

## RESEARCH ARTICLE

Editorial Process: Submission:06/07/2024 Acceptance:02/08/2025

# Knowledge, Attitude and Practices of Areca Nut (kwai) Use among Employees of a Tertiary Health Care Institution in North-East India

Caleb Harris\*, Samapti Debnath, Fine One Laloo

### Abstract

**Objective:** This study strives to look for the knowledge, attitudes, and practices of areca nut use among health care workers in a tertiary hospital in North-East India. **Methods:** A prospective, cross-sectional, questionnaire-based study was conducted among all health care and allied workers at a public sector teaching hospital in Meghalaya, Northeast India. A questionnaire, which was validated for content, was administered to the target population. Three domains of learned behavior towards areca nut viz. knowledge (cognitive), attitude (affective) and practice (psychomotor) were assessed. Data was analyzed using SPSS V21.0. Descriptive statistics were used. **Result:** A total of 434 participants completed the questionnaire. Majority of the respondents [52.8% (229)] had consumed Kwai (Areca nut) in the past 12 months. Kwai was perceived to have beneficial effects by 17.9% (78) of respondents. A total of 76.3% (331), 72.8% (316) and 62.2% (210) of respondents thought that Kwai consumption caused throat, oral and esophageal cancers respectively. 48.0% (110) of the respondents swallowed the kwai juice in contrast to 32.4% (69) who spit the kwai juice. 61.6% (141) Kwai chewers tried quitting, out of which 41.8% (59) managed to stay away from Kwai for more than a year but eventually ended consuming Kwai again. 62.4% (143) of the respondents claimed that the children in their family/neighbor consumed Kwai. **Conclusion:** Among our study population, the knowledge about harmful effects of areca nut is good. However, this knowledge has not translated into change in practices.

**Keywords:** Areca- Betel Nut- Behavior- India- Attitude

*Asian Pac J Cancer Prev*, 26 (2), 489-495

### Introduction

The habit of areca nut chewing is considered to be 2000 years old [1]. Among South East Asian population areca nut is estimated to be used by 600 million people [2-4]. India being the highest producer of areca nut in the world, contributes to 330000 million tons of areca nut production per year which is nearly half of the global areca nut production [5].

'Kwai' is the local name for areca nut (*Areca catechu*) in Meghalaya and is chewed along with betel leaves (*Piper betle*) and slaked lime. The active agent in betel nut is an alkaloid called arecoline. While the dried and fermented forms are used in other parts of India, Kwai is generally a raw and unprocessed form.

Areca nut is the fourth most addictive substance (after tobacco, alcohol and caffeine) [6]. According to Pankaj et al. [5], it is the 2nd most common carcinogenic substance in the Indian subcontinent. Areca nut, also known as betel nut, without tobacco has been classified by International Agency for Research on Cancer (IARC) as Group 1 carcinogen in volume 85, 100E in the year 2012 [7].

Betel nut increases risk of precancerous oral lesion, oral cancer, pharyngeal cancer and esophageal cancer [2, 8-9], hepatocellular carcinoma, cancer of larynx, stomach, lung, cervix [10]. Northeast India has a high incidence of esophageal cancer. The Age Adjusted Rate (AAR) of esophageal cancer was highest in East Khasi hill District of Meghalaya irrespective of gender as per data from the National Cancer Registries [11].

Understanding the knowledge, attitude, practices about betel nut chewing in this part of the country (North-East India) may enable steps for the prevention of various cancers. Thus, this study aimed to explore, among the health care and other hospital workers, the knowledge, attitudes and practices of kwai use and its adverse effects. The study also sought to find out the reasons behind the use of Kwai in a relatively educated population despite areca nut being a proven carcinogen.

### Materials and Methods

#### Study design

A prospective, cross-sectional, questionnaire-based

Department of Surgical Oncology, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong, India. \*For Correspondence: calebhar@gmail.com

study was conducted, with due review by Institutional Ethics Committee (IEC). A questionnaire was developed for this purpose and validated by experts for content. These were distributed to all health care and allied workers at a public sector, tertiary hospital in Meghalaya, Northeast India and responses collected from those who volunteered to participate.

