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THE IMPACT OF MATERNAL INFLUENCES ON EARLY CHILDHOOD DENTAL CARIES

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science  
in Dentistry at Virginia Commonwealth University.

by

Rana Graham-Montaque  
B.S. Hampton University, 2000  
M.S. Hampton University, 2002  
D.D.S. Virginia Commonwealth University, 2006

Director: Tegwyn H. Brickhouse, D.D.S., Ph.D.  
CHAIR, DEPARTMENT OF PEDIATRIC DENTISTRY

Virginia Commonwealth University  
Richmond, VA  
May 2012

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## Abstract

### THE IMPACT OF MATERNAL INFLUENCES ON EARLY CHILDHOOD DENTAL CARIES

By Rana Graham-Montaque

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science  
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Virginia Commonwealth University, 2012

Director: Tegwyn H. Brickhouse, DDS, PhD  
Chair, Department of Pediatric Dentistry

**Purpose:** The purpose of this study was to examine the maternal influences on the development of infant oral biofilm and early childhood dental caries.

**Methods:** The study utilized a cross-sectional design to evaluate factors influencing biofilm colonization and the identification of bacterial strains present in mother and child by utilizing oral health literacy surveys, clinical examinations, and plaque samples. Participants were enrolled in the Children's Health Involving Parents of Greater Richmond (CHIP). Plaque samples and dental disease levels were collected from mother and children ages six months to thirty-six months. Oral Health Literacy was compared to both mother and child's dental disease levels.

**Results:** Sixty-two CHIP families were involved in the pilot study yielding caries in 88% of mothers and 26% of children. The DMFTs for adults was 32.60 and the dmft for children was 7.69.

This study demonstrated that DMFT scores have a direct impact on infants' early childhood dental caries potential. If mothers have a DMFT of 80%, then the child has a 50% chance of developing dental caries. However, if the mother has a DMFT of 0%, then the child has a 14% chance of developing dental caries.

**Conclusion:** The results from the oral health literacy survey demonstrated that the average parenting style was associated with the contemplative parent construct.



## **Introduction**

Each year more than fifty-one (51) million school hours are lost due to dental-related illness and over forty billion dollars are spent on the treatment of this disease.<sup>1</sup> Studies have shown that low birth weight, preterm birth, and birth trauma increase the risk of developmental anomalies in the tooth structure, which, in turn may accelerate the colonization of biofilms that increase the risk for dental caries.<sup>2</sup> Most parents in the United States do not receive extensive information on oral health prevention practices during pregnancy or the perinatal phase.

Many new mothers are not aware of the opportunities for prevention of dental caries in the primary dentition. This lack of knowledge may be detrimental to the primary dentition of these children and without intervention the permanent dentition may be grossly affected. Dental caries in primary teeth can affect growth, results in significant pain, may produce a potentially life-threatening infection, and cause a diminished overall quality of life.<sup>3</sup> Some important topics new mothers need to know are; 1) the timing of the first dental visit, 2) dietary counseling, 3) information on primary dentition eruption, and 4) oral hygiene instructions.<sup>4</sup> Reaching out to these mothers and educating them about the importance of good oral health may help decrease the incidence of early childhood dental caries in “at risk” populations. This is why it is critical to screen mothers during the perinatal time period to evaluate their oral health literacy and implement oral health education as a prevention tool.

There are many factors involved in a dental caries risk assessment. There are socio-demographic factors such as income, race, and education. There are also behavioral factors such as feeding practices, nutrition and sleeping habits. Microbiologic factors, such as colonization of *Streptococcus mutans*, traditionally have been measured in children with high dental caries

rates.<sup>5,6</sup> The conceptual model of risk factors must reflect an understanding of the multi-factorial nature of the disease process amongst “high risk” mother and infant population with oral health disparities and how it translates in the gene-behavior-environment. Dental caries is thirty-two times more likely to occur in infants who are of low socioeconomic status and whose mothers have a lower education level compared to the general population.<sup>3</sup>

