Developing and Implementing Context-Specific Quantity Frequency (CSQF) for Assessing Drinking Patterns and Alcohol Consumption in a General Population

Polathep Vichitkunakorn

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Epidemiology (International Program)

Prince of Songkla University

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Major Program   Epidemiology (International Program)

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This is to certify that the work here submitted is the result of the candidate's own investigations. Due acknowledgement has been made of any assistance received.

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I hereby certify that this work has not been accepted in substance for any degree, and is not being currently submitted in candidature for any degree.

…………………..…….…....Signature

(Mr. Polathep Vichitkunakorn)

Candidate

ชื่อวิทยานิพนธ์	การพัฒนาและการใช้งานแบบสอบถามสำรวจพฤติกรรมและปริมาณการบริโภคเครื่องดื่มแอลกอฮอล์โดยใช้เทคนิคการเกริ่นนำบริบทในประชากรไทย
ผู้เขียน	นายพลเทพ วิจิตรคุณากร
สาขาวิชา	ระบาดวิทยา (นานาชาติ)
ปีการศึกษา	2561

บทคัดย่อ

วัตถุประสงค์:

เพื่อพัฒนาแบบสอบถามสำรวจพฤติกรรมและปริมาณการบริโภคเครื่องดื่มแอลกอฮอล์โดยใช้เทคนิคการเกริ่นนำบริบท ในกลุ่มตัวอย่างภาคใต้ของประเทศไทย

ระเบียบวิธีวิจัย:

รูปแบบวิจัยแบบผสมผสาน ซึ่งประกอบด้วยการศึกษาเชิงคุณภาพโดยการสัมภาษณ์เชิงลึกและการศึกษาเชิงปริมาณโดยการสำรวจในกลุ่มตัวอย่างอายุตั้งแต่ 15 ปีขึ้นไปในจังหวัดสงขลา ประเทศไทย การศึกษานี้แบ่งได้เป็นสองส่วนหลัก ได้แก่ แบบสอบถาม context-specific quantity frequency หรือ CSQF ได้ถูกพัฒนาจากการทบทวนวรรณกรรม ผลการศึกษาสัมภาษณ์เชิงลึกและคำแนะนำจากนักวิชาการผู้ทรงคุณวุฒิ (ส่วนที่หนึ่ง) จากนั้นแบบสอบถาม CSQF จะถูกทดสอบความถูกต้องโดยการเปรียบเทียบกับแบบสอบถาม beverage-specific quantity frequency หรือ BSQF ที่ใช้กันอย่างแพร่หลายในประเทศไทย โดยใช้กรอบระยะเวลาสามเดือนเท่ากัน และแบบสอบถามจะถูกสลับลำดับในกลุ่มตัวอย่างเพื่อลดความลำเอียง และท้ายสุดจะเป็นการประยุกต์ใช้งาน (ส่วนที่สอง)

ผลการศึกษา:

ประชากรที่บริโภคเครื่องดื่มแอลกอฮอล์จำนวน 15 คนได้ถูกสัมภาษณ์เชิงลึก พบว่า รูปแบบพฤติกรรมการบริโภคที่น่าสนใจมีทั้งหมดสี่รูปแบบ ได้แก่ การบริโภคเป็นกลุ่ม โดยจะมีนักดื่มหนึ่งคนที่ทราบถึงขีดจำกัดการบริโภคของตน การบริโภคเป็นเทศกาล และการบริโภคกับการขับขี่ยานพาหนะ จากนั้นผู้วิจัยได้นำผลการศึกษาจากการสัมภาษณ์เชิงลึกและคำแนะนำจากนักวิชาการผู้ทรงคุณวุฒิจำนวนสี่คนจากสี่ภูมิภาคของประเทศไทยมาพัฒนาข้อคำถามในแบบสอบถาม CSQF สุดท้ายแล้วแบบสอบถาม CSQF ประกอบไปด้วยการเกริ่นนำบริบท ได้แก่ รูปแบบสถานการณ์ สถานที่ ผู้ร่วมบริโภคและชนิดเครื่องดื่ม จากนั้นจึงถามปริมาณและความถี่ในการบริโภคในแต่ละบริบท โดยแบบสอบถาม CSQF จะอนุญาตให้รายงานเหตุการณ์ในการบริโภคเครื่องดื่มแอลกอฮอล์ได้สูงสุด 15 เหตุการณ์ในช่วงสามเดือนที่ผ่านมา

กลุ่มตัวอย่างทั้งหมด 804 คน มีกลุ่มตัวอย่างที่บริโภคเครื่องดื่มแอลกอฮอล์ในสามเดือนที่ผ่านมาจำนวน 183 คน ซึ่งนักดื่มดังกล่าวได้ตอบแบบสอบถามทั้ง CSQF และ BSQF เพื่อทดสอบความถูกต้องของ CSQF เปรียบเทียบกับ BSQF ผลการศึกษา พบว่า กลุ่มตัวอย่างนักดื่มประมาณร้อยละ 50 รายงานปริมาณการบริโภครวมในแต่ละบุคคลจากแบบสอบถาม CSQF สูงกว่าจากแบบสอบถาม BSQF โดยสาเหตุมาจากการรายงานปริมาณการบริโภคต่อวันที่สูงกว่า แต่อย่างไรก็ตามไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติสำหรับตัวชี้วัดอื่น ๆ รวมถึงระยะเวลาและภาระในการตอบแบบสอบถาม

เหตุการณ์การบริโภคจำนวน 412 คนจากนักดื่ม 183 คนนั้น เป็นการบริโภคแบบปริมาณระดับสูงจำนวน 118 เหตุการณ์ ระดับปานกลางจำนวน 79 เหตุการณ์และระดับต่ำจำนวน 215 เหตุการณ์ ประมาณร้อยละ 50 ของเหตุการณ์ทั้งหมดเกิดขึ้นในช่วงสถานการณ์พิเศษ เช่น

วันหยุด สังสรรค์หรือช่วงประเพณีต่าง ๆ เป็นต้น และประมาณร้อยละ 50 ของเหตุการณ์ทั้งหมดเกิดขึ้นนอกบ้านของผู้ดื่ม และมักจะบริโภคกับเพื่อน ผลจากการศึกษาวิเคราะห์พหุระดับ พบว่าระดับการศึกษาที่สูงขึ้นสัมพันธ์กับปริมาณแอลกอฮอล์ที่บริโภคต่อวันประมาณ 4.74 เท่าสำหรับระดับปานกลางและ 5.23 เท่าสำหรับระดับสูง สำหรับช่วงสถานการณ์พิเศษต่าง ๆ ก็สัมพันธ์กับปริมาณแอลกอฮอล์ที่บริโภคต่อครั้งประมาณ 2.46 เท่าสำหรับระดับปานกลางและ 2.78 เท่าสำหรับระดับสูง

การศึกษาย่อยโดยใช้รูปแบบ case-control สำหรับทดสอบสมมติฐานว่า การบริโภคเครื่องดื่มแอลกอฮอล์ในระดับต่ำสัมพันธ์กับคุณภาพชีวิตที่ลดลงเมื่อเปรียบเทียบกับผู้ที่ไม่ดื่มเลยหรือไม่ โดยสุ่มกลุ่มตัวอย่างที่มีระดับคุณภาพชีวิตในระดับปานกลางถึงต่ำ (คะแนน EQ-5D ≤0.8) จำนวน 108 คน และกลุ่มตัวอย่างที่มีระดับคุณภาพชีวิตในระดับสูง (คะแนน EQ-5D >0.8) จำนวน 443 คน พบว่า การบริโภคเครื่องดื่มแอลกอฮอล์ในระดับต่ำ (น้อยกว่า 7 หน่วยดื่มมาตรฐานต่อสัปดาห์) มีความสัมพันธ์กับระดับคุณภาพชีวิตในระดับปานกลางถึงต่ำประมาณ 3.16 เท่า แต่ไม่พบว่าการบริโภคในระดับที่สูงกว่านี้หรือการหยุดบริโภคจะส่งผลกับคุณภาพชีวิต

สรุปผลการศึกษา:

การใช้เทคนิคการเกริ่นนำบริบทมีประโยชน์สำหรับแบบสอบถามสำรวจพฤติกรรมและปริมาณการบริโภคเครื่องดื่มแอลกอฮอล์ โดยการทราบถึงสถานการณ์ สถานที่ ผู้ร่วมบริโภค ชนิดเครื่องดื่ม รวมถึงการแบ่งเครื่องดื่มในกลุ่มนักดื่มจะให้ข้อมูลที่สำคัญทั้งในทางการแพทย์และสาธารณสุข โดยทำให้เข้าใจพฤติกรรมได้ดียิ่งขึ้น แต่อย่างไรก็ตามแบบสอบถาม CSQF ควรมีการพัฒนาต่อไปอีกในอนาคต

Thesis Title   Developing and Implementing Context-Specific Quantity Frequency (CSQF) for Assessing Drinking Patterns and Alcohol Consumption in a General Population

Author   Mr. Polathep Vichitkunakorn

Major Program   Epidemiology (International Program)

Academic Year   2018

ABSTRACT

Objective:

This thesis aimed to develop a questionnaire with a contextual approach to accurately measure alcohol drinking patterns and alcohol consumption in a community of southern Thailand

Methods:

This was a mixed-method study that consisted of both qualitative with in-depth interview techniques and quantitative approaches using a community-based cross-sectional survey conducted among adults aged ≥15 years in Songkhla Province, Thailand. There were two parts in this study. The context-specific quantity frequency (CSQF) instrument was developed from a literature review and the results of in-depth interviews and expert comments (part 1). The CSQF was then validated by the traditional beverage-specific quantity frequency (BSQF) instrument using the same 3-month retrospective time frame and applied in a random order with each participant. The implications of the CSQF were then examined (part 2).

Results:

In the qualitative approach, 15 current drinkers were interviewed. There were four themes of Thai drinking behavior: (i) group drinking with at least one friend who is a buddy drinker who knows the drinker's limits; (ii) social and cultural drinking; (iii) seasonal drinking; and (iv) drinking and driving. Regarding seasonal drinking and the culture of drinking in a group, a CSQF questionnaire using probing questions on drinking context was developed and experts from the four main regions of Thailand revised the CSQF. The final version of the CSQF questionnaire elicited information on location, partner or partners, beverage, quantity, and frequency for five common drinking situations. The CSQF questionnaire allowed for a description of 15 types of 'drinking events'. Each drinking event was a unique combination of one specified drinking situation, location, drinking partner(s), beverage, and volume consumed.

For convergent validity testing, 183 current drinkers in the last three months were identified from a total of 804 participants. At the individual level, total alcohol consumption of almost all types of beverage according to the CSQF questionnaire was higher than based on the BSQF questionnaire in approximately 50% of current drinkers and was mainly due to the higher report of average quantity. At the sample level, there were no significant differences in the average daily intake, 3-month intake per drinker or per capita consumption between the instruments. The interview duration and burden of answering the questions by the participants for the CSQF were not significantly higher than for the BSQF.

This thesis revealed two implications of the use of the prototype CSQF questionnaire. First, the drinking context associated with different drinking intensities using the CSQF instrument can be described. There were 412 drinking events (215 low-, 79 medium-, and 118 high-intensity) from the 183 current drinkers. More than half of these events occurred in special situations (i.e., holiday, party, and cultural drinking). About half of the drinking events occurred outside the drinker's house, usually in the homes of other people, and most drinking events occurred among friends. The multilevel analysis showed that higher drinking intensity was associated with a higher level of education (adjusted odds ratio [aOR] 4.74 for medium- and aOR 5.23 for high-intensity) and with a special drinking situation (aOR 2.46 for medium- and aOR 2.78 for high-intensity). Non-beer beverages (aOR 7.27) were associated with medium risk of acute harm.

Second, the hypothesis that drinking alcohol even at a low level is associated with low-to-moderate health-related quality of life (HRQoL) was tested and compared to abstainers. A case-control study was conducted as part of the large survey. The adult participants ($\geq$15 years) with low-to-moderate HRQoL scores (EuroQol [EQ-5D] index $\leq$0.8, n = 108) were assigned to be the case group and those with high HRQoL (EQ-5D index >0.8, n = 443) were the control group. Compared with lifetime abstention, light drinking (0.1-7 drinks/week) was significantly associated with low-moderate HRQoL (odds ratio (OR) = 3.16, 95% confidence interval (CI) 1.08-9.20); however, no significant associations were found for moderate to heavy drinking (OR = 3.55, 95% CI 0.49-25.49) or abstinence during the previous 12 months (OR = 0.86, 95% CI 0.45-1.63).

Conclusion:

The contextual approach appears to be appropriate for an alcohol survey. Comprehensive assessment of the drinking context (i.e., drinking situation, location, drinking partner(s), beverage, and sharing of beverages in a group) provides valuable information for clinical practice and for alcohol policies and helps to more clearly understand drinking behavior. However, the current version of the CSQF instrument needs to be explored further for reliability (e.g., inter-interviewer reliability, parallel-form test-retest reliability) and revised again to be more user-friendly.

Keywords: alcohol consumption, questionnaire, alcohol survey, contextual approach

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

Abbreviation	Term
aOR	adjusted odds ratio
APC	alcohol per capita consumption
BAC	Blood Alcohol Concentration
BSQF	beverage-specific quantity frequency
BSY	beverage-specific yesterday
CI	confidence interval
CSQF	context-specific quantity frequency
DALY	disability-adjusted life years
ED	emergency department
HED	heavy episodic drinking
EQ-5D-5L	5-level EQ-5D version
EQ-VAS	EQ-5D visual analogue scale version
GF	graduated frequency
HIPOP-OHP	High-risk and Population Strategy for Occupational Health Promotion Study
HRQoL	Health-related quality of life
IQR	interquartile range
L7D	last 7-day
NCD	non-communicable disease
QF	quantity frequency
RRR	relative risk ratio

Abbreviation	Term
SD	standard deviation
SDG	Sustainable Development Goals
TLFB	timeline followback
WHO	World Health Organization
YLD	year of living with disability
YLL	years of life lost

CHAPTER 1

INTRODUCTION

1.   Background

1.1   Global situation of alcohol use and burden of alcohol

Drinking alcohol is a causal factor in many injuries and disease conditions.[1, 2] The harmful use of alcohol ranked among the top five modifiable risk factors for morbidity and mortality throughout the world.[3] In 2016, about 5% of all global deaths were attributable to alcohol consumption. One hundred and thirty-three million disability-adjusted life years (DALYs), or 5.1% of the global burden of disease and injury, were attributable to alcohol consumption. The worldwide social and economic consequences for drinkers and society at large are due to the effects of alcohol.[4, 5] Alcohol consumption results in substantial societal costs through loss of productivity, healthcare expense, criminal activity, and violence.[6]

In all of the World Health Organization (WHO) regions, the average recorded alcohol per capita consumption (APC) was equal to 6.4 liters of pure alcohol consumed per person aged 15 years or older, which translates into 13.9 grams of pure alcohol per day in 2016. Around 57% of the population aged 15 years or older had not drunk alcohol in the previous 12 months. Females were more often lifetime abstainers than males. About 18% of drinkers aged 15 years or older engaged in heavy episodic drinking.[7]

The World Health Organization (WHO) reported high prevalences of 12-month abstainers in the countries of Africa (70%), Asia (86%), and in the Eastern Mediterranean region (95%) (Figure 1) and most drinkers consumed alcohol only occasionally. In contrast, most drinkers in other regions were regular drinkers.[7]
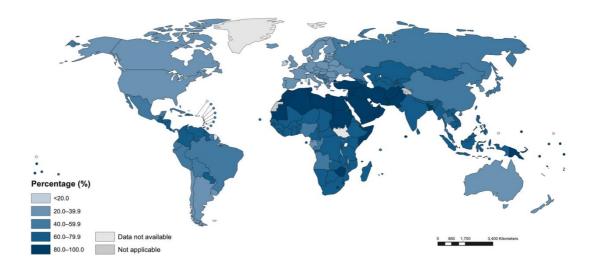
Figure 1 Prevalence of former drinker or past year abstention (≥15 years)[7]

1.2   Situation in Thailand on alcohol use and burden of alcohol

In Thailand, the average recorded annual APC in 2016 was 8.3 liters of pure alcohol per person aged 15 years or older with a ranking of 3rd in Asia followed by Laos (10.4 liters), and Republic of Korea (10.2 liters). The prevalence of alcohol use disorder in Thailand was 5.4% with a ranking of 3rd in Asia followed by the Republic of Korea (13.9%) and Mongolia (7.8%).[7] In 2017, the prevalence of current drinkers, who had drunk not less than one standard drink of alcohol during the past 12 months, was 28.4% and the regular drinkers, who drank at least one time per week, was 44.0% among the current drinkers.[8] Regarding the burden of diseases in Thailand, 10% of the total DALYs were attributed to alcohol and the trend is increasing. Alcohol is in the top

three of burden of disease risk factors for deaths in males, years of life lost (YLL), years of living with disability (YLD), and DALYs.[9]

1.3   Alcohol monitoring and surveillance

The alcohol survey provides epidemiological trends and use problems in a population and the individual levels. Understanding trends in alcohol use is vital to the effective development, implementation and evaluation of national and provincial strategies, policies, and programs.

In Thailand, a series of repeated surveys on health and welfare, the so called "Health and Welfare Surveys", were started in 1991 by the National Statistical Office of Thailand (NSO) (Table 1). In these surveys, there are some questions on tobacco and alcohol use. There have been eight waves of surveys (1991, 1996, 2001, 2003, 2006, 2009, 2013, and 2015) until now. In 2004, The Cigarette Smoking and Alcohol Drinking Survey was done independently from the Health and Welfare Survey. To date, five waves (2004, 2007, 2011, 2014, and 2017) have been conducted. Apart from these, a series of repeated surveys that integrated a health examination with the questionnaire interview have been done since 1991. The National Health Examination Survey is the largest national health surveillance. However, alcohol consumption questions have been integrated as a part of risk behaviors since 2003.

Questions related to alcohol consumption were asked initially in 2003. The alcohol consumption part is the main component in each survey (approximately 50% of alcohol section items). The beverage-specific quantity frequency (BSQF)

questionnaire was applied in all previous surveys except in The National Health Examination Survey in 2008 and 2013.

The National Health and Welfare survey 2015 found that most Thai drinkers were occasional drinkers (60% of all drinkers). Drinking is seasonal and also varies by days of the week. During the festive seasons (e.g., the New Year's and Songkran Water Festival holidays) there may be holiday periods of five to seven days when people celebrate and drink more. On the other hand, during the three-month Buddhist Lent, usually in July to October, many drinkers stop drinking for the entire period or drink less frequently. All of these variations need to be considered in the data collection on alcohol consumption.

Table 1 Review of alcohol consumption measurements in Thai national surveys

Year	Survey	Questions on alcohol consumption
1991	The Health and Welfare Survey	- Only frequency category
1996	The Health and Welfare Survey	- Only frequency category
2001	The Health and Welfare Survey	- Only frequency category
2003	The Health and Welfare Survey	- Frequency category - Top 3 most consumed beverages
2003	The National Health Examination Survey III	- Frequency category **- BSQF (all beverage types)**
2004	The Cigarette Smoking and Alcohol Drinking Survey	- Frequency category - Top 3 most consumed beverages
2006	The Health and Welfare Survey	- Frequency category - Top 3 most consumed beverages
2007	The Cigarette Smoking and Alcohol Drinking Survey	**- BSQF (top three common beverage types)** - Heavy episodic drinking
2008	The National Health Examination Survey IV	- Frequency category **- Tri-level**

Year	Survey	Questions on alcohol consumption
2009	The Health and Welfare Survey	- Frequency category
		- Most consumed beverage
2011	The Cigarette Smoking and Alcohol Drinking Survey	- Frequency category
		- BSQF (all beverage types)
2013	The Health and Welfare Survey	- Frequency category
		- Heavy episodic drinking
2013	The National Health Examination Survey V	- Frequency category
		- Quantity frequency (QF)
		- Last 7-day (L7D)
		- Beverage-specific yesterday (BSY)
2014	The Cigarette Smoking and Alcohol Drinking Survey	- Frequency category
		- BSQF (all beverage types)
2015	The Health and Welfare Survey	- Frequency category
		- BSQF (all beverage types)
		- Heavy episodic drinking
2017	The Cigarette Smoking and Alcohol Drinking Survey	- Frequency category
		- BSQF (top three common beverage types)

1.4   Study setting background

Songkhla Province is a province in Southern Thailand (Figure 2). Neighboring provinces are Nakhon Si Thammarat, Pattani, Phatthalung, Satun, and Yala. The area of Songkhla Province is 7,393.9 square kilometers and ranks 26th in area in Thailand. As of April 2016, Songkhla Province had a population of 1.41 million and ranks 11th in population in Thailand. Songkhla Province has 16 districts. Its largest districts are Hat Yai and Muang Songkhla. The predominant religions are Buddhism (64.7%) and Islam (32.0%).

According to the Provincial Alcohol Report 2017, the prevalences of current drinkers among people aged 15 and over and adolescent people aged 15 to 19 years old in Songkhla Province were only 13.2%, which ranked 73rd in Thailand, and 6.9%, which ranked 59th in Thailand, respectively. About half of the current drinkers were regular drinkers (51.7%) and drivers who would drink and drive (54.6%). Moreover, the prevalence of alcohol-related harm among the current drinkers was 67.6%, which ranked 21st in Thailand and ranked 3rd in southern Thailand).[8]

Hence, Songkhla Province was chosen purposively for the initial step of the pilot project because of the mixed urban-rural community, high proportion of risky drinking patterns and alcohol-related consequences, and our limitations of human and time resources.

1. Mueang Songkhla
2. Sathing Phra
3. Chana
4. Na Thawi
5. Thepha
6. Saba Yoi
7. Ranot
8. Krasae Sin
9. Rattaphum
10. Sadao
11. Hat Yai
12. Na Mom
13. Khuan Niang
14. Bang Klam
15. Singhanakhon
16. Khlong Hoi Khong

Figure 2 Map of Songkhla Province, Thailand with the districts numbered

2. Literature review

2.1 Terminology: drinking prevalence, alcohol consumption indices, drinking frequency, and drinking pattern

Listed below are the terms and definitions used in alcohol research and in the alcohol status report by the WHO.[10-13]

2.1.1 Drinker classification

- **Lifetime abstainers** are people who have never consumed alcohol. A lifetime abstainer is one who has never started drinking.

- **Former drinkers** are people who previously consumed alcohol but have not done so in the previous 12-month period. These abstainers should be encouraged to stop drinking entirely.

- **Past 12-month abstainers** are people who did not drink any alcohol in the previous 12-month period. This includes former drinkers and lifetime abstainers.

- **Current drinker** is an individual who drinks not less than one standard drink of alcohol during the previous 12 months. The prevalence of current drinkers might be influenced by some drinking patterns (e.g., occasional [<1 day/week] vs regular [≥1 day/week], which is related to the lifetime risk of hospitalization from an alcohol-related injury[14, 15], and heavy drinking).[7]

- **Heavy episodic drinking (HED)** is defined as a heavy episodic alcohol consumer and is described as a person who has consumed not less than 60 g of

pure alcohol on at least one single occasion. This is one of the most important indicators for acute-related harm (e.g., injuries, accidents, acute social consequence)[16] and chronic diseases (e.g., tuberculosis, epilepsy, ischemic heart disease, and cirrhosis).[17] The mechanism can be described as the relationship between alcohol intoxication and drinking intensity (Figure 3).[18]

2.1.2 Alcohol consumption indices

- **Average daily intake (g/day)** is a measure of the average quantity of consumption per day. It is the alcohol amount consumed by all drinkers on a day.

- **Average drinking intensity (g/drinking day)** is a measure of the average quantity of consumption on a drinking day. Drinking intensity is associated with acute harm of drinking. The linkage is explained by an intoxication mechanism (Figure 3).[18]

- **Annual per drinker consumption (liters of pure alcohol/drinker/year)** is a measure of the average amount of alcohol consumed by each drinker during a specific year. This parameter is usually used to indicate the risk of chronic harm from alcohol use. An increased level of alcohol consumption is associated with all-case mortality and chronic diseases (e.g., cirrhosis, other chronic liver diseases, and cancers).[19] Toxicity and Dependence mechanisms (Figure 3) may be causally implicated in chronic alcohol-related harm (e.g., chronic diseases including cancers).[18]

- **Annual per capita consumption (liters of pure alcohol/capita/year)** is the total amount of alcohol consumed in a specific year. This index is used to

describe the average amount of consumption in the population, including non-drinkers and drinkers, in a country or community and expressed as per capita consumption value.
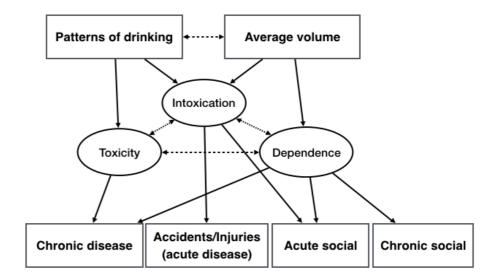
Figure 3 Conceptual model of alcohol consumption, intermediate mechanisms, and long-term consequences (Rehm, 2003[18])

2.2 Methodological issues in measuring alcohol use

2.2.1 *Reference period*

Different studies might have different purposes in asking about the pattern and amount of drinking. It is advantageous to use the same reference period for both alcohol consumption and outcome. A past 12-month time frame is generally recommended. Yesterday or the two previous days are time periods for the sole interest of characterizing drinking in a population as a whole. However, this approach is not a

good method to establish the amount and pattern of drinking at the level of the individual participant and also misses many infrequent drinkers (e.g., women, youth, and elderly). It requires careful adjustment for possible seasonal effects.[20]

2.2.2 Frequency categories

Questions on drinking frequency should be asked in descending order, which participants have to answer the most frequent drinking event at first.[20] A completely open-ended technique is not recommended.[21]

2.2.3 Quantity of drinks measuring

Asking about the quantity of drinks consumed per occasion is more important than asking about quantity of drinks consumed per day. However, a drinking day may span more than one calendar day (i.e., when drinking continues after midnight).[20]

2.2.4 Ordering of specified quantities

Asking first about the largest quantity consumed in the previous 12 months then work down is one well-established approach.[22] An ascending approach may result in more underreporting. However, there are too few methodological studies in this field.

2.2.5 Quantity thresholds

The questions should not be asked in terms of grams of ethanol, but in terms of the unit drinks (i.e., standard drink unit or actual drink unit). The size of a standard drink typically used in surveys and analyses varies across cultures (e.g., 10 grams in Thailand and Australia, 14 grams in the United States, 8 grams in the United

Kingdom). A 60-gram cut-off corresponds to the definition of hazardous consumption and heavy episodic drinking.[12, 20]

2.2.6 Beverage specified or overall questions

Questions on the alcohol beverage types should be asked.[23] The beverage-specific questions yield higher estimates of consumption than data from a single series of questions on overall consumption because of better recall ability of the participants.[24, 25]

2.2.7 Context of drinking questions

Contextual factors can impact drinking behaviors and consequences such as drinking events (e.g., weekend, holiday, and cultural event), partners (e.g., friends, family, and strangers), and location (e.g., house, pub/bar, restaurant, and workplace).[26-28] For instance, a higher level of alcohol consumption was associated with going on spring break trips with friends among college students.[29] A high density of alcohol outlets where people live and work can influence high alcohol consumption.[30] Drinking at a large party or having parents who provide alcohol were associated with heavy episodic drinking.[27] Also, there are complex relationships between alcohol-related harm and alcohol consumption. A neglect of the drinking contexts in these relationship pathways could lead to a misinterpretation of the association between alcohol consumption and harm in the sense that some drinking patterns are more harmful than others.[31]

The specific social context technique for an alcohol consumption survey was originally developed in 1973.[32] It asked eight common drinking situations such as "a man is at a bar with some of his male friends", "a husband having dinner out with

his wife", and "a man visiting his parents". After that, many studies have focused on a contextual approach.[33-36] However, previous strategies to contextualize questions did not thoroughly enquire specific details of the drinking events. So, the results could not provide complete information about drinking behavior.

In addition, in some countries, for example Thailand, drinking is seasonal and varies by days of the week. During holiday seasons (e.g., New Year's and Songkran Water Festival holiday periods), there may be a long holiday period of 5 to 7 days when people celebrate and drink more. On the other hand, during the three-month period of Buddhist Lent, usually in July to October each year, many drinkers stop drinking for the entire period or drink less frequently. All of these variations need to be considered in collecting data on alcohol consumption.

2.3 Alcohol consumption measuring instruments

Alcohol consumption can be measured by various instruments which have strong and weak points for capturing the volume, pattern, and context of drinking in the individual and population levels. These instruments include QF, BSQF, Within-location beverage-specific consumption, graduated frequency (GF), tri-level, L7D, BSY, and Timeline Followback Interview (TLFB). It is unlikely that one instrument can be appropriate for all survey aims.[37]

2.3.1 Quantity frequency (QF) questionnaire

The QF is the most widely applied and simplest method. It measures alcohol consumption with two simple questions: overall frequency and usual amount of alcohol consumed on drinking days.

