Sociocultural Factors that Affect Chewing Behaviors among Betel Nut Chewers and Ex-Chewers on Guam

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Abstract
Areca nut (betel nut) is chewed by an estimated 10% of the world’s population which is equivalent to about 600 million people. It is classified as a Group 1 carcinogen by the World Health Organization (WHO) and has been linked to various types of oral cancer. Chewing areca predominates in South and South East Asia, East Africa, and the Western Pacific and has important social and cultural implications. The purpose of the pilot study was twofold: (1) to examine sociocultural factors that affect why people on Guam chew betel nut, their chewing behaviors, perceptions of risks, probability of changing behaviors, and methods that could be used to reduce use or quit; and (2) to pilot two surveys (one for chewers and one for ex-chewers) to be used in a larger study in the future. A mixed methods design was employed that included surveys pertaining to their status (chewer or ex-chewer) and in-depth interviews. A total of 30 adults participated in this pilot study: adult betel nut chewers (n = 15) and ex-chewers (n = 15). Chewing betel nut is a learned behavior, embedded within the culture, and is viewed as an important cultural identifier. Socially, chewing is viewed as positive. Chewers stated that they were not as aware of health issues; however, ex-chewers stated health reasons for quitting.

Introduction
An estimated 600 million people worldwide chew areca nut, or betel nut.²⁴ Areca nut chewing is ranked as the fourth most frequently abused substance following nicotine, ethanol, and caffeine.²⁵ The behavior and practice are indigenous predominantly to South and South East Asia, East Africa, the Western Pacific, and are an important expression of social and cultural identity.²³⁶⁷ The prevalence of areca nut chewing is expanding.⁴

Areca nut chewing is a Group 1 carcinogen by the International Agency for Research on Cancer (IARC).⁸ It is associated with oral and oropharyngeal cancer, oral lesions, oral lukoplakia and submucous fibrosis, gum disease, along with cancer of the pharynx and oesophagus.⁵⁹¹⁰ Oral cancer rates are high in the Western Pacific¹¹⁻¹³ and the rate of mouth cancer is much higher in some Micronesian groups on Guam compared to rates among Caucasians.¹¹,¹² Feelings of euphoria, feelings of warmth throughout the body, oral fixation, rituals associated with preparation, and a desire to prevent withdrawal symptoms are among the reasons given for chewing.⁶,¹⁰,¹⁴,¹⁵

Origins and Constituents
The areca nut originates from the areca catechu tree.³ The areca nut is a hard brown kernel similar in size to a plum stone and can be consumed in a variety of ways: raw, roasted, or boiled.³¹⁴,¹⁵ The term betel quid is defined as a mixture of various substances.³⁸,¹⁰,¹⁵⁻¹⁷ The most common preparation is to cut the nut in half and fold it into a Piper betel leaf, with slaked lime added.⁸,¹⁰,¹⁵ The term “betel nut” evolved from the combination of the areca nut with the Piper betel leaf.⁴ Tobacco and alcohol may be added to the quid.⁸,¹⁸ Other variations include: chewing the areca nut by itself as the mature nut, or chewing the areca nut in combination with the betel vine, stem, flower, or pods.⁸,¹⁹,²⁰ The betel quid is then placed in the mouth against the mucosa and chewed to extract the juice from the mixture.⁸,¹⁰ In the current manuscript, the term betel nut is used to refer to any preparation of the areca nut (alone or with ingredients added).

Betel Nut Chewing on Guam
Betel nut chewing practices vary by geographical region.²³⁶ Two distinct groups of chewers exist on Guam:

• Chamorro Style: This group includes predominantly native Chamorros of Guam which are a mix of Malayo-Polynesian, Spanish, Mexican, and Filipino descent.²¹ They chew the red, mature nut by itself and ingest the nut. Some chewers in this group occasionally add betel leaf.²⁰

• Yapese Style: The second group includes predominantly other Micronesians who migrated from the neighboring islands of Micronesia (Chuuk, Kosrae, Palau, Pohnpei, Saipan, and Yap) along with the Philippines.²² This group prefers to chew a custom-made betel quid which includes unripe nut, betel leaf, slaked lime, and tobacco (often from a cigarette stick). These chewers often spit out the betel quid and juices.¹⁹,²⁰,²³

