An Oral Health Survey of the Lumbee Tribe in Southeastern North Carolina

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Abstract
Pamela L. Wells: An Oral Health Survey of the Lumbee Tribe in Southeastern North Carolina
(Under the direction of Ms. Mary George)

The purpose of this study was to assess the oral health knowledge, oral health-related quality of life (QOL) and access to dental care issues of the Lumbee tribe in Robeson County, North Carolina (NC). Lumbee Indians attending the Lumbee Homecoming Festival volunteered to complete a self-administered survey. This study revealed that there was low knowledge regarding the link between oral and systemic health. Many believed that it is natural to loose your teeth as you get older. Oral health-related QOL was affected by oral pain, altered taste, and feeling self-conscious because of oral problems. Barriers to accessing dental care included being unable to find a dentist, not being able to miss work to go to the dentist, dental fear, and cost of dental services.

Dedication

“To Donny, Amanda, and my father, your love and support mean the world to me. I love you very much.”

Acknowledgements

I would like to thank Dr. Dan Caplan, Danny Bell, Dr. Ron Strauss, and Ms. Mary George for serving on my thesis committee. Your enthusiasm for this project provided me with the encouragement I needed. It has been a great pleasure to work with you all. I would also like to thank Benny Henderson's Pinestraw for purchase of supplies necessary for this project.

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List of Abbreviations

ADA	American Dental Association
AI	American Indian
BOP	Bleeding On Probing
CAL	Clinical Attachment Level
CHD	Coronary Heart Disease
DMFS	Decayed, Missing, Filled Score
IHS	Indian Health Service
NAIM	Native American Interfaith Ministries
NC	North Carolina
OHIP-14	Oral Health Impact Profile-14
ORDRHD	Office of Research, Demonstrations and Rural Health Development
QOL	Quality of Life
SES	Socioeconomic Status
USDHHS	United States Department of Health and Human Services

Introduction

The Lumbee Indian tribe is the largest of NC's eight American Indian (AI) tribes. (1) The Lumbee tribe is the largest AI tribe east of the Mississippi River and the ninth largest tribal band in the United States.(2) The tribe is located in Robeson County, a rural area of southeastern North Carolina (NC). (1) In Robeson County, AI's make up 37.5% of the population compared to 36% Caucasian and 24.6% black.(2) The population of Robeson County also tends to be younger than the general population of NC (32 years old compared to 35.3 years old respectively). (3) The median income in Robeson County is $27,241 compared to the state median of $40,863. Although most adults in Robeson County have a high school diploma (64.9%), only 11.4% have a Bachelor's degree or higher. (2) The Lumbee tribe does not receive funding from the United States Bureau of Indian Affairs that would give them access to the Indian Health Service (IHS).(4)The IHS provides medical and dental care to federally recognized AI tribes.(5, 6) Native American Interfaith Ministries, Inc. (NAIM)'The Healing Lodge' provides the Lumbee tribe with some health services. The Healing Lodge has recently implemented the Parish Nurse Program through funding by the Duke Endowment. This program is designed to provide health education and services for the Lumbee community. Currently, there are no dental services available through NAIM. (7) Although there is a significant amount of data available for the oral health needs of AI's receiving dental services from the IHS, no data are

available which report the needs of AI's like the Lumbee tribe, who do not receive federally funded medical and dental services.(6, 8-10)

Oral diseases are common among AI tribes monitored by the IHS. (6, 8-10) (11) Dental decay and periodontal disease, which is a bacterial infection involving the gum tissue and bone support of the teeth, are among the most common.(9, 11) A study reporting data collected by the IHS in 1991 found that AI adults had a higher prevalence of dental decay compared to the general population of the United States. They also found that although there had been a decline in decay among AI children, AI adults did not show the same trend. Compared to data collected in 1984 by the IHS, AI children had a 47 percent reduction in caries experience. However, AI adults aged 35-44 showed a 3 percent increase in caries experience in the same time period.(9) Further data reported by the IHS showed that AI's have a high rate of periodontal disease compared to Caucasian populations in the United States. In all age groups, AI's with diabetes had significantly higher rates of severe periodontal disease compared to those without diabetes.(11) Recent research has found that there is an association between periodontal disease and systemic diseases like diabetes.(12, 13)

Literature Review

Systemic Disease and Oral Health

There is a bidirectional association between the presence and severity of periodontal disease and the severity of diabetes. If diabetes is uncontrolled, periodontal disease will be more severe. In the presence of more severe periodontal disease, diabetes is less likely to be well controlled. Research shows that patients with diabetes will also have more aggressive forms of periodontal disease. (12-16) A study by Mealey et al found a correlation between the severity of periodontal disease and diabetes. (13) This relationship was found to be due, in part, to decreased immune response in patients with diabetes. Although subjects had the same types of oral bacteria present, the healthy function of immune cells that help fight chronic infections such as periodontal disease were inhibited. (13) Research by Navarro-Sanchez et al found that persons with diabetes are less able to fight infections like periodontal disease due to unhealthy immune response. (16) Since diabetes is one of the leading causes of death for AI's in NC and because they have a much higher incidence of the disease compared to other NC populations, they are at risk for developing more severe periodontal disease.(1, 12, 17-19)

Another systemic disease that is associated with periodontal disease is coronary heart disease (CHD).(20, 21) Coronary heart disease has been linked to oral health conditions such as periodontal disease, tooth loss and gingivitis. (21-23)According to Beck et al.,

> "the association between poor dental health and coronary heart disease (CHD) was independent of age, total cholesterol….diabetes and smoking." (21)

Research by Geismar et al assessed the presence of periodontal disease and coronary artery disease in men. They found that the presence of periodontal disease is a risk factor for developing CHD. After adjusting for other factors, men with periodontal disease, even those less than 60 years of age, were more likely to develop CHD. (23) Because AI's in NC have a higher risk of mortality due to heart disease than NC's Caucasian population and it is their leading cause of death.

