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Betel Quid Awareness Among South Asian Immigrant Communities

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ABSTRACT

This study examines how the attitudes and knowledge of first and second generation South Asian immigrants towards betel quid and oral health may help identify potential public health concerns in more developed countries.

The practice of betel quid, commonly known as Paan, has created a significant public health concern, particularly in South Asia, a region that contributes to about 40% of newly diagnosed oral cancer cases globally. As South Asian populations continue to migrate to destination countries, cultural practices such as betel quid chewing are increasingly being observed within immigrant communities. Given the well-established association between betel quid chewing and oral cancer, this raises concerns about the potential public health implications for destination countries with large South Asian populations.

To investigate this further, semi-structured interviews were conducted to eight South Asian immigrants, including four first generation immigrants and four second generation immigrants. Interviews were analyzed using thematic analysis across five themes. Results showed that first-generation immigrants knew more about betel quid overall and were more aware of its cultural contexts. Both first- and second-generation immigrants generally perceived that younger generations demonstrated better oral health practices and awareness overall. These findings may suggest generational differences in oral health awareness, although additional research with larger and more diverse samples is needed.

INTRODUCTION

Betel quid chewing (BQC) is the practice of chewing a combination of betel leaf, areca nut (often called betel nut), catechu, and slaked lime with or without tobacco (Diwan et al., 2023). Commonly referred to as paan, betel quid is popularly consumed in South Asia. In these areas, BQC occurs as a social lubricant and an ingrained cultural practice. Furthermore, it was thought to have health benefits, with a perceived ability to cease gum bleeding, act as a mouthwash, and heal oral wounds (Berniyeti et al., 2023).

In South Asia, the incidence of oral cancer is concerning - in 2025, the region was estimated to contribute nearly 40% of newly diagnosed oral cancer cases globally (Saraswat et al., 2020). Recent studies examine the potential correlation between BQC and oral cancer, most finding that carcinogenic, or cancer-causing, components in the betel quid cause a higher incidence of oral cancer. Until the mid 1980s, researchers determined that the added ingredient tobacco in the betel quid was the primary carcinogen causing the onset of oral cancer (Warnakulasuriya & Chen, 2022). However, this was not the case; in fact, the areca nut emerged as the primary carcinogen in betel quid. Through a study conducted in Taiwan, a country with a high incidence of oral cancer, 80% of betel quid preparations did not contain tobacco. This groundbreaking finding shifted the focus of the primary carcinogen in betel quid from tobacco to the areca nut. Noting this, this paper focuses on the areca nut, as it is not only foundational to how the betel quid is consumed, but is also the most concerning ingredient within the betel quid.

As oral cancer rates continue to increase globally with no avail, researchers have begun to place their focus on the practice of betel quid chewing in South Asia as a significant region of interest. South Asians account for about 15-20% of total immigration. Additionally, given that immigrants tend to carry their cultural practices and norms with them, there is a preliminary concern that the practice of betel quid chewing, and thus, rising oral cancer rates could persist in South Asian immigrant communities across generations, creating an important public health consideration (Saraswat et al., 2020). This study sought to investigate this by creating an understanding of how first and second-generation South Asian immigrants differ in their knowledge and awareness of betel quid chewing and oral health practices.

LITERATURE REVIEW

Oral Cancer Burden in South Asia

Oral cancer remains a significant health concern in South Asia, containing a persistently higher incidence than anywhere else in the world. Oral cancer has a mortality rate of 50%, a statistic attributed to late diagnosis and a lack of public health awareness resulting in harmful practices. Authors Stephen and colleagues note that the South Asian subcontinent accounts for approximately 45.3% of oral cancer cases globally (2024). Adding to this notion, Ken Russell Coelho finds from the University of Cambridge that oral cancer accounted for about 30% of all cancer cases recorded in India, demonstrating the severe burden of oral cancer in South Asian countries (Coelho, 2012). Both authors attribute these statistics due to harmful practices, citing betel quid chewing as specific instances of this.

Most in-depth research finds patterns in consumption practices of the betel quid. For instance, various authors state that males are more prone to developing oral cancer, which they associate with the disproportionately higher number of males who practice BQC versus females (Senapati et al., 2021) (Thankappan et al., 2023). This number is linked to the higher social acceptance and access to areca nut that men have. Further, regional differences exist within South Asian countries themselves, particularly in

India, where rural areas report higher rates of oral cancer annually (Coelho, 2012). This is widely attributed to limited healthcare access and stronger adherence to cultural practices.

Chemical and Molecular Mechanisms of Betel Quid

The betel quid contains many carcinogenic, or cancer-causing, components. These components were found to contribute to the onset and development of oral cancers in individuals. This research focuses on the areca nut's carcinogenesis, an ingredient in betel quid, as the areca nut is the most common ingredient in the betel quid and is widely established as a carcinogenic component. Studies analyzing the molecular pathway of areca nut found that the compounds arecoline, arecaidine, guvacoline, and guvacine identified by Senevirathna et al., researchers from the Centre for Research in Oral Cancer at the University of Peradeniya, interact with various genetic pathways, assisting in the development of oral cancer. They highlighted that the carcinogenic risk of betel quid is present with or without the presence of tobacco, a new and concerning notion. Specifically, the authors found that the compounds within the areca nut that were identified have the tendency to inhibit DNA repair mechanisms, break single-strand DNA, and induce unscheduled DNA synthesis (Senevirathna et al., 2023, p. 330-331). Similarly, Diwan et al. notes "an accumulation of damaged mitochondrial DNA primarily in the form of deletions" (Diwan et al., 2023, p. 6). This damage to DNA can cause harmful genetic mutations, resulting in inflammatory responses and disruptions in the homeostasis of the oral microbiome, contributing to the initiation of oral cancer.

New findings emphasize the impacts of betel quid chewing on the oral microbiome. The oral microbiome is the microenvironment of the oral cavity, containing various bacteria and microorganisms. Homeostasis in the oral microbiome is imperative to maintaining oral health, including periodontal diseases, cancers, and cavities (Deo & Deshmukh, 2019). Disruptions of the oral microbiome are inferred to cause dysbiosis. Dysbiosis is defined as an imbalance in a community of microorganisms. In the context of oral cancer, oral dysbiosis is thought to result in the development of oral cancers.

Liuyang Cai and associates, researchers under the Department of Microbiology at Chinese University in Hong Kong, explored the genetic basis of host-microbiota interactions in the oral microbiome, finding that the certain bacterial species are present in a higher abundance in the oral microbiomes of patients with oral cancer (Cai et al., 2024, p.8). Through a DNA analysis, Mayank Bahugana and associates, researchers at the Department of Microbiology at Ram Lal Anand College, found that the oral microbiome's composition is affected by the habit of areca nut chewing, due to fluctuating numbers of the bacteria *prevotella*, *streptococcus*, and *rothia* (2023, p. 16). These changes have been suspected to cause the carcinogenesis of oral cancer, however clinical causation is yet to be established in research.

Current Literature Associating Betel Quid and Oral Cancer

Connections between BQC and oral cancer have been consistently demonstrated across studies analyzing populations. For instance, a study found that in Taiwan, a country with a significantly high incidence of oral cancer, close to 50% of men with oral cancer consumed betel quid as well (Warnakulasuriya &

Chen, 2022). The findings of this study emphasize the potential linkage of the betel quid and oral cancer. Agreeing with these findings, authors Hernandez et al. found through a study of 122 participants at a dental clinic in Guam (Hernandez et al., 2017, p. 3), that changes to the oral microbiome attributed to BQC and the onset of oral cancer are "most pronounced in current chewers, particularly those using areca nut for 10 years or longer" (Hernandez et al., 2017, p. 13). These findings help to understand how the oral microbiome is impacted by betel quid chewing, which is significant in my research. However, while both sources establish a correlation, they do not affirm that the BQC causes cancer. There is a lack of knowledge regarding causation between BQC, areca nut, and oral cancer.

Additionally, research on the practices of immigrant populations tend to conclude that cultural practices tend to persist, despite differences in location. This is an important implication, as this may indicate that BQC is translated in destination countries. William J. Moss affirms that a lack of public awareness and increasing global availability of the betel quid contributes to high rates of oral cancer in South Asian immigrant populations (Moss, 2022). Current available literature demonstrates how sustained cultural practices persist in immigrant populations, despite changes in location. However, it is widely unknown how these practices are translated to second-generation immigrant populations. Second-generation immigrants are children born in the destination country to parents that immigrated.