2.3.2 Beverage-specific quantity frequency (BSQF) questionnaire

The BSQF instrument is a modification of the traditional QF instrument in 1992 by National Longitudinal Alcohol Epidemiologic Survey and National Institute on Alcohol Abuse and Alcoholism. The BSQF instrument asks the participants for their usual frequency and amount of each specific beverage. It has some advantages over the QF in terms of increasing recall ability, comparing consumption by culture and sex[38], and a higher estimate of overall volume.[39]

The questionnaire recommended by the National Institute on Alcohol Abuse and Alcoholism is much the same as the BSQF in that it provides the basic beverage-specific frequency and usual quantity in the general population.[23]

2.3.3 Within-location beverage-specific consumption questionnaire

A within-location beverage-specific consumption instrument, which was developed by Sally Caswell in 2002 and applied in the International Alcohol Control (IAC) study. It asked the participants for their alcohol consumption in 10 common locations (e.g., own house, restaurant, workplace, and public areas). It provided high correlation coefficients between alcohol consumption and their consequences and drunkenness and also accounted for 94% of the alcohol sales data.[36]

2.3.4 Graduated frequency (GF) questionnaire

The GF applies a succession of questions to obtain the frequency of alcohol consumed by drinkers in different levels of quantities.[22] It can measure the drinking variability especially for heavy episodic drinking.[40] This instrument can perform well only if the participants are required to report their consumption in terms of standard drinks rather than actual drink sizes. This requirement may introduce a

source of error because some participants can not convert their actual amount to standard drink unit.[41]

2.3.5   Tri-level questionnaire

This tri-level approach was modified from the GF.[42] The participants are required to think of their drinking by "low-", "medium-" and "high-level alcohol consumption". The alcohol beverage types, actual drink size, and volume at each specific level are elicited.[43]

2.3.6   Last 7-day (L7D)

The L7D questionnaire asks the participants to report the amount of alcohol consumed day by day for each of the prior seven days. Then, the total alcohol consumption is aggregated by the number of standard drinks. Several studies used this questionnaire among different populations.[37, 44, 45]

2.3.7   Beverage-specific yesterday (BSY) questionnaire

The yesterday approach asks the participants to report the amount of alcohol consumed of each beverage type during the day before the interview.[46, 47] This instrument is not appropriate for a population that has variations in the drinking behaviors between the days of the week.

2.3.8   Timeline Followback Interview (TLFB) questionnaire

The TLFB is a calendar-based method to obtain the participant's drinking behaviors (e.g., alcohol consumption indices, drinking patterns, or heavy episodic drinking frequency) in term of "daily drinking", including both drinking days and non-drinking days. The reference period can be range from one month to one year.

Recall ability is enhanced by memory aids (e.g., public holidays, Birthday, or other special days) The time duration to complete the TLFB varies as a function of the retrospective time frame (e.g., 10 to 15 minutes for the 90-day version, 30 minutes for the one-year version).

Table 2 Questions, advantages, and disadvantages of alcohol consumption measurement questionnaires

Questionnaire	Question	Advantage	Disadvantage
Quantity frequency (QF)	- *"How often did you drink alcoholic beverages during the past 12 months?" (Answer: drinking frequency category)*	- Simple and easy to use	- Recall bias - Lack of drinking variability
	- *"During the past 12 months, on those days when you drank, how many drinks did you usually have?" (Answer: number of standard drinks in a drinking day)*		
Beverage-specific quantity frequency (BSQF)	- *"During the past 12 months, did you drink these kinds of beverages*?"*	- Provides drinking variability on beverage types and consumption levels	- Higher burden on the participant to answer the questions compared to QF
	- *"How often did you usually have... (for specified beverage) ... in the past 12 months?"* (answer: drinking frequency category)		
	- *"On those days when you had ... (for specified beverage)... , which containers did you usually use?"*		
	- *"And, how much did you usually have ... (for specified beverage)... per day in that container?"*		
	These four questions were asked in a loop for seven common kinds of beverages* (i.e., beer, white spirits, whisky, local beverage, wine, wine coolers and vodka)		

Questionnaire	Question	Advantage	Disadvantage
Within-location beverage-specific questions	- *"Which type of alcohol was consumed at … (for specified location)…?"* - *"How often did you drink at… (for specified location)…?"* - *"How much did you drink at…(for specified location)…?"*	- Provides drinking variability on locations, beverage types and consumption levels	- Higher burden on the participant to answer the questions compared to QF
Graduated frequency (GF)	- *"During the last 12 months, what is the largest number of drinks you had on any single day?"* - *"During the last 12 months, how often did you have <u>12 or more drinks of any kind of alcoholic beverage</u> in a single day—that is, any combination of cans of beer, glasses of wine or drinks containing liquor of any kind?"* - *"During the last 12 months, how often did you have at least <u>8 but less than 12 drinks</u> of any kind of alcoholic beverage in a single day?"* - *"During the last 12 months, how often did you have <u>5, 6, or 7 drinks</u> of any kind of alcoholic beverage in a single day?"* - *"During the last 12 months, how often did you have <u>3 or 4 drinks</u> of any kind of alcoholic beverage in a single day?"*	- Provides drinking variability on consumption levels	- The need to understand standard drink - Drinking days may be more than 365 days

Questionnaire	Question	Advantage	Disadvantage
	- *"During the last 12 months, how often did you have <u>1 or 2 drinks</u> of any kind of alcoholic beverage in a single day?"*		
Tri-level	- *"In the last 30 days, did you have an alcoholic drink of any kind?" (The participants are asked to think of their alcohol consumption by low, medium and high levels alcohol consumption days)*	- Provides drinking variability on consumption levels	- Difficult to answer - Depends on drinker's perception of consumption level
	- *"For high-level drinking, what is type of beverage and what is actual drink size and volume?"*	- Does not miss occasional drinkers	
	- *"For medium-level drinking, what is type of beverage and what is actual drink size and volume?"*		
	- *"For low-level drinking, what is type of beverage and what is actual drink size and volume?"*		
Last 7-day (L7D)	- *"Starting with yesterday, how many drinks did you have?"*	- Less recall bias	- Misses occasional drinkers
Beverage-specific yesterday (BSY)	- *"How many regular bottles of beer did you drink yesterday?"*	- Less recall bias - Simple and easy to use	- Misses occasional drinkers
	- *"How many glasses of wine did you drink yesterday?"*		

Questionnaire	Question	Advantage	Disadvantage
	- *"How many drinks of cocktails, spirits or hard liquor did you drink yesterday?"*		- Lack of drinking variability
	- *"How many regular bottles of wine cooler did you drink yesterday?"*		
	- *"How many regular bottles of spirit cooler did you drink yesterday?"*		
Timeline Followback (TLFB)	- *"Let's start with yesterday (date) and go back 30 days"* *(Interviewer marks these dates on the calendar and show the participant)*	- Provides drinking situations with specific dates - Provides drinking patterns on the greatest and lowest alcohol consumption days - Does not miss occasional drinkers	- Time consuming
	- *"Do you have any special holidays or dates you want to mark on the calendar to help you better recall your drinking during the past 30 days?"* *(Participant replies and fills in calendar if appropriate)*		
	- *"When did you last drinking in this 30-day period?"* *(Participant replied a date)*		
	- *"How much did you drink on this day?"* *(Participant replies with an actual unit amount and interviewer converts to*		

Questionnaire	Question	Advantage	Disadvantage
	standard drink unit and put that number in on the calendar		
	for the appropriate date)		
	- "What was the greatest amount you consumed on any given		
	day during this period? Do you recall when this occurred?"		
	(Participant replies with an amount and a date)		
	- "What was the least amount of drinking during this		
	period?" (Participant replies with an amount)		

Table 3 Summary of alcohol consumption measurement questionnaires

Questionnaire	Quantity	Frequency	Variability	Standard drink	Drinking day	Intensity	Heavy drinking frequency
Quantity frequency (QF)	+	+	-	Standard drink	+	+	-
Beverage-specific quantity frequency (BSQF)	+	+	+ by beverage	Standard or actual drink	+/- (may be >365 days)	+/-	+
Within-location beverage-specific consumption	+	+	+ by location and beverage	Standard or actual drink	+/- (may be >365 days)	+/-	+
Graduated frequency (GF)	+	+	+ by intensity	Standard drink	+/- (may be >365 days)	+/-	+
Tri-level	+	+	+ by intensity	Actual drink	+/- (may be >365 days)	+/-	+
Last 7-day (L7D)	+	+	+ with short time frame	Standard or actual drink	+	+	+
Beverage-specific yesterday (BSY)	+	+	-	Standard or actual drink	+	+	+
Timeline Followback Interview (TLFB)	+	+	++ by intensity and beverage	Standard or actual drink	+	+	+

2.4   Comparing alcohol consumption using different instruments

In the literature there are many comparisons between the alcohol consumption instruments (Table 4). First, comparisons between the original QF and the modified QF found that the modified version that asked about the day or beverage-specific yielded higher volume estimations. Second, the GF method consistently yielded higher volumes and quantities across all countries compared with the QF method, while the BSQF did not result in higher quantities and higher volumes compared with the GF. However, they found complications that GF often resulted in overcounting the drinking frequencies, including a substantial proportion of participants whose estimated annual frequency was more than 365 days. Only one research study that compared the tri-level and BSQF found that the BSQF instrument provided only annual per capita consumption which was higher than the tri-level method, but it was not significant in the other indices. Finally, the existing research lends support to the TLFB which captured alcohol consumption indices and prevalence of heavy episodic drinking quite well compared to the diary method.

Table 4 Overview of previous studies that compared alcohol consumption instruments

Comparison	Study	Country	Results
QF vs extended QF	Kühlhorn and Leifman, 1993[48]	Sweden	- Day-specific yielded higher volumes than traditional QF; Monday-Thursday, Friday, Saturday, and Sunday yielded higher volumes
	Williams et al., 1994[49]	USA	- BSQF gave higher average daily intake estimates than the QF
	Serdula et al., 1999[39]	Columbia	- BSQF gave a higher total volume estimation than the QF
GF vs QF	Hilton, 1989[50]	USA	- GF versus BSQF: no difference
	Midanik, 1994[51]	USA	- GF yielded higher volume than QF
	Poikolainen et al., 2002[52]	Finland	- GF yielded higher volume than QF but overcounted annual frequency
	Graham et al., 2004[53]	Canada	- GF yielded higher volume than QF but overcounted frequency
	Dawson, 2003[54]	-	- QF yield higher frequency of heavy episodic drinking than overall frequency

Comparison	Study	Country	Results
Tri-level vs BSQF	He et al., 2015[55]	China	- BSQF estimated APC higher than tri-level, but not significant in average daily intake, drinking intensity, and annual per drinker consumption
TLFB vs diary	Carney et al., 1998[56]	Mexico	- TLFB captured overall levels of drinking quite well compared to a 28-day daily diary and a 30-day electronic interview
	Bernhardt et al., 2009[57]	USA	- Average daily intake and intensity were the same results from the TLFB and dairy (wireless mobile device)
	Aalto et al., 2009[58]	Finland	- Gold standards based on the TLFB interview. - The primary gold standard for heavy episodic drinking
	Levola and Aalto, 2015[59]	Finland	- TLFB was the gold standard for risky alcohol use and the reference measurement

2.5   Health-Related Quality of Life (HRQoL)

2.5.1   *Definition and measuring questionnaires*

The Constitution of the World Health Organization that came into force in 1948 stated that "Health is state of complete physical, mental and social well-being".[60] The important issues are to have an understanding of health from the patient's perspective and to evaluate the patient's participative experience of their symptoms and impact of illness on their quality of life.

There are several questionnaires to measure health-related quality of life (HRQoL) of individuals with and without disease. The examples are EQ-5D and SF-36, which have been used widely for measuring the quality of life in research in the clinical field, economic evaluation of population health survey, community health intervention or health technology assessment.[61]

2.5.2   *Health-Related Quality of Life and alcohol consumption*

Over the past decades, some studies have shown that consumption of alcohol at a low level was associated with a lower incidence of cardiovascular diseases and their mortality in some populations. The American Heart Association; however, mentioned that the associations may be due to other lifestyle factors (e.g., physical activity, fruits/vegetables diet, lower in saturated fats) rather than alcohol consumption itself.[62] Moreover, a recent meta-analysis of 87 studies shows that reduction in alcohol consumption, even among previous low-volume drinkers (1.30 to <25 g/day) is beneficial for CVD prevention.[63]

Some studies have shown a lower quality of life among individuals with alcohol dependence when compared with not only with the general healthy population

but also with those with other chronic medical conditions.[64] Furthermore, the quality of life was even worse if they were unemployed and had many serious somatic or psychiatric diseases.[65] Most studies have focused on people with alcohol abuse or alcohol dependence, which are severe stages of the alcohol problem spectrum. There are more drinkers with lower levels of consumption and related problems in the society. However, less information has been reported on the quality of life of light or moderate drinkers. A variety of studies have reported inconsistent results regarding the associations of drinking alcohol with HRQoL, depending on instruments and age group.[66-68] Recent studies have shown the association between alcohol consumption and better physical HRQoL at baseline, but no association was found after 3.3 years of follow-up.[69] Tremendous attempts have been done to reduce per-capita consumption in Thailand aiming at the general population, who mostly are non-drinkers, light or moderate drinkers rather than alcohol dependents. Evidence on the relationship between alcohol drinking and quality of life would be beneficial for policy advocacy and can be used for public education to promote non-drinking in the country.

3.   Rationale

An accurately measured alcohol consumption survey is one surveillance method to reduce alcohol-related harm via developing health policies.[10, 11] The WHO recommended that the alcohol survey components include the volume of alcohol consumed, drinking pattern, and drinking context (e.g., festive drinking, the proportion of drinking events when getting drunk, drinking with meals, and drinking in a public place).[7]

One of the objectives of the WHO was to reduce the health and social burdens caused by the harmful use of alcohol which causes diseases and social and economic burdens on societies. Social inequities in alcohol-related harm do not follow a consistent pattern and can vary due to demographic factors such as economic status, education, gender, ethnicity, and place of residence.

There are several alcohol consumption measuring instruments which have strong and weak points for capturing the volume, pattern and context of drinking in a population and at the individual level. However, the most frequently used instruments were developed in areas of high prevalence of current regular drinkers.[22, 25, 70] The instruments ask general questions. A limitation is that when these instruments are applied in areas of low prevalence of current drinkers and where most are occasional drinkers, the interviewees could not remember their drinking occasions and the volume consumed. Loss of recall ability is one of the barriers to obtaining accurate data in an alcohol survey in the general population.[71] The situations (e.g., birthday party, graduate ceremony, and New Year's holiday period) where drinking is taken place can be a good clue to remind interviewees of their drinking occasions.

4. Research questions

1. What are the drinking patterns of Thai drinkers in Songkhla Province?

2. What is the appropriate instrument to measure alcohol consumption indices in Thai drinkers?

3. What are the implications of the context-specific quantity frequency (CSQF) questionnaire, developed by our team in measuring alcohol consumption in Thai drinkers?

5.   Objectives

5.1   General objective

To develop a questionnaire with a contextual approach to accurately measure alcohol consumption with drinking pattern, and determine the drinking context in a community of southern Thailand.

5.2   Specific objectives

1. To understand the alcohol drinking patterns among Thai drinkers in Songkhla Province.

2. To develop and validate the CSQF by comparing it with the traditional BSQF to estimate alcohol consumption indices.

3. To examine the implications of the CSQF:

    a. To describe the drinking context associated with different drinking intensities using the CSQF.

    b. To test the hypothesis that drinking alcohol even at a low level is associated with low-to-moderate health-related quality of life (HRQoL) compared to abstainers.

CHAPTER 2

RESEARCH METHODOLOGY

1.   Conceptual framework
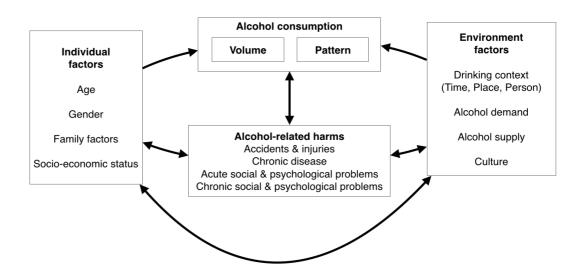
Figure 4 Conceptual framework modified from WHO, 2014[72]

2.   Overview of the research methodologies

This mixed methods study, consisting of both qualitative and quantitative approaches, had two parts (Figure 5).

−   **Part 1: Qualitative method: an in-depth interview**

o   Draft context-specific quantity frequency (CSQF) was developed from the results of the literature review. We then explored a range of drinking patterns in Thai drinkers by in-depth interviews until the data were saturated. The draft CSQF was developed from the information provided by

the in-depth interviews such as terminology clarifications and examples for each special drinking situation to avoid the double counting issue.

- o The draft CSQF was revised by senior researchers and experts from the four main regions of Thailand. Special drinking situations and some questions were omitted and modified in the final version of the CSQF instrument.

- **Part 2: Quantitative method: validity testing and implications of the CSQF**

  - o Convergent validity testing was applied because of the lack of a gold standard to measure alcohol consumption. The alcohol consumption indices measured by the CSQF instrument were compared with those from the traditional BSQF questionnaire.

  - o We aimed to identify the drinking context (i.e., situations, place, and partner) for risky drinking.

  - o We aimed to test the hypothesis that drinking alcohol even at a low level is associated with low-to-moderate health-related quality of life (HRQoL) compared to abstainers.
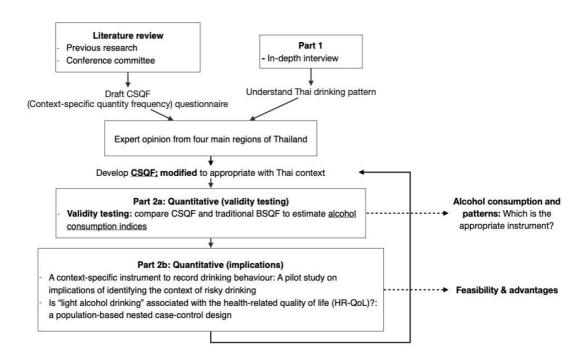
Figure 5 Overview of the research

3. Part 1: Qualitative method

3.1.1 Study design

Qualitative study design with an in-depth interview method

3.1.2 Study subject and selection criteria

A group of 15 current drinkers and their family members who lived with the drinker for more than one year and neighbors were participants in this study. The purposive sampling was employed through our gatekeepers (i.e., health volunteers, teachers, and nurses) who contacted potential participants in the community and hospital settings.

3.1.3 Study settings

The study was undertaken at government and private schools, government offices, private companies, primary care units, and Songkhla

Rajanagarindra Psychiatric Hospital in Hat Yai and in Muang District, Songkhla Province, Thailand.

3.1.4   Data collection

Data were collected by an in-depth interview until theoretical saturation was reached. The interviewer followed the in-depth interview guide (Annex 2 In-depth interview guide). At the beginning of the session, the participants were informed of the objectives and process of the study. After signing the consent form, participants were asked to complete a questionnaire concerning their demographic characteristics. A research assistant recorded the conversation using an audiotape.

3.1.5   Data analysis

Qualitative methods proceeded until there was theoretical saturation. The data were analyzed using content analysis.[73] The researchers independently reviewed the entire transcripts and inductively created a master list of possible themes and codes to describe segments of the text for each question.

4.   Part 2: Quantitative method

4.1   Study design and population

A community-based cross-sectional study was conducted among a population aged 15 years and older. We recruited current drinkers and non-current drinkers that included lifetime abstainers and former drinkers who drank but had not drunk during the previous three months because we desired to assess the 3-month per capita consumption at the sample level as well.

4.2   Sample size calculation

In calculating sample size for dependent samples t-tests using the following formula.[74] The parameters (i.e., standard deviation, SD and Delta of 3-month per capita consumption) from our pilot study were used to determine the target sample size for this study.

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 \sigma^2}{\Delta^2}$$

Where,

σ (standard deviation, SD) = 504.3 (from our pilot study)

Δ (delta) = 56.8 (from our pilot study)

$Z_{1-\alpha/2}$ = 1.96 for 95% confidence interval

$Z_{1-\beta}$ = 0.84 for 80% power

Sample size (n) = 619

The recruitment of 818 of which a design effect (DE) of 1.2 and estimate of 10% of unusable data from a sample of 619 samples has been taken into account.

4.3   Sampling technique

A multistage sampling technique was used. In the first stage, four sub-districts in both urban and rural areas in Songkhla Province in southern Thailand were selected randomly. In the second stage, eight villages were selected with probability proportional to size. In the third stage, households within each village were listed and 50 to 52 households were selected by systematic random sampling procedure. In the fourth stage, two participants in each household were selected using the Kish selection grid.[75] The final sample comprised 804 participants. Although 818 people were

selected, only 804 agreed to participate in the interview which resulted in the response rate of 98.3%.

4.4   Data collection and instruments

A structured questionnaire covering demographic characteristics and alcohol consumption was used. A face-to-face interview with paper-and-pencil administration was performed by trained interviewers. The actual time spent in completing the survey was measured by recording the starting and ending points. Furthermore, the perceived burden of the participants to answer each instrument was measured using a 5-point rating scale: *"Did you find it easy or burdensome to answer the questions?"*

The alcohol consumption part comprised two instruments: the BSQF and the CSQF. A retrospective time frame of three months was set for both instruments. The instruments were employed in a random sequence to diminish recall bias. Pictures of various kinds of alcoholic beverages and containers were used to increase recall ability of the alcohol volume consumed by the participants.

The BSQF asked three questions separately for each specific beverage consumed in the previous 3 months. The first question determined the frequency level and the other questions defined the usual amount of each beverage actually consumed. The CSQF instrument (item 4 to 7 of the CSQF) used a similar question format and response categories as the BSQF (item 1 to 4 of the BSQF). However, it asked more about the drinking context (item 1 to 3 of the CSQF). The questions elicited information on location, partner, beverage, quantity, and frequency for each common drinking situation or event. The CSQF can provide a maximum of three drinking locations in

each situation, with a total of five drinking situations. So, each participant had the chance to respond to 15 types ($3 \times 5 = 15$) of drinking events. A drinking event was a unique combination of one specified drinking situation, location, drinking partner(s), beverage type(s), and volume consumed (Table 5, Figure 6, and Figure 7).

Table 5 Questions used for the BSQF and CSQF instruments

Instrument	Question	Answer
BSQF	1. "During the last 3 months, did you drink these kinds of beverages*?"	
	2. "How often did you usually have... (for specified beverage) … in the last three months?"	- Every day - 5 to 6 days/week - 3 to 4 days/week - 1 to 2 days/week - 1 to 3 days/3 month (can choose one frequency category).
	3. "On those days when you had ... (for specified beverage)… , which containers did you usually use?"	The interviewer shows pictures of various kinds of containers to the interviewee (can choose one drinking container type).
	4. "And, how much did you usually have ... (for specified beverage)… per day in that container?"	Answered in terms of the number of containers (can answer only one number).
	*These four questions were asked in a loop for seven common kinds of beverages (i.e., beer, white spirits, whisky, local beverage, wine, wine coolers and vodka). Pictures of beverage in each category were provided.	
CSQF	1. "During the last 3 months, did you drink in these situations**?"	
	2. "Where did you usually drink … (for specified situation)… in the last three months?"	Own house, someone else's house, restaurant, pub/bar, workplace, religious place, local shop (can choose a maximum of three locations for each situation).
	3. "With whom did you usually drink in … (for each unique combination of situation(s) and location(s))… ?"	Alone, family, male friends, female friends, strangers, colleagues (can choose one drinking partner(s)).
	4. "How often did you usually have... (for each unique combination of situation(s), location(s), partner(s), and beverage type(s)) … in the last three months?"	- Every day - 5 to 6 days/week - 3 to 4 days/week

Instrument	Question	Answer
		- 1 to 2 days/week
		- 1 to 3 days/3 month
		(can choose one frequency category).
	5. "What beverage did you usually drink at... (for each unique combination of situation(s), location(s), and partner(s)) …?"	The interviewer provides pictures of common beverage of each type; beer, white spirits, whisky, local beverage, wine, wine coolers and vodka (can choose one type of beverage).
	6. "On those days when you had ...(for each unique combination of situation(s), location(s), partner(s), beverage type(s), and frequency categories)… , which containers did you usually use?"	The interviewer shows pictures of various kinds of containers to the interviewee (can choose one drinking container type).
	7. "And, how much did you usually have ... (for each unique combination of situation(s), location(s), partner(s), beverage type(s), frequency categories, and container type(s))… per day in that container?"	Answered in terms of the number of containers (can answer only one number).

*****These seven questions were asked in a loop for five common situations
(i.e., usual drinking, holiday, party, cultural event, and music/sport event).
Pictures of beverage in each category were provided.***

Figure 6 Relationship between alcohol consumption and drinking context

Situation	Location	Drinking partner(s)	Frequency	Beverage type	Container type	Number of container(s)	Drinking event(s)
	Location₁ →	Partner(s) →	Frequency →	Beverage type →	Container type →	No. of container(s) →	**1st event**
1. Usual drinking	Location₂ →	Partner(s) →	Frequency →	Beverage type →	Container type →	No. of container(s) →	**2nd event**
	Location₃ →	Partner(s) →	Frequency →	Beverage type →	Container type →	No. of container(s) →	**3rd event**
	… →	… →	… →	… →	… →	…	…
2. Holiday	… →	… →	… →	… →	… →	…	…
	… →	… →	… →	… →	… →	…	…
⋮	… →	… →	… →	… →	… →	…	…
5. Music/sport event	… →	… →	… →	… →	… →	…	**14th event**
	… →	… →	… →	… →	… →	…	**15th event**

Figure 7 Drinking situation, location, drinking partner(s), beverage, container type, and number of container(s) and drinking event(s) from the CSQF

4.4.1 *Alcohol consumption index measures*

In this study, we investigated alcohol consumption at two levels of analysis: the individual level and the sample level.

For the individual level analysis,

"Total consumption" was calculated for each participant in grams of pure alcohol per three months (g/3 months). The two instruments have different methods to estimate the total consumption. Regarding BSQF, the midpoint was used to represent each frequency level (Table 5, item 2 of the BSQF). For example, "1 to 2 days/week" level was converted to 1.5 days/week or $1.5 \times 13 = 19.5$ days/three months. The sum of the midpoint frequencies multiplied by the quantities for all types of beverages reflected the total consumption in the last three months. The quantities can be determined by multiplying the percentage volume of pure alcohol (i.e., 5% for beer, 6% for wine coolers, 13% for wine, and 40% for white spirit, whisky, local beverage, and vodka based on the local market) and volume of beverage consumed (in milliliters), and then multiplying by 0.789 (the specific gravity of ethyl alcohol). The container size was converted into milliliters based on the standard size of alcoholic beverage containers popularly used in Thailand (i.e., 1 regular beer can = 330 mL, 1 small whisky cup = 300 mL, 1 regular cup = 50 mL). The volume consumed was calculated by the container volume (item 3) multiplied by the actual number of those containers (item 4). For CSQF, the total consumption was the sum over all situations of the product of consumption amount and frequency in the last three months for each situation.

For sample level analysis, the alcohol consumption was assessed in three consumption indices.[12]

1. **"Average daily intake"** was a measure of the average quantity of consumption per day (g/drinker/day) of average drinkers. It was calculated by the average "total consumption" in three months divided by 92 days.

2. **"3-month per drinker consumption"** was a measure of the average amount of alcohol consumed in grams of pure alcohol by each drinker during the last 3 months (g/drinker/3 months). This was obtained from the sum of "total consumption" of all drinkers divided by the number of drinkers.

3. **"3-month per capita consumption"** was a measure of the amount of alcohol consumed in grams of pure alcohol in each given sample that included non-drinkers (g/capita/3 months). It was calculated by the sum of "total consumption" of all drinkers divided by the number of all participants.

4.5   Validity testing

The two methods used most often to test the validity of consumption are convergent validity and a comparison with data on taxable alcohol available (sales data) for consumption.[36] The convergent validity method assesses the consistency level among measurement methods (i.e., correlation of alcohol consumption between two measurement tools). The comparisons with taxable alcohol available for consumption are derived from data on production, import/export from the revenue department, and taxation office. Most studies found that the results from a population-based survey could account for 40% to 60% of taxable alcohol available.[76-78]

In this study, we applied the convergent validity method because the Thai Revenue Department reported sale data only at the national level. In our study setting, taxation information is limited.

4.6   Data analysis

4.6.1   Outcome measures

Drinking intensity and average daily consumption

- **"Alcohol drinking intensity":** Assuming there was a single drinking event in a day, this was a measure of alcohol consumption in grams of pure alcohol per drinking event (g/drinking day). It can be determined by multiplying the percentage volume of pure alcohol (Table 5, item 5 of the CSQF) and volume of beverage consumed (in milliliters), and then multiplied by 0.789 (the specific gravity of ethyl alcohol). The volume consumed was calculated by the volume's container (item 6) multiplied by the actual number of those containers (item 7 and 8) (Table 6).

- **"Average daily consumption":** This was a measure of the mean quantity consumed per day (g/day) of drinkers. The midpoint was used to represent each frequency level (item 4). For example, "1 to 2 days/week" level was converted to 1.5 days/week or $1.5 \times 13 = 19.5$ days/three months. The average daily consumption in the last three months was calculated by summation of multiplying for each drinking situation (drinking intensity) with the midpoint frequencies, and then dividing by 92 days (Table 6).