Low-Birth Weight and Periodontal disease

Periodontal disease has been linked to low birth weight babies and preterm labor.(24-27) Studies have shown that the bacteria associated with periodontal disease have a significant association with preterm labor and adverse pregnancy outcomes. (25, 28) Measurements like clinical attachment loss (CAL) and bleeding upon probing (BOP) were used to assess periodontal disease in expectant mothers. It was found that pregnant women with high levels of periodontal disease were more likely to have preterm labor and low birth weight infants. (26, 27, 29, 30) American Indians in NC have a higher infant mortality rate than NC's Caucasian population. They also have nearly twice the incidence of low-birth weight babies compared to Caucasian populations.(1, 17) One of the goals of 'The National Call to Action to Promote Oral Health' by the United States Department of Health and Human Services (USDHHS) is to increase the awareness of all Americans regarding the

seriousness of oral disease and other systemic conditions like diabetes, CHD, and adverse pregnancy outcomes. (31)

Oral Health-Related Quality of Life

When assessing CHD and diabetes, as well as oral disease, it is necessary to consider how these conditions affect the quality of life (QOL) for people who are afflicted by them. Health care policy is being made that includes both the prevalence of disease and how those diseases affect QOL.(32) Measuring QOL is difficult. A number must be to an individual's personal feelings and perceptions of how their physical health affects their ability to carry on a productive life. (32-35) Various data including the presence and severity of oral diseases and oral health-related QOL measures have been collected to assess how much a population suffers from oral related disease. Measurements are taken to determine if there is oral disease present and the degree to which it affects the QOL of each individual. The two measurements are compared for a sample population. This gives researchers information about how oral disease affects the QOL of that population. (36) In a study performed in the early 1990's by Slade et al., data which included decayed, missing or filled scores (DMFS) and clinical attachment level (CAL) along with the Oral Health Impact Profile-14 (OHIP-14) survey were taken from adults 65 years or older in Canada, Australia and North Carolina. The data were compared among the three populations. Researchers found that older adult minorities from the Piedmont area of North Carolina had a greater prevalence of oral disease and that they suffered from those diseases more than other study populations.(35) Another research study performed in China assessed the severity of periodontal disease and

its affects on QOL. (37) Periodontal status was determined by CAL. Subjects aged 25 to 64 were divided into two groups that depended on the average amount of attachment loss for each individual. Mild or no periodontal disease was considered as 2mm or less of periodontal attachment loss, where as severe periodontal disease was considered as 3mm or more of periodontal attachment loss. The OHIP-14 was used to assess how QOL was affected by periodontal disease. Results showed that 22% of subjects reported that:

> "their oral health status impacted on their QOL in one or more ways" and that "the OHIP-14 score was significantly associated with occurrences of swollen gums, sore gums, receding gums, loose teeth, bad breath and tooth ache." (37)

This information provided researchers with a better understanding of the negative affects that oral disease has on QOL. (33-35, 37)

Access to Dental Care in North Carolina

North Carolina has an access to dental care crisis, especially in more rural areas of the state, like Robeson County, where the Lumbee tribe is located. (38-40) North Carolina ranks 47th out of 50 states in its dentist to patient ratio. Robeson County has 1.1-2 dentists per 10,000 people. This places Robeson County well below the national (6.0 dentists per 10,000) and state (4.1 dentists per 10,000) averages.(38, 40) One objective of the Healthy People 2010 report by the Surgeon General is to increase the use of dental services by all Americans.(41) To meet this objective, NC is currently working with the public university system to increase the number of NC trained dentists from the University of North Carolina School of

Dentistry. Emphasis is also being placed on recruiting dentists into rural areas of NC.(38, 40) A new dental school is currently being developed at East Carolina University (ECU). According to the American Dental Association (ADA), the new dental school at ECU will provide community based dental care in rural communities throughout NC. North Carolina has doubled their dental safety net programs from 43 in 1998, to 115 in 2004.(38) Dental safety net programs provide dental care for low-income patients in NC.(42) However, concerns by the NC Office of Research, Demonstrations and Rural Health Development (ORDRHD) regarding accessibility of the program by those who need it most have arisen.

> "Many of the patients most in need of safety net services do not have employment that allows them to leave work (with or without pay) for…dental appointments."(40)

This has prompted the ORDRHD to consider creating dental safety net programs with more flexible hours to meet the dental needs of low-income working individuals.(40, 42) Increasing the number of people who seek dental care is also a matter of creating value for oral health through education by culturally competent oral health care professionals.(31, 40, 43, 44)

The aim of this study was to assess the self-reported oral health status, oral health knowledge and oral health-related quality of life of the Lumbee tribe. Factors influencing access to dental care were also investigated.

