Betel Nut Product Characteristics and Availability in King County, Washington: A Secret Shopper Study

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Abstract

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Background: The cultural practice of betel nut chewing with known detrimental health effects has become more geographically widespread through migration, and subsequently, global disease patterns have changed. Immigrants are at risk for oral health and multi system diseases due to continued patterns of betel nut use. Although legal in the U.S., little is known about the availability, purchasing patterns, and regulation of betel nut products.

We documented the availability of betel nut and the consumer experience of buying betel nut in King County, Washington.

Methods: We created a census sample of all Asian stores in King County, Washington through an internet search and in person store visits. We used a Secret Shopper design method to identify all stores that sold betel nut products and to document consumer experience and buying conditions of betel nut. We examined product pricing, labeling and marketing information of betel nut products purchased and developed a Product Information Score to evaluate products warning and consumer information properties.

Results: Twenty-seven Asian stores (42%) sold betel nut products in King County. We identified 60 different types of betel nut products: 67% did not have warning labels, 22% had promotional advertising, 30% were marketed to children. No stores had warning signs about betel nut health risks, and all betel nut products without tobacco were available for self selection by consumers. Gutka was sold in 26% of stores and all gutka products were sold behind the counter. All regions of the Seattle metropolitan area contained stores that sold betel nut and regions of greater Asian population density had more betel nut stores.

Conclusion: Betel nut is widely available, accessible, and inexpensive in King County, Washington. Stores inadequately warn consumers of betel nut health risks due to lack of in store warning signs, lack of age requirements for purchasing, easy access to most products, and limited product package warning information. Policy changes are needed to better regulate the betel nut market for consumer protection. Betel nut awareness campaigns are needed to promote prevention and cessation of betel nut use in order to reduce poor health outcomes among betel nut users.

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1 Background

Areca nut, commonly known as betel nut, is the seed of the areca catechu palm tree and is a major component of a social and cultural masticatory practice among South Asian, Pacific Islands and East African populations. Although prevalence and patterns of betel nut use have been difficult to document, approximately 600 million people, or 10 to 20% of the world's population, use betel nut in some form.[1]

The ancient practice of betel nut consumption has long been a part of cultural, religious and social tradition.[2] Its role in social cohesion has been described in two ways. Some have described it as a practice of commonality that unites people together across social strata. On the other hand, it also has been described as a way to distinguish social identity, serving as an "ethnic marker" of minority populations.[3] In several cultures, betel nut has played a role in ceremonies of courtship and marriage and other social interactions.[3] Many South Asian Indians believe betel nut is a food of the divine and use it in Hindu religious ceremonies.[4] The practice is often started in early childhood or adolescence, and is seen as a rite of passage into adulthood.[5] Therapeutic use of betel nut has also been rooted in Ayurveydic pharmacological practices.[3]

Betel nut consumption patterns vary widely between regions and countries; betel nut is chewed alone or in multiple combinations specific to region and individual preference. Betel nut can be used fresh, dried, or in fermented forms. The most common preparation combines betel nut with leaves from the piper betel tree, loose or powdered tobacco, slackened lime paste, and catechu extract from the Acacia tree. To assemble this combination (or variations of it), colloquially known as betel quid or paan, lime paste is spread on a betel leaf and then a slice of areca nut is added, often topped off with a piece of tobacco.[1] The tobacco may also be placed in the mouth

separately from the other betel nut components. The betel leaf is wrapped around the betel nut slice and this approximately one-inch packet is placed between the gum and cheek. It is chewed for long periods of time and individuals swallow or spit out the juice that is produced.[6] In some regions of the world, it is possible to purchase the quid packet hand assembled by vendors or as a commercially packaged form, a product often labeled "Paan Masala," which typically includes betel nut, spices (cloves, cardamom, fennel seeds, and or anise seeds), other flavorings, and sweeteners. Another combination packet known as "Gutka" also includes smokeless tobacco.[7]

Users of betel nut have described positive benefits, including stress relief, hunger suppression, mouth freshener, and relief from multiple body ailments.[3] The presence of psychoactive alkaloids contributes to properties of a mild stimulant, and users describe the heightened alertness contributing to greater work capacity. Some users also say that chewing betel nut is a way to simply avoid boredom.[4]

1.1 Oral Health Effects

Research over the past 40 years has shown betel nut use to be associated with problematic oral health effects.[8] Histological mucosal studies performed on subjects in India, Sri Lanka, and Malaysia in the 1960's-1970's showed associations between betel nut chewing and precancerous lesion formation of the oral mucosa.[9 10 11]

The alkaloid chemicals of arecoline, arecaidine, guvacine and guvacoline, along with the copper released from betel nut when chewed, are involved in the collagen-producing pathway that can lead to potentially malignant disease of oral submucous fibrosis. Local inflammation of tissue by betel nut is also a component of the increased collagen production.[12] Other oral diseases with premalignant potential, including leukoplakia, erythroplakia, and lichen planus are associated

with betel nut consumption.[4] When betel nut is combined with tobacco, the risks of oral health disease are magnified.[13] Betel nut, tobacco smoking, and alcohol use have been shown to have synergistic effects on the development of oral cancer.[13 14]

