

Betel Nut Chewing Behavior among Adolescents in Papua Province, Indonesia¹

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Abstract

Chewing betel nut is a Papuan tradition and widely accepted. The nut contains a psychotropic substance called arecoline that is a stimulant. This study used a descriptive cross-sectional method. Its objective was to find what are the dominant factors regarding the behavior among adolescents in Papua province. Data were taken from 293 respondents from eight different academies in Papua. It was found that individuals aged 17 to 29 showed significantly higher consumption of betel nut than other age groups. One dominant factor influencing high school students in chewing betel nuts was the cultural factor. The habit of chewing betel nuts was influenced by level of education, religion, and tribe. In addition, there were significant differences between participants from Adventist schools and non-Adventist schools in terms of chewing betel nuts. This study can be used to help young people in Papua province understand the negative effects of chewing betel nuts on health and social life.

Keywords: *Areca nut, oral health, social networking*

Introduction

Background Usage and Cultural Influences

More than 600 million people chew betel nut with lime powder in many regions of the world (Gupta & Ray, 2004). In Indonesia, chewing areca nuts has become part of the culture and way of life since the 6th century (Ome-Kaius et al., 2015). Specifically in the region of Papua, the chewing of areca nuts with lime powder and betel leaves has become a tradition followed by many (Wilujeng, 2015).

Chewing areca nuts that include lime powder and betel leaves has become a phenomena in the region of Papua, especially among teenagers. According to Aminuddin (2013), chewing areca nuts from an early age is for them a way to look impressive and to be accepted in society. He even added, "a modern Papuan man to be stylish, has a hairstyle like William Smith, wears a brightly colored shirt, necklace, has a hand phone in his pocket, Papuan traditional bag or *noken*, typical knitted Papuan bag, which contains areca nuts, lime powder, and betel leaves." High school students and college students tuck betel nuts between textbooks. Office clerks carry betel nuts in briefcases. 'Ceremonies, meetings, except those in church, opened with betel nut, drinking, and then a big meal, then betel nut again,' said Yulianus, a local indigenous person (Wilujeng, 2015). A single Papuan individual can chew 20 seeds a day. No one cares if one's teeth turn red or black. Most start chewing areca nuts from an early age (Aminuddin, 2013).

In Indonesia, the habit of chewing areca nuts has been known since the 6th century and has become a part of the Indonesian culture ever since. This habit can be seen in several regions such as Sumatra, Java, Borneo, Nusa Tenggara, and Papua. Particularly in the Papua Region, there are basic ingredients when consuming areca nuts, which usually consist of areca nuts, mixed with betel leaves and lime powder (Fitriana, 2014).

Like most cultures, the social network is a way of connecting with peers in Papuan culture. People consume areca nuts to boost self-esteem and to be accepted in their community. Areca nuts and Papuan people are already like two sides of a coin that are difficult to separate. Areca nuts also increase the economic sector of both Papuan and non-Papuan people. It is believed that some of the problems in Papua can be solved when people consume areca nuts. Furthermore, chewing areca nuts gave positive effects when people communicate (Pinang dan masyarakat Papua, 2018).

Chewing areca nuts is very significant among all ethnic Papuan people groups. Chewing areca nuts is believed to benefit digestion, reinforce the teeth, heal various diseases, shrink the uterus after

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childbirth, and increase the male sex drive. The social aspect of areca nuts can be a symbol of bonding and opening of interactions among individuals. It is used at all significant social interactions such as weddings, births, and funerals. The social customs associated with its use constitute part of the identity of the people (Yuliana, Idrus, Mansoben, & Arifin, 2018). While chewing areca nuts, people start telling jokes to warm the situation and comfort hearts (Agmasari, 2016). Papuans, like other people groups who use betel nut, chew it to facilitate social interactions much as drinking tea or coffee is used in other cultures. Areca nuts have also been associated with animistic practices and the practice of tribal medicine (Rooney, 1995).