Table 6 Calculation method of drinking intensity and average daily consumption

		Questionnaire item						Calculation	
ID	Event	Situation	Location	Partner	Frequency (days/3 months)	Beverage (% of ethanol)	Volume (mL)	Drinking intensity (g/event, g/day)	Average daily consumption (g/day)
		Item1	Item2	Item3	Item4	Item5	Item6,7		
1	1	S_1	$L_{1,1}$	$P_{1,1}$	$F_{1,1}$	$B_{1,1}$	$V_{1,1}$	$I_{1,1} = B_{1,1} \times V_{1,1} \times 0.789$	
1	2		$L_{1,2}$	$P_{1,2}$	$F_{1,2}$	$B_{1,2}$	$V_{1,2}$	$I_{1,2} = B_{1,2} \times V_{1,2} \times 0.789$	
1	3		$L_{1,3}$	$P_{1,3}$	$F_{1,3}$	$B_{1,3}$	$V_{1,3}$	$I_{1,3} = B_{1,3} \times V_{1,3} \times 0.789$	
1	4	S_2	$L_{2,1}$	$P_{2,1}$	$F_{2,1}$	$B_{2,1}$	$V_{2,1}$	$I_{2,1} = B_{2,1} \times V_{2,1} \times 0.789$	
1	5		$L_{2,2}$	$P_{2,2}$	$F_{2,2}$	$B_{2,2}$	$V_{2,2}$	$I_{2,2} = B_{2,2} \times V_{2,2} \times 0.789$	$\dfrac{\sum_{i=1}^{5} \sum_{j=1}^{3} I_{i,j} \times F_{i,j}}{92}$
1	6		$L_{2,3}$	$P_{2,3}$	$F_{2,3}$	$B_{2,3}$	$V_{2,3}$	$I_{2,3} = B_{2,3} \times V_{2,3} \times 0.789$	
1	7	S_3	$L_{3,1}$	$P_{3,1}$	$F_{3,1}$	$B_{3,1}$	$V_{3,1}$	$I_{3,1} = B_{3,1} \times V_{3,1} \times 0.789$	; *i represents a drinking situation j represents a combination of location, partner, beverage, and volume.*
1	8		$L_{3,2}$	$P_{3,2}$	$F_{3,2}$	$B_{3,2}$	$V_{3,2}$	$I_{3,2} = B_{3,2} \times V_{3,2} \times 0.789$	
1	9		$L_{3,3}$	$P_{3,3}$	$F_{3,3}$	$B_{3,3}$	$V_{3,3}$	$I_{3,3} = B_{3,3} \times V_{3,3} \times 0.789$	
…	…	…	…	…	…	…	…	…	
…	…	…	…	…	…	…	…	…	
…	…	…	…	…	…	…	…	…	
1	13	S_5	$L_{5,1}$	$P_{5,1}$	$F_{5,1}$	$B_{5,1}$	$V_{5,1}$	$I_{5,1} = B_{5,1} \times V_{5,1} \times 0.789$	
1	14		$L_{5,2}$	$P_{5,2}$	$F_{5,2}$	$B_{5,2}$	$V_{5,2}$	$I_{5,2} = B_{5,2} \times V_{5,2} \times 0.789$	
1	15		$L_{5,3}$	$P_{5,3}$	$F_{5,3}$	$B_{5,3}$	$V_{5,3}$	$I_{5,3} = B_{5,3} \times V_{5,3} \times 0.789$	

* 0.789 is the specific gravity of ethyl alcohol (g/mL)

Drinking intensity classification

The drinking-intensity was classified based on criteria for risk of acute harms set out by WHO. The risk is divided into three groups (Table 7).[12]

Table 7 WHO Criteria for acute harm based on drinking intensity[12]

Level of acute harm	Drinking intensity (g/drinking day)	
	Male	Female
Low-risk	>0-40	>0-20
Medium-risk	41-60	21-40
High-risk	>60	>40

Risk of chronic harm based on average daily intake

WHO's "International Guide for Monitoring Alcohol Consumption and Related Harm" sets out the criteria to assess risk of chronic harm (Table 8)[12] based on all-cause mortality for different levels of average daily consumption.[79] Average daily consumption is classified into three levels.

Table 8 WHO Criteria for chronic harm based on average daily intake[12]

Level of chronic harm	Average daily intake (g/day)	
	Male	**Female**
Low-risk	>0-40	>0-20
Medium-risk	41-60	21-40
High-risk	>60	>40

Health-Related Quality of Life (HRQoL)

Health-Related Quality of Life (HRQoL) was the primary dependent variable. The data were collected using the 5-level EQ-5D version (EQ-5D-5L).[80] This instrument is made up of five items distributed into five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each domain has five levels: no problems, slight problems, moderate problems, severe problems and extreme problems (Table 9). The EQ-5D index was calculated by the Crosswalk Index Value (Thai population value set) suggested by Pattanaphesaj et al.[81], with the total score ranging from 0 (dead) to 1 (perfect health).

As suggested by Golicki[82] the relative HRQoL states were categorized into good (>0.8), moderate (0.4–0.8) and low (<0.4) HRQoL states. In this study, we applied the cutoff value of >0.8 to classify the EQ-5D index into "high HRQoL" (EQ-5D index >0.8) and "low-to-moderate HRQoL" (EQ-5D index ≤0.8).

Table 9 The EQ-5D-5L questionnaire

Dimension	Score
Mobility	
"I have no problems in walking about"	0
"I have slight problems in walking about"	1
"I have moderate problems in walking about"	2
"I have severe problems in walking about"	3
"I am unable to walk about"	4
Self-care	
"I have no problems washing or dressing myself"	0
"I have slight problems washing or dressing myself"	1
"I have moderate problems washing or dressing myself"	2
"I have severe problems washing or dressing myself"	3
"I am unable to wash or dress myself"	4
Usual activities (e.g., Work, study, housework, family, or leisure activities)	
"I have no problems doing my usual activities"	0
"I have slight problems doing my usual activities"	1
"I have moderate problems doing my usual activities"	2
"I have severe problems doing my usual activities"	3
"I am unable to do my usual activities"	4
Pain/discomfort	
"I have no pain or discomfort"	0
"I have slight pain or discomfort"	1
"I have moderate pain or discomfort"	2
"I have severe pain or discomfort"	3
"I have extreme pain or discomfort"	4
Anxiety/depression	
"I am not anxious or depressed"	0
"I am slightly anxious or depressed"	1
"I am moderately anxious or depressed"	2
"I am severely anxious or depressed"	3
"I am extremely anxious or depressed"	4

4.6.2   Statistical analysis

The statistical analysis included both continuous and categorized variables for alcohol consumption indices measured by the BSQF and CSQF instruments. The median and interquartile range (IQR) were used to describe consumption indices as the alcohol consumption data were not normally distributed. The Wilcoxon signed-rank test was used to compare the alcohol consumption indices from different instruments within the same participant. Categorical variables were analyzed using a Chi-square or Fisher's exact test.

Linear regression analysis was used to identify the effects of the questionnaire variables (i.e., quantity and frequency ratio) between the CSQF and BSQF associated with calculated total alcohol consumption. Associations were expressed as standardized regression coefficients and partial regression coefficients. We used standardized regression coefficients to compare the effect size of logarithm-transformation ratios of drinking parameters between CSQF and BSQF. A logarithm-transformation was used to transform the skewed data to a symmetrical distribution more appropriate to the model. Only independent variables were standardized. They were transformed by subtracting the mean and dividing by the standard deviation. The standardized coefficient estimated the change in outcome associated with one standard deviation increase in the corresponding predictor variable.

A multinomial logistic regression model was fitted to the outcome, with participants categorized into three groups: lifetime abstainers/former drinkers (reference group); low-risk drinkers; and medium/high-risk drinkers. Multilevel, mixed-effects logistic models were applied to assess the determinants of medium- and

high-intensity drinking compared with low-intensity (reference group). These models were chosen given the hierarchical nature of the data with clustering of drinking events (first or lower level) within drinkers (second or higher level).

Binary logistic regression analysis was conducted to measure the association between the independent variables and the low-to-moderate HRQoL.

All P values were two-tailed and significance was set at less than 0.05. All analyses were conducted using R-software version 3.4.4[83] with the epicalc[84], lme4[85] and the ggplot2[86] contributed packages.

4.6.3   *Unit of analysis*

This study identified two units of analysis. The primary unit of analysis was the participants. The next unit of analysis was their drinking events (if they drank).

As described previously, the CSQF can provide a maximum of three drinking locations in each situation, with a total of five drinking situations. So, each participant had the chance to respond to 15 types ($3 \times 5 = 15$) of drinking events. A drinking event was a unique combination of one specified drinking situation, location, drinking partner(s), beverage type(s), and volume consumed (Figure 7).

4.7   **Data visualization**

Figure 8 depicts the structure of a plot of the relationship between the logarithm of the drinking frequency ratio (X-axis) and the logarithm of the average quantity ratio (Y-axis) between the CSQF and BSQF instruments. The data are plotted in this structure as individual jittered points. The plot is jittered to clearly show individual points. Three lines divide the area into five zones.

In this thesis, the terms "over-report" and "under-report" refer respectively to a higher and lower estimated level of drinking parameters by the specified instrument compared with the other instrument.

Line P is the "equality of effects line" which means that the over- or under-report between instruments is affected equally by both drinking frequency and average quantity. Line Q indicates that the total consumption reported by CSQF is more than 1.5 times higher than the BSQF while Line R indicates the opposite (i.e., the total consumption reported by BSQF is about 1.5 times higher than the CSQF).

Logarithm base 2 was applied to simplify the interpretation, in which a unit increase represents a ratio of 2. For example, if Log_2 ($\text{CSQF}_{\text{quantity}}$ /$\text{BSQF}_{\text{quantity}}$) = 1, then the CSQF over-reported the average quantity compared with the BSQF $2^1 = 2$ times.

Participants in Zones A and B were those whose total consumption was over-reported by the CSQF, whereas participants in Zones C and D were those over-reported by the BSQF. Line P separates Zone A from B and Zone C from D. Zones A and C are where the discrepancy in the average quantity was greater than the discrepancy in frequency. Likewise, in Zones B and D, the discrepancy in frequency was greater than the discrepancy in the average quantity. A ratio of BSQF/CSQF or CSQF/BSQF $\leq$ 1.5 or within 1.5 times was considered to be within the range of equivalence and was represented in the figure by the area between Lines Q and R (Zone E).

Figure 8 The anatomy of jitter plot of frequency ratio and average quantity ratio with five zones

5.   Ethical considerations

The study protocol was approved by the ethics review committee for research in human subjects of the Faculty of Medicine, Prince of Songkla University (Ref no: 59-254-18-1). The objectives, benefits, and harms of the study were explained verbally and in written form to the potential participants. Informed consent was obtained from those who agreed to participate.

CHAPTER 3

RESULTS

1. Part 1: Qualitative method

1.1 Demographic characteristics

A group of 15 current drinkers and their family members who lived with the drinker for more than one year and their neighbors were used in this study. Of all 15 participants, the majority (53.3%) was male and nine (60%) participants were alcohol dependent to hazardous drinkers.

1.2 Alcohol use and drinking pattern of Thai drinkers

Four core categories of Thai drinking patterns were generated from the interview data.

1.2.1 Buddy system

The buddy system and group drinking were defined in terms of at least one of the friends was a buddy drinker who knew the drinker's limit.

1.2.2 Social and cultural drinking

Social and cultural drinking is a symbolic vehicle for constructing interpersonal relationships and behavioral norms. A celebration by a group of friends or family often has few alcohol drinkers.

1.2.3 Seasonal drinking in Thailand

Drinking in Thailand is seasonal and varies by days of the week during holiday seasons (e g., New Year's and Songkran Water Festival holidays) or when there

may be a long holiday period of five to seven days when people celebrate and drink more. On the other hand, during the three-month period of the Buddhist Lent, usually in July to October each year, many drinkers stop drinking for the entire period or drink less frequently.

1.2.4 Drunk driving

Perceptions of alcohol-impaired driving symptoms do not match the legal BAC limit symptoms. Most participants perceived that they cannot drive safe when they had impairments, such as slurred speech, unsteady walking or blurred vision, which fall in the range of 150 to 250 mg/dL of BAC. Past experiences of driving safely while drunk gave them the confidence.

1.3   Expert opinion

The expert panel was four senior researchers from the four main regions of Thailand (i.e., the northern, northeastern, central, and southern regions) which have different drinking cultures and drinking contexts. Each expert judged the questionnaire including the CSQF instrument for content validity. These are the comments and suggestions from the experts on the panel.

- Answering the draft CSQF instrument seems complicated. So, the participant should answer the CSQF by interview by trained interviewers and not provide the answer by themselves. Also, the interviewers should be well trained and frequently check the results.

- Recall bias should be a concern. However, the 3-month time frame is more appropriate than the 12-month time frame in terms of minimizing recall bias.

- A prospective drinking diary is another choice as a gold standard to validate the alcohol indices from the CSQF instrument. However, Thais are not familiar with keeping a diary.

- A small-scale preliminary study should be done before trying to apply the CSQF instrument in a large-scale study.

- Some special events are not mutually exclusive and double counting of drinking events can occur. For instance, the participants can be confused with the difference between a holiday and a party because some parties occur during holidays (i.e., New Year's holiday or Christmas party).

- The BSQF and CSQF questionnaires should be asked in a random sequence to diminish recall bias from answering the prior questionnaire.

- Definitions of terminology (i.e., binge drinking) should be stated clearly in the questionnaire.

2. Part 2: Quantitative method

2.1 Characteristics of participants and drinking events based on the CSQF instrument

2.1.1 *Demographic data by drinking status and drinking patterns*

Among 804 eligible participants (response rate 98.3%), 183 (22.8%) drank in the last three months (Table 10; 82 occasional drinkers and 101 regular drinkers). Most were male, aged 35 to 60 years, Buddhist, married, and had attained a primary school level of education. Most worked in agriculture and had a monthly income of between 10,000 and 26,500 Baht (30 Baht = 1 USD) (Table 11).

There were 456 (56.7%) lifetime abstainers and 165 (20.5%) former drinkers who had a history of drinking but had not consumed anything for the three months prior to the survey (Table 11). Most of the lifetime abstainers were female (86.0%) but most former (63.6%) or current drinkers (85.2%) were male. The age group and marital status distributions were similar between lifetime abstainers, former, and current drinkers. However, the current drinkers were more likely to have a higher level of education and household income. Among current drinkers, the median of average daily intake was 5.9 g/day (IQR 1.33, 23.93) and the distribution of consumption was positively skewed.

Table 10 Drinking status and drinking patterns of participants

Drinking status and patterns	n (%)
Lifetime abstainer	456 (56.7)
Former drinker[1]	165 (20.5)
Current drinker	183 (22.8)
- Occasional drinker (<1 day/week)	82
- Regular drinker (≥1 day/week)	101
Total	**804**

[1] *Former drinkers: who drank but had not consumed anything for three months*

Table 11 Participant characteristics by drinking status and risk of chronic harm categorized based on CSQF instrument (n=804)

Characteristics	Lifetime abstainers (n=456), n (%)	Former drinkers[1] (n=165), n (%)	Current drinkers by risk of chronic harm[2] (n=183), n (%)		
			Low-risk (n=154)	Medium/high-risk (n=29)	Total
Gender					
Male	64 (14.0)	105 (63.6)	128 (83.1)	28 (96.6)	156 (85.2)
Female	392 (86.0)	60 (36.4)	26 (16.9)	1 (3.4)	27 (14.8)
Age (year)					
Median (IQR)	52.0	50.0	46.5	49.0	47.0
	(41.0-63.0)	(39.0-63.0)	(34.2-60.0)	(40.0-57.0)	(35.0-60.0)
15 to 29	41 (9.0)	18 (10.9)	24 (15.6)	2 (6.9)	26 (14.2)
30 to 44	110 (24.1)	47 (28.5)	44 (28.6)	10 (34.5)	54 (29.5)
45 to 59	151 (33.1)	46 (27.9)	45 (29.2)	11 (37.9)	56 (30.6)
≥60	154 (33.8)	54 (32.7)	41 (26.6)	6 (20.7)	47 (25.7)
Marital status					
Married	371 (81.4)	126 (76.4)	124 (80.5)	25 (86.2)	149 (81.4)
Single	48 (10.5)	26 (15.8)	26 (16.9)	3 (10.3)	29 (15.8)
Widowed/divorced/separated	37 (8.1)	13 (7.9)	4 (2.6)	1 (3.4)	5 (2.7)
Education level					
Primary school or less	302 (66.2)	87 (52.7)	74 (48.1)	12 (41.4)	86 (47.0)
High school	88 (19.3)	44 (26.7)	45 (29.2)	13 (44.8)	58 (31.7)
Bachelor and above	66 (14.5)	34 (20.6)	35 (22.7)	4 (13.8)	39 (21.3)
Occupation					
Unemployed	147 (32.2)	45 (27.3)	33 (21.4)	0	33 (18.0)
Laborer	57 (12.5)	28 (17.0)	25 (16.2)	9 (31.0)	34 (18.6)
Agriculture	170 (37.3)	55 (33.3)	69 (44.8)	14 (48.3)	83 (45.4)

Characteristics	Lifetime abstainers (n=456), n (%)	Former drinkers[1] (n=165), n (%)	Current drinkers by risk of chronic harm[2] (n=183), n (%)		
			Low-risk (n=154)	Medium/high-risk (n=29)	Total
Commercial	82 (18.0)	37 (22.4)	27 (17.5)	6 (20.7)	33 (18.0)
Household income level (Baht/month)					
Median (IQR)	10,000 (6,000-20,000)	12,000 (6,000-24,000)	15,000 (10,000-25,000)	15,000 (10,000-30,000)	15,000 (10,000-26,500)
<10,000	181 (39.7)	63 (38.2)	37 (24.0)	7 (24.1)	44 (24.0)
10,000 to 29,999	206 (45.2)	71 (43.0)	84 (54.5)	12 (41.4)	96 (52.5)
≥30,000	69 (15.1)	31 (18.8)	33 (21.4)	10 (34.5)	43 (23.5)
Smoking status					
Non-smoker	431 (94.5)	108 (65.5)	86 (55.8)	11 (37.9)	97 (53.0)
Current smoker	25 (5.5)	57 (34.5)	68 (44.2)	18 (62.1)	86 (47.0)
Average daily intake (g/day)					
Median (IQR)	-	-	3.0 (1.0-14.5)	67.5 (54.7-90.3)	5.88 (1.33-23.93)

IQR, interquartile range

[1] Former drinkers: who drank but had not consumed anything for three months

[2] Criteria for risk of chronic harm on average daily consumption level;

Low-risk: >0-40 g/day in male, >0-20 g/day in female,

Medium to high-risk: >40 g/day in male, >20 g/day in female

2.1.2   *Characteristics by drinking context based on the CSQF instrument*

From the 183 current drinkers, there were 412 drinking events in the past three months derived from the CSQF instrument (Table 12). More than half of the drinking events occurred in special situations (i.e., holiday, party, and cultural drinking). About half of the drinking events occurred outside the drinker's house, mostly in the homes of other people. The majority of drinking events occurred among friends. Beer and whisky were the most common beverages consumed in all drinking events. Most drinking events (65%) occurred in groups in which beverages were shared among 2 to 4, or 5 or more drinkers.

There were significant differences in drinking intensity between drinking situation, partner(s), beverage, and sharing of beverages in a group. Drinking events in special situations yielded higher drinking intensity than drinking events in normal life activities. Drinking events with sharing of beverages in a group also gave higher drinking intensity compared with no sharing.

Table 12 Number, percentages, and drinking intensities of each drinking context based on CSQF instrument (n=412 drinking events from 183 current drinkers)

Drinking context	Drinking event n (%)	Drinking intensity (g/drinking day) median (IQR)	p-value [1]
Drinking situation			
Normal life activity	151 (36.7)	26.1 (9.5, 49.8)	$<0.001_a$*
Special situation activity	261 (63.3)	41.7 (17.8, 73.7)	
Holidays	123	47.4 (18.8, 86.0)	
Party	88	36.9 (15.8, 64.0)	
Cultural event	50	37.6 (20.9, 62.3)	
Drinking location			
Drinker's own house	190 (46.1)	28.7 (13.0, 54.5)	0.08_a
Outside owner's house	222 (53.9)	40.6 (15.8, 73.7)	
Other people's house	152	43.0 (14.9, 74.4)	
Workplace	26	31.3 (19.3, 47.8)	
Restaurant	21	49.8 (24.9, 104.3)	
Local shop/religious place	23	38.7 (9.5, 59.2)	
Drinking partner(s)			
Alone	40 (9.7)	19.0 (9.2, 33.6)	
Family	71 (17.2)	31.6 (15.6, 52.1)	0.003_b*
Friend	254 (61.7)	41.6 (15.7, 73.7)	
Colleagues	47 (11.4)	31.3 (15.8, 62.6)	
Drinking beverage			
Beer	152 (36.9)	24.9 (10.0, 39.1)	
Whisky	152 (36.9)	66.4 (38.6, 110.6)	$<0.001_b$*
White spirit	52 (12.6)	35.4 (8.3, 49.8)	
Others [2]	56 (13.6)	24.6 (9.5, 43.3)	
Sharing of beverages in a group (no. of drinkers/sharing group)			
No sharing	144 (35.0)	26.1 (12.1, 49.8)	0.002_a*
Sharing	268 (65.0)	46.0 (16.5, 73.3)	
2 to 4	126	37.6 (16.4, 55.3)	
≥5	142	46.5 (17.9, 88.5)	

[1] *Testing of drinking intensity among drinking context*
[2] *Others: local beverage, wine, wine cooler, and vodka*
[a] *Ranksum test,* [b] *Kruskal-Wallis test,* * *p-value<0.05*

2.1.3   Drinking context by drinking intensity event based on the CSQF instrument

Based on WHO criteria for acute harm, 215 low-, 79 medium-, and 118 high-intensity drinking events were reported from the CSQF instrument (Table 13). Medium- or high-intensity drinking events were more likely to occur in special situations, particularly during holidays. Whisky was significantly the most common in high-intensity drinking and beer in low-intensity drinking situations. Medium- and high-intensity drinking events were significantly more likely to occur in groups compared to low-intensity drinking.

Table 13 Drinking context by drinking intensity based on CSQF instrument

(n=412 drinking events from 183 current drinkers)

Drinking context	Drinking intensity[1] (n, %)			
	Low-intensity (n=215)	Medium-intensity (n=79)	High-intensity (n=118)	Total
Drinking situation				
Normal life activity	95 (44.2)	25 (31.6)	31 (26.3)	151 (36.7)
Special situation activity	120 (55.8)	54 (69.4)	87 (73.7)	261 (63.3)
Holidays	49	25	49	123
Party	43	20	25	88
Cultural event	28	9	13	50
Drinking location				
Drinker's own house	110 (51.2)	36 (45.6)	44 (37.3)	190 (46.1)
Outside own house	105 (48.8)	43 (54.4)	74 (62.7)	222 (53.9)
Other people's house	71	29	52	152
Workplace	14	8	4	26
Restaurant	7	3	11	21
Local shop/religious place	13	3	7	23
Drinking partner(s)				
Alone	33 (15.3)	2 (2.5)	5 (4.2)	40 (9.7)
Family	37 (17.2)	18 (22.8)	16 (13.6)	71 (17.2)
Friend	122 (56.7)	49 (62.0)	83 (70.3)	254 (61.7)
Colleagues	23 (10.7)	10 (12.7)	14 (11.9)	47 (11.4)
Drinking beverage				
Beer	114 (53.0)	24 (30.4)	14 (11.9)	152 (36.9)
Whisky	39 (18.1)	27 (34.2)	86 (72.9)	152 (36.9)
White spirit	29 (13.5)	12 (15.2)	11 (9.3)	52 (12.6)
Others [2]	33 (15.3)	16 (20.3)	7 (5.9)	56 (13.6)
Sharing of beverages in a group (no. of drinkers/sharing group)				
No sharing	89 (41.4)	22 (27.8)	33 (28.0)	144 (35.0)
Sharing	126 (58.6)	57 (72.2)	85 (72.0)	268 (65.0)
2 to 4	64	32	30	126
≥5	62	25	55	142

[1] Low-intensity: >0-40 g/drinking day in male, >0-20 g/drinking day in female,
  Medium-intensity: 41-60 g/drinking day in male, 21-40 g/drinking day in female,
  High-intensity: >60 g/drinking day in male, >40 g/drinking day in female
[2] Others: local beverage, wine, wine cooler, and vodka

2.1.4   Relationship between drinking situations, locations, and partner(s)

About a quarter of the drinking events occurred at the drinker's own house during normal life activities (24.03%), drinker's own house with friends (23.79%), and at other people's houses with friends (28.88%). More than 15% of all drinking events occurred at the drinker's own house during a holiday (15.78%), other people's houses during a party (15.29%), and with friends during normal life activities (20.39%) or holidays (18.2%). Other drinking events occurred in less than 10% of all drinking events (Table 14, Table 15, and Table 16).

For a combination of three drinking contexts (i.e., drinking situation, location, and partner(s)) (Table 17), 120 drinking events (29%) occurred in special situation activities outside the owner's house with a friend, followed by drinking events that occurred in the drinkers' own house with friends in special situation activities (12.14%) and in normal life activities (11.65%) (see, Annex 5 Drinking events with drinking contexts).

Table 14 Relationships between drinking situations and drinking locations (n=412 drinking events)

Drinking situation	Location, n (%)											
	Drinker's own house		Other people's house		Workplace		Restaurant		Local shop/ religious place		Total	
Normal life activities	99	(24.03)	27	(6.55)	11	(2.67)	8	(1.94)	6	(1.46)	151	(36.65)
Holidays	65	(15.78)	42	(10.19)	5	(1.21)	9	(2.18)	2	(0.49)	123	(29.85)
Party	11	(2.67)	63	(15.29)	9	(2.18)	4	(0.97)	1	(0.24)	88	(21.36)
Cultural event	15	(3.64)	20	(4.85)	1	(0.24)	0	(0)	14	(3.40)	50	(12.14)
Total	190	(46.12)	152	(36.89)	26	(6.31)	21	(5.10)	23	(5.58)	412	(100)

Table 15 Relationships between drinking situations and drinking partner(s) (n=412 drinking events)

Drinking situation	Drinking partner(s), n (%)									
	Alone		Family		Friend		Colleagues		Total	
Normal life activities	35	(8.50)	18	(4.37)	84	(20.39)	14	(3.40)	151	(36.66)
Holidays	3	(0.73)	33	(8.01)	75	(18.20)	12	(2.91)	123	(29.85)
Party	1	(0.24)	10	(2.43)	59	(14.32)	18	(4.37)	88	(21.36)
Cultural event	1	(0.24)	10	(2.43)	36	(8.74)	3	(0.73)	50	(12.14)
Total	40	(9.71)	71	(17.23)	254	(61.65)	47	(11.41)	412	(100)

Table 16 Relationships between drinking locations and drinking partner(s) (n=412 drinking events)

Drinking location	Drinking partner(s), n (%)									
	Alone		Family		Friend		Colleagues		Total	
Drinker's own house	36	(8.74)	46	(11.17)	98	(23.79)	10	(2.43)	190	(46.13)
Other people's house	2	(0.49)	22	(5.34)	119	(28.88)	9	(2.18)	152	(36.89)
Workplace	0	(0)	0	(0)	6	(1.46)	20	(4.85)	26	(6.31)
Restaurant	1	(0.24)	2	(0.49)	12	(2.91)	6	(1.46)	21	(5.10)
Local shop/religious place	1	(0.24)	1	(0.24)	19	(4.61)	2	(0.49)	23	(5.58)
Total	40	(9.71)	71	(17.23)	254	(61.65)	47	(11.41)	412	(100)

Table 17 Number and percentages of drinking events in common drinking contexts

No.	Situation	Location	Partner(s)	n	(%)
1	Special situation activity	Outside owner's house	Friend	120	(29.13)
2	Special situation activity	Drinker's own house	Friend	50	(12.14)
3	Normal life activity	Drinker's own house	Friend	48	(11.65)
4	Normal life activity	Outside owner's house	Friend	36	(8.74)
5	Normal life activity	Drinker's own house	Alone	33	(8.01)
6	Special situation activity	Drinker's own house	Family	32	(7.77)
7	Special situation activity	Outside owner's house	Colleagues	27	(6.55)
8	Special situation activity	Outside owner's house	Family	21	(5.10)
9	Normal life activity	Drinker's own house	Family	14	(3.40)
10	Normal life activity	Outside owner's house	Colleagues	10	(2.43)
11	Special situation activity	Drinker's own house	Colleagues	6	(1.46)
12	Normal life activity	Outside owner's house	Family	4	(0.97)
13	Normal life activity	Drinker's own house	Colleagues	4	(0.97)
14	Special situation activity	Drinker's own house	Alone	3	(0.73)
15	Special situation activity	Outside owner's house	Alone	2	(0.49)
16	Normal life activity	Outside owner's house	Alone	2	(0.49)
	Total			**412**	**(100)**

2.2   Comparisons of alcohol consumption indices between BSQF and CSQF

2.2.1   Comparisons of drinking frequency, average quantity and total consumption between BSQF and CSQF

Comparisons of drinking frequency, average quantity, and total consumption ratio are presented in Table 18. The CSQF instrument over-reported the average quantity in 39% to 50% of current drinkers, whereas the BSQF over-reported in 7% to 23%. More than half of the participants reported equivalent drinking frequency by the BSQF and CSQF: 62.2% for beer, 75.0% for white spirits, 55.6% for whisky, and 60.7% for other beverages.

Regarding total consumption, over-reports by the CSQF were found in approximately 50% of current drinkers for almost all types of beverages except for "other beverages" comprising local beverage, wine, wine coolers or vodka (46.7% for beer, 50.0% for white spirits, 50.6% for whisky, and 35.7% for other beverages). The over-report of total consumption by the CSQF was mainly attributable to over-reported average quantity (average quantity effect vs. frequency effect: 73.8% vs. 23.8% for beer, 78.6% vs. 14.3% for white spirits, 63.4% vs. 26.8% for whisky, and 100% vs. 0% for other beverages). Interestingly, less than 30% of current drinkers reported higher average quantity, drinking frequency or total consumption by the BSQF instrument.

