A Pilot Tobacco Intervention Study in Palau, Micronesia

by

Anli Sun

Graduate Program in Global Health
Duke Kunshan University and Duke University

Date:_______________________

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Truls Ostbye

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in the Graduate Program in Global Health in the Graduate School of Duke Kunshan University and Duke University

2018
ABSTRACT

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Abstract

Tobacco has been recognized as a serious public health issue that threatens people’s health in Palau, Micronesia, especially as young people consume tobacco in multiple ways. The research of this thesis begins with a description of the complex mix of habits, social norms, history, and cultural practice that make up tobacco use in Palau. Then an intervention project using “journaling behavior change paradigm” among young adults based on their own reflections on tobacco use by writing journals, is described. A high prevalence of tobacco use in all forms was revealed in this study, among which chew betel nuts with tobacco is the most popular method. Friend and family members’ attitude play important roles in affecting people’s tobacco use. Also, the evaluation of journaling paradigm reveals potential in lowering tobacco consumption in Palau and other countries by raising awareness of the problem through the writing of journals and diaries.
Dedication

To my beloved family and my wife Yilin WANG.
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Tobacco endangers the lives of millions of people worldwide, it threatens our future and our development. Tobacco damages our health, economy and environment, and it undermines our goal to build a healthy, prosperous and peaceful world.

– World Health Organization

1. Introduction

Tobacco use in Palau, Micronesia is a growing health problem, especially as young people consume tobacco in multiple ways: smoking, chewing, and as an additive to betel nut chewing. A novel intervention using journaling, a behavior change paradigm, or the writing of diaries by young adults, was designed and tested as a possible way to raise consciousness about tobacco use and lower tobacco consumption among Palauan young adults.

1.1 The Global Burden of Tobacco

Tobacco is a global health issue with a high prevalence of use in the world. One study indicates that more than one billion adults – 22.5% of adults worldwide – habitually smoke (Gowing et al., 2015). Smoking has been the recognized as the one of the four major risk factors of Non-communicable disease (NCDs). Tobacco is the number one preventable cause of premature death (Koplan et al, 2015), and the second leading cause of all death worldwide. Studies have shown negative effects of tobacco on health. One research revealed that roughly 10% of men and 6% of women die each year from
tobacco-related complications (Gowing et al., 2015). Another study argues the well-established causal link of smoking tobacco to lung cancer (the world’s leading cause of death), and as tobacco use continues to rise in low-and middle-income countries, cancer rates are also expected to increase (Torre et al., 2015; Peleteiro, 2015). Moreover, smoking tobacco is also associated with colorectal, stomach and liver cancers, and has a particularly insidious relationship with infectious diseases (Torre et al., 2015; Islami et al., 2015; Basu 2011). As just one example, worldwide tobacco use is projected to render tuberculosis control goals set by world leaders for the next two decades completely unattainable as tobacco is a high-risk factor for tuberculosis infection.

With the current situation of tobacco, the World Health Organization (WHO) has estimated that six million people worldwide die annually due to the use of tobacco. Most deaths occur in low- and middle-income countries. Unfortunately, this number would continuously go up to 10 million in 2020 (Peto, Lopez et al. 1994, Warren, Jones et al. 2006). Therefore, in order to better guide and assist countries to address the tobacco issue, the World Health Assembly has adopted the Framework Convention on Tobacco Control (FCTC) in 2003 and WHO has put the FCTC in to force in 2005. It is an evidence-based framework applying methods relating the tobacco supply, product marketing and political regulations as a complex approach to the tobacco control. By July 2017, the
FCTC framework has been ratified by 181 parties worldwide, and it serves as a standard guide towards tobacco control all over the world (WHO, 2017).

Figure 1. Estimated prevalence of current tobacco smoking in 2025
(Bilano, Gilmour et al. 2015)
1.2 Tobacco & Health in Palau

Tobacco is a major risk factor of Noncommunicable Disease (NCDs), the cause of premature death and ill health (David, Lew et al. 2013). According to the WHO report, tobacco consumption is strongly associated with heart disease, cancer, and stroke, which are the three main causes for mortality in some Pacific islands (WHO, 2012). In Palau, tobacco has been recognized as a serious public health issue that threatens people’s health over the past decade. Some studies report that NCDs have already become the predominant health problem in this country, and the leading four diseases of mortality, cardiovascular disease, cancer, chronic respiratory disease, and diabetes accounts for more than two thirds of the total death rate (Watson et al., 2015; Chiang et al., 2015). The high mortality rate and negative health outcomes impose a huge burden to the people live in the country.
Additionally, tobacco use in Palau is more than smoking cigarettes, it is a combination of smoking, betel nut chewing mixing with tobacco and other smokeless tobacco. With the high percentage of tobacco consumption of all types mentioned above (Watson et al., 2015). Chewing betel nuts mixing with tobacco reveals to be the most popular method among Palauans than people from other countries, since 58% men and 69% women of Palauan are currently using this method (Watson et al., 2015).
High frequency use of betel nuts also generates many health-related problems. Beside the relationship of oral cancer with betel nut (Quinn Griffin, Mott et al. 2014), a study conducted in Palau focused on the oral health of chewing betel nut with tobacco also indicates that the practice would affect issues related to social function, like the embarrassment of the stained teeth or missing teeth and lessened social interaction among betel nut chewers due to the self-consciousness (Oakley, Demaine et al. 2005). Another study which was done in rural Tamil Nadu of India argues that the substance named arecoline in the betel nut is the fourth main psychotropic substances that has a similar effect to nicotine. This suggests that perhaps people who use betel nut may develop a dependency to the practice because of the feeling of well-being that they achieve when chewing betel nut. (Rajan, Ramesh et al. 2007).

Even knowing the adverse impact of the carcinogens in tobacco, families and peers exert a strong influence on the chewing habit of betel nut (Quinn Griffin, Mott et al. 2014). Some people argue that the habit of chewing continues because of the centuries of use among Pacific Islanders, making it a cultural practice and symbol of identity that is difficult to change (Parsell 2005, Quinn Griffin, Mott et al. 2014). Likewise, other researchers note that the stained teeth of a young person signals to others that they are now considered adults and of marriageable age (Oakley, Demaine et al. 2005).
Despite the negative impact of tobacco, various consumption methods, the tobacco history, and the tobacco social environment in Palau, this country has a very high tobacco consumption rate in general. Surveys of tobacco use in Palau suggest that 60% of men and 58% of women (25-64yrs) are presently tobacco users (Watson et al., 2015). Compare this to the world’s largest producer and consumer of tobacco China, of which the tobacco use rate is 49.3% for males and 2.0% for females (WHO, 2015), the overall tobacco consumption rate in Palau indicates an urgent situation.

The tobacco consumption situation among young adults is even worse. Research reported that the age people initiate to chew betel nut as a habit is as young as 5 years old, and the rate gradually increase as people grow up (Ysaol, Chilton et al. 1996, Oakley, Demaine et al. 2005, Prajapati, Nayak et al. 2015). Furthermore, percentage of tobacco use in both male and female among young adults (18-24yrs) and youth (13-15yrs) are astonishingly high as more than 70% of young adults and more than 45% of youth are currently tobacco users in Palau (Chiang et al., 2015; Rasanathan&Tukuitonga, 2007; Global Youth Tobacco Survey, 2013). Moreover, young adults’ heavy tobacco situations directly harm the development of this country. Due to the large demographic with the relatively high tobacco use rate among all groups in Palau, young adults, no matter the males or females, have been recognized as a prime focus of anti-tobacco efforts if
prevention and cessation measures are to be effective across the Republic of Palau (Rasanathan&Tukuitonga, 2007).

1.3 Efforts to address tobacco use in Palau

Palau has ratified the Framework Convention on Tobacco Control (FCTC) early in 2004. The country passed its legislation about tobacco control in 2011. But the legislation is not fully consistent with the requirements by FCTC framework as the Palau tobacco control legislation does not ask for packaging warning and still allows for public for tobacco use, including smoking in public locations (David, Lew et al. 2013). A Palau report published in 2006 argues that while the tobacco control programs launched by local government encouraged people not to use tobacco, these programs do not warn against using tobacco with betel nut chewing (Palau Division of Oral Health, 2006).

Though laws, regulations, and policies have been implemented, the effect are still not clear. Erik Martin and his research team found that the low commitment might be the most significant barrier to the FCTC and other tobacco control programs implementations (Martin and de Leeuw 2013). In addressing the tobacco issue, the Ministry of Health (MOH) in Palau now has made a strategic action plan for NCD prevention and control for 2015-2020, of which the first goal is to reduce tobacco consumption by 30% by 2020 (Palau MOH, 2015). Specifically, it anticipates to decreases
the overall smoking rate from 17% to 12% and the overall chewing rate from 40% to 28%. Among its seven objectives, the last one indicates an ambitious goal that by 2020, it plans to achieve the full compliance of the provision of the FCTC framework to address the demand reduction in tobacco. Therefore, it is reasonable to anticipate a favorable position of tobacco control issue, a growing focus towards the current situation, and a plan for future reduction of the burdens of tobacco use in Palau.

1.4 Necessity and significance of the study

Even though the negative health impacts are well known, and the high percentage of tobacco use in Palau has been demonstrated (Watson et al., 2015; Chiang et al., 2015), however, little research on tobacco reduction have ever been done in Palau. In addition, testing potential tobacco cessation methods in Palau has not been carried out. The research of this thesis begins with a description of the complex mix of habits, social norms, history, and cultural practice that make up tobacco use in Palau. Then an intervention project among young adults based on their own reflections on tobacco use by writing journals, is described.