GAP

Despite an availability of research linking BQC, changes in the oral microbiome, oral cancer prevalence, and cultural awareness, current literature largely disregards considerations that may correlate the long-term impacts of rising South Asian immigrant populations to increasing global rates of oral cancer. This should be considered, as immigrants are thought to bring their cultural identity and practices with them, bringing with them the practice of betel quid chewing (Saraswat et al., 2020). In areas with a dense immigrant population, cultural habits such as BQC may continue to prevail and potentially contribute to oral cancer in a destination country (Sajjad et al., 2025). A study conducted by Sajjad et al. concluded there was a prevalence of areca nut-related oral cancer in a non-endemic region (meaning the disease does not usually occur in that area) due to a high immigrant population in the area (2025). Similarly, author Tami-Maury et al. (2025) found that this is actively occurring in the United States. Through a series of interviews, the authors concluded that almost a fifth of the South Asian participants they interviewed consume betel quid, establishing BQC as an ongoing concern.

This study seeks to explore the gap between betel quid chewing and long-term concerns of oral cancer in South Asian immigrant populations by investigating how first and second-generation South Asian immigrants differ in their knowledge and awareness of betel quid chewing and oral health practices. By researching the difference between first and second generation immigrants as it pertains to oral health, this study aims to understand whether there are potential long term oral public health risks that should be addressed.

METHODOLOGY

I employed qualitative data collection and analysis through structured interviews accompanied by a thematic analysis. Interviews are a series of predetermined questions that are asked to the participant 1-on-1 (Paradis et al.). I decided to use interviews because it would enable me to analyze the personal experiences of individual South Asian immigrants relating to oral health and the areca nut/betel quid mixture to answer my research question. Adding to this notion, I determined that a qualitative approach to my data analysis would enable me to closely examine the data for patterns and trends rather than objectively examining it. Furthermore, I chose a thematic analysis in order to map out and organize my data easily. Overall, the combination of interviews and a thematic analysis allowed for data to be collected and examined precisely.

Interviews

In order to collect data on the personal experiences of South Asians as it pertains to oral health practices and knowledge, I conducted semi-structured interviews as the first phase of my research. For reference, semi-structured interviews utilize "questions that are written prior to an interview, are asked of every candidate, and are scored using an established rubric", employing the same qualities as structured interviews, with the addition of using probing questions in order to gather further details (Bergelson et al.). I chose interviews as my data collection method because it would enable me to receive information on the varied experiences of people who have come into contact with betel quid, as well as inform me of if there are differences in the oral health behaviors across generations. Hence, I chose this method for my data collection.

Prior to conducting interviews, it was necessary to first select a target group and gain approval from the Institutional Review Board (IRB) of my district (Appendix A). This process spanned the course of 3 months, due to the cultural sensitivity of the topic. I had to repeatedly make revisions in order to avoid asking participants to include identifying information or cultural information in their interviews, whether that was intentional or unintentional. After gaining IRB approval, I sent out a google form to my participants, in which they had to fill out a form to express interest in participating, fill out a consent form, and provide contact information to arrange an interview time (Appendix B).

As mentioned, South Asian participants were examined in this study. This is because the practice of chewing betel quid prevails in South Asia. Due to the association of betel quid and oral cancer, I concluded interviewing South Asian participants would determine whether there is potential future concern of rising oral cancer rates where there are dense communities of South Asians. I selected participants based on the inclusion criteria of being South Asian and identifying as a first or second-generation immigrant. Participants were reached out to for informed consent and arranging a mutually agreed upon time for an in person or online 1-on-1 interview. Anonymity was maintained through participant interviews being labelled and saved as numbers. Interview transcriptions were saved solely on my computer on a password protected file. Additionally, I ensured that only myself would have

access or would listen to the recordings through the use of headphones and being in private spaces (such as my room). In the end, twenty-five participants were reached out to and eight participants ended up being interviewed.

There were minimal risks to the participants involved. The participants did have to allocate time out of their day to attend the interviews, however, they took a maximum of ten minutes each so the time commitment was minimal. Additionally, these interviews were able to occur in-person or online, decreasing the burden to the participants. All information remained confidential and anonymous (Appendix A). Benefits include the participants gaining a stronger awareness of betel quid and its potential health drawbacks, as well as reflection and improvement in oral health practices.

The goal for each interview was to investigate generational awareness gaps and the retention of oral health habits and knowledge. In order to accomplish this, all interviews were conducted using the same set of 11-14 questions, aiming to find out if the participant knew betel quid , what their oral health behaviors look like, and if there was any perceived difference between them and other generations (Appendix C). Most questions were open-ended, with a few exceptions. Questions 2 and 4 were yes-or-no questions, however they had featured probing follow-up questions in order to gain more insight on the participant's firsthand experience with betel quid. Questions were split into three categories: betel quid awareness, oral health, and reflection. Awareness-related questions asked the participant if they knew what betel quid or betel nut is and where and when they have seen others consume betel quid. If the participant was not aware of betel quid or betel nut, I explained what it is using a preset script. During the interview, I had a printed image of betel quid for participants in case a participant had seen betel quid and did not know what it was. Additionally, during some interviews, I had clarified that betel quid was also referred to as paan as that namesake is more commonly used. Oral health-related questions asked each participant about what their oral health behaviors are and what most influences them. Finally, reflection questions asked if the participant thought that their oral health views differed generationally. I decided to include these questions in order to gain a wider perspective of the knowledge of South Asians across generations as it relates to betel quid and oral health.

Thematic Analysis

After the structured interviews were conducted, the research moved into phase 2, or data analysis. In the data analysis stage, I chose to use a thematic analysis for my approach. Thematic analysis is a method of analysis with the goal of identifying and interpreting themes and patterns in data (Ahmed et al.). In the context of this study, this method of analysis was used in order to analyze the individual perspectives of participants as shown in their interviews. It accomplished this by finding common themes across participants that could be used to find similarities and differences between generations.

In order to complete the thematic analysis, I completed the following steps using Braun and Clark's (2006) established 6-phase framework. First, in order to familiarize myself with the data, I manually transcribed each interview and carefully reread each transcript in order to identify patterns in the

knowledge of betel quid and oral health practices across participants. Second, I performed line-by-line coding across all transcripts in order to identify recurring concepts or themes within my data, as visualized and defined in Figure 1 below. Third, I clustered the codes into broader themes in order to capture the generation trends that would later be used for comparison. Next, I finalized five distinct themes, splitting the responses into two groups in order to closely compare first and second-generation immigrants. Finally, using participants' quotes, I generated the final narrative of how, if at all, oral health and betel quid usage differed among generations. Ultimately, through this thematic analysis, I was able to create a clear comparison between first and second-generation South Asian immigrants to understand if there was a difference in oral health knowledge and practices.

Figure 1

Table demonstrating each code I used for the thematic analysis and definitions

Theme:	Definition:	Color:
BQC Awareness	A participant's awareness of betel quid or paan	
Cultural/Social Context	Description of where the participant has seen betel quid consumed, if at all.	
Oral Health Practices	Participant's acknowledgment of proper oral health practices.	
Generational Relations	Participant's acknowledgement of generational differences in betel quid chewing and oral health awareness.	
Health Influences	Participant states their health influences	

I chose thematic analysis as the data analysis method because I felt that it was the best way to create connections between participants' individual interviews. Since this study's goal is to identify generational differences in betel quid and oral health-related knowledge and practices, a thematic analysis would help understand what common differences are seen between generations as it relates to betel quid and oral health. A thematic analysis accomplishes this by finding patterns within the sample, therefore I felt it would be an effective method of data analysis in my research.