Table 18 Comparisons of frequency, average quantity, and total consumption ratios reported using different instruments (CSQF and BSQF) within the same participant

Comparison instrument by beverage	Alcohol consumption parameter, n, (%)			
	(1) Average quantity ratio	(2) Frequency ratio	(3) Total consumption ratio	Number (%) of participants over-reporting total consumption [a]
1. Beer				
CSQF over-report [b]	38 (42.2)	29 (32.2)	42 (46.7)	31 (73.8) vs 10 (23.8) vs 1 (2.4)
BSQF over-report [c]	21 (23.3)	5 (5.6)	21 (23.3)	17 (81.0) vs 4 (19.0) vs 0
Equivalence [d]	31 (34.4)	56 (62.2)	27 (30.0)	-
Total	90	90	90	
2. White spirits				
CSQF over-report [b]	12 (42.9)	5 (17.9)	14 (50.0)	11 (78.6) vs 2 (14.3) vs 1 (7.1)
BSQF over-report [c]	2 (7.1)	2 (7.1)	4 (14.3)	2 (50.0) vs 2 (50.0) vs 0
Equivalence [d]	14 (50. 0)	21 (75.0)	10 (35.7)	-
Total	28	28	28	
3. Whisky				
CSQF over-report [b]	41 (50.6)	26 (32.1)	41 (50.6)	26 (63.4) vs 11 (26.8) vs 4 (9.8)

Comparison instrument by beverage	Alcohol consumption parameter, n, (%)			
	(1) Average quantity ratio	**(2) Frequency ratio**	**(3) Total consumption ratio**	**Number (%) of participants over-reporting total consumption [a]**
BSQF over-report [c]	6 (7.4)	10 (12.3)	10 (12.3)	5 (50.0) vs 5 (50.0) vs 0
Equivalence [d]	34 (42.0)	45 (55.6)	30 (37.0)	-
Total	81	81	81	
4. Others (local beverage, wine, wine coolers or vodka)				
CSQF over-report [b]	11 (39.3)	3 (10.7)	10 (35.7)	10 (100.0) vs 0 vs 0
BSQF over-report [c]	2 (7.1)	8 (28.6)	8 (28.6)	1 (12.5) vs 7 (87.5)
Equivalence [d]	15 (53.6)	17 (60.7)	10 (35.7)	-
Total	28	28	28	

[a] *average quantity (Zones A, C) vs frequency (Zones B, D) vs both effects (Line P)*

[b] *parameter reported by CSQF is more than 1.5 times higher than the BSQF [Log_2 (CSQF/BSQF) > 0.58; CSQF/BSQF > 1.50],*

[c] *parameter reported by BSQF is more than 1.5 times higher than the CSQF [Log_2 (CSQF/BSQF) < -0.58; CSQF/BSQF < 1/1.50],*

[d] *parameter reported by CSQF or BSQF is within 1.5 times that of the other instrument*

[$-0.58 \leq Log_2$ (CSQF/BSQF) ≤ 0.58; $1/1.50 \leq CSQF/BSQF \leq 1.50$]

Figure 9 has four jitter plots for specific beverages depicting the relationship between drinking frequency ratio (X-axis), quantity ratio (Y-axis) and total consumption (CSQF over-report in Zone A, B and BSQF over-report in Zone C, D and equivalence in Zone E; more details in (Data visualization part). These figures visualize the complex results from Table 18 Comparisons of frequency, average quantity, and total consumption ratios reported using different instruments (CSQF and BSQF) within the same participant clearly and concisely. Figure A, B, and C highlight the preponderance of points in the CSQF over-report areas (Zones A and B) with more in Zone A (average quantity over-report) than in Zone B (frequency over-report).
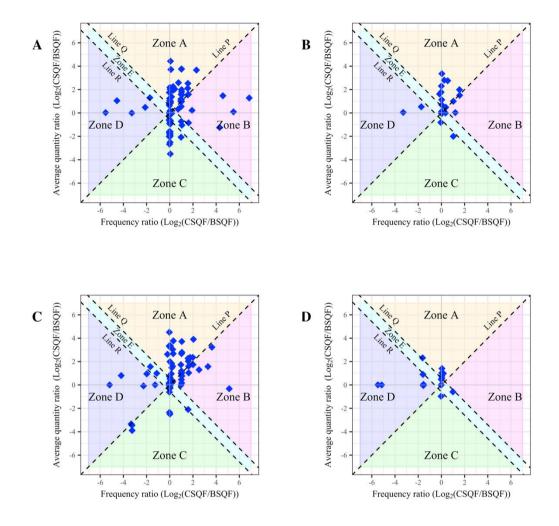
Figure 9 Jitter plots of drinking frequency ratio and average quantity ratio for beer (A), white spirit (B), whisky (C) and other beverages (D)

Zone A represents CSQF over-report by average quantity, Zone B represents CSQF over-report by frequency, Zone C represents BSQF over-report by average quantity, Zone D represents BSQF over-report by frequency and Zone E represents equivalence; Line P represents the equality both effects line, Line Q represents CSQF over-report 1.5 times and Line R represents BSQF over-report 1.5 times

2.2.2 *Effects of CSQF-BSQF quantity and frequency ratios on total consumption ratios*

Table 19 Multiple linear regression analysis of the ratio of total consumption (dependent variable) against ratio of frequency and ratio of average quantity (independent variables) between CSQF and BSQF presents the results of multiple linear regression analyses to explain the effects of drinking quantity and frequency measured by CSQF and BSQF methods on the Log_2 of total consumption ratios based on unstandardized, and standardized regression coefficients and partial correlation.

The ratios of CSQF to BSQF total consumption could be explained more by the discrepancies in drinking frequency reported by the two methods for most types of beverages than by the discrepancies in drinking quantity (beta of frequency ratio vs. average quantity ratio = 1.309 vs. 1.099 or $2^{1.309}/2^{1.099} = 1.16$ times for beer, 1.02 times for whisky and 1.84 times for other beverages) except for drinking of white spirits (beta of frequency vs. average quantity ratio = 0.759 vs. 0.978 or $2^{0.759}/2^{0.978} = 0.86$ times). In a precise sense it revealed that a one standard deviation increase in the frequency variable ratio (as Log_2) between the instruments implied an expected difference of $2^{1.309} = 2.48$ times of ratio difference in the total consumption of beer, whereas a one standard deviation increase in the average quantity ratio (as Log_2) implied only $2^{1.099} = 2.14$ times of ratio difference in the total consumption of beer. The partial correlation coefficient trends are in conformity with the standardized regression coefficients.

Table 19 Multiple linear regression analysis of the ratio of total consumption (dependent variable) against ratio of frequency and ratio of average quantity (independent variables) between CSQF and BSQF

Variable	Standardized coefficient				Unstandardized coefficient				Partial correlation
	Beta	se	t value	p-value	B	se	t value	p-value	
1. Beer									
Intercept	0.197	0.073	2.690	0.009	-0.414	0.077	-5.366	<0.001	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.309	0.074	17.598	<0.001	0.850	0.048	17.598	<0.001	0.884
Average quantity ratio between CSQF and BSQF (Log$_2$)	1.099	0.074	14.781	<0.001	0.716	0.048	14.781	<0.001	0.846
2. White spirits									
Intercept	0.295	0.130	2.260	0.033	-0.373	0.153	-2.443	0.022	
Frequency ratio between CSQF and BSQF (Log$_2$)	0.759	0.134	5.663	<0.001	0.830	0.147	5.663	<0.001	0.750
Average quantity ratio between CSQF and BSQF (Log$_2$)	0.978	0.134	7.299	<0.001	0.821	0.112	7.299	<0.001	0.825
3. Whisky									
Intercept	0.427	0.070	6.117	<0.001	-0.446	0.078	-5.724	<0.001	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.406	0.076	18.415	<0.001	0.923	0.050	18.415	<0.001	0.902
Average quantity ratio between CSQF and BSQF (Log$_2$)	1.375	0.076	18.014	<0.001	0.832	0.046	18.014	<0.001	0.898
4. Others (local beverage, wine, wine coolers or vodka)									
Intercept	-0.896	0.103	-8.702	<0.001	-0.417	0.136	-3.069	0.007	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.464	0.106	13.772	<0.001	0.859	0.062	13.772	<0.001	0.958
Average quantity ratio between CSQF and BSQF (Log$_2$)	0.583	0.106	5.486	<0.001	0.786	0.143	5.486	<0.001	0.799

2.2.3 Comparisons of alcohol consumption indices of the whole sample between CSQF and BSQF

A summary of the alcohol consumption indices for each instrument is presented in Table 20. Even though the CSQF provided higher alcohol total consumption at the individual level, there was no significant difference in the average daily intake, 3-month per drinker consumption or 3-month per capita consumption between instruments in the sample level analysis. However, the CSQF provided drinking contexts which the BSQF did not, while the interview duration and the burden of the participants to answer the questions for the CSQF were not significantly higher than those for the BSQF. The median time actually spent answering the instrument was 3 (interquartile range [IQR], <1 to 3) minutes for CSQF and 2 (IQR, <1 to 2) minutes for BSQF. The burden of the participants placed on both instruments was rated at 2 (IQR, 1 to 2) from a total score of five.

Table 20 Summary drinking variables by measurement instruments (BSQF and CSQF; n=804 with 183 current drinkers)

Alcohol indices and others	CSQF	BSQF	Median difference (95% CI) [a]
Drinking indices			
Average daily intake (n=183) (g/drinker/day), Median (IQR)	8.66 (3.11-27.34)	7.54 (2.36-24.61)	0.56 (-0.30, 2.50)
3-month per drinker consumption (n=183) (g/drinker/3 months), Median (IQR)	796.32 (286.18-2,515.46)	693.23 (217.15-2,264.53)	51.82 (-27.93, 229.89)
3-month per capita consumption (n=804) (g/capita/3 months), Mean, (SD)	472.85 (1,651.41)	412.77 (1,550.92)	51.82 (-27.93, 229.89)
Interview duration (n=183) (minute), Median (IQR)	*3 (<1-3)*	*2 (<1-2)*	1.00 (0, 1.00)
Participation's burden (n=183) (total score = 5), Median (IQR)	*2 (1-2)*	*2 (1-2)*	1.00 (0, 1.00)

[a] *Wilcoxon signed-rank test*

2.2.4   WHO drinking categories between BSQF and CSQF

Table 21 shows the classification of WHO drinking categories by the two instruments. The rates of matched categories between BSQF and CSQF were high, with sum of the matched frequencies of the categories accounting for 69.4% (low risk 28.4%, medium risk 2.7% and high risk 38.3%).

The distribution of the categorized consumption indices differed significantly between instruments ($\chi^2_{\text{BSQF vs CSQF}} = 74.13$, *df* = 4, p<0.001) while the kappa index of agreement between BSQF and CSQF categories was 0.48 (95% CI 0.42-0.54), indicating moderate agreement beyond chance. In summary, the WHO drinking categories were dependent on the measurement tools, which had moderate agreement.

Table 21 Comparisons of WHO drinking categories between BSQF and CSQF (n=183)

Measurements		CSQF							
		Low risk		**Medium risk**		**High risk**		**Total**	
BSQF	**Low risk**	**52**	**(28.4%)**	11	(6.0%)	21	(11.5%)	84	(45.9%)
	Medium risk	3	(1.6%)	**5**	**(2.7%)**	11	(6.0%)	19	(10.4%)
	High risk	6	(3.3%)	4	(2.2%)	**70**	**(38.3%)**	80	(43.7%)
	Total	61	(33.3%)	20	(10.9%)	102	(55.7%)	183	(100%)
		Sum of the matched frequencies of the categories = 69.4%							

183, is the denominator of the marginal probabilities in the parentheses

2.3 **Alcohol-related consequences: risky drinkers and drinking events based on the CSQF instrument and WHO criteria**

Alcohol consumption indices, risky drinkers, and drinking events in this part were derived from the CSQF instrument.

2.3.1 *Influencing factors for risky drinkers*

A higher level of education (i.e., high school, bachelor and above) was associated with low risk drinkers (relative risk ratio [RRR] = 1.97, 95% confidence interval [CI] 1.33, 2.92) and medium/high-risk drinkers (RRR = 2.84, 95% CI 1.27-6.36) rather than with abstainers (Table 22). Current smoking was also more common in low-risk drinkers (RRR = 5.70, 95% CI 3.78-8.58) and medium/high-risk drinkers (RRR = 12.24, 95% CI 5.49-27.29) than in abstainers. The RRRs of these two factors (education level and smoking status) were higher in higher risk drinkers. Only low-risk drinkers were associated with working in agriculture (RRR = 1.78, 95% CI 1.20-2.63) and high household income level (≥10,000 Baht/month) (RRR = 1.92, 95% CI 1.24-2.97).

Table 22 Relationship between drinking status and general characteristics

Variables[1]	Low-risk drinkers versus Lifetime abstainers/former drinkers (ref.)		Medium/high-risk drinkers versus Lifetime abstainers/former drinkers (ref.)	
	RRR (95% CI)	p-value	RRR (95% CI)	p-value
Education level				
Primary school or less	1	-	1	-
Higher than primary school	**1.97 (1.33-2.92)**	*<0.001**	**2.84 (1.27-6.36)**	*0.01**
Occupation				
Non-agriculture	1	-	1	-
Agriculture	**1.78 (1.20-2.63)**	*0.004**	2.17 (0.99-4.78)	0.05
Household income level (Baht/month)				
<10,000	1	-	1	-
≥10,000	**1.92 (1.24-2.97)**	*0.004**	1.86 (0.75-4.66)	0.18
Smoking status				
Non-smoker	1	-	1	-
Current smoker	**5.70 (3.78-8.58)**	*<0.001**	**12.24 (5.49-27.29)**	*<0.001**

RRR, relative risk ratio; CI, confidence interval

[1] Variables in the table remained after model adjustment

[*] p-value<0.05, Variables in the table remained after model adjustment

2.3.2 Influencing factors for medium- and high-intensity drinking events

A higher level of education (i.e., high school, bachelor and above) was an independent predictive factor for having medium- (adjusted odds ratio [aOR] = 4.74, 95% CI 4.73-4.75) and high-intensity drinking events (aOR = 5.23, 95% CI 1.38-19.77), rather than low-intensity drinking events (Table 23). Drinking events linked to special occasions were more likely to be of medium- (aOR = 2.46, 95% CI 2.46-2.47), and high-intensity (aOR = 2.78, 95% CI 1.23-6.28). Drinking white spirit/whisky and others (i.e., local beverage, wine, wine cooler, and vodka) strongly predicted only the medium-intensity drinking events (aOR = 7.27, 95% CI 7.25-7.29).

Table 23 Relationship between predictors and drinking-intensity events (n=412 drinking events from 183 current drinkers)

Variables[1]	Medium- versus Low-intensity (ref.)		High- versus Low-intensity (ref.)	
	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age group (year)				
15-29	-	-	1	-
30-44	-	-	2.89 (0.61-13.75)	0.18
45-59	-	-	2.87 (0.49-16.86)	0.24
60+	-	-	0.31 (0.04-2.59)	0.28
Education level				
Primary school or less	1	-	1	-
Higher than primary school	*4.74 (4.73-4.75)*	*<0.001**	*5.23 (1.38-19.77)*	*0.01**
Drinking situation				
Normal life activity	1	-	1	-
Special situation activity	*2.46 (2.46-2.47)*	*<0.001**	*2.78 (1.23-6.28)*	*0.01**
Drinking partner(s)				
Alone/family	-	-	1	-
Friends/colleagues	-	-	2.58 (0.96-6.92)	0.06
Beverage				
Beer	1	-	-	-
White spirit/whisky/others[2]	*7.27 (7.25-7.29)*	*<0.001**	-	-

*Adjusted OR, adjusted odds ratio; CI, confidence interval, * p-value<0.05*

[1] Variables in the table remained after model adjustment

[2] Others: local beverage, wine, wine cooler, and vodka

2.4   Alcohol-related consequences: Health-Related Quality of Life (HRQoL)

This part applies a case-control design using data of the original study. The participants with low-to-moderate HRQoL (EQ-5D index ≤0.8, n = 108) were assigned to be a case group. Taking a case and control ratio of 1:4, participants with high HRQoL (EQ-5D index >0.8, n = 443) whose households were nearest to the cases' houses were assigned as a control group. This sample size was deemed adequate for testing the hypothesis when an odds ratio (OR) was set at 3.0 and the probability of drinking among low-to-moderate HRQoL group (case) was set at 5.0% with a power of 80.0% and a standard error of 5.0%.

2.4.1   Demographic characteristics

Table 24 shows a summary of the demographic characteristics of the sample. The case and control groups were not significantly different in terms of gender and religion. There were significant differences in age group, marital status, education level, occupation, monthly household income level and smoking status between case and control groups.

Table 24 Characteristics of the participants by the HRQoL group (n = 551)

Characteristics	Low-to-moderate HRQoL (n = 108), n (%)	High HRQoL (n = 443), n (%)	p-value
Gender			
Male	40 (37.0)	138 (31.2)	0.290 a
Female	68 (63.0)	305 (68.8)	
Age (year)			
Mean (SD)	63.0 (15.4)	49.1 (15.9)	<0.001* b
15-29	2 (1.9)	51 (11.5)	
30-44	13 (12.0)	124 (28.0)	<0.001* a
45-59	24 (22.2)	148 (33.4)	
≥60	69 (63.9)	120 (27.1)	
Religion			
Buddhism	106 (98.1)	441 (99.5)	0.174 c
Muslim	2 (1.9)	2 (0.5)	
Marital status			
Married	85 (78.7)	351 (79.2)	
Single	7 (6.5)	59 (13.3)	0.013* a
Widowed/divorced/separated	16 (14.8)	33 (7.4)	
Education level			
Illiterate	16 (14.8)	16 (3.6)	
Primary school	75 (69.4)	232 (52.4)	
Junior high school	3 (2.8)	62 (14.0)	<0.001* a
Senior high school	4 (3.7)	54 (12.2)	
Vocational certification	2 (1.9)	35 (7.9)	
Bachelor and above	8 (7.4)	44 (9.9)	
Occupation			
Laborer	7 (6.5)	66 (14.9)	
Agriculture	32 (29.6)	164 (37.0)	
Commercial	7 (6.5)	53 (12.0)	<0.001* a
Unemployment	57 (52.8)	89 (20.1)	
Others	5 (4.6)	71 (16)	
Household income level (Baht/month)			
Median (IQR)	10,000 (4,752, 20,000)	10,000 (7,000, 20,000)	0.095 d
<5,000	27 (25.0)	54 (12.2)	0.008* a
5,000-9,999	21 (19.4)	110 (24.8)	
10,000-19,999	26 (24.1)	134 (30.2)	

Characteristics	Low-to-moderate HRQoL (n = 108), n (%)	High HRQoL (n = 443), n (%)	p-value
≥20,000	34 (31.5)	145 (32.7)	
Smoking status			
Non-smoker	73 (67.6)	358 (80.8)	
Ex-smoker	12 (11.1)	17 (3.8)	<0.001[*][a]
Current smoker (≥1 time/week)	9 (8.3)	10 (2.3)	
Current smoker (<1 time/week)	14 (13.0)	58 (13.1)	
Drinking status			
Lifetime abstainer	67 (62.0)	287 (64.8)	
Past 12-month abstainers	31 (28.7)	134 (30.2)	
Light drinker (0.1-7 drinks/week)	8 (7.4)	17 (3.8)	0.325[c]
Moderate to heavy drinker (>7 drinks/week)	2 (1.9)	5 (1.1)	
Heavy episodic drinking status			
Lifetime abstainer	67 (62.0)	287 (64.8)	
Past 12-month abstainers	31 (28.7)	134 (30.2)	
No heavy episodic drinker	4 (3.7)	8 (1.8)	0.314[c]
Non-regular (<1 time/week)	3 (2.8)	4 (0.9)	
Regular (>1 time/week)	3 (2.8)	10 (2.3)	

[a] *Chi-square test,* [b] *t-test,* [c] *Fisher's exact test,* [d] *Mann–Whitney U test,* [*] *p-value<0.05*

2.4.2   Health-Related Quality of Life (HRQoL) and influencing predictors

Primary predictor: alcohol drinking status

Table 25 displays the results of univariate and multivariate binary logistic regression on the predictors for low-to-moderate HRQoL. After adjusting for other variables, light drinkers were 3.16 times (95% CI 1.08-9.20) as likely to have low-to-moderate HRQoL, compared to lifetime abstainers. However, no significant associations were found for moderate to heavy drinking (OR = 3.55, 95% CI 0.49-25.49) and past 12-month abstinence (OR = 0.86, 95% CI 0.45-1.63).

Low-to-moderate HRQoL group had higher proportions of elderly aged ≥ 60 years (63.9% vs 27.1%), widowed/divorced/separated (14.8% vs 7.4%), unemployed (52.8% vs 20.1%), having a monthly household income <5,000 Baht/month (25.0% vs 12.2%), regular current smokers (8.3% vs 2.3%) and light drinkers (7.4% vs 3.8%).

Other predictors

Elderly age group (≥ 60 years) was associated with the risk of low-to-moderate HRQoL (OR = 5.63, 95% CI 1.12-28.28), compared to adolescence and young adult group (15-29 years). Unemployed individuals were about 5.82 times (95% CI 2.21-15.32) the odds of low-to-moderate HRQoL compared to laborers. Regular smokers (≥ 1 time/week) (OR = 5.26, 95% CI 1.65-16.77) or former smokers (OR = 3.92, 95% CI 1.50-10.20) were more likely to have low-to-moderate HRQoL, compared to non-smokers. The interaction between smoking and drinking status was not significant (p-value = 0.49).

On the other hand, education status was a significant protective predictor, having a junior or senior high school education decreased the odds of low-to-moderate HRQoL about 10 times (OR = 0.10, 95% CI 0.02-0.42) and 4.8 times (OR = 0.21, 95% CI 0.05-0.82), compared with being illiterate, respectively.

Health-Related Quality of Life domains and drinking status

Table 26 indicated that there was a statistically significant association between pain/discomfort domain of the EQ-5D and drinking status (p-value = 0.01). Pain/discomfort was the most frequently reported domain, followed by mobility domain.

Table 25 Analysis of influencing predictors for low-to-moderate HRQoL by univariate and multivariate logistic regression models (n = 551)

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value (Wald's test)	p-value (LR-test)
Age group (year) [ref. = 15-29]				
30-44	2.67 (0.58-12.27)	2.54 (0.48-13.28)	0.270	0.012
45-59	4.14 (0.94-18.10)	2.70 (0.53-13.88)	0.234	
≥60	**14.66 (3.46-62.07)**	**5.63 (1.12-28.28)**	0.036	
Education status [ref. = Illiterate]				
Primary school	**0.32 (0.15-0.68)**	0.55 (0.25-1.24)	0.150	0.006
Junior high school	**0.05 (0.01-0.19)**	**0.10 (0.02-0.42)**	0.002	
Senior high school	**0.07 (0.02-0.25)**	**0.21 (0.05-0.82)**	0.025	
Vocational certification	**0.06 (0.01-0.28)**	0.25 (0.04-1.38)	0.111	
Bachelor and above	**0.18 (0.07-0.51)**	0.65 (0.18-2.29)	0.503	
Occupation [ref. = Laborer]				
Agriculture	1.84 (0.77-4.37)	1.91 (0.74-4.97)	0.184	<0.001
Commercial	1.25 (0.41-3.77)	1.83 (0.54-6.16)	0.331	
Unemployment	**6.04 (2.59, 14.09)**	**5.82 (2.21, 15.32)**	<0.001	

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value (Wald's test)	p-value (LR-test)
Others	0.66 (0.20, 2.19)	1.01 (0.26, 3.94)	0.984	
Smoking status [ref. = Non-smoker]				
Former-smoker	**3.46 (1.59, 7.56)**	**3.92 (1.50, 10.20)**	0.005	0.004
Regular smoker (≥1 time/week)	**4.41 (1.73, 11.24)**	**5.26 (1.65, 16.77)**	0.005	
Occasional smoker (<1 time/week)	1.18 (0.63, 2.24)	1.27 (0.56, 2.84)	0.568	
Drinking status [ref. = Lifetime abstainer]				
Past 12-month abstainers	0.99 (0.62, 1.59)	0.86 (0.45, 1.63)	0.646	0.089
Light drinker (0.1-7 drinks/week)	2.02 (0.83, 4.87)	**3.16 (1.08, 9.20)**	0.035	
Moderate to heavy drinker (>7 drinks/week)	1.71 (0.33, 9.02)	3.55 (0.49, 25.49)	0.208	

Table 26 Proportion of EQ-5D domains by drinking status (n = 551)

Drinking status	EQ-5D domains, n (%)									
	1st domain Mobility		2nd domain Self-care		3rd domain Usual activities		4th domain Pain/discomfort		5th domain Anxiety/depression	
	Yes 1	No 2	Yes 1	No 2	Yes 1	No 2	Yes 1	No 2	Yes 1	No 2
Lifetime abstainer	78 (62.9)	276 (64.6)	15 (71.4)	339 (64.0)	47 (68.1)	307 (63.7)	150 (66.7)	204 (62.6)	32 (57.1)	322 (65.1)
Past 12-month abstainers	37 (29.8)	128 (30.0)	6 (28.6)	159 (30.0)	17 (24.6)	148 (30.7)	55 (24.4)	110 (33.7)	19 (33.9)	146 (29.5)
Light drinker (0.1-7 drinks/week)	7 (5.6)	18 (4.2)	-	25 (4.7)	4 (5.8)	21 (4.4)	16 (7.1)	9 (2.8)	4 (7.1)	21 (4.2)
Moderate to heavy drinker (>7 drinks/week)	2 (1.6)	5 (1.2)	-	7 (1.3)	1 (1.4)	6 (1.2)	4 (1.8)	3 (0.9)	1 (1.8)	6 (1.2)
Total	124	427	21	530	69	482	225	326	56	495
p-value	0.89 a		0.84 b		0.65 b		*0.01* b		0.43 a	

1 *Problem: score = 2 (slight problems) to 5 (extreme problems)*

2 *No problem: score = 1*

a *Chi-square test,* b *Fisher's exact test,* * *p-value<0.05*

CHAPTER 4

DISCUSSION

1. Summary of the key findings

This thesis aimed to develop a questionnaire with a contextual approach to measure alcohol consumption and the drinking context in a community setting. There were three steps for development of the CSQF instrument. The first step was the conceptualization phase that started with documents from an extensive literature review, results from in-depth interviews, and a review by a panel of experts. Second, convergent validity testing was evaluated using a community-based survey in Songkhla Province, Thailand. Lastly, the implications of the CSQF instrument were examined. For example, identifying the drinking context for risky drinking and testing low level consumption was associated with a lower HRQoL.

The CSQF questionnaire could provide a comprehensive picture of drinking behavior. It describes not only the drinking beverage and quantity but also the drinking context (i.e., drinking situation, location, partner, and sharing of beverages in a group). Moreover, the contextual approach was likely to have increased recall ability.

In previous research with the context approach, there were relatively few studies in the United States and Canada and only one study in New Zealand (Table 27 and Table 28). Hilton developed a setting-specific questionnaire.[34] For example, "go out for an evening meal at a restaurant", "go to a club or organizational meeting", and "go to bars, taverns or cocktail lounges". The social activities specific questionnaire reported higher alcohol consumption compared with the amounts they did overall. Clark's social activities measurement[87] was used by Single and Wortley.[33, 88] There

were 11 specific activities such as "go to a bar or tavern", "attend a party, social gathering or wedding", and "spend a quiet evening at home". Using convergent validity, this questionnaire reported higher weekly alcohol consumption than the results from the recent occasions and QF method. Moreover, the results also accounted for about half (48.8%) of the sales data, which was higher than the other methods. A within-location beverage-specific consumption instrument provided high correlation coefficients between alcohol consumption and their consequences and drunkenness and also accounted for 94% of the alcohol sales data. However, previous strategies to contextualize questions did not thoroughly inquire about the specific details of the drinking events. So, the results could not provide complete information about drinking behavior. Our CSQF has tried to fill this gap by demonstrating a fuller picture of the drinking context (i.e., drinking situation, location, drinking partner(s), beverage, and sharing of beverages in a group).

Table 27 Summary of context approach questionnaires

Context approach questionnaire	Question
Social activities questionnaire **[Hilton, 1986][34]**	- How often did you go to…*(14 social activities*)*…? - How often did you drink an alcoholic beverage during…(specific activity)…? - And, how many standard drinks did you typically have during…(specific activity)…?
Specific setting approach **[Eric Single & Wortley, 1993][88]**	*Clark's social activities measurement [Clark, 1985][87]* - How often did you go to….*(11 specific activities*)*…? - How often did you drink when you went to…. (specific activities)…? - And, how much did you usually have when you went to…. (specific activities)…?
Typical location **[Wyllie, Zhang, & Casswell, 1994][35]**	- How often did you drink alcoholic beverages at… *(11 locations)*…? - How often did you typically drink at…(specific location)…? - How many standard drinks did you typically have at…(specific location)…?
Within-location beverage-specific questions **[Casswell, Huckle, & Pledger, 2002][36]**	- Which type of alcohol was consumed at … *(10 locations***)*…? - How often did you drink at… (specific location)…? - How much did you drink at…(specific location)…?

* For example: "go out for an evening meal at restaurant", "go to club or organizational meeting", and "go to picnic/beach"

** For example: "go to a bar", "attend a party, social gathering or wedding", and "spend a quiet evening at home"

*** For example: "own house", "restaurant", "workplace", and "public areas"

Table 28 Previous studies of context approach questionnaires

Context approach questionnaire	Country	Comparison	Result	Other
Social activities questionnaire [Hilton, 1986][34]	USA	- Convergent validity: social activities questionnaire vs overall consumption	- Outcome: consumption (standard drinks/month) - 9.6% of all drinkers reported that they drank more in specific activity (i.e., going to bar) than they reported by overall consumption and 6.0% of all drinkers drank more at parties than reported by the overall consumption.	- The drinkers may be more willing to provide their actual consumption or more inclined to exaggerate that level when asked about these occasions. - The specification of social activities may jog their memory into remembering some information (i.e., drinking occasions or amounts), which have been forgotten.
Specific setting approach [Eric Single & Wortley, 1993][88]	Canada	- Provide implications	- Alcohol consumption levels were highest at bars (3.4 standard drinks/occasion) and at parties (3.2 standard drinks/occasion). - Women consumed a higher percentage of their total consumption in social situations (e.g., parties or social gatherings, and visiting friends or relatives). - Men consumed a greater proportion in bars and taverns (14.1% vs 9.4% for women)	- The individual levels of alcohol consumption were strongly associated with the situational distribution of consumption.

Context approach questionnaire	Country	Comparison	Result	Other
Specific setting approach [Single & Wortley, 1994][33]	Canada	- Convergent validity: specific setting approach vs QF vs recent occasions approach - Compare with sales data	- Outcome: consumption (standard drinks/week) - Using the specific setting approach, the alcohol consumption was 5.17 (SD = 0.11) standard drinks/week. On the other hand, the consumption levels were 4.48 (SD = 0.09) standard drinks/week using the QF and 3.74 (SD = 0.08) using the recent occasions instruments. - The specific setting approach reported 48.8% coverage of sale data, compared to only 35.3 and 42.3% and 35.3% for the recent occasions and QF instruments.	- Asking with a longer questionnaire improved recall ability by providing more memory cues.
Typical location [Wyllie, Zhang, & Casswell, 1994][35]	New Zealand	- Convergent validity: typical location vs typical occasion vs New Zealand variation of period estimate vs Finnish period vs Last 7-day vs Last 2-occasion	- Outcome: consumption (liters of pure alcohol) - The proportion of alcohol tax and sales for consumption was accounted for by the typical location which was 64% of sales data, compared with 61% with last 2-occasion, 54% with typical occasion, 49% with New Zealand period, 49% with last 7-day, and 45% with Finnish period. - The typical location reported the highest consumption levels for both sexes and both parameters (i.e., means and medians)	- Reminding of drinking locations may enhance recall ability of drinking occasions.

