Review Article

# Epidemiology of Betel Quid Usage

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## Abstract

**Betel quid chewing is an ancient practice common in many countries of Asia and among migrated communities in Africa, Europe and North America. It enjoys complete social acceptance in many societies and is also popular among women. In its most basic form, betel quid consists of betel leaf (*Piper betel*), areca nut, the main psychoactive ingredient, and slaked lime (calcium hydroxide). Areca nut is said to be the fourth most commonly used psychoactive substance in the world, after caffeine, nicotine and alcohol. There are a great variety of ingredients and ways of preparing betel quid in different countries. In some, particularly in India, tobacco is added to the quid. In recent years, commercially-manufactured non-perishable forms of betel quid (*pan masala* or betel quid mixtures and *gutka*), not containing betel leaf, have been marketed. Within a short period of about 2 decades, this industry has risen in value to several hundred US million dollars. Use of areca nut in any form is not safe for oral health; the use of commercially manufactured forms seems even riskier.**


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## Introduction

Betel quid/areca nut use has been common in South and Southeast Asia and the Asia Pacific region for a long time and is common among migrated communities in Africa, Europe and North America. Because of its ancient history, its use is socially acceptable among all sections of society, including women and quite often, children. Areca nut (usually incorporated in betel quid) is the fourth most common psychoactive substance in the world (after caffeine, alcohol and nicotine), its use extending to several hundred million people.

In its most basic form, betel quid is a combination of betel leaf, areca nut and slaked lime (aqueous calcium hydroxide paste). In many countries, tobacco is commonly used in conjunction with betel quid. Areca nut is the main psychoactive substance in betel quid if tobacco is not added.

## Spectrum of Betel Quid Preparations and Geographic Prevalence of Usage

The habit of chewing betel quid/areca nut is known in and has been reported from many countries such as Pakistan, Sri Lanka, Bangladesh, Thailand, Cambodia, Malaysia, Indonesia, China, Papua New Guinea, several Pacific islands and migrant populations in places like South Africa and eastern Africa, the UK, North America and Australia.[1]

There is a great spectrum of variation in ingredients and ways of preparing betel quid. There are several forms of areca nut (green unripe; ripe but raw; baked roasted or boiled; fermented; or, processed with sweeteners and flavours), betel (leaf or inflorescence); and, ingredients consisting of spices, condiments, tobacco and lime. In Papua New Guinea, betel quid chewers apply the lime separately with a spatula at the commissure of the mouth.[2] Among aboriginal groups of Southeast Asian countries, betel quid chewers commonly add tobacco to the quid and additionally smoking habits are also common among such populations. The hill tribes of Thailand, Cambodia, Myanmar and Laos include cloves, cinnamon and the roots of certain local plants in their betel quid.[3] In most countries, the habit appears more and more to be confined to the elderly, while retaining ceremonial value in some areas. In Thailand, a decline was recorded several decades ago[4] and reconfirmed recently.[5] However, in Taiwan, an increase in consumption has been recorded, especially among children and youth.

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There are many reports on the epidemiology of betel quid usage from Taiwan, where a green unripe areca nut of the size of an olive is often used with betel inflorescence or betel leaves. The habit is more common among men than women (9.8% versus 1.6%), is high among aborigines (42.1%)[6] and starts in childhood (around 12 years).[7]

In 1991, 13.3% of the interviewees in a survey of 1162 residents of Kaohsiung city aged 15 years and above reported chewing betel quid (only 2.8% chewed daily) and the age distribution of chewing behaviour suggested that more young people chewed it at the time of the survey than in the past.[8]

Increasing betel quid usage among adolescents in Taiwan has been investigated in other studies. The phenomenon appears to be due to an upsurge in marketing and production of areca nut and the sale of ready-made quid in shops. Among 2442 junior high school students in Changhua County, 6.4%, 3.7% and 3.0% of students in rural, semi-urban and urban areas respectively were chewers. More than half (53.6%) of the habitual chewers first tried it with a family member, most often the father or grandfather.[7] In other school surveys in Taiwan, betel quid use was more common among boys than girls. It was also more common among students who smoked, consumed alcohol and had friends who chewed betel quid.[7,9] Betel quid use was more prevalent in students of vocational schools than among those in general junior and senior high schools.[9,10]

In Guam, unripe areca nuts are chewed, by themselves or with betel leaves. Some habitual chewers in Guam add smokeless tobacco (The Guam Website, Betel Nut or Pugua Home Page, http://ns.gov.gu/pugua.html, Agana, 2003).

