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Analysis correlation of betel nut consumption behaviour with dental caries in poor communities in Kupang Regency (West Timor)

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Abstract--Introduction: Dental caries is one of the diseases that becomes a burden of disease whose background is caused, among others, by low socioeconomic status. If coupled with lifestyle behaviors that are not beneficial for health such as consuming betel nut, then the burden of life for the poor will get worse. The aim of this research to analysis correlation between betel chewing behaviour and dental caries in low income community. Methode: This type of research is observational-analytic, with a cross-sectional design. To determine the low income community, researchers collaborate with village heads, with the following provisions: low income is a community that receives assistance from the government. The measurement of the caries rate in accordance with the provisions of WHO (2012) is to calculate the DMFT with predetermined criteria regarding the caries rate, Very low, Low, Moderate, High, Very High. By using the formula Lameshow, obtained a sample of 363 and each sub-district around 91 respondents. Result: There is no relationship between the behavior of consuming betel nut with the incidence of dental caries. There is no relationship between occupation and the behavior of consuming betel nut in. There is no relationship between education and betel nut consumption behavior. The average caries rate of betel nut chewing is 6.90 lower than those who do not chewing betel nut. Conclusion: Furthermore, more detailed research is needed on the poverty community about untreated cavities and other types of preventive dentistry such as fissure sealants, topical applications. Government programs on health and dental health must side with community poverty.

Keywords--betel chewing, behavior, dental caries, low income community.

Introduction

The people of Kupang Regency mostly consume betel nut, which generally consists of betel, areca nut and lime. According to WHO, areca nut has been designated as a class 1 carcinogen (WHO, 2012), meaning that areca nut can cause oral cancer. So far, there have been many studies that areca nuts apart from causing oral cancer can also cause systemic effects on both mother and baby such as low birth weight (De Silva et al, 2019). Consuming betel nuts will also affect the household economy because the price of betel and areca nut is quite expensive for the pockets of the poor. Di Micronesia children generally starts to consume betel nuts by the early age of 12 and has proven to effect the economy income of the families (Pratt, 2022)

In Timor Kab, Kupang, East Nusa Tenggara is an area known as a dry area. The number of poor people in 2019 is 92.02 thousand people, in 2020 it increased to 94.91 thousand people and in 2021 it is 91.25 thousand people and is the second highest number of poor people after South Central Timor (BPS Province of NTT, 2021). Data on the poor population released by BPS (Central Statistics Agency) as of March - September 2021, the percentage of poor people in Indonesia is 9.71 percent, with the 10 poorest regions as follows: Papua: 27.38%, 2. West Papua: 21.82% . East Nusa Tenggara: 20.44%, 4. Maluku: 16.3% ,5. Aceh: 15.53% . The five provinces have poverty rates far above the Indonesian average.

To measure poverty, BPS uses the concept of ability to meet basic needs (basic needs approach). With this approach, poverty is seen as an economic inability to meet basic food and non-food needs as measured from the expenditure side. So the poor are people who have an average monthly per capita expenditure below the poverty line. (BPS, NTT). Meanwhile, according to Titu Eki (2021) poverty is the inability of a person or group of people to fulfill basic needs such as food, clothing, housing, education and health. Usually the World Bank sets a poverty line that applies to countries in the world. The poverty line is always changing according to market conditions but in general it will increase over the years. The survey conducted in 2016 in the sample countries has set the poverty line for developed countries, which is US\$ 5.50 per person per day, while developing countries, including Indonesia, are around US\$ 3.20 per person per day. If we look at the global poverty line applied in Indonesia, almost all Indonesians are poor, and if the poverty line in NTT is compared with the global poverty standard, the average expenditure per person per day is US\$ 0.76. NTT is lower than the poverty line, but the number of poor people in NTT is higher (Titu Eki, 2021) this year due to the impact of the COVID-19 pandemic. Thus, Indonesia is no longer an upper middle-income country but has become a low-middle income country (World Bank, 2022.). To end poverty completely and based on global poverty standards by 2030, NTT for rural areas including Timor must pursue poverty standards from US\$ 0.76/10,344 per person per day to US\$ 3.20/44,000 per person per day (Titu Eki, 2021) , of course this is very heavy.

