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Oral Health Literacy and Oral Health Practices in South Asian Populations

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Oral Health Literacy and Oral Health Practices in South Asian Populations

Ambika Sharma

B.S., University of Connecticut, 2015

Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Public Health

At the

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2020

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APPROVAL PAGE

Master of Public Health
Thesis

Oral Health Literacy and Oral Health Practices in South Asian
Populations

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2020

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Abstract

Background: Oral Health is a strong predictor of and has strong implications on overall health and quality of life¹. The 2018 Surgeon General's Report of Oral Health declared a need for more data collection and surveillance on the oral health status of minority groups in America.

Surveillance studies examining the scope of inequalities can ultimately drive policy to mitigate disparities. Surveillance data can also help shed light on South Asians in Americans, their oral health perspectives and practices.

Methods: A 19-question survey was administered to convenience samples of South Asians in Connecticut, New York and New Jersey. Study subjects were recruited at Hindu or Sikh Temples and at the University of Connecticut, Storrs campus.

Results: Data collection yielded 178 individuals meeting the inclusion criteria.

Conclusion: There are disparities in oral hygiene habits as well as oral health beliefs and practices suggesting the South Asian community of the tri-state area could benefit from targeted public health outreach.

I. Introduction

Little is known about the oral health literacy and oral health practices of many minority populations in the United States, including Asian Americans and the ethnic subgroups within that population. Even less is understood about how oral health practices, behaviors and literacy may change between generations of immigrants and American-born generations of Asians.

Considering this lack of data and the direct relationship oral health has with general health, it is imperative to understand the oral health care and the beliefs held by a major subset of the Asian American population, south Asians. South Asians individuals are those whose families originate from India, Pakistan, Sri Lanka, Nepal Bangladesh, Afghanistan, Bhutan and Maldives.

Understanding oral health literacy levels among different subgroups of the population can help inform interventions to meet public health objectives.

Oral health affects everyone.¹ It has implications for overall health and quality of life.¹ The Surgeon General's Report of Oral Health notes that the highest achievable level of oral health is attainable, however, it is not being realized by all Americans.¹

Oral health refers to not only dental health, but also the integrity of the gums and soft tissues within the mouth.¹ Fluoride exposure, oral hygiene, diet and preventive dental visits are critical in preserving oral health throughout an individual's lifetime.¹ These factors in oral health are directly related to an individual's environment, oral health literacy and socioeconomic factors.¹ These social determinants of health are the reason that oral health disproportionately affects vulnerable populations including racial and ethnic minorities.²

Health insurance has become more accessible through the enactment of the Affordable Care Act in 2010, Medicaid and health benefits for employed individuals, however, dental

insurance was not included in the individual mandate and typically has to draw from a family or individual's disposable income.³ This lack of mandated coverage may imply that the federal government does not consider dental insurance as important for overall health. While health literacy empowers individuals to make educated choices about their healthcare⁵, low oral health literacy can be associated with a decreased understanding of how oral health affects systemic health and well-being.⁴ This can lead to a lack of prioritization of acquiring dental insurance.⁴ A lack of dental insurance can create an even larger gap in oral health literacy, it can lead to fewer preventive dental visits resulting in less knowledge about oral health and the importance of oral health care, as well as a higher likelihood for developing dental problems, chronic illnesses and infections.⁴

While the Surgeon General's Report of Oral Health recommended that there must be more data collection and surveillance on the oral health status of minority groups in America, there is little to no data collected on the oral health literacy, access to dental care and oral hygiene practices of any minority groups in the United States. Gathering data on the extent and reasons for disparities can help us better understand the scope of inequalities and ultimately help to drive policy change and oral health care interventions.

The purpose of this study was to assess the oral health and oral health literacy of the South Asian community in Connecticut, New Jersey and New York. The study was designed to investigate whether there are differences in health literacy, preventive dental care and behavior, and oral health of South Asian immigrants and American-born South Asians. If there are fundamental differences in the beliefs, behaviors and practices of South Asians according to generational status, it will have implications for oral health educational programs and interventions directed toward members of this minority group.

II. Literature Review

Health Literacy

There is consensus that there is a positive correlation between general health literacy and health outcomes.⁸ This finding is attributed to the belief that if an individual is knowledgeable about the factors that contribute to their health, they will be more likely to make educated decisions about their health.⁵ However, there is limited research on health literacy and health outcomes among Asians in particular. Lee and his colleagues conducted the California Health Interview Survey (CHIS), a cross-sectional survey designed to assess the health literacy of Asian American immigrants and to evaluate whether there was an association between “health literacy and self-rated health status”.⁸ The study had a sample size of over 30,000 non-Latino Americans and approximately 3,000 Asian Americans of various nationality groups including: Chinese, Korean, South Asian and Vietnamese individuals.⁸ The levels of health literacy were based on participants’ ability to read prescription bottles and understand instructions from their doctors, while health outcomes were based on reported chronic, non-communicable diseases.⁸ The study determined that non-Latino Americans were more likely than Latino Americans to be educated at or above a high school level, to be proficient in English, to have health insurance, and to have higher health literacy.⁸ In addition, non-Latino Americans were more likely to report being in very good or excellent health.⁸ The study aggregated of all Asian Americans in presenting the data, as well as analyzed the data for Asian Americans by their country or region of origin. This analysis by subgroup illustrated the diversity amongst Asian American immigrants, suggesting that one all-encompassing demographic, ‘Asian American’, is an inadequate representation of the individual cultures of countries and regions within Asia.⁸ The variation noted between Chinese, Korean, South Asian and Vietnamese individuals suggested that these groups may be

subject to different determinants of health. This study suggested that disparities in health literacy exist between the general population of non-Latino Americans and just Asian Americans.

Although this study demonstrated the importance of considering health literacy and outcomes data by nativity, it is uncertain whether these findings would generalize to Asians living outside of California and different generational groups.

This study is also a prime example of how in general population studies, minority populations, although included in the studies, do not allow for a large enough sample size of each nativity group to draw conclusions about each one. Rather, a study targeting a specific minority population may be more effective.

Oral Health Literacy

Oral health literacy has been measured through the Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30) test in a number of studies.⁹ This method quantifies an individual's oral health literacy through their ability to read dental terminologies and functions under the assumption that an individual's ability to read is synonymous with their understanding of oral health⁹. A meta-analysis of ten different studies by Lee et. al evaluated whether oral health literacy has an effect on oral health outcomes.⁹ Oral health outcomes were measured through the number of recorded dental caries, periodontal status, and dental plaque score, the presence of malocclusions, dental fluorosis, temporomandibular joint disorder, oral mucosal lesions, the need for a dental prosthesis and the need for any kind of dental treatment.⁹ The studies within the meta-analysis revealed inconsistent relationships between oral health literacy, as defined by the REALD-30 test, and oral health outcomes.⁹ Three of the studies showed a higher prevalence of caries associated with lower oral health literacy, while two other studies found that there was a negative association between caries and oral health literacy.⁹ However, five studies included in

the meta-analysis found that lower levels of oral health literacy were associated with fewer remaining teeth in adults.⁹ These inconsistent findings may be due to problems in measuring oral health literacy. For instance, the REALD-30 method only evaluates an individual's ability to read dental terminology, it does not assess their understanding of the terminology or oral health concepts.⁹

A systematic review by Firmino et. al. also studied the association between oral health literacy and oral health outcomes.¹⁰ The study examined 25 studies and included a meta-analysis of three studies.⁹ Firmino et al. found no relationship between oral health literacy and tooth brushing frequency, dental treatment outcomes, oral health behaviors or oral health perception.⁹ These apparently inconsistent findings may be due to shortcomings in the reporting of the studies included in the systematic review as well as the inclusion criteria for the cumulative data analysis.⁹ The review did not mention the sample sizes of the studies included and also claimed many of the studies were of "low methodological quality".⁹ This quality issue and risk of bias in the included studies was raised by two reviewers using a Newcastle-Ottawa scale that determines the quality of a study based on, "selection...comparability... and exposure".⁹ The studies included in this analysis used different metrics for measuring oral health literacy.⁹ Once again, the need for high quality studies with standardized measurements of oral health literacy is called for in the literature.

