their child’s teeth properly also improved significantly ($p<.05$); however, confidence in the two remaining oral health behaviors listed remained unchanged (Table 4).

Table 3

<table>
<thead>
<tr>
<th>Changes in Perception of Oral Status and Care (Intervention Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% Confidence Interval</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Importance of primary teeth compared to permanent teeth</td>
</tr>
<tr>
<td>Importance of oral care of primary teeth compared to general health needs</td>
</tr>
<tr>
<td>Importance of oral care of permanent teeth compared to general health needs</td>
</tr>
</tbody>
</table>

*p<.05
Table 4

Changes in Confidence in Oral Care (Intervention Group)

|                                          | 95% Confidence Interval | Z   | Pr>|Z| |
|------------------------------------------|-------------------------|-----|-----|
| I don’t know how to brush my child’s teeth properly | -2.0587, -0.0460        | -2.05 | 0.0404* |
| Don’t have time to brush child’s teeth twice a day | -1.7396, 0.0541         | -1.84 | 0.0655 |
| Can’t make our child brush their teeth at least twice a day | -1.7172, 0.0046         | -1.95 | 0.0512 |

*p<.05

Behaviors. Of the ten feeding behaviors analyzed, the only feeding habit which significantly changed over time (p<.05) was related to an increase in the number of times the child ate during the day (meals and snacks).

Results from the initial ECOH questionnaire indicated 28 of the 44 infants had teeth at the time of administering the questionnaire. In the intervention group, 14 (50%) of the 28 parents of children who had teeth were brushing their children’s teeth, whereas the other 14 (50%) were not yet brushing their children’s teeth. When the final ECOH questionnaire was completed and all 44 children had teeth present, 97.7% (n=43) of the participants in the intervention group stated they were brushing their children’s teeth. Therefore, at the completion of the study when the child was either 12 or 15 months old, only 2% (n=1) of the participants in the intervention group had not initiated tooth brushing despite having teeth present. Therefore, brushing improved significantly (p<.0001) from 14/28 (50%) to 43/44 (97.7%) for those children who had teeth erupt during the course of the study.

Toothbrushes were used to clean the child’s teeth in 100% (n=44) of the intervention group instead of other forms of tooth cleaning (e.g., using a washcloth instead of a toothbrush) according to parental responses to the final ECOH questionnaire. There was also a statistically
significant change in the frequency of tooth brushing over time. Initial ECOH questionnaire responses to brushing frequency in the 28 children with teeth indicated that 50% (n=14) of the parents were brushing irregularly or had never brushed their children’s teeth, 25% (n=7) were brushing their children’s teeth once a day and 25% (n=7) parents brushed more than once a day. However, the parents responses to the final ECOH questionnaire revealed a significant change \((p<.0001)\) in their tooth brushing frequency compared to their initial ECOH questionnaire responses with 45.5% (n=20) of the participants brushing their child’s teeth once a day, 45.5% (n=20) brushing more than once a day and 6.8% (n=3) stating they were brushing their children’s teeth 2 to 3 times a week at the completion of the study.

**Hypothesis 2.** Hypothesis number two of the study stated that parents of children ages 6 to 15 months who received standard oral health care during their well child care visits without the addition of two enhanced oral health promotion visits will demonstrate a significant positive change in oral health beliefs and behaviors for their children.

**Oral health beliefs.** Parents’ perceptions of the importance of oral care for their children’s primary teeth compared to the general health care needs improved significantly \((p<.05)\); however, the other two questions about parents’ perception of oral health care did not significantly change (Table 5). Parents’ confidence in their knowledge about how to brush their children’s teeth properly improved significantly \((p<.05)\); however, confidence in the two remaining oral health behaviors listed remained unchanged (Table 6).
Table 5

Changes in Perception of Oral Status and Care (Control Group)

|                                                     | 95% Confidence Interval | Z   | Pr>|Z| |
|-----------------------------------------------------|-------------------------|-----|-----|
| Importance of primary teeth compared to permanent teeth | -1.2647, 1.3757         | 0.08| 0.9344 |
| Importance of oral care of primary teeth compared to general health needs | 0.0109, 2.0110          | 1.98| 0.0476* |
| Importance of oral care of permanent teeth compared to general health needs | -0.3309, 1.9192         | 1.38| 0.1665 |

*p<.05

Table 6

Changes in Confidence in Oral Care (Control Group)

|                                                     | 95% Confidence Interval | Z   | Pr>|Z| |
|-----------------------------------------------------|-------------------------|-----|-----|
| I don’t know how to brush my child’s teeth properly | -2.1534, -0.1329        | -2.22| 0.0266* |
| Don’t have time to brush child’s teeth twice a day  | -2.1369, 0.0849         | -1.81| 0.0703 |
| Can’t make our child brush their teeth at least twice a day | -1.6996, 0.1416        | -1.66| 0.0972 |

*p<.05

Behaviors. Results from the initial ECOH questionnaire indicated 24 of the 40 infants in the control group had teeth at the time of administering the questionnaire. Eleven (46%) of the 24 parents were already brushing their children’s teeth, while the remaining 13 (54%) parents were not brushing their children’s teeth. When the final ECOH questionnaire was completed and all 40 children had teeth present, 92.5% (n=37) of the control group stated they were brushing their children’s teeth and 7.5% (n=3) of the control group stated that their children’s teeth had
not yet been cleaned. However, brushing did significantly improve over time \((p<.0001)\) for the control group from 11/24 (45.8\%) reported during the first data collection visit compared to 37/40 (92.5\%) at the final data collection visit.

Toothbrushes were used to clean the child’s teeth in 94.6\% \((n=35)\) of the control group that were brushing their children’s teeth; however 5.4\% \((n=2)\) were using washcloths to clean their children’s teeth according to parental responses to the final ECOH questionnaire. There was also a statistically significant change in the frequency of tooth brushing over time. Initial ECOH questionnaire responses to brushing frequency in the 24 children with teeth indicated that 54.2\% \((n=13)\) of the parents were brushing irregularly or had never brushed their children’s teeth, 20.8\% \((n=5)\) were brushing more than once a day, 12.5\% \((n=3)\) parents were brushing or cleaning their children’s teeth once a day, 8.3\% \((n=2)\) parents were brushing 2 to 3 times a week and 4.2\% \((n=1)\) were brushing once a week. However, the parents responses to the final ECOH questionnaire revealed a significant change in their tooth brushing frequency compared to their initial ECOH questionnaire responses \((p<.0001)\), with 40\% \((n=16)\) of the participants brushing their children’s teeth once a day, 47.5\% \((n=19)\) brushing more than once a day, and 5\% \((n=2)\) of parent’s stating that they were brushing 2 to 3 times a week at the completion of the study. At the completion of the study, only 7.5\% \((n=3)\) of the parents in the control group stated they were brushing irregularly or had never brushed their children’s teeth.