### ***Children’s Health Involving Parents (CHIP)***

The CHIP health care model provides mentoring, education and behavioral health services to “at risk” families in their homes.<sup>12</sup> A typical CHIP family consists of a single female head of household, with a least two children, who has not finished high school and is living in an urban environment plagued by drugs and crime. Eighty percent of the families live in public housing or section VIII subsidized housing. *S. mutans* has been considered the primary bacteria responsible for the initiation of dental caries. Transmission of oral bacterial strains occur from caregiver to infant during a period of infectivity from 6 months to 36 months of age.<sup>17</sup> Vertical transmission involves the movement of oral bacteria from mother to child.<sup>18</sup> Horizontal transmission however involves transmission of bacteria from non-maternal sources such as playmates or day care providers.<sup>19</sup> Certain perinatal conditions may contribute to the development and establishment of a micro flora that has a greater virulence.

### ***Oral Health Literacy Factors***

The Readiness Assessment of Parents Concerning Infant Dental Decay scale (RAPIDD) was developed to assess parental stage of change. The stages are pre-contemplative, contemplative, and taking action with regard to his/her child’s dental health.<sup>9</sup> The measuring tool was based on the work of Prochaska and DiClemente and measures the pros and cons of parental beliefs about caring for the child’s teeth. Constructs were designed to score the parents

survey responses.

### ***Microbiologic Factors***

A child's mouth must be colonized by specific microorganisms to be at risk for dental caries. There is some debate as to when the child's mouth is inoculated with a focus on a discrete windows of infectivity.<sup>13</sup> Studies show that those children infected earlier and with higher levels of *S. mutans* have more dental decay.<sup>14</sup> Conditions that are important concerning the microbiology of the child's mouth are timing of inoculation, types of organisms, levels of the organisms in the mouth, and the virulence of those specific organisms.<sup>15</sup> Genetic profiling of oral biofilms of children with severe ECC found differences in microbial diversity and complexity than biofilms in caries free children.<sup>16</sup> The presence of virulent species will help explain, on the molecular level, the variance in the presence of early childhood caries.<sup>8</sup> The Human Microbe Identification Microarray (HOMIM-Forsyth Institute) provides a method of rapid identification of 425 microbial species in a single hybridization.<sup>7</sup> It is these genetic microbial differences in the individual biofilms of mothers and their infants that may provide some insight into varying clinical manifestations of early childhood caries (ECC). Pyrosequencing is a methodology that offers significant advantages compared to other sequencing options. Such as; higher coverage per sample, greater resolution of the community composition, and more efficiency in elimination of the need for preparing clone libraries.

The purpose of this study was to determine the relationships between maternal influences and dental disease in children and parents enrolled in Richmond Children's Health Involving Parents (CHIP). A description of maternal oral health literacy and maternal and infant disease levels was examined. The maternal and infant biofilms will be examined with the use of pyrosequencing for future analysis.

## **Methods**

### ***Study Design***

A cross sectional study of mother-infant dyads (n=62) was enrolled in the study over an 18-month period. Mother-Infant dyads that were enrolled in the Richmond Children's Health Involving Parents (CHIP) were invited to participate in the study. Inclusion criteria were that the mother had to be a participant in the CHIP program, willing to participate, and be present for the data collection. CHIP of Greater Richmond is located in the city of Richmond, VA. This home visitation program provides outreach, health education, and case management to improve perinatal outcomes for predominately minority mothers, specifically focusing on the reduction of infant mortality. Community health nurses and family case managers employed by CHIP work with the entire family to foster a nurturing, safe and healthful home environment. Mother and infants who enrolled in the study were then given the opportunity to receive a follow-up comprehensive dental evaluation, appropriate dental radiographs, dental prophylaxis, and professional topical fluoride application. In addition, mothers participating in the study were offered basic restorative treatment. The VCU Institutional Review Board approved this study for research involving human subjects.

### ***Primary Data Collection***

Primary data collection took place at the Richmond CHIP locations with translators readily available if needed. After obtaining informed consent, a visual epidemiological dental examination and biofilm collection was completed on the mothers and infants (6-36 months of age). The oral health literacy survey consisted of a thirty-four-item questionnaire and was completed either before or after the clinical exam.