Methods and Materials

A self-administered survey was created to assess self-reported oral health status, oral health knowledge, access to dental care issues and oral health-related QOL as well as demographic information. The survey received initial approval from the University of North Carolina Institutional Review Board. The survey was pilot tested at Mt. Elim Baptist Church, which has a predominantly Lumbee Indian congregation, prior to the Lumbee Homecoming Festival. Seven volunteers from the congregation completed the survey. The survey was revised and resubmitted for IRB approval. With a population of approximately 22,500 Lumbee Indians attending the event within the age limitations of 18 years or older, a sample size of at least 109 completed surveys was determined using a prevalence estimate of 20 % +/- 7.5% of the Lumbee population having their QOL affected due to low oral health knowledge and access to dental care issues. (The sample size was calculated using EpiInfo version 3.3.2 software.) The survey was administered during the Lumbee Homecoming Festival in Pembroke, NC on July 7, 2007. A covered tent with tables and chairs was set up at the festival where the surveys were completed. A flyer describing the survey and participation requirements was distributed by a volunteer from the Lumbee community to recruit participants for the survey. The principal investigator was present during administration of the survey to aid in completing the survey for participants who could not read. Cold beverages were offered and dental hygiene supplies were distributed once the survey was completed. Student

volunteers were present to hand out drinks, pencils, and dental hygiene supplies. A convenience sample was assessed from those attending the Lumbee Homecoming Festival who met eligibility requirements. A total of 118 surveys were collected.

The survey was divided into four sections. Section 1 included questions about self-reported oral health status. The questions were formatted as nominal and ordinal response variables. Section 2 included questions about oral health knowledge. A Likert type scale was used to assess the level of agreement for each statement about oral health. A summary score was obtained from section 2 by assigning a value of 1 for responses of disagree/don't know for each subject and 0 for agreement. Section 3 contained statements about access to dental care issues. A Likert type scale was used to measure the level of agreement for each participant. A summary score was obtained by assigning a value of 1 to those who agreed to each statement and 0 was assigned if subjects disagreed or were unsure. Section 4, the OHIP-14 questionnaire, was used to assess oral health-related quality of life. (33) It includes questions that measure the seven domains of Locker's model of oral health. This model states that disease may lead to impairment, which may lead to discomfort, functional limitation, physical and psychological disability and handicap. The OHIP-14 questions are rated on a Likert type scale response of 0-4 for a response of never, hardly ever, occasionally, fairly often or very often respectively. (33-36) A summary score was obtained by assigning a value of 1 for responses of 'occasionally' or more often and 0 for hardly ever or never. The summary scores were computed to test the hypothesis that low oral health knowledge and issues with access to dental care were associated with oral-health related QOL. The summary

scores were also used to asses the relationship between co-variates and oral health knowledge, access to dental care issues, and oral health-related QOL.

Statistical analysis

Since this was a convenience sample, no p values were reported. (45) Statistical analyses were performed using JMP version 6.0 software.

Results

Table 1 contains demographic information of the survey population. Of the 118 participants, most had at least some college (70%) and 55% were females. The majority of respondents had an income of at least $35,000 (60%). Only 58% had any dental insurance coverage. Many respondents had not received a dental examination (35%) or dental cleaning (39%) in over one year.

Table 2 describes the distribution of responses to the oral health knowledge section of the survey. The majority of respondents had knowledge about fluoride use (96%), daily flossing (90%), and dietary considerations for oral health (96%). However, many did not know that oral disease may affect the heart (48%), pregnancy (50%) and diabetes (43%).

Table 3 describes the distribution of responses regarding access to dental care issues. Access to dental care was affected by cost (50%), an inability to miss work (34%), and dental fear (27%). Many also reported that it was too far to travel to visit a dentist (20%).

Table 4 describes the distribution of participants with low oral health-related QOL. Many participants had low oral health-related QOL due to oral pain (30%) and were self-conscious (33%) because of problems with their teeth/mouth. Some found it difficult to relax (21%) and had decreased taste (21%).

Table 5 describes the characteristics of those with low oral health knowledge, problems accessing dental care, and low oral health-related QOL. Males had less

oral health knowledge than females. Those with less than a high school education had significantly less oral health knowledge than those with at least some college. Those with an income of <$35,000 (3.00 ±0.30) had more issues with accessing dental care compared to those with an income of ≥$35,000. Participants age 36-45 had the most trouble accessing dental care. Having no dental insurance was also a deterrent to receiving dental care. Males had lower oral health-related QOL than females. Respondents age 36-45 had lower oral health-related QOL than other age groups. Current tobacco use was also associated with poor oral health-related QOL.