While behaviors related to the care of teeth changed, there was no significant change over time in any of the feeding behaviors reported by the parents.

**Hypothesis 3.** Hypothesis number three of the study posited that parents of children ages 6 to 15 months who received standard oral health care with the addition of two enhanced oral health promotion visits (intervention group) will have a significantly greater change in their oral health beliefs and behaviors compared to parents of children ages 6 to 15 months who received standard oral health care without enhanced oral health promotion visits (control group) was not supported by the data. There were no statistically significant differences in any of the
following: parents’ perceptions of the importance of oral status and health care for their children; parent’s confidence in oral care for their children; feeding habits or oral habits.

**Hypothesis 4.** Hypothesis number four of the study stated that parents of children ages 6 to 15 months who received the additional enhanced oral health promotion visits will describe their experience to the visits as positive by identifying learned oral health information and recommending the program to others. This statement was supported by the responses by the parents in the intervention group to the four open-ended questions presented at the completion of the final study visit (Table 7). A total of 37 participants in the intervention group chose to complete the open-ended questions that focused on their experiences while participating in the enhanced oral health promotion visits. These responses were analyzed using a content analysis approach. Main categories were identified as valuable information learned about oral health care, oral health skills learned for better oral health for their children and value of oral health incentives for the participants and their children. Specifically, the participants identified important aspects of the intervention including oral health techniques (brushing) they were taught, importance of proper oral health care for their children at an early age and incentives (toothbrushes and cup) they received while participating in the enhanced oral health promotion visits (Table 7). Participants stated that they learned how to care for their children’s teeth including how to brush them (n=11), how often to brush them (n=10) and the importance of fluoride toothpaste when brushing (n=5). Ten participants stated that they learned about the importance of primary teeth (baby teeth) and the need to properly care for their children’s teeth early in their lives. Two participants noted the importance of learning about fluoride varnish and two participants stated they learned about the importance of dental care and seeing a dentist early in life.

When parents were asked what was the most helpful aspect of attending the enhanced oral health promotion visits twenty participants identified the free toothbrushes and/or varnish applied to their children’s teeth. Eleven participants stated learning how to properly brush their
children’s teeth was very helpful, while four participants documented that learning about the importance of primary teeth was helpful. Finally, two participants noted the importance of having their questions answered fully about the oral health of their children was a great help to them.

When parents were asked what was least helpful, 34 participants responded to the question by stating everything was helpful. A total of 35 participants responded positively to the program and stated that they would recommend this program to others. There was only one additional comment that thanked the PNP for all the information she provided. Despite the participants need to find time to attend the two enhanced oral health visits, all participants responded with only positive responses about their experiences.
Chapter 5: Discussion

The overall purpose of this study was to test the impact of oral health promotion visits in a primary care practice on parental beliefs about oral health and parental oral health behaviors for their children 6 to 15 months of age. The study compared the differences in the parents’ oral health beliefs and behaviors over time based on their random assignment to the group receiving standard oral health promotion during well child care visits with the addition of two enhanced oral health promotion visits (intervention group) or the group receiving standard oral health promotion during well child care visits without the addition of two enhanced oral health promotion visits (control group). 

The study results revealed improvements in parents’ oral health beliefs and behaviors for their children ages 6 to 15 months after receiving standard oral health care during their well child care visits with the addition of two enhanced oral health promotion visits (intervention group). Similarly, results indicated that there were positive changes in parental oral health beliefs and behaviors in the parents’ of children ages 6 to 15 months who received standard oral health promotion visits without enhanced oral health promotion visits (control group). The analysis for the intervention group indicated statistically significant changes in parents’ perception of the importance of oral care for their children’s primary teeth compared to their general health (p<.05), parents’ confidence in oral care, specifically related to the parents’ knowledge about how to brush their children’s teeth properly (p<.05), parental responses to whether or not they were brushing their children’s teeth (p<.0001) and parental frequency of tooth brushing for their children (p<.0001). The analysis for the control group also revealed statistically significant changes in parents’ perception of the importance of oral care for their children’s primary teeth compared to their general health (p<.05), parents’ confidence in oral care, specifically related to the parents’ knowledge about how to brush their children’s teeth properly (p<.05), parental responses to whether or not they were brushing their children’s teeth (p<.0001) and parental frequency of tooth brushing for their children (p<.0001). Additionally,
parents of children ages 6 to 15 months who received the additional enhanced oral health promotion visits described their experiences related to these visits as positive. Moreover, they identified several oral health topics and techniques they found helpful during their visits, as well as stating that they would recommend this program to others. It is not apparent based on the study results that standard oral health care visits provided during well child care visits with two additional enhanced oral health promotion visits is any more beneficial in changing parents’ oral health beliefs and behaviors for their children than the standard oral health assessment and education provided during well child care visits.

The social ecology model, which examines the interaction between people and the environment, was appropriate for use in this study due to the multifactorial nature of ECC. Demographic data including SES, parental education, and exposures to fluoride were explored in the current study to determine the characteristics that categorize children as being at an increased risk for ECC. Results of this study revealed that 41.7% (n=35) of the parents earn less than $10,000 per year and 32.1% (n=27) earn $10,000-$19,000 annually. Previous literature notes younger children living in families with incomes of less than $10,000 have a much greater risk of higher caries rates compared to children in families with incomes greater than or equal to $20,000 per year (Reisine, et al., 2008).

A parent’s education in combination with their income can also affect the dental care their child receives. Children whose primary caregiver had not completed high school were found to be more likely to have no dental visits compared to those children whose caregivers had completed high school or were college educated (Kenny, et al., 2000). In this current study 95.2% (n=80) of the participants stated they were the mother of the child. When all 84 participants were asked about the mother’s educational level it was determined that 66.7% (n=56) of the mothers had earned a high school degree followed by 20.2% (n=17) with less than a high school education. According to the literature, the educational levels of these mothers placed their children at risk for less than optimal dental care and high risk for ECC. This further
supports the need for oral health promotion in primary care practice where these children are seen frequently for well child care in the first years of their lives.

Fluoride has a protective effect against the development of caries. Unfortunately, fluoride exposure by way of drinking water for the study population is limited, with only 25.6% of the population of Columbia County benefiting from a fluoridated water system (FDOH, 2009). At the completion of this study only 22.7% (n=10) of the intervention group and 30% (n=12) of the control group stated they had fluoridated water. According to Mattheus (2010), the lack of fluoridated water, low income and limited parental education are three factors found to impact a child’s vulnerability to adverse early childhood oral health outcomes.

