

CHAPTER 2 LITERATURE REVIEW

2.1. An overview of betel nut waste

This section aims to provide an overview of the current state of information available to date and provide an insight into the work that was carried out in reference to the use of *Areca catechu*. There are several types of Areca palms grown in PNG and the betel nut differs in colour and size. The idea of chewing betel nut begins at an early age in many societies and places in PNG. An approximate starting age for betel nut chewers in PNG was under 3 years whilst in other places, the starting age was under 5 years (Atkinson *et al.* 1964). Most coastal villages indulge themselves heavily in betel quid consumption then the highlands regions of PNG (Pindborg *et al.* 1968). But the trend seemed to have shifted from village usage of betel nut to more urban usage due to high demand. Moreover, the habit of betel nut chewing in combination with lime and mustard do exists for a long time (Cooke, 1969; Scrimgeour & Jolley, 1983; Jamrozik, 1985; Talonu, 1989; Martin *et al.*, 1992; Thomas & MacLennan, 1992). The betel nut is normally chewed raw without curing (MacLennan *et al.*, 1985). The literature review here will also provide an insight into how wastes associated from the use of Betel quid were managed and reveal the environmental and other associated impacts of improper waste management.

2.2. Definition and description of terms

The table below shows a description of the terms used in this context and their definitions. Sharp (2013) gave definitions and descriptions of the betel nut, piper betel and lime used in PNG.

Table 1 The summary of betel nut, betel pepper and lime properties and usage.

Ecological distribution	Betel nut - widely distributed throughout PNG from 0 – 1100m A.S.L. Betel pepper - widely distributed throughout PNG from 0 – 1000m A. S. L.
Plant description and characteristics	Betel nut (<i>Areca catechu</i>) is a tall slender single stemmed palm tree. The palm produces 150 – 200 fruits/nuts per annum. Piper betel is a creeping vine which is consumed with betel nut and lime.
Local nomenclature (PNG pidgin)	Betel nut – <i>buai</i> Piper betel – <i>daka</i> Lime – <i>kambang</i>
Consumption distribution	Consumed widely in lowland/coastal areas and urban centers of the highlands region.
Drug effects	Active ingredients: arecoline, arecaidine, guvacine, phenols Effects: sense of well-being, euphoria, warming sensation, sweating, salivation, increase heart rate and palpitation, alertness, hunger suppression, mild intoxication, increased stamina etc.
Health impacts of consumption	Oral cancer, cardiovascular hypertension, lungs aggravated asthma, liver, gut ulcer, pancreas issues, pregnancy issues leading to low birth rate etc.
Customary uses in PNG	Everyday stimulants, to welcome visitors, socialization, relaxation of tension, resolving conflicts, resolving conflicts and making peace, lovemagic, sorcery, gift exchange or trade etc.
Legality	PNG: Legal but consumption and sale regulated in some urban centers.

2.3. Overview of the environmental impacts

Betel quid consumption has been a major pass time addictive substance used almost every day in Papua New Guinea due to its stimulants effects. The practice of betel nut usage has passed down from generations and were inherited by current generations. It is believed that the trend of betel nut consumption may continue at an unprecedented rate given the increase in the population within the city. The consumption of betel nut has been widely described as addictive and uncontrollable despite the health departments warning about the negative impacts that arises as a

result of continuous use among every citizen of the society. Almost all levels of people within the city have chewed betel nut. People started chewing betel nut as young as 8 years old and beyond. Although there are calls and awareness made on the negative impacts of betel nut, people do ignore those warnings and tend to continue using betel nut on a daily basis. There were advertisements put forward in the media such as television, radio, newspapers as well as public forums as a form of awareness for the people to understand the serious health impacts. However, the information received does very little to change the human way of living. Shetty *et al.* (2013) argued that betel quid consumption has been part of their tradition with little known oral cancer recorded until recent revelation. According to the study, Shetty *et al.* (2013) stressed that the health impacts such as oral cancer has never been an issue for the people in the past until now. He further added that people who have used betel nut in the past have never realized that oral cancer occurs as a result of continuous usage. The use of betel nut for its stimulants has been described by Staples and Bevacqua (2006) as a '*major health risk*' considering the continuous ignorance from the users. They further added that people consuming betel nut were very much ignorant by taking unreasonable risks. Several studies that were undertaken have revealed a staggering incidence of oral cancer due to the continuous usage of the betel nut (Gupta & Ray, 2004) and (WHO IARC, 2003). The study conducted by Gupta and Ray (2004) have discovered high rate of oral cancer related to the use of betel nut.