### ***Dental Examination***

Two trained and calibrated Virginia Commonwealth University pediatric dental residents completed the dental exam of the infants in a knee-to knee position. Dental caries was evaluated using the d1-d2-d3 criteria. This visual examination recorded both frank (d2 and d3) and non-cavitated (d1) carious lesions. The mother received a dental exam in a portable dental chair. Dental caries levels in the mother's permanent teeth were recorded using the modified criteria for diagnosis of dental caries DMFT index. This index, in aggregate, represents the sum of the following components: D=decayed teeth or untreated caries; M=missing teeth; F=filled teeth; T=permanent teeth.

### ***Biofilm Collection***

Two samples of biofilm were collected from right and left sides on the buccal and lingual surfaces in the infant and mother using an Implacare 4r-4l disposable scaler. The samples were placed in MOBIO glass bead tubes provided for processing samples. A randomly selected tooth with a carious lesion present was selected and a biofilm sample was collected from buccal and lingual surfaces of this tooth. The bacterial DNA samples were frozen immediately in dry ice, and then prepared according to the recommend DNA isolation protocol of the MOBIO Laboratories, Inc, Powerlyzer DNA Isolation Protocol at [www. Mobio.com](http://www.Mobio.com).<sup>10</sup> PCR was performed from the isolated DNA samples. Purification of PCR samples was completed using the QIAquick Spin Handbook PCR Purification Kit Protocol and then pyrosequenced.<sup>11</sup>

### ***Streptococcus Diversity and Transmission***

After biofilm analysis, pyrosequencing will indicate the correlation between mother and infant dyads. This data will be analyzed to find a correlation between the different Streptococcus species to identify characteristics of "caries free" or "caries present" samples. Insight on the

presence of Streptococcus in infant-mother dyads will allow the study to determine if vertical transmission occurred or horizontal transmission may have been a factor.

### ***Oral Health Literacy Survey Analysis***

This study provided an oral health literacy survey to measure the mother's oral health knowledge and set the stage of readiness for the acceptance of infant oral health education. The survey instrument includes measures of readiness (RAPIDD scale), oral health knowledge, and preventive behaviors. The RAPIDD scale is a measure of parental readiness to change children's dental behaviors. The instrument is based on four constructs: Openness to Health Information, Valuing Dental Health, Convenience/Difficulty, and Child Permissiveness.<sup>9</sup> The outcome variable was the DMFT scores of mother and children. Knowledge scores were calculated by summing 12 knowledge items, while 11-items were used in the RAPIDD scale.

All analyses were performed using SAS software (SAS version 9.3, JMP Pro version 10, SAS Institute Inc., Cary NC). Summary descriptive statistics were followed by tests for relationships. A Pearson correlation was used to test for relationships between continuous variables and chi-square test was used to test for associations between nominal variables. Relationships were declared statistically significant if the p-value < 0.05.

## **Results**

A total of 62 mother infant dyads (n=62) participated in the study and completed the exams and survey. Due to some participants having multiple children that qualified, there were 62 mother participants and 72 children participants. The descriptive analysis of the patient's race revealed the population of 23% black (n=14), 3% white (n=2), 71% Hispanic (n=44), 2% other. The average CHIP enrollment age for the parent was found to be 27.7 years (SD=5.9). The

majority of patients lived in Richmond, VA and all met the income requirements to enroll in CHIP. In analyzing the parent’s education, 50% of the parents did not have a High School Diploma or GED. These results are summarized in Table 1.