Discussion

This study found evidence that there is low oral health knowledge regarding the link between oral and systemic disease among those surveyed at the Lumbee homecoming Festival in Pembroke, NC. Although subjects had a high level of knowledge about oral health topics such as daily flossing and fluoridated toothpaste and its positive affect on oral health, many had low knowledge about oral health and its relationship with systemic diseases like CHD and diabetes. Even though recent research shows a significant relationship between periodontal disease and adverse pregnancy outcomes, many of the female participants in this study did not know that oral health can affect pregnancy outcomes.(24, 25, 29) The results of the OHIP-14 survey suggest that the Lumbee population surveyed at the Lumbee Homecoming Festival have low oral health-related QOL. Slade et al reported a mean OHIP-14 score of 1.64 in South Australian populations aged 60 and older.(33) The present study found a mean OHIP-14 score of 2.74 for the population surveyed. Those age 36-45 years had the lowest oral health-related QOL. Those aged 56 or older had a better oral health-related QOL than those aged 36-45. This suggests that the Lumbee population surveyed may experience poor oral health-related QOL at a younger age than some populations. Data from the IHS revealed that AI's had an increase in caries in those aged 35-44. (9) The current study found a lower oral health-related QOL in a similar age group. This suggests that future research efforts may need to focus on those aged 30 and older.

These deficits in oral health knowledge and low oral health-related QOL may be related to the access to dental care crisis in North Carolina. Because of the rural location of the Lumbee tribe, dental offices may be a long distance away for many of Robeson County's population.(1, 17) This is especially true for those with low socioeconomic status (SES). As fuel costs rise in the Unites States, traveling far distances to receive dental care may use up monetary resources needed for traveling to work. Therefore, driving a far distance to receive dental care may become an unaffordable expense, even for those who carry dental insurance. For many respondents, the cost of receiving dental services was also a deterrent to accessing care. Many were unable to find a dentist to take care of them. This is due in part to the low dentist to population ratio in Robeson County. (38, 39) Many reported that although they wanted to go to the dentist, they were unable to take time off from work. This finding is in agreement with concerns raised over accessibility of dental safety net programs by working individuals. (40)

There were some limitations to this study. There may have been some bias in the survey instrument because the data were self-reported. Since the population surveyed tended to be well-educated and had a high household income compared to the general population of Robeson County, the results may not be generalized to the entire Lumbee population of Robeson County. However, since the sample population had a higher SES than Robeson County's general population, there may be greater difficulty accessing dental care and lower oral health-related QOL than the current study found. Many of the Lumbee community were unintentionally excluded from the study because they did not have financial or transportation

resources to attend the Lumbee Homecoming Festival. Therefore, it is only representative of a portion of the Lumbee population. Further investigation of the oral health needs of the entire Lumbee community is needed.

One observation of interest was that although recruitment was performed in the same manner by all of those involved, subjects were more willing to participate when recruited by the Lumbee community volunteer than when recruited by the PI or student volunteer who were not AI. Without the efforts of the Lumbee volunteer, it is unlikely that there would have been enough subjects recruited into the study. This finding supports recommendations from the USDHHS and the US Surgeon General that oral health professionals need to be culturally competent in order to have effective communication and increase access to dental services. (31, 40, 41, 44) It is important that future oral health research with the Lumbee community be conducted by a research team that includes qualified members of the Lumbee tribe.

Conclusion

Although most survey participants had basic dental knowledge concerning brushing, flossing and fluoride use, there was significantly less knowledge regarding how oral health affects systemic health. Access to dental care was impeded by cost, not being able to miss work, not being able to find a dentist to care for them and dental fear. Oral health-related quality of life was affected due to oral pain, feeling tense because of their mouth, an inability to eat certain foods and feeling self-conscious about their teeth and mouth. The information gained from this survey will help Lumbee tribal leaders to make decisions regarding the oral health needs of the Lumbee community.