Oral cancer rates are higher in countries where betel nut preparations are chewed.[15] In 1966, the World Health Organization published a multi-country study of South, Eastern, and Central Asian populations that found the highest rates of oral cancers in India and Sri Lanka, suggesting that betel quid chewing played a major role in cancer development. A case control portion of this study demonstrated a strong oral cancer association with tobacco and betel quid chewing as well as associations with smoking and alcohol consumption.[16] More recent studies show that high incidence rates of oral cancer in Central Asia and India have been associated with the use of betel nut with and without tobacco, especially when combined with additional risk factors of smoking, alcohol use, and poor diet.[17]

1.2 Multi System Health Risks

In addition to oral health consequences, betel quid use has been associated with multiple other health conditions.[18 19] Asthma has been shown to be aggravated by betel nut use and can result in moderate to severe bronchospasm.[20] Betel quid containing tobacco used during pregnancy has been associated with adverse infant outcomes including higher rates of stillbirths and low birth weights among betel nut using mothers compared with those who did not use these products.[18] Esophageal and laryngeal cancer risks were increased among users of betel nut with and without tobacco.[18] Betel nut use is an independent risk factor in the development of liver cirrhosis and liver cancer, and users have more than twice the risk of developing chronic kidney disease than

nonusers.[21] [22] Research suggests betel nut is a more powerful factor in the development of chronic kidney disease than is smoking or alcohol use.[23]

Several studies have shown an association of betel nut use with cardiovascular diseases. General obesity and increased abdominal girth have been associated with betel nut use, as has metabolic syndrome.[24] [25] Increased risks of hyperglycemia and development of Type 2 diabetes have been associated with betel nut use. Taiwanese subjects developed diabetes at an earlier age when compared to Europeans, implicating early betel nut use habit development.[26] Increased risk of cardiovascular disease and all cause mortality were found among Taiwanese betel nut users.[27] [28] In Taiwanese males, betel nut use was associated with a greater risk of cardiovascular disease and all-cause mortality than from smoking with a dose-response effect.[28]

1.3 Dependency Syndrome

The presence of tolerance, withdrawal symptoms, cravings, and chronic daily use suggest a dependency syndrome from betel nut use, although research has been limited.[29] The alkaloid chemicals in betel nut could explain the stimulant and relaxation properties often described by users.[29] User reports of increased alertness, decreased tension, and general pleasure/euphoric feelings could be explained by the stimulation of both sympathetic and parasympathetic nervous systems.[30] The common practice of combining tobacco with betel nut could also explain the development of dependency.[29] [31] Cambodian women in California described withdrawal symptoms when they abstained from betel nut use, providing further evidence of the addictive potential of betel nut products.[6]

1.4 Emerging Public Health Threat

Gutka, a more recently developed combination betel nut and smokeless tobacco product that masks the bitter taste with flavorings and spices, has been aggressively marketed in India. It is relatively inexpensive and technically easy to export due to longevity of the product.[7] Public health activists have expressed concern that this product poses a danger (especially to children) because of its cultural acceptance, inexpensive price, easy access, sweet taste, and lack of social stigma.[7] Subsequently, gutka has been banned by the Indian Supreme court in 14 Indian states.[32] The product factors, coupled with rising South Asian immigration to the U.S. and the increased buying power of those immigrants, creates a confluence of indicators pointing to a public health danger.[7] In a pilot study by Dr. Changrani and colleagues in 2006, more than half (54 %) of the Indian Gujarati community studied in New York were found to have initiated their use of gutka in the United States.[33]

1.5 Effects of Migration

With migration of Asian people to other countries and continents, betel nut practice has become more geographically widespread. Immigrants tend to continue similar patterns of use after migration.[34] However, some changes in patterns of use have been documented in a qualitative study of South Asian immigrants in New York where immigrants describe changing from spitting to swallowing betel nut juices for social acceptability reasons, and initiating betel nut use in lieu of smoking in response to indoor smoking restrictions.[35] In small studies conducted in Great Britain, high betel nut use prevalence rates were found in the UK Bangladeshi community, coupled with moderate rates of usage in the mixed Asian population.[34] High betel nut use rates were found in adolescent Asian ethnic groups residing in the UK.[34] Moderate to high prevalence

rates were found in Asian adults and high prevalence rates among Asian adolescents residing in the UK. In London, a high prevalence of Asian children was found to have ever used betel nut and 15-30% of children were current users.[15] Also in this London study, children between ages 5 and 12 were at greatest risk for engaging in betel nut practice.[15]

The levels of awareness among immigrants of the dangerous health effects of betel nut are largely unknown, since few studies are available. Two studies of South Asians in London showed a general lack of awareness of the hazards of betel nut use.[36 37] Among Bangladeshi adolescents, a low percentage were aware of betel nut use and its association with cancer and respiratory issues.[38] Some South Asian immigrants in New York expressed concerns that in the midst of a strong anti-smoking campaign, there is a general lack of anti gutka/betel nut public health messaging and hence, lack of community awareness of betel product use health issues.[35]