“Journaling behavior change paradigm” (refer as “journaling”) is a scientifically proven behavior change model used in this study during the research and the pilot intervention. Journaling, which is defined as: a daily written record of experiences,
ideas, and reflections concerning one’s tobacco use behavior, has been used in previous health research with positive results. For example, Stopka et al. (2004) used daily participant diaries as a data collection tool to study the habits of injection drug users. Surprisingly, after only 6 days of journaling, several participants approached the researchers seeking professional help, and the paper closed by calling for more research into the interventional effects of journaling. Another social research using journaling also demonstrated significant impact on subjects’ cognition and emotion (Ullrich & Lutgendorf, 2002). This research need has hardly been met, however. To the best of our knowledge, no prior study has assessed the effects of daily journaling in influencing attitudes and perceptions of tobacco use in Palau, nor its potential role as an intervention measure to reduction and eventual cessation.

In conjunction with the MOH’s five-year plan and considering the astonishingly high use rate among young adults, this study was designed to in response to the need, using the “journaling behavior change paradigm” in the pilot intervention, so as to lower tobacco use and prevalence among young adults by working closely with the Prevention Unit office under the Division of Behavioral Health, Ministry of Health in Palau.
1.5 Study aims

Specifically, the research was conducted with two aims as below:

• AIM 1: To better describe the tobacco situations of young adults in Palau.
  • Aim 1.1: Describe tobacco use behavior, first tobacco introduced person, tobacco social environment (attitudes from family and friends towards subject’s tobacco use), nicotine dependence level, and cessation history.
  • Aim 1.2: Investigate the association between participants’ tobacco use status (user or non-user) and their demographic characteristics (age, gender, marital status, nationality, education, and family size).
  • Aim 1.3: Investigate whether social environment of tobacco (attitudes from family and friends towards subject’s tobacco use) is associated with one’s tobacco status, cessation goals, and cessation efforts.
• AIM 2: Investigate the effects of journaling behavior change paradigm on influencing perceptions of tobacco use among young adults in Palau.

Theoretical foundation: the study is predicated on the Transtheoretical model (TTM) of behavior change (Prochaska and DiClemente 2005). According to this model, there are 5 stages in changing an adverse behavior, ranging from the pre-contemplation stage (not intending to initiate a healthy behavior within 6 months) to the maintenance stage (initiated healthy behavior more than 6 months ago). The purpose of this pilot study was to assess the feasibility and effectiveness of journaling behavior change paradigm in moving tobacco users in lower stages to more advanced stages along the TTM pathway to healthy behavior change.
2. Methods

This is a study that combines quantitative and qualitative methods, including a face to face tobacco survey, two-week daily journaling, and a post intervention exit interview. The survey is used for quantitative study and the questions within it mainly investigate participants’ tobacco use history, behavior, dependence level, and past efforts to quit tobacco. The journal and exit interview are designed for qualitative study and change in perceptions, a first step of behavior change. Contents of the journaling activity explore the participant’s daily triggers for using tobacco and the amount of tobacco they consume. The purpose of this exit interview is to gather a deeper understanding regarding tobacco use and tobacco use perceptions. In addition, the exit interview enables the examination of behavioral change and predictors of future tobacco use.

2.1 Setting

Palau had long been a colony and protectorate of different major countries for the past 500 years, including Spain, Germany, Japan, and the United States. It became an independent country from the Federated States of Micronesia in 1994. Located in the Western Pacific, Palau is an island country with a total population of 17,661. Along with the indigenous Palauans, the country has a guestworker population of over four thousand who are mainly from the Philippines (Pierantozzi, 2000; Palau Government,
In addition to the resident population, Palau receives over 160 thousand tourists a year (Palau Government, 2015), sometimes increasing the resident population to over twenty-one thousand. According to the latest national population and housing census conducted in 2015, 65% of the total population reside in Koror, the main commercial center of Palau (Palau Government, 2015).

![Figure 3. The location of Palau](http://bit.ly/2G5Qbef)
Table 1. Citizenship and Year of Entry by Village Residence in Koror, Palau 2015

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<td>2014 - 2015</td>
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<td>2004 - 2006</td>
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<td>1998 - 1999</td>
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</table>

Source: 2015 Census of Population, Housing & Agriculture, Republic of Palau
Classified as an upper middle-income country by the World Bank, Palau plays a pivotal role in developing tourism and accelerating the economic growth together with other islands in Micronesia. The most important economic sources in these island countries used to be international aid, fishing, and subsistence agriculture (Watson et al., 2015).

2.2 Participants

This study investigated young adults living in Palau which included Palauans, Filipinos, people from the Federal States of Micronesia, and others who are currently living in this country. This study contains two parts, the inclusion criteria for survey part are 1> young adults age from 18 through 24 years old, 2> no matter they have ever used tobacco or not, and 3> reside in Palau currently. The study exclusion criteria are 1> people whose age falls outside this age range - either lower than 18 or above 24 years old, and 2> those who are visitors who happened to be reached during the research period.

For journaling part, the inclusion criteria are 1> young adults who are between 18-24 years old, 2> people are currently using at least one type of tobacco, and 3> people finished the tobacco survey. The exclusion criteria are 1> people fall outside of the age range, 2> people within this 18-24 age range while are not self-reported using tobacco,
and 30 people expressed the willingness to record a daily journal for two weeks. The tobacco use status is defined and identified based on self-reported in the survey questions they filled in.

The young adults in Palau were recruited through convenience sampling and snowball sampling. The local population is small, and people are connected to each other closely. Applying these two sampling methods and using personal connections was effective to recruit enough subjects in an efficient and effective way.

Subjects recruited for this study included: 1) college students, from Palau Community College, Police Academy, and other education institutions; 2) young adults attending in various summer camps from different states; and 3) participants at events such as the “Bible Learning group”, “movie night”, “summer tournament of sports”, Friday night markets, and interns from the local government.

2.3 Procedures

This study was conducted in collaboration with the Prevention Unit office under the Division of Behavioral Health, Ministry of Health in Palau. A research team consisting of three staff members from the Prevention Unit, namely Ms. Rusiang Kotaro, Mr. Sergio Ngiraingas and Ms. Josephine Ngiralmau was formed. These three research assistants are community behavioral health workers with abundant knowledge in cultural knowledge, epidemiology, and health education in the local community.
Training sessions were held among the team in terms of research aim, methods, and the procedures of conducting survey and interviews. The questionnaire was also revised with the help of our research team and an epidemiologist Joy to become more culturally appropriate to the residents.

This research followed Institutional Review Board approval both at Duke Kunshan University and the Ministry of Health in Palau. In the survey part, our study included the use of an explanation of the research, protection of privacy and confidentiality, and the assent given by young adults to an approved “oral consent form,”. This form is included in Appendix E. Thus, the potential participants had understanding about the study and were aware that returning the questionnaire would be considered offering informed consent. Participants received a small Chinese souvenir as a token of appreciation for their participation once they agreed to take the survey. Participants were also informed that they were free to pull out of the study at any time but keep the gift. Finally, a total of 117 young adults were reached and 102 of them were surveyed. Among the 15 who did finish the survey, nine of them turned down the survey and six young adults quit in the middle of the survey.

As for the journaling part, instructions on how to journal were given when participants finished the survey and expressed the willingness to join. The informed consent form (Appendix C) was given to each potential participant after the instruction.
By signing the form and returning it to our research team, participants were offering voluntary consent, and were officially enrolled in the journaling part of this study. A souvenir with a value of approximately $10 USD, representing the feature of Chinese culture was offered as our appreciation for their contribution. Participants had the rights to clarify any question or quit at any time point during the journaling period. Journaling part consists of 16 young adults. During the two weeks journaling, two people were lost in the follow-up, four dropped out and three people decided not to turn in the journal at the end. Finally, seven current users (3 male and 4 female) were interviewed with their journals turned in.

All participants journaled for two weeks to self-record tobacco use information. Our team contacted each journaling participant in the middle of the two-week period to express the gratitude, encourage them keep doing, and answer questions raised by them. By the end of the second week, an appointment was made during the phone call deciding the time and location for picking up the journal and for conducting the exit interview. To allow for privacy and protection of rights, the participant’s name was not included in the journal and the exit interview.

The questionnaire, on average, took approximately 10 minutes to complete. The journaling took around 5 minutes each day. And finally, the exit interview took approximately 10 minutes.
2.4 Measures

Survey part:

The tobacco use and cessation survey (Appendix D) was adapted from Global Tobacco Surveillance System (GTSS) questionnaire (CDC, 2011) and another questionnaire from Health Improve Organizations (HIO, 2014). It also included a part from the Fagerstrom Test for Nicotine Dependence (FTND) questionnaire (Heatherton, Kozlowski et al. 1991) (Appendix F). The questionnaire has then been revised based on the suggestions from the Prevention Unit, making the survey more culturally sensitive. Demographic characteristics such as: gender, age, marital status, nationality, and education level were also obtained through the survey of the study. Current tobacco behavior part measured the tobacco use status, tobacco types, amount, dependence level, and tobacco using environment. The survey also describes the tobacco cessation information, including intention to quit, quitting history, quitting duration, methods applied, and reasons for cessation.

