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Introduction

There are three parts to a tooth: the enamel, the dentin, and the pulp. Dental Caries, commonly known as tooth decay, occur when the enamel, the major tissue in the human tooth, breaks down due to harmful bacteria that erodes it away.[1] Enamel is the visible layer of non-living tissue on the outermost layer of the tooth that protects the nerves inside the tooth.[2] The enamel is the most important part of the tooth because it serves as the first line of oral defense against harmful bacteria.[2] Unlike bone, which repairs itself if damaged, enamel never regenerates once it erodes.[1,3] Minerals on the enamel protect it from harmful bacteria by providing fluoride or toothpaste to remineralize and form a new layer of protective minerals. [4] Likewise, sugary foods and drinks promote the growth of unhealthy bacteria that attacks and removes the protective mineral layer in a process called demineralization.[4] Tooth decay occurs when the process of demineralization outpaces the process of remineralization.[5] Sugar from food and drink leaves residues known as plaque on the enamel (outside of the tooth), and this plaque serves as the nesting grounds for pestilent bacteria to cultivate and produce acid that decomposes the enamel to induce tooth decay.[7] Tooth decay leads to a cavity, which is the leading cause of tooth loss around the world.[3,7] A cavity is when bacteria erode away too much of the enamel and has infiltrated the inner, sterile part of the tooth.[4,8]

Complications from tooth decay result in serious illnesses if untreated once a cavity forms. A cavity provides a direct opening from the mouth into the sterile inner layer of the tooth

where the bacteria infect and erode the tooth from the inside unlike the enamel that protects the tooth on the outside.[3] Once in the tooth, the bacteria damage the nerves to elicit painful responses and the bacteria move further into the deepest part of the tooth to create pus and more infectious bacteria that eventually enter the bloodstream to proliferate throughout the entire body.[3,5] 25% of children ages two to five, and 23% of children ages six to nineteen have evidence of untreated dental caries, which indicates the high potential for the tooth decay to develop into a cavity and spawn serious health conditions that require intensive medical interventions.[4,5,7]

Over 95% of citizens in the United States have evidence of tooth decay because the enamel deteriorates spontaneously if proper care is not taken.[6] Numerous studies prove dental caries occurs most frequently among children.[1,3,4,5,9] Tooth decay occurs at a rate five times higher than the rate of asthma in children even though the cost to prevent caries is significantly less than the cost to prevent other common childhood chronic diseases.[6] [4,7,10] I have chosen to further examine dental caries in children ages two to seventeen because it is the most common chronic disease that can easily prevent a lifetime of agonizing oral health problems. The CDC considers any person from the age of two to nineteen as a child when discussing tooth decay and oral health diseases.[2] Caries is connected to *Healthy People 2020*'s objectives: OH-1 Reduce the proportion of children and adolescents who have dental caries experience in their primary or permanent teeth and OH-2 Reduce the proportion of children and adolescents with untreated dental decay.[11]

Early Childhood Caries (ECC) is the term that describes tooth decay for primary (baby) teeth in children.[12] ECC infects and transmits to other teeth throughout the mouth due to the acid-producing bacteria.[9,13] Tooth decay is the most common chronic disease in children aged six to eleven and adolescents aged twelve to nineteen, yet only 58% of children in the latter group

visited any dentist in 2011.[6,8] A study found that 85% adults have some form of evidence for decay on an average of 13.65 decays on the enamel of the permeant set of teeth that require dental care intervention for postponing the rate of decay, and 98% of this group of adults with evidence of decay reported having dental caries as a child.[3,14] The CDC, NIH, and *Healthy People 2020* report the Hispanic racial population harbors the highest rates of dental caries in both adults and children.[2,6, 11] Dental Caries appears in 40% of Hispanics aged six to eight compared to only 25% of White children aged six to eight have decay.[6] Given that tooth decay is easily preventable, yet so widespread, I have chosen to focus on Dental Caries among the Hispanic population youth population from ages group from two to seventeen-years old.

The primary risk factors for dental caries are easily preventable with proper care, but majority of the entire population fails to sufficiently care for their oral health.[2] The risk factors I will be studying are: dietary behavior and oral hygiene. The food and drink a person consumes serve as breeding grounds for the toxic bacteria to cultivate and release higher levels of acid that erode away the enamel.[15] A diet higher in sugar correlates to a higher prevalence of tooth decay among all populations.[11] Oral hygiene combats poor dietary behaviors by reinforcing the enamel via remineralization to compensate for the demineralization from an unhealthy diet and other factors. Simple actions of brushing, flossing, and rinsing kill, remove, and cleanse the mouth of plaque from residual build-up from foods and drinks.[12]

Health determinants are outside factors that a person cannot control, and, the most significant health determinants for Dental Caries are: education, income, dental care, and water quality. Education indicates how much oral health knowledge a person possesses to practice preventative measure for oral diseases.[15] Dental care access involves two aspects: having dental insurance and visiting the dentist. Income provides the person with the necessary means to live a

better quality of life to minimize the risks of developing dental caries as well as most other chronic illnesses. The quality of water a person consumes is the difference between someone with proper diet and hygiene having a perfect set or teeth or a flawed set of teeth due to fluoride.[16]

Health status measure offers a general health status, or "well-being," of a population in order to find if various interventions and programs have been successful or not in improving the overall health of a population. Finding the health status of the population requires various factors to monitor. For dental caries, I will be using *Healthy People* 2020's health status measure of chronic disease prevalence in the United States because tooth decay is the most common chronic disease in children.[7] This will provide me a baseline to study how various factors impact the frequency of tooth decay across the Hispanic youth population when compared to other ethnicities in the same age group.

Methods

Literature Review

Scholarly articles on dental caries on Pubmed returned several results, but finding data specifically on certain health determinants such as income and education requires extensive searching to find the specific connection between the risk factor and tooth decay. In order to gather relevant data regarding dental caries in the youth Hispanic population, I accessed the Stony Brook University Libraries database search engine to use Pubmed. On Pubmed, I searched for "Dental Caries Hispanics," "Brush teeth youth," "Hispanic oral health" for preliminary results, but to focus and narrow my search, I used "Hispanic dental caries children" to find published papers on the Hispanic youth regarding dental caries. This yielded valuable sources.