Fluoridated toothpaste is another source of fluoride for children and continues to be a common way to reduce caries in children. Currently, the AAPD (2012) recommends a “smear” of fluoridated toothpaste for children less than 2 years of age and “pea size” shape of toothpaste for children 2 to 5 years of age. Despite the education that was provided about the importance of fluoride during both the standard oral health care visits and enhanced oral health promotion visits, 50% (n=22) of the intervention group and 32.5% (n=13) of the control group at the completion of the study were using toothpaste that did not contain fluoride. This may be due to the conflicting information that parents receive regarding the use of fluoridated toothpaste in children, including the content of labels on children’s fluoride toothpaste, advising against its use for children less than 2 years of age. Despite the encouraging results of the study showing an increase in tooth brushing frequency, there is evidence of the need to further educate parents and guardians about the benefits of fluoride and to encourage their use of fluoridated toothpaste for their children.

Fluoride varnish also provides additional benefits for those high-risk children who may have limited access to fluoridated water. All children in this study who had teeth present at the time of their routine well child care visits, which includes standard oral health care, received applications of 5% sodium fluoride varnish. Fluoride varnishes have been shown to be easy to
use, safe and effective for infants and toddlers (Milgrom, et al., 2009). Including standard oral health care during the well child care visits allows the child to experience some of the benefits of fluoride without needing any further efforts from the parents.

Dietary practices are known contributors to caries development. Feeding habits provide a basis for determining current knowledge of the parent as well as perceived susceptibility of poor oral health outcomes for their child. Habibian et al., (2001) identified a positive correlation between the frequency of a child’s eating and drinking during the day at 6 months of age and evidence of plaque noted on dental examinations at 12 months of age ($r=0.25$, $p=0.001$); and a positive correlation between the frequency of a child’s eating and drinking during the day at 12 months and evidence of plaque noted on dental examinations at 12 months ($r=0.15$, $p=0.05$). In this study, despite education provided to parents regarding the relationship between eating and drinking and the development of caries, there were limited changes in parents’ feeding habits for their children. These results indicate that parents who participated in this study could benefit from additional education about the risks of children’s intake of sugary fluids and snacks, as well as being provided with alternatives choices for their young children who still require frequent feedings and fluid intake throughout the day based on the child’s individual growth and development.

Providing parents with sippy cups starting at 6 months of age, having further discussions about ways to eliminate night time feedings and alternatives such as water instead of juice in the cup, as well as providing the participants with a list of inexpensive alternative foods and drinks that limit caries development may help to create change in parental behaviors.

Parental knowledge about proper oral health care and the importance of the child’s primary teeth are factors known to improve a child’s oral health outcomes. In the current study, the oral health care education provided to the parents was associated with positive changes in their beliefs about their children’s oral health care as well as positive changes in parental behaviors in both the control and intervention groups over time. Parental responses from the
The initial ECOH questionnaire indicated that the lack of eruption of primary teeth, identified in 36.4% (n=16) of the intervention group and 40% (n=16) of the control, was the primary reason for stating that their children’s teeth were not being cleaned. At the completion of the study, when the children were 12 or 15 months old, the majority of parents in the intervention and control group reported changes in their oral health behaviors for their children with a total of 97.7% of the parents in the intervention group and 92.5% of the parents in the control group stating they were brushing their children’s primary teeth. These percentages with or without the additional enhanced oral health visits are much higher than those documented in the 2010 AAPD report that found that 97% of parents were not providing minimum preventive oral care for their infants and only 45% of the surveyed mothers regularly brushed their infant’s teeth. In this study, responses to the final ECOH questionnaire and to the four open-ended questions completed during their child’s final oral health promotion visit revealed that parents used toothbrushes to clean their children’s teeth in 100% (n=44) of the intervention group and 87.5% (n=35) of the control group; and found that the child friendly toothbrushes provided to them during the study were viewed as being very helpful by the parents. In this study it appears that the concept of brushing teeth and the beneficial effect on oral outcomes was an easy concept to grasp for parents. The addition of a toothbrush as an incentive may have had a positive effect on parental behavior over time.

The HBM used in the development of the ECOH questionnaire assisted in predicting as well as understanding parental beliefs and behaviors that changed or did not change over time. The nature of the standard oral health visits and the enhanced oral health promotion visits were also formed based on the HBM, which proved to be successful in changing some, but not all of the oral health beliefs and behaviors of parents who participated in this study. Utilization of the socioecological model, which was the basis for the concept map of early childhood oral health (Figure 1), demonstrates not only the complexity of developing poor oral health in early childhood but also the high risk nature of the current study participants. Several factors that can
increase a child’s chances of developing suboptimal oral health were identified in this study cohort including a high community poverty rate, low water fluoridation status, limited access to dental providers, low SES and high single or divorce rates for the parents of the children. These factors are known to not only increase a child’s vulnerability to poor oral health outcomes but are likely to remain unchanged over time (Mattheus, 2010).

This study’s results along with the current oral health promotion program developed at the research site, NFP clinic, demonstrate how dental education and care that has not been easily accessible to high risk families can be accessed and integrated into primary care practice by performing standard oral health care assessments. In addition, the current oral health promotion program developed at the research site, NFP clinic, was also able to perform simple interventions (e.g., fluoridated varnishes) during well child care visits. Standard oral health care not only benefits the child and family, but also can benefit the practice with the financial reimbursements from Medicaid that are currently provided for these standard pediatric oral health services in Florida.

**Study Limitations**

The main limitation of the current study was based on its small sample size. A small sample size can fail to detect clinically significant differences due to a lack of statistical power. This can result in type II errors or a false negative, resulting in the researcher failing to reject a null hypothesis that is actually false in the population being studied.

Because responses to several questions in the ECOH questionnaire produced small cell sizes during the analysis, only descriptive statistics were conducted for the responses to these questions. In addition, some of the responses to the ECOH questionnaire were not directly applicable to the subjects enrolled in the study (e.g., parents of infants who had not yet developed teeth could not validly answer the item: “when did you start cleaning your child’s teeth?”). However, despite these limitations, meaningful data were still gathered.
The length of the ECOH questionnaire also created some difficulty for parents with limited education and reading comprehension because their interpretation of the questions and responses to questionnaire items may have been different than anticipated despite the input from the subjects in the pilot study that was previously conducted regarding the use of the ECOH questionnaire in a similar population. In addition, subjects might have been influenced by the time constraints that impeded patient flow in the practice setting. The positive belief and behavior changes for the participants, based on their responses to the questionnaire, may have also been affected by recall bias as well as by the maturation effects associated with their child's change in growth and development. Over the study period it is likely that the infants participating in the study increased their total number of erupted primary care teeth which could have influenced parental behavior changes.