Chemical composition
The areca nut is composed of “carbohydrates, fats, proteins, crude fibre, polyphenols (flavonoids and tannins), alkaloids and mineral matter.”⁷ There are six related alkaloids contained in the areca nut; arecoline being the main alkaloid.³ Arecoline is a central nervous system stimulant that increases the amount of acetylcholine in the brain which results in an increase of the transmission of nerve impulses across the synapses.¹⁰ It is also responsible for many side effects, including an acceleration of the cardiorespiratory system in humans and an induced arousal response in animals.⁵ The chemical composition varies according to the manner in which the betel nut is prepared (raw, quid with tobacco, quid without tobacco).¹⁵ Adding tobacco to the mixture or taking it with alcohol has been found to increase the dependency.⁴,¹⁸

Cultural context
Betel nut chewing is an expression of cultural and social identity and is woven into the cultures of South and South East Asia and the Pacific Islands.²³⁶ To our knowledge, risk reduction and cessation programs for betel nut do not exist. Little is known
about what people think about chewing and how they think about changing chewing behaviors. The purpose of the current study was to examine the sociocultural factors that affect why people on Guam chew, chewing behaviors, perceptions of the risks, probability of changing behaviors, and methods that could be used to reduce use or quit. An additional purpose was to pilot two surveys (one for chewers and one for ex-chewers). Data from the surveys will be used for a larger study to develop a culturally appropriate risk reduction and cessation program.

**Methods**

**Participants**
The following inclusion criteria were employed: self-identified as a betel nut chewer or ex-chewer and 18 years old or older. Current chewers are defined as having chewed betel nut for 3 years at least once a week. Ex-chewers were defined as having chewed betel nut at least once per week for 3 or more years and having stopped chewing for 6 weeks or longer.

**Procedures**
The study was conducted on Guam. Participant recruitment techniques included: newspaper advertisements, flyers in the community and at the mayor’s office of each village, and word of mouth. Targeted recruitment was used to ensure diversity and representativeness of the sample. Interested participants contacted the researcher and were screened. Initially, surveys were distributed through the mail and included addressed and stamped envelopes for participants to return surveys. The protocol was later changed to face-to-face due to a low response rate with the mailed surveys (2% vs 98% response rate). Researchers conducted the interviews in a location that was convenient for participants. Procedures were explained to the participants, who then signed the informed consent prior to completing the survey. Once the surveys and interviews were completed, the participants received a $25 gift card. Institutional Review Board approval was granted from the University of Hawai‘i at Manoa and the University of Guam.

**Surveys and Interviews**
Participants completed a survey pertaining to their status (chewer or ex-chewer) followed by a separate, in-depth interview. The phases for distribution of surveys and conducting interviews were as follows:

- Phase one: Develop two surveys, one for chewers and one for ex-chewers;
- Phase two: Mail surveys to 8 chewers and 8 ex-chewers;
- Phase three: Conduct interviews regarding clarity of survey items, add and delete items, and learn about their betel nut use and probability of changing their chewing behaviors; and
- Phase four: Revise surveys based on comments from phase three. Mail revised survey to an additional 7 chewers and 7 ex-chewers. Repeat phases three and four to obtain final survey.

**Instruments.** Pilot surveys were developed for both betel nut chewers and ex-chewers to be used during the current pilot study and intended for use in a future larger study. Because the literature is limited on measurement tools regarding betel nut chewing and cessation, the researchers adapted items from existing smoking cessation surveys. The surveys consisted of multiple response questions and Likert scale questions.

The survey for chewers consisted of 37 questions related to the following categories: demographics; background; chewing behaviors; type of betel nut; cultural importance; social importance; quitting behaviors; Betel Nut Dependence Scale (with 16 sub-questions); quit methods; risk perception; and ingredients added to quid. Examples of survey questions used to elicit information pertaining to social and cultural implications include: “Did you feel that chewing betel nut or betel quid was expected in your culture?” and “Rate how negatively people would think of you if you decided to give up chewing betel nut or betel quid.”