All the subjects who fall under the ambit of our inclusion criteria were encouraged to participate in the study and informed consent was obtained. This tool, apart from collecting demographic information, included details with regard to use of areca nut, tobacco, alcohol and other addictive substances. The duration of use, quantity, type of substance, specific form-if any, and other specific details for each of the substances consumed were elicited. The knowledge with regard to the carcinogenic and other adverse effects of Kwai consumption was assessed. The factors leading to initiation and continued use of kwai, including social factors, were also studied.

The research is reported in accordance with the STROBE guidelines [12].

#### Study questionnaire

A validated (for content), close-ended, structured, self-administered questionnaire was administered. This questionnaire consisted of 29 questions assessing three domains of learned behavior towards areca nut viz. knowledge (cognitive), attitude (affective) and practice (psychomotor).

#### Statistical analysis

Data was handled anonymously and SPSS V21 for Windows was used for the statistical analysis. Categorical variables are presented as frequency and percentages. Continuous variables are presented as mean and standard deviation (SD). Descriptive statistics were used.

#### Ethical Consideration

Ethical approval from the IEC was obtained. Written informed consent was taken and subjects who agreed to participate completed the questionnaire. Confidentiality of the data was maintained.

## Results

A total of 434 health workers completed the questionnaire. The sociodemographic profile of the study participants can be found in Table 1. The median age of the study participants was 31 with a range from 18 to 56 years with 31.1% had graduate degree and 30.7% had professional courses (Table 1).

#### Betel nut chewing practices among study subjects

Majority of the respondents 229(52.8%) had consumed Kwai in the past 12 months [current chewer] with several of them consuming in the past week (79.9% of 229) (Table 2). While many consumed Kwai occasionally [79 (34.4%)], almost a quarter of the respondents consumed at least 2 to 5 times per day or more [64 (28.0%)] (Table 2). A total of 43 (18.8%) respondents claimed to consume kwai with tobacco and 76.7% (33) out of these 43

Table 1. Sociodemographic Characteristics of the Study Participants(n=434)

Sl. No.	Characteristics	Frequency n (%)	
1	Age {Median [Range]}	31[18-56]	
2	Gender	Female	309 (71.2)
		Male	125(28.8)
3	Education	Graduate	135 (31.1)
		Professional Courses	133 (30.7)
		Higher Secondary	68 (15.7)
		Post Graduate	58 (13.4)
		Upto Secondary School	21 (4.8)
		Matriculate	8 (1.8)
		Vocational Courses	4 (0.9)
		Upto Primary School	3 (0.7)
		No Response	4 (0.9)
4	Occupation	Nurse	115 (26.5)
		Attendant	72 (16.6)
		Technician	44 (10.1)
		Nursing Student	41 (9.5)
		Medical Student	29 (6.7)
		Resident Doctors	28 (6.5)
		Faculty	23 (5.3)
		Clerical Staff	20 (4.6)
		Project Staff	17 (3.9)
		Allied Health	9 (2.1)
		Other	24 (5.5)
		No Response	12 (2.7)

respondents started using tobacco following the habit of Kwai consumption (Table 2). A quarter [110(48.0%)] of the respondents swallowed the Kwai juice (umbiah kwai) in contrast to 30.2 % (69) who spit the kwai juice (Table 2). 5.76% (13) of the respondents consumed Kwai instead of food (diet replacement) when hungry. 62.4% (143) of the respondents said that the children in their family/neighbor consumed Kwai. Betel nut chewing practices among our subjects can be found in Table 2.