The geographical location of Lake City, Florida limits the generalizability of the study's results to other populations (e.g., urban settings). However, the enrollment of only Florida Medicaid patients allows for the results to be generalized to other Florida Medicaid patients, a group who are considered to be at a high risk for caries development. However, since Medicaid reimbursement differs from state to state, and oral health promotion programs may not be economically beneficial to the practice, there may be a decreased emphasis on providing standard oral health care during well child care visits.

Many pediatric primary care practices allow only 15 to 20 minutes to perform a well child care examination instead of the 30 minutes allotted in the study at the NFP practice. These time constraints may also limit the ability to provide proper standard oral promotion for parents during well child care visit, and therefore limit the generalizability of the study results to other practices.

The validity of the study's results may have been affected by parents' prior experience with oral health education and experience with oral health care for themselves and/or with older children. The slight variations in the age distribution for children between each group
(intervention versus control) may also have affected the responses of parents and the study results.

There was also a potential for bias from the researcher due to her active role as a PNP at the research site (NFP Clinic). Previous contact and respect for the PNP/researcher may have positively affected the parents’ responses to the ECOH questionnaires as well as affected the credibility of the responses of the parents in the intervention group to the four open ended questions at the completion of the study. The PNP/researcher was also not blinded to which group the participants where assigned (I or C) after randomization, creating further potential threats to the studies internal validity.

The strength of the research study design could have been enhanced if the researcher designated one group as a pure control group that received no interventions including standard oral health care during their well child care visits. However, this was not an option and deemed unethical based on the State of Florida’s standard of care. In Florida, pediatric primary care includes oral health evaluation and education for all children during well care visits with the addition of fluoride varnish treatments for children under the age of 42 months if they participate in the Medicaid insurance plan.

Lastly, a more conservative approach to data analysis for this study would have included an intent to treat analysis. By not completing this analysis, it is not known whether there would have been possible differences in the significance of the changes identified in parental oral health beliefs and behaviors over time both within and between the groups.

**Study Strengths**

Despite the small sample size, the current study was able to develop meaningful new knowledge about oral health care in a relatively short period of time (17 months). A study with a larger sample size would take much longer to enroll participants, require additional funding, and would require multiple sites to obtain a sufficient number of participants.
Although the study could have used additional providers to expedite enrollment, this study used only one primary provider to perform the standard oral health promotion during the well child care visits as well as the enhanced oral health promotion visits increasing the consistency of the oral health education. The researcher (PNP) completed all routine well child care visits for the sample which includes standard oral health care and all enhanced oral health promotion visits during the study period, which reduced the variability in the assessment, education and oral health interventions provided for the study population.

Based on the study’s results and on the experiences of and observations made by the NFP clinic staff during the study period, the NFP clinic chose to revise their procedures for providing standard oral health care during their well child care visits. In addition to providing standard oral health, every child who has Medicaid coverage is provided a toothbrush and fluoride toothpaste during well child visits from the ages of 6 months until 3 ½ years of age.

**Recommendation for Future Research**

Based on the data from this current research it would be beneficial to replicate this study using a larger sample size in order to confirm the current results. The ECOH questionnaire used for the study could also be revised in an attempt to be more concise and less time consuming for the participants to complete. In addition, it could be revised to be age and developmentally specific. Changing the study criteria to include only children who currently have teeth can improve the ability to analyze the data by increasing the number of responses to several of the ECOH questions. It would also be interesting to re-examine the participants in this study in one to two years to determine: (a) if parental oral beliefs and behaviors have remained constant or changed; (b) to measure whether or not the children in the study are caries free; (c) to determine if the parents are currently seeking professional dental care for their children; and (d) to determine if the children in the original study have assumed responsibility for their oral health as evidenced by reduced sugar intake and regular tooth brushing with fluoridated toothpaste.
Results from the current study showed limited changes in the feeding and drinking habits of children over time. Future research focusing on the feeding and drinking habits of infants and young children may produce more significant changes in parental behaviors that place a child at higher risk for ECC.

Knowing that families can increase their children’s risk of developing EEC by transmitting MS orally, parents, particularly mothers during pregnancy, should receive education about the importance of proper oral health care and interventions aimed at reducing the replication and transmission of the MS to their present and future children. Future research focusing on interventions to improve a mother’s dental health during and after pregnancy may assist in reducing poor oral health outcomes for both the mother and her children, with a reduction of ECC.

Conclusion and Implications

Oral health continues to be a major public health issue for children and families, particularly for low-income populations. The results of this study indicate that primary care providers who initiate oral health promotion programs in their primary care practices can positively impact parents’ beliefs about the oral health needs of their children and change parental behaviors about actively participating in the oral health of their children. Importantly, this study documented that additional oral health visits were not needed to achieve this level of success in which virtually all parents were brushing their children’s teeth by the ages of 12 or 15 months. This finding in a low SES setting is in contrast to previous reports of inadequate level of oral health care in the general population of infants and highlights the effectiveness of oral health promotion in routine pediatric care.

Standard oral health procedures including obtaining an oral health history, completing a caries risk assessment, providing oral health education, applying topical fluoride varnish to primary teeth and, if needed, referring the child to a dentist can be easily integrated into well child care visits with limited disruption to the practice flow. Primary care NPs are in a pivotal
position to address these oral health issues during the multiple well visits occurring in the first years of a child’s life.

Child, family and community factors that can affect oral health outcomes of children require equal consideration in the development of any prevention programs. Education should be simplified to maximize patients’ understanding and beliefs about the importance of their children’s oral health. In addition, incentives such as sippy cups, toothbrushes and toothpaste should be included in the program to increase parental behaviors that are aimed to reduce ECC and promote their children’s oral health.

Due to the undersupply of dental providers, primary care providers can and should act to implement these programs and document the results of such programs. The limited time required to perform standard oral health care, the potential economic benefit to the practice, and satisfaction of impacting children’s oral health are three important reasons to increase the number of programs like this in the U.S. as well as internationally.
Table 2:

Comparison between standard oral health care and enhanced oral health promotion visit