The survey for ex-chewers was similar to the survey for chewers, with additional questions added related to cultural and social importance and behaviors since quitting (total of 45 questions). Examples of survey questions include: “Which method(s) did you use to quit chewing betel nut or betel quid (cold turkey; motivation/desire; substitution; diagnosed with medical condition; changed social group, other); and “Have you ever been diagnosed by a doctor as having any of the following conditions (cardiovascular disease; metabolic syndrome; oral cancer; oropharyngeal cancer; oral lesions; oral leukoplakia; submucous fibrosis; gum disease; cancer of the pharynx; cancer of the esophagus; heart disease).”

**Interviews.** Interviews were conducted to give participants the opportunity to: clarify answers given in the survey; expand on answers; and answer additional questions regarding psychological, social, and cultural reasons as to why people on Guam chew(ed). Questions were open-ended and developed from a list of possible survey topics (Appendix A). All interviews were audiotaped and transcribed verbatim and sent to participants to check for accuracy.

**Data Analyses**
Data analysis followed the same process as Gould, Finch, & Jackson (1993); Murphy (2007; 2010a, b); and Murphy, Brown & Nelson (2009). Inductive reasoning was used. Three phases of coding were used. The purpose during each phase of coding was to compare data to research questions, condense, and eventually arrive at overall higher order themes. This is referred to as a constant comparison method. Two researchers and two research assistants participated in the coding process. Initially, the lead researcher began the process by counting the total number of individual sentences from all of the transcribed interviews. Individual sentences were referred to as raw data units.

The objective during the first phase of coding was to examine raw data units and identify any references to psychological,
social, and cultural reasons for chewing; chewing behaviors; perceptions of the risks; and probability of changing behaviors. When any of these references were found, they were extracted as quotes. They were placed into concept maps to demonstrate a visual representation of the connections among raw data units.

The objective during the second phase of coding was to reduce raw data even further by using the constant comparison method described above. Individual raw data units with the same meaning were combined into lower order themes and labeled with two to three words to identify the theme. If individual raw data units did not have the same meaning they were not combined. If the researchers and research assistants did not unanimously agree on the theme then raw data units were placed into different lower order themes.

The constant comparison method continued during the third phase of coding. In this phase of coding, lower order themes with the same meaning were condensed into higher order themes that could be explained by existing research and labeled with two to three words to identify the higher order theme. “Trustworthiness” is used to describe the “overall quality of the results.” In the current study, the following was used to measure trustworthiness: (a) audit trail and a pilot study; (b) in-depth description of participants and the setting; (c) triangulation by the use of interviews and surveys; (d) member checking; and (f) purposeful selection of participants which is used when the researcher deliberately selects from a population in which he or she can learn the most rather than random sampling.

Results
A total of 30 individuals, including adult betel nut chewers (n = 15; 6 males, 9 females) and ex-chewers (n = 15; 7 males, 8 females) from Guam volunteered to participate in the pilot study (Table 1). The ethnic breakdown for chewers was: Chamorro - 7; Palauan - 5; Yapese - 2; and Caucasian – 1. The average age for chewers was 41.29 years (SD – 13.89). The average years of chewing was 20.27 (SD – 12.74). The average amount of times per day they reported chewing was 14.85 (SD – 11.81) times. The ethnic breakdown for ex-chewers was: Chamorro – 11; Filipino – 3; Hispanic – 1. The average age for ex-chewers was 43.47 years (SD – 18.81). Average years of chewing was 9.27 (SD – 12.25) years and they reported chewing an average of 6.36 (SD – 8.11) times per day. The average amount of years that they had stopped chewing was 6.33 (SD – 5.96) years.

Among chewers, 13,045 raw data units were condensed into 12 lower order themes and 6 higher order themes (Table 2). For ex-chewers 9,660 raw data units were condensed into 12 lower order themes and 6 higher order themes. Results were combined because themes that emerged were similar for chewers and ex-chewers (N = 30).