The PNG department of health has revealed that oral cancer has seen the highest cases recorded so far mostly among betel nut chewers. The PNG health department determined that there were a lot more cases of oral cancer admitted at the Port Moresby's General hospital for treatment all related to the consumption of betel nut. Lin *et al.*, (2008) further added that the continuous use of betel nut causes several mouth cancers as well as the cardiovascular diseases among the users. Some studies have revealed that due to the stimulants effects of betel nut, chewers become very addictive. It was soon realized that the stimulant effects of betel nut have even made it impossible for consumers to quit and they become very addictive. The people tend to embrace the stimulants emitted from the consumption of betel nut

and continue to chew. The stimulant effect on the chewers has been the driving force among consumers and as many as 200 million people chew it in the Asia and Pacific region (Chen, *et al.*, 1999). The stimulant effects are thought to have a significant effect on the way chewers behave. It has been observed that betel quid tends to stimulate speakers during formal and informal gatherings. The speakers tend to be more vocal when they chew betel nut in any meetings. The practice of chewing betel nut during meetings or forums stems from the assumption that chewers speak better and fluently whilst chewing betel nut.

Many people tend to be addicted to chewing betel nut for its stimulants that give out a '*mild psychoactive effect*' which gives out a feeling of drunkenness (Prat, 2014) and (Staples & Bevacqua, 2006). However, the psychoactive effect does not seem to have an adverse impact on the chewers but rather gives them a feeling of wellness. A study conducted by Warnakulasuriya (2002) revealed that the use of betel nut is widespread thus affecting 20% of the world's population. This simply implies that betel nut is widely used not only in the Pacific but across the world. The way betel nut and its associated products are being prepared for consumption differs across the world. In PNG, betel nut is chewed with a mustard dipped with a lime placed together inside the mouth. Whilst in some Asian countries, betel nut is usually scraped into small particles and a pinch of lime added and wrapped together which is then chewed.

In the Pacific, the usage of betel nut is indeed very prevalent especially in Papua New Guinea and the neighboring Solomon Islands. It has become a way of life that cannot be easily prevented. Therefore, the consumption of the betel nut has evolved as part of the fabric of the Pacific Islands community and has become part of a ritual culturally and socially in all societies (Staples and Bevacqua, 2006). It simply implies that it has become a way of life that everyone tends to embrace. It is indeed hard to prevent the spread of betel quid usage among the communities despite several calls made to educate the people about the negative impacts of continuous betel nut usage. According to a survey conducted by Baldwin *et al.*, (2007) have revealed that 89.6% of respondents had at least tried or tasted betel nut

in their lifetime. His survey has revealed that a bigger population has indeed tried or tasted betel nut which gives an insight into how people become so entrenched into using it. One of the common reasons for the use of betel nut among the population was to have a red stained lips/mouth (Baldwin *et al.*, 2007). His findings revealed that some people use betel nut just to have a sense of how it felt and tasted. However, once tasted, more people continue to chew betel nut whilst few people quit for good. It is in fact very hard to quit for most of the chewers and it remains as a mystery as to whether those addicted betel nut chewers can refrain for good.

In spite of that, there is limited studies on the rate at which betel nut wastes have been managed in Papua New Guinea. The wastes derived from betel nut tends to be a big problem within the city and it all comes down to people's mischievous behavior. The management of wastes has been a major concern in the city of Port Moresby. Wastes such as betel nut husks and betel quid salivary spittle contributes more than the other wastes. Due to widespread betel nut wastes discarded within the city, the governor of Port Moresby introduced a law banning the sale and consumption of betel nut in the city some years ago but that did not last long (Wenogo, 2018) and (Sharp, 2013). The law imposed by the governor tried to control the wastes within the city and to ensure people live a healthy lifestyle but did not eventuate as there were a lot of issues arose as a result of the law been imposed. Sharp (2013) revealed that banning betel nut has stirred unrest '*...fueled by elements of moral panic*' which was seen by the government as an issue beyond their control. Though the law came into force, it did not last long. The main aim of the ban was to control and manage the betel nut wastes within the city but that did not last long and was abolished. Therefore, the sale and consumption of betel nut became a norm among the general public in Port Moresby to this day.