Figure 1: Distribution of Age Groups

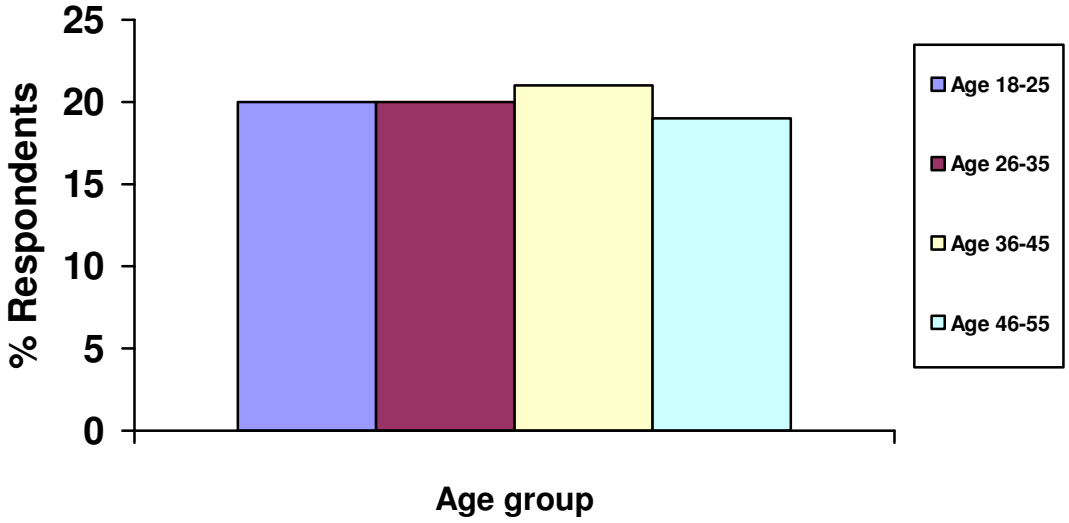


Figure 2: Tobacco Use

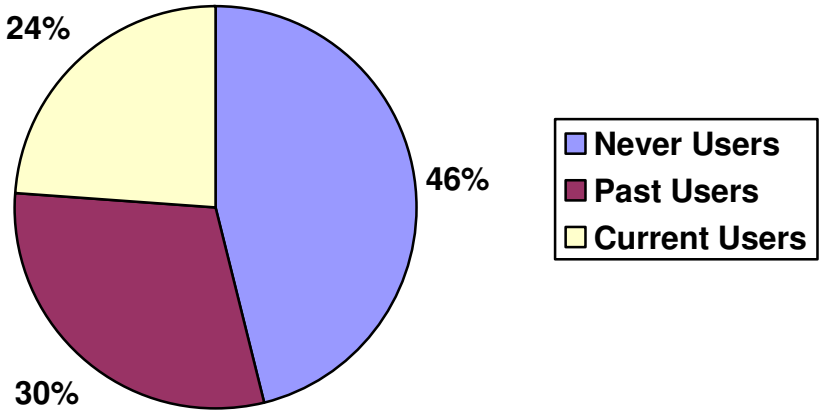


Figure 3: Percent agreement that tooth loss is natural

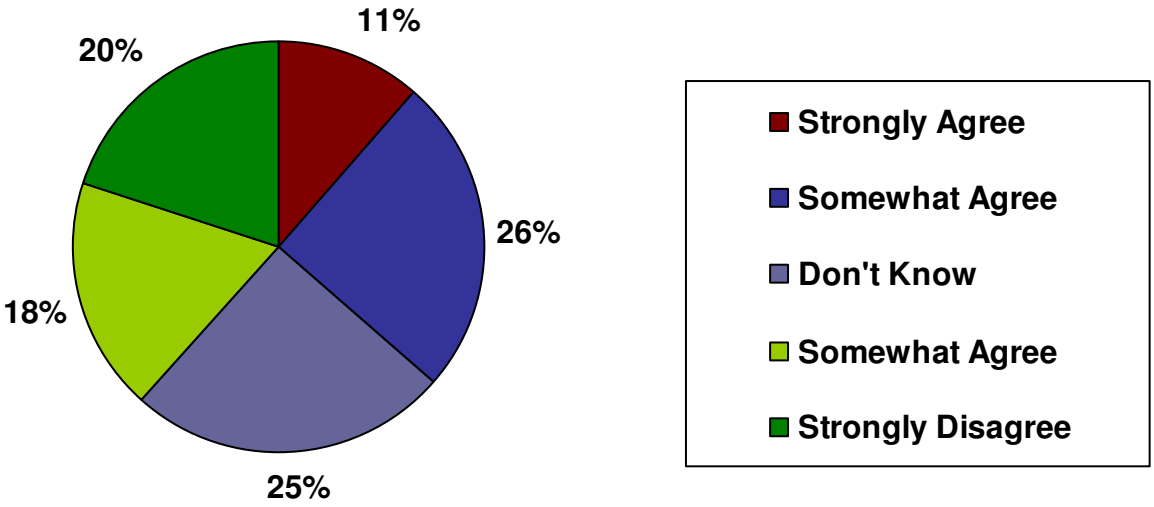


Table 1. Demographic characteristics of Subjects (n=118)

Demographic characteristics	% Subjects	% Robeson County
Gender		
Male	45	49
Female	55	51
Age (years)		
18-25	20	*
26-35	20	*
36-45	21	*
46-55	19	*
56 or older	21	*
Marital status		
Never married	26	*
Married	56	*
Separated/divorced/widowed	18	*
Education		
Less than high school graduate	7	
High school graduate/GED	23	65
At least some college	43	*
Bachelor's degree or higher	27	11.4
Income		
$\leq$$19,999	20	
$20,000 to $34,999	21	
$\geq$$35,000	60	

Table 2. Distribution of responses to oral health knowledge questions (n=115)

	Agree %	Don't Know %	Disagree %
Problems with the teeth/mouth may cause problems with:			
the heart	52	39	9
pregnancy	50	45	5
diabetes	57	38	5
It is natural to loose your teeth as you age	39	25	36
Daily flossing makes your teeth /mouth healthier	89	10	<1

Table 3. Distribution of responses to access to dental care questions (n=117)

	Agree %
I want to go to the dentist but cannot or do not because:	
it is too far to travel	20
I am afraid	27
it costs too much	50
I cannot miss work	34
I cannot find a dentist	30
I do not want to go to the dentist	18

Table 4. Distribution of responses to Oral Health Impact Profile-14 (OHIP-14) item responses (n=117)

	Occasionally/ fairly/very often %
Functional limitation	
Trouble pronouncing words	13
Taste worsened	21
Physical pain	
Painful aching	30
Uncomfortable to eat	31
Psychological discomfort	
Self-conscious	33
Tense	25
Physical disability	
Diet unsatisfactory	15
Interrupt meals	19
Psychological disability	
Difficult to relax	21
Been embarrassed	22
Social disability	
Irritable with others	13
Difficulty doing jobs	9
Handicap	
Life unsatisfying	16
Unable to function	8