South Asian Americans

Fifteen percent of documented residents in the Connecticut are immigrants, while another 14% have a parent who is an immigrant.⁷ In Connecticut, Indian immigrants comprise over 34,000 individuals, accounting for the largest proportion of foreign-born individuals in the state.⁷ According to the United States Census Bureau, the population of foreign-born individuals in

New York is 22.8%, while 29.4% of these immigrants are from Asia.⁸ Similarly, New Jersey has a foreign-born population of approximately 22.8%, with 32.4% of these individuals born in Asia.⁸

Minority and immigrant populations face numerous barriers to oral healthcare.² Immigrant families often struggle financially and may not be able to prioritize healthcare when adjusting to a new country, language and culture.² Immigrants and undocumented immigrants, who make up about 7% of the United States population, are far less likely to have health insurance than the general population.⁶ According to studies conducted by the Henry J. Kaiser foundation, the reason for this disparity stems from a fear of deportation, a lack of funding for community-based health centers as well as reduced funding for enrollment programs.⁶

Very few epidemiological studies have focused on collecting data on South Asian Americans, especially with regard to oral health. A focus group study conducted in Toronto, Canada assessed how Punjabi immigrants, individuals from a particular state in India, perceived oral health and oral health related problems.¹² This study, with a total of 33 participants, showed the nuanced ways a subset of immigrant South Asians view and understand oral health. The study showed that Punjabi immigrants tend to lean towards Ayurveda, or traditional Indian naturopathic practices, and use western dental care solely for emergencies.¹² The study also shed light on a plethora of misinformation stemming from cultural and superstitious beliefs within the Punjabi community. Many individuals in the focus groups had misconceptions about the causes of dental caries, infections and the systemic effects of infections.¹² There are several limitations to this study; most notably is its qualitative nature.

It is important to note that the study primarily interviewed Punjabi-speaking immigrants over the age of 65 with little education.¹² The findings of this study may not generalize to

younger or more educated individuals of Punjabi decent. This study may have limited generalizability to not only Punjabi immigrants in America, but also immigrants from other parts of India.¹² Just because Punjabi immigrants are from India, they may not share the same views as other Indian immigrants.

Summary

The American Dental Association (ADA) has asserted that general health literacy is an indicator of an individual's oral health.¹³ According to the New York State Health Department's Oral Health Literacy Toolkit, limited health literacy is associated with fewer dental care visits, more severe dental diseases decreased oral health quality of life and decreased use of preventive services.⁴ It is estimated that 33% of Asian Americans lack health literacy versus an estimated 36% in the general American population.⁴ It is, however, inaccurate to assume that all Asian Americans are influenced by the same biopsychosocial determinants of health. Asia is made up of 48 countries, all with very distinct cultures, religions, customs, beliefs, practices and languages. Such a blanket statistic cannot be accurate or representative of all Asian Americans and points to a larger need of evaluating the many subsets of the population that make up the Asian American community.

South Asian immigrants are a subset of the American population that is a rare target for oral health surveillance studies.⁹ With the information available it can be assumed that general and oral health literacy have major effects on oral health behaviors. Given this relationship, it is the responsibility of public health to identify populations that are most vulnerable.¹ When considering studies surrounding oral health disparities in America, it is my hypothesis that Asian Americans in the tri-state New York area, especially those who are immigrants, have relatively

low levels of oral health literacy. A lower level of oral health literacy among South Asian Americans may be associated with a number of oral health outcomes.

This study analyzed oral hygiene practices, oral health beliefs and oral health practices of South Asians born abroad and born in the United States. Statistical comparisons using a chi square test were made between age, education, gender and health literacy with questions pertaining to the oral hygiene habits, oral health beliefs and practices of the study population. The null hypothesis being tested in these models predicted that there would be no differences observed in the oral hygiene habits, oral health beliefs and practices of South Asians regardless of age, gender, education level or health literacy level.

The data collected through this study can illustrate how oral health practices, beliefs and literacy varies whether South Asians individuals are immigrants or if they are native to the United States. This kind of data is the first step in identifying oral health issues in South Asians in Connecticut. A better understanding of the state of health of this subset of the population can identify shortcomings oral health accessibility and can inform future oral health interventions that could directly benefit the individuals surveyed.

III. Methodology

In order to assess the oral health habits and oral health literacy of members of the South Asian community living in the tri-state area, a survey was administered to a Connecticut-based Hindu temple, a Indian Student Association cultural event at the University of Connecticut, a Hindu temple in New Jersey and a Sikh temple in New York. This included individuals who were born in a South Asian country and American-born individuals of South Asian heritage, including individuals with native origins in Afghanistan, Bangladesh, Bhutan, India, Maldives,

Nepal, Pakistan or Sri Lanka. The self-administered survey measured oral health literacy and oral health behavior and attitudes of South Asians. The data collection for this study began in March, 2019 and continued through February, 2020. A total of 178 South Asian participants completed the survey.

Survey Instrument

An 18-item questionnaire was developed to measure demographic characteristics of participants, oral health literacy, oral health knowledge, dental insurance coverage, preventive dental care practices, and dental health status. (A copy of the instrument can be found in Appendix A). The first four questions of the survey gathered demographic information, including respondent's gender, age, country of origin, highest level of education and whether they are of South Asian descent. A series of three Likert-type questions gauged oral health literacy. Since general health literacy has been associated with oral health literacy, individuals were asked: how sure he/she is when completing a medical form by themselves, how sure the individual is when reading written instructions on an over-the-counter medication, and how often he/she needs help to read printed materials from their health care providers. In addition, respondents were asked whether they believe oral health affects general health. Respondents received an "oral health literacy score" score based on their cumulative responses to these four questions. These numbers were then compared across demographic groups.

Individuals were then asked whether or not they have dental insurance and health insurance. Likert items were used to determine whether individuals seek dental care preventively and whether they seek dental care only when experiencing dental pain. Following these questions, individuals were asked when and why they last visited a dentist. This question was intended to

gauge whether the respondents routinely seek dental care and whether they are receiving dental care at the time.

Respondents were then asked about their oral hygiene practice through a series of questions that included: how often they brush their teeth, whether they use toothpaste when brushing their teeth, and how often they floss their teeth.

Finally, individuals were asked how many teeth they have remaining. This served as a broad assessment of oral health status.