It is assumed that the social and environmental impacts of betel nuts wastes disposal is a result of total negligence and irresponsible behavior of citizens in Port Moresby and PNG. The wastes derived from betel nut includes the betel nut husks and the salivary spittle. The betel nut husks are usually discarded as wastes whereas the salivary spittle are spewed out from the chewers mouth as liquid-solution wastes

known as the betel salivary spittle. The consumption of betel quid produces some of the most very unpleasant and unbearable red mixture with saliva spattered everywhere into the environment. The salivary spittle can be seen on roads, foot paths, building walls, posts, in the trash cans/bins, offices, public bus stations etc. (Sharp, 2013).



Figure 2 Betel nut wastes (husks and salivary spittle) being disposed along the streets and sidewalks in Port Moresby (Source: Author).

The management aspect of the wastes has been a grave concern for the city authorities of Port Moresby. The PNG medical society has begun advocating since 2009 for the regulation and consumption of betel nut (PNG Post-Courier, Feb. 11, 2009). There are cases where new trash bins or cans are being littered with salivary spittle making it unusable and thus becoming very filthy for recycling. Management of these wastes is a major issue and there is limited effort to control. This study is crucial as it will provide an avenue to understand the rate at which betel nut is consumed in the city and provide an insight into how wastes derived from betel quid could be managed.

2.4. Theoretical review for betel nut as domestic waste

Betel nut tends to be part and parcel of people's lifestyle mostly at home for most of the families. For generations, the use of betel nut was only restricted to village and communities. But the trend has changed and became a monetary commodity. The usage and consumption of betel nut at home seem to be a better option in terms of waste management. As wastes are deposited within residential places that does not necessarily affects public properties. In fact, wastes are controlled within residential places then those in public places. There has been a

policy brought forward in the government to ban betel nut in public places (Wenogo, 2018). The application of the policy includes the use of force by police ends up fatally bad and has never been fully applied. This policy aims to restrict the use of betel nut in public places and thus encouraged the chewers to chew betel nut with residential areas and homes. It was in fact a reasonable approach but that approach did not work out well for the local people who depend on the betel nut business.



Figure 3 Showing the movement of betel nut from the growers along the coastal regions to the main urban centers in PNG. Photo: Brian Cassey

2.5. Why should we take action in waste management?

Now, there are growing calls that betel nut usage in public places needs to be controlled within the city. There are instances where betel nut vendors became ignorant in managing their wastes. The outlook of the city tends to look filthy with rubbish all over the places and has become an instant eye sore for visitors and the general public.

It is highly anticipated that betel nut waste can easily be controlled if and only when government enforces laws and ensures law breakers are penalized for misbehaving. Although, banning the sale of betel nut may bring about social issues and problems, it is appropriate that control measures should be put in place to control the wastes.

2.6. The role played by the national government on the issue of betel nut control

There are calls for a nationwide betel nut ban in public places and that the issues were discussed at the national level. But application has never actually eventuated due to the opposing views expressed by producers and betel nut traders (Wenogo, 2018). Burton-Bradley (1978) described the PNG governments approach undertaken in banning the consumption of betel nut in all government offices in the early 1970s. But the approach seemed to have failed without much success in the later years of the establishment. In the last decade, attempts were made to address the issue at the national level but some members of the parliament oppose the idea (Wenogo, 2018). It is because, almost half of the city and urban population tend to generate income from the trade of betel nut and its associated products.

So a different approach was taken by the Port Moresby city authority to enforce the trade and sale of betel nut by assigning few designated areas that allows people to trade within specified areas. In the designated areas, betel nut brought directly from the producers are sold in bulk as in the form of wholesale product. This allows local vendors to purchase in bulk and resell at the designated local markets and residential areas within the city.



Figure 4 showing the police officers manning road blocks and retrieving betel nut bags being illegally transported into Port Moresby by street vendors during the

period of betel nut ban. Photo Brian Cassey.