Betel nut practice is an expression of cultural identity and social ritual in many cultures, and social acceptability likely affects prevalence of use (and levels of associated disease) in immigrant and Asian-descent populations. Lower socioeconomic status of South Asian immigrants, as well as lower levels of English literacy, were related to higher betel nut use rates in the UK.[12] These factors may be determinants of continued betel nut use and may reinforce cultural habits and contribute to the lack of acculturation among adults.[34] Although one in four Bangladeshi adolescents were found to use betel nut in East London, it was noted to be much lower than adult use (78-98%), which could be suggestive of acculturation process.[38]

Migration patterns have changed the patterns of oral health diseases. Case reports of oral submucous fibrosis, a disease once endemic to South Asia and parts of China, have been recorded for immigrant populations in Western countries including the UK, Canada, Germany,

France, Australia, and South Africa.[4] South-Asian immigrants to the US, UK, Malaysia and South Africa are reported to have higher rates of oral cancer, which has been associated with betel use.[4 7 34] Initial results from a cancer registry study in British Columbia, Canada, suggest that South Asians have higher oral cancer incidence rates and relative risks than the general population of British Columbians.[4] Another study in the Malay peninsula cited higher oral cancer rates among South Indians who migrated to Malaysia.[34] The general lack of awareness of betel nut's harmful effects, rising incidence of betel nut use, established social acceptability in relation to ethnic identity, and the legality of betel nut create the perfect storm for this public health threat.

1.6 Purpose of Study

Health risks of betel nut use are well known. However, little is known worldwide and especially in the U.S. about availability, access, purchasing patterns and regulation of betel nut products. One small study in Virginia noted few betel nut products had health warning labels and that products were easily purchased and relatively inexpensive.[39] The U.S. Bureau of Alcohol, Tobacco, and Firearms allows the importation of gutka, and while the state of New York has banned the sale of gutka to minors, little is known about regulation or taxation of gutka in other U.S. states.[7] Previously, U.S. Customs did not permit travelers to bring betel nut in their luggage into the U.S. mainland, however the U.S. Food and Drug Administration lifted this ban in 2000 and now allows amounts less than 5 pounds to be carried into the country.[40] We did not find any information about commercial importation regulations of betel nut products in our literature review.

Our study was intended to document the availability of betel nut products in a large urban county surrounding the Seattle area, where Asians are estimated to comprise 15% of the population and Pacific Islanders, 0.8%.[41] Our secret shopper study design creates a set of new knowledge about the actual experience and buying conditions of a poorly regulated, yet legal product with significant known health risks.

2 Methods

Using a secret shopper study design, we visited all Asian markets in Washington State's most urban area, King County, to measure betel nut accessibility, labeling information, and market characteristics. We created a census of all likely betel vendors by identifying Asian stores through internet searches using Google, Yellow Pages, and City Search engines. We used the search terms "Indian grocery stores," "Indian goods," "Asian goods," "Asian grocery stores," "Pakistani grocery," "Asian market," "Oriental grocery," and "Chinese grocery." Through this process, we identified 115 stores. We included stores that were described as grocery store, importers, gift shops, housewares, department stores, spices, wholesale grocery and ethnic foods. We excluded stores if they were listed as restaurants, bars, wholesale food products, food service management, caterers, delivery service, party and event planning, delicatessen, restaurant management or consultants.

We attempted to visit all 115 stores on our census list. We dropped 26 stores because they did not really exist. We dropped an additional 30 stores; restaurants, tea shops, convenience stores, warehouses, stores selling exclusively herbs and spice or non-Asian ethnic stores since these businesses did not purvey general Asian consumer goods. When shopping, we observed six nearby stores that were Asian groceries or markets not on our original list, and added them to our

sample. Our final census was 65 eligible stores (115-26-30+6). We visited all of them. If a store was closed for the day, we returned on a different day. (See Table 1.)

One author (SB) presented anonymously to each store and posed as a consumer interested in buying betel nut products. As per our human subjects protocol, we did not inform salespeople that the store or its products were part of a study. This is typical of secret or mystery shopper studies, so as to replicate the actual experience of a betel purchaser. Mystery shopper studies have been used to understand typical health-seeker experiences; observation of experiences and behavior by unidentified observers gives confidence to results and can reveal important issues and information that would not otherwise be revealed.[42]

In every store, we walked each aisle searching for betel nut products. If we found betel nut products, we noted the names of the products and their prices. We also asked the salesperson if there were any other betel nut products in the store, even if we found some on our own. If the product packages contained no labeling, we confirmed with the salesperson that the product was indeed betel nut or contained betel nut. We used terms to describe betel nut that are commonly used in Asian cultures: "paan," "betel nut," "kuo," or "supari," and if none of these terms were known to the salespersons, we described betel nut and the chewing practice. If one salesperson said there were no betel nut products, we asked one additional salesperson to confirm this was so; we did this to confirm failure to find the product was not just the result of one salesperson's lack of knowledge or a language barrier.