Data Collection

Individuals included in the study were patrons of Hindu or Sikh temples or attendees at the Indian Student Association of the University of Connecticut's annual culture show. To recruit participants for the study, the investigator first sought the permission of managers of Hindu temples and Sikh temples and the University of Connecticut to conduct a survey on the premises. On weekend mornings the investigator brought surveys with a cover letter explaining the purpose and uses of the study, a table, clip boards and pens. The investigator personally recruited volunteers by first introducing herself, explaining her affiliation with UConn School of Dental Medicine and UConn Program in Public Health, and asking their assistance by completing a confidential and anonymous survey. Participants were told that this survey was entirely voluntary and that they could stop answering questions at any time. All participants were given as much time as they needed and were able to ask any questions they would like. Study participants who could not read or understand English and were Hindi or Urdu speaking, were read the survey by the investigator. When participants had completed the surveys, the completed

forms were collected and put into a sealed envelope, and the respondents were thanked for their participation. No incentives were offered to participants.

In the case of individuals who were completely edentulous, they were unable to completely and accurately respond to several of the questions in the survey that pertained to oral hygiene habits. Surveys completed by individuals who were edentulous were identified as those who selected “no natural teeth” on the survey. All incomplete surveys, with the exception of individuals who were edentulous, were not included in the data analysis.

Data Analysis

SPSS was used for the analysis of the survey data. A codebook was used to input the survey data into a computer file. Each question in the survey was analyzed using the “COUNTIF” function to determine the percentages of individuals who selected each answer choice. The nominal data, such as the demographic data and yes or no questions, were reported by frequency of responses. Once these values were calculated, histograms were created to visualize the proportions of responses.

All questions that were asked in a Likert format were converted to quantitative values, as dictated by the codebook, for further analysis. This data was interpreted as ordinal level data. Health literacy was given a score based on the answers to the Likert-style questions. Each response was scored and the sum of the three response scores resulted in an individual health literacy score. The health literacy scores were then categorized as low health literacy, intermediate health literacy or high health literacy. Similarly, the ages of individuals were categorized based on decade of life.

A SPSS chi square test with 95% confidence intervals was used to assess the association between independent variables like gender, education, health literacy and age to the dependent variables measuring oral health beliefs, practices and behaviors. For the majority of variables analyzed, cells did not exceed the necessary five units to allow for an accurate chi square test. To take into consideration this smaller sample size and consequentially smaller numbers, a Fisher Exact test was used to assess the validity of the chi square values computed. Cramer's V was also used to measure the strength of the obtained chi square. If a Cramer's V exceeded a value of 0.25, the chi square value would suggest a moderate association between the independent and dependent variables. If the Cramer's V is over 0.75, the chi square association would be considered strong.

Human Subjects

There are very few risks to respondents involved in this study. The study did not involve collection of patient identifiers, so there was little concern regarding a breach of privacy for study participants. Some participants may have felt some discomfort in answering specific questions about their oral health practices, literacy and health. All study participants were told personally and in writing through the informed consent forms, that they did not have to partake in the study or answer any questions that made them feel uncomfortable. In order to mitigate any concerns about privacy and confidentiality of their responses, the survey documents were kept in a secure location and on a password protected computer that could only be accessed by myself and Dr. Tadinada, the principal investigator of this study.

IV. Results

A total of 193 surveys were administered over the course of the study. Of these, 178 surveys matched the inclusion criteria and were considered for further statistical analysis. Nine

of the surveys were not included in the study because the respondents had incomplete questions. Of the incomplete surveys, the individuals who marked “no natural teeth” were deemed edentulous and were still included in the study because their incomplete answers were pertaining to oral hygiene habits for dentate individuals. Another six surveys were not included in the study because the respondents were not of South Asian descent.

Analyses of the demographic information revealed that the average age of participants was 43.5 years and the majority of participants were male (Table 1.0). Descriptive statistics highlighting country of origin and education levels were also calculated (see Table 1.1). This revealed that the population studied was predominately of Indian descent (82%) and most of them had sought higher education such as college or post-graduate degrees (see Figure 1.0). Only 24 (13%) of respondents in this study were born in the United States. The small number of first generation South Asians meant that differences between foreign-born and US-born groups could not reliably be pursued in this study.

Characteristic	Number	Percent
Male	106	60%
Female	72	40%
Mean age	43.5	
Total	178	

Table 1.0. Gender, mean age and total number of participants.

Place of Birth	Number	Percent
India	146	82.0%
United States	25	14.0%
Pakistan	2	1.1%
Afghanistan	3	1.7%
Iran	1	0.6%
Kenya	1	0.6%

Table 1.1. Country where respondent was born.

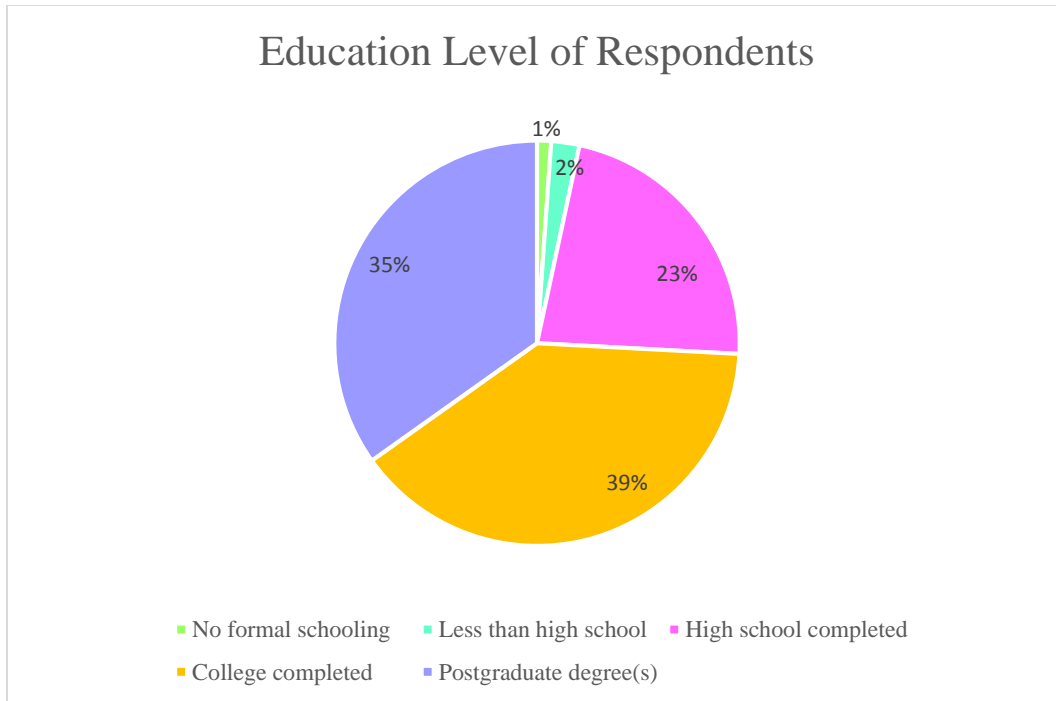


Figure 1.0. Level of education.

The analysis of insurance coverage revealed that most individuals had both health insurance and dental insurance (Figure 2.0 and Figure 2.1). However, the percentage of individuals without dental insurance was more than four times that of individuals who did not have health insurance (17% vs. 4%).