Rebellious Attitudes

Teenagers who consume areca nuts have contradictory thoughts. They chew areca nuts to show rebellious attitudes towards authority figures such as their parents, teachers, or superiors. In research about the Aboriginal tribes in Australia, ethnic groups that consume areca nuts have a tendency to consume alcohol and smoke cigarettes. According to Chen and Shen, "When aborigines gather together, they drink alcohol, smoke cigarettes, and chew betel nut" (Chen & Shen, 1992).

In general, people understand that drinking alcohol and smoking cigarettes demonstrate a rebellious attitude toward norms, and combined with consumption of areca nuts, it contradicts the lifestyle of an educated and healthy society. Parents and religious leaders ban the behavior of consuming areca nuts because it violates health and hygiene rules.

Health Effects

Positive Effects

Teeth are the chewing organ consisting of jaw teeth, lower jaw teeth, plus the tongue with the salivary ducts. An adult has 32 teeth, and each tooth has its own function in chewing food (Rahmadhan, 2010). Changes can happen to the teeth and their nerves because of several factors, one of which is oral hygiene. Oral hygiene has an important role in keeping a healthy set of teeth and periodontium network (Herijulianti, Indriani, & Artini, 2002). Areca nuts, betel leaves, and lime powder, according to Papuan ancestors, could strengthen the gums and teeth, and eliminate bad odor from teeth (Iptika, 2014). Areca nuts contain an antiseptic substance. "Our ancestors did not know toothbrushes, but they knew this could get rid of bad breath. Papuans rarely get toothaches," said Yulianus Awujbi, a Papuan resident who lives in the remote interior area of Sima (Wilujeng, 2015).

However, explanations about areca nuts strengthening the teeth and supporting a healthy body are but the opinions of their ancestors. No medical records can be found that accurately prove the positive health effects of areca nuts. According to Iptika (2014), there is no evidence that chewing areca nuts can strengthen the teeth. From observations, the average teeth of people chewing areca nuts are not strong, and it could be seen that their teeth are incomplete. There are also dental cavities and color changes in the teeth. People have limited knowledge about oral hygiene. In the interview, 11 people admitted that they do not brush their teeth; however, damage and dental cavities could be seen. Only one person admitted to experiencing toothache. Finally, out of 12 informants, only one experienced toothache that was considered clinical pain (Iptika, 2014).

Based on questionnaires provided by researchers, some respondents have claimed that chewing areca nuts with lime powder and betel leaves increased their energy and concentration at work, and it refreshed their bodies. Immigrants from South Asia who resided in England described the chewing of areca nuts as refreshing and motivating. As a snack, it was believed to help reduce stress and to strengthen the teeth and gums (Flora, Mascie-Taylor, & Rahman, 2012). Additionally, it was believed that chewing areca nuts could prevent cavities (Paulino, Novotny, Miller, & Murphy, 2011).

There is no relevant connection between being independent and consuming areca nuts. Correspondents in surveys indicated that the lowest and least significant number of users were associated with independent individuals. However, it is believed that there is a meaning behind areca trees. The meaning is "the high nature of the areca tree is straight up and has a heavy fruit on the table" (Fitriana, 2014). Users also believed that chewing areca nuts helped their self-esteem, which refers to the "positive or negative attitudes toward oneself" (Rosenberg, 1965). In conclusion, there

is a connection between teenagers chewing areca nuts and self-esteem. By chewing areca nuts, teenagers believe that they have become independent.

Negative Effects on Teeth and Body

People chew betel leaves and areca nuts to give the same sensation as cigarettes. A number of diseases are related to the habits and lifestyle of consuming areca nuts. The *International Agency for Research on Cancer* (IARC) suggests that chewing areca nuts may result in gum bleeding, mouth odor, difficulty in chewing and swallowing solid food, burning sensation in the tissues, and purulent wounds in the oral cavity (Parmar, Sangwan, Vashi, Kulkarni, & Kumar, 2008). Consumption of areca nuts can trigger periodontal diseases, change in teeth color, and result in mouth cancer (Anand, Dhingra, Prasad, & Menon, 2014).