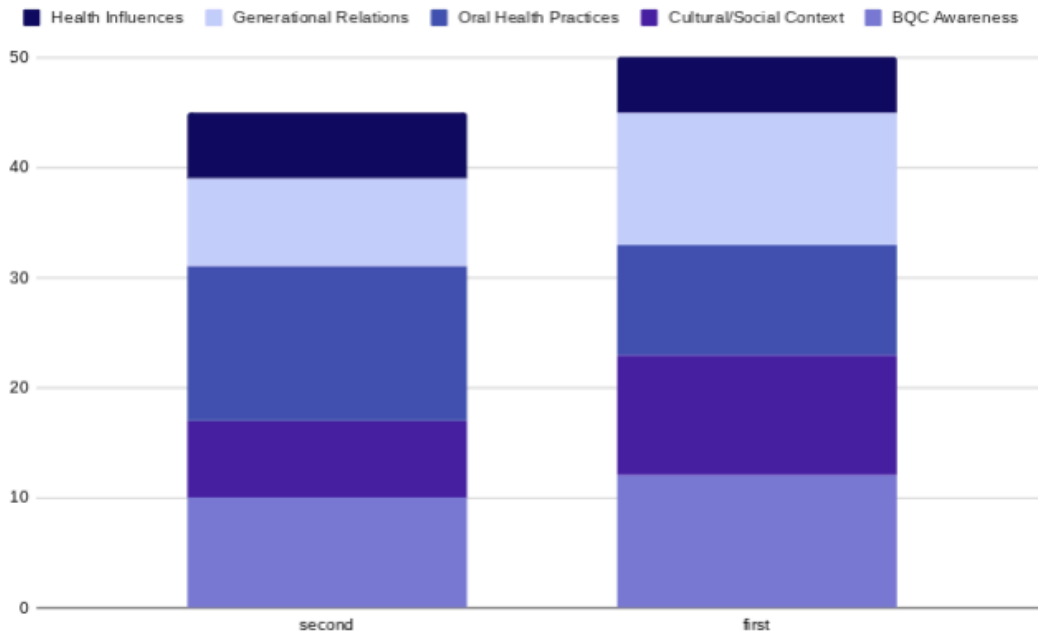
OVERVIEW OF FINDINGS

For each of my interviews, I employed structured interviews with the exception of occasional follow-up questions in order to acquire adequate information for each participant. While I initially intended to use structured interviews, I found that probing questions helped me with important clarifications that would make data collected easier to use. Through the use of interviews, my inquiry aimed to examine five major themes in each participant's interview: betel quid chewing (BQC) awareness, cultural/social context, oral health practices, generational relationships, and health influences. Each theme served a specific purpose in my findings. BQC awareness aimed to understand the participant's familiarity with betel quid, which was also referred to as paan in interviews. Cultural/social context was noted when the participant demonstrated BQC as a common practice in cultural or social settings. Oral health practices consisted of the oral health practices that each participant stated. Generational relationships was documented when the participant acknowledged similarities or differences in oral health practices across generations. This could have included both older or younger generations. Finally, health influences were when the participant acknowledged external factors that influenced the participant's oral health behaviors.

In my coding, I decided to code my data through a thematic analysis. I accomplished this through both qualitative and quantitative analysis. For my qualitative analysis, if a theme presented itself in a participant's interview, I included a quote in a table under the column corresponding with the theme. This was in order to better understand the common themes and responses I saw across my data, and to spot any patterns prior to the quantitative analysis. In my quantitative analysis, I created two tables; the first table noted how many times each theme was noted in the participant's interview, and the second table grouped participants by first or second-generation status to better understand if there were descriptive differences across themes. Additionally, through a quantitative analysis, I believed that it would be easier for me to see the spread of my data and identify patterns. I created the second quantitative table in order to represent the data in a graph simplistically.

Figure 2

Stacked bar graphs of theme presentation between first-and second-generation participants



Using the figure, which helped me to combine my quantitative findings with my qualitative findings, I was able to observe various patterns within my data. As this study relies on a small sample size, the numerical data observed are intended for solely descriptive purposes; they reflect patterns within this sample rather than mathematical or statistically significant results when observing the difference in the attitudes and behaviors of first and second-generation South Asian immigrants. Within this baseline, it is shown that first-generation immigrants were more familiar with betel quid through its cultural name of paan, with one participant in the first-generation group noting that "My dad eats it, and I've had family friends also bring it in family gatherings" and another participant even claiming use of betel quid, noting that when asked if the participant had ever witnessed others consume betel quid, the participant stated that they have seen "parents and grandparents and me as well." (Appendix D). Additionally, as demonstrated in figure 2, first-generation immigrants in this sample presented as better able to evaluate the generational differences in betel quid consumption, whether that included an analysis of older or younger generations. Some first-generation participants noted that they had seen older generations chew betel quid commonly, also noting that they have seen younger generations consume betel quid much less frequently. Following this theme, first-generation immigrants were able to better evaluate the social/cultural context of betel quid chewing. First-generation immigrants strongly evaluated the context of betel quid chewing occurring, noting this was a common occurrence after meals and in times of celebration and cultural events.

However, while my quantitative findings demonstrated a clear theme of first-generation participants being more aware and actively involved in betel quid chewing, some second-generation participants demonstrated a high knowledge and awareness of betel quid chewing. Additionally, second-generation immigrants were overall able to state and acknowledge appropriate oral health behaviors. This potentially

indicates a trend where future generations have the tendency to become more aware of betel quid chewing as a harmful practice.

ANALYSIS OF RESULTS

Betel Quid Chewing (BQC) Awareness

The findings of my research observed patterns pointing towards the notion that generational status (first-generation versus second-generation) may serve as a descriptive factor in cultural familiarity and awareness of betel quid chewing. As previously mentioned, the theme of BQC awareness aimed to understand the participant's familiarity with betel quid, which was also referred to as paan in interviews. Within this sample, it is shown that first-generation immigrants frequently demonstrated stronger familiarity with betel quid through its cultural name of paan. First-generation immigrants stated they had commonly seen BQC occur in family gatherings and major religious holidays. In contrast, second-generation South Asian participants in this sample tended to showcase lesser awareness of betel quid chewing, with the exception of some second-generation immigrants that had demonstrated a high knowledge and awareness of BQC.

Cultural and Social Contexts

When examining the acknowledgement of the cultural and social context within this sample, first-generation immigrants had a lesser public awareness of the implications of betel quid chewing, stating that it was "good for digestion" and "tastes good" (Appendix D). This indicates a descriptive trend where first-generation immigrants, especially among the participants who spent the most time in South Asia prior to immigration, reflect the deeply-rooted traditional views regarding betel quid chewing. While participants recognized these traditional cultural benefits, their modern perspectives show a complex mix of neutral or cautious opinions toward betel quid chewing today. In these cases, the participants are reflective of an exploratory trend: despite recognizing the health risks, cultural practices may still lead to higher levels of continued betel quid usage in destination countries. In contrast, second-generation participants in this sample were either neutral or negative towards betel quid chewing. This difference highlights a descriptive breakdown in cultural transmission, where the adherence to cultural norms that sustains older generations appears to weaken significantly among younger individuals raised in a destination country.

Oral Health Practices

In regards to evaluating reported oral health practices, a contrast emerged in how participants manage their day-to-day dental care. Second-generation participants overall demonstrated a strong adherence to routine preventive habits, highlighting regular visits to the dentist and an awareness of healthy oral health practices. Conversely, interviews of first-generation immigrants suggested a history of more limited

access to dental professionals prior to immigration, which often resulted in individuals not going to the dentist as frequently (Appendix D). I measured these generational perspectives through a transcriptional analysis and through listening to audio recordings of interviews for tone and nuance. Ultimately, within the limits of this small data pool, these observations reveal an exploratory pattern where generational status shapes a participant's regular oral healthcare access and habits.

Health Influences

Upon evaluating the raw data, the raw data suggests that first-generation immigrants in this sample tend to have lesser public health awareness and knowledge of the negative impacts of betel quid chewing, which may contribute to the pattern of first-generation South Asians having higher levels of usage. Because behaviors can be heavily shaped by cultural factors, there may be public health concerns in areas with high levels of first-generation South Asian immigration, due to persisting cultural practices. However, there is not a perceived issue reported by the second-generation immigrants interviewed. This may be because of their upbringing in a new country where betel quid chewing is not a common practice, and is therefore not adopted as a habit. This distinction emphasizes a descriptive trend where environmental factors and regional cultures heavily dictate health outcomes; while the first-generation cohort's behaviors are deeply influenced by the cultural practice back home, the second generation's framework is shaped by destination-country norms that discourage habit adoption.