<table>
<thead>
<tr>
<th>Standard Oral Health Care</th>
<th>Enhanced Oral Health Promotion Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6-36 months</strong> (Length of visit 30 minutes)</td>
<td>(Length of visit 20 minutes)</td>
</tr>
<tr>
<td>- General Health History</td>
<td>- Oral Health History</td>
</tr>
<tr>
<td>Development</td>
<td>Feedings (daytime/night; amounts/frequency)</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Pacifier use</td>
</tr>
<tr>
<td>Sleep</td>
<td>Transition to cup</td>
</tr>
<tr>
<td>Oral health</td>
<td>Tooth cleaning/brushing</td>
</tr>
<tr>
<td>Visual Acuity</td>
<td>Toothpaste (fluoride)</td>
</tr>
<tr>
<td>Auditory Health</td>
<td>Water supply (well or city)</td>
</tr>
<tr>
<td></td>
<td>Child history of caries</td>
</tr>
<tr>
<td></td>
<td>Family history of caries</td>
</tr>
<tr>
<td>- Review of Systems</td>
<td>- Review of Oral System</td>
</tr>
<tr>
<td>General</td>
<td>Trouble eating or sleeping</td>
</tr>
<tr>
<td>HEENT</td>
<td>associated with oral cavity</td>
</tr>
<tr>
<td>Heart</td>
<td>Treatment for oral problems</td>
</tr>
<tr>
<td>Abdomen</td>
<td></td>
</tr>
<tr>
<td>Genitourinary</td>
<td></td>
</tr>
<tr>
<td>Neurological</td>
<td></td>
</tr>
<tr>
<td>Dermatological</td>
<td></td>
</tr>
<tr>
<td>Psychiatric</td>
<td></td>
</tr>
<tr>
<td>- Past History</td>
<td>- Past History</td>
</tr>
<tr>
<td>Medical</td>
<td>Medical</td>
</tr>
<tr>
<td>Family</td>
<td>Family</td>
</tr>
<tr>
<td>Social</td>
<td>Social</td>
</tr>
<tr>
<td>- Medications</td>
<td>- Medications</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>- Allergies</td>
<td>- Allergies</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>- Physical Examination</td>
<td>- Oral Examination</td>
</tr>
<tr>
<td>Full physical examination</td>
<td>Complete oral examination</td>
</tr>
<tr>
<td>*Caries-Risk Identification</td>
<td>*Caries-Risk Identification</td>
</tr>
</tbody>
</table>

*Caries Risk Assessment Tool (CAT) by the American Academy of Pediatric Dentistry (2011b).*
Standard Oral Health Care Enhanced Oral Health Promotion

6-36 months (cont)

-Anticipatory Guidance
  (Age specific focus)
  Development, communication
  Sleep; feeding strategies
  Oral health care
  Accident prevention
    Falls
    Car seat
    Choking
    Poison
  Vaccination
  -Application of Fluoride Varnish
  Establish Dental home

-Oral Education
  (Patient/age specific focus)
  **Oral Education Handout
  ***Toothbrush/paste or cup

1-4yr

-Anticipatory Guidance
  (Age specific focus)
  Family decisions, work balance
  Family time
  Sibling rivalry
  Bedtime, nap time
  Development (talking, reading to child)
  Play opportunities
  TV/Computer limits
  Accident prevention
    Car seats
    House safety
    Bike safety
    Guns
  Dental referral
  Vaccinations

-Oral Education
  (Patient/age specific focus)
  **Oral Education Handout
  ***Toothbrush/paste or cup

**Oral Health Handout: A Healthy Smile for your Child (Mattheus 2010).
***At oral health visit parents will be given a toothbrush and paste or sippy cup.
Table 7: Content Analysis of Responses to Open-Ended Questions (Enhanced Oral Health Visits [EOHV])

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Participant Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Important facts learned during EOHV</td>
<td>• How to care for their child’s teeth including how to brush them (n=11)</td>
</tr>
<tr>
<td></td>
<td>• How often to brush teeth (n=10)</td>
</tr>
<tr>
<td></td>
<td>• Importance of primary teeth (n=10)</td>
</tr>
<tr>
<td></td>
<td>• Importance of fluoride toothpaste (n=5)</td>
</tr>
<tr>
<td></td>
<td>• Learning about fluoride varnish (n=2)</td>
</tr>
<tr>
<td></td>
<td>• Importance of seeing a dentist early in life (n=2)</td>
</tr>
<tr>
<td>2. Most helpful for participants attending EOHV</td>
<td>• Free toothbrushes and/or varnish application (n=20)</td>
</tr>
<tr>
<td></td>
<td>• Learning how to brush their child’s teeth (n=11)</td>
</tr>
<tr>
<td></td>
<td>• Having questions answered fully (n=2)</td>
</tr>
<tr>
<td>3. Least helpful for participants</td>
<td>• Everything was helpful (n=34)</td>
</tr>
<tr>
<td>4. Recommendation of EOHV to others</td>
<td>• Yes (n=35)</td>
</tr>
</tbody>
</table>
Figure 2:

**Efficacy of Oral Health Promotion Visits**

<table>
<thead>
<tr>
<th>INDIVIDUAL PERCEPTION</th>
<th>MODIFYING FACTORS</th>
<th>LIKELIHOOD OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Susceptibility</td>
<td>Questions 1-10; pg 1 &amp; 2</td>
<td>Parents Perceived threat of ECC in their child</td>
</tr>
<tr>
<td>Demographic Variables</td>
<td>Questions 1-13; pg 5 &amp; 6</td>
<td></td>
</tr>
<tr>
<td>Cues to action</td>
<td>Advice during well child visits Dental Posters in pediatric office Handouts given during oral health visits Toothbrush and cups for oral health visit group</td>
<td></td>
</tr>
</tbody>
</table>
A HEALTHY SMILE FOR YOUR CHILD

ORAL HEALTH TIPS

- Avoid sharing spoons, cups or cleaning your child’s pacifier with your mouth to prevent the spread of bacteria to your child
- Provide healthy foods and drink that are low in sugar
- Limit sweets or sugary fluids to meal times
- Eliminate use of the bottle by 1 year
- Provide water only if your child is thirsty during the night
- Clean gums or brush teeth with a soft toothbrush twice a day
- Use fluoride toothpaste – a smear for a child less than 2 years
- Take your child to the dentist by 1 year of age
- ________________________________
Figure 6: Participants Relationship to the Child
Figure 7: Child’s Race and Ethnicity

Graph 1: Frequency of Child’s Race
- Hispanic or Latino: Low Frequency
- Non-Hispanic or Latino: High Frequency

Graph 2: Frequency of Child’s Ethnicity
- Caucasian: High Frequency
- African American: Moderate Frequency
- American Indian or Alaskan Native: Low Frequency
Figure 8: Marital Status

![Bar chart showing frequencies of marital status]

- Married: 30
- Divorced: 5
- Never Married: 45
- Separated: 10
Figure 9: Major Caregiver of the Child

Who cares for child during most days

- mother
- father
- daycare
- grandparent
- other

Frequency
Figure 10: Education Status of Parents

Mother's Highest Education

Father's Highest Education
Figure 11: Work Status of Parents

![Bar chart showing mother's current work status](chart-mother-work-status)

- Part time
- Full time
- Not employed
- Does not have a mother

![Bar chart showing father's current work status](chart-father-work-status)

- Part time
- Full time
- Not employed
- Child does not have a father
Figure 12: Household Income

---

Frequency

Yearly Household Income

- Less than 10,000
- 10,000 to 19,000
- 20,000 to 40,000
- 40,000 to 60,000
- Greater than 60,000
## Power calculation based on confidence