Chewing areca nuts has a negative impact on dental caries and periodontitis, which could result in the loss of teeth. One reason that areca nuts may damage the periodontal network is because the cholinergic constituents from areca nuts are mixed with calcium salt from the saliva, which leads to porous teeth. Chewing areca nuts for a long time could bring more damage to the periodontitis than not chewing areca nuts (Chatchaiwiwatana, 2006).

Table 1 (on following page) explains different characteristics of habit-forming substances such as areca nuts, coffee, alcohol, tobacco, marijuana, and cocaine (Norton, 1998). It shows the substances that have a significant impact on health, such as carcinogenic substances (substances that trigger cancer) and addictive substances. This has led Seventh-day Adventists to forbid the consumption of areca nuts among themselves.

Researcher Avon and his friends gave more facts about the outcome of chewing areca nuts with betel leaves and lime powder. He stated, "The adverse oral health effects associated with betel nut use have been well documented. Several researchers have linked betel nut chewing to the development of oral mucosal lesions, oral leukoplakia, oral pre-cancer and cancer, periodontal disease, as well as submucous fibrosis, which has a high rate of malignant transformation and is extremely debilitating with no known cure" (Avon, 2004; Parsell, 2005). Areca nuts contain alkaloids, arecoline, and arecaidine. These chemical elements have addictive substances that cause people to have energy to work, as well as look healthy and strong. Beecher and his friends (1979) support this by claiming "betel nut is the fruit of the plant *Areca catechu* Linn. from the *Palmae* family. The active ingredients in betel nut are the alkaloids, arecoline, and arecaidine" (Beecher, Hartman, & Christen, 1985; Burton-Bradley, 1979).

Surveys in Papua New Guinea and West Java showed the frequency of dental caries is not significant among people chewing areca nuts. However, because the distance between one tooth to another may cause leftover food to be stuck, bacteria could grow and there would be damage to the teeth. Moreover, lime powder will discolor the teeth (Rooney, 1995). People who chew areca nuts and do not brush their teeth long term could experience changes in the color of their teeth. Black teeth could cover the dental caries and make them invisible. Dental caries could get worse if chewing areca nuts was not painful, and this will increase the chance of tooth loss.

Sanitation Problem

Chewing areca nuts is a culture that differentiates Papuans from other people in different regions. However, this tradition sometimes creates problems, especially in terms of hygiene. Public awareness is low regarding the stains from areca nuts. People spit on the streets, market places, in the malls, and other public places (Pinang danmasyarakat Papua, 2018).

Spit stains from people chewing areca nuts can be seen everywhere – on school campuses, in cars, airports, local markets, hospitals, supermarkets, and even government buildings. Important meetings could not stop people from taking breaks to chew areca nuts. Some offices put a sign that says, "Do not spit in here;" however, those are the same walls with spit stains. Trying to reduce the spit stains of areca nuts is like starting a fire in Papuan culture. It is out of their comfort zone. Papuans argue, "If our ancestors could spit on this ground, why can't we also do so?" There should be a meeting where people sit, chew areca nuts while discussing how to regulate the spit stains from areca nuts

(Wilujeng, 2015). The same problem happened in Taiwan with regard to the expectorated remains (or quid). The chewing of betel nut leaves deep reddish-brown stains on the ground and has had a negative impact on environmental health (Chen & Waigandt, 2009). Thus, the red stains from areca nuts and its waste have a negative impact on the environment.