Tobacco use could be defined as any habitual use of the tobacco leaf and its products (Al-Ibrahim and Gross 1990). The current study consists tobacco use in many ways including cigarettes, pinches, chewed tobacco, and others. Self-reported tobacco use was used to classifying users and non-users. “User” in the study was defined as
people who reported who has ever used or tried tobacco for at least once. “Current user” was defined as people who reported still using tobacco by the time of doing tobacco survey. “Quitter” was deemed as people who self-reported “user” beforehand while no long using tobacco.

Journaling part:

The instructions were described to participants as records on the tobacco using behavior in each day, including why use (any trigger, events or habitually use), how much time they spend on tobacco using and acquiring process (time on the road and tobacco using period), how much money they purchase tobacco (money for cigarettes or packs, gasoline fee, parking fee when buying or other related expense), how much tobacco they consume a day (cigarettes or packs). The primary purpose of this section is to potentially influence participants’ perceptions on their tobacco use behaviors by helping them reflect the total amount of the time and money that they spend on tobacco. The exit interview (Appendix A) sought information about respondent’s attitude and behavioral changes toward tobacco consumption after conducting two-week journaling.
2.5 Analysis

The questionnaire data was paper recorded and entered using Epidata 3.1. Double entering was performed to control the data quality. Descriptive analysis was used to show the demographic characteristics, tobacco use behavior, tobacco introduced person, social environment, nicotine dependence level, and cessation history among young adults in Palau.

In the quantitative analysis, T-test or the Chi-square test was applied to compare the demographic characteristics (age, gender, marital status, nationality, education, and family size) of participant with opposite tobacco use status. These two tests along with the Fisher’s exact test were then used to investigate whether tobacco social environment (attitudes from family and friends) is associated with participant’s cessation goals and cessation efforts. Presenting and comparing the tobacco use behavior, pattern, and nicotine dependence level were also achieved by using T-test, the Chi-square test, and the Fisher’s exact test.

The study also used stratification to better describe the tobacco use situations of subgroups. In terms of the selection of stratification variables, this study first displayed the distribution of each demographic variable to see the feasibility of stratification (not feasible if one distribution reveal very skewed). Second, the team referred to research (Warren, Jones et al. 2006, Organization 2012, Chiang, Singeo Jr et al. 2015) that stratify
subjects by genders, age, nationality, and other variables, which claimed that gaps about tobacco use behavior exist between different groups. After combining the results from the two steps, consequently, the study selected gender, nationality, and education levels as the variables for stratification and subgroup comparison.

The calculation of the nicotine dependence level was a process by combining the original formula of the Fagerstrom test (Heatherton, Kozlowski et al. 1991) and transforming the nicotine amount from other tobacco types into the equivalent numbers of cigarettes. Based on previous research (Benowitz et al. 1988; Maes Her, 2004), one “chew” was considered equal to 1.5 cigarettes, one “dip” was equal to 2.0 cigarettes, and one “pinch” was equal to 2.0 cigarettes when conducting the nicotine transformation in this study. The total nicotine one participant consumes a day equals to the sum of all types tobacco consumption and then was applied to calculate the nicotine dependence level. All the analyses were conducted using the software Stata 14 and Microsoft Excel.

In the qualitative analysis, both journaling and interviews were recorded and transcribed. Transcriptions were coded for prominent and recurring themes. Themes generated provided insights on respondents’ feelings, perceptions, and triggers about consuming tobacco. The qualitative analysis was conducted in Microsoft Word and Excel, relying on word counts, recurring themes, and commonly paired words or phrases that appear within the transcripts.
3. Results

3.1 Findings from the tobacco survey

3.1.1 Participant demographic

Table 2 describes the demographic characteristics of the participants age 18 to 24 years old. A total of 117 potential participants were reached during the research period, of which 102 of them finished the survey and turned it in. Among the total 102 young adults participated in this research, 81 people who have used tobacco (including 72 people who used tobacco within the past six months and nine quitters in total) while 21 individuals who never used tobacco. The average age of the total research participants is 20.70 ± 2.12 years old, with 20.88 years old among people used tobacco and 20 years old among people never used tobacco. T-test shows that the difference of age between people with opposite tobacco status is statistically significant. There were 64 male and 38 female participants in this study, with 55 (85.94%) of the male and 26 (68.42%) of the females who have ever used tobacco. The Chi-square test shows that that gender is significantly associated with individual’s tobacco use status.

As for the marital status, most of the participants are unmarried (n=98, 96.08%). The Fisher’s exact test shows that the there is no significant relationship between marriage and tobacco use status. In terms of the nationality, there are 54 Palauans, 42 Micronesians (including Federal States of Micronesia, and the Marshall Islands) and six
others (including white people and Filipinos). A total of 56 people achieved no more than high school or GED degree, while 46 subjects achieved at least some college or associate degree. The Chi-square test indicates that both nationality and education have no significant effects on individual’s tobacco use status.

Table 2. Demographic characteristics of young adults age 18-24 yrs in Republic of Palau, 2017

<table>
<thead>
<tr>
<th>Characteristic [% percentage]</th>
<th>All (n=102)</th>
<th>Used tobacco (n=81)</th>
<th>Never used tobacco (n=21)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean±SD)</td>
<td>20.70(2.12)</td>
<td>20.88(2.11)</td>
<td>20(2.05)</td>
<td>0.046*</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>55(85.94)</td>
<td>9(14.06)</td>
<td>0.034*</td>
</tr>
<tr>
<td>Female</td>
<td>38</td>
<td>26(68.42)</td>
<td>12(31.58)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>4</td>
<td>3(75.00)</td>
<td>1(25.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>Unmarried</td>
<td>98</td>
<td>78(79.59)</td>
<td>20(20.41)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palauan</td>
<td>54</td>
<td>42(77.78)</td>
<td>12(22.22)</td>
<td></td>
</tr>
<tr>
<td>Micronesia</td>
<td>42</td>
<td>34(80.95)</td>
<td>8(19.05)</td>
<td>0.921</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>5(83.33)</td>
<td>1(16.67)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤High school graduate or GED</td>
<td>56</td>
<td>44(78.57)</td>
<td>12(21.43)</td>
<td>0.817</td>
</tr>
<tr>
<td>≥Some college, associate degree</td>
<td>46</td>
<td>37(80.43)</td>
<td>9(19.57)</td>
<td></td>
</tr>
<tr>
<td>Family size (mean±SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of persons per family</td>
<td>7.10(5.15)</td>
<td>7.33(5.60)</td>
<td>6.19(2.77)</td>
<td>0.192</td>
</tr>
<tr>
<td>Number of siblings per family</td>
<td>4.26(2.41)</td>
<td>4.28(2.44)</td>
<td>4.19(2.32)</td>
<td>0.887</td>
</tr>
<tr>
<td>Tobacco users per family</td>
<td>3.22(2.49)</td>
<td>3.60(2.51)</td>
<td>1.71(1.73)</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

The average family size of each participant was 7.10±5.15 person, and the average number of siblings each subject has was 4.26±2.41. There is no significant difference of the number per family and siblings among people have opposite tobacco use status. The number of participant’s family member who use tobacco was 3.22±2.49
person on average, with $3.60 \pm 2.51$ among subject used tobacco and $1.71 \pm 1.73$ person among subject who never used tobacco. T-test shows that the difference of tobacco users per family between tobacco users and non-users is statistically significant.

### 3.1.2 Tobacco Social Environment

#### 3.1.2.1 Introduction to tobacco and attitudes towards tobacco use

Figure 4 displays the frequency of the tobacco introduced person (the person first introduced tobacco to the participant) among everyone who used tobacco. Both in male and female groups, “friends” is the primary source of tobacco introduction, with 35 of 55
in male groups and 15 of 26 in female groups. Grandparents and parents are reported at a low introducing rate, with two grandparents and four parents in male groups, and zero grandparents and two parents who introduced tobacco in the female group.

“Others” include siblings, other family members, and people learned to use tobacco by themselves.

Regarding the attitudes of tobacco from subject’s family members, friends, and others (Figure 5), grandparents reveal to have a clear negative attitude. 54.35% of the subjects reported their grandparents are strongly discouraging their tobacco use, 28.26% of them are somewhat discouraging. A stronger negative pattern of attitude is shown among parents, with 67.74% who are strongly opposing and 22.58% are somewhat discouraging their children’s tobacco use. Siblings also have a negative attitude with 65% (39.58% strongly discouraging and 25% somewhat discouraging) of them are opposing the subject’s tobacco use status.

Different patterns are observed among other groups including other family members, friends and others. The attitudes of other family members reveal that around half (13.70% strong encouraging and 37.25% somewhat encouraging) of them hold a positive attitude and the other half (25.49% somewhat discouraging and 23.53% strongly discouraging) hold a negative one toward the subject’s tobacco use. A similar pattern is shown among others that 45% of others encourages the subject to use tobacco while 55%
A strong positive attitude is only observed among friends group that a total of 66% of friends (with 28% strongly encouraging and 38% somewhat encouraging) shows the encouragement toward the participant’s tobacco use. Only 8% of them are perceived to show strongly discouragement about tobacco use.