*Table 1: Demographics of the Families*

Characteristic	n	%	
<b>Parent's race/ethnicity</b>			
Biracial	2	3	
Black	14	23	
Hispanic	44	71	
White	2	3	
<b>Years of education</b>			
Less than high school	30	50	
High school/GED	21	35	
Some college/Technical school	7	12	
Finished college	2	3	
<b>Age</b>			
	<u>Mean</u>	<u>SD</u>	<u>Range</u>
Adult (years)	27.73	5.94	18 42
Child (months)	19.56	9.69	2 42
<b>Number of ...</b>			
Children in household	2.35	1.23	1 6
Other adults in household	1.48	0.99	0 5

The RAPIDD scale is a measure of parental readiness to change children’s dental behaviors. The instrument is based on four constructs utilized to analyze oral health literacy: Openness to Health Information, Valuing Dental Health, Convenience/Difficulty, and Child Permissiveness. The results of the first portion of the Oral Health Literacy survey are shown in Table 2. The average score was calculated using Strongly agree=1, Agree=2, Neutral=3, Disagree=4, and Strongly disagree=5. The percentage of all adults either Strongly agreeing or agreeing is shown in the “A%” column. The average of the Openness to Health Information construct was 2.02, indicating that the average adult agrees with these four items. The average of the Valuing Dental Health construct was 1.47, indicating that the average adult is between

strongly agree and agree on these three items. There were no significant differences in the Openness or the Valuing Permissiveness constructs due to: Race, education, adult's age, or the number of children.

Table 2: Readiness Assessment of Parents Concerning Infant Dental Decay Scale (RAPIDD)

Question	RAPIDD responses (n)					Mean	SD	A%
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree			
<u>Openness to Health Information Construct</u>								
1. I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.	13	23	6	4	16	2.79	1.52	58.1
2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.	17	27	9	1	7	2.25	1.22	72.1
3. I feel comfortable asking questions at my health care provider regarding the baby.	33	22	2	1	4	1.73	1.07	88.7
4. Keeping my baby's teeth healthy is important to me.	43	18	0	0	0	1.30	0.46	100.0
Average of questions 1-4						2.02	0.73	
<u>Valuing Dental Health Construct</u>								
5. My baby will benefit from my cleaning his/her teeth.	37	25	0	0	0	1.40	0.49	100.0
6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.	33	25	4	0	0	1.53	0.62	93.5
7. Dental visits are as important as regular medical check-ups.	33	29	0	0	0	1.47	0.50	100.0
Average of questions 5-7						1.47	0.46	
<u>Permissiveness Construct</u>								
8. My baby gives me a hard time when I try to brush his/her teeth.	10	15	13	7	16	3.07	1.45	41.0
9. I am able to put my baby to sleep without feeding/nursing him/her.	13	14	4	4	27	3.29	1.68	43.5
10. My baby is happier, when I give him/her something sweet in his/her bottle.	7	11	13	7	23	3.46	1.44	29.5
11. Foods and drinks that are not sweet, don't taste good to my baby.	2	9	17	11	23	3.71	1.21	17.7

The eleven knowledge questions were scored as the percentage correct (a Yes answer). The average correct was 77.9% (SD = 19.4, range = 9% to 100%). There was no significant



differences in the percentage correct and the Race, Education, Age of the adults, or Number of children.

*Table 3: Infant Oral Health Knowledge*

Question	Response			% Yes
	Yes	No	Don't know	
12. Putting a child to bed with a bottle containing milk can cause cavities.	50	3	7	83
13. Putting a child to bed with a bottle containing juice can cause cavities.	53	2	6	87
14. Fluoride helps prevent tooth decay.	47	3	11	77
15. Fluoride can be used to coat and protect the teeth of infants and children.	44	1	17	71
16. Bacteria and germs on the teeth help to produce cavities.	52	7	3	84
17. Adults who have cavities can pass tooth decay germs to their children.	42	4	16	68
18. Baby's should have their teeth cleaned/brushed regularly by their parents.	59	2	1	95
19. Do cavities in baby teeth need to be filled?	42	4	16	68
20. Has a doctor or nurse ever told you when your child should be off the bottle?	40	20	0	67
21. Has a doctor or nurse ever told you how to clean your child's teeth?	51	11	0	82
22. Has a doctor or nurse ever told you when your child should begin seeing the dentist?	51	10	0	84

The dental home question and the preventative behaviors are summarized in Table 4. The percentage of positive dental behaviors ranged from a low of 38% to a high of 89%