Generational Differences

In aiming to synthesize broader generation comparisons and relationships, I am unable to make sweeping generalizations in my research. However, I aim to complete more interviews which will provide me with further insight on the topic. Most significantly, since this study focuses on a small sample size of eight participants, observed variations do not indicate definitive trends across all first and second-generation South Asian immigrant populations.

LIMITATIONS

Several limitations should be considered and addressed in order to truly understand the results of this research. First, my research employed a smaller sample size, containing less than 10 total interviewees. This was due to scheduling conflicts with participants. Additionally, many potential participants had not submitted their informed consent forms, which resulted in me not being able to move forward with the interview process. While a cohort of 8 participants is appropriate for developing an exploratory framework, it remains as an operation constraint within my analysis.

Adding to this, my time in conducting research was cut down heavily due to difficulty obtaining Institutional Review Board approval. It took 4 attempts spanning the course of three months in order to obtain approval, which cut down the time that I had to collect participants and data. This process delay

heavily compressed my fieldwork timeframe, thus restricting my ability to conduct follow-up interviews or expand interview recruitment efforts.

Another limitation is the scope of participants. Participants tended to be people from one specific geographic location and background. For this reason, the generalizability of my results may be limited, as these participants may not reflect unique backgrounds and perspectives that would exist in a larger population. The geographic homogeneity of my interviews categorize my research as an isolated case study of a specific diaspora pocket, rather than a universal representation of all South Asian immigrant communities.

Further, I utilized interviews in my data collection, which is a form of self-reported data. This means that participants could have underreported or misstated their experiences and knowledge of betel quid. Because betel quid consumption contains medical risks and potential stigma, self-reported accounts are susceptible to bias in which participants alter their answers to align with beneficial oral health practices.

In some cases, it is common that a first -generation South Asian immigrant moves into a destination country as a child and leans toward a second-generation immigrant upbringing. Following this, each participant has a unique upbringing and personal experiences. It should be noted in future research that this is a consideration to be made. This fluidity suggests that age-of-migration factors heavily into an individual's upbringing, creating a confounding variable, limiting the potential of absolute generational categories.

Finally, my use of quantitative data analysis may not have accounted for the depth and complexity of interviews, creating rigid data rather than data that accounts for unique perspectives and themes across research. I accounted for this by using both a qualitative and qualitative approach, however, due to self-reporting, this may not have been the best approach either. Through the mixed-methods framework, the rigid data balances with the thematic analysis to account for each participant's unique perspectives, though future research could focus on a purely qualitative design for further depth.

FUTURE RESEARCH SUGGESTIONS

Building upon the limitations of this study, future research pathways emerge to address remaining knowledge gaps. My research aimed to see if there is a difference in the oral health behaviors and attitudes of first-and second-generation South-Asian immigrants, with a focus specifically on the betel quid, also known as paan. South Asia is a region with the highest rates of oral cancer globally, heavily attributed to a lack of public health awareness and cultural and the common social practice of betel quid chewing, which contains the carcinogen betel nut, and in some occasions, tobacco. To investigate this issue, my research evaluated how first and second-generation South Asians immigrants differ in their knowledge and awareness of betel quid chewing and oral health practices.

In interpreting these findings on a macro scale, the data naturally addresses a critical global question: with increasing numbers of South Asian immigrants to nations like the United States, is there a public health concern of oral cancer due to the public health knowledge and awareness of South Asian immigrants? Using the data I collected and presented, I saw that there may not be a significant long-term future public health concern for oral cancer as it pertains to oral health behaviors and betel quid chewing among subsequent generations.

For future directions of my research, a study could build upon my conclusions by expanding the size and scope of their data collections. Rather than collecting participant data from one area, future research could conduct interviews across multiple geographic areas and demographics. This expanded approach would allow for a stronger understanding of South Asian immigrant behavior and public health concerns across a macro-demographic scale. Furthermore, future directions may include research that correlates the public health behaviors of South Asian immigrants to oral health outcomes. Through an analysis of this, it may be clearer to understand how the practices of South Asian immigrants result in public health outcomes. This can result in future initiatives for public health interventions in diverse communities.

In the Contemporary Era, as the world becomes more connected, it is important to acknowledge the implications of globalization. Additionally, when understanding this through a public health perspective, it is important to see how practices are translated across cultures and regions. My research aimed to acknowledge this and help inform future public health interventions in diverse communities, taking another step toward global interconnectedness. By bridging the gap between historical cultural practices and generation changes, this study aims to highlight that public health frameworks must evolve alongside global migration.

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Appendix A

IRB Approval Form

This appendix consists of the approval form I filled out to submit for IRB approval. I used this to receive approval to begin my research data collection.

I. RESEARCH PROJECT IDENTIFICATION

A. Title of Proposed Research Project

Investigating Betel Quid Chewing and Oral Cancer in diverse populations

B. Name and e-mail address of Primary Researcher

Hemani Sankar

D. Date of Submission

11/12/2025

E. Purpose of Study

This study aims to inform future interventions to mitigate the public health risks of oral health.

II. RESEARCH GOALS

A. Summary Statement of Problem

There is a problem with public health in South Asia due to the high incidence and mortality of oral cancers in the country. Despite increased research and better knowledge understanding the mechanisms of oral cancer, oral cancer treatment continues to be plagued by high incidence rates and late diagnosis. This can be attributed to the prevalent practice of consuming betel nut, a mixture which contains betel leaf topped with lime, catechu, betel nut, and in some cases may contain tobacco. This problem has negatively impacted a significant number of people in India, where, according to Professor Stephen at the Department of Oral Pathology in the Government Dental College of Trivandrum, oral cancer accounts for 30% of all cancers in and accounts for 45.3% of global deaths related to oral cavity cancers (Stephen et al., 2024). A possible cause of this problem is betel nut chewing, which is identified as a type 1 carcinogen (cancer causing agent). Perhaps a study that investigates public health awareness in immigrant

populations can offer further insight into the severity of betel quid chewing and raise awareness to the necessity of public health interventions.

B. Context of Study

Betel quid chewing (BQC), is the practice of chewing a combination of betel leaf, areca nut, referred to as betel nut, catechu, and slaked lime with or without tobacco (Diwan et al., 2023). Known as Paan in India, betel quid is popularly consumed in South and Southeast Asia, with roots stretching centuries in the past. In these areas, BQC occurs as a social lubricant and a widely accepted practice. Furthermore, it is thought to have health benefits, causing the with a falsely perceived ability to cease gum bleeding, act as a mouthwash, and heal oral wounds (Berniyeti et al., 2023). In India, the incidence of oral cancer is concerning - it ranks among the top three types of cancer in the country and accounts for approximately 45.3% of oral and lip cancer globally (Coelho, 2012) (Stephen et al., 2024). With increasing South Asian immigrants in developed countries, a possible rise in oral cancer cases could be expected given the high prevalence in their source countries (Saraswat et al., 2020). Immigrants' behaviors that they carry with them from their home country to destination country may influence oral disease patterns in destination countries. This study can reveal how knowledge of betel quid chewing and oral health behaviors change between first- and second-generation South Asian immigrants, helping to understand how practices evolve across generations and inform future directions for public health interventions. . This study seeks to address this gap by investigating how first- and second-generation South-Asian immigrants differ in their knowledge of betel quid chewing and preventative oral health behaviors.

C. Research questions and hypotheses or specific objectives

How do first and second-generation South-Asian immigrants differ in their knowledge of betel quid chewing and preventative oral health behaviors?

D. Foundational Research (include sources that have led to your inquiry).

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E. Research Design / Chosen Methodology (Name and describe proposed steps)

Chosen Methodology: In my inquiry process, I plan to conduct recorded interviews with informed consent. Using the data I have gathered, I will conduct an analysis of the transcripts of the interviews to identify common themes and conclude how first and second generation immigrants vary in oral health knowledge and behaviors.