We then purchased one or more betel nut products available in the store. At checkout, we observed if additional information about betel nut products was voluntarily offered by the salesperson. We asked if there was an age requirement for buying betel nut. Immediately after

leaving the store, we recorded observations about the type and size of store, the presence of betel nut advertisements or warning signs, the presence of cigarettes and cigarette advertisements. We electronically recorded the GPS of the store in which the betel nut products were found.

Back in our offices, we inventoried and reviewed the betel products we had purchased to categorize and catalogue the factors of interest related to package labeling and consumer information.

2.1 Package Labeling

We created a spreadsheet of data points related to the betel nut product acquisition. Our variables included: presence and content of warning labels, presence of an expiration date (and whether that date had passed at the time of purchase), presence and contents of the ingredients list and nutrition information, country of origin label, promotional advertising, "kid friendly" packaging, and whether the product was commercially or hand packaged. Promotional advertisement was assessed as any type of labeling on the package that indicated a positive connotation about the product through words, phrases or pictures to motivate people to buy the product. For example, "good taste," "superb quality," "finest quality" labeling was documented as positive advertising that would encourage people to buy the product. Kid friendly packaging was defined as any product with cartoon characters, colorful pictures such as flowers, animals, children on the package. We found many products not professionally packaged, sold in ziplock bags or plastic bags hand secured with a knot or staples; we labeled these products as "hand packaged."

2.2 Product Information Score

We combined variables to create a scoring system to rate each product as to its consumer information and warning properties. This system was informed by a previous scoring system developed for tobacco control policy measures in a study of public universities.[43] Points were allocated to each product score based on the presence of a positive factor or the absence of a negative factor on the packaging for a total of 10 possible points (perfect 10 points were considered safest). Presence of warning labels (+1 for each type absent, maximum of 3 points), Presence of nutrition information (+1), Presence of a list of ingredients (+1) and Presence of expiration date (+1), Absence of promotional advertising (+1), Absence of kid friendly packaging (+1), Absence of hand packaging (+1). The sum of the scores became the Product Package Information Score. (See Table 2.)

3 Results

Of the 65 stores in the sample, 27 stores (42%) sold one or more betel nut products. We identified 60 different products containing betel and accompanying ingredients. (See Figure 1.) Not a single store that carried the products posted a general public warning sign about health effects. Further, no salespeople provided health information or verbal or written warnings. We were not asked for whom we were purchasing the product in any of the stores, nor were there questions about age (although the buyer was clearly not under-age). On the other hand, no stores posted any advertisements for betel products either inside or outside the store.

In five of stores that sold betel products (19%), a salesperson offered unsolicited comments intended to motivate us to buy the betel products. For example, one salesperson said, “It tastes good, very nice feeling in the mouth, and aids with digestion,” while another salesperson said, “it

helps cure diseases in the body." In the same five stores, the salesperson also offered unsolicited reasons not to buy the product, such as, "it made me dizzy and vomit" and "people who chew it have black mouths and teeth." The remaining 22 stores did not comment on the product, or attempt to promote or discourage a sale (81%).

All of the stores carrying betel nut products displayed them on shelves for self-selection. Additionally, in 26% of stores, betel nut products containing tobacco ("gutka") were "behind the counter," requiring the assistance of a clerk to access them. In eight stores, tobacco-containing betel nut products, as well as loose tobacco, were available on the shelf without requiring a clerk to access them. We found three products containing only loose tobacco in 8 of the 31 small Asian stores (26%). Loose tobacco was always grouped together with other betel quid components in the same section of the store. All of loose tobacco products had warning labels that included "addiction." An additional unlabeled product we identified as loose tobacco, however, did not have a list of ingredients.

Only one store posted an age requirement of at least 18 years of age for purchase of betel nut products that did *not* contain tobacco. In all stores, salespersons, when asked, stated the consumer must be 18 years of age to purchase tobacco or betel nut products containing tobacco.

Among the 60 betel products we found, 62% of all products contained betel nut alone without additives, and these were sold in 26 (40%) of the stores. More than a third (38%) of the products contained multiple ingredients, including one or more of the following: tobacco, sweeteners, spices, and flavors. Multi-ingredient products were sold in 11 (41%) of the stores that carried betel nut or 17% of all 65 stores.

All gutka products were sold behind the counter and were sold in only 4 of our 65 stores. Tobacco was listed as an ingredient on only three different combined products, all of them labeled as "gutka." Only one combination betel nut product did not have a list of ingredients, but it was labeled simply "gutka," and was sold behind the counter, so we assumed this product contained tobacco.

Artificial sweeteners were used in most of the sweetened products we found (81% of the 16 products). We found three sweetened products that were labeled as containing cyclamate, an artificial sweetener banned in the U.S. since 1970 because of its association with bladder cancer.[44] Some unlabeled betel products that appeared not to contain multiple ingredients may have contained spices or sweeteners anyway.