Context approach questionnaire	Country	Comparison	Result	Other
Within-location beverage-specific questions [Casswell, Huckle, & Pledger, 2002][36]	New Zealand	- Convergent validity: annual volume from New Zealand National Alcohol Survey 2000 vs two other variables (i.e., self-reported consequences and drunkenness) - Compare with sales data	- The partial Spearman correlation coefficient of the annual volume and consequence was 0.59 (p-value < 0.001). - The alcohol consumption was associated with the drunkenness frequency (Spearman correlation coefficient = 0.62, p-value < 0.001). - The annual consumption from instruments accounted for approximately 94% of sale data.	-
Context-specific quantity frequency (CSQF) [Vichitkunakorn, Balthip, Geater, & Assanangkornchai, 2018][89]	Thailand	- Convergent validity: 3-month alcohol consumption vs BSQF	- Total alcohol consumption of almost all types of beverage by the CSQF was higher than the BSQF in approximately 50% of current drinkers. - There were no significant differences in the average daily intake, 3-month intake per drinker or per capita consumption between instruments. - The interview duration and burden of answering the questions by the participants for the CSQF were not higher than those for the BSQF.	- No significant differences of the sample-level indices between the two instruments because of the small number of drinkers.

2. Comparisons of alcohol consumption indices between BSQF and CSQF

To the best of our knowledge, this is the first study to compare the contextual approach method (i.e., the CSQF instrument) and the BSQF instrument to assess alcohol consumption at individual and sample levels. We found that asking about the volume of alcohol consumption specific to the context, including situation, place, and partner, provided higher consumption volume in the past three months compared to the standard BSQF method, while the interview duration and burden on the participant to answer the questions were not significantly higher. This is in keeping with previous findings that motivation and a location-specific approach can estimate higher total consumption in the previous week than the traditional QF or recent occasion methods.[33] Questions asking about the most typical locations or occasions of drinking also provided a higher total alcohol consumption than did the QF, L7D, and two recent occasions methods.[35]

We also found that the quantity of consumption contributed to the difference of total consumption measured by the two instruments. The higher volume of consumption reported by the CSQF might be because the context-specific questions increased the recall ability by stimulating the participants to think of all the different situations they consumed alcohol[20], whereas the BSQF could only capture usual or average drinking events.

However, in terms of variability, our study revealed that variation in drinking frequency had a greater effect on the ratios of CSQF to BSQF total consumption than the average quantity. The variability of frequency categories and time

frame is one important dimension for alcohol consumption assessment.[90] In this study, we measured the average quantity of drinking using open-ended questions based on the number of containers the drinkers usually took for drinking (e.g., glass, cup, bottle, and can). On the other hand, drinking frequency was based on a ordinal item as it was reported to provide easier, higher alcohol consumption estimates and less item-missing data than reporting in an open-ended question.[21] However, it might be that the frequency categories we used, which were based on those used in other instruments, might not capture all drinking frequencies by all groups of drinkers. Thus, we suggest subdividing the frequency category into more categories. For example, adding "2 to 3 days/month (every fortnight)" to fill the gap between "1 to 2 days/week (every week)" and "1 to 3 days/3months (every month)".

This study has several strengths. First, using the same retrospective time frame in both instruments possibly minimized the measurement errors from adjusted drinking frequencies. A past-year reference period was previously suggested to link an alcohol drinking pattern with alcohol-related harm.[23] A 12-month time frame is recommended by some studies because it is appropriate for drinking cultures where alcohol is used seasonally or influenced by various festive activities.[12, 23] The 12-month time frame attributes to usual drinking more than a detailed memory of actual drinking events.[54] Hence, a 3-month time frame was applied in this study because we supposed that it would be the average time frame over which most drinkers would be able to remember their drinking history with less recall bias effect. This 3-month reference period covered (i) usual days, (ii) Christmas and New Year's Day (celebration), (iii) Constitution Day (holiday), and (iv) Buddhist Lent and a Thai festival at the end of 10th lunar month (cultural event). These days commonly have different drinking situations

in Thailand. In Thailand, New Year's Day and the Buddhist Lent are the periods of greatest and lowest alcohol consumption, respectively. Second, both individual and sample level analyses were done in this study. An accurate estimate at the individual level would facilitate an accurate estimate at the sample level. Last, the actual time and burden in responding to the questionnaires were measured. An increased response burden may result in a low response rate, incomplete questionnaire, and reduced data quality. One important questionable disadvantage of the contextual approach is a greater response burden because of longer and more complex questions.[36] Based on the guideline for Minimizing Perceived Respondent Burden, response burden can be divided into actual and perceived burdens.[91] In this study, the actual and perceived response burden in completing the CSQF was not significantly higher than that of the BSQF in either dimension. This finding was consistent with a meta-analysis study revealing weak support for an association between questionnaire length and response burden in medical and public health questionnaires.[92]

We also acknowledge that our study may have some limitations. It is generally known that there is no definite "gold standard method" to estimate alcohol consumption and validate a new instrument such as the CSQF.[76, 77] Researchers typically want the criterion validity to be measured against a gold standard, but the convergent validity method is another powerful method which was applied in this study because there is no specific gold standard to assess alcohol consumption. Prospective data collection can be more accurate in measuring alcohol drinking history using a self-recorded diary, mobile application or telephone interview by trained staff.[93] Since prospective data collection was not a feasible method in our study sample, a retrospective inquiry of consumption in the previous 3-month period was used instead

to minimize recall bias, and the comparison between two instruments was reported rather than a comparison with a "gold standard". Second, drinking situations in the CSQF are not mutually exclusive. Although the CSQF provides examples of each drinking situation to minimize the double counting effect, some participants were confused concerning the situation categories (e.g., drinking at a New Year' party can be considered as drinking on a holiday or during a celebration). Therefore, the CSQF-over-report could be explained by this double counting. Third, both the CSQF and BSQF assess the same construct, which is the amount of alcohol consumption and they both have some identical questions. This may overestimate the concordance between the two measures and limit the chance that occasional influencing factors affect self-reports. However, both the CSQF and BSQF in our study asked about the consumption in the same time frame of the past three months, which is a relatively short period. It was not possible to separate the interview into two occasions at 2-3 days apart. Fourth, the actual number of drinking days could not be accurately estimated by either instrument. The actual number of drinking days is an important variable to calculate "drinking intensity" which has many clinical benefits. However, the main purpose of the CSQF development is for public health implication. Fifth, when sample-level indices were compared, there were no significant differences between the two instruments. This might be due to the small number of drinkers in this study, which resulted in insufficient power to reveal the significant differences by the Wilcoxon Signed-Rank Test. Last, the generalizability of this study is limited by the small–scale, localized single population which possibly has culture-specific drinking patterns. The alcohol consumption level and drinking patterns have high variability among WHO regions due to different drinking cultures and contexts.[94] The WHO Eastern

Mediterranean Region (EMR) and South-East Asia Region (SEAR) including Thailand are regions of the lowest consumption levels and most drinkers are occasional drinkers (less than one day per week). In contrast, in other regions there are high levels of alcohol consumption and most drinkers are regular drinkers.[7] However, our aim was to initially test the hypothesis on a small scale. Had we found a significant result, we would draw a sample from many provinces in a further study. Nevertheless, this localized study has provided information with important implications for alcohol-related policy at the particular site.

The findings of our study have considerable managerial implications for the health-care sector and the alcohol survey manager who will select the appropriate instrument to estimate alcohol consumption in each survey. A full picture of drinking behaviors from the CSQF has several valuable advantages. Specific alcohol policies can be more directly specific to some target populations or situations. For example, if strategies to prevent underage drinking are launched, the CSQF can provide the specific conditions such as the occasion (when), location (where), partner (with whom), and types of beverages (what), that are strongly associated with underage drinking. Consequently, alcohol specified-group rules or interventions can be framed.

Our suggestions for CSQF users are to use a technology-assisted technique such as personal cellphones, functionalities (e.g., text, calls, internet, GPS, sound recorders, and applications), skipping function or sequence of items to minimize human errors caused by the complexity of the questionnaire and to ask questions in a loop within each context to ease recall. Technology and other innovative ways for data collection purposes in alcohol research have many advantages (e.g., matching date, location via GPS with alcohol consumption, possibility of response to previous

answers, enhancing repeated measurements, and minimizing recall bias.[95-97] Categorical responses should be modified to suit each country in terms of drinking cultures such as local beverage types, cultural or regional events or containers.

Lastly, additional methodological studies are needed to further explore the inter-interviewer reliability and test-retest reliability of the instruments using the same retrospective time frame. The acceptability in multiple languages and cultures needs to be demonstrated in the future. Data collection from taxable alcohol available for consumption is another useful source to validate the survey results and can be used for cross-country comparison.[12, 98] However, in our study we could not obtain the taxation data.

In summary, the inclusion of drinking context in harm reduction surveys is recommended. The CSQF appears to be appropriate for an alcohol consumption survey because it provides significantly higher total alcohol consumption than the BSQF at the individual level and provides drinking contexts (situation, place, and partner), which are not part of the BSQF. The major effect of the difference between two instruments was the over-reporting of average quantity. However, there was no significant difference in the average daily intake, 3-month per drinker consumption or 3-month per capita consumption between instruments in the sample level analysis. The interview duration and participant's burden to answer the questions for the CSQF were not significantly higher than those for the BSQF.

The methodological research on measuring alcohol consumption generally values the instrument which estimates the highest alcohol consumption. However, an instrument which captures drinking context can provide more useful

information with public health implication than the one that simply estimates the highest alcohol consumption indices.

3.   Alcohol-related consequences: risky drinkers and drinking events

The CSQF allows identification of the social and other factors which predict acute and chronic harms based on WHO criteria. The context-specific questions were also likely to have increased recall ability by stimulating the participants to think of all of the different situations when they consumed alcohol[20] and to have encouraged honest and accurate reporting.[99] The contextual approach can capture the participants' drinking as either usual drinking or drinking associated with special situations. It results in higher alcohol intake estimates[77] because the CSQF asks about various kinds of drinking situations.

In the current study, consistent with a previous study, the drinking situation associated with special events was associated with higher drinking intensity. For example, alcohol drinking by college students during a spring break was higher than drinking throughout the academic year period[100, 101] and drinking on weekend nights in public drinking premises (i.e., pubs/bars) was likely be excessive alcohol consumption.[102] This may be explained by differing motives for drinking such as going out with the purpose to engage in risky behavior or selecting a location because of its party reputation.[103, 104] The context was also strongly associated with other risk-taking behavior, including substance use, substance-related driving, and risky sexual behavior.[102]

There were no significant differences in drinking intensity associated with drinking location and type of drinker partner(s) in our analysis. In contrast, previous studies found that people were less likely to drink during ecotourism or in a religious place.[105] Drinking with friends was associated with an increased risk of binge drinking and getting drunk[28, 105, 106], whereas drinking with parents was associated with decreased risks.[28] Johannes et al.[107] found that a mixed gender drinking group was associated with higher drinking intensity beyond the effect of drinking-group size in young adults.

In summary, the combination of drinking context (i.e., drinking situation, location, drinking partner(s), beverage, and sharing of beverage in a group) could generate different *"drinking motives"* for each drinker. Prior studies point out the same concept, that the within-person variability of drinking motives can be associated with the day and the context, as well as with the consequences experienced.[108, 109]

Our study found a significant association between primary school or higher education with current drinkers and higher amount of alcohol consumed. This relationship was consistent with that reported in northeast Thailand.[110] However, this deviates from the results of studies in other countries that show those who had a lower level of education were more likely to be current drinkers[111], hazardous drinkers based on AUDIT[112-114], excessive drinkers[115, 116], and to have a higher risk of alcohol-attributable hospital admission or death.[117, 118] This difference in findings may be explained by changes in the Thai education system. The 1997 Constitution provided for all Thai people to have a basic compulsory education for at least 12 years through secondary school or high school.[119] So, younger people are more likely to have completed education beyond primary school. In parallel with these increases in

education, data from the Thai National Statistical Office showed that the percentage of young people who were currently drinking had been increasing ≥5% each year during the previous four years.

Our study found that occupation was a predictor for being a current drinker. This supports previous findings in the literature that some occupations can affect drinking behavior. For example, agriculturalist, service industry employee[120], food preparation and serving-related jobs[121, 122], laborer[123], and truck driver[124] were found to have a higher risk, whereas professional occupations have a lower risk.[125] The reason may be explained by work-related stress[126-128] or job strain theory, that includes physical demand and social engagements associated with alcohol consumption[129] or ready access to alcohol at work.

The dose-response relationship seen between current smoking and current drinkers (low and medium/high-risk drinkers) in this study was consistent with several prior studies.[130-132] This association can be explained by physical, psychological, and social level mechanisms.[133]

Our study has a number of limitations. First, the purpose of this study was not the potential generalizability of the CSQF, but a description of the implications of use of the prototype CSQF questionnaire as an approach for an alcohol survey, linked to drinking context. Nevertheless, this localized study has provided information with important implications for alcohol-related policy at the survey site. Second, alcohol consumption was based on self-report of the participants and laboratory data were not used to validate these findings. Self-reported alcohol behaviors may be prone to underestimation and recall error. Third, we employed a cross-sectional study design which meant we were not able to analyze causal associations. Lastly, each participant

is allowed to choose only one unique combination of drinking partner(s), beverage, frequency, and quantity of alcohol consumed in each specified situation and location, to minimize participant's burden in answering the questionnaire. In fact, the participant may be having more than one unique combination in each specified situation and location.

The strength of this study is that much of the currently available literature has focused on predictors of episodic heavy drinking, which are seen in high-intensity drinking events for both sexes and some of the medium-intensity events in males in our study. We also examined low-, medium- and high-intensity drinking events and examined dose-response relationships to clearly reflect the effect of predictors (i.e., education level and special situation drinking activity).

The CSQF will be useful to identify alcohol drinking environments in a general population survey or clinical practice. It can potentially be employed to screen patients for risky drinking at outpatient clinics, health care professional visits, ambulatory visits, or in a general population survey. Interventions targeting drinking associated with known high-risk events are starting to be developed and evaluated with some success. For example, the Good Sports program in a community sports club in Australia delivered lower rates of risky drinking within club settings. Not only did responsible drinking patterns increase but also a range of other benefits were observed (i.e., financial, memberships increased).[134] A web-based personalized feedback intervention for 21st birthday drinking found reduced drinking at such events.[135] It is feasible to use a contextual approach in any countries where the purpose is to explore alcohol drinking behaviors.

It would be worthwhile in the future to explore other applications of the CSQF, its acceptability in multiple cultures and languages, and methodological issues such as inter-interviewer reliability and test-retest reliability. The response categories in each drinking context can change to conform to different drinking cultures. For instance, local beverages for different countries (e.g., sake in Japan, grappa in Italy, and schnapps in Germany) and the special public holidays which influence drinking behaviors can be selected.

In conclusion, the CSQF possesses several advantages over existing instruments for assessing alcohol consumption. Comprehensive assessment of the drinking context (i.e., drinking situation, location, drinking partner(s), beverage, and sharing of beverages in a group) provides valuable information for clinical practice and for alcohol policies and helps to more clearly understand drinking behavior. For our analysis, the special situation drinking, such as during a holiday, party or cultural events, and non-beer beverages were more likely to be a feature of medium- or high-intensity drinking events. Hence, the alcohol preventive interventions or policies can be framed specifically for the holiday and cultural events in Thailand. The improved drinking behavior instrument has various benefits for the health system, from the individual to public health levels.

4.   Alcohol-related consequences: Health-Related Quality of Life (HRQoL)

This epidemiological study provides support for the hypothesis that drinking alcohol even at a low level can decrease HRQoL. The strength of the evidence

is underscored by the strongly significant association (OR = 3.16, 95% CI 1.08-9.20) between alcohol drinking in a light level with low-to-moderate HRQoL, independently of other factors. This confirms previous findings of lower quality of life among alcohol drinkers compared with non-drinkers[136-139], especially in those with heavy episodic drinking pattern[140-142] and the improvement of the quality of life when drinking was decreased.[143] Nevertheless, our study did not find a significant association between moderate to heavy drinking or heavy episodic drinking and low HRQoL. The reason may be due to the small numbers of those with higher levels of drinking, which is typical for the Thai population.

Considering other measurement methods, some have found that non-current drinkers had a lower HRQoL than lifetime abstainers for SF-36 score.[144] Those who drank higher alcohol volume in the previous one month had a higher HRQoL or physical and mental health using HIPOP-OHP (High-risk and Population Strategy for Occupational Health Promotion Study) compared to lifetime abstainer.[145] However, this contrast with earlier findings may be due to different measurement instruments and populations.

Lower quality of life was also found among current and former smokers, compared to non-smokers in this study. This result lends support to previous findings in the literature.[137, 146] It is very common for drinkers to be smokers as well.[132] The increased consumption of alcohol and tobacco are among the four most important risk factors for non-communicable disease (NCD).[147] Both substances work by similarly addictive mechanisms in the brain and dramatically increase the risk of various cancers.[148] We found no significant interaction of smoking and drinking status in this study. This can be explained by the very low proportion of participants who drank and

smoked (16 participants in the total of 551 participants; 2.90%). This proportion did not represent the drinking and smoking status in the population because this study was a case-control study.

General demographic characteristics also had an influence on HRQoL and this is consistent with other surveys. EQ-5D index was lower for increasing age groups and lower education level in the U.S population.[149] Among the Australian population, age and employment status affected lower EQ-5D index while higher education level predicted better score on a visual analogue scale (EQ-VAS).[150]

This study is a part of a larger community-based survey, and some limitations inevitably could not be avoided. First, the EQ-5D instrument may not be appropriate for measuring quality of life among alcohol drinkers whose concerns are more on social aspects such as appearance and relationships with family and friends.[151] The EQ-5D mainly measures physical discomfort, ability and activities. It is likely to underestimate other aspects of problems with well-being suffered by drinkers (e.g., stress, self-esteem and life satisfaction).[152] This limitation is demonstrated in our study by the fact that most participants had high EQ-5D index scores (1.1% had <0.4, 0.9% had 0.4-0.59, 4.1% had 0.6-0.79 and 93.9% had ≥0.8) and the selected cut-off of 0.8 and less for lower HRQoL might inadequately reflect meaningful clinical significance. In addition, other factors could have affected a person's quality of life, such as the presence of some diseases (e.g., diabetes, asthma, hypertension, heart disease, stroke and emphysema).[149] However, these could not be adjusted for in this study.

Notwithstanding these limitations, the findings from our study indicated that alcohol consumption even at a low level could significantly lower a drinker's quality of life. It is especially useful for public health workers or policy makers who

seek evidence to promote alcohol abstinence among the general population. As strongly evidenced, alcohol is one of the four significant risk factors for non-communicable diseases (NCD)[153] and a crucial threat to achieving the 2030 Agenda for Sustainable Development Goals (SDG).[154] In many nations, where more people are light drinkers than heavy drinkers or alcohol dependent, a public health strategy to reduce drinking in the general population is far more essential than selective interventions for those with alcohol use disorders. Integration of health messages on the impacts of alcohol not only on NCD and SDG but also on an individual's general well-being is therefore imperative.

To overcome the limitations related to the EQ-5D instrument used in our study, we suggest more research employing a specific alcohol-related quality of life measure, such as the Alcohol 9-item Quality of Life scale[149], which claims to be valid and reliable in drinkers of various patterns. Further research with a larger sample size, especially in moderate to heavy drinkers is needed to provide sufficient power to determine the dose-response effect between the alcohol consumption level and HRQoL.

In conclusion, alcohol drinking at a light level (0.1-7 drinks/week) was associated with a reduced Health-Related Quality of Life (HRQoL) compared with lifetime abstinence and controlling for general characteristics. Based on the assumption that a decreased HRQoL could be influenced by alcohol drinking, and not vice versa, people should be discouraged from the idea that they may get any health benefits from alcohol, even if keeping their drinking at a light or moderate level. Instead, we should promote certain behaviors that include regular aerobic exercise, eating healthy food, good sleep hygiene, and quitting smoking.

5.   Strengths, limitations, and further research

This section illustrates and discusses the items using the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) checklist for reporting an observational design and the STARD (Standards for Reporting of Diagnostic Accuracy Studies) guideline for reporting diagnostic studies (Table 29).

Table 29 Summary of strengths and limitations by the STROBE and STARD guideline

Sections	Strengths	Limitations	Limitation minimization and further research
Introduction			
Background and rationale	- First study that compared the contextual approach (i.e., the CSQF instrument) and the BSQF to assess alcohol consumption indices.	-	-
Methods			
Study design	- Mixed method is appropriate for drinking patterns in Thai drinkers, which is an unclear issue. - Consisting both validity testing and implications of the CSQF in this study.	- Lack of some reliability and validity testing (e.g., test-retest validity and inter-interviewer reliability)	- Research to assess the validity and reliability as mentioned is needed.
Setting and participants	-	- The generalizability was limited because of a small-scale, localized single population of Songkhla Province in southern Thailand.	- Further research on a large scale is needed.
Data sources/measurement (data collection)	- For validity testing, the same 3-month time frame was applied for both the CSQF and BSQF instruments. Similar time periods can minimize the variabilities from different drinking events.	- 3-month time frame might not be appropriate for drinking cultures where alcohol is used seasonally or influenced by various festive activities.	- Further research using a 1-year time frame should be applied.

Sections	Strengths	Limitations	Limitation minimization and further research
	- Proxy responses were not used.		
	-	- Mutual exclusivity on drinking situations (i.e., usual drinking, holiday, party, cultural event, and music/sport event) should be a concern.	- Giving examples and clear terminology of each drinking event can minimize double counting effect. For instance, holidays including New Year's or Songkran Festival and party including wedding ceremony or workplace party.
Bias	-	- Recall bias was introduced by poor recall of alcohol consumption.	- 3-month time frame was applied because we supposed that it would be the average time frame over which most drinkers would be able to remember their drinking history with less recall bias effect. - Further research using technology for data collection purposes might reduce recall bias.
Statistical methods (data analysis)	- Both individual and sample level analyses were performed (Part 2). - Both current drinkers and their drinking events were analyzed (Part 3).	-	-
Test method	-	- Criterion validity could not be applied because reference standards or gold standards to	- This study applied the "convergent validity method" to compare consumption data between

Sections	Strengths	Limitations	Limitation minimization and further research
		measure alcohol consumption indices are limited (Part 2).	the CSQF and the BSQF methods because we did not have a gold standard (Part 2).
Results			
Participants	- High response rate, 98.3% (Part 2 and 3).	-	-
Main results	- All alcohol consumption indices were compared within the same participant. The intra-person variabilities were self-controlled by matching within the participants (Part 2).	-	-
Other results	- The response burden to answer the questions (i.e., actual time and perceived burden with a 5-point rating scale) was measured.	-	-
Others	- The methods for developing the CSQF were comprehensive, including a literature review and the results from mixed methods.	- The current version of the CSQF instrument is still complicated to answer because the questions are asked in loops. Some participants felt a bit confused because they felt they had already answered the questions.	- The interviewers require additional training prior to collecting data from the participants. - For further study, exploring the drinking context and minimizing them would be useful.

CHAPTER 5

CONCLUSION AND IMPLICATIONS

1.   Conclusion

The fuller picture of drinking behaviors on drinking context (i.e., drinking situation, location, drinking partner(s), beverage, and sharing of beverages in a group) from the CSQF has several valuable methodological advantages and provides information allowing alcohol policies to be more directly specific to certain target populations or situations.

Based on our results interviewing the participants in Songkhla Province, we found that the prevalence of current drinker in last three months was 22.8%. Most were male, aged 35 to 60 years old. Most drinking events occurred in special situations (i.e., holiday, party, and cultural event). Most drinkers drank with their friends outside of their own houses.

The current version of CSQF also needs further exploration of the reliability testing (e.g., inter-interviewer reliability, parallel-form test-retest reliability) and needs revisions to be more user-friendly.

2.   Implications

2.1   Clinical implications

-   **Clinical assessment instrument:** Screening for excessive drinkers among patients in a primary care setting has many advantages. The patients can be classified by the AUDIT score into four levels of risk. Each category has

different initial interventions (i.e., "alcohol education", "simple advice", "simple advice plus brief counselling and continued monitoring", and "referral to specialist for diagnostic evaluation and treatment"). However, the AUDIT provides information in only three conceptual domains (i.e., "alcohol use", "alcohol dependence", and "adverse consequences"), not for drinking behaviors or contexts. An interview using the CSQF questionnaire with the AUDIT might be useful in this case. Moreover, for continuous monitoring, the CSQF questionnaire can also be a part of continuous quality improvement evaluation. For instance, their doctor will define the triggers (e.g., activity or places exist for drinking) and how to avoid them.

- **Screening instruments:** The contextual approach can explore not only the alcohol consumption, but also tobacco and other drug use. The screening process can be evaluated before they meet their doctors at the clinic or hospital. The CSQF questionnaire can be a one of the useful screening tools in a primary setting or other clinics (e.g., gastrointestinal clinic or emergency department). Moreover, a nurse, clinical social worker or a clinical psychologist can interview a patient while they are waiting for the doctor. The patients would then have more time to talk about their diseases and illnesses with their doctors.

- **Monitoring instruments:** The CSQF instrument combined with a technology-assisted method could help with self-monitor drinking. For example, a smartphone application could track alcohol consumption on a daily or weekly basis.

2.2   Public health implications

-    **Small area-level:** Community leaders can apply the contextual approach to explore and design some local-specific interventions for solving alcohol problems or other issues.

-    **National- or cross-national-level:** Using the contextual approach on the national to monitor alcohol behaviors might be useful. Some policy interventions suggested by WHO may be not effective in some settings or countries. Hence, a cross-nation evaluation on drinking context might be useful. For example, a choropleth map from multilevel latent class analysis is a form of data visualization that shows different drinking patterns across regions.

2.3   Research implications

-    Clinical research: Currently, a randomized controlled trial or a clinical trial is commonly use in clinical research for healthcare improvement. Accurate measurement of clinical outcomes that change from the intervention should be considered. Changes of alcohol drinking behaviors over time regarding some interventions (e.g., brief intervention, motivation intervention, counseling psychology) can be more precise by using a contextual approach.

-    Alcohol-related harm is defined as the effect of quantity and pattern of alcohol consumption that places participants at risk for adverse events. The CSQF instrument can explore the combination of alcohol amount and the drinking context that results in adverse consequences. For example, research at an emergency department (ED) can examine the drinking context (e.g., binge

drinking with friends at pub/bars or high drinking intensity associated with drinking in group) prior to the ED visits.

REFERENCES

1. Baan R, Straif K, Grosse Y, Secretan B, El Ghissassi F, Bouvard V, et al. Carcinogenicity of alcoholic beverages. The Lancet Oncology. 2007;8(4):292-3.

2. Shield KD, Parry C, Rehm J. Chronic diseases and conditions related to alcohol use. Alcohol Research : Current Reviews. 2014;35(2):155-71.

3. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2013;380(9859):2224-60.

4. Anderson P, Baumberg B. Alcohol in Europe: a public health persepctive. A report for the European Commission. London: Institute of Alcohol Studies; 2006.

5. Sacks JJ, Roeber J, Bouchery EE, Gonzales K, Chaloupka FJ, Brewer RD. State costs of excessive alcohol consumption, 2006. American Journal of Preventive Medicine. 2013;45(4):474-85.

6. Anderson P, Chisholm D, Fuhr DC. Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. The Lancet. 2009;373(9682):2234-46.

7. World Health Organization. Global status report on alcohol and health 2018. Geneva: World Health Organization; 2018.

8. Vichitkunakorn P, Tanaree A. Thailand Provincial Alcohol Report 2017. Center for Alcohol Studies; 2017.

9.   Thai Burden of Disease Working Group. Burden of Diseases, Thailand 2009. Bangkok: International Health Policy Program; 2012.

10. World Health Organization. Global strategy to reduce the harmful use of alcohol. Geneva: World Health Organization; 2010.

11. World Health Organization Regional Office for Europe. European action plan to reduce the harmful use of alcohol 2012-2020. Copenhegen: World Health Organization Regional Office for Europe; 2012.

12. World Health Organization. International guide for monitoring alcohol consumption and related harm: Geneva : World Health Organization; 2000.

13. Indicator Code Book, Global Information System On Alcohol and Health. Geneva: World Health Organization; 2014.

14. National Health Medical Research Council. Australian guidelines to reduce health risks from drinking alcohol. Canbera: Commonwealth of Australia; 2009.

15. Rehm J, Room R, Taylor B. Method for moderation: measuring lifetime risk of alcohol-attributable mortality as a basis for drinking guidelines. International Journal of Methods in Psychiatric Research. 2008;17(3):141-51.

16. World Health Organization. Global health observatory (GHO) data. Geneva: World Health Organization; 2015.

17. Rehm J, Baliunas D, Borges GL, Graham K, Irving H, Kehoe T, et al. The relation between different dimensions of alcohol consumption and burden of disease: an overview. Addiction. 2010;105(5):817-43.

18. Rehm J, Room R, Graham K, Monteiro M, Gmel G, Sempos CT. The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease: an overview. Addiction. 2003;98(9):1209-28.

19. Griswold MG, Fullman N, Hawley C, Arian N, Zimsen SR, Tymeson HD, et al. Alcohol use and burden for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet. 2018;392(10152):1015-35.

20. Dawson DA, Room R. Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpö conference overview. Journal of Substance Abuse. 2000;12(1-2):1-21.

21. Ivis FJ, Bondy SJ, Adlaf EM. The effect of question structure on self-reports of heavy drinking: closed-ended versus open-ended questions. Journal of Studies on Alcohol. 1997;58(6):622-4.

22. Greenfield TK. Ways of measuring drinking patterns and the difference they make: experience with graduated frequencies. Journal of Substance Abuse. 2000;12(1-2):33-49.

23. Wilson VB, Allen JP. Assessing alcohol problems: a guide for clinicians and researchers. Bethesda: National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism; 2003.

24. Dawson DA. Volume of ethanol consumption: effects of different approaches to measurement. Journal of Studies on Alcohol. 1998;59(2):191-7.

25. Russell M, Welte JW, Barnes GM. Quantity-frequency measures of alcohol consumption: beverage-specific vs global questions. British Journal of Addiction. 1991;86(4):409-17.