Figure 5. Attitudes toward subject’s tobacco use behavior
3.1.2.2 The association between attitudes and cessation efforts

Table 3. Comparisons of cessation efforts and tobacco use time between participants with different family and friends’ attitudes

<table>
<thead>
<tr>
<th></th>
<th>Family attitude (n=75)a</th>
<th></th>
<th>Friends attitude (n=53)b</th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encourage (n=13)</td>
<td>Discourage (n=58)</td>
<td>p</td>
<td>Encourage (n=33)</td>
<td>Discourage (n=18)</td>
</tr>
<tr>
<td>Cessation goal (score)</td>
<td>2.54</td>
<td>2.59</td>
<td>0.900</td>
<td>2.67</td>
<td>2.28</td>
</tr>
<tr>
<td>Have quit</td>
<td>3</td>
<td>15</td>
<td></td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Quit in next month</td>
<td>5</td>
<td>21</td>
<td></td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Quit in next half year</td>
<td>2</td>
<td>9</td>
<td>1.000</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Decrease amount</td>
<td>2</td>
<td>9</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>No intention to quit</td>
<td>1</td>
<td>4</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Total times that individual tried to quit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the past</td>
<td>4.15</td>
<td>3.95</td>
<td>0.848</td>
<td>4.6</td>
<td>4.56</td>
</tr>
<tr>
<td>Within the last 6 months</td>
<td>2.67</td>
<td>2.51</td>
<td>0.889</td>
<td>3.03</td>
<td>2.38</td>
</tr>
<tr>
<td>Total tobacco use time since initiation (months)</td>
<td>52.38</td>
<td>45.43</td>
<td>0.728</td>
<td>43.27</td>
<td>46.28</td>
</tr>
<tr>
<td>Longest time without tobacco after cessation (day)</td>
<td>54.92</td>
<td>260.19</td>
<td>&lt;0.001*</td>
<td>182.94</td>
<td>171.83</td>
</tr>
</tbody>
</table>

Note: family=grandparents, parents, siblings, and other family members; friends= friends and others; Index goal: quit in next month=3 points, quit in next 6 months=2 points, cut back=1 point, no intention to quit=0 point.

When investigating whether the family or friends’ attitudes have an impact on subjects’ cessation goals, total tobacco use time, and no tobacco time since cessation. Table 3 first quantified the goals by defining “have quit” as 4 points, “quit in next month” as 3 points, “quit in next half year” as 2 points, “decrease amount” as 1 point, and “no intention to quit” as 0 point. The higher the score is, the stronger the motivation of cessation one subject has. The family or friends’ attitudes indicates the weighted average score calculated as below. “Strongly encourage” is 2 points, followed by “somewhat encourage” as 1 point, missing value as 0 point, “somewhat discourage” as -1 point, and “strongly discourage” as -2 points. When the average point is > 0, the results
indicates the attitude one perceived is “encourage”, otherwise the attitude is “discourage”.

When a comparison is made of the cessation goals in two subgroups with opposite attitudes (encourage and discourage), subjects score 2.54 in the group with family attitude as “encourage” and 2.59 in the group with family attitude as “discourage”. The cessation score in the group with friends’ attitude “encourage” is 2.67, and 2.28 with friends’ attitude “discourage”. The p-value indicates that the difference between the two groups with opposite attitudes are not statistically significant.

Regarding the number of times that individual tried to quit tobacco, participants with the family attitude “encourage” have tried to quit 4.15 times in the past, and 2.67 times in the past six months. The two numbers of those with the family attitude “discourage” are 3.95 times in the past, and 2.51 times within the past six months. The differences are not statistically significant. The people with friends’ attitudes “encourage” have quit tobacco 4.6 times in the past, and 3.03 times in the past six months. The numbers of these in the group with friends’ attitudes “discourage” are 4.56 times in the past, and 2.38 times within the past six months. The differences of the times tried to quit tobacco in these two groups are not statistically significant.

In terms of the total tobacco use time, people with family attitudes “encourage” have longer time that the average number is 52.38 months. The number is 45.43 months
in the group with family attitude “discourage”. The T-test indicates there is no
significant difference between the tobacco use time in these two groups. The pattern is
the opposite in the friends group that the people uses tobacco for 43.27 months with
friends’ attitude “encourage” while 46.28 months with “discourage”. The difference
between the tobacco use time in these two groups reveal no significance either.

Table 3 also displays the results of “no tobacco time after cessation”, which is
defined as the longest time that one is free from tobacco after he/she made the
determination to quit. In the group with family attitude “encourage”, the average no
tobacco time is 54.29 days while the number is much higher in the group with family
attitude “discourage” that people could refrain from tobacco as long as 260.19 days on
average. T-test shows that the difference about no tobacco time between these two
groups is statistically significant. On the other side, the difference reveals no statistically
significance between people with opposite friends’ attitudes. 182.94 days is the average
number of no tobacco time that people have friend’s attitude “encourage” and 171.83
days is the no tobacco time for people with friend’s attitude “discourage”.

3.1.3 Tobacco use behavior and the association with genders, nationalities, and education levels

Figure 6 displays the most frequent ways for tobacco consumption. It is apparent that chewing betel nuts with tobacco becomes the most popular way for using tobacco in the local society, followed by smoking, and chewing. No subject reported dipping as the most common way for consuming tobacco.

![Figure 6. Most common way for tobacco consumption](image)

As for the subgroup comparison between gender, 69.39% of male (n=49) choose chewing betel nut with tobacco as the most common way for tobacco use while the
number (86.21%) is higher among female groups (n=23). The Chi-square test shows that
the difference between two genders regarding the most common way of tobacco is not
statistically significant (Table 4). One quarter of Palauan users (n=34) in this study
reported that smoking is their most frequently way, 67.65% reported chewing betel nut
with tobacco mostly. The two number for smoking and chewing betel nut with tobacco
are 15.15% and 84.85% among Micronesian people (n=33, with 31 from Federal State of
Micronesia, FSM, and two people from the Marshall Islands). Chi-square test indicates
no statistically difference is observed between the Palauan and Micronesian groups.

In terms of the people with a less than or equal to high school degree, one third
reported smoking, and more than three fifths chose chewing betel nut with tobacco as
their most common way for tobacco consumption. The most frequent tobacco use
method among people who had greater than or equal to some college degree is 9.09%
(n=3) for smoking, and 87.88% (n=29) for chewing betel nut with tobacco. Chi-square test
reveals that the association between education level and most frequent tobacco way is
statistically significant (Table 4).
Table 4. Comparison of tobacco use behavior and nicotine dependence level between genders, nationalities, and education levels of Palau young adults who are current tobacco users, 2017

<table>
<thead>
<tr>
<th>Gender</th>
<th>Smoking (%)</th>
<th>Chew Betel Nut+Tobacco (%)</th>
<th>Chewing Tobacco (%)</th>
<th>Dipping (%)</th>
<th>Others (%)</th>
<th>Nicotine Dependence Level (FTND-Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>68.06</td>
<td>30.12</td>
<td>18.50</td>
<td>20.81</td>
<td>32.12</td>
<td>2.00</td>
</tr>
<tr>
<td>Female</td>
<td>86.11</td>
<td>28.60</td>
<td>19.00</td>
<td>21.00</td>
<td>27.00</td>
<td>2.00</td>
</tr>
<tr>
<td>All (n=72)</td>
<td>73.61</td>
<td>30.12</td>
<td>18.50</td>
<td>20.81</td>
<td>32.12</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Note: Chew B+T indicates chew betel nuts with tobacco; FTND-score indicates the Fagerstrom Test for Nicotine Dependence score; * indicates the P value is less than 0.05.

Apart from the most common way for tobacco use, Table 4 also presents the frequency of each methods, how many methods each individual used, and the nicotine dependence level of current tobacco users. Among all (n=72), the percentage of subjects smoking, chewing betel nut with tobacco, chewing tobacco, dipping and others are 68.06%, 86.11%, 55.56%, 33.33% and 13.89%, respectively.

As for the comparison between genders, statistical difference is observed in the method of dipping where 44.90% (n=22) of male uses dipping while only 8.70% (n=2) of female use the method as dipping tobacco. In terms of the comparison between ethnicities, Micronesian people tends to have a higher percentage of multiple tobacco use behaviors. 81.82% (n=27) of Micronesian people use smoking while the number among Palauan is only 55.88% (n=19). The percentage of chewing tobacco is 72.73%.
(n=24) among Micronesian and only 41.48% (n=14) among Palauan. Also, 48.48% (n=16)
of Micronesian use dipping and the number among Palauan is only 14.71% (n=5). Chi-square test shows that the differences among the two genders regarding these three methods are all statistically significant. The differences regarding tobacco use methods between subjects with different education levels are not statistically significant.

A total of 20 people used one method to consume tobacco (Table 4), including 8 (11.11%) subjects solely smoking and 12 (16.67%) people chew betel nuts with tobacco. Subgroup comparison shows that gender, nationality, and education have no significant impact on subjects regarding the single method use behavior. In terms of multiple methods situation, the majority (n=52, 72.22%) use at least two methods to consume tobacco and more than half (n=37, 51.39%) of the subjects even apply three ways of tobacco consumption. Gender and nationality have significant impacts on multiple methods use situation. 81.63% (n=40) of the males used at least two methods of tobacco, which is higher than those in the female group (n=12, 52.17%). The percentages of people who use at least three methods to consume tobacco are 61.22% (n=30) in male group and 30.43% (n=7) in female group. Chi-square test shows the difference between two genders regarding the multiple tobacco methods (more than 2 methods and 3 methods) are statistically significant. Micronesian people report a higher rate for multiple methods use that 84.85% (n=28) apply at least two tobacco methods and three quarters (n=25,
75.76%) use at least three ways. The two percentages are much lower in Palauan group that 58.82% (n=20) Palauans use more than 2 tobacco methods and 29.41% (n=10) use at least three methods. The differences are also statistically significant between two ethnicities.