#### Knowledge pertaining to Kwai use

Kwai was perceived to have beneficial effects by 17.9% (78) of respondents (Table 3). A total of 76.3% (331) of respondents thought that Kwai consumption caused throat cancer and 42.0% (139) of the above percentages were kwai chewers. Similarly, 72.8% (316) of respondents thought that Kwai consumption caused mouth/oral cancer and 42.1% (133) of the above were kwai chewers. Finally, a total of 62.2% (270) respondents thought that Kwai consumption caused esophageal cancer and 40% (108) of the above were kwai chewers (Table 3). Knowledge regarding betel nut chewing among our subjects is listed in Table 3.

Table 2. Descriptive Variables Related to Betel Nut Chewing Practices among Study Participants

			n (%)
Kwai chewing habits	Current chewers	Male	63 (14.5)
		Female	166 (38.3)
		Total	229 (52.8)
	Former chewers		183 (42.2)
Form in which kwai is consumed	Raw kwai		36 (15.7)
	Processed/fermented (Kwai scop)		33 (14.4)
	Depend on availability		123 (53.7)
	No difference		37 (16.2)
Kwai consumption	With tobacco	Yes	43 (18.8)
		No	186 (81.2)
	With Lime	Always	115 (50.2)
		Sometimes	36 (15.7)
		Never	78 (34.1)
	With Betel leaf	Always	119 (52.0)
Sometimes		99 (43.2)	
Practice of chewing areca nut and other products	Spitting or swallowing of the juice	Swallow always	110 (48.0)
		Swallow sometimes	41 (17.9)
		Spit always	69 (30.2)
		Spit when combined with tobacco	9 (3.9)
	Spitting or swallowing of the remnant/quid	Swallow always	136 (59.4)
		Swallow sometimes	50 (21.8)
		Spit always	43 (18.8)
		Spit when combined	0 (0.0)
	2-5 times a day		64 (28.0)
	More than 5 times daily		35 (15.3)
Occasionally		79 (34.4)	
After every meal		14 (6.1)	
Duration of betel quid is kept in the mouth(min)	1 to 10		140 (61.2)
	11 to 20		24 (10.5)
	21 to 30		11 (4.8)
	>60		3 (1.2)
	No response		51 (22.3)
Habits of any other addictive substances	Yes		50 (21.8)
Children in the family/neighbour consume Kwai	Yes		143 (62.4)
Consume kwai even after warning	Yes		86 (37.6)

#### Attitude pertaining to Kwai use

A total of 55.0% (126) of the kwai-chewing respondents consumed Kwai for mouth freshening purpose and 22.7% (52) did so out of cultural courtesy or societal practice (Table 4). A total of 141 (61.6%) kwai chewers had tried quitting, out of which only 59 (41.8%) managed to stay away from Kwai for a year but eventually ended consuming Kwai again (Table 4). Sadly, only 3(2.1%) of those who attempted to quit kwai were successful. 17.5% (40) of the respondents have had a family member suffering from some kind of cancer and 20.0% (8) of the above claimed that this does not have any effect on their Kwai chewing habits. All details related to betel nut

chewing attitudes can be found in Table 4.

#### Discussion

Among our study population, the knowledge about harmful effects of areca nut is good. However, this knowledge has not translated into change in practices. Health care workers play a vital role in promoting positive attitudes towards health in the community by shaping public health policy and increasing awareness. This study helps us to understand the prevalence of this risk factor in a well-educated population, where 75.2 % (326) hold graduate degree or more [Table 1]. This is in contrast to a

Table 3. Descriptive Variables Related to Betel Nut Chewing Knowledge among Study Participants

			n (%)
Benefit of kwai consumption	Yes	Mouth refreshments	24 (5.5)
		Prevention of tooth decay	13 (3.0)
		Keeps body warm	12 (2.8)
		Aids in digestion	8 (1.8)
		Increase appetite	4 (0.9)
		Form of cultural courtesy	5 (1.1)
		No reason	12 (2.8)
		Total	78 (17.9)
Harmful effects of kwai consumption	No		356 (82.1)
	Yes		297 (68.4)
Harmful effects of kwai consumption	Throat cancer	Yes	331 (76.3)
		No	103 (23.7)
	Oral cancer	Yes	316 (72.8)
		No	119 (27.2)
	Esophageal cancer	Yes	270 (62.2)
		No	164 (37.7)
Warned about ill effects of kwai	Yes		225 (51.8)
	No		209 (48.2)
Active chewer in the family	Yes		308 (71.0)
	No		126 (29.0)

study done by S Ravikant et al. in Assam, a neighboring state in India, among shopkeepers where only 26% (126) had graduate degree and above [13].