Table 1. Comparison of Characteristics of Betel Nut and Other Habit Forming Substances

	Betel	Coffee	Other Caffeinated beverages†	Alcohol	Tobacco	Marijuana	Cocaine
Consumed throughout the day	+	+	+	+(Dysfunction)	+		+(Dysfunction)
Stains cutaneous structures	+	-	-	-	+	-	-
Causes excessive salivation and expectoration	+	-	-	-	+	-	-
Consumed for stimulant properties	+	+	+	Often yes (although a depressant)	+	-	+
Highly ritualized preparation, service	+	Occasional	+	+ Toast, ceremonies	Occasional	Occasional	Occasional
Carcinogenic	+	-	-	+	+		
Legal status in U.S	FDA advisory	Legal	Legal	Legal (>21yr)	Legal (>18yr)	Schedule1 ‡	Schedule2 ‡
Flavored w/ spices, aromatics	+	+	+	+	+		
Addictive (psychological dependence)	+	+	+	+	+	+	+
Physiological dependence	+	+/-	+/-	+	+	+	+
Specialized shops for sale or consumption	+	+	+ Tea, Yerba mate	+	+	+	+
Elaborate curing practices	+	+	+ Tea	+	+		
Smoked	-	-	-	-	+	+	+
Effects on appetite	↑↓	↓	↓	-	↓	↑	↓

+ Characteristics present or commonly associated; - characteristic absent or unassociated; *FDA*, Food and Drug Administration; *w/*, with.

* Partly derived from Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington (DC): American Psychiatric Association; 1994.

† Caffeinated soft drinks, tea, yerba mate, guarana.

‡ Schedule 1: Controlled, no medical indications; schedule 2: limited, medical indications.

The Problem

Results from an unpublished 2016 research study regarding the chewing of areca nuts among Seventh-day Adventist church members in one part of Papua Province (Watopa, 2016) suggested that Adventists themselves, especially young adults, have a significant tolerance ($p = 0.01$) toward the cultural aspects of eating areca nuts as compared to older people. This led this researcher to attempt to understand the dominant factors influencing Papuan young adults (ages 12-20) to be more interested in consuming areca nuts across religious denominations.

When a person consumes areca nuts, it gives an addictive feeling similar to cigarettes and alcohol. Scientific literature has shown that areca nuts have a negative impact on a person's health because of their addictive substances. This may damage younger generation of Papuans and their potential. The impact on sanitation has also become a concern since people are not aware of the negative impact caused by chewing areca nuts.

Study Purpose

The main purpose of this study is to understand the pattern of chewing areca nuts among teenagers in the Papuan province. Why does the tendency to chew areca begin from an early age rather than later in adulthood? What are the factors that affect the decisions of young adults to consume areca nuts?

Methodology

This study used a descriptive cross-sectional survey. Natoatmodjo stated, "research is to study the correlation dynamics between risk factors and effects, by means of approaching, observing or collecting data at a time" (Notoatmodjo, 2012). This method is used to observe current problems, and thus to explain, to describe, to elaborate, and to connect facts that are growing, by explaining the processes and the effects.

A total of 293 respondents were used as a convenience sample of the population. Among the sample population, there were 139 males and 154 females. Furthermore, the sample is divided into two main categories —Papuan and non-Papuan. Some respondents came from a specific tribe outside of the Papua region, but their responses are still used as data. There were 188 Papuan and 105 non-Papuan respondents. Purposive sampling was used to collect data from schools that fit a certain criteria for the survey. For example, schools under the Seventh-day Adventist Church forbid their students to chew areca nuts; such schools are Doyo Baru Adventist Academy, Timika Adventist Academy, and Urfas Adventist Academy. There are non-Adventist academies or public schools that also forbid the chewing of areca nuts: for example, SMK Yapis Kotaraja, SMK YPK Urfas, SMA Negri Waren, SMK Negri Urfas, and SMA Negri Urfas. Among the many districts in Papua, the Waropen District was chosen for this study because of its significant number of young adults in the Adventist circle that consume areca nuts (Watopa, 2016). Data were collected using a questionnaire constructed by the researcher regarding areca nut consumption behavior and were distributed to those willing to respond. The subjects of this research were teenagers, which according to the World Health Organization (WHO), are individuals between 12 and 20 years old. Data were taken from several different public and private schools within the district and in Jayapura City, Papua Province.