Not all communities in Timor Kupang can enjoy access to health, there are several large groups of people who are less fortunate. According to the CDC (2021) that some ethnic and socioeconomic groups have poor dental health due to, among others, no access to health centers or hospitals, there is money to go to health

and nutrition facilities that cannot support optimal dental health. Dental caries incurs significant health and social costs for individuals and society. People from lower socioeconomic status (SES) and disadvantaged groups suffer from a much greater burden of disease. Actually, the main problem with dental caries is the socioeconomic status of the poor who cannot afford it. According to Foley and Akers (2018) that there is a complex relationship between caries and socioeconomic status which includes ethnic status, education level, income and place of residence.

Oral and dental health is an important indicator of overall health, well-being and quality of life. The most common dental and oral diseases are dental caries (tooth decay), periodontal (gum) disease, tooth loss, lip and oral cavity cancer (WHO, 2018). Although most diseases are communicable, they are one of the most common diseases globally in terms of public health, which will have a social impact (WHO, 2018). According to Anil and Anand (2017) that caries is influenced by many things, including the environment consisting of premature birth, low birth weight, limited parental education, socioeconomic status. The second factor is diet which includes high sugar, breastfeeding at night with bottle feeding, the third microorganism which includes maternal oral health, oral hygiene, saliva and the fourth which includes fluoridation deficiency, enamel defects and genetic factors (Bilbilova, 2020; Kelly, 2017; Thomson, 2017; Peterson, 2016)

The emphasis behind this research is the large number of people with low economic status by looking at the number of people who expect direct cash assistance (BLT) to meet their daily needs. The number of people who consume betel nut (almost 80%) affects their dental and oral health. The objectives of this study are 1. To analyze the relationship between education and betel nut consumption behavior in low income communities, 2. To analyze the relationship between betel nut consumption behavior and the incidence of dental caries in low income communities. 3. To analyze the relationship between occupation and betel nut consumption. areca nut in low income communities, and 4. Analyzing caries rates in people with low socioeconomic status

Method

Type/Research Design

This type of research is observational-analytic, with a cross-sectional design and Path Analysis. To determine the low income community, researchers collaborated with village heads, with the following provisions: low income is a community that receives assistance from the government. The measurement of the caries rate in accordance with the provisions of WHO (2012) is to calculate the DMFT (D=decay M=Missing F=Filling), with predetermined criteria regarding the caries rate, namely 0.0-1.1 very low, 1.2- 2.6 low, 2.7-4.4 Moderate , 4.5-6.5 High, 6.6-> Very High.(WHO, 2019). The population of this research is the people of Kupang Regency, East Nusa Tenggara Province which consists of 4 sub-districts by purposive sampling and the inclusion criteria are consuming betel nut aged 17-50 years and consuming betel nut or not. By simply random sampling, using the formula until Lameshow obtained a sample of 363 and each sub-district around 90 respondents

Result

Characteristics of respondents are described as follows

Table 1. Frequency distribution of respondents by gender district Kupang

Gender	Frequency	
	f	%
Male	176	48,5
Female	187	51,5
Total	363	100

From table 1. Based on gender, it shows that there are more female respondents (51.5%) than male (48.5%).

Tabel 2. Distribution of respondents' work frequency based on betel consumption betel nut and do not consume betel nut, Kupang Regency

Profession	Chewing betel nut				Total		P
	No		Yes		f	%	
	f	%	f	%			
housewife	4	16,7	20	83,3	24	100	p = 0,862
farmer	64	21,3	236	78,7	300	100	
government employees	1	11,1	8	88,9	9	100	
Private employees	0	0,0	5	100,0	5	100	
others	4	16,0	21	84,0	25	100	
Total	73	20,1	290	79,9	363	100	

The majority of respondents work as farmers, 82.6%, while the occupations of other respondents vary, the other occupations (6.9%), housewife, (6.6%), Civil Servants/Teachers (2.5%), and private sector (1.4%). The results for the type of occupation showed that there was no significant effect between consuming betel nut and the type of occupation ($p > 0.005$)

Tabel 3. Distribution of respondents' education frequency based on consumption of betel nut in the district Kupang 2022

Education	Betel chewing				Total		P
	No		Yes		f	%	
	f	%	f	%			
No school	2	10,0	18	90,0	20	100	p = 0,314
Primary School	38	17,7	177	82,3	215	100	
Junior High School	12	25,5	35	74,5	47	100	
Senior High School	18	25,4	53	76,6	71	100	
Diploma/College	3	30,0	7	70,7	10	100	
Total	73	20,1	290	79,9	363	100	

As many as 61.03% of respondents have primary school education. The results for the type of education showed that there was no significant effect between consuming betel nut and education ($p > 0.05$).