3.1 Product Labeling and Packaging Score

As described in the methods section, we scored each package for its labeling properties—the higher the score, the more attention was given to safety and truthfulness. No product received a perfect score of "10" or even a near perfect score of "9." Only two products (0.03%) achieved a score of "8"; these were both multiple ingredient products without tobacco. One product, a type of gutka, received 7 points. Fourteen products (23%) scored 6 points; most were betel-nut-only products with nutrition and ingredient labeling. One third of products scored 4-5 points (30%) and encompassed nearly all of the sweetened products and most had promotional advertising, kid friendly marketing features, and no warning labels. Six products (10%) received 3 points. Sixteen products (26%) received the lowest score of 2 points; these included all of the hand packaged products that had no warning labels or other product information. The highest rated products (scores of 7-8) were from India, while Thailand and California products scored "6."

Products scoring 4-5 points included all Pakistani products and some products from India, Vietnam, and Thailand.

There was a complete absence of package labeling on 25 products (42%). These products contained no ingredient lists, nutrition information, warning labels, expiration dates, or country of origin information.

More than half (58%) of the 60 different products we found had labels with a list of ingredients on the package (N=35). The ingredient "betel nut," or a variation (eg, supari, cau kho, mak kho, fragrant wood slice, palm nut) was named on the label on just more than half (58%) of the products. About 42% of the labeled products were very likely to contain betel, but didn't name it (or a variation of it) on the label. We determined the likely betel content only because of experience and/or confirmation by the salespeople.

About one in three (32%) packages had a nutrition label, containing information about caloric, protein, carbohydrate, fat content.

One in three (32%) betel nut products had a warning label of some type. The three most common warnings were: 1) Presence of Artificial Sweetener, 2) Not for Use by Minors and 3) General Health. General health warnings included "chewing of pan masala is injurious to health," "tobacco kills," "nonnutritive product," and one package had a photo of a diseased mouth and teeth. Among stores selling betel products, only one-third (33%) sold betel products with warning labels.

Only one product (sold in four stores) sported a warning label specifically mentioning risk of "addiction." All but four products with artificial sweeteners warned about the hazards of consuming artificial sweetener. These warning labels called out that artificial sweeteners should

not be consumed by children and should only be consumed by those who must limit intake of sugar. Five products (8%) sold in three stores contained a general health warning. Six products (10%) carried in four stores warned that minors should not use the product.

Almost one fourth of products (22%) had promotional advertising and these products were carried in eight stores (12%).

A total of eighteen betel nut products (30%) had packaging messages that seemed to be aimed at children; nearly two-thirds of stores (63%) carried these betel nut products (See Figure 3.) In addition, we often found kid friendly packaged and sweetened betel nut products displayed next to candy, cookies and chips. (See Figure 4.)

Only a small number (17%) of the products had expiration dates; these were sold in 5 stores. Two of the products in one store had expired and we had no trouble purchasing them anyway. In another store, the clerk did not allow us to purchase an additional two expired products because he noticed on his own they were expired.

About a third (37%) of the products portrayed the country of origin of the product on the package. Twelve of the products came from Thailand, 11 from Pakistan, nine from India, one from United Arab Emirates and one from Vietnam. Three products said they were from California. Products without country of origin labeling were found in 6 stores. (See Table 3.)

One in five products (20 %) was hand-packed rather than commercially packaged, and these were available in 12 stores (18%). (See Figure 5.)

3.2 Pricing

Gutka and loose tobacco products had the smallest price range between products. Large price ranges were found among betel nut only, combined, sweetened, kid friendly packaged, hand packaged, and no warning label products. Multiple servings per package and product variety could explain the large range in prices between products. It was difficult to objectively define serving size between multiple varieties of products, as this depended greatly on personal preference and products were not comparable in form. All types of products, with the exception of loose tobacco, could be found in stores for less than $1.00. (See Table 4.)

3.3 Store Type and Store Size

We divided the stores into three categories: Small Indian grocery (21%), small Asian grocery (31%) and large Asian grocery (13%). (See Figure 6.) There were no large Indian grocery stores in the sample. Betel nut products were found in 15 small Indian grocery stores (71%), 8 small Asian grocery stores (26%), and in 4 large Asian grocery stores (31%).

One in three small Indian stores sold betel-only products, as did one in four (26%) of small Asian grocery stores and one in three (31%) large Asian grocery stores. Only small Indian groceries carried combined and sweetened betel nut products. While half (52%) of the small Indian stores sold combined products, only a portion were sweetened. The illegal cyclamate containing products were all found in four small Indian groceries.

Almost all stores carried products without labeling of any type. Two in three (67%) Indian stores, eight small Asian stores (26%), and three large Asian stores (23%) carried unlabeled products.

All stores that carried betel nut products sold at least one product that did not have a warning label. Warning labels were absent in 15 small Indian grocery stores (71%), 8 small Asian grocery stores (26%) and in 4 large Asian grocery stores (31%).

While nine of the small Indian stores (43% of them) carried betel nut products directed towards children, only 16% of small Asian grocery stores and 23% of large Asian grocery stores carried these child-oriented products. Small Indian groceries were the only stores to carry betel nut products with promotional advertising and these products were carried in 8 of these stores (38%).