The hardest data to find was whether the Hispanic youth consumed more or less sugar than the other populations because the initial and only pertinent other study I found provided data on liquid-consumed sugars by Hispanics. I made a generic search on the Stony Brook Health Sciences database search of "Hispanic sugar food" and found a reliable paper. To find information about educational levels, I searched for "income by ethnicity or race" as well as "education by race" on the Stony Brook Libraries database search. Ultimately, my greatest resources came from a basic Google search on subtle variations of "race incomes" and "education by ethnicity" to access well-organized data tables because I only required the specific incomes for each racial group in the United States, not a research analysis.

I went to the Stony Brook University Health Science Center Library in order to access books specifically focused on various aspects of dental caries and how to prevent it, and these books provided several great facts and information to enhance my study on tooth decay in the Hispanic youth population in the United States.

Numerical Analysis

Federal Government sponsored departments such as the Centers for Disease Control and Prevention (CDC) and *Healthy People 2020* provided several tables relevant to Dental Caries. Plenty of graphs also contained valuable information that required me to extract the data and present it on a concise table. I accessed one digital database, Pubmed, to search for information pertinent to my risk factors of access to fluoride water and hygiene habits. I searched with various combinations from these key phrases to find scholarly literature on tooth decay: "Dental Caries," "Hispanic Caries" "Youth Latino Oral Health," "Tooth Decay by race," "Children Dental Caries," "Fluoride Water Access in U.S," and "Oral Hygiene Habits." For the health determinants, I utilized Google to find data about income and education by race in the United

Sates. I also visited my sources under my “References” section to check again for any valuable tables and charts that might provide useful information for this paper. I used tables that surveryed whether people had dental insurance or not as well as sealant evidence as indicators for access to dental care.

Interview

The questions for my questionnaire were strategically created in order to gain as much pertinent information I needed in order to continue my analysis on Dental Caries. Each question(s) corresponds to a risk factor or health determinant, and the type of question varies from income to hygiene practices to education. The broad variety of questions sufficiently covered all aspects of finding the data required to analyze my risk factors and health determinants on tooth decay. Because each question requires a different type of response (i.e income is a salary range, but employment is a fill-in response), I included a variety of multiple choice based questions as well as fill-in questions so that the subject being interviewed would be able to provide me the most useful information for me. I used my first version of interview questions to test out on two peers for finding the modifications required to optimize my interview questionnaire so the real subjects will not have any issue answering my questions.

The introductory paragraph of my survey provided a brief explanation of why I am here and it also included the email address to my instructor in the event that any conflict occurred. I mentioned in the beginning and middle of the questionnaire how the subject may choose to not answer any question if they ever felt uncomfortable. Furthermore, I emphasized to each subject in person that they may skip any part of the interview they wish and it will be alright since any response will be well appreciated.

Personal confidentially is very important, and so, I enabled a similar tactic to how I managed uncomfortable questions: I told the subjects at the beginning and middle of the interview that absolutely no personal information will be displayed to the public, and the only information I will use is what was provided in the questionnaire to respect each subject's privacy.

After a period of two weeks, I finalized my survey questionnaire when I felt comfortable giving to real interview subjects because I went through many drafts and received critiquing from both my instructor and two other peers. I decided to conduct my survey by selecting a popular area where I believed I could find my target population of Hispanic youth between the ages of two to seventeen. I used the Broadway Mall in Hicksville, Long Island because I know that area contains many members of the Hispanic population from previous visits to this shopping plaza over the past several years. I had my interview printed out and attached onto a clipboard in my backpack. I used a backpack to conceal my clipboard because I know most people steer away from interview-conducting personnel just like me. I identified Hispanic members who had children that appeared to fit in my targeted age range at the shopping plaza with what seemed to be their parent(s) or guardian(s).

I went to Broadway Mall in Hicksville, Long Island on April 2nd, 2016 at 11:00am to conduct my survey to find three members. Instantly, I found two children who seemed to fit my age range, and so, I approached the, assumed, parent/guardian with the child and offered to purchase their child a small goodie bag from Candy Heaven, a sweet shop, in Broadway Mall if they just spend five minutes to complete my survey. Surprisingly, two of the parents told me that was a very courteous offer, but kindly declined, and accepted to take my survey after I explained how I am analyzing trends in tooth decay among the Hispanic Populations. Knowing Spanish up

to a conversational and medical level greatly contributed to receiving a positive reception from the three members I found within just two hours. As the parent answered the questionnaire, I interacted with the child or children to ask about school and just maintained a friendly conversation with them in order to keep them occupied so the parent could dedicate more time for my survey.

I reached out to two Hispanic students I know at Stony Brook University, and asked them if they had any younger siblings. One of them did, and so, he completed the survey on behalf of his parent and his younger brother. The other friend introduced me to another Hispanic student on campus with two younger siblings, and that student filled out the survey in a similar manner as the first Hispanic student.

RESULTS

General Information

Literature Review

General information on dental caries can be found in the introduction.

Numerical Analysis

Table 1: Rates

Untreated Dental Caries Prevalence in Children in the United States by Race in 2010

Age 3 to 5			**Age 6 to 9**			**Age 13 to 15**	
Race	Percent of Population		Race	Percent of Population		Race	Percent of Population
White	11.3		White	13.9		White	9.4
Black	19.3		Black	18.6		Black	24.6
Hispanic	19.8		Hispanic	25.8		Hispanic	11.7

References:

1. Oral health disparities as determined by selected Healthy People 2020 oral health objectives for the United States, 2009-2010. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/nchs/data/databriefs/db104.pdf Published August 2012. Accessed April 7, 2016.

Table 1 shows the percentages of children from the ages of 3 to 15 with untreated dental caries among each race in 2010. From the ages of 3 to 5, 11.3% of white population had untreated tooth decay while 19.3% of blacks had untreated tooth decay, and 19.8% of Hispanics had untreated tooth decay. From the ages of 6 to 9, 13.9% of white population had untreated tooth decay while 18.6% of blacks had untreated tooth decay, and 25.8% of Hispanics had untreated tooth decay. From the ages of 3 to 5, 9.4% of white population had untreated tooth decay while 24.6% of blacks had untreated tooth decay, and 11.7% of Hispanics had untreated tooth decay.

Interview

3. Has your child ever had any cavities?

P1: 1

P2: 3

P3: 6

P4: 2

P5: 3

Participant 1 reported having the least amount of cavities, and participants 2 and 5 reported having 3 cavities. Participant 3 responded to having 6 cavities, and participant 4 had 2 cavities.

