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Biology, Disease and Epidemiology

Detection of micronuclei in the buccal mucosa of areca nut and gutka chewers* (Poster #1)

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Introduction: The chewing of Arecanut is a common habit amongst all sections of society in South East Asia. Arecanut and commercially available products like Gutka contain genotoxic components that result in damage to cells leading to oral cancer. The frequency of occurrence of micronuclei has been used as an important dosimeter for assessing the genotoxic effects of chemical mutagens.

Objectives: The objective of the study was to assess the genotoxic effects of arecanut and Gutka and to quantify the number of micronuclei in buccal mucosa of arecanut and Gutka chewers.
Materials and method: The study was conducted in Manipal College of Dental Sciences, Mangalore, India (2008-2010). The study consisted of 140 individuals which included 3 groups. Group I was the control group that included 70 healthy individuals. Group II (subject) were arecanut chewers and Group III (subject) were Gutka chewers, with 35 individuals in each group. In the present study, the micronucleus test was applied to smears obtained from buccal mucosa of all 140 individuals.

Abstracts with poster presentations at the conference are marked with an (*). This list represents all accepted, not withdrawn, abstracts. Due to travel limitations, not all accepted abstracts will be presented at the conference

Results: Out of the two varieties of arecanut, 80% were red variety and the rest 20% were white variety of arecanut. The results of this study showed that there was a significant elevation in micronucleated cells from the exfoliated oral mucosal cells obtained from arecanut chewers and Gutka chewers over control samples.

Conclusion: The increase in the number of micronucleated cells observed in chewers reinforced the possible genotoxic damage in chewers.

Correlation between oral submucous fibrosis and various clinicopathological and biochemical parameters in oral cancer* (Poster #2)

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Objective: Oral cancer is the most common cancer in Indian males and is the third most common cancer in Indian females. The most common etiological factors in India are tobacco and areca nut. The aim of this study was to assess the correlation between Oral Submucous Fibrosis (OSMF) and the various clinicopathological and biochemical parameters in oral cancer. A high incidence of oral submucous fibrosis (OSMF) is linked to areca nut chewing in the Indian subcontinent and its use is also linked to diabetes mellitus, cardiac diseases, hepatotoxicity, etc.

Methods: We prospectively studied 371 consecutive patients with proven squamous cell carcinoma of the oral cavity. Of these, 112 patients had oral cancer with OSMF and 259 had oral cancer without OSMF. All patients underwent standard management and their clinicopathologic and biochemical findings were recorded.

Results: We found that patients of oral cancer with OSMF were younger males with better prognostic factors such as lesser incidence of nodal metastases, extracapsular spread and better grade of tumor differentiation. OSMF did not show any statistically significant relation to the studied biochemical abnormalities like impaired liver enzymes, raised blood sugar levels or abnormal WBC counts, etc.

Conclusions: Based on these findings we propose that oral cancers with OSMF constitute clinicopathologically distinct disease but it does not have any significant association with biochemical abnormalities. Since all patients with OSMF had chewed areca nut with or without smokeless tobacco, we believe that the differences in the 2 groups arise from differential mechanisms of areca nut carcinogenesis.

The influence of areca (betel nut) chewing on the oral microbiome* (Poster #3)

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Objectives. We sought to evaluate the influence of betel nut chewing on the oral microbiome.

Materials and Methods. Adults with and without a history of betel nut use were recruited from a dental clinic in Guam. Oral cell and saliva samples were collected and the presence of oral lesions was evaluated. Roche 454 FLX Titanium based pyrosequencing was used to target the V3-V5 regions of the 16S ribosomal RNA bacterial gene.

Results. One hundred twenty-two adults were enrolled. Sixty-four individuals reported current use of betel nut, 37 were former chewers, and 21 had no history of betel nut use. Oral lesions were observed in 9 betel nut users and oral submucous fibrosis in 1. Overall, oral bacteria taxa included 101 distinct genera and 74 distinct species. Specific taxa were detected more frequently and in greater abundance in current betel nut chewers compared to past/never chewers including the order Streptophyta (27% vs. 5% p=0.002); genera Acholeplasma (9% vs. 0%, p=0.02), Campylobacter (31% vs. 14%, p=0.02), and Sharpea (17% vs. 5% p=0.04); and species Prevotella nigrescens (20% vs. 7%, p=0.03). Streptophyta was also more predominant in ever vs. never betel nut chewers (19% vs. 0%, p=0.03) and those chewing for ≥10 years relative to never chewers (32% vs. 0%, p=0.03). The genus Staphylococcus was detected with greater frequency and abundance in individuals with oral lesions compared to those without lesions (89% vs. 23% p<0.0001).

Conclusions. Betel nut chewing may change the composition of the oral microbiome, including the establishment of periodontal pathogens.

Betel quid use as the primary form of tobacco use among Cambodian women: trends indicating a persistent burden across a decade of national tobacco surveys (2005 to 2014)

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In 2005, NIH-funded researchers from Cambodia National Institute of Statistics, Ministry of Health, WHO, SEATCA and Loma Linda University reported findings from the first national prevalence survey of tobacco use indicating that among the 2 million tobacco users in Cambodia, 500,000 were women who chewed tobacco in the form of a betel quid. During 2005 to 2014, landmark public health measures were taken to reduce tobacco use in Cambodia, including placing health warnings on cigarette packs, banning all forms of tobacco advertising, increasing excise tax on tobacco, and the recent adoption of a comprehensive tobacco control law that included pictorial health warnings on tobacco packaging and stronger enforcement for smoke-free environments. Despite the efficacy of these measures, findings from a decade of nationally representative surveys indicate a persistent burden of betel quid use that remains unchanged among half a million Cambodian females. It has been documented in the scientific literature that the betel quid habit in Cambodia is associated with higher rates of infant mortality, infectious disease, and oral cancer. This presentation will show secondary analysis of data from both 2011 and 2014 National Tobacco Surveys conducted in Cambodia. Findings are relevant to the design of effective measures that can address both supply and demand of betel quid in target populations in which betel quid and tobacco use are prevalent.

Areca nut use in India: Findings from Global Adult Tobacco Survey* (Poster #4)

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Background: Areca nut is a widely used substance globally specially as an ingredient in betel quid. Its use is widespread from countries of South Asia right up to Pacific Islands of Saipan and Guam.

Objective: We have investigated the prevalence of the use of areca nut, betel quid, pan masala with and without tobacco from the GATS India data.

Methods: We constructed contingency tables and conducted chi-square test to compare relationship between areca nut use with and without tobacco by several other characteristics. We conducted logistic regression analysis to look at the noticing of marketing of smokeless tobacco products and areca nut users with and without tobacco.

Results: The overall prevalence of user of areca-nut with tobacco was 12.7% and without tobacco, 0.6%. Among male the use of areca nut with tobacco was reported by 18% and without tobacco, by 0.6%. Among female with tobacco and without tobacco use was 7% respectively, 0.6%. The estimated number of users of areca nut without tobacco in India was 4,931,632 and with tobacco, it was 101,002,365.The difference between two categories was significant using chi-square for noticing any health warnings , money spent on smokeless tobacco(SLT) and the age of initiation of SLT which was lower among non-tobacco users.

Conclusion: This study points out areca nut use as a specific problem of the country with at least 5 million regular users in addition to those using tobacco.