Hand packaged betel nut products were found in 12 stores (18%) and almost all of these products were found in small Indian stores. Half of the small Indian stores contained these hand-packed products, and only one small Asian grocery sold similarly hand-packed betel nut products. Only small Asian stores sold loose tobacco, found in 26% of them.

Twenty stores (74%) had betel nut products that did not list a country of origin. All the products originating from India or Pakistan were found in small Indian grocery stores. Of the ten stores that carried betel nut products from Thailand, eight were small Asian grocery stores, one store was a small Indian grocery and one store was a large Asian grocery. One small Indian grocery carried a betel nut product from United Arab Emirates. Two stores, one small Asian and one large Asian, carried betel products from Vietnam. One small Asian grocery sold products with California as place of origin. (See Table 3.)

3.4 Geographic Distributions of Stores by Type

We divided the metropolitan area into the regions of Seattle city, South Seattle, Eastside, and North Seattle. Two-thirds (66%) of the county zipcodes in these regions contained stores selling betel nut. In the Seattle City region, we found the greatest number of zipcodes with the largest

number of betel nut free stores (5 zipcodes with 18 stores). Tukwila in the South Seattle region ranked second in betel nut free stores (2 zipcodes with 6 stores).

All 4 regions of the Seattle metropolitan area contained nearly half of all child friendly products (found in 11 zipcodes). Hand packaged products and products without ingredient or warning labels were also found throughout the metropolitan region in 10 and 16 zipcodes, respectively. Our investigation revealed region specific findings of product availability. Gutka was found only in Eastside and South Seattle regions (3 zipcodes) as was multiple ingredient products (7 zipcodes). Cyclamate products were found in the Eastside and North Seattle regions (4 zipcodes). The Eastside (5 zipcodes) harbored nearly all of the sweetened products. Regions outside of Seattle city contained products with positive advertising. Loose tobacco was found solely in Seattle city and South Seattle regions in 4 zipcodes (17%).

3.5 Asian and Pacific Islander Population Density

We used U.S. Census data to look at location of Asian stores that sold betel nut in relation to Asian population density by zipcode**.** Asian/ Pacific Islanders populations < 5,000 (7 zipcodes), had 26 Asian stores (40%). Ten of these stores (38%) sold betel nut which averaged to 0.7 betel nut stores per zipcode. Thirty-two Asian grocery stores (49%) exist in 13 zipcodes where Asian/Pacific Islander population was 5,000-10,000 people. Fifteen of these stores (47%) sold betel nut, or an average of 0.9 betel nut stores per zipcode. Asian and Pacific Islander zipcode population densities > 10,000 (3 zipcodes) had a total of 7 Asian grocery stores. Two of these stores (29%) sold betel nut for an average of 1.5 betel nut stores per zipcode. Bellevue, Tukwila, and Redmond contain the highest Asian/Pacific Islander population dense zipcodes (1 zipcode each); 8 stores (47%) sold betel nut in these cities. Seattle city contained the greatest number of

zipcodes (3) with the lowest densities of Asian/Pacific Islanders; 7 stores (28%) sell betel nut in Seattle city.

In summary, betel nut products permeate all regions of the Seattle metropolitan area, however distinct patterns of product availability emerge in specific regions notably gutka, sweetened products, and loose tobacco. The locations of betel nut stores tend to be in regions outside of Seattle city boundaries, and denser Asian/Pacific Islander population areas have more betel nut stores. Additionally, when population densities are compared with income levels, a notable difference in presence of betel nut stores emerges. The Eastside region has modestly more Asians (53,164) than South Seattle (46,330) and much higher median household incomes (Eastside=$88,703, South Seattle=$55,175), yet it has approximately half the amount of betel nut stores than the South Seattle region (Eastside=6 betel nut stores, South Seattle=11 betel nut stores).[41]

4 Discussion

The ancient practice of betel nut chewing has well known detrimental oral and multi-system health effects. With migration, betel nut practice patterns appear to persist in immigrants, and betel nut related disease trends that were formerly only in countries of origin have now emerged in immigrants' new countries of residence. Betel nut practice is a challenge to public health since it is socially acceptable in many cultures, and many immigrants may continue the habit as a way to maintain cultural identity. In the U.S, prevalence and patterns of betel nut practice are still largely unknown; however Asians are the fastest growing immigrant ethnic group in the U.S. (60% immigrants) with South Asian populations showing some of the strongest growth in the last decade.[41] Our focus in this study was to understand the consumer experience of acquiring

betel nut and the availability and characteristics of betel nut products in King County, Washington.

Betel nut products are widely available, accessible, and inexpensive in all regions of the Seattle metropolitan area. Many products cost less than $1.00 and are accessible by most, including children. The sales conditions left us with a precarious risk free impression of betel nut products due to an absence of warning signs, easy access to the products, and no minimum age purchasing requirement with the exception of gutka. While it was reassuring that all gutka products were sold behind the counter, we were struck by the abundance of betel products that could be purchased by anyone. When we read the package warning information, our initial harm free impression of betel nut was somewhat mitigated. However, since more than two in three products lacked complete consumer information and health warnings, we conclude consumers are not well informed about risks of using betel nut.