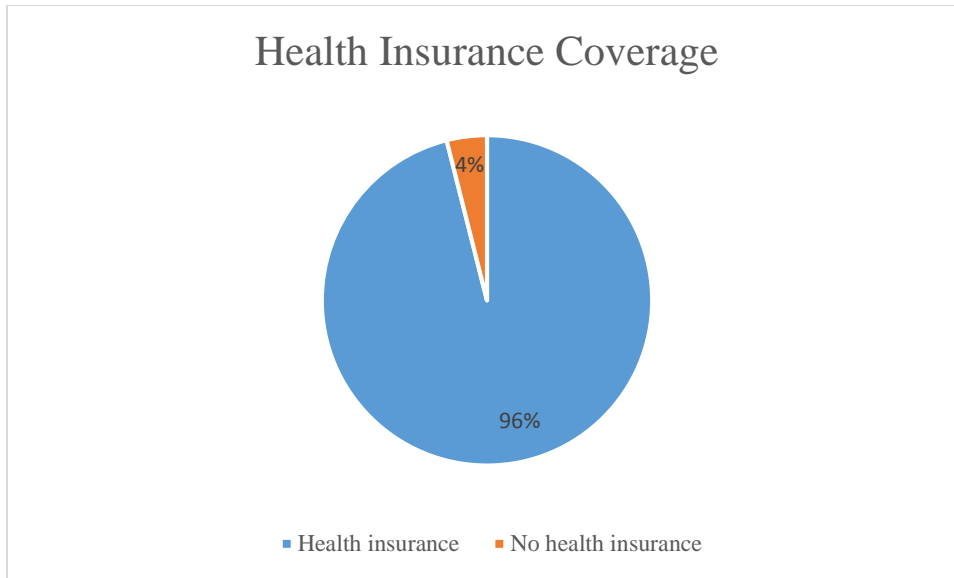


Figure 2.0. Health insurance coverage.

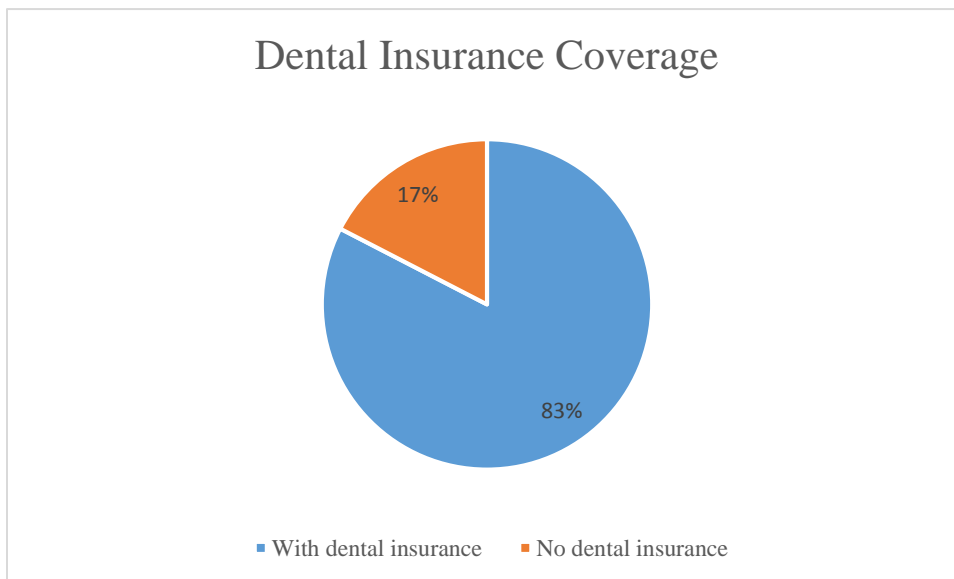


Figure 2.1. Dental insurance coverage.

There are thirty-two teeth in a typical adult's mouth, and twenty-eight if the adult had his/her wisdom teeth removed. Of the individuals surveyed in this survey, most reported that they had more than twenty teeth. About 8% of respondents did not know how many teeth they had in their mouth (Table 2.0).

Number of Teeth	Number	Percent
No natural teeth	6	3.4%
1-9 teeth	3	1.7%
10-19 teeth	6	3.4%
20 plus teeth	148	83.1%
Don't know	15	8.4%

Table 2.0. Number of natural teeth.

Analysis of the participants' oral hygiene habits followed. While all individuals reported using toothpaste, almost 10% reported using non-fluoride toothpaste, almost 17% did not know whether their toothpaste contained fluoride in it (Table 3.0). While the majority of individuals surveyed brush twice a day, 33% of individuals said that they brush only once a day (Figure 3.0). None of the individuals surveyed reported that they never brushed their teeth nor that they brushed their teeth once a month (see Figure 3.0). Twenty-four percent of participants reported that they never floss their teeth, while about 34% reported they floss once or more times a day (Table 3.1).

Fluoride Use	Number	Percent
I use fluoride toothpaste.	126	73.3%
I do not use fluoride toothpaste.	17	9.9%
I do not know if I use fluoride toothpaste.	29	16.8%

Table 3.0. Fluoride toothpaste use.

Flossing Frequency	Number	Percent
Never	42	24.4%
Once a month	18	10.5%
2-3 times a month	18	10.5%
Once a week	16	9.3%
2-6 times a week	19	11.0%
Once a day	45	26.2%
Twice or more a day	14	8.1%

Table 3.1. Flossing frequency.

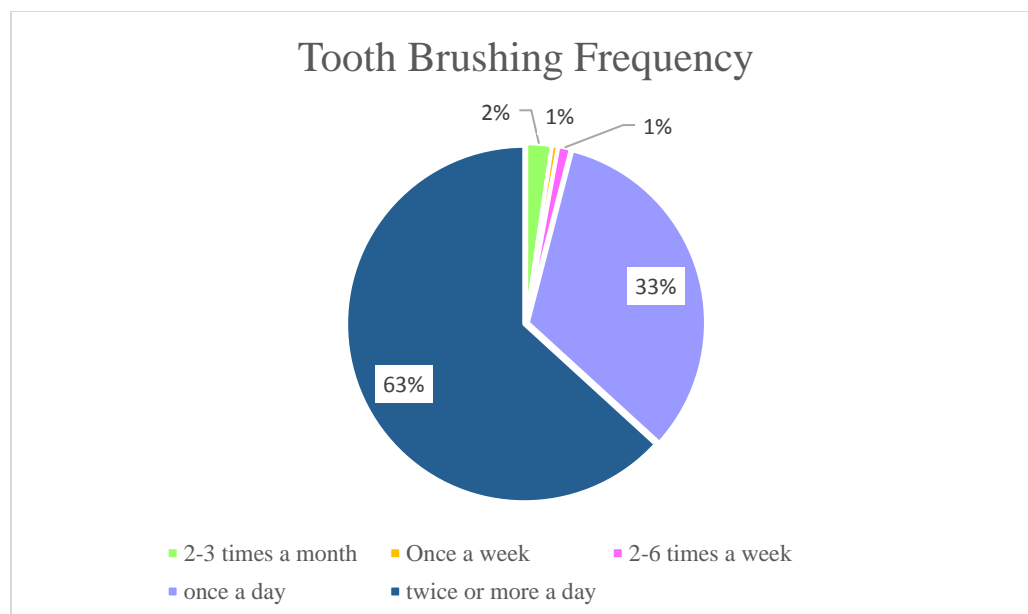


Figure 3.0. Frequency of tooth brushing.

When asked about their most recent dental visit and their reasons for the visit, more than half of the respondents had been to the dentist in the past six months. Almost one-fourth (23%) of the South Asian participants had not been to the dentist in over a year (Figure 4.0). The majority stated that their last dental visit was for a routine check-up (Table 4.1). Several individuals had indicated multiple reasons for their dental visits and all of the selections are reflected in the findings depicted in Table. 4.1.