Results and Discussion

The dominant factors influencing teenagers to consume areca nuts were investigated, and the data are shown in Table 2. From the table, it is evident that culture is the dominant factor (2.82), although Papuans understand the negative effect of consuming areca nuts (2.72).

Table 2. Dominant Factors Influencing Consumption of Areca Nuts

Dominant Factors	N	Minimum	Maximum	Mean	Std. Deviation
Papuan Culture	293	1.00	4.00	2.817	0.718
Social Networking	293	1.00	4.00	1.725	0.580
Rebellious Attitudes towards Parents/Authority	293	1.00	4.00	2.534	0.797
Maturity/Independence	293	1.00	4.00	1.724	0.656
Negative Effects on Health	293	1.00	4.00	2.722	0.645
Positive Effects on Health	293	1.00	4.00	2.326	0.628

Table 3 indicates the considerable significance of culture and formation of a rebellious attitude towards authority figures in perpetuating the areca culture, together with the importance of social networking.

Table 3. Analysis of Significance of Factors Influencing Areca Nuts Consumption

Influence Factors	Contingency Coefficient	P value	Note
Papuan Culture	0.407	0.000	Significant
Social Networking	0.337	0.001	Significant
Rebellious Attitudes towards Parents/Authority	0.357	0.000	Significant
Maturity/Independence	0.266	0.098	Not Significant
Negative Effects on Health	0.364	0.000	Significant
Positive Effects on Health	0.434	0.000	Significant

Significance at the 5% level is indicated by a value of 0.05; thus, 0.01 is significant

There was an ambiguity among teenagers in understanding the negative and positive effects from chewing areca nuts. This indicates that there is less knowledge provided to teenagers about the negative impacts of areca nuts. Counseling should be provided by the government, schools, churches, and charity organizations to help educate these young people. However, results from this research showed that some teenagers knew about the negative effects, yet they still consumed areca nuts because of addiction and the euphoria it provides. This finding was supported by Chu: “Betel quid chewing has been claimed to produce a sense of well-being, euphoria, warm sensation of the body, sweating, salivation, palpitations, heightened alertness, and increased capacity to work” (Chu, 2001).

Further data were gathered on the influence of gender, education level, religion and tribal affiliation on betel nut chewing. The results are shown in Table 4. All factors other than gender exerted some influence, with religion having the least significant influence in the group surveyed.

Table 4. Pattern of Chewing Areca Nuts: Gender, Level of Education, Religion, and Tribe

Feature	Chi-Square Value	Significance	Note
Gender	3.669	0.598	No difference
Level of Education	25.951	0.011	Different
Religion	25.003	0.024	Different
Tribe	48.386	0.000	Different

The pattern of usage among clients is illustrated in Table 5. Analysis of results showed the difference in chewing practices ranged from never chewed to chewing every day. The frequency differences shown by Chi-Square analysis were significant ($p < 0.0001$).

Table 5. Betel Nut Chewing Patterns Observed Among Clients

Chewing Pattern	Observed N	Expected N	Residual
Have never chewed	67	48.8	18.2
Have tried once or twice	66	48.8	17.2
Have tried before, but don't chew anymore	46	48.8	-2.8
Chew when provided/have chance, invited by friends	74	48.8	25.2
Chew once per week	9	48.8	-39.8
Chew every day	31	48.8	-17.8
Totals	293		

Table 6 indicates the relationship between chewing behavior and smoking cigarettes. The correlation between chewing of areca nuts and smoking returned a nominal contingency coefficient with a value of 0.425. This result reflected the findings of Chen and Shen, who commented: “When

aborigines gather together, they drink alcohol, smoke cigarettes, and chew betel nut” (Chen & Shen, 1992). Thus, many of those who consume betel nuts also smoke.