Steps:

1. Acquire subjects through informed consent forms
2. Schedule time and dates for interview
    a. I will accomplish this through a SignUp Genius. For each time I select, there will be an associated patient number. For example, the earliest date and time would be participant 1, while the latest date and time would be participant 100.
3. Conduct Interview
    a. I will be recording the interviews I conduct on voice memos. It will be protected through a password protection and remains linked to only my icloud account, to which I am the sole owner. If the interviewee does not approve of being recorded, I will take notes to the best of my ability.
    b. I will be using the research questions that I have developed, without deviated or asking new questions unless I am asking for more details.
4. Analysis
    a. In my analysis, I will type out the recorded interviews I have conducted onto google sheets. Then, I will find common words, phrases, or themes across interviews.
5. Discussion
    a. In my discussion, using the results of my research, I will identify common themes and synthesize my interviews to determine intergenerational immigrant differences in behaviors. Furthermore, I will be able to see the urgency and projected urgency of oral health initiatives.

F. Using human or animal participants (Yes or No) If yes, in what capacity?

Yes, my research will use human participants. I will use human participants in interviews, gathering data such as age and potential usage of betel nut.

G. Using a Survey or Interview (Yes or No) Specify which.

Yes, I will be using an interview.

III. DETAILED DESCRIPTION OF PROCEDURES

A. Subjects needed and sampling procedure.

Check all that apply and estimate total number of individual participants in each relevant category about whom you will be collecting data for your research project:

High school students Number: 0

General public Number: 10-15

From the general public, I would like to gain information regarding whether the participant is a first or second-generation immigrant. I would also like to gather information regarding their oral health habits. Using this information, I can distinguish differences in attitudes of oral health between first and second-generation South-Asian immigrants.

Faculty Number: 0

Children and Youth under 18 Number: 10-15

From the group of children and youth under 18, I would like to interview around 10-15 people. This is because I would like to interview many age groups for more accuracy. Furthermore, my research intends to see if there are changes in practices across generations.

B. Approximate dates to begin and end data collection.

Approximate start : November 21, 2025

Approximate end : February 1, 2026

C. Amount of time required of participants

The time required of participants is approximately 20-30 minutes of a mutually agreed upon time. This is because the interview process will be a one-time question process, where I plan to ask approximately 9-10 questions for each participant.

D. Instructions, instruments, or technology to be used (Describe and attach copies as links at right. Be sure to set viewing rights to "Anyone in FISD")

Interview Questions

Analysis Page

Interest Form

IV. RESULT OF RESEARCH

A. Rationale for the Study (How will the study contribute to this field of research?)

This study seeks to bridge a gap in knowledge by investigating how first- and second-generation immigrants of South Asian descent differ in their knowledge of betel quid chewing and oral health behaviors. Immigrants' behaviors may influence oral disease patterns in destination countries. This study can reveal how knowledge of betel quid chewing and oral health behaviors change between first- and second-generation immigrants, helping to understand how cultural practices evolve across generations and inform future directions for public health interventions.

B. Potential Risks to Participants

There are minimal risks to participants. Potential risks to participants include discomfort or embarrassment, sensitivity, and time commitments. Discomfort or embarrassment may emerge from asking questions about oral health knowledge, as well as from asking about betel quid behaviors. This is because admitting to a bad habit can be hard to do. Sensitivity to this topic may be an issue as well. My research aims to understand immigrant practices, but questioning behavior may come off as insensitive or offensive. Finally, a risk to participants may face is time commitment. Since participants will be from various age groups and walks of life, it may be difficult to come to a time where both I and the participant will be available. Furthermore, privacy of information may provide a potential risk.

C. Benefits to the subjects/populace at large

In its broadest range, my research will help to increase the public awareness of the negative implications of betel quid chewing to South-Asian immigrant populations. Additionally, my research will provide representation for immigrants in more-developed countries, a minority that is severely under-researched in available literature. To researchers and public health professionals, my research will open a new layer of knowledge to create directed public health initiatives and future directions that are sensitive to immigrant populations.

D. Use of information gained from research

This study would be valuable across various fields for a multitude of reasons. Firstly, in terms of healthcare, the oral microbiome remains widely unresearched and unknown. Researching this may offer further clarification on how exactly betel nut chewing impacts the oral microbiome, and if that is a key risk factor in the development of oral cancer. Furthermore, this study would be valuable due to the cultural significance of betel nut in South-Asian countries, helping to spread awareness about the potential health implications of chewing betel nut to healthcare providers in South-Asia. Researching the intergenerational awareness of the public health risks of betel quid chewing is significant because it investigates how practices evolve in immigrant populations. This is an area that remains underrepresented in current literature, and research regarding this topic is widely unavailable. By researching intergenerational fluctuations in healthcare knowledge, something that has not been addressed or completed in current literature, effective action regarding public health in immigrant populations can be completed. This will not only save lives, but will help offer a broader perspective of public health and communication in diverse areas.

V. PARENTAL PERMISSION AND/OR INFORMED CONSENT INFORMATION

*If you are conducting a survey or study involving children under the age of 18 - outside of the Capstone Program, you will need documented parental or informed consent.

1. Attach a copy of a proposed letter to parents. The intent of this letter should be to secure informed consent from the parents for their child's participation in the research. If the study design includes a treatment group and a control group, be sure that the consent letter is appropriate for either group assignment, or write one version of the consent letter for potential treatment group students and one version for potential control group students.
    a. If you choose this option, please attach a copy of the letter or letters as a hyperlink HERE.

Appendix B

Informed Consent Form

This appendix includes the consent form that all participants fill out prior to their interview.

TITLE OF STUDY

Investigating Betel Quid Chewing and Oral Cancer in Immigrant populations

PRINCIPAL INVESTIGATOR

Hemani Sankar
Independence High School

10555 Independence Pkwy
469-633-5400
hemani.sankar.128@k12.friscoisd.org

PURPOSE OF STUDY

The purpose of this study is to establish possible differences in the intergenerational knowledge and practices of South-Asian immigrants as it relates to oral health and oral cancer. This study focuses on specifically the betel quid, which is the combination of the betel leaf, betel nut, catechu, lime, and in some cases, tobacco. The practice of consuming betel quid is common in South-Asia where it remains a common practice. Current literature has found evidence associating a translation in oral cancer rates with Indian immigration to destination countries. This study aims to understand how the practices of South-Asian immigrants causes this, specifically looking at how first and second-generation immigrants vary in their knowledge of betel quid and oral health behaviors.

STUDY PROCEDURES

This study uses interviews in order to gather information. First and foremost, participants will be selected through an interest form in which everyone who fills out the form will sign an informed consent form. After this stage, participants will select an interview time slot using a SignUpGenius. Each slot will be assigned with a number, ensuring randomization. Participants will show up at their chosen time, and the interview will ask questions regarding their background, oral health practices, and knowledge of betel quid. Participants will be asked during the interview if they consent to their interview being recorded. After the interview process is concluded, recorded interviews will be converted to a transcript. The transcripts will be used to gather data to come to a conclusion.

RISKS

There are minimal risks to participants. Potential risks to participants include sensitivity to this topic. My research aims to understand differences in the practices of South-Asian immigrants across generations, collecting data through structured 30 minute interviews. However questioning behavior may come off as insensitive or offensive. Additionally, I understand that the privacy of data may be a concern to participants.

BENEFITS

There are no direct benefits to the subjects. The study intends to establish a difference between the knowledge and practice of preventative oral health behaviors as it relates to Indian immigrants, a demographic that is heavily associated with oral cancer. If there is no established difference, then the study offers zero benefits to the subjects, direct or indirect. However, an established difference may help to increase the public awareness of betel quid chewing among the researched demographic.

CONFIDENTIALITY

Your responses to this study will be anonymous. Every effort will be made by the researcher to preserve your confidentiality including the following:

- Assigning numbers for participants that will be used on all research notes and documents
- Interview recordings will be kept on a password protected phone in the researcher's possession. They will not be sent or shared.
- Keeping notes, interview transcriptions, and any other identifying participant information in a locked file cabinet in the personal possession of the researcher.

Participant data will be kept confidential except in cases where the researcher is legally obligated to report specific incidents. These incidents include, but may not be limited to, incidents of abuse and suicide risk.

CONTACT INFORMATION

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigator, please contact the AP Research teacher Mrs. Sinclair at sinclairg@friscoisd.org.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Parent's signature _____ Date _____

Appendix C

Interview Questions

This appendix consists of the 10-15 questions that I utilized in my semi-structured interviews. The interview questions were asked in this order and are split up by various sections. The questions are asked in this order in order to introduce the participant to their topic and understand their oral behaviors.