The prevalence rate of current areca nut chewers was found to be high [52.8% (229)] in our subjects, whereas according to the report of monitoring surveillance for cancer risk factors for Northeast Region of India (NER) by the Indian Council of Medical Research (ICMR), 42.1%

of the respondents consumed non-tobacco betel products, areca nut being the most frequently used product (33.1%), followed by betel quid (18.2%) [14]. In addition to these non-tobacco betel products, 21.8% (50) of our subjects consumed other addictive substances such as tobacco and ghutka. Although this habit is equally distributed among all age groups, areca nut chewing among children as reported by respondents was found to be on the higher side

Table 4. Descriptive Variables Related to Betel Nut Chewing Attitude among Study Participants

			n (%)
Reasons for kwai chewing		Mouth freshening	126 (55.0)
		Societal pressure	52 (22.7)
		Inquisitiveness to try	27 (11.8)
		To keep warm	19 (8.3)
		To concentrate in work	5 (2.2)
Ever tried quitting kwai	yes		141 (61.6)
Duration of time before resuming Kwai again after attempt to quit		<1 month	44 (31.2)
		1-6 month	25 (17.7)
		6-12 month	10 (7.1)
		>12 month	59 (41.8)
Factors against quitting kwai		Peer pressure	4 (1.7)
		Societal pressure/cultural practice	39 (17.0)
		Addiction to the effects	12 (5.2)
		No intention to quit	112 (48.9)
		Feel better, happier, confident	50 (21.8)
		Helps concentrate	6 (2.7)
		Others	6 (2.7)

[(62.4 % (143)], similar to the study by Kapoor et al. [15]. According to Goyal G et. al. [16], a male predominance [87% (913)] was reported among areca nut users whereas in our study female predominance [71.2 % (309)] is reported. It may be noted that Meghalaya is a matrilineal society, where the ancestral descent is through maternal lines and the daughters inherit the property. Women have a certain level of autonomy not seen in patriarchal societies.

Mouth freshening [55.0% (126)] was the most common reason for chewing kwaï in our subjects whereas Kumar A [13] in his study done in a neighboring state reported pleasure after use of areca nut and relieving stress as the most common reasons. Dhole A S et al. [17] in his study found only one subject had habit of areca nut chewing as a mouth freshener.

Phukan RK et al. [18] in his study done in Assam has shown betel nut chewing with or without tobacco was independently associated with development of esophageal cancer. The development of oral premalignant lesions was also associated with betel nut chewing habit [6]. People who chew betel nut have a significantly high risk of developing oral and oropharyngeal cancers [10]. More than half [68.4% (297)] of the subjects were aware about the harmful effects of areca nut. Only 17.9% (78) believed areca nut consumption has beneficial effects. Contrarily, Srihari JS [19] in his study done in Karnataka reported that 69.0% of their respondents thought areca nut chewing has beneficial effects and one third of the respondents were aware of the harmful effects of areca nut. Kumar A [13] found more than half of their subjects knew about the harmful effect of areca nut and 22.5% (108) believed areca nut had beneficial effects. 76.3% (331), 72.8% (316), 62.2% (270) of our subjects were aware that areca nut chewing causes throat, oral and esophageal cancers respectively. Of the 61.6% (141) who ever tried quitting areca nut, 31.2% (44) of the subjects re-started areca nut consumption within a month. Only 3(2.1%) respondents were successful at quitting betel nut. Kumar A [13] also reported low quit rates among subjects despite being aware of harmful effects.