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**Table 1. Descriptive statistics of chewers and ex-chewers.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chewers (n=15) N (SD)</th>
<th>Ex Chewers (n=15) N (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age</td>
<td>41.29 (SD – 13.89)</td>
<td>43.47 (SD – 18.81)</td>
</tr>
<tr>
<td>Average Years of Chewing</td>
<td>20.27 (SD – 12.74)</td>
<td>9.27 (SD – 12.25)</td>
</tr>
<tr>
<td>Average Chewed Per Day</td>
<td>14.85 (SD – 11.81)</td>
<td>6.36 (SD – 8.11)</td>
</tr>
<tr>
<td>Average Years Stopped Chewing</td>
<td>--</td>
<td>6.33 (SD – 5.96)</td>
</tr>
</tbody>
</table>

**Ethnicity**

<table>
<thead>
<tr>
<th></th>
<th>Chewers</th>
<th>Ex Chewers</th>
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</thead>
<tbody>
<tr>
<td>Caucasian</td>
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<td>0</td>
</tr>
<tr>
<td>Chamorro</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Filipino</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Palauan</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Yapese</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

**Employment**

<table>
<thead>
<tr>
<th></th>
<th>Chewers</th>
<th>Ex Chewers</th>
</tr>
</thead>
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<tr>
<td>Administrative Assistant</td>
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<td>0</td>
</tr>
<tr>
<td>Airline Employee</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Butcher</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cook</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Government Employee</td>
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<td>3</td>
</tr>
<tr>
<td>Graphic Artist</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Homemaker</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Maintenance</td>
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<td>0</td>
</tr>
<tr>
<td>Program Coordinator</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Retired</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Student</td>
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<td>1</td>
</tr>
<tr>
<td>Teacher</td>
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<td>2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

SD, standard deviation

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**Table 2. Lower order and higher order themes for chewers (13,045 raw data units) and ex-chewers (9,660 raw data units).**

<table>
<thead>
<tr>
<th>Lower Order Themes</th>
<th>Higher Order Themes</th>
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<tbody>
<tr>
<td>Availability for Others</td>
<td>Reasons Started</td>
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<tr>
<td>Preparation for Others</td>
<td></td>
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<tr>
<td>Medicinal Properties</td>
<td>Reasons to Chew</td>
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<tr>
<td>Sign of Beauty</td>
<td></td>
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<tr>
<td>Availability at Ceremonies</td>
<td>Cultural Importance</td>
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<tr>
<td>Cultural Identifier</td>
<td></td>
</tr>
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<td>Peer Pressure</td>
<td>Social Importance</td>
</tr>
<tr>
<td>Social Acceptance</td>
<td></td>
</tr>
<tr>
<td>Expense</td>
<td>Reasons to Quit</td>
</tr>
<tr>
<td>Medical Issues</td>
<td></td>
</tr>
<tr>
<td>Cold Turkey Substitution</td>
<td>Methods to Quit</td>
</tr>
</tbody>
</table>

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Peer pressure. Eight participants (27%) felt that there was peer pressure to chew. An ex-chewer stated: “If you didn’t chew, you were kind of an outcast.” Similarly, a chewer stated: “The first time I tried it, I got sick so I said I didn’t want to do it anymore, but peer pressure, they kept telling me to do it.”

Social acceptance Thirteen participants (43%) stated that it was an important venue to connect and interact socially. An ex-chewer explained: “I didn’t want to feel left out…this is what’s making us hang out, is the betel nut.” Participants stated that often times it was the socializing with friends that initiated the chewing of betel nut.

Reasons to Quit

Expense. The amount of money spent per week buying betel nut varied (n = 9, $0-$10; n = 2, $11-$20; n = 2, $21-$30, and n = 1, $71-$80; data not shown). An ex-chewer stated: “It was really expensive and being around that age, I did not have a job.” When additional ingredients are added the expense increased. A chewer stated: I taught my daughter not to chew because it’s an expensive habit and once you get addicted, it’s hard to stop.”

Medical Issues. Nine participants (30%) cited experiencing serious medical issues. An ex-chewer explained: “I got a lot of acid reflux from it [chewing because] I swallowed them.” Another ex-chewer explained: “Right after eating (betel nut) my throat started to swell up really bad […] it was the turning point of my betel nut chewing and that is what stopped me from chewing.”

Ex-chewers cited medical reasons for quitting; however, even though chewers experienced medical issues from chewing betel nut, this did not deter them. They stated that taking a temporary break from chewing alleviated the symptoms and then they were able to resume chewing betel nut again. A chewer stated: “Sometimes I switch sides (of the mouth) if one side is burnt. If both sides are burnt, then I would relax until the next day because then it would heal.” An ex-chewer reiterated a similar story involving parents: “Usually when they have sores, they will gargle with warm water just to help with the pain. Then after that, they’ll still continue on. They will not stop.”