Table 5. Characteristics of subjects' summary scores in oral health knowledge, access to dental care and poor oral health-related QOL

	Oral health knowledge Mean (SE)	Access to dental care issues Mean (SE)	Poor oral health-related QOL Mean (SE)
Gender			
Male	2.69 (0.22)	2.21 (0.31)	2.91 (0.55)
Female	1.90 (0.19)	1.92 (0.26)	2.73 (0.45)
Age (years)			
18-25	2.36 (0.34)	1.22 (0.44)	1.43 (0.76)
26-35	2.22 (0.33)	1.91 (0.44)	3.09 (0.76)
36-45	2.67 (0.32)	2.96 (0.43)	4.21 (0.91)
46-55	2.18 (0.34)	2.50 (0.45)	2.68 (0.78)
56 or older	1.91 (0.33)	1.63 (0.43)	2.21 (0.75)
Income			
<$19,999	2.68 (0.32)	3.00 (0.43)	4.00 (0.85)
$20,000 to $34,999	2.13 (0.31)	3.00 (0.42)	4.35 (1.02)
>$35,000	2.14 (0.19)	1.46 (0.25)	2.09 (0.39)
Education			
Less than high school graduate/GED	4.14 (0.83)	2.88 (0.97)	2.38 (1.33)
High school graduate/ GED	2.52 (0.26)	2.33 (0.39)	4.07 (0.73)
At least some college	2.02 (0.16)	1.89 (0.24)	2.47 (0.42)
Dental insurance			
No dental insurance	2.60 (0.26)	2.64 (0.56)	3.67 (0.56)
Dental insurance	2.08 (0.26)	1.68 (0.31)	2.15 (0.38)
Tobacco use			
Current tobacco use	2.41 (0.24)	2.86 (0.45)	3.96 (0.76)
Past tobacco use	2.76 (0.30)	1.91 (0.36)	3.17 (0.74)
Never user	1.90 (0.21)	1.66 (0.27)	1.72 (0.38)

Appendix A

"Describing Your Mouth: A Survey of Oral Health of the Lumbee Tribe"

DESCRIBING YOUR MOUTH

A Survey of Oral Health of the Lumbee Tribe

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
SCHOOL OF DENTISTRY
DEPARTMENT OF DENTAL ECOLOGY
DENTAL HYGIENE GRADUATE PROGRAM
CB# 7450, BRAUER HALL
CHAPEL HILL, NC 27599-7450

To all participants:

Many of the Lumbee tribe are taking part in this important survey. This survey will help us understand your thoughts and concerns so that programs can be improved or developed to enhance the quality of life of the Lumbee tribe.

If you are Lumbee Indian 18 years of age or older, please answer the following questions about your mouth. The questions in this survey ask about a wide range of concerns and feelings regarding your oral health. Some of these may or may not be important to you.

This is NOT a test; there are no right or wrong answers. Please answer as honestly as you can. Your responses will be kept strictly secret.

Please circle the appropriate answers. You can refuse to answer any question if you like and just leave it blank.

Thank you for your help!

IF YOU ARE NOT A LUMBEE INDIAN AGE 18 OR OLDER, PLEASE DO NOT FILL OUT THIS SURVEY!

Thank you

This research has been reviewed by the University of North Carolina Institutional Review Board (IRB). Your participation in this survey is completely voluntary and your identity will remain secret. Each survey will have an identifying code with no personally identifiable information. Only the study researchers will have access to the survey information. There is NO penalty for deciding not to complete the survey. Results from this study will be shared with tribal leaders and may be published. However, shared results will not include information that might identify you.

It may be very hot so cold drinks will be provided to you while you fill out the survey. Although you may not get any direct benefit from filling out this survey, it will provide information that may be used to develop oral health education programs to improve the oral health of the Lumbee community.

Each participant will receive cold drinks, a free toothbrush, toothpaste and floss; as well as information about care provided by the University of North Carolina School of Dentistry. If you have any questions about this study, please call the principal investigator, Pamela Wells RDH, BS or the faculty advisor, Mary George RDH, MEd at 919-966-0045. If you have questions or concerns about your rights as a research subject you may contact, secretly if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

It should take about 15-20 minutes to finish this survey.

Section 1. About Your Mouth

The following are some questions about your mouth. Please circle the answer that best describes your mouth. There are no right or wrong answers; we are interested in your view of your mouth. You do not have to answer any question that you do not feel comfortable answering.

Please circle the best answer for each question.

A. How would you rate the health of your mouth today?	1 **Poor**	2 **Fair**	3 **Good**	4 **Very Good**	5 **Excellent**	6 **Don't Know**
B. Do you have any natural teeth?		1 **No**	2 **Yes**	3 **Don't Know**		
C. Has a dentist ever told you that you have gum disease or Pyorrhea?		1 **No**	2 **Yes**	3 **Don't Know**		
D. Have you ever had any fillings, crowns or caps put in your teeth?		1 **No**	2 **Yes**	3 **Don't Know**		
E. Have you ever had a tooth pulled by a dentist?		1 **No**	2 **Yes**	3 **Don't Know**		
F. Have you ever had a dental cavity or dental decay?		1 **No**	2 **Yes**	3 **Don't Know**		
G. Do you wear a denture or false teeth?		1 **No**	2 **Yes**			

H. In the past 12 months, have you had a dental exam for any reason?

1	2	3	4
No, but I have been to the dentist before	**No, I have never been to the dentist**	**Yes**	**Don't Know**

I. In the past 12 months, have you noticed any puffy, swollen or sore places on your gums?

1	2	3
No	**Yes**	**Don't Know**

J. In the past 12 months, have your gums bled when you brush your teeth?

1	2	3
No	**Yes**	**Don't Know**

K. In the past 12 months, have you had a toothache or pain in your mouth?

1	2	3
No	**Yes**	**Don't Know**

If you do not have any natural teeth, please skip to section 2.