The nicotine dependence level displayed by FTND score is 3.78 (low to moderate dependence level) among all current tobacco users. A higher score is observed among the male group (4.39, low to moderate dependence level), Micronesian group (5.36, moderate dependence level), and higher education group (4.64, low to moderate dependence level) compared to its counterpart. T-test results indicate that the differences are all statistically significant at the significance level of 0.05.
3.1.4 Cessation goals, efforts, and resources

Figure 7. Cessation goals of tobacco users

Figure 7 presents the tobacco cessation aim of the subjects. A total of 72 current tobacco users are included into the graph. “Have quit” means “have quit within the past 6 months” in the tobacco survey. Thus the nine people who are quitters are not included into the calculation. From Figure 7, only five people expressed no intention to quit tobacco. Specifically, a total of 14 people reported have already quit tobacco within the past six months, 30 of the current users wished to quit in next month, 11 people wished to quit tobacco within the next six months, and 12 people reported at least to decrease the tobacco consumption amount.
As shown in Table 5, among the total 81 subjects who used tobacco before, 34 people expressed the wish to receive positive messages when asked what kind of prevention messages they think would be most helpful to them. A total of 32 people believed negative messages would play a more vital role. Around one sixth (14) of the subjects thought messages contain fact sheets of smoking, chew, other behaviors, or knowledge about tobacco would be most helpful for quitting. When asked the main motivation if the subject decides to quit using tobacco, the majority (53) of the subjects deemed their own health to be the primary concern, followed by financial concern (15 people) and family attitude (8 people). Two people thought the policies at workplace and one people chose the social acceptability as the main reason for quitting. Another two people chose “other” and indicated religion is their primary reason for quitting.

<table>
<thead>
<tr>
<th>Frequencies (n)</th>
<th>Used tobacco (n=81)</th>
<th>Current users (n=72)</th>
<th>Quitters (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>34</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Negative</td>
<td>32</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Fact Sheets</td>
<td>14</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money</td>
<td>15</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Own health</td>
<td>53</td>
<td>47</td>
<td>6</td>
</tr>
<tr>
<td>Family attitudes</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Workplace policies</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Social acceptability</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 8. The frequency of cessation method and self-reported usefulness

Among the people who tried to quit tobacco in the past, Figure 8 displays the frequency of each methods that one may apply in assisting the cessation process with its self-reported usefulness. A total of 23 people used cessation program before and 19 of them thought this method is useful. Another 13 people applied tobacco cessation counseling and all of them thought counseling helped them to quit. Ten people have used NRT method and 2 people did not think this help them to quit. Compared with other methods, exercise became the most popular way people chose to help quit, and 24 of 27 people think it helped them to quit. Willpower seems have a low useful rate that 5
people of 11 who applied willpower believe this method did not offer much help. There was also five people chose other methods to assist quit, including the religion concern, and basketball friendship (peer influence).

3.2 Findings from journaling and exit-interviews

3.2.1 Overall view on journaling activity

All participants reported journaling is a good exercise which helped them to keep good records of daily tobacco amount one consumes. By writing down the time, money, and triggers about tobacco, participants believed journaling gives them an opportunity to better reflect themselves in terms of the tobacco behavior and related issues. One participant said that “I would say I am playing with tobacco and not really using it, but what the journal (tells me) is oh my gosh, I think I should really like stop using it you know, because it’s scary that we get addicted to it.” Another participant expressed that “I think the journal activity is great. It helped us and keeps us to know how much tobacco I use every day. For today I use too much, for tomorrow I use only less, so I think it is a great thing.”

Although people favored for this journaling activity, four people thought that two weeks are enough to do the journaling and another two subjects preferred to choose one week as the maximum they would like to keep a daily journal. One participant
thought three weeks journaling was better by mentioning that three weeks could offer more data and records to analyze. As for the comparison between the answers of tobacco consumption amount in the survey and in the journal, half of the subjects reported that the content they wrote in daily records were the same as they reported in the tobacco survey. While the other half believed the answers are only 50-80% matches. One mentioned that “The journal gives more precise number, because we keep the record of how much tobacco we use every day”. Almost all participants finished their journal after work at evening, and they thought it would be better to record the tobacco related numbers and reflect on them.

3.2.2 Triggers for tobacco use

In the journals and exit interviews, several common “triggers” for tobacco use in each instance were found. Many participants reported that peer influence would be their primary reason for tobacco use. Peer influence was presented as 1> people receive tobacco and betel nuts from other friends; 2> people feel like to chew or smoke when they see others chew; 3> some participants are social chewers that they only chew betel nuts with tobacco when they are with friends. “Sometimes when people chew, you want to do what people do. So, you see them chew, you want to chew…” said by one participant. “…people offered me chew bag, so I went ahead and chewed.” Another participant shows a different way of peer influence.
Addiction revealed to be another major reason that it manifests as 1> people just feel like to chew for no reason or feel boring; 2> people find various reasons to justify their tobacco use (chew while working, traveling, weather conditions, and relaxation activities); 3> the belief that chewing gives energy, deals with stress and helps to digest the food after meals. One participant said “I don’t know, but in the morning, I usually watch my anti’s store on 6 am, so at that time I am very sleepy, and I chew betel nut with tobacco to give me energy to make me awake…”; Another subject thought “boring” is the main trigger to use tobacco. “…Just boring, I feel nothing to do…” Three other participants also mentioned that “only wanted to chew because of rainy day…”, “was on a trip and felt like chewing on the road”, and “…I had to (chew), it’s a habit including nicotine I can’t control…” were their tobacco use triggers.

3.2.3 Tobacco purchasing behavior and financial burden

In terms of acquiring tobacco, betel nuts, and lime, more people chose to go stores and buy them solely (the aim of going to a store is only for tobacco product). “…I only go buy tobacco and betel nuts” said by most interviewees. One subject who described him/her as a social chewer mentioned that “Oh I was buying grocery for home then I got one (pack of cigarette), the other one was on my way to Koror so I just stop and get one (pack of cigarette).” A small portion of subjects also said they do not buy tobacco, friends and relatives would give tobacco product to them.
The subjects were asked to reflect the total amount of money they spent during the two weeks. It seems that when participant had an opportunity to calculate the number, they started to reflect and felt astonished to see the total amount of money was been spent in such a brief period. Nearly all participants use the word “too much” when commented the total money they spent on tobacco and betel nuts. In the interview, one participant said that “Maybe $75 (total money on tobacco and betel nuts). It is too much! It is really too much. In those two weeks if I didn’t buy tobacco I could have bought something else good than the tobacco.” Only one interviewee expressed that “…more than $20 USD. I think it’s acceptable.” The money one spends during two-week time vary from around 20 USD to approximately more than 70 USD based on interviews.

3.2.4 Perception and behavior change

People tend to believe that two-week journaling has somewhat changed their tobacco perception. When asked if the journaling activity has any effect on the perception about tobacco use, 4 of 7 interviewees gave positive answers that they thought after two-week journaling, they have a better understanding about their tobacco use behavior. Some participants also reflect it as “bad habit” and plan to make behavior change in the short future. One participant said “…the journal showed me I am using too much tobacco, what I am doing (wish to do) right now is to minimize it. (Now) every day I use more the half of a pack cigarette (10+). Around five is the ideal number
for daily use…” Another participant supported the positive effect of journaling by saying “…Well, yeah, like I said earlier, to me I am just saying I am playing with it. When I was asked to write it down and reflect on it, it could be a bad habit. Like it is a bad habit…” While two participants gave neutral answers that they believe journaling could only provide them with an objective record of tobacco consumption amount. One participant did not think journaling has any effect on his/her perception change.

Situations of behavior change are the opposite compared with perception change above. In terms of the journaling effect on behavior change during the two weeks, almost all participant said that they did not make any behavior change during this period. Most people used the phrase “still the same” and “no” to indicate their tobacco use behavior basically do not change. Only one participant mentioned that he/she tried to quit during the two-week period while did not success in the end. His/her answer is “…I tried to stop but I think I’m gonna need time, and it’s gonna be a slowly progress.”

3.2.5 Tobacco cessation goals and suggestions

Among all seven tobacco users who received the interviews, all participants expressed their wish to quit tobacco in either short or long period of time, and at least to decrease the tobacco consumption amount. Five of the subjects have a strong wish to quit tobacco and it is interesting to find that three of them mentioned that they wish to
quit tobacco while they are abroad for schools and not physically in Palau. Two participants said they wish to cut down the tobacco amount in the next few months.

One typical answer is that “Yes, I am really gonna stop it, in two weeks, when I leave Palau, (go to Hawaii for school).” Another participant noted lack of alternatives for tobacco and the belief in culture preservation might be the reasons for tobacco consumption. “Yes. (goal) I need to find something instead of chewing like activity that I do so when I think about chewing, I motivate myself not to chew. Cut down (cigarettes not the betel nuts) within next half month. (chewing) It is part of our culture.”