Risk Factors

Dietary Behavior

Literature Review

Dietary behavior is a major risk factor in developing Dental Caries. Tooth decay in young children is on the rise since the children are beginning to consume more sugar and processed foods at an earlier age and in larger amounts.[16] Unhealthy dietary behaviors revolve around sugar intake for children. The average four to eight-year old consumes 84 grams of sugar a day while the average nine to nineteen year old consumes around 55 grams of sugars a day in the United States.[16] The American Heart Association conducted a study that tested for the physiologic sugar limit, which is the amount of sugar the body can handle and process healthily, to be 32 grams of sugar consumed per day for children.[8,9] Another study found Hispanic youth to consume the highest amount of processed sugars consumed via fluids than any other racial group and age group.[17]

Dietary behaviors are a significant risk factor because the residual sugars in the mouth promote the bacteria growth to erode away the enamel to cause dental caries.[15] Diets higher in sugar denotes more residual sugar leftover in the mouth post consumption of food or drink, and the harmful bacteria utilize these residual sugars as the best energy source for toxic bacteria to cultivate and damage the enamel.[15,17] More sugar correlates to more bacteria, which results in more acid production to deteriorate the enamel at a faster and deadlier rate.[10] The Hispanic population consumes the most sugar-sweetened beverage, which tend to be very cheap and of

low quality, and this is primarily due to the fact that this ethnic group statistically places among the lowest household income ethnicities in the United States so this population can only afford to purchase what it is able to within its lower income range. [8]

An extensive study on dietary behavior found that children who consume more processed foods have a 27% chance of developing dental caries because processed food not only contains artificial sugar, but also harmful chemicals for the enamel.[14,18] Processed food is defined as an item that has extensively been treated with various chemicals through several processing stages, and the product is the food found packaged within cans or boxes.[18] Processed food plays an important factor in the Hispanic youth population for developing dental caries because this particular group consumes the most sugar-rich diets, and this population has been found to consume a diet with the highest average calorie intake.[18] Processed foods contain significantly elevated levels of calories, and thus, it can be implied that Hispanic youths consume the most processed foods due to the higher level of calorie intake.

Numerical Analysis

Table 2: Risk Factor: Dietary Behavior

Comparison between the White and Hispanic youth populations ages 4 to 18 in Prediabetes prevalence in the US from 2011 to 2012.

Prediabetes prevalence between the Hispanic and White youth (%)	
White	43.1
Hispanic	55.6

Reference:

1. Disparities details by race for 2011-12. *Healthy People 2020* Web site. https://www.healthypeople.gov/2020/data/disparities/detail/Chart/4116/3/2012 Updated April 14, 2016. Accessed April 15, 2016.

This table shows the prediabetes prevalence rate for the White and Hispanic populations in 2011-2012 in the US for a population ages 4 to 18 years old. 43.1% white youth population was found to have prediabetes. 55.6% of the Hispanic youth population was found to have prediabetes.

Interview

7. Dietary Behavior: How often do you have sugar-heavy drinks and foods each week? (Anything with over 20g of sugar→ examples: soda, candy bars, sweet tea, desserts.).

    P1: 3

    P2: 5

    P3: 7 or more

    P4: 4

    P5: 5

Participant 3 consumes the most sugars each week with 7 or more servings of food or drink while participant 1 was consuming no more than three sugar-heavy food or drink a week. Participants 2 and 5 listed not consuming more than 5 sugar-heavy food or drink each week and participant 4 consumes 4 sugar-heavy food or drink.

9. Please list out the sugary and sweet drinks and foods that you have at least once a week:

    P1: One soda can limit, small treat after dinner like jellybeans or skittles, fruit snack gummies in school, chocolate milk every other day.

P2: 2 Chocolate chip cookies every day from school lunch and Gatorade with lunch, oreos at home sometimes.

P3: Gummy snacks two times a day, 2 goya juice after school, lucky charms or cocoa puffs in morning.

P4: Gatorade once or twice a week after exercising. Starbucks frappucino two times.

P5: Oatmeal cream pie with everyday lunch, gummy snacks most days. Chocolate milk.

Participant 1 maintains the healthiest diet while participant 3 has the highest sugar intake diet. Participant 2 has a relatively high sugar intake slightly lower than that of participant 3. Participants 4 and 5 also have similar sugar intakes.

Oral Hygiene

Literature Review

Oral hygiene is just as important a risk factor in Dental Caries as dietary behaviors. Dental hygiene is a broad term that refers to the upkeep and maintenance of oral hygiene by consistently brushing, flossing and rinsing the mouth.[2] The CDC notes that fluoride varnish, which is a higher concentration of fluoride that dentists paint onto teeth, prevents around one-third of all tooth decay in baby teeth.[11] This is particularly important for the Hispanic youth because this is the highest risk population in the world for developing dental caries, and primary teeth are the most vulnerable to enduring decay.[3] An elaborate study conducted in Eastern Saudi Arabia analyzed schoolchildren for evidence of dental caries and asked them if they brushed

their teeth, and how often they brushed, and the children who indicated to brushing their teeth at least once a day had diagnosis rates of dental caries 31% lower than those who did not brush their teeth on a daily basis.[15] This study proves the importance of brushing teeth because this simple practice has shown to decrease the chance of developing dental caries by 31%. The American Dental Association recommends people to brush their teeth at least two times a day, floss once a day, and rinse once a day.[17] Most children fail to follow a consistent schedule in brushing, flossing, and rinsing; oftentimes, children always skip at least one of the three hygiene practices in their oral care routine.[15] In a survey conducted at an elementary school in New York, the Hispanic students had the least percent of students who responded to brushing at least twice a day and flossing at least once a day.[17] With the Hispanic youth being the most at risk population to developing tooth decay, practicing basic oral hygiene habits can decrease the prevalence rates among this ethnic group.

Numerical Analysis

Table 3: Risk Factor: Oral Hygiene

Youth members ages 6 to 16 from common ethnicities in the US that brush their teeth at least twice a day in 2012.

Percent of each population that brush teeth at least twice a day	
Black	42
White	53
Hispanic	36

Reference:

1. Oral health. CDC Web site. http://www.cdc.gov/OralHealth/children_adults/child.htm. Published November 10, 2014. Accessed April 14, 2015.

Table 3 shows the percentage of each ethnic group ages 6 to 16 that reported brushing their teeth at least twice a day in 2012. 42% of the black population reported brushing their teeth at least twice a day. 53% of the white population reported to at least brushing their teeth twice a day, and 36% of the Hispanic population reported brushing their teeth at least twice a day.