Tabel 4. The caries rate in those who consume betel nut and those who do not consume betel nut

Criteria DMFT, status betel chewing or not		Betel chewing				Total		P
		No		Yes		f	%	
		f	%	f	%			
Criteria for caries rate / DMF-T (WHO, 1987, 1997)	0,0-1,1 Very low	10	13,7	65	22,4	75	20,7	p = 0,323
	1,2-2,6 Low	5	6,8	17	5,9	22	6,1	
	2,7-4,4 Moderate	3	4,1	22	7,6	25	6,9	
	4,5-6,5 High	7	9,6	29	10,0	36	9,9	
	6,6-> = Very High	48	65,8	15	54,1	20	56,5	
	Total	73	100,0	29	100,0	36	100,0	

The results for DMF-T or the average caries rate for those who consume betel nut are 6.90 and are in the very poor category. The average DMF-T is 7.51 and is in the very poor category. The results showed that there was no significant relationship between betel chewing and caries rate ($p > 0.05$).

Tabel 5. Path Coefficient testing of betel nut consumption behavior with caries number DMF-T

Path	Original sample	Sample Average (M)	Standar Deviasi (STDEV)	T Statistik (O/STDEV)	P values
Behaviour DMF-T →	0,034	0,032	0,049	0,695	0,487

From table 5 Path Behavior to DMF-T with p-value 0.487; t statistic 0.695; and path coefficients 0.034. This shows that behavioral variables have no effect on the DMF-T variable because the p-value is more than 0.05 and the t-statistic value is less than 1.96.

Discussion

Characteristics of respondents are described as follows that all respondents are low income groups because they receive BLT assistance, and almost 80% of the people chewing betel nut. The betel nut consumers are statistically dominant with primary school education. The occupations are mostly farmers and housewives. Research conducted by Ting Huang et al, (2020) in Taiwan explains that Drivers and construction laborers showed high prevalence of betel chewing and cigarette smoking.

Based on the analysis, women consume more betel nuts daily compared to men. This is in accordance with the research of Snigdha et al (2021) that the consumption of betel nut is higher in women than men. In this study, most of the betel nut consumption started at school or even at the age of 2 or 3 years. In

India, they started consuming betel nut when they started school and used packages that were packaged with a sweet taste and attractive packaging (Srivastava et al, 2014). The results of this study showed that there was no significant effect between consuming betel nut and education ($p>0.05$). This means that from the lowest educated society to the higher education society consume betel nuts. Most of them do not know that betel nut causes health risks, and they learn to consume betel nut mostly from their parents. Khandelwal's research (2012) supports this research but 55.21% in India learn from friends while in this study almost 100% consume betel nut taught by parents. In the betel nut consumption group, it was associated with dental caries as measured by DMF-T (Decay, Missing, Filling – Teeth) resulting in no significant relationship. This shows that the variable consuming betel nut or not consuming betel nut has no effect on the DMF-T variable or caries rate, possibly caused by other factors not included in this model. The average caries rate for respondents with low income is slightly lower for betel nut consumers, which is 6.90 compared to the average caries rate for those who do not consume betel nut, which is 7.50, both of which are in the very high category for both chewers and non-chewers. Recent findings show that there is a significant relationship between the consumption of betel nut based on period, composition and frequency with the incidence of caries in Papuan students in Makassar (Amelia et al, 2020). While the research of Pintauli et al (2021) found that although no precancerous lesions were detected, it can be said that the betel nut consumers were not aware of the dangers of betel nut for oral health. In the future, a strategy is needed to reduce the consumption of betel nut to prevent damage to the oral cavity. Another study provides evidence that consuming betel nut changes the oral bacterial microbiome and the development of precancer cells (Hernandez, 2017). In this study, this also happened, but both chewers and non-chewers were included in the very high group, Anand (2014) research that the average caries rate among betel nut consumers was lower than that of non betel nut consumers.. Furthermore, according to WHO, untreated dental caries in permanent teeth is the most common health condition according to the Global Burden of Disease 2019 (WHO, 2022), while countries with low incomes such as Indonesia are usually unable to provide services that aim at preventive and curative. dental health.