Interview Questions

Awareness

1. Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?
    a. *This question may be accompanied by a printed image of paan in order to reduce confusion for those who may not know the name of betel quid.*
2. Two options:
    a. If yes to question 2:
        i. What do you know about betel quid or betel nut?
    b. If no to question 2:
        i. I will briefly explain what the betel nut and betel quid is
            1. Betel quid chewing (BQC), is the practice of chewing a combination of betel leaf, areca nut, referred to as betel nut, catechu, and slaked lime with or without tobacco (Diwan et al., 2023).
        ii. After knowing this, do you think this sounds familiar?
3. Have you witnessed people consume betel quid?
    a. If yes to question 4:
        i. How commonly would you say you see this?
        ii. In what kind of situations do you see this? (ex: in times of leisure, celebrations, mourning, with friends, etc.)

Oral Health

4. What do you define as "good oral health behaviors"?
5. What do you define as "bad oral health behaviors"?
6. What do you think most influences your oral health behaviors?
7. Where do you get the most information about oral health? (ex: online, school, dentist, family, etc.)

Reflection

8. Do you think that your views on oral health differ generationally in your community or family? If so, how? (*if needed, preface that this can include smoking, drinking, betel quid, etc.*)
    a. Probing question: Do you think that older generations are less aware of proper oral health practices?
        i. Do you think that this is because of upbringing, or experiences?
9. Do you think attitudes toward betel quid are changing over time? Why or why not?
10. Is there anything that we didn't talk about that you would like to address?

Appendix D

Data Analysis Spreadsheets (Qualitative)

This appendix contains the qualitative thematic analysis portion of my inquiry. This includes my 5 themes as well as quotes from each interview to show that it was mentioned for the participant.

Participant #	BQC Awareness (Participant familiarity with betel quid, also referred to as paan)	Cultural/Social Context (Participant notes cultural practice of betel quid chewing)	Oral Health Practices (Participant's percieved qualities of oral health practices)	Generational Relations (Participant's acknowledgement of generational similarities or differences related to oral health)	Attitude Toward Betel Quid	Health Influences (influences on participant's oral health)	first or second generation
participant 1	Interviewer: "Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?" Interviewee: "Actually yes I have."	"It was at a party. Like a sweet sixteen."	"Brushing your teeth, flossing, yea. "	"I don't think like elderly people are as educated on oral health as teenagers or like young adults. "	neutral	" Um, my dentist?"	second-generation
participant 2	"My dad eats it, and I've had family friends also bring it in family gatherings."	"I'd say any time we have a dinner or the gatherings with family friends, I always see a plate of this. "	" Brushing your teeth, tongue cleaning, and then flossing your teeth, and I'd say every now and then, maybe whitening strips. "	" I think with my dad and then his generation, it was a lot more frequently consumed, and I don't really see it a lot with our generation."	neutral	"Probably my dentist. And sometimes my mom will pull out random facts, but yeah."	first-generation
participant 3	"I've heard of paan, but I haven't heard of like the other like definite things."	" All I know is that it's like a popular thing people usually have after meals, especially at restaurants or events in Indian culture. "	"I mean in general, like brushing your teeth twice a day, flossing and like other things like that. "	" I think oral health like is definitely, definitely like different between generations. Like I know my parents don't put as much of an emphasis on it, whereas like me and my sister definitely do."	neutral	"Probably from my dentist."	first-generation
participant 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
participant 5	"Yes, I've seen it in the streets of India."	"Usually just outside on the street - like everyday life"	" I think like regularly brushing your teeth."	" differ because over time people develop better routines and health habits."	negative	"I think if I were to just research, or look at different sources online."	second-generation
participant 6	Interviewer: "Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?" Interviewee: "Yes."	"After a heavy meal, people usually take a paan."	"they can take it as long as they wash their mouth."	"The new generation? Yes - yes, they are changing a little bit... They're not using it. "	negative	"From a doctor."	first-generation
participant 7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
participant 8	"Interviewer:Number one, have you ever heard of betel nut or betel quid, also known as paan, prior to this interview? And I have an image for you to look at. Interviewee: No, I have not. "	No response	"Like not brushing your teeth, like that's just nasty."	"I feel like both my parents are just as considerate of oral health as like my brother. "	neutral	"I don't know, like my dentist, probably?"	second-generation
participant 9	"interviewer:Have you ever heard of betel nut or betel quid, which is also known as paan, prior to this interview? And there is an image for reference. Interviewee: Yes, I have. "	I know that's usually consumed after eating like a meal, and I usually have seen my parents or like relatives consume it.	" brush your teeth like, like in the morning and the night, flossing or like using mouth wash like I don't. It's just in general making sure that in the morning you're keeping good health and good hygiene of your teeth."	"we usually take pretty good care of our teeth, like, we don't really have much issues like generationally or like family wise. "	negative	"known fact to make sure you take care of your teeth because it impacts you in the long run"	second-generation
participant 10	"Interviewer: Have you witnessed people consume betel quid? Interviewee: Yes, my parents and grandparents and me as well."	"After a meal to refresh your mouth."	"Brushing your teeth twice a day, taking care of it with toothpaste, flossing and cleaning your tongue, and regularly going to the dentist once a year, at least, maybe twice a year. "	"Yeah, it definitely depends generationally because my grandparents probably have less knowledge because they don't go to the dentist as much."	positive	"From the dentist."	first-generation
participant 11	N/A	N/A	N/A	N/A	N/A	N/A	N/A
participant 12	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix E

Data Analysis Spreadsheet (Quantitative)

This appendix contains the quantitative thematic analysis portion of my inquiry. This includes my 5 themes as well as numbers for each participant to show each time that the theme was explicitly mentioned for the participant.

interview_analysis

participant #	Generation	BQC Awarenes s	Cultural/ Social Context	Oral Health Practices	Generatio nal Relations	Health Influence s
participant 1	second	3	1	2	2	1
participant 2	first	3	3	2	2	2
participant 3	first	3	3	4	3	1
participant 4	N/A	N/A	N/A	N/A	N/A	N/A
participant 5	second	3	2	2	1	1
participant 6	first	4	3	2	3	1
participant 7	N/A	N/A	N/A	N/A	N/A	N/A
participant 8	second	0	0	3	1	1
participant 9	second	4	4	3	4	3
participant 10	first	2	2	4	4	1
participant 11	N/A	N/A	N/A	N/A	N/A	N/A
participant 12	N/A	N/A	N/A	N/A	N/A	N/A

Appendix F

Interview Transcripts

This appendix contains the participant's interviews that I transcribed. The only parts of the transcript not included are filler phrases such as "um" or "okay".

Participant 1

Interviewer: Hi my name is Hemani, this is my first AP Research interview, Participant #1, please refrain from speaking of any identifying information. Yes?

Interviewee: Yes.

Interviewer: I need you to speak louder.

Interviewee: Yes.

Interviewer: Okay. Number 1, have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?

Interviewee: Actually yes I have.

Interviewer: I have a photo pulled up so you can see-

Interviewee: Yes I have.

Interviewer: What do you know about betel quid or betel nut?

Interviewee: I know it's popular like not maybe maybe not here in America but I know it's popular in other parts of the world - just to chew I think?

Interviewer: Mhm. Do you know like what specifically other parts of the world?

Interviewee: Asia, I think? Specifically like India?

Interviewer: Mhm. Have you witness people consume betel quid before?

Interviewee: Yes.

Interviewer: How commonly would you say you see this?

Interviewee: Just once.

Interviewer: In what kind of situation?

Interviewee: It was at a party. Like a sweet sixteen.

Interviewer: Was it like adults?

Interviewee: Um, yes I think so.

Interviewer: Okay. What do you define as good oral health behaviors?
Interviewee: Brushing your teeth, flossing, yea.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Not brushing your teeth, not flossing, or like brushing less than you should I guess. And not like taking care of your just like general health could also be bad.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Um, my dentist? Is that - ok?

Interviewer: Do you think that you views on oral health differ generationally in your community or family? And if so, explain how.