Methods to Quit

Cold turkey. Among ex-chewers, eight quit “cold turkey” (53%). One ex-chewer was motivated for cosmetic reasons and stated: “When I finally put my braces on that’s when I decided I’m going to just go cold turkey and I just never went back.” Another ex-chewer was motivated for medical reasons. The ex-chewer stated: “Actually I quit chewing after I was diagnosed with cancer. I just quit.”

Substitution. Additional methods such as substitution (n = 7; 47%) were used to successfully quit. An ex-chewer stated: “Of course you have to cut down so every time they offer me, I would just take half and then half of that.” In relation to replacement therapy, another ex-chewer also stated: “But then once I just stopped and started chewing gum more, so every time I wanted to chew, I would just chew gum.”

Reasons Started

Availability. Out of the 30 current and former betel nut chewers, 30% (n = 9) started chewing because it was readily available and they were constantly exposed to the practice. A chewer explained this by stating: “I picked it up at the house […] everyone that stays at my house chews betel nut, my uncles, everybody.”

Preparation for Others. A common practice for participants (n = 9; 30%) is to prepare the betel nut for elders in the family to chew because of their lack of teeth. Part of the process of preparation included: placing the betel nut in their mouths and chewing on it to soften it up and get it ready for the elders to chew. As a result of constantly preparing the betel nut and chewing it, they began to chew themselves. An ex-chewer told a story of preparing the betel nut for both parents by stating: “I never really wanted to try it. I had to chew it to prepare it for other people. I had to and I did it for 11 years. Both of my parents chewed betel nut.”

Reasons to Chew

Medicinal Properties. Seven participants (23%) believed that betel nut offers medicinal properties and learned to use the betel nut to treat ailments. An ex-chewer stated: “They used betel nut […] for medicine when you are feeling nauseous. You would swallow it to make you feel better.”

Sign of Beauty. Mixing the piper betel leaf with the nut causes a red stain in the mouth and on the teeth. It is a sign of beauty (n = 2; 13 %) to have red stained and black stained teeth and it is expected in the culture. A chewer stated: “In my culture, women with red teeth are beautiful.” Another chewer supported this concept by stating: “…girls with white teeth are considered ugly in our culture.”

Cultural Importance

Availability at ceremonies. Forty-three percent of participants (n = 13) stated that betel nut is an integral part of rosaries and other ceremonies. A chewer stated: “It’s cultural, especially at rosaries and anniversaries (of death), they pass it out. They pass out the betel nut- it’s cultural and traditional.” An ex-chewer explained: “It’s very big at weddings. The first thing the manamko (older people) would say is where’s the mama (chew)? Where is the betel nut? Where is the pupulu (leaf)? They don’t want any food. That’s the first thing they want.”

Cultural identifier. Half of participants (n = 15; 50%) stated that chewing betel nut was an important cultural identifier. An ex-chewer stated: “It’s Chamorro culture.” Interestingly, one chewer stated: “It’s an identifying marker. It identifies the group and we are-Micronesians in general- we all chew betel nut.”

Social Importance

Chewing betel nut was not only viewed as an integral part of the culture but socially significant.

Peer pressure. Eight participants (27%) felt that there was peer pressure to chew. An ex-chewer stated: “If you didn’t chew, you were kind of an outcast.” Similarly, a chewer stated: “The first time I tried it, I got sick so I said I didn’t want to do it anymore, but peer pressure, they kept telling me to do it.”
Discussion
The current pilot study was designed to examine psychological and sociocultural factors that affect why people on Guam chew betel nut, their chewing behaviors, their perceptions of the risks, probability of changing behaviors, and methods that could be used to reduce use or quit.

The results are supported by the social cognitive theory and are consistent with other studies. According to the social cognitive theory people learn through observation of others. Participants stated that chewing betel nut was a learned behavior that was influenced by their environment in addition to the people they were surrounded by in the environment. Participants picked up the habit of chewing betel nut because it was readily available around the home and at social gatherings. Participants learned that it was an acceptable behavior to demonstrate in social situations and somewhat expected. Little et al also supported the fact that the social significance attached to chewing betel nut had an impact on the desire to change behaviors or even quit.