Consuming betel nut is a combination of betel nut and lime will produce red saliva associated with the betel nut mixture. If the betel nut regularly consumes the same thing, namely consuming it continuously, the stains from the mixtures will stick to the teeth, gingiva and oral mucosa. Coloring depends on the frequency and duration of use of each individual ranging from red to black (WHO, 2012). According to WHO (2012) basically areca nut is naturally fibrous and hard which can cause tooth fracture and extensive abrasion on the occlusal surface of the teeth in regular and continuous betel nut consumption. Betel nut chewing is implicated in oral submucous fibrosis (OSF) and its use along with tobacco can cause leukoplakia, both of which are potentially malignant in the oral cavity. Oral cancer often arises from such precancerous changes. Thus, public health measures to quit betel use are recommended to control disabling conditions such as OSF and oral cancer (Anand et al., 2014). Betel chewing has a significant association with systemic inflammation, and is addictive (Shafique et al 2012)

Dental and oral health is an important component of overall health and plays an important role in the lives of both children and adults. Dental caries is one of the most serious dental and oral health problems. Oral caries poses a major hazard to physical, psychological and social health by causing teething and subsequent tooth loss, making it difficult to eat, talk, sleep, and socialize. Since children should get used to developing their first childhood routines and habits during their early years of life. As a result, developing basic oral health behaviors is critical to setting dental standards that will be maintained into adulthood.

Based on the 2018 Basic Health Research Indonesia (RISKESDAS, 2018) data, it was stated that the prevalence of dental caries in Indonesia for all groups based on the average characteristics was 88.8% with the prevalence of caries in males as much as 87.2% and females 89.9%. In this study, all respondents had carious teeth (100%) with 54.1% having very high caries rate criteria above 6.6 according to the WHO classification. Of all the respondents they never had their teeth filled, so the average number of fillings was 0. This could be due to, among others: 1. The government does not provide facilities such as dental clinics in urban areas, 2. Costs for dental treatment, especially dental fillings, are expensive for the poverty community, 3. They believe that consuming betel nut will relieve toothache, 4. Public knowledge is very limited about dental health, and 5. Public perception about the bad consequences of consuming betel nut is still wrong.

There are 4 relationships between oral health and poverty by Molly P (2019), among others: First, there is a close relationship between poor oral health and malnutrition because the teeth cannot chew food perfectly so that it does not get enough nutrition.. The second is that if people experience chronic toothache, they lose productivity, lose working hours and are unable to focus and do not make money, these are associated with poverty. Third, uncontrolled bacteria in the mouth due to poor oral hygiene conditions, because of dental and oral diseases, will also influence throughout the body such as endocarditis, pneumonia and pregnancy complications, Fourth, bad habits or behavior such as smoking and consuming betel nut will take effect with overall health. The Folan Research (2020) stated a negative relationship between most poverty indicators and the prevalence of Early Childhood Caries observed. Poor dental and oral health conditions will result in pregnancy complications, especially low birth weight babies who will later become stunted toddlers. Poor dental and oral health conditions in pregnant women contribute to the number of stunting under-fives in Indonesia. Research by Badarrudin et al (2021) found that there was no relationship between primary dental caries and stunting, but parental education and socioeconomic conditions affected stunting.

Regular preventive dental care is essential for good oral and dental health so that a person can find the problem earlier and it will be easier to treat, but in reality many are not getting the care they need. More people cannot afford dental care than any other type of health care. According to the CDC (2021) many poor people do not have health insurance for dental health, so many cavities are not filled (untreated cavities). Income-related inequality with dental and oral health requires special attention from officials, has been reported by Fang et al, 2021. Healthy people 2030 identifies individual and community public health priorities to improve health and well-being. Dental and oral health is one of the 23 leading

indicators of health. Meanwhile, Healthy People 2020 has 5 important basic domains, namely: Education, health and care, environment, social and community.

Conclusions and recommendations

Furthermore, more detailed research is needed on the poverty community about untreated cavities and other types of preventive dentistry such as fissure sealants, topical applications and fluoridation. Government programs on health and dental health must side with community poverty because it turns out that respondents with low income dominate the research area in Timor, Kupang Regency.

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Conflict Interest

The authors declare that they have no conflict of interest.

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