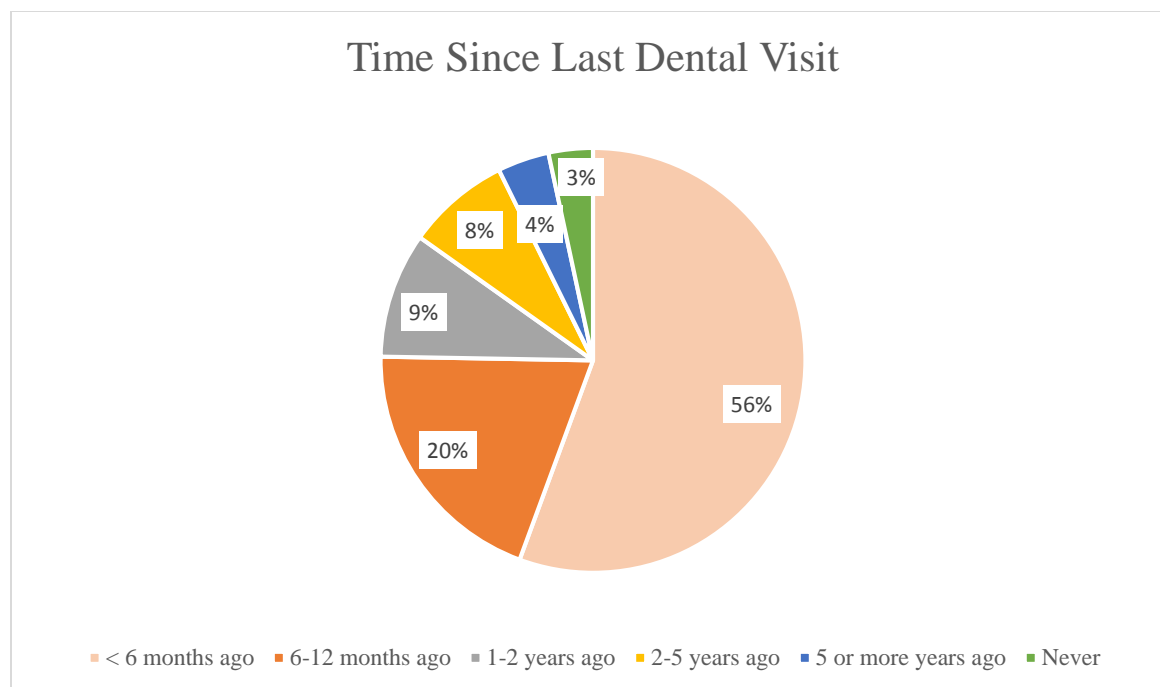


Figure 4.0. Time since last dental visit.

Reason for Last Dental Visit	Number	Percent
Consultation/Advice	9	5.1%
Pain or trouble with teeth, gums or mouth	25	13.7%
Treatment/follow-up for treatment	21	11.5%
Routine check-up	122	68.5%
Don't know/Don't remember	5	2.8%

Table 4.0. Reason for last dental visit.

Two questions were asked regarding whether the participant had orthodontic treatment (ie. braces) and if they did have orthodontic work, what the purpose of the treatment was (Table 5.0). Thirty percent of survey participants reported having orthodontic treatment (Table 5.0). Half of those surveyed said that their reason for orthodontic work was to improve concerns about their appearance (Table 5.1).

Orthodontic Treatment	Number	Percent
Received orthodontic treatment	54	30.3%
Did not receive orthodontic treatment	123	69.5%

Table 5.0. Orthodontic treatment.

Reason for Orthodontic Treatment	Number	Percent
For appearance	27	50.0%
For function	21	38.9%
Both appearance and function	2	3.7%

Table 5.1. Reason for orthodontic treatment.

The majority of individuals strongly agreed that their general health affects their general health. Figure 5.0 shows that 23% of individuals either strongly disagreed, somewhat disagreed or were neutral regarding the statement suggesting that oral health affects general health. Fifty-one percent of survey participants strongly agreed that they visited the dentist regularly, regardless of being in pain, while 14% reported that they only went to the dentist when in pain (Figure 5.1 and Figure 5.2).

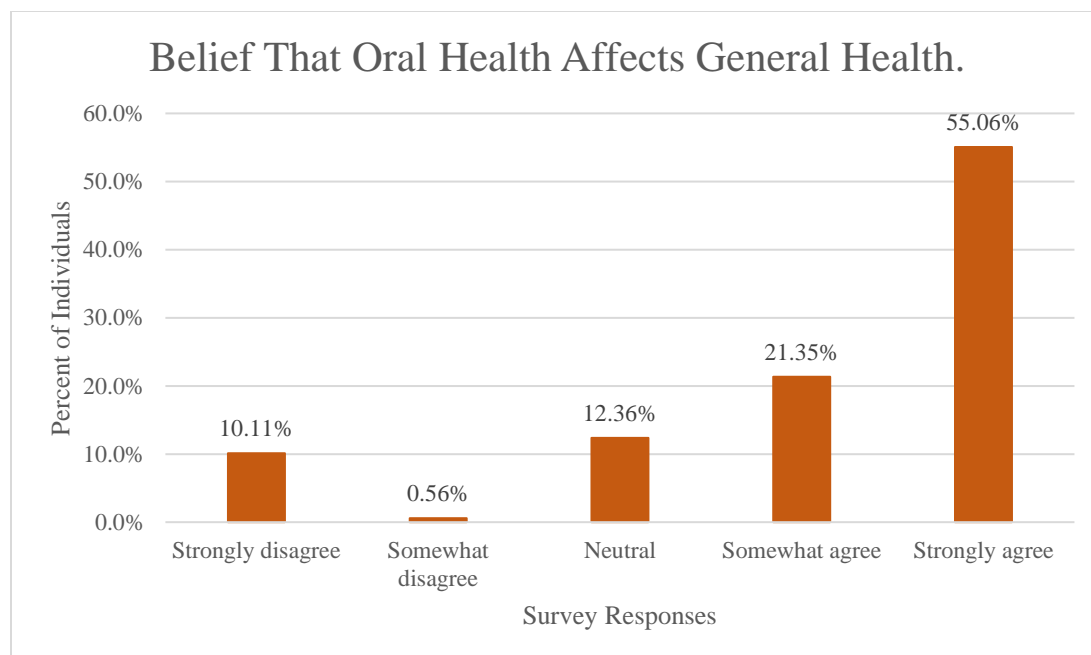


Figure 5.0. Belief that oral health affects general health.