In the Pacific island of Palau, areca nut is chewed in the green unripe state, one half at a time with slaked lime (made from fire-burned coral) and tobacco, wrapped in a piece of betel leaf. The ingredients for a single chew, including tobacco from half a cigarette, wrapped in aluminium foil, are sold in many shops. A prevalence study conducted in 1995 on 1110 residents of 2 states, 5 to 74 years, with an age distribution similar to that of the whole population, found that 72% of males and 80% of females chewed areca nut (betel quid), 80% of whom incorporated tobacco in their quid.[11]

In Cambodia, most users add tobacco to their quid, while others use it to rub the gums/clean the teeth after chewing betel quid. Most users are elderly women.[12] In a community-based study, 32.6% of women and 0.8% of men over the age of 15 years chewed betel quid. Most of the women chewers were over the age of 39 and the men over the age of 50. Smoking was the most prevalent tobacco habit in men (42.9%), but was uncommon in women (4.5%).[13]

In Indonesia, betel quid is chewed first and then a large wad of finely cut tobacco is used to clean the teeth. It is then kept in the mouth for a while.[2]

In Malaysia, betel quid usage is highest among some of the indigenous groups, who also add tobacco to the quid. In mainstream/urban Malaysian society, the ethnic Indians incorporate tobacco in betel quid, but the Malays do not.[14]

As stated earlier, betel quid is prepared in many different ways, and especially so in India. The most common way in India is to use half a large leaf, 1 medium or 2 small-sized betel leaves, smear them with slaked lime and a small amount of a catechin-containing substance (*catechu*, *gambir*, or *kath*, but not in the southern region), along with pieces of areca nut. Only ripe areca nut is used, usually after curing (generally by roasting or boiling in water). Betel quid can be prepared plain (or astringent) or sweet. Sometimes cardamom and often tobacco are added to the plain variety. In the sweet variety, cardamom, cloves, coconut, sugar crystals, camphor, amber, nutmeg, mace and even colouring agents are commonly added. In North Eastern parts of India, fermented areca nut called '*Tamol*' is frequently used.[15] Habitual users generally include tobacco, which can be raw and unprocessed or processed with a mixture of spices and often sweetened with unrefined sugar or artificial sweeteners and flavoured.[16]

In the 1960s, a set of house-to-house surveys in India of over 50,000 individuals 15 years of age and above with roughly equal numbers of males and females in 5 disparate districts in 4 states (Andhra Pradesh, Bihar, Gujarat, Kerala) showed a range of betel quid usage prevalence of 3.3% to 37%.[17] In Ernakulam, Kerala, where the highest prevalence had been found, when it was studied again in the late 1970s and early 1980s, over 30% of both men and women aged 15 years and older chewed betel quid, almost always with tobacco.[18,19]

A survey was conducted during 1992 to 1994 in Mumbai, India, among 99,598 residents 35 years and older, belonging to the middle and lower socioeconomic strata. Areca nut use was 29.7% among women and 37.8% among men, almost all with tobacco, while smokeless tobacco habits were reported by 57.1% women and 45.7% men.[20]

In other population-based, rural and urban habit surveys reported from India, Nepal and Pakistan over the last 2½ decades, between 20% and 40% of the population 15 years of age and above were betel quid or areca nut chewers. The surveyed areas were located in the Indian states of Karnataka and Maharashtra, as well as in Karachi, Pakistan and 3 regions of Nepal.[21-25]

In addition to men and women, betel quid chewing is also a major habit among youth. For example, among youth aged 5 to 20 years surveyed in a small fishing community

in Kerala, betel quid-tobacco chewing was regularly practiced by 27.4% boys (14.3% occasionally) and 1.6% girls (11.3% occasionally). Betel quid chewing was common among both men and women in this community as was smoking among men.[26] In a fishing community on Baba Island of Karachi, 74.2% of students in a probability sample of 160 primary school students were using areca nut products, mostly sweetened areca nut and betel quid.[27]

### Newer, Imperishable Forms of Betel Quid

The popularity of betel quid has decreased in South Asia over many years, the main reason being that its perishability does not fit into the modern lifestyle. During recent decades, fairly imperishable preparations have been marketed and their use has become common, especially among younger people.