The POWER Procedure  
Fisher's Exact Conditional Test for Two Proportions

<table>
<thead>
<tr>
<th>Fixed Scenario Elements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>Exact conditional</td>
</tr>
<tr>
<td>Method</td>
<td>Walters normal approximation</td>
</tr>
<tr>
<td>Group 1 Proportion</td>
<td>0.459</td>
</tr>
<tr>
<td>Group 2 Proportion</td>
<td>0.569</td>
</tr>
<tr>
<td>Nominal Power</td>
<td>0.8</td>
</tr>
<tr>
<td>Number of Sides</td>
<td>2</td>
</tr>
<tr>
<td>Alpha</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computed N Per Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Power</td>
<td>N Per Group</td>
</tr>
<tr>
<td>0.800</td>
<td>341</td>
</tr>
</tbody>
</table>

Total sample size needed: 341*2 = 682 subjects
Appendix B: Early Childhood Oral Health Questionnaire

Early Childhood Oral Health Questionnaire

My name is Deborah Mattheus. I am a Doctorate student in nursing at the University of Hawaii. During my practice as a nurse practitioner I have noticed that many young children have teeth in poor condition and many of the families have no place to go for dental care. When I started my studies I decided to focus my research on early childhood oral health.

Early childhood caries (cavities) is the most common chronic illness in children in the United States. The health of your child, which also includes their teeth, is important for their growth and development. Children that have problems with their teeth as infants are also more likely to have problems as they grow older.

Your answers to this questionnaire will be completely confidential and will be used as part of a data analysis. The results of the completed questionnaires will assist in the improvement in current oral health programs for children as well as in the development of new programs to decrease poor oral health in young children.

At the completion of the questionnaire you will be given $20 for your time and effort.

Thank you for cooperating with this project.

Deborah Mattheus RNC, PNP, ARNP
Early Childhood Oral Health Questionnaire

Date ____________ Code: ____________

**Please place a check next to the BEST answer (ONLY one response per question).**

Please answer the following questions about feeding your child.

1. From birth until one year of age your baby was:
   _____Breast fed
   _____Formula fed
   _____Both breast and formula fed

2. Is your child still drinking from a bottle or breastfeeding now?
   _____Yes
   _____No

3. If your child is NOT still taking a bottle or breastfeeding, how old was he/she when they stopped? ________ month old

4. What is the most common content in your child’s cup or bottle in the daytime?
   _____Water
   _____Milk
   _____Formula
   _____Juice
   _____Other please explain________________________________________

5. Does your child sleep with a cup or bottle (other than water) at nap or bedtime?
   _____Yes
   _____No

6. If your child gets up in the night what do you usually do to make him sleep?
   _____No feedings, other behaviors like comforting him
   _____Feed child water
   _____Breast feed the child
   _____Feed child milk or sweet liquid

7. How many times do you usually feed your child during the night?
   _____None
   _____1 time
   _____2-3 times
   _____Greater than 3 times
8. How often does your child eat during the day (include meals and snacks)?

____ 3-4 times
____ 4-5 times
____ 6-7 times
____ Greater than 8 times

9. What is the most common snack your child receives throughout the day?

____ Crackers or chips
____ Fruit
____ Cookies or cakes
____ Other (please explain) ________________________________

10. How much does your child drink in a day (not including water)?

____ 3-4 cups, bottles or breast
____ 4-5 cups, bottles or breast
____ 6-7 cups, bottles or breast
____ Greater than 8 cups, bottles or breast

The next set of questions is about you and your child’s oral (mouth and teeth) care.

1. When did you first start cleaning your child’s teeth?

____ When first tooth came in
____ After one year
____ After two years
____ Teeth have not been cleaned

2. What is used to clean the teeth of the child?

____ Washcloth
____ Gauze
____ Toothbrush
____ Water
____ Other (please explain) ________________________________

3. Do you use fluoride toothpaste to brush your child’s teeth?

____ Yes, I use fluoride toothpaste
____ No, I do not brush my child’s teeth
____ No, I use toothpaste without fluoride
____ No, I do not use toothpaste at all
____ I am not certain if toothpaste has fluoride in it
4. Who performs the child’s tooth brushing?
   _____ The child alone
   _____ Another child
   _____ The child with adult supervision
   _____ The child with help of adults
   _____ The adult alone
   _____ No one, child does not brush his/her teeth

5. How often are the child’s teeth brushed and cleaned?
   _____ Irregularly or never
   _____ Once a week
   _____ A few (2-3) times a week
   _____ Once a day
   _____ More than once a day

6. How important are your infant’s first teeth (primary) compared to their permanent teeth?
   _____ Extremely important
   _____ Moderately important
   _____ Somewhat important
   _____ Minimally important
   _____ Not important at all

7. How important to you is the oral care of your infant’s first teeth (primary) compared to their general health needs?
   _____ Extremely important
   _____ Moderately important
   _____ Somewhat important
   _____ Minimally important
   _____ Not important at all

8. How important to you is the oral care of your child’s permanent teeth (secondary) compared to their general health needs?
   _____ Extremely important
   _____ Moderately important
   _____ Somewhat important
   _____ Minimally important
   _____ Not important at all
The next 3 questions are about your confidence to care for your child’s teeth.

1. I don’t know how to brush or clean my child’s teeth properly.
   _____Strongly agree
   _____Agree
   _____Neutral
   _____Disagree
   _____Strongly disagree

2. We don’t have time to brush or clean our child’s teeth twice a day.
   _____Strongly agree
   _____Agree
   _____Neutral
   _____Disagree
   _____Strongly disagree

3. We cannot make our child brush or clean his or her teeth twice a day:
   _____Strongly agree
   _____Agree
   _____Neutral
   _____Disagree
   _____Strongly disagree

The next set of questions is about dental care/visits.

1. Has your child ever been seen by a dentist? (Do not include the oral visit at your pediatricians’ office)
   _____Yes
   _____No

2. If your child HAS been to a dentist, what was the reason for the visit?
   _____Teeth cleaning
   _____Tooth trauma
   _____Tooth pain due to decay
   _____Other Explain________________________________________
   _____My child has not seen the dentist
3. When did you last see a dentist?
   
   _____ Within the past 6 months
   _____ Within the past year
   _____ Within the past 3-5 years
   _____ Over 5 years ago

The final set of questions is about you and your child.