Table 6. Cross-Tabulation Counts of Chewing Patterns and Smoking Cigarettes

Chewing of Areca Nuts	Smoking Pattern				Total
	Never	Once in My Lifetime	Sometimes/ Invited by Friends	Everyday	
Have never chewed	61	6	0	0	67
Have tried once or twice	38	22	5	1	66
Have tried before, don't chew anymore	26	15	3	2	46
Chew when provided, invited by friends	42	17	12	3	74
Chew once per week	3	2	3	1	9
Chew every day	9	9	8	5	31
Total	179	71	31	12	293

The differences in consuming areca nuts noted between Adventist and non-Adventist schools are shown in Table 7. Analysis indicated significance at the 0.01% between Adventist schools and non-Adventist schools in terms of chewing areca nuts. Adventist schools forbid the consumption of areca nuts during school hours, and this rule applies to all students, whether Adventist or non-Adventist. The results indicate that faith affiliation and school rules combined have a positive influence in reducing areca chewing.

Table 7. Chewing Patterns Contrasted between Adventist/Non-SDA Academies

Feature	Faith Affiliation		Totals
	Adventist	Non-Adventist	
Have never chewed	44	23	67
Have tried once or twice	31	35	66
Have tried before, don't chew anymore	32	14	46
Chew when provided, invited by friends	26	48	74
Chew once per week	3	6	9
Chew every day	2	29	31
Totals	138	155	293

Finally, differences noted among schools regarding consumption of areca nuts were recorded and are illustrated in Table 8 on the following page. The samples were taken from eight different schools. All schools showed different chewing behavior among teenagers. Results indicated that chewing patterns in Adventist schools were relatively low compared to public schools ($p < 0.000$).

Table 1 explained different consumption characteristics of habit-forming substances such as areca nuts, coffee, alcohol, tobacco, marijuana, and cocaine (Norton, 1998). The literature reviewed above showed that the substances present have significant impacts on health that may be carcinogenic (triggers cancer) and addictive (Avon, 2004; Beecher, Hartman, & Christen, 1985; Burton-Bradley, 1979; Parsell, 2005). Chewing areca nuts has a negative impact on dental caries and periodontitis (Chatchaiwiwatana, 2006). In Jul Asdar's research in Indonesia among the Karo tribes in Biru-Biru Village, Deli Serdang District, he discovered that the people's periodontal health in the village was in a critical state. He found 74 people (80.2%) with severe periodontal health and 18 more people (19.6%) in poor condition. The critical condition of their periodontal health was influenced by their

culture. People in the village believed that not consuming areca nuts before starting their daily activities could be detrimental to their health (Samura, 2009). This information led Adventists to make a decision to forbid consumption of areca nuts among their members.

Table 8. Cross-Tabulation Counts of Chewing Patterns by Schools

Feature	Schools								Total
	SMA Advent Doyo Baru	SMA Advent Urfas	SMA Advent Timika	SMA YPK Urfas	SMK Yapis Kotaraja	SMA Negeri Waren	SMK Negeri Urfas	SMA Negeri Urfas	
Have never chewed	13	3	28	1	17	1	3	1	67
Have tried once/twice	12	2	17	3	9	11	8	4	66
Have tried before, don't chew anymore	14	11	7	0	8	6	0	0	46
Chew when provided, invited by friends	6	4	16	14	3	7	15	9	74
Chew once per week	2	1	0	4	0	0	1	1	9
Chew every day	0	0	2	8	4	0	3	14	31
Totals	47	21	70	30	41	25	30	29	293

Conclusion and Recommendations

Teenagers in Papua are finding their identity through the chewing of areca nuts. The main factor that influences this behavior is culture (Mean = 2.82). The level of understanding regarding the negative impact of areca nuts on health is significant (Mean = 2.72), but because of culture, self-esteem, and acceptance in society, many teenagers choose to consume areca nuts as part of their lifestyle. This has a negative impact on the young generation and environment. In addition, there is a significant difference between Seventh-day Adventist and non-Adventist schools regarding this issue; Adventist schools have less incidence of chewing areca nuts.