*Supari* (a North Indian word for areca nut), as a commercial preparation, consisting of small roasted and flavoured pieces of areca nut, is often served to guests after meals. *Mainpuri* tobacco is a preparation that has been popular in Uttar Pradesh for many years. It contains tobacco with finely cut areca nut, slaked lime, camphor and cloves. *Mawa* is a newer preparation containing thin shavings of areca nut with the addition of some tobacco and slaked lime. It gained popularity in Gujarat, especially among youth, and a high increase in prevalence took place in the 1970s and 1980s. In a house-to-house survey in Bhavnagar District, Gujarat, India, 20.4% of total males were using mawa or betel quid in a surveyed population of nearly 22,000 villagers aged 15 years and older[28] whereas in earlier surveys during late 1960s such use was rare.

A major change in betel quid/areca nut use occurred in India when an industrially manufactured mixture of areca nut, lime, a catechin-containing substance, sandalwood fragrance and tobacco was introduced to the market in small aluminium foil sachets. This product was termed *gutka*. The same product without tobacco was termed *pan masala*. Most companies manufacture *gutka* as well as pan masala and market both products with the same brand name and packaging. This way manufacturers bypass restrictions on advertising of tobacco products on radio and television since there is no restriction on the advertisement of *pan masala*. Both these products can be conveniently carried around in one's pocket. They are heavily advertised in all media including television and intensely marketed. The products are especially targeted at youth – there are kiosks outside most schools and free sample distribution by manufacturers is not uncommon. Cyclamates are added to make mixtures taste sweet and attractive flavouring agents, like sandalwood, are included. The sachets are bright, colourful, often with blatantly appealing brand names such as "Sir" – a common form of address from student to a teacher in India. Within 3 decades, the *pan masala* and *gutka* industry registered a phenomenal growth from zero to Rs. 25 billion (US$500 million). It is one of the fastest-growing industries, registering 25% to 30% growth per year, with *gutka* responsible for most of the growth.

A number of unpublished surveys conducted in schools and colleges in India have shown that *pan masala* and *gutka* are commonly chewed by children and youth, especially in Gujarat, Maharashtra and Bihar. Street children have been commonly found to chew *gutka* all day long.[29] In a survey of 1200 students from junior and degree colleges of Maharashtra, 9.9% took *pan masala* and 9.6% chewed *gutka*.[30]

A survey conducted in 1998 among 400 male medical students in Patna, Bihar, India (out of a total of 509) revealed that about 12.5% were regular users of *gutka* and 27.5% used *pan masala* occasionally, while 30.5% used other smokeless tobacco products not containing areca nut.[31]

### Betel Quid Use in Migrant Communities

South Asian communities in the UK are considered a high-risk group for oral cancer, primarily because of their betel-quid chewing habits.[32] The major betel quid-using communities in the UK include those originating from Bangladesh, Pakistan, Sri Lanka and India, especially Gujarat.[33]

Over 80% of adults of Bangladeshi descent in London use betel quid regularly with no gender difference, according to 2 studies. Tobacco is commonly but not universally added. Men commonly smoke as well.[34,35] The industrial forms of betel quid are also becoming popular among these communities. Studies reporting on betel and tobacco habits among expatriate South Asians in the West also point out the lack of awareness of the risks and signs of oral cancer irrespective of age, gender, national subgroup and social class. They tend to be more aware of the risks of smoking, but not those other oral habits such as betel quid use.

Betel quid use has spilled over to a small number of curious Westerners, some of whom have posted information on the Internet, through which also, the ingredients are commercially available. These users appear entirely unaware or unconcerned about any possible dangers of these substances, which they also use freely with alcohol and other psychoactive substances.

### Oral Submucous Fibrosis and Oral Cancer

It is now well accepted that the use of areca nut causes oral submucous fibrosis (OSF). This condition was first described in the 1950s.

Up until the mid-1960s, when the dental research group at the Tata Institute of Fundamental Research (TIFR)

started large-scale population-based epidemiologic studies, OSF was considered to be a rather enigmatic disease of unknown aetiology, as it was reported only amongst Indians living in India and abroad.

In addition, the most prominent feature was intolerance to normal Indian spicy food, which initially led some researchers to suspect chillies as a causative agent. The epidemiologic research of TIFR during the late 1960s and 1970s, supported by many others, helped in pointing out and establishing areca nut use as the main aetiologic factor for OSF.[36]

During the 1960s and 1970s, OSF was a comparatively rare condition (0.1% to 0.4%), found mainly among older individuals. The popularity of areca nut mixtures, like *mawa, pan masala* and especially *gutka*, has spawned an epidemic of OSF among young individuals in India, as borne out by the changing age distribution of the disease (Table 1).