Alkaloid profiles of commercial areca nut-containing products: Implications for addiction and carcinogenic potential* (Poster #5)

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Use of areca nut-containing products, such as betel quid or commercially-produced pan masala and gutkha, is associated with a range of negative health outcomes, ranging from addiction to various non-malignant and carcinogenic effects, particularly oral and esophageal cancers. Chemical composition of these products, which is affected by the characteristics and the amount of areca nut as well as by the presence of other ingredients, is most likely one of the key contributors to the associated health outcomes. Arecoline, arecaidine, guvacoline, and guvacine are areca nut-specific alkaloids that have been implicated in both the abuse liability and the carcinogenicity of areca nut. Arecoline is believed to be the major addictive alkaloid in areca nut and has been shown to modulate a range of cellular enzymes such as matrix metalloproteinases and lysyl oxidase, as well as inhibit p53 mRNA expression and DNA repair. Contribution of other alkaloids to the addictive potential of areca nut-containing products is not known; however, they have been shown to be positive in bacterial mutagenicity assays and induce macromolecular changes in mammalian cells. Furthermore, areca nut alkaloids can undergo nitrosation in the oral cavity of users, leading to the formation of areca-derived nitrosamines (ADNA),

some of which have been shown to cause DNA damage. The rate of such endogenous nitrosamine formation can depend on a number of factors, including product pH and the presence of other constituents that may serve as the source of nitrosating species. Therefore, variations in the levels of areca alkaloids and other constituents could potentially contribute to variations in addictive and carcinogenic potential across areca nut-containing products. However, such information is virtually non-existent. We have developed a sensitive and accurate liquid chromatography-tandem mass-spectrometry method for the analysis of arecoline, arecaidine, guvacoline, and guvacine and applied this method to the analysis of a range of products obtained from India and China. The samples included commercial products (pan masala and gutkha) as well as different forms of areca nut (bulk product of different cut size as well as commercially packaged areca nuts). Our findings indicate that there is substantial variation in the relative amounts of measured alkaloids across various products. In addition, preliminary data suggest that presence of other ingredients, such as tobacco, in the areca nut-containing products may affect the rate of ADNA formation in oral cavity of users. Our research highlights the need to characterize the chemical diversity and the associated addictive and carcinogenic potency of commercial and cottage areca nut-containing products. Further studies on areca nut alkaloid nitrosation in the oral cavity, and the effect of product characteristics on the rate of this process, are needed to better understand the association between areca nut constituent exposure and the induction of genotoxic damage and cancer in users.

Identification of pro-inflammatory molecules involved in Areca nut-mediated carcinogenesis* (Poster #6)

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Betel nut consumption has significant implications for the public health globally, as the wide-spread habit of Areca chewing throughout Asia and the Pacific is associated with a high prevalence of oral carcinoma and other diseases. Despite a clear causal association of betel nut chewing and oral mucosal diseases, the biological mechanisms that link Areca nut-contained molecules, immune cell activation, cytokine production, inflammation, and cancer remain underexplored. We observed that the Areca nut extract is capable of mobilizing calcium in a dose-dependent manner in various cells of the innate and adaptive immune system, which can support the production and release of pro-inflammatory mediators, contribute to chronic inflammation, and ultimately play a role in oral disease of betel nut chewers. Interestingly, none of the four major alkaloids (arecoline, arecaidine, guvacine and guvacoline) of Areca nut were able to induce such Ca2+ signals, suggesting that the active components might represent novel or so far unappreciated chemical structures. The separation of the Areca nut extract processed by means of reversed phase high-performance liquid chromatography (HPLC) has further revealed multiple active fractions with differential response spectra in the tested immune cell lines (mast cells, monocytes, T cells), suggesting the presence of more than one calcium-mobilizing compound. In addition, we determined that fractions obtained from Areca nut variants sourced from Hawaii and Guam exhibit differential patterns of pro-inflammatory activities. Ongoing structural analyses will help us elucidate the chemical structures of the pro-inflammatory compounds and their relative abundance in Areca nut variants.

The role of physical activity in harm reduction among betel quid chewers from a prospective cohort of 419,378 individuals* (Poster #33)

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Objective: To assess the benefits of regular exercise in reducing harms among the betel quid (BQ) chewers.

Methods: The study cohort, 419,378 individuals, participated in a medical screening program between 1994 and 2008, with 38,324 male and 1,495 female chewers, who consumed 5-15 quids of BQ a day. Physical activity of each individual, based on "MET-hour/week", was classified as "inactive" or "active", where activity started from a daily 15 minutes/day or more of brisk walking (≥3.75 MET-hour/week). Hazard ratios for mortality and remaining years in life expectancy were calculated.

Results: Nearly one fifth (18.7%) of men, but only 0.7% of women were chewers. Chewers had a 10-fold increase in oral cancer risk; and a 2-3-fold increase in mortality from lung, esophagus and liver cancer, cardiovascular disease, and diabetes, with doubling of all-cause mortality. More than half of chewers were physically inactive (59%). Physical activity was beneficial for chewers, with a reduction of all-cause mortality by 19%. Inactive chewers had their lifespan shortened by 6.3 years, compared to non-chewers, but being active, chewers improved their health by gaining 2.5 years. The improvement, however, fell short of offsetting the harms from chewing.

Conclusions: Chewers had serious health consequences, but being physically active, chewers could mitigate some of these adverse effects, and extend life expectancy by 2.5 years and reduce mortality by one fifth. Encouraging exercise, in addition to quitting chewing, remains the best advice for 1.5 million chewers in Taiwan.

Prevalence of Areca nut usage among school students in Mumbai* (Poster #10)

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Research Objective: To estimate prevalence of Areca nut usage among school students

Methods: A large scale survey covering 1918 students of 7, 8, 9 grades from 12 schools conducted using self-administered questionnaire in Hindi, Marathi and Urdu languages. Data Analysis was conducted using SPSS 23. Descriptive frequencies; chi-square and Independent sample T test were used. A p value of <0.05 was considered significant.

Results: Ever use of areca nut was reported by 32.5% and significant differences were observed with respect to gender and grade. Higher Percentage of male students, 9th grade reported ever use. Mean age of initiation was 11.8 yrs. Gender specific differences were insignificant.

Recent behaviour was captured by asking 30 and 7 days use and it was noticed to be 17.6 %, 13.7% respectively. 66.0% reported an association between health problems and areca nut usage. 52.3% reported it is possible to purchase areca nut within 100 yards of the school and 1.2 % indicated intention to use in next 12 months. Gender specific significant differences with male students having higher

intention and more knowledge were observed. Similar differences were observed with respect to attitudes 'use of areca nut is a cool behaviour' and 'it makes people free from stresses'.

17.4% shown interest in cessation programme, 83.8% prefers group sessions and 62.2% felt it should be provided in school.

Conclusions: Areca nut usage starts at early age. Gender differentials in attitude and usage are very evident. There is an imperative develop

Notification to betel quid chewers for aflatoxin B1 contamination in areca nuts (Areca catechu Linn.)* (Poster #7)

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Background: Areca nut is main component of betel quid and enjoyed in South and Southeast Asia. Aflatoxin B1 (AFB1) is the naturally occurring secondary metabolite and most potent hepatic carcinogen and mutagen produced by certain species of Aspergillus flavus, Aspergillus parasiticus.

Objective: To determine the AFB1 level in areca nuts and notify the betel quid chewers about the danger of AFB1 contamination in areca nuts.