After having two-week journaling experience, participants had some suggestions to give people who just started using tobacco, wishing to help them quit. One participant emphasized the severity of tobacco addiction and the financial burden “…I would say that for beginner don’t become addicted, don’t let tobacco affect how you think, don’t start what you cannot stop. For the ones who haven’t use it, don’t start it. Because once you start it you gonna be addicted and its gonna affect how your live. You gonna waste a lot of money, you gonna get a lot of diseases, it is like lung cancer.” Another echoed this by saying “…Just make them stop, we can find activities and show them how(chewing) it affects you, maybe a brochure or some advertisements to tell them, how it affects your teeth. It is very addictive, once you start, you can’t to quit unless something motivates you to stop it.”
On the other hand, among those good suggestions, discrepancy between personal tobacco use status and their cessation suggestions to others was found in a participant’s note “…Should tell them to quit because it costs a lot of money. For me I won’t quit cos if I quit I would have to find other alternatives, like smoking cigarettes. That’s why I would like to stick with chewing tobacco.” This discrepancy reveals an underestimation about the health impact of chewing betel nut with tobacco. It also showed the severe dependency that tobacco use develops among young adults.
4. Discussion

This study applied journaling behavior change paradigm as an innovative intervention method for tobacco cessation among young adults in Palau. Our research team investigated the tobacco use behavior, nicotine dependence level, tobacco use environment and cessation efforts through a tobacco survey of 102 young adults in Palau. The results reveal a high prevalence of tobacco use, and young adults not only use one type, but also mix tobacco use frequently (high prevalence of multi-method consumption). Chewing betel nuts with tobacco is the most popular method followed by smoking cigarettes. Subgroup (classify by demographic characteristics) comparisons of tobacco use shows that there are significant differences between people according to their gender and nationality. We also tested the effect of daily journaling on subjects’ perception and behavior change toward tobacco use from the two-week journaling activity and exit-interviews. Positive feedbacks about the journaling activity, and tobacco perception change were observed in most of the subjects.

Some studies (Herzog, Murphy et al. 2014) reported that taking into account of all types of tobacco use, Palau has an extremely high portion of tobacco use (70.2%), and also indicates that betel nut chewing accounts for the high proportion because almost all young chewers would add tobacco to the betel nuts. These findings are consistent with the results of the current research that our tobacco survey confirmed an alarmingly high
tobacco use rate among young adults (70.59%) in both male (76.56%) and female groups (60.52%). The most frequent method for consuming tobacco in Palau young adults is chewing betel nuts with tobacco (60.78%), followed by smoking cigarettes (48.04%) and chewing tobacco (39.22%). The higher tobacco prevalence of this study, compare to the “Stepwise survey” as 60% by researcher Chiang and Palau government in 2015, might be biased due to that almost half of the subjects are from FSM (much higher FSM proportion than Palau demographic characteristics shown in Table 1) who were revealed higher tobacco use frequency and dependency based on the results. In addition, the high use of betel nut with tobacco might be due to the long-standing use of betel nut chewing in the culture of Palau. One study focused on the prehistoric chewing of betel nut in western Micronesia (Fitzpatrick, Nelson et al. 2003) indicates that the production of betel quids has been archaeologically documented in western Micronesia dating back to at least 3000 years B.P. and betel nut may have been used over a thousand years earlier or more in Palau. One book written by Mac Marshall states that the first case of tobacco in Palau could date back to 1710, and local people started to grow tobacco around 1833 (Marshall, 2013). Several participants expressed during the exit-interviews that chewing betel nut is their “custom” and “culture”, and they feel this belief could justify their tobacco use behavior. While, only Palau and Yap are islands where betel nut chewing is part of the culture. More studies are needed to further
investigate the underlying reasons for high rate of chewing betel nuts with tobacco among islands, including Chuuk, Pohnpei, Kosrae, and the Marshals that do not have a tradition of betel chewing.

Some studies (Quinn Griffin, Mott et al. 2014, Watson, Chiang et al. 2015) shows that woman in Palau have a higher betel nut chewing rate than men. While this pattern is not observed in the current study, a high rate of chewing betel nut and tobacco still exist in female group that 50% (19/38) of female participants reported they chew betel nuts with tobacco, of which the high tobacco use situation among women is rarely seen in other countries. One WHO report (Organization 2012) focused on the women tobacco use in Cambodia, the only one country in Western Pacific Region that shows women have a higher use rate of chewing betel nut and tobacco than man, summarized that “addiction”, “the female rite to adulthood” and “a remedy to relief pregnancy-related symptoms” might be the reasons for the high use prevalence among women. Nonetheless, the reasons for the high tobacco use among Palau women are still not clear, more studies are encouraged to investigate the underlying reasons for this phenomenon.

Subgroup comparison related to tobacco use behavior suggest clear differences between males and females as well as between ethnic groups. Male young adults reveal a higher tobacco use rate in all types than female (85.39% VS 68.42%, p<0.05). Also, male participants are more likely to use multiple ways to consume tobacco. Results show that
the percentage of males who use more than two tobacco methods (81.63% VS 52.17%, P<0.05) and three (61.22% VS 30.43%, P<0.05) are both higher than among females. As for the comparison between ethnic groups, bigger difference was shown between people from Micronesia region (FSM and Marshall Islands) and Palau. Higher proportion of Micronesia participants who use tobacco was reported, and these Micronesians have higher percentage who use more than two and three tobacco methods than Palau people. Nicotine dependence levels are consistent with tobacco use in each subgroup. With the high use rate and multiple-way consumption pattern, both male group (low to moderate) and the group from other Micronesian islands (moderate) present higher nicotine dependence level than female group (low) and Palauan group (low) based on the FTND test. Given that the Palau and Micronesia region (Marshall Islands and FSM) are at the same middle-income level, and these counties and regions share similar culture and history, more research to provide insights about the difference revealed in the current study are needed. The local government could also take advantage of these difference to design new intervention or education programs tailored to the needs of different genders and groups from other Micronesian islands to better address the tobacco issue in Palau.

The social environment where tobacco is used plays a crucial role in affecting people’s tobacco use behavior. Findings from our research revealed that friends become
the primary source of tobacco introduction and initiation. In both male and female groups, most people reported that “friends” first introduced tobacco to them. A supportive attitude toward subject’s tobacco use was also clearly found in two thirds of the participants in the current study, which echoes what people mentioned during the exit-interview that “seeing other people chewing or smoking makes me want to use tobacco”. Family attitudes, on the other hand, reveal great support in helping subjects refrain from tobacco use. Compared with the attitudes from friends, family members opposed tobacco use at much higher level. It is also interesting to note that grandparents and parents show stronger discouraging attitudes than siblings and other family members. This perhaps implies the connection between the degree of caring attitude and the degree of the blood relationship of a family member. In addition, there was a strong association between tobacco use and the number of tobacco users of individuals in the family. In other words, participants in the study who reported not using tobacco came from families with less tobacco users (p<0.001). We also found that family attitudes affect the effort that the subject put to quit tobacco. Young adults whose family members discouraged tobacco use had a longer “no tobacco time” after cessation. This finding could benefit from further research into the importance of family members’ attitudes and tobacco consumption in Palau.
More than half of the participants expressed the hope to quit tobacco, of which most people wish to quit within one month. The reasons for quitting tobacco are primarily the health concern of themselves, followed by financial burden of tobacco. While people have the intention to quit, nearly half of the participants mentioned during the exit-interviews that they wish to quit or cut down the amount of tobacco when they leave Palau for school or other reasons. This expression offers insights of the importance of environment that “being in Palau” seems have an impact on people’s tobacco use behavior, and subjects sometimes refer to the environment change to help them quit tobacco. In terms of the resources to help tobacco cessation, only a small number of young adults have ever applied cessation programs, counseling and NRT method to help them quit. Though the most frequent method people reported to reduce tobacco consumption was “exercise”, the number who reported using regularly was small (n=27).

Raw, Regan and others who researched tobacco use in Palau in 2009 reported that Palau still has limited resources for public to use for tobacco cessation. For instance, Palau has officially identified person in government who manages treatment services. NRT treatment is available in this country as well. According to the report from WHO 2017 on the global tobacco epidemic, the treatments for tobacco dependence including NRT, Bupropion, and Varenicline are partially covered by national health insurance (WHO, 2017). While, resources and regulations including official policy of tobacco,
clinical guidelines, national quit line or national treatment system have not been implemented in Palau (Raw, Regan et al. 2009). This is consistent with findings in the current study and more resources and intervention approaches are needed to help address tobacco issue in Palau.

The journaling behavior change paradigm introduced in our research revealed great potential in changing people’s perception on tobacco use. Positive feedback about the activity itself and the acknowledgement of the impact from journaling were received during the exit-interviews. More than half subjects reported a better understanding of tobacco were achieved after journaling. As for the journaling lasting time, the period of two-week seems relatively short in changing one’s behavior. On the other hand, most people may not accept a longer period as they indicated during the interviews. This conflict may be the focus of future studies that wish to apply and revise journaling method to conduct tobacco intervention in Palau.

This pilot study calculated prevalence of tobacco use of the total 102 subjects. No calculation for incidence (new cases) were used in this study. When conducted the tobacco survey and its related data analysis, all subjects including non-users, ever users, and current users finished the demographic part of the tobacco survey (Part A and B in Appendix D). Only current users answered the tobacco use behavior part (Part C in
Appendix D) while both current users and ever users answered the tobacco cessation part (Part D in appendix D).

Palau is a matriarchal society and the difference of social status between males and females might affect some aspects of the current study. Because the primary researcher of this study Anli Sun is a male, the team indeed encountered some barriers due to this characteristic. When reaching potential participants in the field for survey and journaling, the response rate from young adults were perceived lower when the team had only male research assistants. Also, when applying the local IRB, the delay of approval might also be partially due to the gender hierarchy since both of Duke Kunshan students are male. No apparent difference was found in the quantitative survey results due to the matriarchal characteristic. Future intervention programs developed by MOH Palau may use more female educators, female influencers and female members in a family to possibly lead the behavior change.