Interviewee: I think it's more like - I think that when you like ask older generations like my grandparents for example, they're not gonna like know as much because I also noticed that adults don't go to the dentists as often as kids do - is that like like true? Because I feel like I notice that but I don't know if it's true. But I think that when you're younger you're more educated about - maybe that's just this generation specifically but I don't think like elderly people are as educated on oral health as teenagers or like young adults.

Interviewer: Do you think attitudes toward betel quid are changing over time or across generations? Why or why not?

Interviewee: Um I'm not sure because I'm not really educated in that area. But I think like I said like older generations are not as educated so I think it probably is changing I just don't know in what way exactly.

Interviewer: And is there anything we didn't talk about that you would like to discuss?

Interviewee: No, I think we're good!

Interviewer: Okay, thank you!

Participant 2

Interviewer: Hello. This is AP Research interview number 2. Uh participant 2, please refrain from speaking of any identifying language. Yes.

Interviewee: Yes.

Interviewer: Okay. You need to talk like super loud.

Interviewee: Yes.

Interviewer: Okay. Number one, have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?

Interviewee: Yes, I have.

Interviewer: Do these images look familiar to you?

Interviewee: Yes

Interviewer: Okay. What do you know about betel quid or betel nut?

Interviewee: My dad eats it, and I've had family friends also bring it in family gatherings.

Interviewer: Have you witnessed people consume betel quid?

Interviewee: Yes, I have.

Interviewer: How commonly would you say you see this?

Interviewee: I'd say any time we have a dinner or the gatherings with family friends, I always see a plate of this.

Interviewer: Would you say pretty frequently?

Interviewee: Yeah, pretty frequently.

Interviewer: In what kind of situations do you see this?

Interviewee: Pretty much dinners or any gatherings or parties.

Interviewer: What do you define as good oral health behaviors?

Interviewee: Brushing your teeth, tongue cleaning, and then flossing your teeth, and I'd say every now and then, maybe whitening strips.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Oh, not brushing your teeth twice a day, not flossing every day, not tongue cleaning every day.

Interviewer: What do you think most influences your oral health behaviors? Where do you think you learned these things from? Parents, teachers?

Interviewee: Yeah, definitely my mom, when I was younger, so I'd brush my teeth and stuff. And then the dentist to floss.

Interviewer: Where do you get the most information about oral health?

Interviewee: Probably my dentist. And sometimes my mom will pull out random facts, but yeah.

Interviewer: Do you think that views on oral health differ generationally in your community or family? If so, how? I wanted to preface that this can include smoking, drinking, and betel quid as well.

Interviewee: I'd say definitely just because my parents grew up in a different area than me, they probably had a lot more different resources than I did. And so their routines for brushing your teeth would differ from mine a lot.

Interviewer: Do you think attitudes towards betel quid are changing over time?

Interviewee: Yeah, I do think that. I think with my dad and then his generation, it was a lot more frequently consumed, and I don't really see it a lot with our generation.

Interviewer: Is there anything we didn't talk about that you would like to address?'

Interviewee: No.

Interviewer: Okay, thank you!

Participant 3

Interviewer: Okay, This is research interview number 3. Participant three, do not say any identifying information.

Interviewee: Okay

Interviewer: You need to talk super loudly because of the audio.

Interviewee: Okay

Interviewer: Have you ever heard of betel nuts or betel quid, also known as paan prior to this interview?

Interviewee: I've heard of paan, but I haven't heard of like the other like definite things.

Interviewer: This is just an image I have pulled up.

Interviewee: Okay

Interviewer: What do you know about betel nut or betel paan and betel nut is the same as paan.

Interviewee: All I know is that it's like a popular thing people usually have after meals, especially at restaurants or events in Indian culture.

Interviewer: Have you witnessed people consume betel quid?

Interviewee: Yeah, even my parents. And then like even at restaurants whenever we go on weekends. Usually it's like after your meal kind of thing.
Interviewer: So how commonly would you say you see this?

Interviewee: Very often. It's like seen everywhere in Indian cuisine.

Interviewer: And what kind of situations do you see this in?

Interviewee: It's usually after meals, especially dinners or lunches. And it's just a way to like end off your meal. I guess it's like a dessert kind of thing.

Interviewer: What do you define as good oral health behaviors?

Interviewee: I mean in general, like brushing your teeth twice a day, flossing and like other things like that.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Maybe choosing not to brush your teeth, using other bad dental practices.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Probably like my routine, like usually choosing to like go through like a specific set of steps that I go through in the morning and like afternoon.

Interviewer: Where do you get the most information about oral health?

Interviewee: Probably from my dentist.

Interviewer: Do you think that your views on oral health differ generationally in your community or family? And if so, how? And I just wanted to preface that this can include smoking, drinking or beetle quit consumption.

Interviewee: I think oral health like is definitely, definitely like different between generations. Like I know my parents don't put as much of an emphasis on it, whereas like me and my sister definitely do. Just

because it's like something that's more advertised to us both in school and then like in general in like the health community.

Interviewer: Do you think attitudes towards betel quid are changing over time? Why or why not?

Interviewee: I think a lot of people, even if like, besides the consequences or like the good implications about betel quid, I feel like a lot of people just don't know about it or like, if there is, like, a problem with it or if it's good for you, but people just aren't very aware of it. And I feel like older generations really don't mind it, but now I feel like not as many people.

Interviewer: And is there anything we didn't talk about that you would like to address?

Interviewee: Nope

Interviewer: Great

Participant 5

Interviewer: This is an interview for Participant 5. Participant 5, don't say any identifying information, okay?

Interviewee: Okay.

Interviewer: Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview? And I have an image pulled up for reference.

Interviewee: Yes, I've seen it in the streets of India.

Interviewer: What do you know about betel nut or betel quid?

Interviewee: I know that it's pretty harmful, but I don't really know as to what it affects.

Interviewer: Okay. Have you witnessed people consume betel quid?

Interviewee: Yes, I have.

Interviewer: How commonly would you say you see this?

Interviewee: Not that common, but especially when I travel to India.

Interviewer: Can you speak a little louder please?

Interviewee: Not that often, but when I travel to India, I see it quite often.

Interviewer: In what kinds of situations do you see this?

Interviewee: Usually just outside on the street - like everyday life

Interviewer: What do you define as good oral health behaviors?

Interviewee: I think like regularly brushing your teeth.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: I mean, I think that would also consist of paan.

Interviewer: Anything else?

Interviewee: Alcohol, All of those, like harmful products.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: I think it's just like based off your routine, so I brush my teeth often, therefore my mouth is clean.
Interviewer: Where do you get the most information about oral health?

Interviewee: I think if I were to just research, or look at different sources online.

Interviewer: Do you think that your views on oral health differ generationally in your community or family, and if so, how?

Interviewee: I think they do differ because over time people develop better routines and health habits.

Interviewer: Do you think attitudes towards betel quid are changing over time? Why or why not?

Interviewee: I think they are, and that's just because people have raised more awareness as to why it's harmful.

Interviewer: Is there anything we didn't talk about that you would like to address?

Interviewee: No.

Interviewer: Okay.

Participant 6

Interviewer: This is the research interview for participant number six. Participant number six, you should not say any identifying information. Say okay.

Interviewee: Okay.

Interviewer: Okay. Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview?

Interviewee: Yes.

Interviewer: Okay.

Interviewee: It helps with digestion.

Interviewer: Have you witnessed people consume betel quid?

Interviewee: Yes.

Interviewer: How commonly would you say you see this?

Interviewee: Yeah, pretty common.

Interviewer: In what kinds of situations do you see this?

Interviewee: After a heavy meal, people usually take a paan.

Interviewer: What do you define as good oral health behaviors?

Interviewee: Yeah, they can take it as long as they wash their mouth.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Not brushing their teeth.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Can you repeat the question?

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Bad smell.

Interviewer: Where do you get the most information about oral health?

Interviewee: From a doctor.
Interviewer: Do you think that your views on oral health differ generationally in your community or family? If so, how? And this can include smoking, drinking or beetle quid consumption?

Interviewee: Yeah, it has - It is different from how my family looks at it. Yes.

Interviewer: Can you explain how?

Interviewee: My mom uses paan after her meal, especially the lunch, but I'm not inclined to it. I try educating her and she doesn't listen. So I try to teach her oral health benefits and stuff, but she doesn't listen. So, I don't do it knowing the importance of it.