26. Holyfield L, Ducharme LJ, Martin JK. Drinking contexts, alcohol beliefs, and patterns of alcohol consumption: Evidence for a comprehensive model of problem drinking. Journal of Drug Issues. 1995;25(4):783-98.

27. Kaplan LM, Karriker-Jaffe KJ, Greenfield TK. Drinking context and alcohol's harm from others among men and women in the 2010 US National Alcohol Survey. Journal of Substance Use. 2017;22(4):412-8.

28. Reboussin BA, Song E-Y, Wolfson M. Social influences on the clustering of underage risky drinking and its consequences in communities. Journal of Studies on Alcohol and Drugs. 2012;73(6):890-8.

29. Grekin ER, Sher KJ, Krull JL. College spring break and alcohol use: Effects of spring break activity. Journal of Studies on Alcohol and Drugs. 2007;68(5):681-8.

30. Chaloupka FJ, Wechsler H. Binge drinking in college: The impact of price, availability, and alcohol control policies. Contemporary Economic Policy. 1996;14(4):112-24.

31. Stockwell T, Single E, Hawks D, Rehm J. Opinion piece: sharpening the focus of alcohol policy from aggregate consumption to harm and risk reduction. Addiction Research. 1997;5(1):1-9.

32. Room R, Roizen R. Some notes on the study of drinking contexts. Drinking and Drug Practices Survey. 1973;8:25-32.

33. Single E, Wortley S. A comparison of alternative measures of alcohol consumption in the Canadian National Survey of alcohol and drug use. Addiction. 1994;89(4):395-9.

34. Hilton ME. Inconsistent responses to questions about alcohol consumption in specified settings. The American Journal of Drug and Alcohol Abuse. 1986;12(4):403-13.

35. Wyllie A, Zhang JF, Casswell S. Comparison of six alcohol consumption measures from survey data. Addiction. 1994;89(4):425-30.

36. Casswell S, Huckle T, Pledger M. Survey data need not underestimate alcohol consumption. Alcoholism: Clinical and Experimental Research. 2002;26(10):1561-7.

37. Del Boca FK, Darkes J. The validity of self-reports of alcohol consumption: state of the science and challenges for research. Addiction. 2003;98 Suppl 2:1-12.

38. Dawson DA. Patterns of alcohol consumption: beverage effects on gender differences. Addiction. 1993;88(1):133-8.

39. Serdula MK, Mokdad AH, Byers T, Siegel PZ. Assessing alcohol consumption: beverage-specific versus grouped-beverage questions. Journal of Studies on Alcohol. 1999;60(1):99-102.

40. Lemmens P, Tan ES, Knibbe RA. Measuring quantity and frequency of drinking in a general population survey: a comparison of five indices. Journal of Studies on Alcohol. 1992;53(5):476-86.

41. Kaskutas LA, Graves K. An alternative to standard drinks as a measure of alcohol consumption. Journal of Substance Abuse. 2000;12(1-2):67-78.

42. Saunders JB, Aasland OG. WHO Collaborative Project on the Identification and Treatment of Persons with Harmful Alcohol Consumption. Report on phase I: the development of a screening instrument. Geneva: World Health Organization; 1987 1987.

43. Assanangkornchai S, Sam-Angsri N, Rerngpongpan S, Lertnakorn A. Patterns of alcohol consumption in the Thai population: results of the National Household Survey of 2007. Alcohol and Alcoholism. 2010;45(3):278-85.

44. Shakeshaft AP, Bowman JA, Sanson-Fisher RW. A comparison of two retrospective measures of weekly alcohol consumption: diary and quantity/frequency index. Alcohol and Alcoholism. 1999;34(4):636-45.

45. Batty GD, Bhaskar A, Emslie C, Benzeval M, Der G, Lewars H, et al. Association of life course socioeconomic disadvantage with future problem drinking and heavy drinking: gender differentials in the west of Scotland. International Journal of Public Health. 2012;57(1):119-26.

46. Stockwell T, Zhao J, Chikritzhs T, Greenfield TK. What did you drink yesterday? Public health relevance of a recent recall method used in the 2004 Australian National Drug Strategy Household Survey. Addiction. 2008;103(6):919-28.

47. Stockwell T, Zhao J, Macdonald S. Who under-reports their alcohol consumption in telephone surveys and by how much? An application of the 'yesterday method' in a national Canadian substance use survey. Addiction. 2014;109(10):1657-66.

48. Kühlhorn E, Leifman H. Alcohol surveys with high and low coverage rate: a comparative analysis of survey strategies in the alcohol field. Journal of Studies on Alcohol. 1993;54(5):542-54.

49. Williams GD, Proudfit AH, Quinn EA, Campbell KE. Variations in quantity-frequency measures of alcohol consumption from a general population survey. Addiction. 1994;89(4):413-20.

50. Hilton ME. A comparison of a prospective diary and two summary recall techniques for recording alcohol consumption. British Journal of Addiction. 1989;84(9):1085-92.

51. Midanik LT. Comparing usual quantity/frequency and graduated frequency scales to assess yearly alcohol consumption: results from the 1990 US National Alcohol Survey. Addiction. 1994;89(4):407-12.

52. Poikolainen K, Podkletnova I, Alho H. Accuracy of quantity-frequency and graduated frequency questionnaires in measuring alcohol intake: comparison with daily diary and commonly used laboratory markers. Alcohol and Alcoholism. 2002;37(6):573-6.

53. Graham K, Demers A, Rehm J, Gmel G. Problems with the graduated frequency approach to measuring alcohol consumption: results from a pilot study in Toronto, Canada. Alcohol and Alcoholism. 2004;39(5):455-62.

54. Dawson DA. Methodological issues in measuring alcohol use. Alcohol Research and Health. 2003;27(1):18-29.

55. He J, Assanangkornchai S, Cai L, McNeil E. Patterns of alcohol consumption in yunnan province of china: which measure is optimal? Alcohol and Alcoholism. 2015.

56. Carney MA, Tennen H, Affleck G, Del Boca FK, Kranzler HR. Levels and patterns of alcohol consumption using timeline follow-back, daily diaries and real-time "electronic interviews". Journal of Studies on Alcohol. 1998;59(4):447-54.

57. Bernhardt JM, Usdan S, Mays D, Martin R, Cremeens J, Arriola KJ. Alcohol assessment among college students using wireless mobile technology. Journal of Studies on Alcohol and Drugs. 2009;70(5):771-5.

58. Aalto M, Alho H, Halme JT, Seppä K. AUDIT and its abbreviated versions in detecting heavy and binge drinking in a general population survey. Drug and Alcohol Dependence. 2009;103(1–2):25-9.

59. Levola J, Aalto M. Screening for At-Risk Drinking in a Population Reporting Symptoms of Depression: A Validation of the AUDIT, AUDIT-C, and AUDIT-3. Alcoholism: Clinical and Experimental Research. 2015;39(7):1186-92.

60. World Health Organization. Preamble to the Constitution of the World Health Organization, as adopted by the International Health Conference, New York, pp. 19-22 (June 1946): signed on 22 July 1946 by the Representatives of 61 States,(Official Records of the World Health Organization, No. 2 p. 100) and Enterd into Force on 7 April 1948. http://wwwwhoint/about/mission/en/. 1948.

61. Brazier JE, Yang Y, Tsuchiya A, Rowen DL. A review of studies mapping (or cross walking) non-preference based measures of health to generic preference-based measures. The European journal of health economics. 2010;11(2):215-25.

62. American Heart Association. Alcohol and Heart Health2015 January 12, 2015. Available from: https://goo.gl/E2UVBC.

63. Stockwell T, Zhao J, Panwar S, Roemer A, Naimi T, Chikritzhs T. Do "moderate" drinkers have reduced mortality risk? A systematic review and meta-analysis of alcohol consumption and all-cause mortality. Journal of Studies on Alcohol and Drugs. 2016;77(2):185-98.

64. Donovan D, Mattson ME, Cisler RA, Longabaugh R, Zweben A. Quality of life as an outcome measure in alcoholism treatment research. Journal of Studies on Alcohol, Supplement. 2005(15):119-39.

65. Morgan MY, Landron F, Lehert P. Improvement in quality of life after treatment for alcohol dependence with acamprosate and psychosocial support. Alcoholism: Clinical and Experimental Research. 2004;28(1):64-77.

66. Chan AM, von Mühlen D, Kritz-Silverstein D, Barrett-Connor E. Regular alcohol consumption is associated with increasing quality of life and mood in older men and women: the Rancho Bernardo Study. Maturitas. 2009;62(3):294-300.

67. Mathiesen E, Nome S, Eisemann M, Richter J. Drinking patterns, psychological distress and quality of life in a Norwegian general population-based sample. Quality of Life Research. 2012;21(9):1527-36.

68. Kaplan MS, Huguet N, Feeny D, McFarland BH, Caetano R, Bernier J, et al. Alcohol use patterns and trajectories of health-related quality of life in middle-aged and older adults: a 14-year population-based study. Journal of studies on alcohol and drugs. 2012;73(4):581-90.

69. Ortolá R, García-Esquinas E, Galán I, Rodríguez-Artalejo F. Patterns of alcohol consumption and health-related quality of life in older adults. Drug and alcohol dependence. 2016;159:166-73.

70. Miller HW. Plan and operation of the health and nutrition examination survey, United States, 1971-1973. Vital Health Stat 1. 1973(10a):1-46.

71. Stockwell T, Donath S, Cooper-Stanbury M, Chikritzhs T, Catalano P, Mateo C. Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. Addiction. 2004;99(8):1024-33.

72. World Health Organization. Global status report on alcohol and health 2014. Geneva: World Health Organization; 2014.

73. Weber RP. Basic Content Analysis. 2nd. Newbury Park, CA: Sag. 1990.

74. Chow S-C, Shao J, Wang H, Lokhnygina Y. Sample size calculations in clinical research: Chapman and Hall/CRC; 2017.

75. Kish L. A procedure for objective respondent selection within the household. Journal of the American Statistical Association. 1949;44(247):380-7.

76. Midanik L. The validity of self-reported alcohol consumption and alcohol problems: a literature review. Addiction. 1982;77(4):357-82.

77. Rehm J. Measuring quantity, frequency, and volume of drinking. Alcoholism: Clinical and Experimental Research. 1998;22:4s-14s.

78. Parnanen K. Validity of survey data on alcohol use. Research Advances in Alcohol and Drug Problems. 1974;1:355-74.

79. English DR, Holman CDJ, Milne E, Winter MG, Hulse GK, Codde JP. The quantification of drug caused morbidity and mortality in Australia 1995 edition: Commonwealth Department of Human Services and Health; 1995.

80. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of Life Research. 2011;20(10):1727-36.

81. Pattanaphesaj J, Thavorncharoensap M, Teerawattananon Y, Tongsiri S. Health-related quality of life measure (EQ-5D-5L): Measurement property testing and Its preference-based score in Thai population. Bangkok: Mahidol University; 2014.

82. Golicki D, Niewada M, van Hout B, Janssen M, Pickard AS. Interim EQ-5D-5L value set for Poland: first crosswalk value set in Central and Eastern Europe. Value in Health Regional Issues. 2014;4:19-23.

83. R Development Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing; 2015.

84. Chongsuvivatwong V. epicalc: epidemiological calculator. R package version. 2012;2(1.6).

85. Bates D, Mächler M, Bolker B, Walker S. Fitting linear mixed-effects models using lme4. arXiv preprint arXiv:14065823. 2014.

86. Wickham H. ggplot2: elegant graphics for data analysis: Springer; 2016.

87. Clark W. Alcohol use in various settings. Public drinking and public policy. 1985:49-70.

88. Single E, Wortley S. Drinking in various settings as it relates to demographic variables and level of consumption: findings from a national survey in Canada. Journal of Studies on Alcohol. 1993;54(5):590-9.

89. Vichitkunakorn P, Balthip K, Geater A, Assanangkornchai S. Comparisons between context-specific and beverage-specific quantity frequency instruments to assess alcohol consumption indices: Individual and sample level analysis. PLOS ONE. 2018;13(8):e0202756.

90. Room R. Measuring alcohol consumption in the United States. Research Advances in Alcohol and Drug Problems. Boston: Springer; 1990. p. 39-80.

91. Hedlin D, Dale T, Haraldsen G, Jones J. Developing methods for assessing perceived response burden. Statistics Swden/Statistics Norway/UK Office for National Statistics, February. 2005.

92. Rolstad S, Adler J, Ryden A. Response burden and questionnaire length: is shorter better? A review and meta-analysis. Value Health. 2011;14(8):1101-8.

93. Lemmens P, Knibbe RA, Tan F. Weekly recall and diary estimates of alcohol consumption in a general population survey. Journal of Studies on Alcohol. 1988;49(2):131-5.

94. Rehm J, Rehn N, Room R, Monteiro M, Gmel G, Jernigan D, et al. The global distribution of average volume of alcohol consumption and patterns of drinking. European Addiction Research. 2003;9(4):147-56.

95. Kuntsche E, Labhart F. The future is now—using personal cellphones to gather data on substance use and related factors. Addiction. 2014;109(7):1052-3.

96. Kuntsche E, Labhart F. Using personal cell phones for ecological momentary assessment: An overview of current developments. European Psychologist. 2013;18(1):3.

97. Kuntsche E, Dietze P, Jenkinson R. Understanding alcohol and other drug use during the event. Drug and Alcohol Review. 2014;33(4):335-7.

98. Gmel G, Rehm J. Measuring alcohol consumption. Contemporary Drug Problems. 2004;31(3):467-540.

99. Muggli E, Cook B, O'Leary C, Forster D, Halliday J. Increasing accurate self-report in surveys of pregnancy alcohol use. Midwifery. 2015;31(3).

100. Patrick ME, Lewis MA, Lee CM, Maggs JL. Semester and event-specific motives for alcohol use during spring break: associated protective strategies and negative consequences. Addictive behaviors. 2013;38(4):1980-7.

101. Greenbaum PE, Del Boca FK, Darkes J, Wang CP, Goldman MS. Variation in the drinking trajectories of freshmen college students. Journal of Consulting and Clinical Psychology. 2005;73(2):229-38.

102. Calafat A, Blay NT, Hughes K, Bellis M, Juan M, Duch M, et al. Nightlife young risk behaviours in Mediterranean versus other European cities: are stereotypes true? European Journal of Public Health. 2011;21(3):311-5.

103. Patrick ME, Morgan N, Maggs JL, Lefkowitz ES. "I got your back": Friends' understandings regarding college student spring break behavior. Journal of Youth and Adolescence. 2011;40(1):108-20.

104. Smeaton GL, Josiam BM, Dietrich UC. College students' binge drinking at a beach-front destination during spring break. Journal of American College Health. 1998;46(6):247-54.

105. Andersson A, Mardby AC, Holmgren K, Hensing G. Associations between leisure activities and binge drinking in adults: findings from a Swedish newly sick-listed sample. Work. 2014;48(2):143-53.

106. Andersson A, Andersson C, Holmgren K, Mårdby A-C, Hensing G. Participation in leisure activities and binge drinking in adults: Findings from a Swedish general population sample. Addiction Research and Theory. 2012;20(2):172-82.

107. Thrul J, Labhart F, Kuntsche E. Drinking with mixed-gender groups is associated with heavy weekend drinking among young adults. Addiction. 2017;112(3):432-9.

108. Arbeau KJ, Kuiken D, Wild TC. Drinking to enhance and to cope: A daily process study of motive specificity. Addictive Behaviors. 2011;36(12):1174-83.

109. Patrick ME, Maggs JL. Short-term changes in plans to drink and importance of positive and negative alcohol consequences. Journal of Adolescence. 2008;31(3):307-21.

110. Chanaboon S, Kanato M. The prevalence and associated factors of alcohol consumption: a cross-sectional study in Khon Kaen, Thailand. Journal of the Medical Association of Thailand. 2015;98 Suppl 6:S34-40.

111. Islam JY, Zaman MM, Bhuiyan MR, Hasan MM, Ahsan HN, Rahman MM, et al. Alcohol consumption among adults in Bangladesh: Results from STEPS 2010. WHO South-East Asia Journal of Public Health. 2017;6(1):67-74.

112. Liu YC, Chen HH, Lee JF, Chu KH, Chien LY. Factors associated with drinking behavior among immigrant women in Taiwan. Substance Use and Misuse. 2017;52(5):674-82.

113. Obadeji A, Oluwole LO, Dada MU, Ajiboye AS. Pattern and predictors of alcohol use disorders in a family practice in Nigeria. Indian Journal of Psychological Medicine. 2015;37(1):75-80.

114. McKee M, Pomerleau J, Robertson A, Pudule I, Grinberga D, Kadziauskiene K, et al. Alcohol consumption in the Baltic Republics. Journal of Epidemiology and Community Health. 2000;54(5):361-6.

115. Hong JW, Noh JH, Kim DJ. The prevalence of and factors associated with high-risk alcohol consumption in Korean adults: The 2009-2011 Korea National Health and Nutrition Examination Survey. PLOS ONE. 2017;12(4):e0175299.

116. Xiang YT, Ma X, Lu JY, Cai ZJ, Li SR, Xiang YQ, et al. Alcohol-related disorders in Beijing, China: prevalence, socio-demographic correlates, and unmet need for treatment. Alcoholism: Clinical and Experimental Research. 2009;33(6):1111-8.

117. Katikireddi SV, Whitley E, Lewsey J, Gray L, Leyland AH. Socioeconomic status as an effect modifier of alcohol consumption and harm: analysis of linked cohort data. The Lancet Public Health. 2017;2(6):e267-e76.

118. Liao CM, Lin CM. Geographical inequalities in alcohol-related mortality rates in Taiwan due to socio-demographic differences. Alcohol and Alcoholism. 2015;50(5):558-64.

119. Siwarak P, Traimāt C, Vayagool R. Thai constitutions in brief: Institute of Public Policy Studies; 1997.

120. Jarman DW, Naimi TS, Pickard SP, Daley WWR, De AK. Peer reviewed: binge drinking and occupation, North Dakota, 2004–2005. Preventing chronic disease. 2007;4(4).

121. Zhang Z, Snizek WE. Occupation, job characteristics, and the use of alcohol and other drugs. Social Behavior and Personality: an international journal. 2003;31(4):395-412.

122. Shaikh RA, Sikora A, Siahpush M, Singh GK. Occupational variations in obesity, smoking, heavy drinking, and non-adherence to physical activity recommendations: findings from the 2010 National Health Interview Survey. American Journal of Industrial Medicine. 2015;58(1):77-87.

123. Kim S, Rifkin S, John SM, Jacob KS. Nature, prevalence and risk factors of alcohol use in an urban slum of Southern India. The National medical journal of India. 2013;26(4):203-9.

124. Birdsey J, Sieber WK, Chen GX, Hitchcock EM, Lincoln JE, Nakata A, et al. National Survey of US Long-Haul Truck Driver Health and Injury: health behaviors. Journal of Occupational and Environmental Medicine. 2015;57(2):210-6.

125. Matano RA, Wanat SF, Westrup D, Koopman C, Whitsell SD. Prevalence of alcohol and drug use in a highly educated workforce. The Journal of Behavioral Health Services and Research. 2002;29(1):30-44.

126. Siegrist J, Rödel A. Work stress and health risk behavior. Scandinavian Journal of Work, Environment and Health. 2006(6):473-81.

127. Colell E, Sanchez-Niubo A, Benavides FG, Delclos GL, Domingo-Salvany A. Work-related stress factors associated with problem drinking: A study of the Spanish working population. American Journal of Industrial Medicine. 2014;57(7):837-46.

128. Virtanen P, Vahtera J, Broms U, Sillanmäki L, Kivimäki M, Koskenvuo M. Employment trajectory as determinant of change in health-related lifestyle: the prospective HeSSup study. European Journal of Public Health. 2008;18(5):504-8.

129. Barnes AJ, Zimmerman FJ. Associations of occupational attributes and excessive drinking. Social Science and Medicine. 2013;92:35-42.

130. Dee TS. The complementarity of teen smoking and drinking. Journal of Health Economics. 1999;18(6):769-93.

131. Ritchey PN, Reid GS, Hasse LA. The relative influence of smoking on drinking and drinking on smoking among high school students in a rural tobacco-growing county. Journal of Adolescent Health. 2001;29(6):386-94.

132. Bobo JK, Husten C. Sociocultural influences on smoking and drinking. Alcohol Research and Health. 2000;24(4):225-32.

133. Room R. Smoking and drinking as complementary behaviours. Biomedicine and Pharmacotherapy. 2004;58(2):111-5.

134. Crundall I. Alcohol management in community sports clubs: impact on viability and participation. Health Promotion Journal of Australia. 2012;23(2):97-100.

135. Neighbors C, Lee CM, Lewis MA, Fossos N, Walter T. Internet-based personalized feedback to reduce 21st-birthday drinking: A randomized controlled trial of an event-specific prevention intervention. Journal of Consulting and Clinical Psychology. 2009;77(1):51.

136. Kim K, Kim J-S. The association between alcohol consumption patterns and health-related quality of life in a nationally representative sample of South Korean adults. PLOS ONE. 2015;10(3):e0119245.

137. Brønnum-Hansen H, Juel K, Davidsen M, Sørensen J. Impact of selected risk factors on quality-adjusted life expectancy in Denmark. Scandinavian Journal of Social Medicine. 2007;35(5):510-5.

138. Maheswaran H, Petrou S, Rees K, Stranges S. Estimating EQ-5D utility values for major health behavioural risk factors in England. Journal of Epidemiology and Community Health. 2012:jech-2012-201019.

139. Saarni SI, Joutsenniemi K, Koskinen S, Suvisaari J, Pirkola S, Sintonen H, et al. Alcohol consumption, abstaining, health utility, and quality of life–a general population survey in Finland. Alcohol and Alcoholism. 2008;43(3):376-86.

140. Okoro CA, Brewer RD, Naimi TS, Moriarty DG, Giles WH, Mokdad AH. Binge drinking and health-related quality of life: do popular perceptions match reality? American Journal of Preventive Medicine. 2004;26(3):230-3.

141. Dussaillant F, Fernandez M. Alcohol's harm to others' well-being and health: a comparison between Chile and Australia. Alcohol and Alcoholism. 2015;50(3):346-51.

142. Livingston M, Wilkinson C, Laslett A-M. Impact of heavy drinkers on others' health and well-being. Journal of Studies on Alcohol and Drugs. 2010;71(5):778-85.

143. Kraemer KL, Maisto SA, Conigliaro J, McNeil M, Gordon AJ, Kelley ME. Decreased alcohol consumption in outpatient drinkers is associated with improved quality of life and fewer alcohol-related consequences. Journal of General Internal Medicine. 2002;17(5):382-6.

144. Stranges S, Notaro J, Freudenheim JL, Calogero RM, Muti P, Farinaro E, et al. Alcohol drinking pattern and subjective health in a population-based study. Addiction. 2006;101(9):1265-76.

145. Saito I, Okamura T, Fukuhara S, Tanaka T, Suzukamo Y, Okayama A, et al. A cross-sectional study of alcohol drinking and health-related quality of life among male workers in Japan. Journal of Occupational Health. 2005;47(6):496-503.

146. Rezaei S, Hajizadeh M, Kazemi A, Khosravipour M, Khosravi F, Rezaeian S. Determinants of health-related quality of life in Iranian adults: evidence from a cross-sectional study. Epidemiology and Health. 2017;39:e2017038.

147. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T, et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. The Lancet. 2013;381(9867):670-9.

148. Pelucchi C, Gallus S, Garavello W, Bosetti C, La Vecchia C. Cancer risk associated with alcohol and tobacco use: focus on upper aero-digestive tract and liver. Alcohol Research and Health. 2006;29(3):193-9.

149. Lubetkin EI, Jia H, Franks P, Gold MR. Relationship among sociodemographic factors, clinical conditions, and health-related quality of life: examining the EQ-5D in the US general population. Quality of Life Research. 2005;14(10):2187-96.

150. McCaffrey N, Kaambwa B, Currow DC, Ratcliffe J. Health-related quality of life measured using the EQ-5D–5L: South Australian population norms. Health and Quality of Life Outcomes. 2016;14(1):133.

151. Reaney MD, Martin C, Speight J. Understanding and assessing the impact of alcoholism on quality of life. The Patient: Patient-Centered Outcomes Research. 2008;1(3):151-63.

152. Günther O, Roick C, Angermeyer MC, König H-H. The EQ-5D in alcohol dependent patients: relationships among health-related quality of life, psychopathology and social functioning. Drug and Alcohol Dependence. 2007;86(2):253-64.

153. World Health Organization. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization; 2011.

154. Collin J, Casswell S. Alcohol and the Sustainable Development Goals. The Lancet. 2016;387(10038):2582.

ANNEXES

Annex 1 Documentary Proof of Ethical Clearance

AF/03-05/01.1

คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์

หนังสือฉบับนี้ให้ไว้เพื่อแสดงว่า

รหัสโครงการ:	59-254-18-5
ชื่อโครงการ :	การพัฒนาเครื่องมือสำรวจการดื่มเครื่องดื่มแอลกอฮอล์และผลกระทบจากการดื่มเครื่องดื่มแอลกอฮอล์ในประชากรไทย: การวิจัยแบบผสมผสานวิธี
	Development of the measuring instruments for alcohol consumption indices and alcohol related social harm in Thai drinkers: the Mixed Methods

ผู้วิจัยหลัก:	นพ. พลเทพ วิจิตรคุณากร	สังกัด:	หน่วยระบาดวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์
ที่ปรึกษาวิจัย:	ศ.ดร.พญ. สาวิตรี อัษณางค์กรชัย	สังกัด:	หน่วยระบาดวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์
ผู้ที่ปรึกษาวิจัย:	ผศ.ดร.ขวัญตา บาลทิพย์	สังกัด:	ภาควิชาการพยาบาลสาธารณสุขศาสตร์ คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์

เอกสารที่รับรอง:

1. แบบเสนอเพื่อขอรับการพิจารณาจริยธรรมการวิจัยในมนุษย์ เวอร์ชั่น 2.0 ฉบับวันที่ 21 ตุลาคม 2559
2. โครงการวิจัยฉบับสมบูรณ์ เวอร์ชั่น 2.0 ฉบับวันที่ 21 ตุลาคม 2559
3. เอกสารชี้แจงอาสาสมัคร เวอร์ชั่น 2.0 ฉบับวันที่ 21 ตุลาคม 2559
4. เอกสารแสดงเจตนายินยอมของอาสาสมัคร เวอร์ชั่น 2.0 ฉบับวันที่ 21 ตุลาคม 2559
5. แบบบันทึกข้อมูล
6. ประวัติผู้วิจัย

ได้ผ่านการรับรองจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์ (ในการประชุมคณะกรรมการ วันที่ 3 ตุลาคม 2559 วาระที่ 4.2.03) โดยยึดหลักเกณฑ์ตามประกาศ เฮลซิงกิ (Declaration of Helsinki) และแนวทางการปฏิบัติการวิจัยทางคลินิกที่ดี (The International Conference on Harmonization in Good Clinical Practice หรือ ICH-GCP) โดยขอให้รายงานความก้าวหน้าของโครงการวิจัยทุก 12 เดือน

ลงชื่อ...