1. What is your relationship to the child? Mother___ Father___ Legal Guardian ___

2. What is YOUR age?: __________

3. Your ethnicity/race?: Caucasian ____ African American____ Hispanic_____
   Other (please identify) ____________

4. Are you currently: Married___ Divorced___ Nevermarried___ Separated ___

5. What is the child date of birth?: __________

6. What is your child’s ethnicity?: Hispanic or Latino ____ Non-Hispanic or Latino____

7. What is your child’s race?: White/Caucasian ____ Black or African American____ Native Hawaiian or other Pacific Islander____ Asian____ American Indian or Alaskan Native_____

8. Who takes care of your child during most days of the week?
   ____ Mother
   ____ Father
   ____ Daycare
   ____ Grandparent
   ____ Other (please identify) ____________

9. Does your drinking water contain fluoride?
   ____ Yes
   ____ No
   ____ Not sure
   Mother work: part-time _____ full-time _____ not currently employed _____
   Child does not have a mother ______

   Fathers work: part-time _____ full-time _____ not currently employed _____
   Child does not have a father ______

   Guardian work: part-time _____ full-time _____ not currently employed _____
   Child does not have a guardian ______

11. Yearly household Income ($): less than<$10,000 _____$10,000-$19,999_____ $20,000-$40,000 _____ $40,000-$60,000 _____ Greater than $60,000_____

12. Highest level of mother’s education: Less than High School ___High School ___
    Associate Degree___ Bachelors Degree_____ Masters Degree or greater _____
    Child does not have a mother ______

13. Highest level of father’s education: Less than High School ___ High School ___
    Associate Degree___ Bachelors Degree_____ Masters Degree or greater _____
    Child does not have a father ______

14. Highest level of guardian’s education: Less than High School__ High School __
    Associate Degree___ Bachelors Degree_____ Masters Degree or greater _____
    Child does not have a guardian ______

Thank you for completing this survey!!
Appendix C: Informed Consent

INFORMED CONSENT

Title of Project: Efficacy of Oral Health Promotion in Early Childhood

Principal Investigator: Deborah Mattheus, RN, CPNP, ARNP  
University of Hawaii at Manoa  
School of Nursing and Dental Hygiene  
2600 Campus Road  
Honolulu, Hawaii 96822  
(850) 843-4995

Other Investigator(s): Dr. Maureen Shannon

Sponsor: North Florida Pediatrics  
1859 Southwest Newland Way  
Lake City, Florida 32025

Introduction

We invite you to take part in a research study, Efficacy of Oral Health Promotion in Early Childhood, at North Florida Pediatrics, which looks at the effectiveness of oral health promotion in changing parents’ oral health beliefs and behaviors for their children. Taking part in this study is entirely voluntary. Please read this form carefully. Take time to ask the researcher, Deborah Mattheus, as many questions about the study you would like. If you decide to participate you must sign this form to show that you want to take part.

Purpose of the Research

You are being offered the opportunity to take part in this research study because you are a parent of a child that is 6 or 9 months of age, who is being seen at the North Florida Pediatric Clinic for primary care, resides in Florida and participate in the Medicaid program.

The purpose of this research study is to test the impact of oral health promotion visits in a primary care practice on parental oral health behaviors and beliefs for their children 6-15 months of age.

Approximately 50-100 people will take part in this research study at North Florida Pediatric Clinic in Lake City Florida.

Procedures

You will be asked to complete an early childhood oral health questionnaire and the researcher, Deborah Mattheus ARNP, will conduct the well child examination including standard oral health care. The well child examination, including standard oral health care will take no longer 30 minutes. One-half of the participants will also be assigned to the enhanced oral health group. This group will receive two additional enhanced oral health visits, which will take approximately
20 minutes. The enhanced oral health visits will consist of an oral health history and caries risk assessment, medical history, oral health examination and patient specific education with a handout focusing on common child and family risk factors that increase the likelihood of caries formation. Prior to your child’s 12 or 15 month physical all participant will again complete an early childhood questionnaire.

**Time Duration of the Procedures and Study**

If you agree to take part in this study, your involvement will last approximately 9-12 months. If you are in the enhanced oral health group you will be asked to return to the clinic for two additional visits. Each visit will take approximately 20 minutes.

**Discomforts and Risks**

This study is low risk (with no serious adverse events anticipated). Your child will receive application of 5% sodium fluoride varnish at their well child visits which includes standard oral health care. Fluoride varnishes have shown to be safe and effective for infants and toddlers. Due to the color and adherence of most fluoride varnishes they may cause a temporary change in the surface color of teeth as well as some filling materials.

**Potential Benefits to the participants**

The possible benefit you may experience from the fluoride varnish in this research includes improved oral health outcomes with the absence or decrease in caries. As a parent you may also increase your skills and confidence in care of your child dental needs.

**Potential Benefits to others**

The results of this research may guide the future development of prevention programs aimed at decreasing dental caries in the pediatric population.

**Statement of Confidentiality**

Your research records that are obtained will be used specifically and exclusively for research purposes and only identified with the study ID number of each participant. All questionnaires will be collected using standardized paper forms and only identified with a study ID for each participant. The codes that link the participant names and study ID's will be kept in a secured cabinet and locked data storage room at North Florida Pediatrics. For example, the following People/groups may inspect and copy records pertaining to this research.

- The Office of Human Research Protection in the U.S. Department of Health and Human Services and the U.S. Food and Drug Administration.
- The University of Hawaii Institutional Review Board and
- The North Florida Pediatric Human Subjects Protection Committee

Some of these records could contain information that personally identifies you. Reasonable efforts will be made to keep the personal information in your research record private and confidential but absolute confidentiality cannot be guaranteed.
Cost of Participation

There are no additional costs for participation in the research study beyond the expense of travel for those participants receiving enhanced oral health promotion visits.

Compensation for Participation

You will be given $20 on behalf of the participant for your time and effort.

Research Funding

The institution and researchers are not receiving any grant money or reimbursement for the work that is completed for this research project.

Voluntary Participation

Taking part in this research study is voluntary. You do not have to participate in this research. If you choose to take part, you have the right to stop at any time. If you decide not to participate or if you decide to stop taking part in the research at a later date, there will be no penalty or loss of benefits to which you are otherwise entitled.

Contact Information for Questions or Concerns

You have the right to ask any question you may about this research. If you have questions, complaints or concerns or believe you have developed an injury related to this research, contact Deborah Mattheus at 850-843-4995.

If you have questions regarding your rights as a research participant or you have concerns or general question about the research contact the Michelle Water (Manager at North Florida Pediatrics) at 386-758-0003. You may also call this number if you cannot reach the research team or wish to talk to someone else.

For more information about participation in a research study and about the Institutional Review Board (IRB), a group of people who review the research to protect your rights, please contact Deborah Mattheus at 850-843-4995 and you will be provided with internet copies of these federal regulations. The Committee on Human Studies at the University of Hawaii may be reached at 808-956-5007 or emailed at uhirb@hawaii.edu.

Signature and Consent/Permission to be in the Research

Before making the decision regarding enrollment in this research you should have:

- Discussed this study with the researcher
- Reviewed the information in this form, an
- Had the opportunity to ask any questions you may have.