Interview

4. Hygiene: How often do you brush your teeth each day?

P1: 3

P2: 2

P3: 1

P4: 3

P5: 1

Participants 1 and four brush three times a day on average while participants 3 and 5 only brush an average of once a day. Participant 2 brushes twice a day.

5. How often do you floss each week?

P1: 4

P2: 2

P3: 1

P4: 3

P5: 1 every two weeks

Participant 1 flosses the most one average each week while participant 2 flosses twice a week. Participant 3 flosses once a week while participant 4 flosses three times a week and participant 5 flosses only once every two weeks on average.

6. Do you eat or drink anything after you brush your teeth at night before sleeping? (Circle Yes, No, or Sometimes)

    P1: No

    P2: No

    P3: Yes

    P4: No

    P5: Sometimes

Participants 1, 2, and 4 do not consume any food or drinks after they brush at night while participant 3 does eat or drink after brushing and before sleeping. Participant 5 answered, "Sometimes," indicating that this subject may or not consume food or drink after brushing and before sleeping.

9. Please describe if you rinse or brush after you have these sugar-heavy food or drink?

    P1: Brush and rinse after any soda or candy

    P2: Rinses mouth with water after sugary foods or drinks

    P3: None

    P4: Mouth wash only

    P5: None

Participant 1 has to brush and rinse after consuming high amounts of sugar while participants 3 and 5 do nothing after consuming lots of sugar. Participants 2 and 4 engage in some form of rinsing, but 2 uses water while 4 uses mouthwash.

Health Determinants

Education

Literature Review

Education plays a major role in Dental Caries because the major problem found among the Hispanic youth is the lack of knowledge on how to properly maintain oral health.[3] The higher the educational level achieved by the parental figure, the lower the rate of dental caries.[3] Education remains an issue among the Hispanic population because less than 23% of Hispanics have achieved an Associate's Degree while 47% of the white population has achieved an Associate's degree.[18] The disparity in highest educational level reach correlates to the dental caries prevalence rates by each racial group in the US, and the problem for the Hispanic youth is that the the parental generation has a much lower educational level compared to all other races, and thus, there is less focus and care for oral health because the parents do not possess the academic background to ensure proper oral health care.[18] Some type of community program sponsored by professionals in oral hygiene need to focus on educating the Hispanic populations in order to provide them an opportunity to comprehend the importance of proper oral health measures in order to prevent further Dental Caries damage and cases in the future. [6, 10]

Numerical Analysis

Table 4: Health Determinant: Education

A. The highest level of education achieved by ethnic groups in the United States from a population aged 25 and older in 2015.

	Highest Level of Education Achieved by Percent of Population of Each Race				
Race	High School	Some College (no degree)	Associate's Degree	Bachelor's Degree	Advanced Degree
White	93.3	63.8	46.9	36.2	13.5
Black	87.0	52.9	32.4	22.5	8.2
Asian	89.1	70.0	60.4	53.9	21.4
Hispanic	66.7	36.8	22.7	15.5	4.7

*Each percent refers to the amount relative to the entire population of a specific race, i.e, 4.7% of total Hispanics have an Advanced Degree

Reference:

1. Educational attainment in the United States: 2015. US Census Web site. http://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf Published March 2016. Accessed April 8, 2016.

Table 3 shows the highest level of education achieved by members of each racial population aged 25 and over in the United States in 2015. 93.3% of the white population has graduated high school; 46.9% has an Associate's degree; 36.2% has a Bachelor's degree. 87% of the black population has graduated high school; 32.4% has an Associate's degree; 22.5% has a Bachelor's degree. 89.1% of the Asian population has graduated high school; 60.4% has an Associate's degree; 53.9% has a Bachelor's degree. 66.7% of the white population has graduated high school; 22.7% has an Associate's degree; 15.5% has a Bachelor's degree.

B. Percent of people who reported visiting the dentist by education in the past 12 months from 2013.

Highest Level of Education	Percent that reported visiting the dentist
Less than high school	17.5
High school completed	29.8
At least some college	50.4

Reference:

1. Oral health. *Healthy People 2020* Web site. https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Oral-Health/data Updated April 14, 2016. Accessed April 15, 2016.

This table shows the percent of adults who recorded to attending a dental office categorized by highest education level reached over the 12 month period in 2013. 17.5% of people who never completed high school responded to visiting the dentist in the previous 12 month period when surveyed in 2013. 29.8% of people who completed high school responded to visiting the dentist in the previous 12 month period when surveyed in 2013. 50.4% of people who attended any form of college responded to visiting the dentist in the previous 12 month period when surveyed in 2013.

Interview

10. Education: What is the highest level of education you have completed?

P1: Parent 1: Master.

Parent 2: Bachelor.

P2: Parent 1: Bachelor.

Parent 2: Associate.

P3: Parent 1: None

Parent 2: GED

P4: Parent 1: Master

Parent 2: Bachelor

P5: Parent 1: Bachelor

Parent 2: Diploma

Most parents or guardians have some higher level education completed. Participant 1 has a caregiver with a Master and Bachelor degree. Participant 2 and 4 also have caregivers with at least some type of college degree. Participant 3 has caregivers with no higher education beyond one GED. Participant 5 has one caregiver with a bachelor and another with a high school diploma.

Income

Literature Review

Children living in poverty suffer twice the incidence of decay than their more affluent peers. [2, 8] This issue corresponds with dietary behaviors since the lower income children are more prone to consuming food of a lower quality than those from higher income households due to the fact that higher quality foods tend to be healthier, and thus, will cost much more than cheaper, and unhealthier foods.[19] A study concisely explains that healthy foods are fresh produce while unhealthy foods are processed-based, and the average cost for a meal for fresh foods is approximately 37% higher than the average cost for unhealthy foods.[20]

The Hispanic population is found to have the lowest average income earned per household in the US.[21] This issue is very significant in children because the most vulnerable population are children living in low income households that rely heavily on unhealthy food as primary sources.[1] The insufficient money allocated towards healthy foods is placing children between the ages of six to eleven at the highest risk towards developing dental caries.[2] In a survey where over 64% of those under poverty had some form of tooth caries, 83% of those surveyed reported that they did not have access to any form of dental care by a professional.[4] In 2004, 31.5% of six to nineteen-year olds living under poverty had untreated cavities, which is a more severe form of tooth decay that can directly lead to serious health problems. [8] Tooth decay has the highest rates in children from the ages of two to seventeen in those who are of Hispanic ethnicities.[2]

Numerical Analysis

Table 5: Health Determinants: Income

Mean annual income among each race in the United States in 2011.