Materials and Methods: Total of 42 areca nut samples were collected from 26 betel quid shops, five retailers and 11 markets in Yangon region. ELISA method was used to determine the level of AFB1 in tested samples.

Results: All samples were contaminated with AFB1 in this study. The detected levels of AFB1 were 7.05-21.58ppb in 26 samples (61.9%), 5.18-21.66ppb in 5 samples (11.9%) and 5.48-21.08ppb in 11 samples (26.2%) respectively. AFB1 level of all samples was more than maximum permissible level of 5ppb according to the European Commission.

Conclusions: This study highlighted that AFB1 was contaminated in areca nuts and to promote awareness for presence AFB1 in areca nut among the betel quids or area nut chewers. Betel quid and areca nut chewing are not only major risk factor of oral cancer but also chronic exposure of AFB1 at low levels lead to a high risk of developing cancer and low resistance to infectious diseases.

Recommendation: Regular monitoring for contamination of AFB1 in areca nut should be promoted. The education to use rapid test kits for AFB1 determination should be given to betel quid sellers.

Exploratory Analysis of 51 cases of oral squamous cell carcinoma coexisting with oral submucous fibrosis at a tertiary care hospital in Central India

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Aim & objectives: To explore association of OSF with OSCC and to ascertain likely role of chewing habits prevailing in the central India population in etiology of oral carcinoma.

Materials and Methods: A hospital-based retrospective analytical study was performed at Government Dental College Hospital, Nagpur. A series of 188 patients of histopathologically diagnosed oral squamous

cell carcinoma in last three years (2013 to 2015) was analyzed based on their age, gender, regional distribution, chewing habit's pattern and history of oral submucous fibrosis.
Results: A high proportion (51 cases, 27.1%) out of 188 histopathologically diagnosed OSCC cases were found associated with OSF. A significant (p-value < 0.01) proportion of these 51 OSF cases reported habit of chewing kharra/mava (crude mix -about 8gms- of tobacco+areca nuts, sprinkled on cellophane paper and mixed vigorously with slaked lime chewed constantly trough out the day, sometimes left in mouth overnight) as compared to other chewing habits prevalent in central India population (odds ratio 2.65, 95% CI: 1.2-5.5). OSCC was also found significantly associated (p-value < 0.01) with younger OSF patients having odds ratio (≤ 45 versus 45+ years old) of 2.2 (95% CI 1.09- 4.5).

Conclusion: Young patients of OSF in central India with habit of kharra/mava chewing carry increased risk of developing carcinoma as compared to those not having OSF and kharra chewing habit. Future prevention strategies need to target this young and kharra-addicted population.

The impact of betel quid chewing during pregnancy on pregnancy outcomes in Bhutan* (Poster #8)
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Between February 2015 and February 2016, a hospital-based unmatched case-control study was conducted at the three referral hospitals in Bhutan to explore the impact of betel quid chewing on adverse pregnancy outcomes. A semi-structured questionnaire was used to collect information on the potential risk factors and confounding variables from the mothers and to understand the behavior of alcohol, smoking, and betel quid chewing. The study population were the low birth weight and/or preterm birth neonates born in the three regional referral hospitals and their mothers (Planned sample size=776).

The Interim analysis using the single entry data between February and December 2015 shows that between 50% and 60% of mothers in both case and control group chewed betel nuts during pregnancy while self-reported smoking during pregnancy was between 2 and 5%. The data also suggests high prevalence of gestational hypertension among Bhutanese pregnant women. In the univariate analysis, sex of the baby, parity, smoking during pregnancy, snuff and chewing tobacco, drinking during pregnancy, mother's stated hypertension, recorded gestational hypertension, recorded preeclampsia, recorded eclampsia, mode of delivery, type of delivery, and previous preterm were found to have a statistical significant impact on low birth weight and/or preterm births at the 5% level of significance. Final analysis including multivariate analysis will be conducted using double-entered data. Similar prevalence of betel nuts chewing in both cases and controls may make it difficult to demonstrate the statistically significant difference between the two groups. Details including dose-effect of betel nuts chewing will be examined.

Areca (betel) nut chewing and oral health in the Mariana Islands* (Poster #9)

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Objectives: We sought to detect oral potentially malignant disorders (OPMDs) among areca (betel) nut chewers, and to assess the prevalence of the oral human papillomavirus (HPV) infection in a subset of chewers, in Guam and Saipan, Mariana Islands.

Materials and Methods: A cross-sectional study of 300 adult (≥18 years) betel nut chewers was conducted among households in Guam and Saipan from January 2011 to June 2012. Trained and calibrated researchers collected information on betel nut use and health-related risks and performed an oral screen for oral potentially malignant disorders (OPMDs). Positive cases were referred to the study dentist for a second oral examination. Buccal smears were collected from a subset (n=123) to test for the oral HPV.

Results: The adults surveyed were from 194 households, which included 718 betel nut chewers. The range of chewers was one to eight per household. The age ranged from 9 to 86 years old. Twenty-seven chewers were minors (<18 years). Of the 300 adults, some chewed with tobacco (68%), with slaked lime (75%), with betel leaf (72%), while 35 chewed the nut alone. Eighty-nine (30%) visited the dentist regularly. Forty-six (15%) of the 300 adults had OPMDs and one (0.3%) was confirmed to have squamous cell carcinoma. The prevalence of HPV was about 6% (7/123), although none were high-risk types.

Conclusion: Betel nut chewing was common among household members, which may include children. The identification of OPMDs and HPV in the adults suggests that betel nut chewers, including children, will benefit from oral screening.

Prevention, Addiction and Dependence

Qualitative study for betel quid cessation among oral cancer patients in Taiwan* (Poster #11)

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Objectives: This study aims to explore the behavioral changes of betel quid chewers who have been diagnosed with oral cancer under a trans-theoretical model framework.

Materials and Methods: 30 oral cancer patients with betel quid chewing history were chosen for in-depth interviews and analytic induction.

Results: Our research showed that betel quid chewers with oral cancer typically experience four significant stages of behavior: pre-contemplation, contemplation, action, and maintenance. Each stage change was marked by specific characteristics. For example in the pre-contemplation stage, chewers showed positive expectancy toward the psychoactive or social effects of betel quid. In the contemplation stage, chewers realized the negative effects of betel quid, such as dental or other physical problems. Some chewers also learned they were addicted to betel quid and realized it was difficult for them to stop chewing it. Chewers generally showed insignificant characteristics in the preparation stage and most chewers reported going "cold turkey" when they decided to quit. In the action stage, some chewers successfully quit betel quid and attributed it to willpower. Those quitting because of the loss of oral functions were unable to chew anymore though some chewers had experienced relapse. In the maintenance stage, ex-chewers reported getting rid of addiction, however, relapse was possible. In this study, those with oral cancer suffered a tremendous psychological impact though they usually started quitting betel quid, cigarette, and alcohol together immediately after receiving cancer diagnosis with less chance of recurrence.

Conclusions: This study provided important information for developing betel quid cessation programs.

Barriers to quitting betel quid for Taiwanese chewers* (Poster #12)

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Objective: Most of Taiwanese betel quid (BQ) chewers failed to quit. This study tried to find the reasons why chewers cannot succeed to quit in Taiwan.

Methods: The qualitative design was used for answering the research questions. The data were collected by four focus groups including a total of 24 participants recruited by purposive sampling. The qualitative recordings of content in 4 focus groups were analyzed by content analysis process.