Over 70% of the cases of OSF were under 35 years of age in 3 recent case-control studies in Bhavnagar, Gujarat, Nagpur, Maharashtra and New Delhi.[28,37,38] *Pan masala* and *gutka* chewers develop the condition in about half the time as betel quid or areca quid chewers, with 75% of the *pan masala* chewers developing the disease within 4.5 years and quid chewers in about 9.5 years. The absence of betel leaf in *pan masala* and the proportionate higher dry weight of areca nuts may be partly responsible for the earlier development of OSF in *pan masala/gutka* chewers.[39] Tobacco in areca nut mixtures, although not a causative factor for OSF, is believed to be responsible for a higher occurrence of OSF due to its effect of increasing addiction and thereby causing higher exposure to areca nut chewing.

In follow-up studies, submucous fibrosis was established as a highly precancerous condition. In a cohort of 12,212 tobacco users, the relative risk of malignant transformation in the oral mucosa of OSF patients compared to tobacco users without any precancerous lesion or condition was 397.3.[40]

This high occurrence of OSF in the younger age groups has given rise to the notion that there will be a parallel increase in the incidence rates of oral cancer in this group.

Table 1. A Comparison of the Age Distribution of Recently Reported Oral Submucous Fibrosis Cases and Incident Cases Reported in the Past in India

| Age (y) | Submucous fibrosis cases in different studies | | |
|---|---|---|---|
| | 1998[28] | 1998[37] | 1980[38] |
| 15 to 34 | 138 | >140 | 1 |
| 35 to 54 | 25 | <60 | 19 |
| 55 and over | 1 | – | 6 |
| Total | 164 | 200 | 26 |


Fig. 1. Incidence rates of oral cancer in the city of Ahmedabad.[41]

This appears to be the case as suggested by data from a population-based cancer registry demonstrating a significant increase in oral cancer in the young (<50 years) (Fig. 1).[41]

After conducting its intensive anti-tobacco community outreach programme every June, the Tata Memorial Hospital, Mumbai observed an increase in the number of patients having oral examinations in the months of June and July in 3 successive years from 1997 to 1999. Of these patients, 28% to 30% were diagnosed with OSF, indicating a high level of areca nut use in the population served by this cancer hospital.

**State Bans on Manufactured Betel Quid**

The situation has reached such proportions that the government has no way out except to ban the product. In public health, banning of widely-used products is generally not favoured. This product, however, needs to be banned because under Indian laws, *gutka* is classed as a food item and falls within the purview of Prevention of Food Adulteration Act. The Central Committee on Food Safety (CCFS) has already recommended a complete ban to the Central Government. The CCFS members unanimously wanted a complete ban on manufacture and marketing of gutka for 3 reasons: 1) children are getting addicted to these products in large numbers; 2) users develop OSF and cancer over a relatively shorter duration and die earlier compared to smokers; 3) women prefer smokeless tobacco due to social disapproval of their smoking and therefore may be particularly vulnerable to *gutka* addiction. All legal evaluation processes required for banning *gutka* nationally have been completed.

*Gutka* has now been banned by the following states: Tamil Nadu, from November 19, 2001; Andhra Pradesh; Goa; Maharashtra, from August 1, 2002.

Other developments that took place in quick succession during the first week of August 2002: the Cabinet in Rajasthan accepted the ban in principle and the High

Courts in Uttar Pradesh and Madhya Pradesh asked their Governments to ban *gutka*, but these were later stayed by the Supreme Court.

Naturally, *gutka* manufacturers have gone on the defensive. A major argument of a *gutka* manufacturer now is that *gutka* cannot be so bad when countries like the UK and Singapore are allowing import of their products (Report of a press conference in the Times of India, Mumbai on July 26, 2002). In fact, *gutka* and *pan masala* are also exported to many other European countries, the Middle East, Japan and Australia, as well as across borders within South Asia itself.

Banning *gutka*, of course, does not mean banning tobacco. Some vendors in Mumbai, Maharashtra have circumvented the ban by selling packets of *pan masala* and giving away one packet of *zarda* (flavoured smokeless tobacco) free along with it. This combination contains the essential ingredients and flavourings of *gutka*.

## Conclusions

Betel quid chewing continues to be widespread in South Asian populations, including immigrant communities outside the region as well as among certain tribal groups in Southeast Asian countries and also in Taiwan in increasing measure. From the available evidence, it can be concluded that betel quid and areca nut use in any form are unsafe for oral health. Commercial forms, which have become increasingly popular among South Asians, seem to pose even higher risks. This is an instance where research in oral pathology has been crucial in the formation of public health policy in India, which is hoped will lead directly to primary prevention measures in this country.

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