Race	Average Income
Asian	$45,032
White	$40,300
African American	$31,890
Hispanic	$28,548
Total Average	$39,312

Reference:

1. Dr. Mike Aamodt. Department of Psychology Radford University. Web Site. http://maamodt.asp.radford.edu/HR%20Statistics/Salary%20by%20Sex%20and%20Race.htm. Published July 2012. Accessed March 23, 2016.

Table 2 shows the average annual income for each race in the United States in 2011. The Asian population made an average of $45,032; the whites $40,300; the African Americans $31,890; and the Hispanics $28,548 in 2011.

Interview

11. What is your current job of you and your partner? Please fill in

P1: Parent 1: Business Administration
Parent 2: Stay at home

P2: Parent 1: Small Grocery Store Owner
Parent 2: Bank Teller

P3: Parent 1: Landscaping
Parent 2: Clerk

P4: Parent 1: Teacher
Parent 2: Computer Scientist

P5: Parent 1: Architecture
Parent 2: Cleaner

We can see there is a very diverse set of jobs among the participants surveyed.

12. What is your household income?

P1: $100,000 to $125,000

P2: $60,000 to $69,999

P3: $30,000 to $34,999

P4: $90,000 to $99,999

P5: $40,000 to $49,999

Referring to the highest level of education achieved from question 10, we can observe the correlating salary per household. Participant 1 had the highest household income, followed by

participant 4, and then participant 2 had the median income among the sample population. Participant 3 reported having the lowest household income.

Dental Care

Literature Review

Lack of access to dental services due to insurance is the most important factor in the upkeep of oral hygiene in order to treat any potential tooth decay.[3] Not having access to dental care removes the opportunities for people to prevent and stop the growth and development of Dental Caries. Many of the Hispanics who have no access to dental care live in urban areas and are living in poverty, and thus, do not have the financial means to make a trip to the dental office.[5] 9.5% of Hispanics under the age of nineteen had no dental insurance while only 4.9% of the white population in the same age range had no dental insurance.[22] The Hispanic youth is twice as likely to be uninsured than the white youth, which explains how the Hispanic youth has a higher diagnosis rate of dental caries than the white youth population.

Having dental insurance, but not visiting the dentist is another major factor in developing tooth decay. The Hispanic population with dental insurance that visited the dentist in 2013 was 31.1% while 48.4% of the white population with dental insurance responded to visiting the dentist in 2013.[23]

Numerical Analysis

Table 6: Health Determinant: Access to Dental Insurance

A. Percent of population ages 2-64 that visited the dentist categorized by type of dental insurance in 2013.

Percent that visited the dentist in 2013			
Type of insurance	Private	Public	Uninsured
	50.6	31.4	19.2

Reference:

1. Filling the gaps: dental care. Kaiser Family Foundation Web site. http://kff.org/disparities-policy/event/filling-the-gaps-dental-care-coverage-and-access-2/ Published June 19, 2012. Accessed April 13, 2016.
2. 2014 National health survey. CDC Web site. http://www.cdc.gov/nchs/data/nhis/earlyrelease/earlyrelease201506.pdf Published June 2015. Accessed April 13, 2016.
3. Oral health. *Healthy People 2020* Web site. https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Oral-Health/data Updated April 14, 2016. Accessed April 15, 2016.

Table 4a shows the percentage of each population by type of dental insurance that visited the dentist over the previous 12 month period prior to 2013. 50.6% of the population with private dental insurance responded to visiting the dentist in the 12 months prior to this survey. 31.4% of the population with public dental insurance responded to visiting the dentist in the 12 months prior to this survey. 19.2% of the population with no dental insurance responded to visiting the dentist in the 12 months prior to this survey.

B. The percent of children under the age of 19 by race without health insurance in the US in 2014.

Race	Percent without Dental Insurance (%)
White	4.9
Black	5.1
Asian	6.2
Hispanic	9.5

Reference:

1. Income, poverty, health insurance. US Census Bureau Web site. http://www.census.gov/hhes/www/hlthins/data/incpovhlth/2014/figure6.pdf Published 2015. Accessed April 14, 2016.

Table 4b shows the percentage of each population of people under the age of 19 by race that does not have any form of dental insurance in the US from 2014. 4.9% of the white population did not have dental insurance in 2014. 5.1% of the black did not have dental insurance in 2014. 6.2% of the Asian population did not have dental insurance in 2014. 9.5% of the Hispanic population did not have dental insurance in 2014.

C. Amount of population per race that visited the dental office over a 12 month period in 2013.

Percent who visited a dentist over a 12 month period in 2013	
White	48.4
Hispanic	31.1
Black	32.2
Asian	37.8

Reference:

1. Oral health. *Healthy People 2020* Web site. https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Oral-Health/data Updated April 14, 2016. Accessed April 15, 2016.

Table C shows the percentage of each ethnic group that responded to visiting the dentist in 2013. 48.4% of the white population reported visiting the dentist in 2013. 31.1% of the Hispanic population reported visiting the dentist in 2013. 32.2% % of the black population reported visiting the dentist in 2013. 37.8% % of the Asian population reported visiting the dentist in 2013.

Interview

1. Does your job offer dental insurance?

    P1: Yes

    P2: No

    P3: No

    P4: Yes

    P5: Yes

The households for participants 2 and 3 have occupations with no dental insurance plans offered while the others do.

2. Do you have dental insurance?

    P1: Yes

    P2: Yes

P3: No

P4: Yes

P5: Yes

Regardless of employment dental insurance, participants 3 still has some form of dental insurance that they cover themselves while participant 3 does not have any.

3. Are you happy with your dental care?

P1: Yes

P2: Yes

P3: N/A

P4: Yes

P5: No

All participant homes were satisfied with their current dental insurance coverage expect participant 5, and participant was inapplicable since they did not report having dental insurance.

4. How often do you visit the dentist and for what?

P1: Two times a year for cleanings and whenever any oral emergency.

P2: Once a year cleaning.

P3: Once a year cleaning per child and only sealants.

P4: Twice a year cleaning and sealants/fillings if necessary.

P5: Once a year cleaning and out of pocket sealant/fillings.