In our study 70.7% (162) reported areca nut chewing being practiced by other members of their family. A survey done in Karachi; Pakistan found it to be rude not to chew areca nut if someone among their family member is chewing betel quid [5]. This demonstrates that family members and peer groups have an impact on the chewing of areca nut.

Many of our respondents used kwaï due to societal/cultural reasons. Many Indians believe that areca nuts are of divine origin. In India, as with many other Asian and Pacific nations, it has a particular cultural and social significance. Many Asian nations, such as Taiwan, India, Nepal, Bangladesh, China, Thailand, Vietnam, Cambodia, and Indonesia hold these highly cherished customs [20]. In Malaysia, guests are greeted with a platter of betel nuts, while in Vietnam betel nuts are ceremoniously used in weddings as a symbol of love. These Asian communities frequently consume modest amounts of betel nut on an informal basis due to its frequent usage during festivities [21]. It is presented as dowry and used as a symbol of love and bondage between married couples among

Taiwan's indigenous populations. Betel nuts are frequently presented at formal events and fests. Spitting the liquid out is thought to protect people and ward off evil spirits. In Hinduism, it is regarded as a fortunate component and is utilized in religious rituals and for showing reverence. The various components of the betel quid are compared to the 'Hindu Trimurti': Betel leaves are associated with Vishnu, the preserver; areca nuts are associated with Brahma, the creator; and slaked lime is associated with Shiva, the destroyer. Due to the social acceptance of areca nut and its availability at home, adolescents and young people are more likely to engage in these practices. 62.4% (143) of the respondents in our study claimed that the children in their family/neighborhood, consumed Kwaï.

The dangers associated with what is thought to be a harmless and socially acceptable habit in rural Tamil Nadu are highlighted by Gunaseelan R et al. [22] Areca nut consumption in the nation is evolving in terms of both substance and pattern, and as a result, it is likely to pose serious risk to public health, especially for India's impressionable and thus vulnerable youth. Because areca nut consumption is regarded as benign, it serves as a gateway to tobacco use at a relatively young age [23]. In our study, a total of 18.8% (43) respondents claimed to consume kwaï with tobacco and 76.7% (33) out of 43 respondents started tobacco following the habit of Kwaï consumption. Research conducted in Delhi found that 11.74% (70) of high school students used areca nuts [24]. The discovery that both boys and girls in this population chewed tobacco and areca nuts in the same rate is also alarming. Probably, compared to smoking, this type of tobacco usage appears to be less of a social taboo for young women [24].

All areca nut products – those without tobacco included as well – are linked to oral submucous fibrosis (OSF), with pan masala carrying the highest risk. The length of the habit is more important than how often it is chewed, reinforcing the idea that the risk for OSF increases with younger age at onset. The risk of cancer increases with the length and frequency of areca nut use each day, indicating a dose-response relationship [9, 21]. Numerous investigations on users of areca nut alone have found an elevated risk for development of oral malignancy (oral squamous cell carcinoma) and its precursors, leukoplakia and submucous fibrosis; the risk is significantly exacerbated when tobacco is added [21].

Use of kwaï is exclusive to the inhabitant of Meghalaya and in view of the strong cultural implications this tool was validated by experts belonging to the indigenous community. However, only content validity was performed. Since this study was designed to understand the KAP of a particular group it may not be generalizable to other milieu. Though formal sample size calculation was not performed and only convenient sampling was considered, 434 respondents out of a total 3000 employees of the institute seemed robust.

The region where this study was conducted has the highest incidence of Esophageal cancer in India and is matched by high usage of areca nut, which has a putative role. Understanding the knowledge, attitude and practices may enable us to inform public policy and take preventive

efforts. This study was performed in a well-educated population which, owing to being employed in the healthcare industry, may have more insight into several diseases. This will help inform policy makers that despite awareness, there is high usage and hence legislation may be required to bring about behavioral change.

This study is limited by self-report bias, recall bias as some respondents may have been unable to recollect certain information such as the precise year, they began eating areca nut, etc. Being a cross-sectional study, conclusion on areca nut dependence is not possible.