Your signature below means that you received this information, have asked the questions you are currently have about the research and those questions have been answered. You will receive a copy of the signed and dated form to keep for future reference.
Study Title: Efficacy of Oral Health Promotion in Early Childhood

**Participant:** By signing below, you indicate that you voluntarily choosing to take part in this research.

<table>
<thead>
<tr>
<th>Signature of Participant</th>
<th>Date</th>
<th>Time</th>
<th>Printed Name</th>
</tr>
</thead>
</table>

**Person Explaining the Research:** Your signature below means that you have explained the research to the participant and have answered any questions he/she has about the research.

<table>
<thead>
<tr>
<th>Signature of Person who explained the research</th>
<th>Date</th>
<th>Time</th>
<th>Printed Name</th>
</tr>
</thead>
</table>

Only the approved researcher for this study may explain the research and obtain informed consent.
A witness or witness/translator is required when the participant cannot read the consent document, and it was read or translated.
Appendix D: Post - Questionnaire (Intervention Group Only)

1. What were the two most important things you learned at the enhanced oral health promotion visits?

2. What did you find most helpful by attending the oral health visits?

3. What did you least helpful by attending the oral health visits?

4. Would you recommend this program to your friends for their children?

5. Additional comments:
Appendix E: Checklist for Standard Oral Health Care Visits

Parent Interview Questions:
1. Tell me about your child's diet.
   a. Frequency of meals a day
   b. In between snacks (frequency and types of snacks)
   c. Sugary drinks (frequency)
   d. Use of bottle or cup
   e. Sleeps with bottle or nurses on demand

2. Oral health habits
   a. Do you brush your child’s teeth? How many times a day?
   b. Do you use fluoride toothpaste?

3. Dental Health
   a. Do you or other caregivers of the child have dental problems? If so explain.
   b. Has your child received any dental care? If so explain.

4. Medical Health
   a. Does the child take any medications? If so what types?
   b. Does the child have developmental problems?

Sociodemographic Data to Obtain:
1. Is the parent of low SES?
2. Does the child live in a fluoridated community?

Observations During an Oral Health Examination:
1. Are there white spots, discoloration or decay noted on exam?
2. Is there obvious plaque present?
3. Do the child’s gums bleed easily?
4. Does the child have adequate saliva or does the child have dry mouth?

Anticipatory Guidance:
1. Oral hygiene: tooth brushing on a daily basis (toothbrush provided)
2. Ways to decrease transmission of bacteria
3. Diet: discuss high risk dietary practices
4. Importance of fluoride: use of fluoride tooth paste, importance of fluoride varnish, post varnish education
5. Establishing a dental home by 12 months of age.
Appendix F: Enhanced Oral Health Visit Form

Script for visit will be:

Hi my name is Deb Mattheus. Today you are here for your 1\textsuperscript{st}/2\textsuperscript{nd} enhanced oral health visit. I would like to start by discussing early childhood caries and explain to you how common this condition is today. ECC is the most common childhood chronic health condition.

ECC looks like this in many children. (I will now show 2 pictures of children with caries)

As you know if your child develops caries at a young age there are no dentists in Columbia County that will see Medicaid patients. Many parents have to travel as far as Gainesville or Madison for care.

There are many reasons why a child can develop caries. These are:

- Poor eating habits (frequent snacks, sugary drinks, bottles in bed)
- Poor oral habits (not brushing teeth)
- Transmission of bacteria (mother sharing eating utensils, cleaning pacifier with mouth)
- Lack of fluoride (no fluoride in toothpaste, no fluoride in water)

Caries can not only affect the child’s teeth. They can also:

- Effect eating due to pain
- Effect development due to poor weight gain and pain
- Cause more serious infections, making your child very ill which may require antibiotics and possible hospitalization
- Effect self esteem
- Cause stress on family due to child’s pain, cost of treatment

I would like to now ask you a few questions that will help me in providing you with adequate information to help you take the best care of your child’s teeth to prevent caries.

First let’s talk about what the child eats. Can you tell me:

- How many meals does your child eat? What kind of food do they eat? Are they picky eaters?
- How many in between snacks does your child eat? What types of snacks does he/she eat?
- Does your child drink from a bottle or cup? How many times a day?
- What types of drinks are in the bottle or cup?
- Does your child sleep with a bottle or cup at night? If so what is in it?
- Does your child drink water? Tap or bottled?
- Do you know if your water is fluoridated?
I now want to know more about your oral habits for your child?

- Does your child use a pacifier? If yes have you ever cleaned it with your mouth or do you share eating utensils with your baby?
- Do you clean your child’s teeth? If yes, what do you use to clean them (brush or cloth)?
- Do you use toothpaste? Do you know if it has fluoride in it?

Thank you for sharing so much information. I just have a few more questions to ask. I would like to know more about your child’s medical and dental health of your child and also about your family?

- Does your child take any medications? Is so, what types and how often?
- Has your child received any dental care in the past? If so explain.
- Does your child have any problems with their teeth? If yes, explain.
- Do you have problems with your teeth?
- Does any other family member (siblings, caregivers) have problems with their teeth?

I am now going to examine your child’s teeth. I am looking for any white spots, discoloration or decay. You can also look to see if there is any build up of material on their teeth (plaque). It is important to brush to remove excess food and plaque that can build up and create cavities.

- Based on all this great information you have provided I would now like to discuss some ways you can prevent your child from getting caries. We can use this handout as a guide. (A healthy smile for your child)
- Preventing transmission: take care of your teeth, no sharing of cups or eating utensils, no cleaning pacifier with mouth
- Proper nutritional habits: limited sugars in food and drinks, limited snacking throughout the day, drinking cups with water instead of juice or sweet tea, no bottle of cup in the bed, no bottle after 1 year of age. (sippy cup is given at second visit)
- Oral care: brush or clean teeth at least once a day, try for two times a day. Brush after sweets. (tooth brush given during first visit)
- Fluoride: importance of use of fluoride toothpaste, smear under 2 years of age. Keep appointment for well visits for fluoride varnish application. Fluoride will help to keep teeth healthy and strong to prevent acids from causing cavities. (fluoride toothpaste given at first visit)
- Establishing a dental home: it is important for your child to see the dentist if they have a problem and also important to see a dentist by the time your child is 1 year old. Provide a list of Medicaid approved dentists.
- Is there anything else that you know of that would help you better take care of your child’s teeth? (write it in the blank spot on the handout)

Are there any questions you have about what we talked about today? Please feel free to contact me if you have questions prior to your next well child visit. You are doing something very good not only for your child’s teeth but for their overall health.

Next appointment made and reminder card is given to the parent.
Appendix G: Pictures of ECC
References