Participant 1 has the best access to dental insurance while participant 3 has the least access to dental care. Participants 4 and 5 go to the dentist for twice a year or once a year

cleanings. Participant 3 has the worst access to dental care only going for cleanings and sealants, not fillings.

Quality of Water

Literature Review

The source of water plays a major role in preventing tooth decay because of the levels of fluoride found in water. The CDC labeled community water fluoridation as one of the 10 greatest public health achievements of the 20th century.[2] Fluoride has been found to be the most cost-effective dental caries measure and the most effective method because 276 million Americans (76.6% of the population) uses community water as their primary source of hydration.[24] The enamel absorbs more fluoride when foods and acids demineralize the tissue, and the fluoride acts as an adhesive platform for attracting more minerals such as calcium to bind to the damaged area, which expedites the remineralization process to increase the strength of the outer enamel layer to protect the tooth.[24] A broadcast featuring a mother and her two kids by the NBC news network shared the story of a mother who monitored her children's oral health each day by ensuring sufficient brushing and flossing, but when they visit the dentist, the children always had a new location of decay each year for two years.[25] Eventually, the dentist inquired about the source of water the children consume and the mother indicated that she only provides them with water bottles because she believed her public tap water to be unhealthy; ironically, the bottled water was much unhealthier because the public tap water had levels of fluoride that prevents acids from demineralizing the enamel and simultaneously attracting more minerals for a strengthened enamel.[26]

Numerical Analysis

Table 7: Health Determinant: Water Quality

A. Disease rate per 100,000 people due to tap water among Hispanic and non-Hispanic populations in the US in 2001.

Incidence of Waterborne Diseases (cases per 100,000 people)			
	Hepatitis A	Shigellosis*	Salmonellosis**
Non-Hispanic	1.87	2.44	5.92
Hispanic	5.14	6.99	7.68

*A bacterial infection that causes severe diarrhea.
**Also known as Salmonella

References:

1. Environmental health threats in the Latino community. NRDC Web site. https://www.nrdc.org/sites/default/files/latino_en.pdf Published October 2004. Accessed April 10, 2016.
2. Salmonellosis. NIAID Web site. http://www.niaid.nih.gov/topics/salmonellosis/Pages/default.aspx Updated September 9, 2015. Accessed April 13, 2016.
3. Shigellosis. NIAID Web site. http://www.niaid.nih.gov/topics/shigellosis/pages/shigellosis.aspx Updated September 15, 2015. Accessed April 13, 2016

This tables shows a comparison of the number of recorded cases per 100,000 people for common infections found in the drinking water for Hispanics and non-Hispanics in the US in 2001. The non-Hispanic population had 1.87 cases of Hepatitis A per 100,000 people while the Hispanic population had 5.14 cases per 100,000 people in 2001. The non-Hispanic population had 2.44 cases of Shigellosis per 100,000 people while the Hispanic population had 6.99 cases per 100,000 people in 2001. The non-Hispanic population had 5.92 cases of

Salmonellosis per 100,000 people while the Hispanic population had 7.68 cases per 100,000 people in 2001.

B. Source of water by race in the US in 2009.

Percent of population that uses bottled water as primary source of drinking water	
White	6
Black	10
Hispanic	19

Reference:

1. Black and Hispanics drink more bottled water. Quartz Web site. http://qz.com/436372/blacks-and-hispanics-drink-more-bottled-water-economists-now-know-why/. Published June 29, 2015. Accessed April 14, 2015.

This table shows the percentage of each population in the US that relies on bottled water as their primary source of drinking water in 2009. 6% of the white population reported using bottled water as the primary drinking source. 11% of the black population reported using bottled water as the primary drinking source. 19% of the Hispanic population reported using bottled water as the primary drinking source.

Interview: N/A

Health Status Measure

Literature Review

The increase in life expectancy mentioned in dietary behaviors demonstrates how society has neglected oral health over the past twenty years because the expectancy has increased over 5 years for each gender in the past twenty years, but dental caries rates have slightly increased in prevalence among all children in the United States during the similar time period.[27] The chronic disease prevalence illustrates how dental caries is the most common chronic disease, even above heart disease.[28] Due to the fact that dental caries has little to no evidence that it reduces life expectancy in any significance remotely as much as chronic heart disease or obesity, medical professionals tend to not focus much on tooth decay despite that a study has found oral health to play a major factor in quality of life for a large population sampled in a metropolitan city.[29]

A study published by University of California, Berkley found that the average life expectancy for people born from 1980 to 1991 increased from 70.0 years to 71.7 years for men, and 77.4 to 78.8 years for women.[30] The life expectancy from the 2010 United States Census found that males reach an average of 76.2 years and females reach 81.0 years.[31] With such a drastic increase in life expectancy for people in the United States, one would expect for dental caries rates to also decrease; however, from 1994 to 2004, the tooth decay in children aged two to five increased from 24.23% to 27.9%, and from 49.9% to 51.17% in the six to eleven age range.

Numerical Analysis

Table 8: Health Status Measure: Chronic Disease Prevalence

Dental caries experience by racial youth populations in 2012.

Race	Percent with dental caries
Hispanic	45.7
Black	43.6
White	30.5

Reference:

1. Dental caries in children. CDC Web site. http://www.cdc.gov/nchs/data/databriefs/db191.pdf. Published 2012. Accessed April 15, 2016.

Table 8 shows the chronic disease prevalence among each of the major ethnic groups in the US. The Hispanic population is found to have a 45.7% chronic disease prevalence. The black population is found to have a 43.6% chronic disease prevalence. The white population is found to have a 30.5% chronic disease prevalence.

Interview

3. Do you know if you have tooth decay?

All answered yes.

Every participant responded to knowing each subject has some form of tooth decay.

DISCUSSION

Within Data Analysis

General Information

Literature Review

Several studies indicate that dental caries rates among the Hispanic ethnicity has been consistently higher since the 1970s, and the Hispanic population has the highest prevalence rates for tooth decay in children ages 2 to 17.[1,2] Because dental caries is a chronic disease, preventing infections in children will effectively prevent and reduce the risk for developing them in older generations if proper interventions are taken early in generation's lifetime.[2,6]

Numerical Analysis

Table 1 indicates the white population consistently maintained the lowest incidence rates of dental caries throughout all age groups. The Hispanic population from the 3 to 5 age group had a prevalence rate similar to that of the black population, but in the 6 to 9 age group, the Hispanics had a 35% higher prevalence rate than the black population. The Hispanic group has a usually low rate for the 13 to 15 group at just 11.7% while the black group over twice as high in this same age range. This table demonstrates that the dental caries affects the Hispanic population more than any other populations among children in the US.