1. There should be integrated counseling at the sub-district, district, and provincial levels regarding the negative effects of consuming areca nuts.
2. Brochures and literature should be printed in sub-districts, districts, and provinces, and distributed to schools, churches, and other institutions about the negative impact of areca nuts on health, which are equivalent to cigarettes and alcohol.
3. There should be collaboration between the public health service and department of education to promote increased knowledge of the negative effect of areca nuts
4. There should be patience, sharing of knowledge, and a persuasive approach towards people who are addicted to areca nuts.
5. There should be more research about why young people in Papua have a tolerant approach towards the negative effects on health, and being banned from church.

References

- Agmasari, S. (2016). *Orang Papua punya "Permen", ternyata rasanya mengejutkan* [Papuan "Sweet" with a surprising flavor]. Retrieved from <https://travel.kompas.com/read/2016/06/20/122402727/orang.papua.punya.permen.ternyata.sasanya.mengejutkan>
- Aminuddin, Indarwati (August 30, 2013) Pendidikan, Perempuan, Politik, Pinang, dan Bahasa Indonesia di Papua (Education, Women, Politics, Areca Nut, and Indonesian Language in Papua) <https://indoprogress.com/2013/08/pendidikan-perempuan-politik-pinang-dan-bahasa-indonesia-di-papua/>
- Anand, R., Dhingra, C., Prasad, S., & Menon, I. (2014). Betel nut chewing and its deleterious effects on oral cavity. *Journal of Cancer Research and Therapeutics*, 10(3), 499–505.
- Avon, S. (2004). Oral mucosal lesions associated with use of quid. *Journal of the Canadian Dental Association*, 70(4), 244–248.
- Beecher, D., Hartman, K., & Christen, A. (1985). Betel nut chewing in the United States: An old habit in a new country. *Journal of Indiana Dental Association*, 64(6), 42–44.