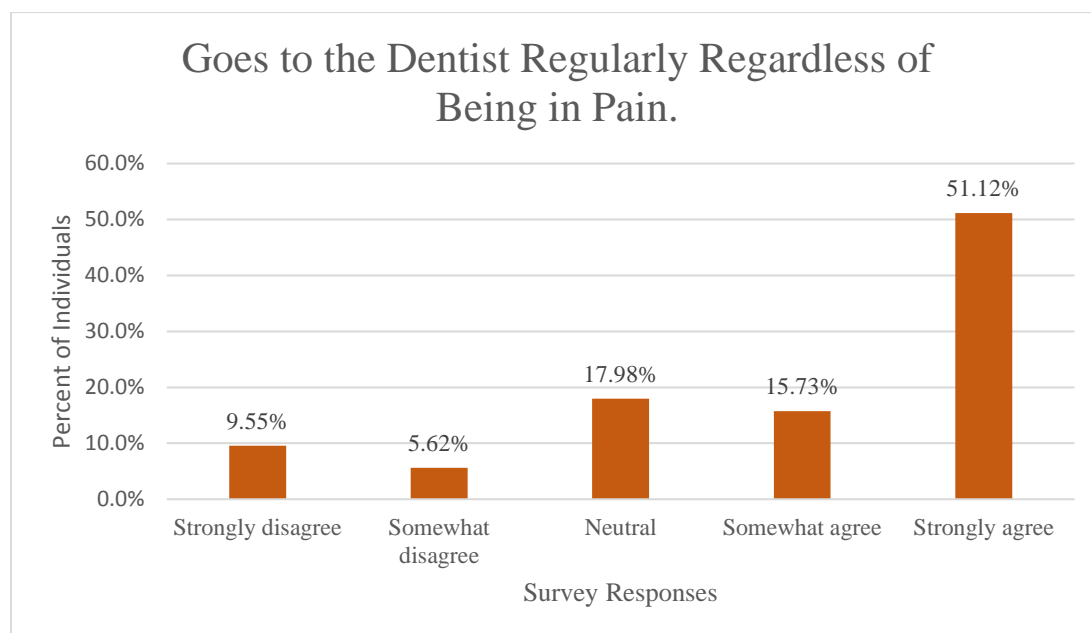


Figure 5.1. Goes to the dentist regardless of whether experiencing dental pain.

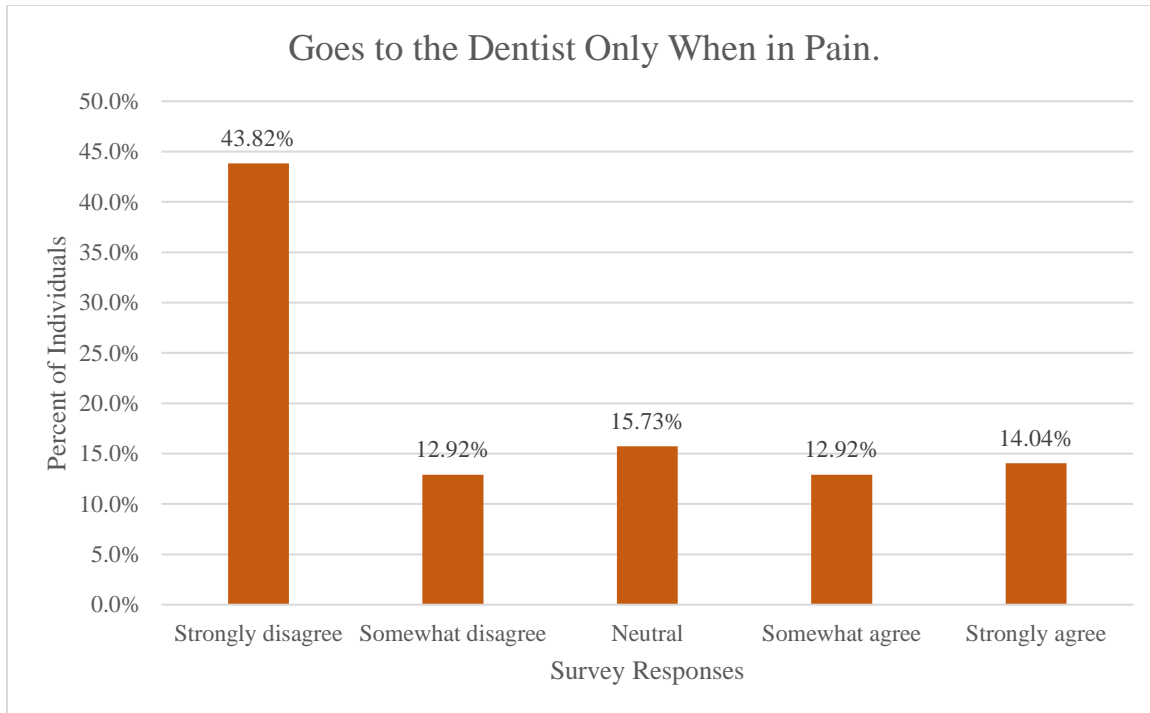


Figure 5.2. Goes to the dentist only when in pain.

The final section of the survey asks three Likert style questions that are meant to provide a metric for health literacy. Based on the health literacy score derived from these items, surveyed individuals were categorized as having low health literacy, intermediate health literacy or high health literacy. As the data in Figure 6.0 shows, 59% of South Asian respondents had high health literacy, 37% had intermediate health literacy and only 5% scored with low health literacy.

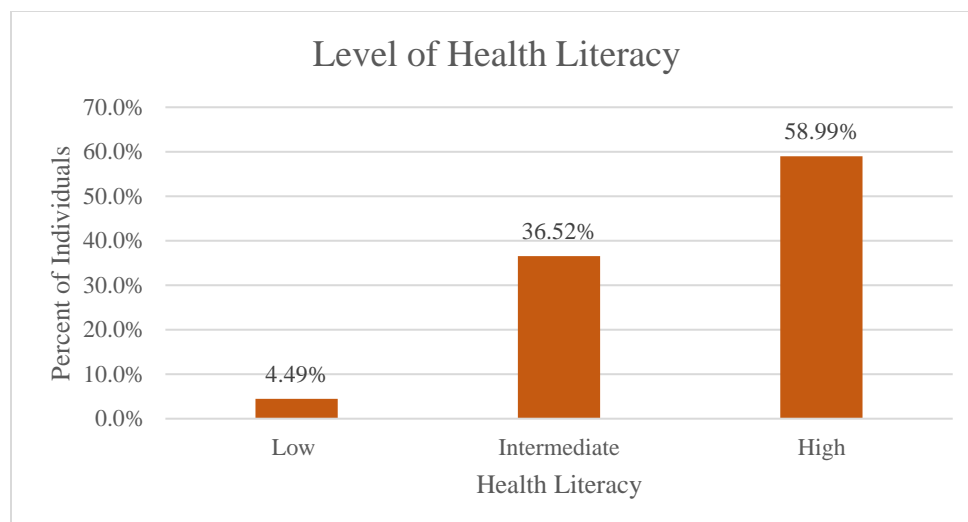


Figure 6.0. Level of health literacy.

The final analysis of the data focused on examining the relationships between gender, education, age, and health literacy level and oral health practices. In general, there were few statistical relationships between the demographic factors and oral health beliefs and behaviors. The respondent's education level was correlated with health insurance coverage and brushing frequency. There was a moderate association between education level and health insurance coverage ($X^2(4, N=178) = 13.182, p=.05$, and a Cramer's V of 0.272). There was also a strong relationship between education and brushing frequency ($X^2(20, N=178) = 72.8, p=.009$, a Cramer's V of 0.322). A moderately significant association was noted between age of the respondent and fluoride toothpaste use ($X^2(15, N=178) = 36.9, p=.001$, and a Cramer's V of 0.263). There was no statistical association found for health literacy level and oral hygiene habits, last dental visit, reason for last dental visit or oral health beliefs.

V. Discussion

The goal of this study was to provide descriptive data on oral health habits, beliefs and practices of South Asians living in the New York tri-state area. In addition, this study sought to

identify whether there are relationships between gender, age, education level and health literacy with these oral health habits, beliefs and practices in this Asian population. The data were meant to provide valuable information on a growing segment of the population that has not been extensively studied, as a call to action by the 2000 Surgeon General's Report of Oral Health recommended.