Results: Two major themes were found to explain the reasons of Taiwanese chewers failed quitting BQ. The first theme is "no confidence in quitting BQ chewing on one's own" with 5 subthemes. They are: 1) experience obvious decline in energy, reaction, and physical strength right after quitting and feel desperate to resume chewing; 2) feel teeth loose and unbearably sore right after stopping BQ chewing; 3) lack of positive model of success for encouragement; 4) perception of the influence of one's physical constitution on the degree of addiction and the odds of successful cessation; and 5) hope that there

would be something to replace BQ to help cope with withdrawal symptoms. The second major theme is "too many temptations to achieve successful cessation" with 3 subthemes. They are: 1) temptations galore, including generous offers from friends; 2) betel quid can be purchased virtually everywhere; and 3) keep haunted by the smell of BQ.

Conclusions:The major factors were found to influence Taiwanese chewers quitting BQ and the data are valuable to help understanding why chewers failed to quit the BQ.

Community Based Tobacco Cessation Programme among Women in Mumbai, India* (Poster #19)

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Aims: To provide tobacco cessation services to women in community to help them quit tobacco and identify factors associated with tobacco quitting. The overall goal was to document the processes involved so as to establish a model tobacco cessation programme which could be replicated elsewhere.

Methods: This is a community based tobacco cessation programme conducted over a period of one year in a low socio-economic area of Mumbai, India. Initial survey showed that 14.92% women residing here consumed tobacco in some form or the other. The women were interviewed to record the socio-demographic and risk factor history followed by interactive health education session. This was followed by three interventions conducted at three monthly intervals and a post intervention follow-up. The interventions were in the form of health education, games and counseling sessions.

Results: The average compliance to participation in programme in the four rounds was 93.31%. The mean age at initiation of tobacco was 17.31 years. Use of tobacco among family members and in the community were important reasons for initiating tobacco while addiction to tobacco was an important reason for continuation of tobacco use. The quit rate at the end of the cessation programme was 33.46%. The multivariate logistic regression analysis shows that younger age and consumption of tobacco only at home were significantly associated with tobacco quitting.

Conclusions: Changing the cultural norms associated with smokeless tobacco use in the community and providing cessation services are important measures in preventing initiation and continuation of tobacco among women in India.

Areca nut cessation programme for schoolchildren: Lessons from 14 schools in Mumbai, India

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Objectives:
1. To create awareness about the ill effects of areca nut and tobacco among schoolchildren in 14 schools of Mumbai.
2. To provide cessation service to voluntarily registered users among these children.

Materials and Methods: Orientation sessions about ill-effects of tobacco and areca nut (supari) were conducted for 5739 students from 14 schools in slum areas of Mumbai using presentations and videos. 718(13%) students voluntarily registered for the LifeFirst cessation service of which 36(5%) were tobacco users, 576(80%) areca nut users and 106(15%) used both type of products. LifeFirst involves six

theme-based sessions with groups of 10-15 students each over six months. Presentations, videos, group discussions, games are used in the sessions to probe the reason of initiation and triggers. Coping mechanisms and refusal skills are instilled to bring about behavioral modification. The sessions are based on established cessation techniques adapted for children by involving specialists in child psychology.

Results: Of the 682 registered areca nut users, 668(98%) students completed the entire programme and 472(69%) among them reported as not using areca nut at the sixth session. 42(6%) reported reduced use while 8(1%) reported relapse.

Conclusions: Areca nut, the fourth most psychoactive substance which is a known GroupI carcinogen also acts as a gateway product for tobacco use among children. Providing scientific, structured cessation services to areca nut users among schoolchildren is an effective way of preventing its ill-effects and also preventing the initiation use of tobacco products.

"When you have a toothache, you just chew betel quid": A qualitative study exploring attitudes and perceptions of betel quid consumption and its oral health implications in Taiwan* (Poster #14)

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Objective: This qualitative study discusses findings concerning betel quid (BQ) use and oral/dental diseases that can be considered in developing health promotion initiatives and cessation efforts in Taiwan, where the dental workforce could have a pivotal role.

Methods: Fifteen in-depth interviews and 4 focus groups discussions were conducted. Men and women over 18 years of age and who self-identified as current and former BQ users were included in the study. Discussion was tape-recorded and transcribed. Interpretative analysis was undertaken manually and themes and emerging key points were developed into a thematic framework.

Results: The sample was 66% male and 34% female, 41.02±9.23 years old on average. Participants agreed that most of the health consequences of BQ chewing occur in the oral cavity (e.g., flat teeth, bad breath, oral ulcers, and gum disease, among others). The most frequently mentioned withdrawal symptoms related to dental/oral conditions were: damage to the enamel surface (coloration and/or erosion), tooth ache, tooth loss, bitter taste, and increased salivation.

Conclusions: BQ chewers must receive routine oral screenings and extensive documentation of oral soft tissue lesions. In addition, dental professionals in Taiwan should be aware of the negative oral/dental effects caused by BQ chewing and be prepared to advise patients on cessation strategies. Dental professionals and oral health stakeholders must have an active involvement in shaping future public health policies on BQ prevention and control in Taiwan.

How to control betel quid addiction, where we are? Thailand and Bangladesh Perspective

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Background: Mobile health (mHealth) is an emerging discipline for medical and public health practice. The first-ever CDC report on the global use and public health impact of smokeless tobacco finds that more than 300 million people in at least 70 countries use these harmful products. The serious health effects of smokeless tobacco have been documented. GATS Bangladesh 2009 reported that among all respondents 26.4% of men, 27.9% of women, and 27.2% overall currently use smokeless tobacco. 7 out of 10 want to quit tobacco. GATS Thailand 2009 report found that 1.3% of men, 6.3% of women, and 3.9% overall currently use smokeless tobacco. Betel quid has different health hazards. The project was done to develop a mobile app to quit betel quid and empower people about health issues regarding betel quid.

Methodology: This was a cross sectional qualitative study that was conducted in January 2016 in Thailand. Ten semi-structured interviews were conducted with physicians who were living in Bangkok, Thailand.

Results: The respondents noted the lack of resources on smoking and betel quid use for people and suggested the following: an audio-visual tool, mobile app with information on smoking and betel quid that could be downloaded for their clients; a poster that could be used in fact sheets. Due to low literacy, it was suggested that information be disseminated verbally via health professionals, religious leaders, existing programs that people attend, and visual social media (e.g. Facebook, YouTube).

Conclusion: The mobile application will be a good tool to quit betel quid.

Developing a Betel Quid Cessation Program: Challenges and Recommendations

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This research reports on some of the challenges researchers encountered in implementing a betel quid cessation program on the US Territory of Guam from June 2014 to August 2015. This program was adapted from a proven cognitive-behavioral tobacco cessation program. Five cessation group meetings were held over a twenty-two day time period. Participants were provided incentives for attendance at meetings and for filling out surveys concerning their betel nut habit. Audio recordings were also made of group meetings. Participants were recruited through several strategies including: advertisements in the local publications distributed throughout the island, posters and brochures that were displayed at public health agencies, local mayor's offices and other public places. Difficulties with recruitment using this method led researchers to add a recruitment incentive for existing participants to bring in additional participants. The family-centric nature of the island community combined with transportation difficulties led to respondents to bring entire families, including young children, which led to some complications. The program asked respondents who chewed to use a "healthy" substitute for betel nut, but many reported an increase in the consumption of junk food and smoking as they began the quitting process. Another step in the quitting process asked respondents to reward themselves for their efforts by treating themselves to a fun activity they enjoyed. However, many participants had difficulty affording such incentives. These challenges are discussed with an aim to help improve approaches to betel quid cessation in the future.