Interview

No interview questions were asked.

Risk Factors

Dietary Behavior

Literature Review

Multiple studies conclude a diet high in sugar boosts the rate of demineralization to be greater than the rate of remineralization, which results in tooth decay.[2,4,7] The Hispanic youth population poses the highest risk for developing dental caries because literature has found the this population to possess diets with the highest sugar intake both in foods and drinks consistently throughout all age ranges below 55 in the US.[11] Several organizations developed guidelines to assist in closely monitoring sugar in the diet for the general population because excess sugar intake directly results in numerous diseases such as tooth decay and diabetes.[8]

Numerical Analysis

Table 2 shows how the Hispanic youth population has a 14% higher prediabetes rate than the white youth population in the US in 2011-2012. The prediabetes indicator serves as an indicator for dietary behavior because prediabetes is a result of primarily consuming excessive unhealthy sugars from foods and drinks. The cause of diabetes in the youth is frequently due to poor dietary behaviors, which also contributes to dental caries. Researchers understand that prediabetes can also be influenced by various factors such as genetics; however, the Hispanic population reported having a significantly higher rate of prediabetes that supports how they also have the highest diabetes rates in children aged 5 to 9.[6] The most likely explanation to Hispanic prediabetes rate is due to the daily average sugar intake, which is much higher in Hispanics than in whites.[6]

Oral Hygiene

Literature Review

Several studies focused on the importance of regularly brushing, flossing, and rinsing the mouth in order to decrease the risk of dental caries because the bacteria from food and drinks harms the enamel, which serves as the protective layer for the tooth.[1,3,4] Only demineralization causes tooth decay, which can be easily prevented if any population closely regulates their dietary behavior, and if the Hispanic youth population gains access to better resources both in education and financially, significant improvements will take place to decrease the rate of dental caries among this targeted population. A study conducted in Saudi Arabia focusing on elementary aged children proved that children who brush their teeth were found to have 37% less frequent rates of dental caries while children who reported not brushing their teeth also reported to having an average of 121% more dental caries than those who did brush.[7]

Numerical Analysis

Table 3 shows how Hispanic youth fail to brush teeth properly and fail to practice adequate oral health hygiene in order to prevent dental caries. The Hispanic youth reported brushing teeth 17% less frequently than the white population. The failure to practice basic oral care offers reason to how the Hispanic population will be more likely to have higher dental caries rate than any other race because the current trend illustrates how Hispanics have the highest prevalence of caries among all populations in the US.[2]

Health Determinants

Education

Literature Review

Numerical Analysis

Table 4A shows how the Hispanic population has the lowest level of education throughout every type of educational level surveyed. The difference between the basic high school graduate rate in the white and Hispanic population is over 26%. This means out of 100 people white and Hispanic people, 26 more white members of a population will graduate than of the Hispanic population. Furthermore, there are 233% more white members who have received a Bachelor's degree than Hispanic members. The educational inequality correlates to higher caries rates among the Hispanic members and lower caries rates for the white members of a population. It is reasonable to imply that the lower the education, the higher the dental caries rates.

Table 4B shows how the populations visit the dentist based off the questioned members' educational levels. Those who reported no high school diploma were nearly three times as less likely to visit a dentist than those who reported to attending at least some form of college whether it be a full four-year institution or community college. It is clearer to observe how education levels correlate to the care for oral health.

Income

Literature Review

Numerical Analysis

Table 5 shows that Asian population has the highest average income per person in 2011, followed by the white population. Predictably, the African American ethnicity and Hispanic ethnicity maintained the lowest incomes for 2011 by race. Even with the average income among all four races, the Hispanic population average income is still approximately 39% lower than the combined average. This shows the income disparity among each race in the US plays a major factor in influencing lifestyles for each racial group due to the available money each one makes annually. For dental caries, we can infer that the income designated towards oral care is larger for the higher earning populations (Asian and White) and it is smaller for the lower earning populations (African American and Hispanic).

Access to Dental Caries

Literature Review

Numerical Analysis

Table 6A shows how significant insurance plays a role in visiting the dentist. Over half the members surveyed with dental insurance via private companies reported visiting the dentist in 2013 while less than a quarter of those without any insurance visited the dentist.

Table 6B shows how the Hispanic youth population under the age of nineteen has the highest rate of having no dental insurance at all. The white population is nearly half of that of the Hispanic population. The access to dental care insurance among each race highlights the major disparity that most likely impacts whether a member of a certain race is able to visit the dentist or not.

Table 6C shows how the white population recorded the highest dental visit rate while the Hispanic population recorded having the lowest dental visit rate by over 17% than the white group. Race plays a major role in both access to dental care as well as visiting the dentist if available. The trend is relatively predictable for dental care in that the white population has consistently reported the highest rates in visiting the dentist and having the least uninsured youth members while the Hispanics have always been found to have the lowest dental visit attendance and highest uninsured youth rate.

Water Quality

Literature Review

Numerical Analysis

Table 7A shows how the Hispanic population has a much higher infection rate from the three common waterborne diseases than all the non-Hispanic members in the US. This health determinant is a major factor in dental caries since the higher quality sources of water have been found to contain the ideal amount of fluoride and least amount of bacteria and viruses. The Hispanic population has rates about 250% higher infection rates for Hepatitis A and Shigellosis than every single other race in the US, and about 30% more for Salmonellosis. These rates for the common water illnesses highlight how much worse the quality of water is for the Hispanic population than all the other races.

Table 7B shows how over three times as many Hispanics consume bottled water than the White population. The correlation of bottled water to dental caries is very well known because bottled water contains no fluoride, which helps strengthen the enamel to prevent dental

caries. This is one explanation for why the Hispanics have such a higher prevalence rate than all other populations.

Health Status Measure

Literature Review

Numerical Analysis

Table 8 shows the health status measure of chronic disease prevalence pertains to dental caries as it is the most common chronic illness among children ages 2 to 19. Again, the Hispanic population recorded having the highest dental caries experience rate among all other populations in the study, supporting how the Hispanic youth has the highest incidence rates of dental caries among all the racial groups.