- Burton-Bradley, B. (1979). Acrecaidinism: Betel chewing in transcultural perspective. *Canadian Journal of Psychiatry*, 24, 481–488.
- Chatchaiwiwatana, S. (2006). Dental caries and periodontitis associated with betel quid chewing: Analysis of two data sets. *Journal Medical Association Thailand*, 89(7), 1004–1011.
- Chen, C., & Shen, Y. (1992). Preliminary study of health problems in Hualien Aboriginal villages. *Journal of National Public Health Association*, 11(1), 13–19.
- Chen, H., & Waigandt, A. (2009). Betel nut chewing behavior among adolescents in eastern Taiwan: A cluster analysis. *Journal of Drug Education*, 39(1), 73–93.
- Chu, N. (2001). Effects of betel chewing on the central and autonomic nervous system. *Journal of Biomedical Science*, 8(3), 229–236.
- Fitriana, R. (2014). Budaya makan pinang [Betel nut chewing culture]. Retrieved from <http://gastroina.blogspot.co.id/2014/08/budaya-makan-pinang.html>
- Flora, M., Mascie-Taylor, C., & Rahman, M. (2012). Betel quid chewing and its risk factors in Bangladeshi adults. *WHO South East-Asia Journal of Public Health*, (2), 162–181.
- Gupta, P., & Ray C. (2004). Epidemiology of betel quid usage. *Annals of the Academy of Medicine, Singapore*, 33(4), 31–36.
- Herijulianti, E., Indriani, S., & Artini, S. (2002). *Pendidikan kesehatan gigi*. [Dental health education]. Jakarta: Penerbit Buku Kedokteran EGC.
- Iptika, A. (2014). Keterkaitan kebiasaan dan kepercayaan mengunyah sirih pinang dengan kesehatan gigi. [The habits and beliefs of chewing betel leaf with dental health]. *Journal Universitas Airlangga*, 3(1), 64–69. Retrieved from <http://journal.unair.ac.id/filerPDF/aun712fc6fc38full.pdf>
- Norton, S. (1998). Betel: Consumption and consequences. *Journal of the American Academy of Dermatology*, 38(1), 81–88. Retrieved from <http://libproxy.unh.edu/login?url=http://search.ebscohost.com/libproxy.unh.edu/login.aspx?direct=true&db=cmedm&AN=9448210&site=eds-live>
- Notoatmodjo, S. (2012). *Metodologi penelitian kesehatan* [Health research methodology]. Jakarta: Rineka Cipta.
- Ome-Kaius, M., Unger, H., Singirok, D., Wangnapi, R., Hanieb, S., Umbers, A., . . . & Rogerson, S. (2015). Determining effect of areca (betel) nut chewing in a prospective cohort of pregnant women in Madang Province, Papua New Guinea. *Journal BMC Pregnancy and Child Birth*, 15, 177.
- Parsell, D. (2005). A habit gone nuts: Asian epidemic of oral cancer. *Science News*, 167(3), 33–48.
- Parmar, G., Sangwan, P., Vashi, P., Kulkarni, P., & Kumar, S. (2008). Effect of chewing a mixture of areca nut and tobacco on periodontal tissues and oral hygiene status. *Journal of Oral Science*, 50(1), 57–62.
- Paulino, Y., Novotny, R., Miller, M., & Murphy, S. (2011). Areca (betel) nut chewing practices in Micronesian populations. *Hawaii Journal of Public Health*, 3(1), 19–29.
- Pinang dan masyarakat Papua, dua sisi yang tak terpisahkan [Betel nut and the people of Papua, two inseparable entities]. (2018). *HarianPapua.com*, August 11. Retrieved from <https://harianpapua.com/pinang-dan-masyarakat-papua-dua-sisi-yang-tak-terpisahkan>
- Rahmadhan, A. (2010). *Serba serbi kesehatan gigi dan mulut* [All about dental and oral health]. Jakarta: Bukune.
- Rooney, F. (1995). Betel chewing in Southeast Asia. Paper prepared for the Centre National de la Recherche Scientifique (CNRS), Lyon, France. Retrieved from http://rooneyarchive.net/lectures/betel_chewing_in_south-east_asia.htm
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Samura, J. (2009). Pengaruh budaya makan sirih terhadap status kesehatan periodontal pada masyarakat suku Karo di desa Biru-Biru Kabupaten Deli Serdang [The effect of the culture of chewing betel leaf on periodontal health status in the Karo tribe community in Biru-Biru village, Deli Serdang Regency]. Tesis [Thesis]. Medan: Fakultas Kesehatan Masyarakat Faculty of Public Health], Universitas Sumatera Utara. Retrieved from <http://repository.usu.ac.id/bitstream/handle/123456789/6914/10E00145.pdf;jsessionid=561B405223140DDE82EAA823173636F9?sequence=1>
- Watopa, James, (2016). *Pemahaman anggota gereja advent tentang kebiasaan makan pinang di distrik Waropen, Papua* [Seventh-day Adventist church members perception of chewing betel nut in the Waropen District, Papua]. Penelitian Fakultas Filsafat [Faculty of Religious Studies research paper], Universitas Klabat.
- Wilujeng, Nuning Catur Sri. *Sirih Pinang di Indonesia dan Taiwan* [Betel in Indonesia and Taiwan]. <https://journal.uny.ac.id/index.php/wuny/article/download/3530/pdf>
- Yuliana, Idrus, N., Mansoben, J., & Arifin, A. (2018). Utilizing the practice of betel nut in the cycle S of Li Fe Papuans in Jayapura city. *International Journal of Scientific and Research Publications*, 8(2), 470–474.