Interviewer: The importance of what?

Interviewee: Importance of not using it.

Interviewer: Do you think attitudes towards betel quid are changing over time?

Interviewee: The new generation? Yes - yes, they are changing a little bit.

Interviewer: How?

Interviewee: They're not using it.

Interviewer: Is there anything else we didn't talk about that you would like to address?

Interviewee: No, nothing, I’m good.

Interviewer: Okay, thank you.

Participant 8
Interviewer: This is AP Research interview participant number eight. Participant eight, please refrain from seeing any identifying information. Number one, have you ever heard of betel nut or betel quid, also known as paan, prior to this interview? And I have an image for you to look at.

Interviewee: No, I have not.

Interviewer: Okay, so to briefly explain what that is like, the betel quid results in the practice of betel quid chewing, which is when you chew a combination of betel leaf, which is from a plant, areca nut, which is also referred to as betel nut, and slaked lime, with or without tobacco. Okay, after knowing this, do you think this sounds familiar?

Interviewee: No.

Interviewer: Okay. What do you define as good oral health behaviors?

Interviewee: Like brushing your teeth, actually flossing, like that stuff? Yea, mouthwash, brushing your teeth twice a day.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Like not brushing your teeth, like that's just nasty.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Like just proper human decency.

Interviewer: Where do you get the most information about oral health?

Interviewee: I don't know, like my dentist, probably?

Interviewer: Do you think that your views on oral health differ generationally in your community or family? And this can include smoking and drinking.

Interviewee: Wait, can you repeat the question, please

Interviewer: Okay, so do you think that your views on oral health differ generationally in your community or family? If so, how? And I just wanted to preface that this can include smoking and drinking.

Interviewee: I feel like in my family it doesn't really, like, differ, but I feel like both my parents are just as considerate of oral health as like my brother.

Interviewer: Do you think that, like, varies in your community?

Interviewee: In my community, I mean, maybe when it comes to like drinking or smoking, but other than that, then I don't really see a difference in like not brushing your teeth or anything.

Interviewer: Can you explain like more about the smoking and drinking?

Interviewee: Like how drinking, like, affects your teeth?

Interviewer: No, like how it differs in your community.

Interviewee: Wait can I have a minute to think? Okay, like, I'm so sorry just give me one moment. feel like in my community, like with drinking, I feel like in comparison to my family, drinking is a different or it's like a bigger, A bigger problem within other people in my community, if that makes sense. That could be like a factor within oral health.

Interviewer: So you would say, like people in your community drink more?

Interviewee: Yeah, I would feel that. Like, I feel like we're like anti drinking.

Interviewer: Do you think attitudes towards betel quid are changing over time? Why or why not?... You can say, I don't know if you don't know.

Interviewee: I don't really know actually, I'm not that informed on that topic.

Interviewer: And is there anything we didn't talk about that you would like to address?

Interviewee: No.

Interviewer: Okay, great. Thank you!

Participant 9

Interviewer: This is research interview number nine, participant number nine, please refrain from saying any identifying language.

Interviewee: Yes.

Interviewer: Okay. Have you ever heard of betel nut or betel quid, which is also known as paan, prior to this interview? And there is an image for reference.

Interviewee: Yes, I have.

Interviewer: What do you know about betel quid or betel nut?

Interviewee: I know that's usually consumed after eating like a meal, and I usually have seen my parents or like relatives consume it.

Interviewer: Have you witnessed people consume betel quid?

Interviewee: Yes, I have, but not really my age. People like, I've seen more people who are like, near like my parents age and like my parents, relatives and more like of South Asian descent consume that. I've never seen someone else.

Interviewer: How commonly would you say you see this?

Interviewee: I see it sometimes, like whenever I'm at like, events that are cultural or like religious.

Interviewer: In what kinds of situations do you see this?

Interviewee: Usually when there's like large gatherings that are celebrating or like, there are like, functions almost with like, relatives and stuff. That's usually when I would see it being consumed, but still, not as common among individuals my age.

Interviewer: What do you define as good oral health behaviors?

Interviewee: I think it's just making sure that you like, brush your teeth like, like in the morning and the night, flossing or like using mouth wash like I don't. It's just in general making sure that in the morning you're keeping good health and good hygiene of your teeth and you're not just, you're not like, you're not just having a bunch of these foods and not taking care of your teeth.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: I think it's like not getting like professional cleaning like every six months or like getting it like at least seen by like dental, like by dental visits, not brushing your teeth, obviously, and just making sure that you're like just neglecting your teeth.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Most influences my oral health behavior is just like, obviously getting taught that it's important to keep like your oral health good, but also because it's just in a foundational, like, genuine thing that everyone has known, it's like a known fact to make sure you take care of your teeth because it impacts you in the long run and yeah.

Interviewer: Do you think that your views on oral health differ generationally in your community or family? If so, how?

Interviewee: Not really, because we usually take pretty good care of our teeth, like, we don't really have much issues like generationally or like family wise.

Interviewer: I just wanted to add that this can include smoking, drinking or betel quid consumption. Do you the views don't differ at all?

Interviewee: The views don't differ because my gen like my family don't really like consume a lot of any of those and if they do it's rare. It's not as common.

Interviewer: Do you think attitudes towards Betel quid are changing over time?

Interviewee: Yes, I do think that they are changing over time and they're shifting.

Interviewer: Why?

Interviewee: Because I feel like there is a more increased awareness of like the risks of like oral cancer and like these like it's, it has more negative effects that nobody probably looked into back then because it wasn't really cared about until now when there's more research and obviously it's there's so much more science and backing up of why there's like negative implications of using certain things.

Interviewer: Is there anything that we didn't talk about that you would like to address?

Interviewee: No.

Interviewer: Okay, thank you!

Participant 10

Interviewer: This is a research interview for participant number 10. Participant 10, please refrain from saying any identifying language. Okay. Have you ever heard of betel nut or betel quid, also known as paan, prior to this interview? And here's a reference image.

Interviewee: Yes, I have.

Interviewer: Okay. What do you know about betel quid or betel nut?

Interviewee: It tastes good.

Interviewer: Have you witnessed people consume betel quid?

Interviewee: Yes, my parents and grandparents and me as well.

Interviewer: How commonly would you say you see this?

Interviewee: Not very commonly.

Interviewer: In what kinds of situations do you see this?

Interviewee: After a meal to refresh your mouth.

Interviewer: What do you define as good oral health behaviors?

Interviewee: Brushing your teeth twice a day, taking care of it with toothpaste, flossing and cleaning your tongue, and regularly going to the dentist once a year, at least, maybe twice a year.

Interviewer: What do you define as bad oral health behaviors?

Interviewee: Not brushing your teeth at all. Or maybe not flossing, not cleaning yourself. Basically the opposite of good. Not going to the dentist, eating a lot of chocolate.

Interviewer: What do you think most influences your oral health behaviors?

Interviewee: Laziness. Because if you're too lazy, you're not going to take care of your, your oral health and you're not gonna do things.

Interviewer: So for you personally, you're influenced by laziness?

Interviewee: Yeah, like if I'm really lazy one day, I, like, don't feel like brushing my teeth, like again and again and again and maybe like doing it less on a day when I'm in a rush and maybe not going to the dentist because of time, because of time constraints.

Interviewer: Where do you get the most information about oral health

Interviewee: From the dentist.

Interviewer: Do you think that your views on oral health differ generationally in your community or family?

Interviewee: I think my views on oral health is definitely better than the average individual in like, in like, compared to like, other people.

Interviewer: So, like, you think it differs generationally?

Interviewee: Yeah, it definitely depends generationally because my grandparents probably have less knowledge because they don't go to the dentist as much.

Interviewer: Do you think that older generations are less aware of healthy oral health practices?

Interviewee: Yes, because they don't have as much knowledge and access to, or they didn't have as much access to dentists or doctors as we do.

Interviewer: Do you think attitudes towards betel quid are changing over time?

Interviewee: Yes, I think it's less common in this generation due to less access to it. Like, it's not as common in places outside.

Interviewer: So you think that because of less access there's less usage?

Interviewee: Yes.

Interviewer: Is there anything we didn't talk about that you would like to discuss?

Interviewee: No.

Interviewer: Okay.