Across Data Analysis

All the data from the tables display how the Hispanic youth population has both the highest risks and current incidence rate for dental caries among all other ethnic groups in the US. Table. The Hispanic youth population is found to have lower access to dental insurance as seen in table 6B, which can correspond to the average income by race in table 2. The jobs that pay less tend to be the jobs that require less skill and more hard labor that can be done without any forming training or education. This means that the lower income jobs do not provide sufficient means for the Hispanic population to afford dental insurance.

Table 7B indicates how the Hispanic population rate is the highest for percent that consumes bottled water as the primary source for drinking water, and as seen in table 4A, the

Hispanic population has the lowest reported levels of education over all the other races. The correlation between these two determinants are that the lack of higher education in the Hispanic population causes such members to believe that tap-water is an unhealthy source of water compared to bottled water since it is sealed and sold by major companies. However, this misconception is completely false because the companies do not include any fluoride in bottled water whereas the government adds adequate levels of fluoride in the tap water for the citizens to protect their teeth to avoid dental caries.

Looking at Table 4A again, we can see how the lower level of education is a major source for higher levels of dental caries because the Hispanic population had the lowest attendance in visiting any dentist over a 12 month period. The link is the lack of education results in lower knowledge about the importance of oral health; subsequently, the members with less education will care less about oral health and disregard visits to the dentist due to the high cost and low income for Hispanics as seen in table 2.

Furthermore, table 3 shows us how the Hispanic youth populations reports the lowest amount of brushing teeth at least twice a day, which can be linked to table 6B, which is the Hispanics have the highest amount of children without dental insurance. If the youth population has no dental insurance, then, it can be predicted that this population also has poor oral hygiene habits as less income from table 2 is available for the child to invest in tooth brushes as well as attention to oral health. Lower income links to lower access to dental care due to lack of insurance and lack of practice for proper oral hygiene.

The responses generated in this survey support the trends studied in the health determinants and risk factors. Several studies indicate better oral health care among populations with higher incomes, and the subjects in this questionnaire elicited responses that reinforce this

trend.[2,5,10] Participant 1 reported having the highest household income while participant 3 reported having the lowest among the surveyed subjects. Correspondingly, participant 1 reported brushing their teeth 3 times a day while participant 3 responded brushing only once a day. Furthermore, participant 1 responded with flossing 4 times a week while participant 3 responded with flossing once a week. Lastly, participant 1 stated to brush and use mouth rinse after consuming sugar-heavy food and drink while participant 3 reported to neither brushing nor rinsing after consuming anything heavy in sugar. It is evident income plays a significant factor in oral hygiene practices that contribute to either reducing or contributing to the development on dental caries depending on how much a person focuses on oral health care.

Educational level obtained by the parent has been found to also serve as a health determinant for developing dental caries.[1,2] Participants 1 and 4 have at least one parent with a Master's degree, and both participants practice the best oral hygiene practices among the other subjects. On the other spectrum of educational level achieved, participant 3 has one parent with a GED and one with education lower than a high school level, and predictably, this participant's responses indicate the poorest oral health care practices. Education and income are closely correlated because higher education results in a higher income,[1,2,5,10] and both factors contribute to the oral health importance for the children.

Dental insurance allows families to visit the dentist at a reasonable cost, and visiting the dentist enables children to visit the dentist to check up on their oral health to obstruct any oral conditions from developing. Only participant 3 stated to have no dental insurance, and subsequently, only visited the dentist once a year for a basic clean-up with no further interventional treatments. The other participants have dental insurance and responded to visiting the dentist either once or twice a year; furthermore, participants 1 and 4 also answered to

receiving any further treatments such as sealants or fillings whenever needed. As studies indicate, those with dental insurance and better coverage participate in more dental visits and invasive procedures when required in order to preserve the enamel and maintain a healthy set of teeth.[8,13]

The survey elicited responses that supported the major trends in dental caries prevalence rates among any population within factors such as income, education, and dental care access, but the survey did not offer much insight to other trends such as quality of water because there is no way to physically test the source of water for each of the sampled subjects. Despite the small sample size, enough data was acquired to support some of the major trends that are most frequently studied and discussed in the oral health care community.

Limitations and Suggestions for Further Research

The shortage in a lack of studies and data available on the pain and decreased quality in life due to dental caries prevents the seriousness of this chronic disease from properly being comprehended by medical professionals. Furthermore, finding studies exclusively focused on Hispanic youth is extremely limited throughout several databases to only one or two published papers at the most even though this population suffers the most with dental caries and faces the most health issues in terms of chronic pain throughout the lifetime.

One major difficulty was finding dietary behavior for the Hispanic population, furthermore, the youth. After extensive research, I found a book in the Health Science Center Library that found a general average sugar intake for a Hispanic male and female adult, which provided me the best access to Hispanic diets. More studies need to focus on the dietary habits to

collect and analyze nutritional information such as calorie, sugar, and carbohydrate intake per racial group by age group.

Another limiting factor was the varying results of different government agencies and peer-reviewed papers displaying different incomes and educational levels achieved by each ethnic group. Two different sources showed that the income for Hispanics in 2011 was about $31,000, but another study showed that the income for Hispanics in 2009 was $43,000. There has to be a uniform income data set available so accurate figures may be applied to different studies such as this one.

For the numerical analysis, the main issue with the risk factor of dietary behavior is finding any type of relevant data or chart that relates directly to the amount of sugar consumed by the youth population by each race. More data needs to either be made available or found to help support the links of how lower education level directly correlates to worse condition of oral health by more rates of dental caries. The links to low education to low income have already been made, but scholarly data linking education to prevalence rates need to be made available to expand on such justification. Furthermore, finding the uninsured rates among each race resulted in several different figures from different government websites, which causes a disagreement in data for uninsured prevalence rates by race.

Conclusion

The Hispanic youth has been found to have the highest rates of dental caries among all other racial groups and age groups.[1] The major risk factors were dietary behavior and oral hygiene. The Hispanics have been found to consume a diet highest in levels of sugar, which has been found to be correlated with higher levels of dental caries rates.[17,25] Despite the poor dietary behaviors, proper oral hygiene habits can eliminate the negative effects of high sugar intake by remineralizing the enamel to prevent breakdown to result in tooth decay,[11] but, the Hispanic population reported having the lowest brushing and flossing habits among elementary aged children in New York.[17] The Hispanic youth has the highest risk of developing dental caries because this group universally has the lowest income, insurance, dental visits, quality of water, and the worst dietary behavior and oral heath hygiene practices.

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