(รองศาสตราจารย์นายแพทย์บุญสิน ตั้งตระกูลวนิช)

ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์

วันที่รับรอง: 31 ตุลาคม 2559
วันหมดอายุ: 30 ตุลาคม 2560

Annex 2 In-depth interview guide

แนวทางในการสัมภาษณ์เชิงลึก เรื่อง การพัฒนาเครื่องมือสำรวจการดื่มเครื่องดื่มแอลกอฮอล์และ ผลกระทบจากการดื่มเครื่องดื่มแอลกอฮอล์ในประชากรไทย: การวิจัยแบบผสมผสานวิธี	
แนวทาง	**เนื้อหาหลัก**
เกริ่นนำ	

- ขอเรียกคืน inform consent
- ขอบคุณ
- แนะนำตัว
- จุดประสงค์
- ความลับของผู้เข้าร่วม
- ระยะเวลา
- วิธีการสัมภาษณ์
- เปิดโอกาสให้ซักถามได้ตลอดการสัมภาษณ์
	- แนะนำตัว
	- อธิบายจุดประสงค์เพื่อศึกษารูปแบบการดื่มเครื่องดื่มแอลกอฮอล์และ ผลกระทบจากเครื่องดื่มแอลกอฮอล์ทางสังคม
	- ข้อมูลที่สัมภาษณ์จะเป็นความลับ โดยที่ถ้าผู้สัมภาษณ์ไม่สบายใจที่จะตอบ คำถามสามารถปฏิเสธการตอบและหยุดการสัมภาษณ์เมื่อไรก็ได้ และผล สัมภาษณ์ในวันนี้จะเป็นความลับโดยจะนำเสนอในภาพรวมไม่สามารถระบุ ตัวตนได้
	- กระบวนการสัมภาษณ์และระยะเวลาการสัมภาษณ์: ใช้เวลาประมาณ 30 ถึง 40 นาทีและจะมีการบันทึกเสียงตลอดการสัมภาษณ์เพื่อความถูกต้องของ ข้อมูล ก่อนการสัมภาษณ์จะให้ท่านทำแบบสอบถามข้อมูลทั่วไป หลังจากนั้น จะแบ่งการสัมภาษณ์ออกเป็น 2 ส่วน ดังนี้
	    1. สัมภาษณ์รูปแบบการดื่มเครื่องดื่มแอลกอฮอล์
	    2. สัมภาษณ์ผลกระทบจากเครื่องดื่มแอลกอฮอล์ทางสังคม

ส่วนที่ 1: รูปแบบการดื่มเครื่องดื่มแอลกอฮอล์	

- ถามข้อเท็จจริงก่อนความคิดเห็น
- ใช้เทคนิคการ probe
	- สาเหตุในการดื่ม (ให้ระบุสาเหตุที่ดื่มมากที่สุด 3 อันดับ)
	- โอกาสในการดื่ม
	    - ก่อน/หลังมื้ออาหาร
	    - วันหยุดสุดสัปดาห์
	    - ปีใหม่/ตรุษจีน/สงกรานต์/คริสต์มาส
	    - เทศกาลท้องถิ่น เช่น สารทไทย, งานบวช, งานศพ
	    - สังสรรค์ เช่น ขึ้นบ้านใหม่, แต่งงาน, เลื่อนขั้น เป็นต้น
	    - อื่น ๆ
	- สถานที่ในการดื่ม
	- เวลาที่ดื่มและระยะเวลาที่ดื่ม
	- ชนิดเครื่องดื่ม
	- ภาชนะที่ดื่ม, ปริมาณการรินใส่ภาชนะ
	- หน่วยดื่มมาตรฐาน (standard drink)

แนวทางในการสัมภาษณ์เชิงลึก	
เรื่อง การพัฒนาเครื่องมือสำรวจการดื่มเครื่องดื่มแอลกอฮอล์และ	
ผลกระทบจากการดื่มเครื่องดื่มแอลกอฮอล์ในประชากรไทย: การวิจัยแบบผสมผสานวิธี	
แนวทาง	**เนื้อหาหลัก**
	- ดื่มกับใคร (กรณีเป็นกลุ่ม: ให้ถามรายละเอียดการแบ่งเครื่องดื่ม เช่น สั่งแยกหรือรวม)
	- อารมณ์ความรู้สึก
ส่วนที่ 2: ผลกระทบจากเครื่องดื่มแอลกอฮอล์ทางสังคม	

- ถามข้อเท็จจริงก่อนความคิดเห็น
- ใช้เทคนิคการ probe
	- จากการดื่มแอลกอฮอล์แต่ละครั้งได้รับผลที่ตามมาอย่างไรบ้าง (ทั้งผลดีและผลเสีย)
	- ประเภทของผลที่ตามมาจากเครื่องดื่มแอลกอฮอล์ทางสังคม โดยถามรายละเอียดของแต่ละประเภท ดังนี้
	    - สาเหตุและปัจจัยที่เกี่ยวข้องกับผลที่ตามมาแต่ละประเภท
	    - ประสบการณ์ในการได้รับผลที่ตามมาแต่ละชนิด (จำนวนครั้งและรายละเอียด)
	    - การแก้ปัญหาหรือตอบสนองต่อผลที่ตามมาแต่ละประเภท
	    - (กรณีที่ถามคำถามปลายเปิดแล้ว ให้ถามคำถามปลายปิดในแต่ละประเด็นหัวข้อของผลที่ตามมาทางสังคม ดังนี้)
	        1. การเรียน/การทำงาน
	        2. อุบัติเหตุ
	        3. ความรุนแรงทางร่างกายและจิตใจ
	        4. ครอบครัว
	        5. เพื่อนและคนรอบข้าง
	        6. การเงินค่าใช้จ่าย
	        7. อื่น ๆ

จบการสัมภาษณ์	- สรุปรวบยอดความคิดเพื่อตรวจสอบความถูกต้อง - ซักถามเพิ่มเติมและขอบคุณผู้ให้สัมภาษณ์

Annex 3 Questionnaires

<div style="border:1px solid">แบบที่ 1</div>

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

แบบสอบถามแบบสัมภาษณ์ (แบบที่ 1)

เรื่อง การพัฒนาเครื่องมือสำรวจการดื่มเครื่องดื่มแอลกอฮอล์และ

ผลกระทบจากการดื่มเครื่องดื่มแอลกอฮอล์ในประชากรไทย: การวิจัยแบบผสมผสานวิธี

คำชี้แจง: กรุณาทำเครื่องหมาย ✔ ลงในช่องหรือเติมข้อความตามคำถามแต่ละข้อให้ครบถ้วน

ข้อที่	คำถาม	รหัส (สำหรับผู้วิจัย)
รายละเอียดการสัมภาษณ์		
Q1	ชุดของแบบสอบถาม [✔] 1 แบบที่ 1 [ ] 2 แบบที่ 2	q [1]
Q2	วันที่สัมภาษณ์ (วัน/เดือน/ปีพ.ศ.) [ ][ ] / 01 / 2560	di [ ][ ]
Q3	รหัสพื้นที่ [ ] 1 ต.ท่าข้าม (หมู่ที่ 7) [ ] 2 ต.ท่าข้าม (หมู่ที่ 8) [ ] 3 ต.น้ำน้อย (หมู่ที่ 4) [ ] 4 ต.น้ำน้อย (หมู่ที่ 10) [ ] 5 ต.คูหาใต้ (หมู่ที่ 8) [ ] 6 ต.คูหาใต้ (หมู่ที่ 10) [ ] 7 ต.กำแพงเพชร (หมู่ที่ 5) [ ] 8 ต.กำแพงเพชร (หมู่ที่ 8)	tid [ ]
Q4	รหัสลำดับที่บ้าน/ครัวเรือน (ตามลำดับที่บ้านของแต่ละหมู่บ้านตามคู่มือภาคสนาม) [ ][ ]	hh [ ][ ]
Q5	ลำดับที่ของผู้สัมภาษณ์ในครัวเรือน (ตามลำดับที่บ้านของแต่ละหมู่บ้านตามคู่มือภาคสนาม) [ ] 1 คนที่ 1 [ ] 2 คนที่ 2	sub [ ]
Q6	ชื่อผู้ถูกสัมภาษณ์ .... นามสกุลผู้ถูกสัมภาษณ์ .... ที่อยู่: บ้านเลขที่ .... ซอย .... ถนน	name [.....................] surname [.....................] address [.....................]
Q7	เบอร์โทรศัพท์ที่ติดต่อได้ [ ][ ][ ] - [ ][ ][ ] - [ ][ ][ ][ ]	phone [ ][ ] [ ][ ][ ][ ]
Q8	รหัสผู้สัมภาษณ์ (พนักงานภาคสนาม) [ ][ ]	staff [ ][ ]
1. ข้อมูลทั่วไป		
G1	วัน/เดือน/ปีพ.ศ.เกิด [ ][ ] / [ ][ ] / พ.ศ. [ ][ ][ ][ ]	db [ ][ ] mb [ ][ ] yb [ ][ ][ ][ ]
G2	อายุ [ ][ ] ปี.	age [ ][ ]
G2	เพศ (จากการสังเกต) [ ] 1 ชาย [ ] 2 หญิง	sex [ ]
G3	สถานภาพของคุณในปัจจุบัน [ ] 1 โสด [ ] 2 แต่งงาน [ ] 3 หม้าย [ ] 4 หย่าร้าง [ ] 5 แยกกันอยู่ [ ] 6 ปฏิเสธตอบคำถาม	mar [ ]
G4	คุณสำเร็จการศึกษาสูงสุดระดับใด [ ] 1 ไม่เคยเรียน [ ] 2 ประถมศึกษาหรือน้อยกว่า [ ] 3 มัธยมศึกษาตอนต้น [ ] 4 มัธยมศึกษาตอนปลาย [ ] 5 ปวส./อนุปริญญา [ ] 6 ปริญญาตรีหรือสูงกว่า [ ] 7 เปรียญ [ ] 8 อื่น ๆ (ระบุ).........................	edu [ ]
G5	ขณะนี้คุณนับถือศาสนาอะไร [ ] 1 พุทธ [ ] 2 มุสลิม [ ] 3 คริสต์ [ ] 4 อื่น ๆ (ระบุ).........................	relig [ ]

1

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

ข้อที่	คำถาม	รหัส (สำหรับผู้วิจัย)
G6	**ปัจจุบันคุณประกอบอาชีพ** [ ] 1 ผู้ประกอบอาชีพงานพื้นฐาน ผู้ใช้แรงงาน คนงาน เช่น รับจ้าง, กรรมกร, รับจ้างแม่บ้านทำความสะอาด, ส่งข่าวสาร/ขนของ [ ] 2 ผู้ปฏิบัติงานที่มีฝีมือด้านการเกษตรและประมง เช่น เกษตรกรปลูกพืชไร่ ชาวนา ชาวสวน เลี้ยงสัตว์ [ ] 3 ผู้ควบคุมเครื่องจักรโรงงานและเครื่องจักรการผลิตภัณฑ์ต่าง ๆ เครื่องทอผ้า ขับรถยนต์ จักรยานยนต์ [ ] 4 ผู้ปฏิบัติงานในธุรกิจด้านความสามารถทางฝีมือและธุรกิจที่เกี่ยวข้อง เช่น ก่อสร้าง, ก่ออิฐ, งานไม้, มุงหลังคา, งานด้านโลหะ เชื่อมเหล็กและอื่น ๆ ที่เกี่ยวข้อง เช่น ช่างเฟอร์นิเจอร์ จักรสาน เป็นต้น [ ] 5 เสมียน เลขานุการ พนักงานบริการลูกค้า แคชเชียร์ พนักงานต้อนรับ [ ] 6 พนักงานบริการและจำหน่ายสินค้าในร้านและตลาด เช่น ฟอ์ครัว, แม่ครัว, ช่างตัดผม, เจ้าของร้านค้าขนาดเล็ก, ขายอาหารสดหรืออาหารพร้อมบริโภคข้างถนน ขายแผงลอย [ ] 7 ช่างเทคนิคต่าง ๆ เช่น ช่างวิศวะ, ช่างคอมพิวเตอร์, [ ] 8 ผู้ประกอบวิชาชีพต่าง ๆ ทางวิชาการทุกสาขา เช่น วิศวะ, สถาปนิก, วิทยาศาสตร์, สังคม, แพทย์, ทันตแพทย์, เภสัช, พยาบาล, นักกฎหมาย เป็นต้น [ ] 9 ผู้บริหารรัฐและเอกชน ข้าราชการอาวุโส [ ] 10 ทหาร [ ] 11 นักเรียน นักศึกษา [ ] 12 ไม่มีอาชีพ เช่น เป็นพ่อ/แม่บ้าน (ดูแลบ้าน ไม่มีรายได้) _(ถ้าตอบข้อนี้ → ข้ามไปข้อ G8)_ [ ] 13 อื่น ๆ (ระบุ)...	occ1 [ ][ ]
G7	**สำหรับผู้ที่ตอบว่ามีงานทำ ในปัจจุบันคุณมีสถานภาพการทำงานอย่างไร** [ ] 1 เจ้าของหรือผู้ดำเนินกิจการเอง [ ] 2 ลูกจ้างรัฐบาล/รัฐวิสาหกิจ [ ] 3 ลูกจ้างเอกชน [ ] 4 สมาชิก/การรวมกลุ่ม [ ] 5 ผู้ปฏิบัติงานโดยไม่ได้รับค่าจ้าง	occ2 [ ]
G8	จำนวนสมาชิกในครอบครัว (บ้านเดียวกัน) [ ][ ] คน	hhn[ ][ ]
G9	จำนวนสมาชิกในบ้านที่อายุเกิน 18 ปี (บ้านเดียวกัน) [ ][ ] คน	hhn18 [ ][ ]
G10	คุณพักอาศัยกับสมาชิกในครอบครัวนานกี่ปี [ ][ ] ปี	dur[ ][ ]
G11	รายได้เฉลี่ยรวมต่อเดือนของสมาชิกทุกคนในครอบครัวรวมกัน [ ][ ][ ],[ ][ ][ ] บาทต่อเดือน	income [ ][ ][ ][ ][ ][ ]
S1	**โดยปกติคุณสูบบุหรี่ซอง หรือบุหรี่มวนเอง (ยาเส้น) หรือใช้ยาสูบประเภทอื่น ๆ เช่นบารากุ หรือ บุหรี่ไฟฟ้า หรือไม่** [ ] 1 ไม่สูบและไม่เคยสูบ _(ถ้าตอบข้อนี้ → ข้ามไปหน้า 3 ข้อ Q1 การเคลื่อนไหว)_ [ ] 2 ไม่สูบแต่เคยสูบ – เคยสูบเป็นประจำ (ตั้งแต่ทุกสัปดาห์ขึ้นไป) [ ] 3 ไม่สูบแต่เคยสูบ – เคยสูบนาน ๆ ครั้ง (น้อยกว่าทุกสัปดาห์) [ ] 4 สูบเป็นประจำ (ตั้งแต่ทุกสัปดาห์ขึ้นไป) [ ] 4 สูบนาน ๆ ครั้ง (น้อยกว่าทุกสัปดาห์)	smoke [ ]
S2	**คุณเริ่มสูบบุหรี่หรือไปป์หรือ ซิการ์หรือ ใช้ยาสูบประเภทอื่น ๆ เมื่อท่านมีอายุเท่าไร** [ ][ ] ปี	sstart [ ][ ]
S3	**คุณสูบบุหรี่ซองหรือบุหรี่มวนเอง (ยาเส้น) หรือใช้ยาสูบประเภทอื่น ๆ มาเป็นระยะเวลานานเท่าไหร่** [ ][ ] ปี [ ][ ] เดือน	syr [ ][ ] smo [ ][ ]
S4	**โดยเฉลี่ยคุณสูบบุหรี่ซอง หรือบุหรี่มวนเอง (ยาเส้น) หรือใช้ยาสูบประเภทอื่น ๆ จำนวนกี่มวนต่อวัน** [ ][ ] มวนต่อวัน	samount [ ][ ]

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

ข้อที่	คำถาม	รหัส (สำหรับผู้วิจัย)
	ในแต่ละหัวข้อ กรุณาทำเครื่องหมาย ✓ ลงในช่อง **เพียงช่องเดียว** ที่ตรงกับสุขภาพของท่าน**ในวันนี้** มากที่สุด	
Q1	**การเคลื่อนไหว** [ ] 1 ข้าพเจ้าไม่มีปัญหาในการเดิน [ ] 2 ข้าพเจ้ามีปัญหาในการเดินเล็กน้อย [ ] 3 ข้าพเจ้ามีปัญหาในการเดินปานกลาง [ ] 4 ข้าพเจ้ามีปัญหาในการเดินอย่างมาก [ ] 5 ข้าพเจ้าเดินไม่ได้	qol1 [ ]
Q2	**การดูแลตนเอง** [ ] 1 ข้าพเจ้าไม่มีปัญหาในการอาบน้ำ หรือใส่เสื้อผ้าด้วยตนเอง [ ] 2 ข้าพเจ้ามีปัญหาในการอาบน้ำ หรือใส่เสื้อผ้าด้วยตนเองเล็กน้อย [ ] 3 ข้าพเจ้ามีปัญหาในการอาบน้ำ หรือใส่เสื้อผ้าด้วยตนเองปานกลาง [ ] 4 ข้าพเจ้ามีปัญหาในการอาบน้ำ หรือใส่เสื้อผ้าด้วยตนเองอย่างมาก [ ] 5 ข้าพเจ้าอาบน้ำ หรือใส่เสื้อผ้าด้วยตนเองไม่ได้	qol2 [ ]
Q3	**กิจกรรมที่ทำเป็นประจำ** *(เช่น ทำงาน, เรียนหนังสือ, ทำงานบ้าน, กิจกรรมในครอบครัว หรือกิจกรรมยามว่าง)* [ ] 1 ข้าพเจ้าไม่มีปัญหาในการทำกิจกรรมที่ทำเป็นประจำ [ ] 2 ข้าพเจ้ามีปัญหาในการทำกิจกรรมที่ทำเป็นประจำเล็กน้อย [ ] 3 ข้าพเจ้ามีปัญหาในการทำกิจกรรมที่ทำเป็นประจำปานกลาง [ ] 4 ข้าพเจ้ามีปัญหาในการทำกิจกรรมที่ทำเป็นประจำอย่างมาก [ ] 5 ข้าพเจ้าทำกิจกรรมที่ทำเป็นประจำไม่ได้	qol3 [ ]
Q4	**อาการเจ็บปวด/อาการไม่สบายตัว** [ ] 1 ข้าพเจ้าไม่มีอาการเจ็บปวดหรืออาการไม่สบายตัว [ ] 2 ข้าพเจ้ามีอาการเจ็บปวดหรืออาการไม่สบายตัวเล็กน้อย [ ] 3 ข้าพเจ้ามีอาการเจ็บปวดหรืออาการไม่สบายตัวปานกลาง [ ] 4 ข้าพเจ้ามีอาการเจ็บปวดหรืออาการไม่สบายตัวอย่างมาก [ ] 5 ข้าพเจ้ามีอาการเจ็บปวดหรืออาการไม่สบายตัวอย่างมากที่สุด	qol4 [ ]
Q5	**ความวิตกกังวล/ความซึมเศร้า** [ ] 1 ข้าพเจ้าไม่รู้สึกวิตกกังวลหรือซึมเศร้า [ ] 2 ข้าพเจ้ารู้สึกวิตกกังวลหรือซึมเศร้าเล็กน้อย [ ] 3 ข้าพเจ้ารู้สึกวิตกกังวลหรือซึมเศร้าปานกลาง [ ] 4 ข้าพเจ้ารู้สึกวิตกกังวลหรือซึมเศร้าอย่างมาก [ ] 5 ข้าพเจ้ารู้สึกวิตกกังวลหรือซึมเศร้าอย่างมากที่สุด	qol5 [ ]

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

ข้อที่	คำถาม	รหัส (สำหรับผู้วิจัย)
2. ข้อมูลพฤติกรรมการดื่มเครื่องดื่มแอลกอฮอล์		
2.1 ทั่วไป		
A1	**คุณดื่มเครื่องดื่มแอลกอฮอล์หรือไม่?** โดยที่เครื่องดื่มแอลกอฮอล์ หมายถึง เครื่องดื่มที่มีส่วนผสมของแอลกอฮอล์ เช่น สุรา แม่โขง สุรา 28 ดีกรี สุราขาว กระแช่ สาโท บรั่นดี ไวน์ วิสกี้ เบียร์ เป็นต้น [ ] 1. ไม่เคยดื่มเลยในชีวิตนี้ *(ถ้าตอบข้อนี้ ➔ จบการสัมภาษณ์)* [ ] 2. เคยดื่ม แต่ไม่ดื่มใน <u>12 เดือนที่แล้ว</u> *(ถ้าตอบข้อนี้ ➔ จบการสัมภาษณ์)* <u>ถ้าเคยดื่มใน 12 เดือนที่แล้ว</u> ให้เลือกความถี่ด้านล่างนี้ [ ] 3. ทุกวัน (7 วัน/สัปดาห์) [ ] 4. เกือบทุกวัน (5-6 วัน/สัปดาห์) [ ] 5. วันเว้นวัน (3-4 วัน/สัปดาห์) [ ] 6. ทุกสัปดาห์ (1-2 วัน/สัปดาห์) [ ] 7. ทุกเดือน (1-3 วัน/เดือน) [ ] 8. นาน ๆ ครั้ง (8-11 วัน/ปี) [ ] 9. นาน ๆ ครั้ง (4-7 วัน/ปี) [ ] 10. นาน ๆ ครั้ง (1-3 วัน/ปี)	d12m [ ]
A2	**ในช่วง <u>3 เดือนที่ผ่านมา</u> (ตั้งแต่ 1 ตุลาคม 2559), คุณดื่มเครื่องดื่มแอลกอฮอล์หรือไม่** [ ] 1. ไม่ดื่มใน 3 เดือนที่ผ่านมา (ตั้งแต่ 1 ตุลาคม 2559) *(ถ้าตอบข้อนี้ ➔ ข้ามไปหน้าที่ 12 หัวข้อ 2.5 ผลกระทบทางสังคม)* [ ] 2. ดื่มใน 3 เดือนที่ผ่านมา (ตั้งแต่ 1 ตุลาคม 2559)	d3m [ ]
A3	**ในความคิดเห็นของคุณ <u>ใน 3 เดือนที่ผ่านมา</u> คุณดื่มเครื่องดื่มแอลกอฮอล์มี<u>ความถี่และปริมาณเฉลี่ย</u>เหมือนหรือ แตกต่างกับ <u>1 ปีที่ผ่านมา</u>หรือไม่** [ ] 1. <u>ความถี่และปริมาณเฉลี่ย</u>การดื่มในช่วง 3 เดือนที่ผ่านมา <u>เท่ากับ</u> 1 ปีที่ผ่านมา [ ] 2. <u>ความถี่และปริมาณเฉลี่ย</u>การดื่มใน 3 เดือนที่ผ่านมา <u>มากกว่า</u> 1 ปีที่ผ่านมา [ ] 3. <u>ความถี่และปริมาณเฉลี่ย</u>การดื่มใน 3 เดือนที่ผ่านมา <u>น้อยกว่า</u> 1 ปีที่ผ่านมา	d3mp [ ]
A3	**ในช่วง <u>3 เดือนที่ผ่านมา</u>, คุณดื่มเครื่องดื่มแอลกอฮอล์<u>บ่อยเพียงใด</u>** [ ] 1. ทุกวัน (7 วัน/สัปดาห์) [ ] 2. เกือบทุกวัน (5-6 วัน/สัปดาห์) [ ] 3. วันเว้นวัน (3-4 วัน/สัปดาห์) [ ] 4. ทุกสัปดาห์ (1-2 วัน/สัปดาห์) [ ] 5. ทุกเดือน (1-3 วัน/3 เดือนที่แล้ว)	qff [ ][ ]
A4	**ในช่วง <u>3 เดือนที่ผ่านมา</u>, เวลาที่คุณดื่มเครื่องดื่มแอลกอฮอล์ โดยเฉลี่ยแล้วคุณดื่มด้วย<u>ภาชนะอะไรและปริมาณ เท่าไร ในแต่ละครั้ง</u> (ให้ผู้ถูกสัมภาษณ์ดูรูปภาชนะประกอบจากคู่มือภาคสนาม)** ให้บันทึกรายละเอียด ดังนี้ ตัวอย่างเช่น: ชนิดเครื่องดื่ม ....*เบียร์*........ ยี่ห้อ ......*สิงโต*..... ปริมาณ ......*1*...... ภาชนะ ......*กระป๋องขนาด 330 ซีซี*..... - ชนิดเครื่องดื่ม .... ยี่ห้อ .... ปริมาณ .... ภาชนะ .... - ชนิดเครื่องดื่ม .... ยี่ห้อ .... ปริมาณ .... ภาชนะ .... - ชนิดเครื่องดื่ม .... ยี่ห้อ .... ปริมาณ .... ภาชนะ .... <u>** ผู้สัมภาษณ์คำนวณได้เท่ากับ</u> [ ][ ] . [ ] หน่วยดื่มมาตรฐาน/ครั้ง <u>(ผู้สัมภาษณ์ต้องคำนวณเป็นหน่วยมาตรฐานด้วยตนเอง โดยดูวิธีการแปลงหน่วยจากคู่มือภาคสนาม)</u>	cont [ ][ ] . [ ]

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

ข้อที่	คำถาม	รหัส (สำหรับผู้วิจัย)
2. ข้อมูลพฤติกรรมการดื่มเครื่องดื่มแอลกอฮอล์		
A5	ในช่วง <u>3 เดือนที่ผ่านมา</u>, คุณดื่มเครื่องดื่มแอลกอฮอล์ <u>หนักหรือปริมาณมากในครั้งเดียว</u> <u>บ่อยเพียงใด</u> โดยดื่มหนักหรือปริมาณมากเท่ากับ **- สุราขาว/เชี่ยงชุน/ยาดองเหล้า** : 5 เป๊ก , 1/4 ขวดใหญ่ หรือ 1/2 ขวดกลาง **- สุรากลั่น/ ผสม:** 1/4 ขวดใหญ่/ดื่มเพียว 5 เป๊ก / 8 แก้วผสม **- เบียร์:** 4 กระป๋อง / 2 ขวดใหญ่ **- ไวน์ / แชมเปญ:** 1 ขวดใหญ่ / 4 แก้วไวน์ **- น้ำผลไม้ผสมแอลกอฮอล์ / ไวน์คูลเลอร์:** 4 1/2 ขวดหรือกระป๋อง **- เหล้าหมัก (กระแช่/สาโท/อุ/สุราพื้นเมือง):** 1 ขวดใหญ่ หรือ 2 แก้วครึ่ง [ ] 1. ทุกวัน (7 วัน/สัปดาห์) [ ] 2. เกือบทุกวัน (5-6 วัน/สัปดาห์) [ ] 3. วันเว้นวัน (3-4 วัน/สัปดาห์) [ ] 4. ทุกสัปดาห์ (1-2 วัน/สัปดาห์) [ ] 5. ทุกเดือน (1-3 วัน/3 เดือนที่แล้ว)	ofhed [ ][ ]

ID: รหัสพื้นที่ – บ้าน – ลำดับ [   ] – [   ][   ] – [   ]

2.2 แบบสอบถาม Beverage Specific Quantity Frequency (BSQF)		
ใน 3 เดือนที่แล้ว โดยปกติแล้วคุณดื่มเครื่องดื่มแอลกอฮอล์มากหรือน้อยเพียงใด บันทึก ก) ความถี่ ข) หน่วยภาชนะที่ดื่ม ค) ปริมาณที่ดื่ม		
ก) ความถี่	ข) หน่วยภาชนะที่ดื่ม	ค) ปริมาณที่ดื่ม
1. ทุกวัน (7 วัน/สัปดาห์) 2. เกือบทุกวัน (5-6 วัน/สัปดาห์) 3. วันเว้นวัน (3-4 วัน/สัปดาห์) 4. ทุกสัปดาห์ (1-2 วัน/สัปดาห์) 5. ทุกเดือน (1-3 วัน/3 เดือนที่แล้ว)	1. เป๊ก 30 ซีซี 2. แก้วไวน์/ขวดเอ็มร้อย - 150 ซีซี 3. แก้วกลมทั่วไป /แก้วโอวัลติน - 200 ซีซี 4. แก้วกลมสั้น/ทรงกระบอกสั้น - 235 ซีซี 5. แก้วทรงกระบอก/แก้วเบียร์สูง - 285 ซีซี 6. แก้วทรงสูงใบใหญ่/แก้วเหยือก - 325 ซีซี 7. กระป๋อง/ขวดเล็ก/แบน - 330 ซีซี 8. กระป๋องใหญ่ - 500 ซีซี 9. ขวดใหญ่ (เหล้าขาว/เบียร์) – 630 ซีซี 10. ขวดใหญ่ (เหล้าสี) – 700 ซีซี 11. ขวดใหญ่ (ไวน์/เหล้าสี) – 750 ซีซี 12. เหยือก/ไหเหล็ก/ขวดลิตร – 1,000 ซีซี <u>(ให้ผู้ถูกสัมภาษณ์ดูรูปภาชนะประกอบจาก คู่มือภาคสนาม)</u>	- ให้บันทึก<u>ปริมาณที่ดื่ม</u>ตามหน่วยภาชนะที่ใช้ดื่มในข้อ ข) โดยมี <u>ทศนิยม 1 ตำแหน่ง</u> เช่น 3 หน่วย บันทึก 3.0 1 หน่วย บันทึก 1.0 1½ หน่วย บันทึก 1.5 3/4 หน่วย บันทึก 0.8 1/4 หน่วย บันทึก 0.3 1/3 หน่วย บันทึก 0.3 1/5 หน่วย บันทึก 0.2 - ถ้าดื่มเครื่องดื่มแอลกอฮอล์หลายคน ให้บันทึกค่าเฉลี่ยต่อคน เช่น ดื่มทั้งหมด 5 คน ดื่มทั้งหมด ¾ หน่วย =0.8/5 = 0.16 บันทึก 0.2

(1) เวลาที่เริ่มถาม (ชม: นาที; ระบบ 24 ชม)			[ ][ ]:[ ][ ]			bss [ ][ ]:[ ][ ]		

(2) เบียร์			(3) สุราขาว / สุรากลั่นชุมชน			(4) สุราสี/สุราแดง			(5) สุราแช่พื้นบ้าน (สาโท, อุ, กระแช่)		
ค.ถี่	หน่วย	ปริมาณ	ค.ถี่	หน่วย	ปริมาณ	ค.ถี่	หน่วย	ปริมาณ	ค.ถี่	หน่วย	ปริมาณ
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
__	__	__ __.__	__	__	__ __.__	__	__	__ __.__	__	__	__ __.__

(6) ไวน์องุ่น / แชมเปญ/ ไวน์ผลไม้			(7) ไวน์คูลเลอร์ / สุราผสมน้ำผลไม้ / เหล้าปั่น			(8) ยาดองเหล้า/สุราจีน/วอดก้า		
ค.ถี่	หน่วย	ปริมาณ	ค.ถี่	หน่วย	ปริมาณ	ค.ถี่	หน่วย	ปริมาณ
B13	B14	B15	B16	B17	B18	B19	B20	B21
__	__	__ __.__	__	__	__ __.__	__	__	__ __.__

(9) เวลาที่เริ่มถาม (ชม: นาที; ระบบ 24 ชม)	[ ][ ]:[ ][ ]	bse [ ][ ]:[ ][ ]

(10) คุณรู้สึกลำบากในการตอบคำถามเพียงใด	
[ ] 1. ตอบง่ายมาก [ ] 2. ตอบง่าย [ ] 3. เฉย ๆ [ ] 4. ตอบยาก [ ] 5. ตอบยากมาก	bbur [ ]

2.3 แบบสอบถาม Context specific quantity frequency (CSQF)

<u>ใน 3 เดือนที่แล้ว</u> คุณดื่มเครื่องดื่มแอลกอฮอล์ใน <u>โอกาสหรือสถานการณ์</u> ต่อไปนี้หรือไม่ บันทึก ก) สถานที่ ข) ผู้ร่วมดื่ม ค) ชนิดของเครื่องดื่มแอลกอฮอล์ ง) หน่วยภาชนะที่ดื่ม จ) ปริมาณที่ดื่ม ฉ) ความถี่ (Table 4, item 1)