This research is the first one that included a combination of surveys and tobacco intervention method, journaling, among young adults in Palau. Using the innovative journaling activity, the current study offers a low cost but high benefit intervention method for cessation programs not just in Palau but in other places as well. Also, this study targeted young adult who are often omitted from other programs. It fills a gap in tobacco use data as well as raises the awareness of the significance of tobacco cessation.
among young adults. The methods of this study also included the application of the Fagerstrom test for nicotine dependence level in Palau, quantifying the nicotine dependence situations of young adults which could be archived as baseline data for future use. The local research assistants effectively increased tobacco survey’s response rate and helped get a good amount of data in limited time.

There are limitations in the current study and its conclusions. The team encountered an unexpected delay in the local IRB evaluating process due to the new formation of local IRB office. Secondly, the research was completed in the summer when many people were on vacation. It was difficult to get the participation of enough young adults as many were visiting families in Taiwan, USA or Japan, or living far away from the Koror state. The research team used all the local connections and took advantage of activities during the summer in Koror such as the “Bible Learning group”, “movie night”, “summer tournament of sports”, “behavioral health outreach”, and Friday night markets for reaching potential participants. Small population of the people living in Palau became another ethical challenge that it made the protection of privacy of subjects difficult.

Another important limitation was due to the loss of subjects who volunteered to participate in the journaling component of the research after taking the survey. Potential reasons for the high drop-out rate include that 1) some participants forgot to conduct the
journals, 2)some left Palau for school by the end of summer vacation when was just the
timing we did the data collection and intervention, and 3)the transportation barriers
resulted that some participants were hard to reach again after recruiting them for the
journaling activity. Future research might consider selecting a suitable timing other than
summer vacation, implementing a more interactive process with participants, and take
into the transportation condition into consideration to increase their adherence when
conducting the intervention.

Convenience sampling was necessary in this study, but that method could also
have introduced bias in the representativeness of data of the tobacco survey. Snowball
sampling was unexpected when subjects introduced this study to their friends and took
them to the participate in as well, which also had impact on the representativeness and
privacy protection. One inevitable issue related to the interviews could be the problem
related to participants providing “social desired answers”. Participants have been
shown in other research to give “good” answers of their desire to change tobacco use in
order to gain a better “evaluation” from researchers (Gordon 1987, Holbrook, Green et
al. 2003). Finally, the surveys and journals are all self-reported, thus might introduce
some bias in the quality of the data.

This research shows the importance of working closely with collaborators in
countries and communities who have interest in tobacco use and cessation as well as
other global health challenges. The success of this project was due to the enthusiasm
and help of the Prevention Office of the Ministry of Health of Palau as well as the
cooperation of the young adults in Palau who are at an age where tobacco
experimentation and initiation have long-term consequences. This research also
illustrates how surveys and other data-gathering methods can be combined with
innovative cessation initiatives such as journaling in order to not only understand
tobacco use but to begin to lower use among young adults.
5. Conclusion

In conclusion, this study has provided tobacco use data among young adults from 18 to 24 years old in Palau. A high prevalence of tobacco use in all forms was revealed in this study and chew betel nuts with tobacco is the most popular way of using tobacco locally. Friend and family members’ attitudes play important roles in affecting people’s tobacco use. Additionally, journaling behavior change paradigm appears to be a potential method for tobacco cessation by changing perception of tobacco use. Based on the results and patterns shown in this study, the Palauan government and the Ministry of Health need to increase more tobacco cessation resources, and perhaps combine some innovative interventions such as journaling to help address the tobacco issue among young adults.
Appendix A

Exit Interview Questions

**Opening questions:**

1. You understand this interview is being recorded?

2. What did you think of the journaling activity?

3. In the tobacco use and cessation survey, I asked you to complete a survey about the thought you use tobacco. How do you think your answer matched with your journal?

4. I asked you to record how much money you spent on tobacco. What did you think of the number?

5. I asked you to record what motivated you to use tobacco in each instance. Could you tell me a bit about the situations that motivated you to get a cigarette or chew betel nuts mixing with tobacco?

6. I asked you to record every time you went about getting more tobacco. How often did you incorporate purchasing tobacco with other things, and how often did go solely to purchase more tobacco?

**Intermediate questions:**

7. Has the journal activity had any effect on how you view your tobacco using?

8. Has anything changed since the start of this study?
9. Do you anticipate making any changes to your tobacco using habits in the near future?

Ending Questions:

10. After having these experiences, what advice would you give to someone who has just begun to use tobacco?

11. Is there something else you think I should know to understand better?

12. Is there anything you would like to ask me?
Appendix B

Semi-structured daily survey: day____

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How much tobacco did you consume today (please answer each one that applies):</td>
<td></td>
</tr>
<tr>
<td>How many cigarettes did you smoke today? (1 pack = 20 cigarettes)</td>
<td>_____cigarettes, or _____pinches (loose tobacco)</td>
</tr>
<tr>
<td>How many betel nuts did you chew today?</td>
<td>_____betel nuts</td>
</tr>
<tr>
<td>How many cigarettes did you chew with betel nut today?</td>
<td>_____cigarettes</td>
</tr>
<tr>
<td>How many times did you chew tobacco today? (E.g. Redman, not including chewing betel nut)</td>
<td>_____times,</td>
</tr>
</tbody>
</table>
How many other types of tobacco did you use today?

(Please specify the type and amount)

<table>
<thead>
<tr>
<th>Type</th>
<th>Amount</th>
<th>Brand</th>
</tr>
</thead>
</table>

2. How much time did you spend on acquiring and using tobacco?

(Tobacco use time include fix, prepare, chew, smoke and all tobacco use time)

________ hours _______ minutes for acquiring tobacco (time on the road for purchasing)

________ hours _______ minutes for using tobacco (fix, prepare, chew, smoke and all tobacco use)
3. How much money did you spend on acquiring (see below for definition) and purchasing tobacco?

<table>
<thead>
<tr>
<th>(Tobacco acquiring costs are what you specifically spend on the process of getting tobacco. This may include transportation costs(taxi), gasoline fee, and other costs associated with driving while getting tobacco)</th>
<th>________ USD$ in total for tobacco acquiring.</th>
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</thead>
<tbody>
<tr>
<td>E.g.: Etpison Museum to Palau Community College = 1.1Km = 0.7mile</td>
<td>________ USD$ in total for purchasing tobacco.</td>
</tr>
<tr>
<td>Etpison Museum to Rock Island Café = 1.7km = 1.1mile</td>
<td></td>
</tr>
<tr>
<td>Gasoline fee = 20 cents$/mile ; 13 cents$/km,</td>
<td></td>
</tr>
</tbody>
</table>
4. Why did you use tobacco today? What activates your tobacco use?

(trigger, initiator or event)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

5. Anything you wish to share with us?

(Concerns, events, suggestions, advices, stories, questions, etc.)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix C

Tobacco Diary Research Consent Form

Why are we doing this study?
You have been selected to participate in this survey because you are a young adult living in Palau. The objectives of this study are 1) to describe the situations of tobacco use and efforts at reduction or cessation; 2) to investigate the effects of a method as daily journaling on influencing perceptions of tobacco use among young adults in Palau. Your contribution is valuable and important to us for informing future prevention efforts.

Who sees the information that I provide?
Primary investigator (PI) is in charge of the responsibility of protection of your confidentiality. Your name and contact information will only be used when PI will contact you to follow up the journaling activity, thus maximizing the protection of your privacy.

What’s involved in this study?
This study will last a period of 2 weeks, and overall there will be two parts. For the first part, it is a survey. For the second part, it is a two-week daily journaling with an exit interview.

Who is in the study?
By participating in the first part, your age should be between 18 to 24 years old (born after July 31st, 1992 and before June 1st, 1999). As for the second part, you should be not only between 18 to 24, but also are currently using tobacco.

Do I have to participate?
Your participation is voluntary and you will receive gifts for your participation.
You are free to quit at any time point during the activities. Gifts for survey and journaling will be offered.

You may contact any of the following:

Anli Sun (PI),
(Advisor),
MSc-Global Health/ Duke Kunshan University
Researcher, intern/ The Prevention Unit
Duke Kunshan University
anli.sun@duke.edu
allan.burns@dukekunshan.edu.cn
M: +680 778 6260
M: (+01) 352 870 1028

Must Read:
All research with human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, you may contact the committee, anonymously if you wish, at dku-irb@dukekunshan.edu.cn

Certificate of Consent
I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked, have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant__________________

Signature of Participant ___________________

Date ___________________________
Day/month/year
Appendix D

Tobacco Use and Cessation Survey

Part A: In the first few questions, I would like to ask background information.

1. Gender:
   _____1) Male       _____2) Female

2. Years of age: ____

3. Marital status
   _____1) Married       _____2) Single       _____3) Other

4. In which group do you mostly place yourself?
   _____1) Palauan       _____2) Filipino       _____3) Chinese       _____4) Korean
   _____5) White       __________________________6) Other ethnicities
5. What is the last grade/ level completed?

_____1) Less than Elementary school (less than 1st grade)

_____2) Elementary school (1st to 8th grade)

_____3) High school graduate or GED (9th – 12th grade)

_____4) Some college, associate degree

_____5) Bachelor’s degree

_____6) Advanced College Degree (e.g., Masters, Doctorates)

6. How many members are in your family including yourself?

__________________

(Family members only include grandparents, parents, siblings, husband/wife and children)

7. How many siblings do you have including yourself?

__________________

8. How many of your family members are currently using tobacco? (i.e. smoking, chewing betel nut with tobacco, chewing tobacco, dip, or other types)

Please answer to the best of your knowledge.