This study was comprised of a convenience sample of 178 individuals who identified themselves as South Asian. The respondents completed a self-administered survey in locations where South Asian immigrant and non-immigrant populations are known to congregate: temples, Gurudwaras, community centers and cultural events. Eighty-seven percent of the survey participants were immigrants, born outside of the United States. Most (82%) were born in India. Thus, this study mostly represents members of the Indian American population rather than all South Asians in the tri state area.

The study population were highly educated, more than one would see in a representative sample of the Asian population. The 2015 United States Census found that 21.4% of Asian Americans had advanced degrees,¹⁶ while in this study 35% of survey participants had postgraduate degrees. This discrepancy may be due to the fact that Asian Americans were once again lumped together as a seemingly homogenous group in the 2015 Census, or because the survey included students on a college campus. This contrast in findings makes it quite apparent that the populations studied is not representative of all Asians. The 35% of individuals in this study with post graduate degrees is also much higher than the national average of 12% documented by the 2015 Census.¹⁶

Likewise, the rate of health insurance coverage was 96% for the South Asians in this study, which is higher than the national average of 91.5% in 2018.¹⁷ Similarly, the rate of individuals with dental insurance surveyed is 83%, much higher than the national average in 2019 of 50.2% of individuals.¹⁸ While dental insurance coverage in New England and the Middle Atlantic region of the country is significantly higher than the national average at 55-57%, the proportions seen in the South Asian American population is still regionally much higher.¹⁸ These findings are contrary to the hypothesis for this study that South Asian populations of the New York tri-state area have poorer access to health insurance and dental insurance.

In this study, 83% of individuals reported having more than 20 teeth, while only 8% did not know how many teeth they had in their mouth. According to the 1999-2004 National Health and Nutrition Examination Survey (NHANES), it was estimated that the average number of teeth for most Americans is about 25.¹⁹ This suggests that this South Asian population's dentate state is not an outlier within the United States population.

All survey participants reported using toothpaste, although 10% reported not using fluoride toothpaste and 16% did not know whether they used fluoride toothpaste. Fluoride toothpaste use is recommended by the American Dental Association (ADA) and the CDC for the prevention of cavities.^{20,21} With approximately one in four people in this South Asian sample saying that they did not use fluoridated toothpaste or unaware of the type they used, it suggests that there is a gap in knowledge and oral health education. Assuming this sample is indicative of other South Asian populations in the tri-state area, a large portion of this demographic group may benefit from oral health education outreach regarding the benefits of fluoride use and exposure.

Sixty-three percent of individuals said they brushed their teeth twice or more times a day, the frequency recommended by the ADA and the CDC.^{20,21} Thirty-three percent reported

brushing their teeth once a day, while another 4% reported brushing their teeth even less frequently. Further, 24% of individuals said they never floss their teeth, and only 33% reported flossing their teeth once or more times a day. These statistics imply that a large proportion of the South Asian population in the tri-state area could benefit from dental public health outreach to improve dental hygiene behavior. As predicted by the hypothesis, the oral hygiene habits of South Asians have definite room for improvement.

Approximately one-fourth of the South Asians surveyed in this study reported not having been to a dentist in over a year. This is comparable to the national average recorded by the CDC for 2014-2017, which was 22.1%.¹⁸ The Middle Atlantic portion of the country, encompassing both New Jersey and New York reported about 20%, while New England reported 14.3% of individuals had not visited a dentist in over a year.¹⁸ The proportion observed in this survey is higher than the predicted regional average and the national average, suggesting that there may be additional barriers to care for this population.¹⁸ The majority of individuals studied reported their last dental visit was just for a routine check-up. Fourteen percent of individual's last dental visit was because they were in some immediate pain. This finding is contrary to the hypothesis, which predicted that most dental visits for this subset of the population would be primarily for emergency purposes.

The survey found that 30% of individuals in this study had had orthodontic treatment or braces. There is no census data or national study that has reported the proportion of the general American population that has had orthodontic treatment in the past. Therefore, this statistic serves as a new source of information to better understand orthodontic treatment in this population.

Contrary to expectation, the vast majority of South Asians in this study understood that oral health affects their overall health. The remaining 23% may represent a portion of the population with misconceptions about the importance of oral health and the direct physiologic, pathologic and psychologic link between oral health and general health.

Two-thirds of the South Asians participating in this study indicated that they went to the dentist regularly, and not motivated by dental pain. Forty-four percent of the respondents indicated that they tended to only visit the dentist when they are in pain. It has been well documented that emergency dental care is much more costly and invasive than preventive dental care. It is always in the best interest of patients to visit the dentist regardless of whether or not they are in pain. Although the majority of those surveyed understood the need for preventive dental services, there is clearly a large percentage of South Asians who would benefit from dental public health outreach.

Most individuals in this study of South Asians (59%) were categorized as having a high level of health literacy, and 36% had an intermediate level of health literacy. Only 5% could be considered to have a low health literacy level. These respondents' high health literacy scores is consistent with the relatively high education level of this sample of South Asians.

In this study population, there were few significant associations found between the demographic variables and oral health beliefs and behaviors. Education level was significantly associated with brushing frequency and health insurance coverage. There was an inverse relationship found between age and fluoride toothpaste use. Younger individuals were more likely to report use of fluoride toothpaste, as well as more likely to not know whether they use fluoride toothpaste. This points to a greater need for both older and younger generations to understand the oral health benefits of fluoride toothpaste.

Study Limitations

This study has several limitations that were taken into consideration when interpreting and drawing conclusions from the data collected. Certain limitations are inherent to studies that collect data through surveys and rely primarily on subject self-reporting. Response bias is a substantial concern for this particular study because of the nature of the questions. Questions concerning an individual's behavior often lead to an inaccurate response when subjects are self-conscious or ashamed of their responses, resulting in individuals answering what they feel is "right", and not necessarily true. Response bias is a threat to the validity of all survey research.

In addition to response bias, this study may also be subject to mono-method bias. Mono-method bias can affect the construct validity of a study because it only uses one method of measuring a certain behavior or education level. By using only one or two measures to answer the research question, the behaviors, beliefs and practices of the population may not be accurately measured.

Another concern regarding the external validity of the study is whether the population that is being surveyed is actually representative of South Asians in the New York tri-state area. Clearly, there was an overrepresentation of Indian Americans in this study, not a broader cross-section of all South Asians in this region. Almost all respondents were foreign-born and first generation South Asians are likely underrepresented in this study. The surveyed population was highly educated and a large portion were attending religious institutions that may draw a certain segment of South Asians. Thus, the findings of this study may not be generalizable to the entire population of South Asians living in Connecticut, New York and New Jersey.

Several other study limitations relate to the design of the survey and the analyses performed. The question asking participants how many natural teeth they have remaining may have been confusing for individuals. A common comment from study participants while administering the survey was “I don’t know how many teeth I have”. This question may have been answered inaccurately due to this confusion. Another instance where the instrument design could have been improved was for the question asking individuals about their brushing habits. Several individuals chose the response 2-3 times a month, which may have been misinterpreted by a quick reader as 2-3 times a day. In addition, to these limitations, the means by which the health literacy score was calculated needs improvement. As mentioned in Lee et. al., the need for a standardized and accurate way to calculate health literacy is required.¹⁰ The adopted method from the New York State Oral Health Program was too abbreviated and not comprehensive enough to provide a substantial assessment of an individual level of health literacy. This fact was evident when the relationship between health literacy and education level was tested. While the literature suggests both these metrics should be directly related, the statistical test did not yield any substantial relationship.