Table 4: Preventative Infant Oral Health Behaviors

Question	Response			Don't know	
	1 yo.	3 yo.	older than 3yo.		
<b>Dental Home</b>					
23. At what age should a child first see a dentist?	54	2	0	6	87
<b>Preventative Behaviors</b>					
	Yes	No		Don't know	%Correct
24. Do you brush/wipe your child's teeth daily?	55	7		0	89
25. Is toothpaste/cleanser used?	52	9		0	85
26. Does your child use a bottle or sippy cup for a nap or at night?	28	34		0	55
27. Has your child had their first visit to the dentist?	33	29		0	53
28. If your child had a dental check-up, did they have cavities?	11	34		0	76
29. If your child had a dental check-up, was fluoride placed on their teeth	30	14		0	68
30. Do you have or have you had cavities in your teeth in the past 5 years?	37	8		15	38

Note: Yes" is the correct answer for all except questions 26, 28 and 30.

### DMFT results

The summary of the N=62 adults is shown in

Table 5 and the summary of the N=70 children is shown in Table 6. In the adults 89% (n=55) had any decay (i.e., either D, M, or F greater than zero). In the n=69 children with T>0, there were 26% (n=18) who had any decay (i.e., either d, m, or f greater than zero).

Table 5: Adult DMFT results (N=62)

Summary		Mean	SD	Range
D	Number	5.61	5.38	0 22.00
	Percent	17.65	16.83	0 68.75
M	Number	2.76	3.72	0 18.00
	Percent	8.62	11.64	0 56.25
F	Number	2.00	4.06	0 20.00
	Percent	6.33	12.84	0 62.50
DMFT	Number	10.37	7.47	0 28.00
	Percent	32.60	23.34	0 87.50
Any decay	Percent	88.71	31.91	

The Openness Summary refers to the openness to health information construct that scores parents' receptiveness to dental education. The Dental Health Summary evaluates parents' value on dental health. The adult Percent D, Percent M, Percent F, DMFT percent, and the presence of any decay for any relationships with: Education, race, age, Openness Summary (openness to health information), Dental Health Summary (valuing dental health), and Knowledge. There were no significant relationships except the following: There was a significant positive relationship between the DMFT percent and Dental Health Summary ( $P = 0.0136$ ) and there was a significant positive relationship between the percentage of missing teeth and the adult's age ( $P = 0.0209$ ).

Table 6: Child dmft results (N=70)

Summary		Mean	SD	Range
D	Number	0.66	1.64	0 8.0
	Percent	4.18	9.78	0 40.0
M	Number	0.50	2.65	0 17.0
	Percent	2.60	13.74	0 89.5
F	Number	0.17	0.80	0 5.0
	Percent	0.91	4.07	0 25.0
Dmft	Number	1.33	3.13	0 17.0
	Percent	7.69	16.85	0 89.5
Any decay	Percent	0.26	0.44	

The adult Percent D, Percent M, Percent F, DMFT percent, and the presence of any decay for any relationships with: Adult's education, adult's race, adult's age, Adult's Openness Summary, Adult's Dental Health Summary, Adult's Knowledge, and the child's age. There were no significant relationships except the following: There was a significant relationship between the Dental Health Summary and the percentage Decayed ( $P = 0.0028$ ), the DMFT percentage ( $P = 0.0055$ ), and the presence of decay ( $P = .0005$ ). There is also a negative relationship between the adult's age and the percent missing ( $P = 0.0259$ )—only adults younger than 23 have children with any missing teeth; and a positive relationship between the adult's age and the percent filled ( $P = 0.0120$ )—only adults older than 26 have children with any filled teeth. There is a positive relationship between the child's age and the percentage filled ( $P = 0.0100$ )—only children older than 26 months have any filled teeth.

There were no significant correlations between the adult's percentage D, M, F, DMFT and the children's percentage D, M, F, or DMFT. The only significant relationship was between the adult's DMFT percentage and whether the child had any decay ( $P = 0.0487$ ). Adults with DMFT=0 have a predicted probability of a child with decay of 14% and adults with a DMFT=80% have a predicted probability of a child with decay of 50%. There was also no significant correlation between the four permissiveness items and dmft percent, adult knowledge, and the number of correct preventative behaviors (Table 7).