__________________
Part B: In this part, I would like to ask your tobacco use history.

9. Have you ever used any type of tobacco? (smoking, chewing betel nut with tobacco, chewing tobacco, dip, and other types)

   _____1) Yes, I have used tobacco at least once in the past (if yes, please skip to Q11)

   _____2) No, I have never used tobacco in the past.

10. Please explain the reasons you do not use tobacco. (Please stop here, thank you)

11. Please list the main reasons you started using tobacco.

12. Approximately how long have you used tobacco? _______year(s) _______month(s)
13. Who first introduced tobacco to you?

_____1) Grandparents
_____2) Parents
_____3) Siblings

_____4) Other family relatives (blood relationship)
_____5) Friends (classmates, co-workers)

_____6) Others (please specify) (if choose 1-6, please continue to Q14)

_____7) No one introduced tobacco to me (if choose 7, please skip Q14 then continue to Q15)

14. Please choose number ① or ② or ③ or ④ below into each blank a, b, ..., f (if applies), describing your family members’ attitudes toward your tobacco use behavior.

①: They **strongly encourage** me to use tobacco;

②: They **somewhat encourage** me to use tobacco;

③: They **somewhat discourage** me to use tobacco;

④: They **strongly discourage** me to use tobacco;
Part C: In this part, I would like to ask your current tobacco use behavior.

15. Please check “Yes” or “No” on each one from 1 to 6

1) I have **smoked** at least once in the past six months.
   
   _____ Yes   _____ No   (If you check “Yes”, please finish Q15.1; If “No”, skip to next)

   15.1 How many cigarettes or pinches do you **smoke a day**?

   _____ cigarettes a day, _____ pinches a day (loose tobacco)

2) I have **chewed betel nut with tobacco** at least once in the past six months.

   _____ Yes   _____ No   (If you check “Yes”, please finish Q15.2; If “No”, skip to next)
15.2 How many cigarettes do you use with betel nut when chewing a day?

_____ cigarettes a day

3) I have **chewed tobacco** at least once in the past six months.

_____Yes  _____No  (If you check “Yes”, please finish Q15.3; If “No”, skip to next)

15.3 How many times do you chew tobacco (e.g. Redman) a day?

_____ times a day

4) I have used **dip** tobacco at least once in the past six months.

_____Yes  _____No  (If you check “Yes”, please finish Q15.4; If “No”, skip to next)

15.4 How many times a day do you dip?

_____ times a day

5) I have used **other types** of tobacco at least once in the past six months.

_____Yes  _____No  (If you check “Yes”, please finish Q15.5; If “No”, skip to next)

15.5 What other types of tobacco do you use? __________________
How much do you use a day? ___________ a day

6) No, I do not use tobacco in the past six months. (If no, please skip Q22 in Part D)

16. What is the most common way you use tobacco? (Check ONE)

_____ 1) smoking: cigarettes and loose tobacco

_____ 2) chewing betel nut with tobacco

_____ 3) chewing tobacco: e.g. Local tobacco

_____ 4) use dip tobacco

_____ 5) other types __________

17. How soon after you wake up do you use tobacco?

_____ 1) Within 5 minutes  _____ 2) After 6 minutes to 30 minutes

_____ 3) After 31 minutes to 60 minutes  _____ 4) After 61 minutes

18. Do you find it difficult to not use tobacco in places where it is forbidden? E.g. school, church, library, airport, etc.

_____ 1) Yes  _____ 2) No
19. Which time of tobacco use would you hate to give up?

_____ 1) The first in the morning  _____ 2) Any other time during the day

20. Do you use tobacco more in the morning?

_____ 1) Yes       _____ 2) No

21. Do you use tobacco even if you are sick in bed most of the day?

_____ 1) Yes       _____ 2) No

Part D: In this part, I would like to ask your tobacco cessation history.

22. Goals Related to Your Tobacco Use (please check one that applies)

_____ 1) I have quit within the past 6 months

_____ 2) I am planning to quit in the next month

_____ 3) I am planning to quit in the next 6 months

_____ 4) I am not planning to quit but would like to cut back

_____ 5) I am not planning to quit
23. Which type of tobacco prevention messages do you feel are most helpful to you.

_____1) Positive messages that encourage you to stop tobacco use
_____2) Messages that warn about the dangers of tobacco use
_____3) Fact sheets or posters about tobacco use

24. How many times have you tried to quit using tobacco in the past?

_______times

(If 0 times, please skip to Q28)

25. How many times have you tried to quit using tobacco in the past 6 months? _______times

26. What is the longest time you have gone without using tobacco?

_______year(s) _____month(s) _____day(s)

27. If you have tried to quit tobacco in the past, what kind of methods have you tried?
(Please check √ each one from answer 1 to 6 that you have used; otherwise, please leave that question empty)

1) Cessation Programs (i.e. A short period of learning process, engaging people who wish to quit tobacco. People will study knowledge about tobacco cessation, hold discussions and participate various activities, helping themselves to quit using tobacco.)

Was it helpful? 1) Yes 2) No

2) Cessation Counseling (i.e. Doctors)

Was it helpful? 1) Yes 2) No

3) Nicotine Replacement therapy (Gum, Patch, Nasal Spray)

Was it helpful? 1) Yes 2) No

4) Exercise

Was it helpful? 1) Yes 2) No

5) Willpower (“Cold Turkey“)

Was it helpful? 1) Yes 2) No

6) Other (please describe): ____________

Was it helpful? 1) Yes 2) No
28. What would be the main motivation if you decide to quit using tobacco?

(Check One)

_____ 1) Money

_____ 2) Your own health

_____ 3) Family (family attitudes and pressure, health of other family members)

_____ 4) Work environment requirements, regulations and policies

_____ 5) Social acceptability

_____ 6) Other (please describe) ________________________________

Thank you!
Appendix E

Oral consent script for survey part

Hello, I am a researcher from Duke Kunshan University China, and my name is Anli Sun. I am studying Global Health for my Master’s Degree and the Ministry of Health here on Palau has invited me and William Pu to help with their study of tobacco use in Palau. Our research team is conducting a study here focusing on tobacco use and cessation among young adults in Palau. The purpose of this study is mainly to describe the situations of tobacco use and efforts at reduction or cessation among young adults in Palau, and to investigate the effects of a method as daily journaling on influencing perceptions of tobacco using among young adults in Palau.

We would very much like to invite you to join our research, and complete a two-page survey sheet. The survey may take you 5 minutes. You are free to share information about your own experiences. The benefit of taking this survey is to a better understanding of your tobacco using profile, while the potential risk is almost none because the survey part is anonymous and we will not obtain your names and contact information. In order to protect your data confidentiality, you will fill in the survey sheet in a classroom without interruption by others, and we will collect your survey sheet, lock it into a box that I would bring with me all the time. An encrypt PC and Duke Box server will be used to enter your data and uploaded with protection by
a unique account. Only our research team will have access to it and your data will not be shared or used for other reasons.

There will be a second part of our study, which is the two-week journaling, and you will find more information after your completion for this survey. Either participating in survey part or both parts will contribute to our study greatly.

Also, a small present from China will be given to you as our appreciation for your participation before answering the survey sheet and you are free to quit at any time point during the activities with the gift. If you are willing to answer our survey sheet, retuning the questionnaire will be considered as offering your inform consent to our research team. Please feel assured that the information of this survey will be kept confidential.

If you have any question about the research, please feel free to contact Anli Sun, the primary investigator of the study.

All research with human volunteers is reviewed by two committees that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, you may contact the Bureau of Arts and Culture at 488-2489, and also the Duke Kunshan University IRB committee, anonymously if you wish, at dku-irb@dukekunshan.edu.cn. (a small card will be given with this information).
# Appendix F

## Fagerstrom Test for Nicotine Dependence

<table>
<thead>
<tr>
<th><strong>Question</strong></th>
<th><strong>Options</strong></th>
<th><strong>Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>How soon after waking do you smoke your first cigarette?</td>
<td>Within 5 minutes: 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-30 minutes: 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-60 minutes: 1</td>
<td></td>
</tr>
<tr>
<td>Do you find it difficult to refrain from smoking in places where it is forbidden? e.g. Church, Library, etc.</td>
<td>Yes: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No: 0</td>
<td></td>
</tr>
<tr>
<td>Which cigarette would you hate to give up?</td>
<td>The first in the morning: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any other: 0</td>
<td></td>
</tr>
<tr>
<td>How many cigarettes a day do you smoke?</td>
<td>10 or less: 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 – 20: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 – 30: 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31 or more: 3</td>
<td></td>
</tr>
<tr>
<td>Do you smoke more frequently in the morning?</td>
<td>Yes: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No: 0</td>
<td></td>
</tr>
<tr>
<td>Do you smoke even if you are sick in bed most of the day?</td>
<td>Yes: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No: 0</td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Low dependence</td>
</tr>
<tr>
<td>3-4</td>
<td>Low to Moderate dependence</td>
</tr>
<tr>
<td>5-7</td>
<td>Moderate dependence</td>
</tr>
<tr>
<td>8+</td>
<td>High dependence</td>
</tr>
</tbody>
</table>
References


Marshall, M., (2013) *Drinking smoke: The tobacco syndemic in Oceania. Hawai‘i: University of Hawai‘i Press*