On the other hand, a major strength of this study was the ability to administer an oral health survey to such a large number of South Asians. There are few if any studies evaluating oral health practices, beliefs and habits in South Asian populations, especially in this region.

VI. Conclusion

There is a general need for data concerning oral health, especially of inherently vulnerable immigrant populations that are more likely to face biopsychosocial barriers to oral healthcare.¹ With South Asian immigrants being a rare target for oral health surveillance studies, this study provided a lens into a population that dental public health knows little about.⁵ While

widespread studies are necessary for all subsets of the population, it is also imperative to begin to identify the different subsets of not only the Asian American population, but the subsets of even the South Asian American population. This survey study sought to understand the oral hygiene habits, oral health beliefs and practices and the oral health literacy of South Asians living in New Jersey, Connecticut and New York.

The initial hypotheses of this study were that the oral health literacy of this population would be low, which would subsequently be reflected in poor oral hygiene habits, misconceptions about oral health and generally poor oral health practices. The assumption that oral health literacy would be low was not proven. However, with respect to oral hygiene habits, there was definite room for improvement. The findings indicated that approximately 40% of South Asians, particularly Indian Asian migrants, could benefit from a better understanding of the importance of brushing twice a day, flossing at least once a day, and the benefits of fluoride toothpaste use. There was a direct relationship between education level and brushing frequency. In addition, individuals in the study population who were younger were more likely to use fluoride toothpaste, but also more likely to not know whether they used fluoridated toothpaste. The finding that about 44% of the South Asian respondents were either neutral or agreed that they “only went to the dentist when in pain” suggests the need for more outreach and education on the importance of preventive dental care. Dental public health outreach could be in the form of education or increasing access to dental health professionals. It is imperative that this sort of research continues, especially in minority and vulnerable populations like the South Asians in this study.

References

1. *Oral Health in America: A Report of the Surgeon General (Executive Summary) | National Institute of Dental and Craniofacial Research.*
<https://www.nidcr.nih.gov/research/data-statistics/surgeon-general>. Accessed October 14, 2018.
2. *Determinants of Health | Healthy People 2020.*
<https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health>. Accessed October 15, 2018.
3. *Key Facts about the Uninsured Population | The Henry J. Kaiser Family Foundation.*
<https://www.kff.org/uninsured/fact-sheet/key-facts-about-the-uninsured-population/>. Accessed October 11, 2018.
4. NY State Oral Health Program. *Oral Health Literacy Tool Kit.*
<https://static1.squarespace.com/static/53bc58e3e4b060a82ab7359d/t/552d2c18e4b057e7ac6e3e3e/1429023768340/Oral+Health+Literacy+Toolkit.pdf>. Accessed October 12, 2018.
5. Todd L, Hoffman-Goetz L. Predicting Health Literacy Among English-as-a-Second-Language Older Chinese Immigrant Women to Canada: Comprehension of Colon Cancer Prevention Information. *J Cancer Educ.* 2011;26(2):326-332. doi:10.1007/s13187-010-0162-2.
6. *Health Coverage of Immigrants | The Henry J. Kaiser Family Foundation.*
<https://www.kff.org/disparities-policy/fact-sheet/health-coverage-of-immigrants/>. Accessed October 14, 2018.
7. Immigrants in Connecticut | American Immigration Council.
<https://www.americanimmigrationcouncil.org/research/immigrants-connecticut>. Accessed October 14, 2018.
8. Census - Table Results. (n.d.). Retrieved April 21, 2020, from
[https://data.census.gov/cedsci/table?q=foreign born new jersey&g=04000000US34&hidePreview=true&tid=ACSDP1Y2018.DP02&t=Foreign born&cid=DP02_0001E&vintage=2018](https://data.census.gov/cedsci/table?q=foreign%20born%20new%20jersey&g=04000000US34&hidePreview=true&tid=ACSDP1Y2018.DP02&t=Foreign%20born&cid=DP02_0001E&vintage=2018)
9. Lee HY, Rhee TG, Kim NK, Ahluwalia JS. Health Literacy as a Social Determinant of Health in Asian American Immigrants: Findings from a Population-Based Survey in California. *J Gen Intern Med.* 2015;30(8):1118-1124. doi:10.1007/s11606-015-3217-6.
10. Lee JY. Lower Oral Health Literacy may Lead to Poorer Oral Health Outcomes. *J Evid Based Dent Pract.* 2018;18(3):255-257. doi:10.1016/j.jebdp.2018.05.003.
11. Firmino RT, Martins CC, Faria LDS, et al. Association of oral health literacy with oral health behaviors, perception, knowledge, and dental treatment related outcomes: a

- systematic review and meta-analysis. *J Public Health Dent*. 2018;78(3):231-245.
doi:10.1111/jphd.12266.
12. MacEntee MI, Wong ST, Smith A, et al. Oral Healthcare Challenges for Older Punjabi-Speaking Immigrants. *Can J Aging / La Rev Can du Vieil*. 2014;33(02):196-207.
doi:10.1017/S0714980814000087.
 13. Health Literacy in Dentistry. <https://www.ada.org/en/public-programs/health-literacy-in-dentistry>. Accessed October 15, 2018.
 14. Asian Population Grows in CT and US, Becomes More Suburban As Challenges Persist | Connecticut By The Numbers. <http://ctbythenumbers.info/2015/04/15/asian-population-grows-in-ct-and-us-becomes-more-suburban-as-challenges-persist/>. Accessed November 19, 2018.
 15. Scutchfield and Keck's Principles of Public Health Practice - Paul C Erwin, Ross C. Brownson - Google Books.
<https://books.google.com/books?id=2XigCwAAQBAJ&pg=PA207&lpg=PA207&dq=Keck+and+schutchfield+surveillance&source=bl&ots=rzOr8Ws3G0&sig=BGU69oWX1IGM2pH-UOQIc4LzJC0&hl=en&sa=X&ved=2ahUKEwjctfSi0v3eAhUi5YMKHa8TA6kQ6AEwAHoECAAQAQ#v=onepage&q=Keck and schutc>. Accessed November 30, 2018.
 16. Ryan, C., & Bauman, K. (2016). Educational Attainment in the United States: 2015. *Current Population Reports, 20*. Retrieved from <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf>.
 17. Berchick, E., Barnett, J. C., & Upton, R. D. (2019). *Health Insurance Coverage in the United States: 2018*.
 18. Blackwell, D. L., Villarroel, M. A., & Norris, T. (2019, May). Regional Variation in Private Dental Coverage and Care Among Dentate Adults Aged 18–64 in the United States, 2014–2017. Retrieved April 18, 2020, from <https://www.cdc.gov/nchs/products/databriefs/db336.html>.
 19. National Institute of Dental Craniofacial Research: Data Statistics: Tooth Loss. (2018). Centers for Disease Control and Prevention. Retrieved from <https://www.nidcr.nih.gov/research/data-statistics/tooth-loss/adults#table1>
 20. *Fluoride and Fluoridation*. (n.d.). Retrieved from <https://www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation/fluoridation-faq>.
 21. Allukian, M., Brown, J. P., Ciardi, J., Clark, D. C., Corbin, S., Easley, M., ... Ringelberg, M. L. (2001). *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*. Retrieved from <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.html>.