This study concludes that among our study population, the knowledge about harmful effects of areca nut consumption is good. However, this knowledge has not translated into change in practices. Legislative action may be necessary to bring about a reduction in the use of this group I carcinogen, which is used extensively.

## Author Contribution Statement

Conceptualization:[CH]; Data curation:[CH] [SD] [FL]; Formal analysis:[CH] [SD] [FL]; Funding acquisition: NA; Investigation: [CH] [SD]; Methodology: [CH] [SD]; Project administration:[CH] [SD]; Resources: [CH]; Software:[CH] [SD] [FL]; Supervision:[CH] [SD] [FL]; Validation: [CH] [SD] [FL]; Visualization:[CH] [SD] [FL]; Roles/writing- original draft:[CH] [SD] [FL]; and Writing-review & editing :[CH] [SD] [FL].

## Acknowledgements

### General

We wish to acknowledge Dr. Star Pala, Department of Community Medicine; Dr. Cliff A Wanniang, Dr. David Ngursangpuia, Dr. Subhrajeev Chakraborty, Dr Ravi Singh, Department of Surgical Oncology, North Eastern Indira Gandhi Regional Institute of Health, and Medical Sciences (NEIGRIHMS); Mr. L Anand, College of Nursing, NEIGRIHMS for their contribution.

### Approval

This study was approved by Institute Ethics Committee, NEIGRIHMS [IEC No.: NEIGR/IEC/M3/F3/17].

### Ethical Declaration

This study was approved by Institute Ethics Committee, NEIGRIHMS [IEC No.: NEIGR/IEC/M3/F3/17]. Written informed consent was taken and subjects who agreed to participate completed the questionnaire. Confidentiality of the data was maintained.

### Conflict of Interest

None.

## References

1. Tibdewal H, Patel B, Tadakamadla J, Duraiswamy P, Kulkarni S. factors related to betel chewing among higher secondary school students in india- a cross sectional study. *J Oral Health Res.* 2010;1(1):26-32
2. Gupta PC, Warnakulasuriya S. Global epidemiology of areca nut usage. *Addict Biol.* 2002;7(1):77-83. <https://doi.org/10.1080/13556210020091437>
3. Little MA, Papke RL. Betel, the Orphan Addiction. *J Addict Res Ther.* 2015;6(3):130-2 . <https://doi.org/10.4172/2155-6105.1000e130>
4. Hussain A, Zaheer S, Shafique K. Reasons for betel quid chewing amongst dependent and non-dependent betel quid chewing adolescents: a school-based cross-sectional survey. *Subst Abuse Treat Prev Policy.* 2018;13(1):16 . <https://doi.org/10.1186/s13011-018-0154-5>
5. Pankaj C. Areca nut or betel nut control is mandatory if India wants to reduce the burden of cancer especially among cancer of the oral cavity. *Int J Head and Neck Surg.* 2010;1(1):17-20. <https://doi.org/10.5005/jp-journals-10001-1003>
6. Prasad S, Anand R, Dhingra C. Betel nut chewing behaviour and its association with oral mucosal lesions and conditions in Ghaziabad, India. *Oral Health Prev Dent.* 2014;12(3): 241-8. <https://doi.org/10.3290/j.ohpd.a31675>
7. Personal habits and indoor combustions IARC Monographs on the evaluation of Carcinogenic Risks to Humans Volume 100E [Internet]. International Agency for Research on Cancer; 2012[Cited 2024 Apr 24]. Available from: <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Personal-Habits-And-Indoor-Combustions-2012> .
8. Sharan RN. Association of betel nut with carcinogenesis. *Cancer J.* 1996;9:13-9
9. Nair U, Bartsch H, Nair J. Alert for an epidemic of oral cancer due to the use of betel quid substitute's guthka and pan masala: a review of agents and causative mechanisms. *Mutagenesis.* 2004;19(4):251-62. <https://doi.org/10.1093/mutage/geh036>
10. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 85. Betel-quid and Areca-nut Chewing and Some Areca-nut-derived Nitrosamines [Internet]. Lyon, France: International Agency for Research on Cancer; 2004 [cited 2024, Dec 10]. Available from: <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Betel-quid-And-Areca-nut-Chewing-And-Some-Areca-nut-derived-Nitrosamines-2004>
11. National Cancer Registry Programme, Reports of National Cancer Registry Programme [Internet]. Bengaluru: Indian Council of Medical Research – National Centre for Disease Informatics and Research; 2020 [Cited 2024 Dec 10]. Available from: [https://ncdirindia.org/All\\_Reports/Report\\_2020/default.aspx](https://ncdirindia.org/All_Reports/Report_2020/default.aspx)
12. Vandembroucke JP, Von Elm E, Altman DG, Gotzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and Elaboration. *PLOS Med.* 2007;4(10):e297. <https://doi.org/10.1371/journal.pmed.0040297>
13. Kumar A, Oswal K, Singh R, Kharodia N, Pradhan A, Sethuraman L, et al. Assessment of areca nut use, practice and dependency among people in Guwahati, Assam: a cross sectional study. *Ecancermedicalscience.* 2021;15:1198. <https://doi.org/10.3332/ecancer.2021.1198>
14. Report on Monitoring Survey of Cancer Risk Factors and Health System Response in North East Region (NER) of India [Internet]. Bengaluru: Indian Council of Medical Research - National Centre for Disease Informatics and Research; 2022 [Cited 2024 June 3]. Available from: [https://ncdirindia.org/All\\_Reports/NE\\_Report](https://ncdirindia.org/All_Reports/NE_Report)
15. Kapoor SK, Anand K, Kumar G. Prevalence of tobacco use among school and college going adolescents of Haryana. *Indian J Pediatr.* 1995;62(4):461-6. <https://doi.org/10.1007>