Knowledge and beliefs of medical and dental students in Cambodia about betel quid chewing* (Poster #15)

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Objective: To investigate the knowledge and beliefs of medical and dental students concerning betel quid chewing.

Methods: 100 senior students were interviewed by 3 trained interviewers.

Results: Perceived reasons for chewing betel quid included: good taste (51%); good feeling (17%); traditional habit (66%). 85% said they would be unhappy if their parent took up the habit. 76% of dental and 28% of medical students said that chewing betel quid could cause general health problems. All but one said that chewing could cause oral health problems, including: tooth problems (91%); gum problems (82%); soft tissue problems (80%). Only 22% of students said the habit could cause oral cancer. 62% of dental and 6% of medical students said they had been taught how to examine the oral soft tissues. 80% of dental and 6% of medical students said they had been taught about betel quid chewing. Only 26% identified tobacco as an ingredient of the quid. 97% of participants suggested the habit should be discouraged through school health education. 57% felt that it was a doctor's and 86% a dentist's responsibility to tell patients about the risks of the habit.

Conclusions: medical and dental students have negative perceptions of the betel quid chewing habit. Dental students had received more education about the habit, and more training on examining the oral soft tissues than medical students. Many students did not recognize that tobacco is a component of the quid and its association with oral cancer. Students need more education about this dangerous habit.

Pattern of selling practices and awareness among vendors selling betel quid and areca in five districts of central Nepal* (Poster #16)

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Research objectives: Despite regulations like ban on advertisements; ban of sale to unlicensed vendors and minors etc; highest dependence rate of betel quid (39-43.5%) is reported in Nepal among six Asian countries. So, this is a pioneer pilot study to compare the various selling patterns and knowledge among the betel quid vendors and find its association with high prevalence.

Materials and methods: A questionnaire survey was carried in 5 urban districts of central Nepal among 125 vendors selling freshly prepared or packaged betel quid and areca products by two interviewers and rechecked the average data after a week to revalidate the data.

Results: 37.5% reported a sale of 50-100 freshly prepared betel quid per day; 48.3% sold 50-100 packaged areca products. 100% vendors displayed these products at point of sale. 48% of them were not aware of tobacco regulations. Despite being aware (72%) about ban of sale to minors; 96% still sold to minors. More than 70% were aware of the risk of tobacco to oral cancer but only 41.7% about betel quid. There was a strong association between the age group with awareness of the ban of sale to minor as well as number of working years with awareness of risks associated. Majority had "vendor" as the only primary source of income.

Conclusion: Growing prevalence of betel quid in Nepal maybe associated to vigorous sale and marketing at point of sale owing to the lack of awareness of the risk of betel quid to oral cancer and economic factors.

An approach to group cessation of betel nut and tobacco chewing—a case of eleven disadvantaged women in India* (Poster #17)

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The sample for the study was eleven women domestic help. Three of them were exclusive betel nut users while eight used mixture of tobacco and betel nut. They made their own quid, except for one who used Gutkha.

Having participated in a session on Healthy- Living on Gandhi Jayanti, they wanted to know more. We conducted a half-day session with them for detailed interactive discussion including their practice of betel nut and tobacco chewing.

Objective: Enabling betel nut and smokeless tobacco users to quit by intensive interactions to address their felt needs pushing them to use these products.

Intervention: Of the 5 days of intervention the first two days was for education on the harms of tobacco and betel nut chewing. Each of the remaining three days we addressed their problems of discord at home or work, zeroing on their chewing habit. They were not to feel deprived but were trained to push the chewing time forward more and more till they felt they did not need it. The discomfort was handled by mutual support, at times sucking on some rock sugar and drinking water. We had planned to meet them after two weeks. They could approach us earlier if needed.

When we met on the 15th day, eight of them had quit while two were contemplating and the remaining one had fallen sick. However, she wanted to try it all over again.

The conclusion is that quitting is feasible.

Use of betel quid (paan), arecanut and tobacco among women in a slum community in Mumbai, India* (Poster #18)

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Chewing betel leaf with arecanut/tobacco (paan/betel quid) is a widely accepted traditional practice among women from India. Betel quid is associated with oral cancers but women do not recognize health consequences. To develop appropriate prevention programs, formative research is required to understand how women use and explain their use of paan.

This paper uses survey data from a mixed methods study of smokeless tobacco (SLT) use in a representative sample of 409 SLT using women aged 18-40 years in a Mumbai slum community during 2010-2012.

Nearly half the women interviewed (48%) chewed paan with tobacco, and arecanut. Ninety percent of chewers belonged to Uttar Pradesh. Most women initiated post marriage (mean age 21.2 years) and 30% started during pregnancy to relieve gum problems. Half chewed 4 or more pan in a day, retaining quid in the mouth for more than 10 minutes; 25% swallowed their saliva. Seventy percent report suffering from food insecurity and 63% said it relieved hunger. Over 60% women agreed with positive reasons for chewing paan. Sixty percent were told to quit, and 40% tried to quit in the past year.

Chewing betel quid places poor women at increased risk of oral cancers. Use is culturally sanctioned and may substitute for food. There are no warning messages directed to paan use but there is both pressure and desire to quit use. Control programs must demystify the cultural benefits associated with paan use, educate women on harmful effects, promote anti paan norms, and identify ways of relieving hunger.

Predictors of tobacco use behavior and addiction among marginalized street children in Mumbai, India

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Background and Objective: Street children constitute a marginalized with transitory existence exposing them to harsh environments making them vulnerable to tobacco use and other substance abuse. A formative research study was undertaken to estimate tobacco use prevalence and factors influencing tobacco use behavior and addiction to develop tobacco use prevention and cessation interventions for this marginalized group.

Method: In a cross sectional survey 1671 street children with 1190 boys and 481 girls between 6 to 16 years were enumerated and interviewed through 11 non profit agencies working with marginalized children for care and support, in Mumbai, India.

Results: Overall 333 (20%) of street children reported tobacco use with mean age for initiation at 10.9 years with 49.2% (164) using smokeless tobacco. Illiterate children were more likely to consume tobacco than the ones who were receiving some informal education through the non profit agencies (OR 6.36;95% CI 4.75-8.52; p<0.0001). Also children with additional substance abuse (OR 3.06; 95% CI 2.33-4.01) and once with no contact with their families (OR 3.20; 95% CI 2.47-4.14; p<0.0001) were more likely to use tobacco.

Conclusion: Study findings emphasize the need for effective strategies to target such marginalized unorganized high risk groups along with developing capacity in the service dimension of non profit agencies working with the marginalized children in promoting tobacco use prevention and designing suitable strategies for tobacco cessation interventions for these children with different vulnerabilities and needs.

Outcomes of providing tobacco treatment service to patients using betel quid through primary health care centers in urban India

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Objectives: To test the feasibility of implementing a counselor led tobacco treatment service provided to patients visiting a government primary healthcare center.

Materials and methods: LifeFirst, an intensive tobacco cessation service was provided by a trained counselor to patients visiting the outpatient department. The primary care center provides clinical and outreach services to slum population of about 65000 mainly consisting of migrant laborers. This involved providing brief advice using motivational interviewing to motivate patients to make a quit attempt, assisting quit attempt by providing behavior modification support and follow-up for six months over phone to maintain abstinence.