Table 7: Correlations between Permissiveness Construct Items and Child and Adult Outcomes

	dfmt percent	Knowledge	Prevention
8. My baby gives me a hard time when I try to brush his/her teeth.	0.02	0.04	0.06
9. I am able to put my baby to sleep without feeding/nursing him/her.	0.13	-0.13	-0.10
10. My baby is happier, when I give him/her something sweet in his/her bottle.	-0.14	-0.07	-0.07
11. Foods and drinks that are not sweet, don't taste good to my baby.	0.05	-0.09	-0.07

### Discussion

The population of children enrolled in this study consisted by division of race, of mostly Hispanic children, then black children, followed by white children. Most of the dental caries was found in the Hispanic population. In terms of oral health literacy, the parents' general knowledge about the appropriate way to care for their children's teeth through dietary guidance and routine oral health care, this research shows the caregiver's lack of understanding of the implementation of proper infant oral health methods, thus leading to increased caries in those children. Dental caries was found in 26% of children enrolled in the study with an average dmft=7.69. Some of the participants had a high dental knowledge score likely from being involved with the program and the at home nursing site visits provided to CHIP families. However, the new immigrant populations seemed to present a low dental knowledge score and the most aggressive disease. Even though translators were readily available, it may be inferred that language barriers existed during collection of survey data and when reviewing oral hygiene instructions. Ideally, a randomized controlled study evaluating dental disease at the time of entry into the program would assist in evaluating the increased dental utilization due to access need into the program.

In addition to many obstacles that “at-risk” populations face, the transition of a newborn infant to a household can present many challenges in itself. All of these factors can make implementation of preventive infant oral health behaviors more challenging. Some of these challenges are; 1) the child’s resistance to toothbrushing, 2) access to providers who will provide dental care, 3) consolation of a crying baby versus at will nursing or feedings that lead to early childhood dental caries, and 4) the ability to afford dental care. The sooner proper educational tools are accessible to parents and they perceive value in maintaining a high level of infant oral health for their child, the greater the chance of implementation of their new skills. Whether the parent is ready to receive the knowledge at a given time is a challenge for all pediatric health care providers. The RAPPID scale is a valuable instrument that will aid the practitioner in determining whether or not a parent is likely to accept and apply the information being received. Once it is evident that the parent is accepting of the educational intervention, the next step would be to provide additional motivational interviewing to ensure that the parent is being reached at the level of need based upon their RAPPID analysis. This method of instruction utilizing oral hygiene instructions with motivational interviewing allows for a free discussion about dental concerns and leaves the parents at ease about their child’s oral health. Implementation of an infant oral health program with mothers may lead to decreased dental caries in children through oral health education. Addressing these obstacles that mothers may encounter and offering solutions and education helps to reinforce the education aspect of oral health prevention. Future implementation of a dental health survey for Medicaid enrolled children among pediatric dentists, pediatricians, obstetricians, case managers, and other public health providers may aid in helping the “at risk” population establish a dental home for infants and expectant mothers. This potential policy implication could provide an excellent foundation for the prevention of early

childhood dental caries in the “at risk” population.

### **Conclusion**

The aim of this study was to evaluate maternal influences on early childhood dental caries and to describe the dental disease status of a population of mother infant dyads enrolled in the Children Health Involving Parents of Greater Richmond (CHIP). The RAPIDD scale is a valuable instrument in measuring mother’s knowledge of infant oral health information. Preliminary findings indicated that a DMFT score of 80% in mothers translated to a 50% chance of dental caries in infants. However, if parents had a DMFT of 0%, then the infants had a 14% chance of dental caries. The Oral Health Literacy Tool was developed with the intention of measuring functional health literacy of mothers. Preliminary findings indicate that the majority of the participants were contemplative parents. This is indicative of a willingness to consider changing their behavior, but a hesitance without the accurate tools and confidence to implement the change.<sup>9</sup>

This study demonstrates:

- A high maternal caries rate in an “at risk” population.
- A significant association exists between the DMFT scores of mothers and subsequent dental caries in their infants.
- The RAPIDD scales are a useful tool in determining the caregiver’s readiness of understanding and accepting infant oral health preventive behaviors.