According to Bandura and colleagues, people react to situations according to what they perceive the outcomes to be, based on their observations. People are more likely to model the same behavior if the outcomes are perceived as desirable and positive. In the current study, chewing betel nut was viewed as a positive social behavior by everyone. Chewing was also viewed as an important cultural identifier and an integral part of many cultural rituals (rosaries and anniversaries of death). As a result of these perceived positive factors, participants modeled the behavior of chewing betel nut. In this case, the importance of the cultural values influenced how participants behaved. Paulino et al (2011) supported these results by also finding that chewing was an important social identifier and in some cases they began chewing as a result of peer pressure and the desire to be included in the group.

Dijkstra et al and Wang et al examined smokers’ motivation to change behaviors. In this study, chewers stated that they were experiencing health issues such as sores in the mouth, inability to open their mouth, and other related issues, but that it was not enough to convince them to cease the behaviors. Chewers stated that if they took a rest, stopped for a while, allowed the sores to heal, then they could resume chewing betel nut. In this case, perception of risk did not influence chewing behavior. However, most of the ex-chewers stated that they quit because they were experiencing serious health issues such as losing their teeth, burns in the back of their throats, and other negative side effects. For the ex-chewers, the connection between perceived health risks was enough to make them stop chewing betel quid. Griffin et al, supported this finding by finding that participants continued chewing even with the awareness of known health risks and did not indicate an intention to quit chewing. Herzog et al, found that participants who added tobacco were less likely to quit due to the increased dependence created by the tobacco. Tobacco is also a widely known health risk and those who added tobacco did not show an intention to quit.

Limitations
Several limitations should be taken into consideration. First the study sample may not be fully representative of all chewers and ex-chewers on Guam. Second, the sample size was small. This was a pilot study utilizing a mixed methods (quantitative surveys and qualitative interviews) design. This will limit the generalizability of our results. Third, results are limited to the honesty of the participants in their responses. Fourth, participants in phase four received a revised version of the two surveys completed by participants in phase one. Questions pertaining to demographics and research questions were similar for both versions of surveys in both phases. The main revisions for phase four were the addition of the Betel Quid Dependence Scale including the addition of 8 questions to the ex-chewer survey specifically related to quitting, quit attempts, and methods used to quit. Thus, comparisons between responses from participants in phase one and phase four may be inappropriate, and the generalizability of our findings may be limited.

Future Research
This pilot study makes an important contribution to understanding the psychological and sociocultural reasons as to why chewers and ex-chewers on Guam chew betel nut, how they think about chewing, and their perceptions of risks. The findings suggest that cultural and social values have strong influences on behaviors and whether or not betel nut chewers are willing to quit. These findings offer insight for creating culturally appropriate and successful behavior change programs. Dijkstra et al (1999) examined the relationship between self-efficacy, intentions, and motivation to change. Self-efficacy was not examined in the current study. Future studies that examine the relationship between self-efficacy, betel nut chewing, and ability to change behaviors or quit among the Micronesian population, would be advantageous. Since this pilot study, the surveys were revised and sent out to 600 participants (375 chewers and 225 ex-chewers). Results from this study will be published in future works.

Conflict of Interest
The authors declare that they have no conflict of interest.

Disclosure Statement
Funding for the study was provided by the National Cancer Institute (NCI) Grant U54 CA143727. The NCI had no further role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

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Appendix A
Possible Survey Item Topics
Possible Survey Item Topics for Chewers
• Patterns of chewing behavior (when, how often, etc)
• Type of areca nut or betel quid (nut only or quid; if quid, what ingredients)
• Motivation to change chewing behavior to reduce health risk
• Reasons for chewing
• Reasons for wanting to change chewing behavior (if any)
• Perceived dependence on areca nut or quid
• Cultural importance of areca nut chewing
• Health risk perceptions associated with areca nut chewing

Possible Survey Item Topics for Ex-Chewers
• Patterns of chewing behavior when they chewed in the past (when, how often, etc)
• Type of areca nut or betel quid chewed in the past (nut only or quid; if quid, what ingredients)
• How each individual succeeded in quitting chewing
• Why they quit chewing
• Difficulties encountered while quitting chewing
• Withdrawal symptoms following cessation of chewing
• Number of cessation attempts before successfully quitting

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411