L. In the past 12 months, have you had a dental cleaning by a dentist or dental hygienist?

1	2	3	4
I have never had a dental cleaning	**No**	**Yes**	**Don't Know**

M. Do you brush your teeth?

1	2	3	4	5	6
Twice a day	**Once a day**	**Three to six times a week**	**One to two times a week**	**Occasionally, but less than once a week**	**I do not brush my teeth**

N. Do you floss your teeth?

1	2	3	4	5	6
Every day	**Four to six times a week**	**One to three times a week**	**Once a week**	**Occasionally, but less than once a week**	**I do not floss my teeth**

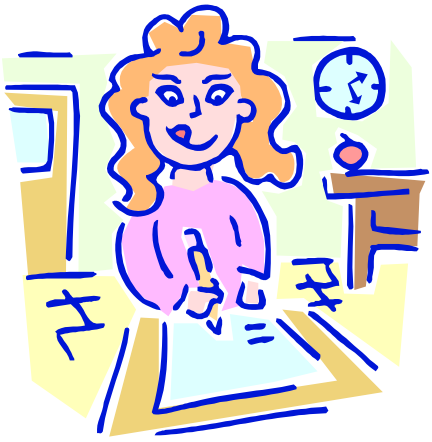
Section 2. Oral Health Issues

The following are some statements about oral health topics. Please circle the answer that best fits how much you agree with these statements. There are no right or wrong answers; we are interested in your view of these statements. You do not have to answer any question that you do not feel comfortable answering.

Please circle the best answer for each question.

		1	2	3	4	5
A.	Problems with your teeth and mouth can cause problems with your heart.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
B.	Problems with your teeth and mouth may cause problems during pregnancy.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
C.	Problems with your teeth can cause problems for people with diabetes.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
D.	It is recommended that you brush your teeth at least two times a day.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
E.	Toothpaste with fluoride helps prevent cavities.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
F.	Cavities are sometimes caused by sugary drinks like soda and Kool-aid.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
G.	It is natural for your teeth to fall out as you get older.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
H.	The foods that you eat can affect the health of your mouth.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
I.	Flossing your teeth everyday makes your mouth healthier.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**

	1	2	3	4	5
J. I want to have dental care, but cannot because it is to far to travel/drive.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
K. I want to have dental care, but do not because I am afraid to go to the dentist.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
L. I want to have dental care, but cannot because it cost too much.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
M. I want to have dental care, but cannot miss work to go to the dentist.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
N. I want to have dental care, but cannot find a dentist to take care of me.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
O. I want to have dental care, but cannot find a dentist who takes my insurance.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
P. I want my mouth and teeth to be healthy.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**
Q. I do not want to go to the dentist.	**Strongly Agree**	**Somewhat Agree**	**Don't Know**	**Somewhat Disagree**	**Strongly Disagree**



Section 3. Oral Health Quality of Life

These questions ask how troubles with your teeth, mouth or dentures may have caused problems in your daily life. Please complete the questions even if you have good dental health. We would like to know how often you have had each of the 14 listed problems during the *LAST YEAR*.

Please circle the best choice for each question.

	1	2	3	4	5	6
A. In the past 12 months, have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
B. In the past 12 months, have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
C. In the past 12 months, have you had painful aching in your mouth?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
D. In the past 12 months, have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
E. In the past 12 months, have you been self conscious because of your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
F. In the past 12 months, have you felt tense because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
G. In the past 12 months, has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**

		1	2	3	4	5	6
H.	In the past 12 months, have you had to interrupt meals because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
I.	In the past 12 months, have you found it difficult to relax because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
J.	In the past 12 months, have you been a bit embarrassed because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
K.	In the past 12 months, have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
L.	In the past 12 months, have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
M.	In the past 12 months, have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**
N.	In the past 12 months, have you been totally unable to function because of problems with your teeth, mouth or dentures?	**Very Often**	**Fairly Often**	**Occasionally**	**Hardly Ever**	**Never**	**Don't Know**

Section 4. Home Life Information

These questions are designed to help us understand your home-life situation. Please complete or circle the answer for each statement that best describes your household.