BF02755068

16. Goyal G. Knowledge, Attitude and Practice of chewing Ghutka, Areca Nut, Snuff and Tobacco Smoking among the young population in the Northern India population. *Asian Pac J Cancer Prev.* 2016;17(11):4813-4818. <https://doi.org/10.22034/APJCP.2016.17.11.4813>
17. Dhole AS, Kohale SC, Motwani M, Siddique A. Knowledge, attitude and practice towards areca nut use among medical student of Nagpur city. *J Indian Acad Oral Med Radiol.* 2019;31(4):318-22.
18. Phukan RK, Ali MS, Chetia CK, Mahanta J. Betel nut and tobacco chewing; potential risk factors of cancer of oesophagus in Assam, India. *Br J Cancer.* 2001;85(5):661-7. <https://doi.org/10.1054/bjoc.2001.1920>
19. Shrihari JS. Patterns of consumption, and levels of addiction among Areca nut chewers in Dakshina Kannada District, Karnataka (Doctoral dissertation, SCTIMST). Trivandrum: Sree Chitra Tirunal Institute for Medical Sciences and Technology; 2014.
20. Gupta PC, Ray CS. Epidemiology of betel quid usage. *Ann Acad Med Singap.* 2004;33(Suppl 4):31S-36S
21. Warnakulasuriya S, Trivedy C, Peters TJ. Areca nut use: An independent risk factor for oral cancer. *BMJ.* 2002;324(7341):799-800. <https://doi.org/10.1136/bmj.324.7341.799>
22. Rajan G, Ramesh S, Sankaralingam S. Areca nut use in rural Tamil Nadu: a growing threat. *Indian J Med Sci.* 2007;61(6):332-7.
23. Chandra PS, Mulla U. Areca nut: the hidden Indian 'gateway' to future tobacco use and oral cancers among youth. *Indian J Med Sci.* 2007;61(6):319-21.
24. Kotwal A, Thakur R, Seth T. Correlates of tobacco-use pattern among adolescents in two schools of New Delhi, India. *Indian J Med Sci.* 2005;59(6):243-52



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.