Results: Among 1490 tobacco users identified during the period November 2013 to December 2015, 165(11%) were users of betel quid with tobacco.66(40%) of these only used betel quid while the rest were poly users. All were provided brief advice and 153(93%) were willing to quit. Of these 138(90%) were willing to join LifeFirst service and 113(82%) actually enrolled. Of the 88 due for the 6th month follow-up, 34 were successfully followed. 40(45%) were lost to follow up due to unavailability or changes of phone numbers. At 6 month, 16 had quit and 10 had reduced use.

Conclusions: There is high intention to quit tobacco among patients and providing cessation support through a primary care setting may result in patient making a quit attempt and eventually quitting their habit. Although clinicians do not have the time and resources to provide intensive cessation service, cessation services provided by a trained counselor may be effective.

A symbol of connection between self and tribal home- Betel quid for Taiwanese aboriginal people* (Poster #13)

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Objective: This study aimed to understand the reasons of Taiwanese aboriginal people having habits of betel quid (BQ) chewing from the meanings in their culture and traditions.

Design: A descriptive qualitative design was approached. Ten regular BQ aboriginal chewers were included in this study. Data were collected by in-depth interviews with semi-structure guidelines and analyzed by qualitative content analysis following the process of open coding, naming, categorizing, meanings and themes.

Results: To most participants, BQ is associated with major footprints in one's life. In indigenous cultures, betel nut embodies the lasting companionship of a friend who stays true and loyal till the very end of one's life. The informants' experiences of chewing BQ were involved with the meanings of the following five themes: 1)BQ chewing helps reinforce self-identity and sense of belonging; 2) BQ plays a symbol of love and marriage in traditional culture; 3) BQ reflects celebration of simple abundance in indigenous life; 4)BQ chewing is for curing physical ailments and handling dental problems; 5)BQ is an attitude toward life accentuating the importance of learning to live in everlasting harmony with things in environment and nature.

Conclusions: The beliefs about BQ deeply impact aboriginal people on the attitude toward the chewing behavior. Since chewing BQ is the essential of indigenous Taiwanese culture, helping them away from the risk of developing oral-related cancers by designing the cessation or making policy need to concerned the important meanings of BQ in the culture.

Screening and Early Diagnosis of Oral Cancers

Pilot study on identification and pharmacokinetics of salivary biomarkers for betel nut and betel quid chewing* (Poster #21)

Adrian Franke[1], Jennifer Lai[1], Ana Joy Mendez[2], Celine Arat-Cabading[2], Xingnan Li[1] and Laurie Custer[1]
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Objectives: Betel chewing is carcinogenic and betel biomarkers are urgently needed for cessation studies. We studied: chemicals specific for 3 preparations commonly used in Guam: nut only (BN), nut+ Piper leaf (BL), and betel quid (BQ), compounds occurring in saliva during betel chewing, and salivary and urinary pharmacokinetics of betel compounds.

Methods: 5 chewers consumed each BN, BL or BQ. Baseline and post-chewing saliva was collected. 4 chewers consumed BQ and donated baseline and timed saliva, hair, and/or urine samples. Betel material was analyzed by HPLC. Saliva, urine, and hair were analyzed by LCMS. T-tests compared baseline and post-chewing samples; ANOVA compared differences between groups.

Results: Predominant alkaloids in betel material were arecoline and guvacoline. Nicotine predominated in tobacco. Chavibetol was found exclusively in Piper leaves. In saliva significant (<0.05) increases from baseline were observed for guvacine (BN, BQ), arecoline (BN, BL, BQ), guvacoline (BN), arecaidine (BN, BL, BQ), nicotine (BQ), and chavibetol (BL, BQ). Arecoline, guvacoline, guvacine, and arecaidine peaked 2 hours post-chewing then returned to baseline >8 hours. Salivary chavibetol peaked ~1 hour post-chewing. Urinary and salivary arecoline, guvacoline, and arecaidine patterns paralleled. Chavibetol glucuronide excretion paralleled salivary chavibetol. Betel compounds were not detected in scalp hair.

Conclusion: Promising biomarkers for BN and BL chewers are arecoline and guvacoline. Those compounds with chavibetol and possibly nicotine, cotinine, NNK, NNN, and NAT may identify BQ chewers. Betel exposure can be followed ≤8 hours post-chewing using the applied urinary and salivary betel specific biomarkers.

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Screening and early detection for Areca nut and betel quid related oral cancers* (Poster #22)

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In Bhutan Areca nut is the most commonly used form of addiction. Habit of chewing Areca nut has been in tradition since many years, used as food, medicine and for social and religious purposes. The Arecholine a principal alkaloid in Areca nut causes subjective effects of increased well-being, Alertness, stamina, mood lifting and increased concentration and relaxation. Betel quid with or without tobacco is a popular oral habit with potential links to the occurrence of oral cancer and various oral precancerous lesion and condition. As an early sign of damage to the oral mucosa , use of betel quid with or without tobacco often develops clinically visible whitesh, reddish lesions and oral sub mucous fibrosis. These oral lesions are curable if detected early. One of the practical approaches to early detection of these cases is by oral visual examination using primary health workers. Three categories of lesions were detected
1. Stage 1: lesions for observation (homogenous and ulcerated leukoplakia)
2. Stage 2: lesions for investigation (oral sub mucous Fibrosis)
3. Stage 3: lesions for treatment (cancers)

Oral Potential Malignant Lesions Screening Among Administrative Staff in Faculty of Dentistry, Universities Padjadjaran, Indonesia* (Poster #23)

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The use of tobacco and betel quid are well established risk factors for oral cancer. Indonesia has a large number of smokers and betel quid users. Because early detection of cancer greatly increases the chances for successful treatment and better prognosis, our study was focussed on detection of oral potentially malignant lesions (OPML) and their correlation with oral cancer risk factors. Specifically, we undertook a screening among administrative staff of Faculty of Dentistry, Universitas Padjadjaran, Indonesia. We hypothesised that these staff members may be at higher risk because they are perceived to habitually smoke during work.

The study was descriptive-cross sectional. We did clinical assessment utilizing white light for intra oral examination to find any alteration such as changes of colour and texture, swelling, and/ or ulceration as well as extra oral examination on head and neck. Questionnaire was given to determine the oral cancer risk factors.

There were 32 respondents (6 females and 26 males) with an age range between 20 and 60. 16 (50%) respondents had leukoplakia, of whom 11 were smokers and 4 were both smokers and alcohol drinkers. None of the respondents were betel quid users. Another 16 respondents who revealed normal oral mucosa did not have any risk factors behaviour.

Our results clearly show that the number of OPML among administrative staff is high. This might be due to their low of awareness towards oral cancer risk factors, however further research is needed to confirm this hypothesis.

Screening studies on oral cancer and potentially malignant disorders in Sri Lanka* (Poster #24)

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Pioneering oral cancer screening studies were conducted in Sri Lanka by Warnakulasuriya and Nanayakkara during 1980s. The first (Warnakulasuiya et al 1984), was a feasibility study employing Primary Health Care Workers (PHCW) in the Central Province. Close to 30,000 were screened reporting a sensitivity 0.95, a specificity 0.81, PPV 0.58 and NPV 0.98.