The use of promotional marketing techniques on packages, especially aimed at children, coupled with the lack of health warning information on most products, adds up to a misrepresentation of betel product contents and the health effects of their use. Especially concerning is the availability and accessibility of sweetened betel nut products marketed towards children. A sweet, cheap betel nut product with package appeal is a risky temptation for young people. We were also alarmed by the illegal loose tobacco displays. In response to our inquiry, all salespeople said anyone purchasing the loose tobacco had to be age 18. We could not be sure if this was the actual practice.

The betel nut marketplace exists almost exclusively in small Asian and Indian grocery stores in the Seattle metropolitan region. The near absence of betel products in large Asian groceries may

indicate higher standards for package labeling, professional packaging and perhaps safety concerns of betel nut products by store owners. The abundance of betel nut products, wealth of sweetened products, and heavy promotional marketing make the Indian stores a hotspot for consumer health risk. Handpackaged products, all of which were sold in small Asian and Indian stores, raise questions about safety standards of product origin, freshness of contents, and handling prior to purchase. Small Asian groceries stood out as the only store type with illegal tobacco displays. These findings suggest that small Indian and Asian stores may pose the greatest health risk to consumers, and therefore, may be a starting point for public health action.

The availability and variety of betel nut products in Asian and Indian stores could reflect the local settlement patterns of immigrants and betel nut use trends among cultures. However, betel nut consumers may not necessarily live close to betel nut stores since travel distances within the region are relatively short. Other demographic factors of betel nut consumers including education and income levels may impact availability of betel nut. Business locations may also reflect rent prices in the region.

4.1 Limitations

Our research has limitations. We may have inadvertently excluded some Asian stores in King County, and although we attempted to be as broad as possible in our internet search terms, some stores may have been excluded or new stores may not be referenced on the internet at the time of our sample selection. Our results may not be generalizable to other geographic areas, as King County has a particular immigration pattern, a particular retail sector that serves that population, and has a particular set of state and local laws. Further, our secret shopper was not of Asian

descent, which may have affected interactions with salespeople, and language barriers may also have affected results.

4.2 Opportunities for Policy Intervention

We found limited information about betel nut regulations and policies in the U.S. during our literature review. This general void of betel nut sales policy information is striking, especially in the context of strong evidence of detrimental health hazards. It is imperative that consumers are informed and warned about the risks of betel nut use. Raising awareness of betel nut harms at all levels is necessary to influence change in habits of current users and prevent potential betel users from initiating the habit. We have provided evidence to support increased awareness of betel nut health risks to target communities where high population densities of South Asians/Pacific Islanders reside and especially to children and young adults of these ethnicities.

Policy change is needed to increase regulations of the betel nut market at local, state and national levels to protect public health. From our Secret Shopper experience, store health standards are a standout priority. At the very least, betel nut products should be professionally packaged and labeled with complete product information and warnings indicating that betel nut products have significant health hazards. Local public health officials need to closely monitor stores for compliance with adequate warning and product information, and require in store warning signs of betel nut health dangers, a minimum age of 18 for purchase, and behind the counter product display for all betel nut products.

The discovery of the banned substance cyclamate and easy access to loose tobacco in some stores in King County raises the question if monitoring and inspection is occurring at points of importation and during store inspections by health departments. Public health officials

themselves may not be aware of betel nut harms and the many varieties of betel nut products in the marketplace. The importation routes of betel products into the U.S. may be clandestine and greater awareness of betel nut products and increased regulation at U.S. borders by Customs Services is needed.

Low prices in stores may reflect the lack of taxation on betel nut products including gutka. Taxation of betel nut products could impact accessibility and rates of use and be a source of revenue for betel nut awareness and cessation efforts.

4.3 Future Research

Areas for future research include a closer investigation into the importation routes and U.S. Customs inspection points. This could inform about betel nut import networks and current regulatory practices to help reform and implement new regulations to protect public health. Qualitative interviews with betel nut store owners could uncover greater insights into patterns of consumption, demographics of betel nut user populations, local regulations of the betel nut market, and supply chain structure. Discussions with betel nut consumers may improve understanding of prevalence of use, demographic and other patterns of consumption, levels of betel nut health danger awareness; this information could guide the design and implementation of public health awareness intervention programs.

Table 1: Census Sample of Asian Grocery Stores in King County.

	Small Indian Groceries	Small Asian Groceries	Large Asian Groceries	Total
Number of Stores	21	31	13	65
South Seattle: Auburn, Burien, Kent, Renton, Tukwila	7	9	8	24
Seattle City	5	17	3	25
North Seattle: Shoreline, Bothell	3	1	2	6
Eastside: Bellevue, Kirkland, Redmond	6	4	0	10

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Table 2: Betel Nut Product Packaging Score.