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## APPENDIX A

ID

### *Infant Oral Health Survey*

1. I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

3. I feel comfortable asking questions at my health care provider regarding the baby.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

4. Keeping my baby's teeth healthy is important to me.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

5. My baby will benefit from my cleaning his/her teeth.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

7. Dental visits are as important as regular medical check-ups.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

8. My baby gives me a hard time when I try to brush his/her teeth.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

9. I am able to put my baby to sleep without feeding/nursing him/her.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

10. My baby is happier, when I give him/her something sweet in his/her bottle.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

11. Foods and drinks that are not sweet, don't taste good to my baby.

Strongly Agree

Strongly Disagree

Agree

Disagree

Neutral

12. Putting a child to bed with a bottle containing milk can cause cavities.

Yes

No

Don't know

13. Putting a child to bed with a bottle containing juice can cause cavities.

Yes

No

Don't know

14. Fluoride helps prevent tooth decay.

Yes

No

Don't know

15. Fluoride can be used to coat and protect the teeth of infants and children.

Yes

No

Don't know

16. Bacteria and germs on the teeth help to produce cavities.

Yes

No

Don't know

17. Adults who have cavities can pass tooth decay germs to their children.

Yes

No

Don't know

18. Baby's should have their teeth cleaned/brushed regularly by their parents.

Yes

No

Don't know

19. Do cavities in baby teeth need to be filled?

Yes

No

Don't know

20. Has a doctor or nurse ever told you when your child should be off the bottle?

Yes

No

21. Has a doctor or nurse ever told you how to clean your child's teeth?

Yes

No

22. Has a doctor or nurse ever told you when your child should begin seeing the dentist?

Yes

No

23. At what age should a child first see a dentist?

at 1 year

at 3 years

Older than 3 years

Don't know

24. Do you brush/wipe your child's teeth daily?

Yes

No

25. Is toothpaste/cleanser used?

Yes

No

If yes, does the toothpaste/cleanser have fluoride?

Yes

No

Don't know

26. Does your child use a bottle or sippy cup for a nap or at night?

Yes  No

27. Has your child had their first visit to the dentist?

Yes  No

If yes, what was their age at the time of the visit?  months

If your child had dental check-up, did they have cavities?

Yes  No

If your child had dental check-up, was fluoride placed on their teeth?

Yes  No

ID Do you have or have you had cavities in your teeth in the past 5 years?

Yes  No  Don't know

Are you Hispanic or Latino?

Yes  No

In your opinion, which group best represents your race?

American Indian or Alaska Native  White  
 Asian  Black/African American  
 Other \_\_\_\_\_  Native Hawaiian/Pacific Islander

How many years of education do you have?

Less than High School  High School/GED  Some College/Technical School  Finished College

What is your age?  Years Child's age?  months

Number of Children in Household

Adults in household that will help care for your child besides you?  number

## VITA

Rana Denise Graham was born in rural West Point, Virginia. In 2000, she received her Bachelor of Science in Molecular Biology at Hampton University as well as a Masters in Medical Science in 2002. She was awarded the Doctor of Dental Surgery Degree from Virginia Commonwealth University School of Dentistry. In 2006, Dr. Graham-Montaque was awarded the Public Service Award by Dean VCU School of Dentistry. Since graduating from dental school, Dr. Graham has been a public health dentist serving the community in Richmond and the surrounding areas. She has been an adjunct faculty member at VCU School of Dentistry Department of General Practice since 2006. She is on the advisory board for Germanna Community College's Hygiene and Dental Assisting Program.

Dr. Graham-Montaque enjoys volunteering in Mission of Mercy Projects, International Mission Trips, and most of all providing quality specialty care to children from disadvantaged populations right at home in Virginia. Rana plans on working in private practice in the Williamsburg and surrounding areas upon completion of her residency.