Warnakulasuriya and Nanayakkara then reported the reproducibility of this screening technique using the same PHCW model in the Galle Province. 57124 were screened detecting 20 cancers and 1716 precancers with a sensitivity 95-97 percent and specificity 75 - 81 percent, well within the data reported from the UK, Japan and India. There were three other screening studies conducted in Sri Lanka during the last 10 years; two were among the estate workers.

Based on these screening data Amarasinghe et al proposed a risk factor model (RFM) to pre-select subjects for screening based on their life style habits (Betel quid and alcohol use). In this RFM betel quid use scored the highest risk for developing cancer. Targeted screening of subjects who are at high risk for

oral cancer due to tobacco, alcohol and betel quid use could maximize the screening efficiency as well as contribute to reduction of mortality from oral cancer.

Risk Factor Model gives a clear definition of patients at high risk for oral cancer in Sri Lanka. Our PHCW model was tested and found suitable for oral cancer screening studies in other low and middle income countries.

Oral Cancer Screening among Tobacco users in Hpa-An, Kayin State, Myanmar* (Poster #25)

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Dental professional has a key role in the prevention of oral cancer by early detection of any suspicious oral lesions. The purpose of the study is to evaluate the various forms of tobacco usage and the occurence of oral lesions among the people living in Hpa An, Kayin State. In this study, 337 participants were underwent for oral screening and 73 participants had various type oral habits. Male:female ratio was 1:1.5. Commonest oral habits were chewing betel quid alone (69.8%) followed by chewing & smoking(12.32%), chewing, smoking and drinking(9.5%), smoking alone(4.1%), smoking&drinking(2.7%) and chewing&drinking(1.3%) respectively. On examination, 19 out of 73 had chewer mucosa (26.02%) and 12 out of 73 had suspicious oral lesions(16.44%). After conducting toluidine blue staining, 7 out of 12 suspicious cases were toluidine blue stain positive. 6 cases were underwent for oral brush biopsy and excisional biopsy was done in one case. One case did excisional biospy along with oral brush biopsy. Epithelial dysplasia were found in 6 cases and histological examination of excisional biopsy was compatible with oral squamous cell carcinoma (well differentiated). Collectively, among the tobacco users(n=73), 6 cases of oral potentially malignant disorders and one oral squamous cell carcinoma were detected (~10.1%). Oral cancer screening at Kayin State Hospital showed effectiveness of oral screening among high risk group for detection of suspicious oral lesions. Therefore, detrimental effect of smokeless and smoking tobacco was significantly involved in the causative factors of OPMDs and oral cancer.

Cross sectional study of smokeless tobacco addictions and its effects on oral health in tribal population and comparison with non-tribal control population* (Poster #26)

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Background: Tobacco chewing and use of tobacco related products is a social norm in Tribal population in Gadchiroli district of Maharashtra state of India. The addiction consequences of this largely ignorant population are further complicated by limited access to basic health care and education.

Objectives: To find the prevalence of tobacco addiction in tribal villages. Screening and Early Detection for Areca Nut and Betel Quid- Related Cancers in the tribal population. Long term objectives being health education, de-addiction and prevention of oral cancer by detecting precancer at early stage.

Methods: Tribal villages were identified in the Gadchiroli district where tribal population according to 2011 census was nearly 100%. A cross sectional data was obtained from these villages by conducting camps and house to house surveys.

Result: 450 tribal individuals were screened out of which 349 were habituated to smokeless tobacco. 124 patients were suffering from oral pre cancer. 534 individuals from non tribal rural population were

screened out of which 211 were habituated to tobacco with 116 individuals suffering from oral pre cancer. 1 patient diagnosed with advanced oral squamous cell carcinoma. High prevalence of smokeless tobacco use especially, 'Kharra' was observed in tribal children starting at the age of 3 yrs. Health education and advice was given for de-addiction to 560 individuals.

Conclusion: Tobacco habits associated oral cancer are more prevalent in tribal population as compared to non-tribal rural population which warrants strong tobacco control measures.

Policy Interventions and Economics of Betel-leaf and Areca Nut

Epidemiology of betel quid chewing in Taiwan and its policy implications* (Poster #27)

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Oral cancer increased 10-fold in incidence, jumping from 550 to 6,000 cases a year, and 6-fold in mortality in the last two decades. Betel quid (BQ) chewers are breadwinners in the lower socioeconomic class, and, with most chewers smokers, chewing worsened the health disparity and led to 18,000 deaths every year from chewing BQ.
Taiwan earned the unenviable reputation as the world leader in oral cancer, and for age 30-54, the leading cancer among all cancer sites. The onslaught, with 30-40 combined oral assaults every day, 15-20 cigarettes and 15 BQ per day, by nearly 2 million adults, has been a public health disaster. The life time oral cancer risk, 42%, is nearly 40 times larger than U.S., at 1.08%, but cancer risk of BQ is systemic, inflicting organs far beyond oral cancer.
Enacting the "betel quid control act" is urgently needed, by modeled after the "MPOWER" approach for both tobacco and BQ. Quitting smoking led to BQ cessation, but not vice versa. Collect BQ consumption and sales data for "Monitoring", publicize the chewing harms for "Protect", offer cessation services for "Offering", place warning pictures on package for "Warning", ban advertisement for "Enforcing", and increase the tax of BQ for "Raise". Barriers to BQ control include unawareness of its harms, the powerful interest groups, and the lack of political commitment. An IOM-like white paper report is needed, but an urgent call for the international community to offer assistance should also be made, including an endgame toward BQ sale and chewing.

A Community-Engaged Approach to develop a South Asian Smokeless Tobacco Product Research and Policy Blueprint for the U.S.* (Poster #28)

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Research Objectives: There is a data gap on U.S. South Asian tobacco product availability, use and cessation. To address this and other S. Asian health research gaps, we developed the NIMHD-funded South Asian Health: From Research to Practice and Policy (1R13 HD007147-01A1).

Methods: We engaged multidisciplinary researchers, community members, policy makers, and practitioners to foster sustained community–academic collaboration and develop a U.S. South Asian tobacco product research and practice translational research blueprint. Virtual working groups reviewed and catalogued the available evidence, identified data gaps, and solicited community research priorities. Research priority recommendations were made, followed by a one day invitational convening (comprised of 50 U.S. Canadian, and S.Asian experts) to synthesize and expand upon the preliminary report. Five post-conference community town hall meetings extended the conference's community interactions.

Results:
Key findings:

- Surveillance systems of alternative tobacco product (ATP) availability (type, amount, location) and use among all ages in the U.S. are not standardized.
- There is a general lack of knowledge and awareness of ATP metabolic and carcinogenic risks.
- There are no available South Asian-specific ATP cessation protocols or trainings in the U.S.
- Product regulation (especially online) is lacking in the U.S., to the community's detriment.

Conclusions: More research is needed on ATP availability, accessibility, labeling, importation, and sales to minors. Prevention initiatives should start with youth, particularly susceptible to ATP use. Local ATP policies in areas with large, growing SA communities should be explored. Community and religious/cultural leaders should be engaged for information dissemination and improved messaging.

Betel quid and areca nut use in India: An in-depth review of numerous products made and policy analysis of ban on ST products for covering these products* (Poster #29)

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Background: Significant gaps persist in information available in different reports and monographs on multitude of smokeless tobacco products available in India.

The objective of this research is to conduct an in-depth study of all possible sources to adequately describe each product, especially those with betel quid or areca nut.

Beginning 2012, different Indian states banned ST products to varying extent. Second objective is to analyze if tobacco products with Betel quid and areca nut are covered adequately by this ban.