A. What is ***your*** marital status?
(please circle your answer)

1	2	3	4	5	6
Married	**Divorced**	**Widowed**	**Separated**	**Never married**	**A member of an unmarried Couple**

B. Compared with other people your age, would you say that your general health is:

1	2	3	4	5	6
Poor	**Fair**	**Good**	**Very Good**	**Excellent**	**Don't Know**

C. How many people under 18 years of age live in your household?
(please enter your answer in the space provided)

_____ **# of people under 18 years of age living in household**

D. What is the highest grade or year of school you completed?
(please check your answer)

- □ **Never attended school or only attended kindergarten**
- □ **Grades 1 through 8 (Elementary)**
- □ **Grades 9 through 11 (Some high school)**
- □ **Grades 12 or GED (High school graduate)**
- □ **College 1 year to 3 years (Some college or technical school)**
- □ **College 4 years or more (College graduate)**

E. What is your annual household income before taxes?
(please check your answer)

- □ **Less than $15,000**
- □ **$15,000 to $19,999**
- □ **$20,000 to $24,999**
- □ **$25,000 to $34,999**
- □ **$35,000 to $49,999**
- □ **$50,000 or more**

F. Are you male or female?
(Please circle your answer)

1 **Male** 2 **Female**

G. In which county and state do you live?
(*Please enter your county and state)*

_____**County**

_____**State**

H. What type of dental insurance plan do you currently have?
(please check your answer)

☐ **State Employee Health Plan**

☐ **Private health insurance plan purchased from an employer or directly from insurance company**

☐ **North Carolina Health Choice (State Children's Health Insurance Program=SCHIP)**

☐ **Medicaid**

☐ **None**

☐ **Do not know / Not sure**

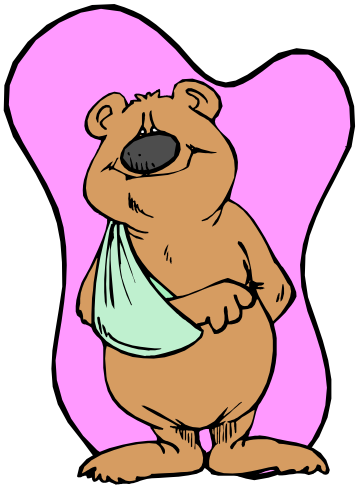
☐ **Carolina ACCESS**

☐ **Health Check**

☐ **South Care**

☐ **The military, CHAMPUS, TRI CARE, or the VA**

☐ **Other, please specify.**
_____



I. What is your age?
(*Please enter your answer)*

_____**Years Old**

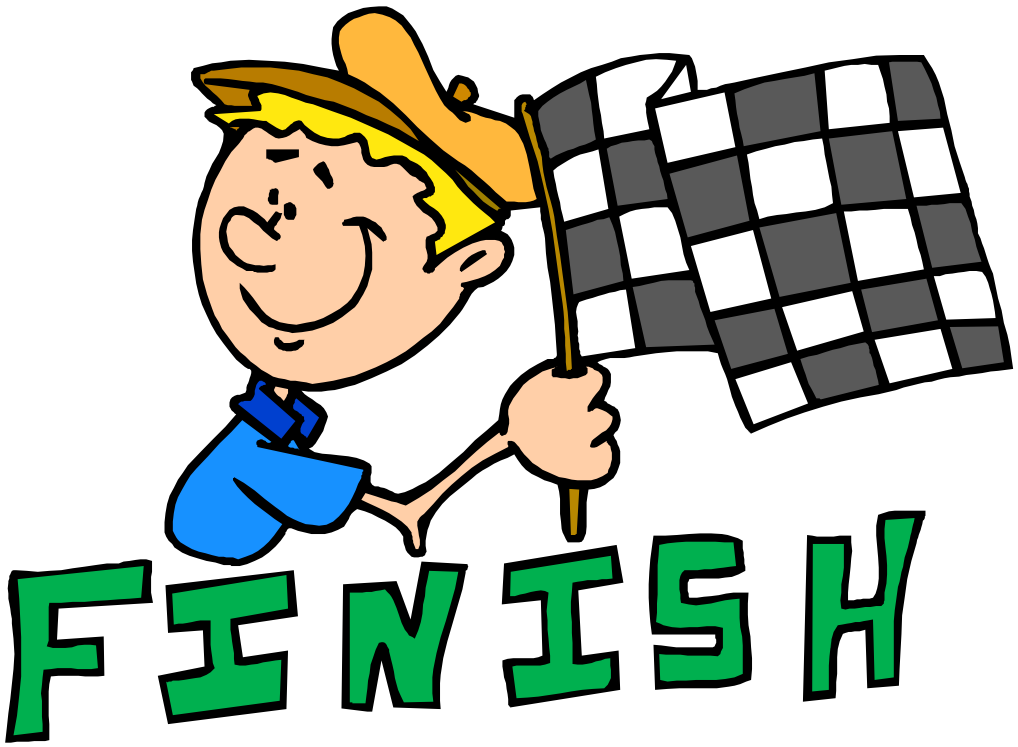
J. Do you use any tobacco products such as cigarettes, cigars or chewing tobacco?

1	2	3	4
No, I have never used tobacco products.	**No, but I have used tobacco products in the past**	**Yes, I use tobacco products.**	**Don't Know**

K. ***If yes to question 'K',*** Please list type of tobacco products you use.

_____**Type of tobacco product(s) used.**

Thank you for your honest feedback and time. You have finished the survey.



We realize that some of the questions in this survey may have left you with questions about your oral health. We strongly recommend that you contact your local dental provider if you feel that you need dental treatment.

If you have *any comments* you would like to add, please write below.

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