Betel Nut Product Package Variables	Points
1. Ingredient list	1
2. Nutrition information	1
3. General health warning label	1
4. Addiction warning label	1
5. Minor use warning label	1
6. Absence of promotional advertising	1
7. Absence of "kid-friendly" packaging	1
8. Expiration date	1
9. Country of Origin	1
10. Absence of commercial packaging	1
Maximum score	10

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Table 3: Betelnut Product Country of Origin.

Country of Origin	Number of Betel Nut Products
Thailand	12
Pakistan	11
India	9
UAE	1
Vietnam	1
California	3
No country listed	23

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Table 4: Betel Product Price Information.

Product	Minimum Price	Maximum Price	Average Price
Betel Nut Only	$0.15	$12.99	$3.86
Combined Products	$0.20	$11.99	$4.69
Gutka	$0.79	$1.00	$0.84
Sweetened Products	$0.20	$11.99	$5.54
Loose Tobacco	$2.98	$5.50	$4.03
Kid Friendly Packaged Product	$0.15	$11.99	$4.51
Hand Packaged Product	$0.44	$9.99	$4.72
Without Warning Label	$0.15	$12.99	$4.30

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

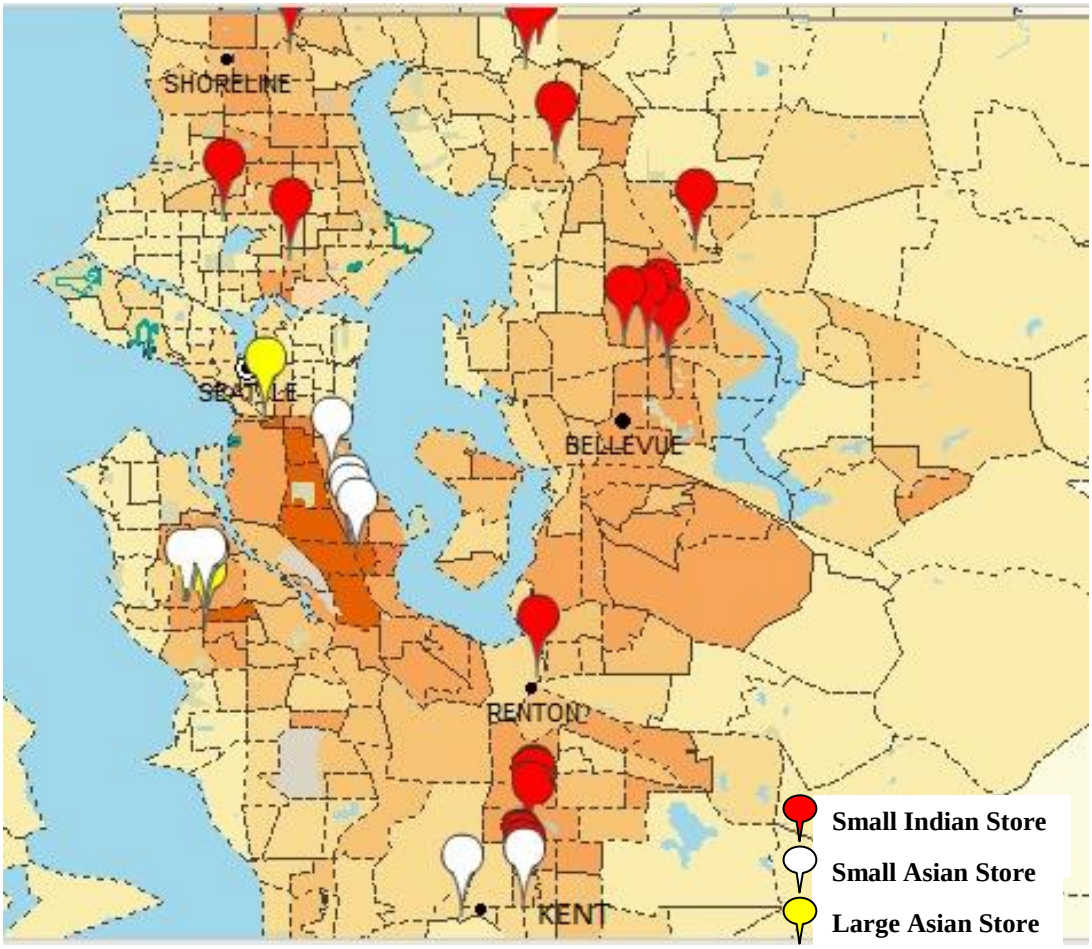
Figure 1: A sampling of betel nut products purchased in King County, Washington.

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Figure 2: A sampling of kid-friendly packaging used to promote betel nut products purchased in King County, Washington.

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Figure 3: The locations of Asian grocery stores that sell betel nut in King County, Washington.



Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Figure 4: Example of a sweetened betel nut product display in an Asian grocery store, King County, Washington.

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Figure 5: Samples of hand-packaged betel nut products purchased in King County, Washington.

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

Figure 6: A small Indian grocery store in Seattle, Washington.

Source: Secret shopper study conducted in King County in 2013, with a census sample of 65 stores and 60 products.

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