Methods: In addition to journal articles, unconventional resources like websites of manufacturers and sellers, newspaper articles, youtube videos, movies, package inserts and litigations were searched for information on ingredients, their processing, methods of use and prevalence.

Also, notifications by 30 State Governments banning ST products were obtained from their websites.

Results: Betel quid with tobacco, Gutka, Kharra, Mainpuri, Dohra, Mawa and 'Pan Masala with zarda sold in separate pouches' have betel quid and/or areca nut. Gutka used by 8% adults is most popular product among adolescents.

Betel quid finds no mention in any notification. Only Maharshtra bans arecanut explicitly. All states primarily ban Gutka and Pan Masala containing tobacco. Upto 11 states have blanket ban on all ST products, depending on how notification is interpreted. Barring 1-2 states, products like Kharra and Mawa find no explicit mention. Also, being made by unorganized street vendors, they largely escape ban.

Conclusion: Despite ban on ST products by different state government, huge gaps in product coverage remain, practically nullifying the impact.

Research Focus on Betel Nut by the University of Hawaii Cancer Center/University of Guam Partnership: An Overview* (Poster #30)

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In 2003, the University of Hawaii Cancer Center and the University of Guam initiated an institutional partnership to address cancer health disparities in Pacific Islanders. In 2007, a first research project on betel nut to develop a tool to assess betel chewing (M.J. Miller, S. Murphy) was funded. Subsequently, multiple betel nut research projects were conducted: isolation and quantification of Areca alkaloids (N.K. Suleman, T. Wright); an epidemiological study of oral precancerous lesions and other health risks in chewers (M.J. Miller, Y. Paulino, S. Murphy, E. Hurwitz); identification of sociocultural factors affecting betel nut chewing in Guam (K. Murphy, J. Moss, T. Herzog); identification of Areca nut components involved in pro-inflammatory mechanisms (N.K. Suleman, T. Wright, R. Penner); identification of salivary biomarkers for betel nut consumption (A. Mendez, C. Cabading, A. Franke); the influence of betel nut chewing on the oral microbiome (Y. Paulino, M.T. Goodman, B.Y. Hernandez). Current studies aim to structurally identify molecular components of betel nut involved in carcinogenesis (J. Yang, W. Jia, P. Williams, R. Penner), and to conduct a first betel nut intervention trial in Guam and Saipan (Y. Paulino, J. Moss, C. Cabading, A. Franke, P. Pokhrel, T. Herzog). Given the paucity of betel nut research in the United States, and its relevance for both our region and internationally, we intend to continue our research emphasis on betel nut, and to make our two institutions a major center for betel nut research in the United States. Supported by NCI grants U56CA096254, U56CA096278, U54CA143727, U54CA143728.

Countering a lethal combination: Mobilizing communities in Solomon Islands for betel nut and tobacco control* (Poster #31)

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Objectives and materials: Betel nut and tobacco are the main cause of oral cancer in Solomon Islands. Responding to the increasing frequency of betel nut use, WHO Regional Office for the Western Pacific (WPRO), in 2012, published A Review of Areca (Betel) Nut and Tobacco Use in the Pacific, offering a framework for action to address both supply and demand for betel nut and tobacco products. To stimulate community mobilization, the Tobacco Free Initiative, WPRO supported production of a video documentary in Solomon Islands and developed an accompanying discussion guide and action planning toolkit.

Methods: The pilot test of the materials was conducted with a focus group comprising 15 residents of Honiara in 2014. Participants viewed segments of the documentary and engaged in guided discussion about the situation and potential action areas using the discussion guide. This was followed by a short action planning workshop, based on the WHO framework for action.

Results and conclusions: Participants highlighted the need to de-normalize betel nut and tobacco use as paramount. Enforcement of laws to decrease affordability and accessibility such as banning the sale of betel nut and tobacco to minors and the sale of loose cigarettes was an identified gap. Likewise, participants identified the need to strengthen collaboration among government agencies, municipalities and civil society in order to support de-normalization of betel nut and tobacco use. This project,

designed to be adapted by other countries experiencing a similar issue, is currently being replicated in two Pacific countries.

It is high-time for WHO & Asian Countries to create a FCAC (Framework Convention on Arecanut Control) – on the lines of FCTC – to control & reduce the supply and demand of Arecanut-based-Products

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Background: According to FAO, total-area under Arecanut-Crop in the world is 468,316 Hectares, producing 593,275 Tonnes – with major-contributions from India, Indonesia, China, Bangladesh, Myanmar, Thailand & Malaysia. IARC's Research concluded that chewing arecanut is carcinogenic to humans. Arecanut affects almost all organs of human-body, including brain, heart, lungs, mouth & re-productive organs – irrespective of age, gender, color, ethnicity & country.

Objectives: To awaken WHO & Asian-Countries – to initiate efforts to formulate a FRAMEWORK CONVENTION ON ARECANUT CONTROL (FCAC), on the lines of FCTC – to control & reduce supply and demand of Arecanut-based-Products, across-the-Globe.

Methods: Ignoring the cascading-harmful-effects of Arecanut, Indian Government (Ministry of Agriculture) has set up a Directorate of Arecanut Development - with a Mandate for developing Arecanut. – in association with 43 Agricultural-Universities, Indian Council of Agricultural Research – with an outlay of INR 110,000,000 during 2015-16.

In 2001, India cultivated Arecanut in 341,000 Hectares producing 403,000 Tonnes– whereas in 2013, production got almost doubled and stood at 730,000 Tonnes obtained from 445 Hectares. Likewise, all Asian Countries are vying with each other to exponentially-promote this product and develop more-and-more new products based-on-Arecanut. CFTRI(Mysore-India) even developed a soft-drink-concentrate called Pan-Supari-Nectar.

Hence it is high-time for WHO & Asian Countries to formulate a FRAMEWORK CONVENTION ON ARECANUT CONTROL (FCAC) – on the lines of FCTC – to control & reduce the supply and demand of Arecanut-based-Products.

Conclusion: To start with, WHO may focus to implement FCAC in all Asian-Countries within 2020.

Policy and Economic Impacts of Betel Quid and Areca Nut Use in Nepal – An Exploratory Study* (Poster #32)

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This study will be the basis of policy and will stimulate research in economics of Betel Quid and Areca Nut Use in Nepal. Literature on smokeless tobacco products which contain areca nut and betel leaf/ root have been reviewed and also field data on the their use have been collected. Nepal Demographic and Health Survey and trade, tax and revenue related data have been analysed. No data is available on the use of Betel Quid and Areca Nut per se but their use in the forms of SLT was estimated at 4.7% among women aged 15-49 in 2011 and 34.8% among men. Areca nut is grown in Nepal and until recently SLT products were produced at home but now big companies in Nepal and India are taking them over and

marketing them. Excise, VAT and import duty are levied on Betel leaves, roots, and Areca Nuts but they constitute less than 1% of total import revenue. Recently SLT excise has increased from 1% in 2010/11 to 25% by 2014/15. Until 1995/96 import of SLT products was non existent but since 1996/97 it has increased substantially. Smuggling of areca nuts and SLT products has been going on for years. A cheap SLT product such as Gutkha is a good substitute for cigarettes. Using available data it was found that SLT is price-inelastic. However, the estimate was subject to limitations due to lack of appropriate data. Nepal needs to follow WHO recommended guidelines to formulate areca nut and SLT control policy.