ก) สถานที่	ข) ผู้ร่วมดื่ม	ค) ความถี่	ง) ชนิดของเครื่องดื่มแอลกอฮอล์	จ) หน่วยภาชนะที่ดื่ม	ฉ) ปริมาณที่ดื่ม	ช) จำนวนคนที่ดื่ม
1. บ้านตนเอง 2. บ้านผู้อื่น 3. ร้านอาหาร 4. ร้านเหล้า/ผับ/คาราโอเกะ 5. ที่ทำงาน 6. ที่ประกอบศาสนา เช่น วัดหรือโบสถ์ 7. ชุ้มยาดอง/ร้านรถเข็น	1. คนเดียว 2. สามี/ภรรยา/ลูก 3. ญาติ ๆ 4. เพื่อนผู้ชาย 5. เพื่อนผู้หญิง 6. เพื่อนผู้ชายและหญิง 7. คนแปลกหน้า 8. เพื่อนร่วมงาน	1. ทุกวัน (7 วัน/สัปดาห์) 2. เกือบทุกวัน (5-6 วัน/สัปดาห์) 3. วันเว้นวัน (3-4 วัน/สัปดาห์) 4. ทุกสัปดาห์ (1-2 วัน/สัปดาห์) 5. ทุกเดือน (1-3 วัน/3 เดือนที่แล้ว)	1. เบียร์ 2. สุราขาว / สุรากลั่นชุมชน 3. สุราสี/สุราแดง 4. สุราแช่พื้นบ้าน (สาโท, อุ, กระแช่) 5. ไวน์องุ่น / แชมเปญ/ ไวน์ผลไม้ 6. ไวน์คูลเลอร์ / สุราผสมน้ำผลไม้ / เหล้าปั่น 7. ยาดองเหล้า/สุราจีน/วอดก้า	1. เป๊ก 30 ซีซี 2. แก้วไวน์/ขวดเอ็มร้อย - 150 ซีซี 3. แก้วกลมทั่วไป /แก้วโอวัลติน - 200 ซีซี 4. แก้วกลมสั้น/ทรงกระบอกสั้น - 235 ซีซี 5. แก้วทรงกระบอก/แก้วเบียร์สูง - 285 ซีซี 6. แก้วทรงสูงใบใหญ่/แก้วเหยือก - 325 ซีซี 7. กระป๋อง/ขวดเล็ก/แบน - 330 ซีซี 8. กระป๋องใหญ่ - 500 ซีซี 9. ขวดใหญ่ (เหล้าขาว/เบียร์) – 630 ซีซี 10. ขวดใหญ่ (เหล้าสี) – 700 ซีซี 11. ขวดใหญ่ (ไวน์/เหล้าสี) – 750 ซีซี 12. เหยือก/ไหเหล็ก/ขวดลิตร – 1,000 ซีซี	ให้บันทึกปริมาณที่ดื่มรวมทั้งหมดในครั้งนั้นตามหน่วยภาชนะที่ดื่มในข้อ จ) ซึ่งอาจเป็นต่อคนหรือกลุ่มก็ได้ โดยลงข้อมูลเป็นทศนิยม 1 ตำแหน่ง	ให้บันทึก<u>จำนวนคนที่ดื่มในปริมาณที่ระบุไว้ในข้อ ฉ)</u> (รวมผู้ถูกสัมภาษณ์)

| (1) เวลาที่เริ่มถาม (ชม: นาที; ระบบ 24 ชม) | | [   ][   ]:[   ][   ] | | | css [   ][   ]:[   ][   ] | |

(2) ดื่มปกติ							(4) วันหยุดราชการ เช่น ปีใหม่ หรือ สงกรานต์							(5) งานสังสรรค์ เช่น งานแต่งงาน, ฉลองที่ทำงาน						
สถานที่	ผู้ดื่ม	ค.ถี่	ชนิด	ภาชนะ	ปริมาณ	คน	สถานที่	ผู้ดื่ม	ค.ถี่	ชนิด	ภาชนะ	ปริมาณ	คน	สถานที่	ผู้ดื่ม	ค.ถี่	ชนิด	ภาชนะ	ปริมาณ	คน
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___

(6) เทศกาลประเพณี/งานบุญ เช่น สารทไทย/บุญเดือน 10, งานบวช, ศพ							(7) กีฬา/การแสดง/คอนเสิร์ต							(8) เวลาที่ถามจบ (ชม: นาที; ระบบ 24 ชม)	(9) คุณรู้สึกลำบากในการตอบคำถามเพียงใด
สถานที่	ผู้ดื่ม	ค.ถี่	ชนิด	ภาชนะ	ปริมาณ	คน	สถานที่	ผู้ดื่ม	ค.ถี่	ชนิด	ภาชนะ	ปริมาณ	คน		
C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35		
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___		[ ] 1. ตอบง่ายมาก [ ] 2. ตอบง่าย
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___	[ ][ ]:[ ][ ]	[ ] 3. เฉย ๆ [ ] 4. ตอบยาก
___	___	___	___	___	___.___	___	___	___	___	___	___	___.___	___		[ ] 5. ตอบยากมาก
														cse [ ][ ]:[ ][ ]	csbur [ ]

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2.4 แบบสอบถามผลกระทบทางสังคมจากการดื่มเครื่องดื่มแอลกอฮอล์				
คำชี้แจง: ในช่วง 1 ปีที่ผ่านมา คุณได้มีเจอเหตุการณ์เหล่านี้ซึ่งเกิดจากการดื่มเครื่องดื่มแอลกอฮอล์ของคุณกี่ครั้ง ขอใช้เครื่องหมาย ✓ ลงในช่อง				
ข้อ	คำถาม	ไม่เคย	1-2 ครั้ง	3-5 ครั้ง	มากกว่า 5 ครั้ง
1	คุณเคยขาดเรียน/งานจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
2	คุณมีปัญหาเรื่องเรียน/งานจากอาการเมาค้างหรือไม่	1	2	3	4
3	การดื่มเครื่องดื่มแอลกอฮอล์ของคุณทำให้การเรียน/งานแย่ลงหรือไม่	1	2	3	4
4	คุณเคยพลาดโอกาสในการเรียนต่อ/เลื่อนขั้น/ได้งานที่ดีกว่าจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
5	คุณเคยถูกไล่ออกจากโรงเรียน/ที่ทำงานเนื่องจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
6	คุณเคยขับขี่รถยนต์/มอเตอร์ไซต์/จักรยาน/เรือ/ยานพาหนะอื่น ๆ หลังจากที่คุณดื่มเครื่องดื่มแอลกอฮอล์	1	2	3	4
7	คุณเคยประสบอุบัติเหตุจากขับขี่รถยนต์/มอเตอร์ไซต์/จักรยาน/เรือ/ยานพาหนะอื่น ๆ จากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
8	คุณเคยรับรู้ว่ามีคนรังเกียจจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
9	คุณเคยทะเลาะวิวาททางวาจากับเพื่อนหรือบุคคลในครอบครัวจากการดื่มเครื่องดื่มแอลกอฮอล์	1	2	3	4
10	คุณเคยทำร้ายร่างกายหรือถูกทำร้ายร่างกายกับเพื่อนหรือบุคคลในครอบครัวจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
11	คุณเคยมีความคิดที่จะฆ่าตัวตายจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
12	สมาชิกในครอบครัวของคุณเคยกล่าวตักเตือนเรื่องการดื่มเครื่องดื่มแอลกอฮอล์ของคุณหรือไม่	1	2	3	4
13	คุณเคยรู้สึกว่าการดื่มเครื่องดื่มแอลกอฮอล์ของคุณส่งผลเสียต่อสมาชิกในครอบครัวของคุณหรือไม่	1	2	3	4
14	คุณเคยรู้สึกว่าสมาชิกในครอบครัวต้องมาดูแลคุณจากอาการเจ็บป่วยหรือผลเสียที่คุณได้รับจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
15	คุณเคยรู้สึกว่าสมาชิกในครอบครัวของคุณเพิกเฉยต่อคุณจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
16	คุณเคยได้รับคำแนะนำจากสมาชิกในครอบครัวให้หยุดดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
17	คุณเคยต้องเสียเพื่อนหรือโดนเพื่อนทิ้งจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
18	คุณเคยได้รับการตักเตือนให้หยุดดื่มเครื่องดื่มแอลกอฮอล์จากเพื่อนฝูงหรือไม่	1	2	3	4
19	คุณเคยรู้สึกว่าการดื่มเครื่องดื่มแอลกอฮอล์ของคุณส่งผลเสียต่อความสัมพันธ์ระหว่างเพื่อนหรือไม่	1	2	3	4
20	คุณเคยจ่ายเงินจำนวนมากจากสิ่งที่เกี่ยวข้องของการดื่มสุราหรือไม่	1	2	3	4
21	คุณเคยจ่ายเงินจำนวนมากจากการดื่มเครื่องดื่มแอลกอฮอล์จนทำให้ไม่สามารถจ่ายเงินกับสิ่งที่จำเป็น เช่น อาหาร, เครื่องนุ่งห่ม เป็นต้น หรือไม่	1	2	3	4
22	คุณเคยรู้สึกว่ามีปัญหาทางการเงินจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
23	คุณเคยมีคดีความทางกฎหมายจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
24	คุณเคยไปโรงพักจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4
25	คุณเคยรู้สึกเป็นที่รังเกียจในสังคมจากการดื่มเครื่องดื่มแอลกอฮอล์หรือไม่	1	2	3	4

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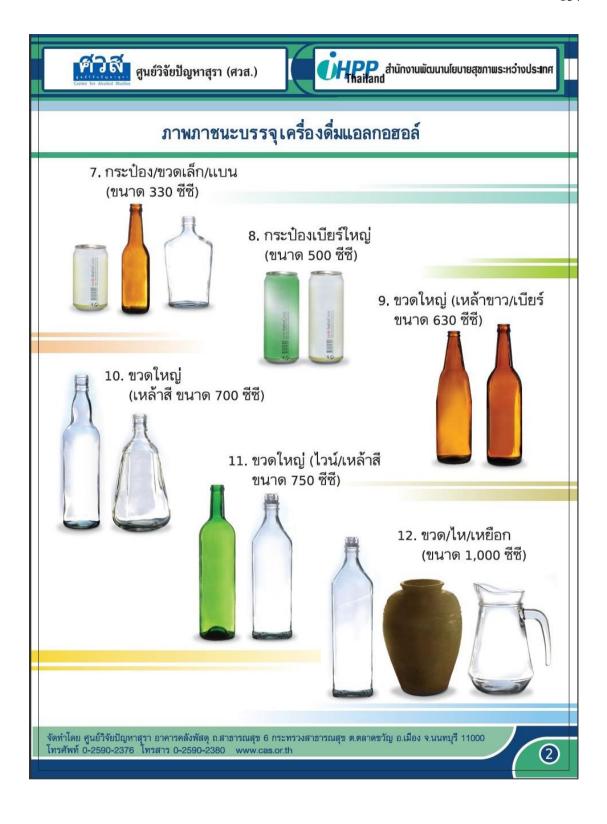| 2.5 แบบประเมินปัญหาการดื่มสุรา (AUDIT: Alcohol Use Disorders Identification Test)						
คำชี้แจง: คำถามแต่ละข้อต่อไปนี้จะถามถึงประสบการณ์การดื่มในรอบ <u>1 ปีที่ผ่านมา</u> โดยสุรา หมายถึง เครื่องดื่มที่มีแอลกอฮอล์ทุกชนิด ได้แก่ เบียร์ เหล้า สาโท กระแช่ วิสกี้ สปายไวน์ เป็นต้น ขอให้ตอบตามความเป็นจริง โดยใช้เครื่องหมาย ✓ ลงในช่อง						
ข้อคำถาม	0	1	2	3	4	รหัส (สำหรับผู้วิจัย)
1. คุณดื่มสุราบ่อยเพียงไร	ไม่เคยเลย	เดือนละครั้ง หรือน้อยกว่า	2-4 ครั้งต่อเดือน	2-3 ครั้งต่อสัปดาห์	4 ครั้งขึ้นไปต่อสัปดาห์	
2. <u>เลือกตอบเพียงข้อเดียว</u> เวลาที่คุณดื่มสุรา โดยทั่วไปแล้วคุณดื่มประมาณเท่าไรต่อวัน **หรือ**	1-2 ดื่มมาตรฐาน	3-4 ดื่มมาตรฐาน	5-6 ดื่มมาตรฐาน	7-9 ดื่มมาตรฐาน	ตั้งแต่ 10 ดื่มมาตรฐานขึ้นไป	
ถ้าโดยทั่วไปดื่มเบียร์ เช่น สิงห์ ไฮเนเกน ลีโอ เชียร์ ไทเกอร์ ช้าง ดื่มประมาณเท่าไร ต่อวัน **หรือ**	1-1.5 กระป๋อง/ 1/2-3/4 ขวด	2-3 กระป๋อง/ 1-1.5 ขวด	3.5-4 กระป๋อง/ 2 ขวด	4.5-7 กระป๋อง/ 3-4 ขวด	7 กระป๋อง/ 4 ขวดขึ้นไป	
ถ้าโดยทั่วไปดื่มเหล้า เช่น แม่โขง หงส์ทอง หงส์ทิพย์ เหล้าขาว 40 ดีกรี ดื่มประมาณ เท่าไรต่อวัน	2-3 ฝา	¼ แบน	½ แบน	¾ แบน	1 แบนขึ้นไป	
3. คุณดื่ม 6 ดื่มมาตรฐาน หรือมากกว่าในคราวเดียวกันบ่อยแค่ไหน?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
4. ในช่วงปีที่แล้ว มีบ่อยครั้งแค่ไหนที่คุณพบว่าเมื่อคุณได้เริ่มต้นแล้วคุณจะไม่สามารถหยุดดื่มได้เลย?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
5. ในช่วงปีที่แล้ว มีบ่อยครั้งแค่ไหนที่การดื่มของคุณเป็นสาเหตุทำให้คุณไม่สามารถทำสิ่งต่างๆ ที่ตามปกติแล้วคุณเคยทำได้มาก่อน?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
6. ในช่วงปีที่แล้ว มีบ่อยครั้งแค่ไหนที่คุณต้องการจะดื่มในตอนเช้าเพื่อให้คุณรู้สึกดีขึ้นหลังจากที่ได้ดื่มจัดมาก่อนหน้านี้?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
7. ในช่วงปีที่แล้ว มีบ่อยครั้งแค่ไหนที่คุณรู้สึกผิดหรือเกิดความรู้สึกเสียใจภายหลังดื่มของคุณ?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
8. ในช่วงปีที่แล้ว มีบ่อยครั้งแค่ไหนที่การดื่มของคุณทำให้คุณไม่สามารถจะจำได้ว่าเกิดอะไรขึ้นบ้างในคืนที่ผ่านมา?	ไม่เคยเลย	น้อยกว่าเดือนละครั้ง	เดือนละครั้ง	สัปดาห์ละครั้ง	ทุกวันหรือเกือบทุกวัน	
9. คุณหรือใครบางคนเคยได้รับบาดเจ็บจากการดื่มของคุณหรือไม่	ไม่เคยเลย		เคย แต่ไม่ได้เกิดขึ้นในปีที่แล้ว		เคยเกิดขึ้นในช่วงหนึ่งปีที่แล้ว	
10. เคยมีเพื่อน ญาติพี่น้อง แพทย์ หรือเจ้าหน้าที่สาธารณสุขอื่นๆ แสดงความห่วงใยเกี่ยวกับการดื่มของคุณหรือเคยแนะนำให้คุณลดการดื่มลงบ้างหรือไม่?	ไม่เคยเลย		เคย แต่ไม่ได้เกิดขึ้นในปีที่แล้ว		เคยเกิดขึ้นในช่วงหนึ่งปีที่แล้ว	

จบการสัมภาษณ์

ขอบพระคุณครับ/ค่ะ

Annex 4 Pictures of alcohol containers

ศวส ศูนย์วิจัยปัญหาสุรา (ศวส.)

iHPP Thailand สำนักงานพัฒนานโยบายสุขภาพระหว่างประเทศ

ภาพภาชนะบรรจุเครื่องดื่มแอลกอฮอล์

7. กระป๋อง/ขวดเล็ก/แบน
(ขนาด 330 ซีซี)

8. กระป๋องเบียร์ใหญ่
(ขนาด 500 ซีซี)

9. ขวดใหญ่ (เหล้าขาว/เบียร์
ขนาด 630 ซีซี)

10. ขวดใหญ่
(เหล้าสี ขนาด 700 ซีซี)

11. ขวดใหญ่ (ไวน์/เหล้าสี
ขนาด 750 ซีซี)

12. ขวด/ไห/เหยือก
(ขนาด 1,000 ซีซี)

②

Annex 5 Drinking events with drinking contexts

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Party	Other people's house	Friend	Whisky	5+	16
Normal life activity	Drinker's own house	Alone	Beer	No sharing	11
Normal life activity	Drinker's own house	Friend	Beer	2 to 4	11
Normal life activity	Drinker's own house	Alone	White spirit	No sharing	9
Normal life activity	Drinker's own house	Alone	Others$_1$	No sharing	9
Holidays	Drinker's own house	Friend	Whisky	5+	8
Holidays	Other people's house	Friend	Whisky	5+	8
Party	Other people's house	Friend	Beer	No sharing	8
Party	Other people's house	Friend	Beer	5+	8
Normal life activity	Drinker's own house	Friend	Whisky	2 to 4	7
Normal life activity	Drinker's own house	Friend	Others$_1$	2 to 4	7
Normal life activity	Other people's house	Friend	Whisky	2 to 4	7
Holidays	Other people's house	Friend	Beer	No sharing	7
Holidays	Drinker's own house	Family	Beer	2 to 4	6
Holidays	Drinker's own house	Friend	Beer	5+	6
Normal life activity	Other people's house	Friend	Beer	No sharing	5

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Holidays	Drinker's own house	Friend	Beer	2 to 4	5
Normal life activity	Drinker's own house	Family	Beer	2 to 4	4
Normal life activity	Drinker's own house	Friend	White spirit	2 to 4	4
Normal life activity	Drinker's own house	Friend	Others$_1$	No sharing	4
Holidays	Drinker's own house	Family	Whisky	No sharing	4
Holidays	Drinker's own house	Family	Others$_1$	No sharing	4
Holidays	Drinker's own house	Friend	Others$_1$	2 to 4	4
Holidays	Other people's house	Friend	Whisky	No sharing	4
Holidays	Other people's house	Friend	Whisky	2 to 4	4
Party	Other people's house	Family	Whisky	5+	4
Party	Other people's house	Friend	White spirit	5+	4
Party	Workplace	Colleagues	Others$_1$	No sharing	4
Cultural event	Other people's house	Friend	Beer	5+	4
Cultural event	Other people's house	Friend	White spirit	5+	4
Cultural event	Other people's house	Friend	Whisky	5+	4
Normal life activity	Drinker's own house	Alone	Whisky	No sharing	3
Normal life activity	Drinker's own house	Family	Beer	No sharing	3
Normal life activity	Drinker's own house	Family	Whisky	2 to 4	3

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Normal life activity	Drinker's own house	Friend	Beer	5+	3
Normal life activity	Drinker's own house	Friend	Whisky	No sharing	3
Normal life activity	Drinker's own house	Friend	Whisky	5+	3
Normal life activity	Workplace	Colleagues	Others[1]	No sharing	3
Holidays	Drinker's own house	Family	Others[1]	2 to 4	3
Holidays	Drinker's own house	Friend	Beer	No sharing	3
Holidays	Drinker's own house	Friend	Whisky	2 to 4	3
Holidays	Other people's house	Friend	Beer	2 to 4	3
Holidays	Other people's house	Friend	Beer	5+	3
Holidays	Restaurant	Friend	Beer	No sharing	3
Party	Drinker's own house	Friend	Whisky	No sharing	3
Party	Other people's house	Friend	Beer	2 to 4	3
Party	Other people's house	Friend	Whisky	No sharing	3
Party	Other people's house	Friend	Whisky	2 to 4	3
Party	Other people's house	Colleagues	Whisky	No sharing	3
Cultural event	Other people's house	Family	Whisky	5+	3
Cultural event	Local shop/religious place	Friend	Whisky	5+	3
Normal life activity	Drinker's own house	Family	White spirit	No sharing	2

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Normal life activity	Drinker's own house	Friend	Beer	No sharing	2
Normal life activity	Drinker's own house	Friend	White spirit	No sharing	2
Normal life activity	Drinker's own house	Friend	White spirit	5+	2
Normal life activity	Other people's house	Friend	Beer	2 to 4	2
Normal life activity	Other people's house	Friend	Whisky	5+	2
Normal life activity	Restaurant	Friend	Beer	5+	2
Normal life activity	Restaurant	Friend	Whisky	2 to 4	2
Normal life activity	Workplace	Friend	Beer	5+	2
Normal life activity	Workplace	Colleagues	Beer	2 to 4	2
Holidays	Drinker's own house	Alone	Others[1]	No sharing	2
Holidays	Drinker's own house	Family	Beer	5+	2
Holidays	Drinker's own house	Family	White spirit	5+	2
Holidays	Drinker's own house	Family	Whisky	2 to 4	2
Holidays	Drinker's own house	Family	Whisky	5+	2
Holidays	Other people's house	Family	Whisky	2 to 4	2
Holidays	Other people's house	Family	Whisky	5+	2
Holidays	Other people's house	Friend	White spirit	No sharing	2
Holidays	Other people's house	Friend	White spirit	5+	2

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Holidays	Restaurant	Friend	Whisky	5+	2
Holidays	Workplace	Colleagues	Beer	5+	2
Holidays	Workplace	Colleagues	Others[1]	No sharing	2
Party	Drinker's own house	Friend	Beer	No sharing	2
Party	Other people's house	Family	Beer	5+	2
Party	Other people's house	Family	Whisky	2 to 4	2
Party	Other people's house	Colleagues	Whisky	5+	2
Party	Restaurant	Colleagues	Others[1]	2 to 4	2
Party	Workplace	Colleagues	Whisky	5+	2
Cultural event	Drinker's own house	Friend	Beer	No sharing	2
Cultural event	Drinker's own house	Friend	Beer	2 to 4	2
Cultural event	Drinker's own house	Friend	Whisky	5+	2
Cultural event	Other people's house	Family	Whisky	2 to 4	2
Cultural event	Local shop/religious place	Friend	Beer	5+	2
Cultural event	Local shop/religious place	Friend	White spirit	No sharing	2
Cultural event	Local shop/religious place	Friend	Whisky	2 to 4	2
Normal life activity	Drinker's own house	Alone	Whisky	2 to 4	1
Normal life activity	Drinker's own house	Family	Whisky	No sharing	1

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Normal life activity	Drinker's own house	Family	Others$_1$	No sharing	1
Normal life activity	Drinker's own house	Colleagues	Beer	No sharing	1
Normal life activity	Drinker's own house	Colleagues	Beer	2 to 4	1
Normal life activity	Drinker's own house	Colleagues	Others$_1$	No sharing	1
Normal life activity	Drinker's own house	Colleagues	Others$_1$	2 to 4	1
Normal life activity	Other people's house	Alone	White spirit	No sharing	1
Normal life activity	Other people's house	Family	Beer	No sharing	1
Normal life activity	Other people's house	Family	Whisky	2 to 4	1
Normal life activity	Other people's house	Friend	Beer	5+	1
Normal life activity	Other people's house	Friend	White spirit	No sharing	1
Normal life activity	Other people's house	Friend	White spirit	2 to 4	1
Normal life activity	Other people's house	Friend	White spirit	5+	1
Normal life activity	Other people's house	Friend	Whisky	No sharing	1
Normal life activity	Other people's house	Friend	Others$_1$	No sharing	1
Normal life activity	Other people's house	Friend	Others$_1$	2 to 4	1
Normal life activity	Other people's house	Colleagues	Whisky	5+	1
Normal life activity	Restaurant	Alone	White spirit	No sharing	1
Normal life activity	Restaurant	Family	White spirit	2 to 4	1

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Normal life activity	Restaurant	Friend	Beer	2 to 4	1
Normal life activity	Restaurant	Colleagues	Others$_1$	2 to 4	1
Normal life activity	Local shop/religious place	Family	Whisky	5+	1
Normal life activity	Local shop/religious place	Friend	Beer	No sharing	1
Normal life activity	Local shop/religious place	Friend	Beer	5+	1
Normal life activity	Local shop/religious place	Friend	White spirit	5+	1
Normal life activity	Local shop/religious place	Friend	Whisky	5+	1
Normal life activity	Local shop/religious place	Friend	Others$_1$	No sharing	1
Normal life activity	Workplace	Friend	Beer	No sharing	1
Normal life activity	Workplace	Colleagues	White spirit	2 to 4	1
Normal life activity	Workplace	Colleagues	White spirit	5+	1
Normal life activity	Workplace	Colleagues	Whisky	2 to 4	1
Holidays	Drinker's own house	Alone	Beer	No sharing	1
Holidays	Drinker's own house	Family	White spirit	2 to 4	1
Holidays	Drinker's own house	Friend	Whisky	No sharing	1
Holidays	Drinker's own house	Friend	Others$_1$	No sharing	1
Holidays	Drinker's own house	Friend	Others$_1$	5+	1
Holidays	Drinker's own house	Colleagues	Beer	5+	1

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Holidays	Drinker's own house	Colleagues	Whisky	No sharing	1
Holidays	Drinker's own house	Colleagues	Whisky	5+	1
Holidays	Drinker's own house	Colleagues	Others$_1$	2 to 4	1
Holidays	Other people's house	Family	Beer	No sharing	1
Holidays	Other people's house	Family	Beer	2 to 4	1
Holidays	Other people's house	Friend	White spirit	2 to 4	1
Holidays	Other people's house	Friend	Others$_1$	2 to 4	1
Holidays	Other people's house	Colleagues	Beer	5+	1
Holidays	Restaurant	Family	Whisky	2 to 4	1
Holidays	Restaurant	Friend	Beer	5+	1
Holidays	Restaurant	Colleagues	Beer	No sharing	1
Holidays	Restaurant	Colleagues	Whisky	2 to 4	1
Holidays	Local shop/religious place	Friend	Whisky	5+	1
Holidays	Local shop/religious place	Colleagues	Whisky	5+	1
Holidays	Workplace	Friend	Whisky	5+	1
Party	Drinker's own house	Family	Whisky	5+	1
Party	Drinker's own house	Friend	Beer	2 to 4	1
Party	Drinker's own house	Friend	Beer	5+	1

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Party	Drinker's own house	Friend	Whisky	2 to 4	1
Party	Drinker's own house	Friend	Whisky	5+	1
Party	Drinker's own house	Colleagues	Beer	2 to 4	1
Party	Other people's house	Alone	White spirit	No sharing	1
Party	Other people's house	Family	Beer	2 to 4	1
Party	Other people's house	Friend	Others[1]	5+	1
Party	Other people's house	Colleagues	Beer	No sharing	1
Party	Other people's house	Colleagues	Whisky	2 to 4	1
Party	Restaurant	Friend	Whisky	5+	1
Party	Restaurant	Colleagues	Whisky	No sharing	1
Party	Local shop/religious place	Friend	Whisky	5+	1
Party	Workplace	Friend	Beer	No sharing	1
Party	Workplace	Friend	Beer	2 to 4	1
Party	Workplace	Colleagues	Beer	No sharing	1
Cultural event	Drinker's own house	Family	Beer	No sharing	1
Cultural event	Drinker's own house	Family	Beer	2 to 4	1
Cultural event	Drinker's own house	Family	Beer	5+	1
Cultural event	Drinker's own house	Family	White spirit	5+	1

Situation	Location	Partner(s)	Beverage	Sharing of beverages in a group (no. of drinkers/sharing group)	Number
Cultural event	Drinker's own house	Family	Whisky	2 to 4	1
Cultural event	Drinker's own house	Friend	Beer	5+	1
Cultural event	Drinker's own house	Friend	White spirit	2 to 4	1
Cultural event	Drinker's own house	Friend	Whisky	2 to 4	1
Cultural event	Drinker's own house	Colleagues	Whisky	5+	1
Cultural event	Other people's house	Friend	Beer	No sharing	1
Cultural event	Other people's house	Friend	Beer	2 to 4	1
Cultural event	Other people's house	Friend	White spirit	No sharing	1
Cultural event	Local shop/religious place	Alone	Beer	5+	1
Cultural event	Local shop/religious place	Friend	Beer	No sharing	1
Cultural event	Local shop/religious place	Friend	White spirit	5+	1
Cultural event	Local shop/religious place	Friend	Whisky	No sharing	1
Cultural event	Local shop/religious place	Colleagues	White spirit	5+	1
Cultural event	Workplace	Colleagues	Beer	No sharing	1
Total					**412**

[1] *Others: local beverage, wine, wine cooler, and vodka*

Annex 6 Manuscript I

Vichitkunakorn P, Balthip K, Geater A, Assanangkornchai S. Comparisons between context-specific and beverage-specific quantity frequency instruments to assess alcohol consumption indices: Individual and sample level analysis. PLOS ONE. 2018;13(8):e0202756. doi: 10.1371/journal.pone.0202756 *(Published)*

PLOS ONE

Comparisons between context-specific and beverage-specific quantity frequency instruments to assess alcohol consumption indices: Individual and sample level analysis

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Abstract

There are many survey instruments to determine drinking patterns and alcohol consumption levels in the general population. This study aims to compare the context-specific quantity-frequency (CSQF) and beverage-specific quantity-frequency (BSQF) methods to estimate alcohol consumption indices at individual and sample levels. A community-based cross-sectional study was conducted among a population aged 15 years and older in Songkhla Province, Thailand. The BSQF and CSQF questionnaires with a 3-month retrospective time frame and in random order were applied to each participant. The CSQF was developed to ask more about the drinking contexts. The questions elicited information on location, partner, beverage, quantity, and frequency for five common drinking situations. Among 804 participants, 183 drank alcohol in the last three months. At the individual level, total alcohol consumption of almost all types of beverage by the CSQF was higher than the BSQF in approximately 50% of current drinkers and was mainly accounted for by the higher report of average quantity. At the sample level, there were no significant differences in the average daily intake, 3-month intake per drinker or per capita consumption between instruments. The interview duration and burden of answering the questions by the participants for the CSQF were not significantly higher than those for the BSQF. In summary, the fuller picture of drinking behaviors from the CSQF has several valuable methodological advantages and provides information allowing alcohol policies to be more directly specific to certain target populations or situations. The CSQF is a prototype questionnaire and forms the basis for a contextual approach. However, additional methodological studies need to be explored.

Introduction

Drinking alcohol is a causal factor in many injuries and disease conditions [1, 2]. The harmful use of alcohol ranked among the top five modifiable risk factors for morbidity and mortality throughout the world [3]. Alcohol consumption results in substantial societal costs through loss of productivity, healthcare expense, criminal activity, and violence [4].

In Thailand, the average recorded annual alcohol per capita consumption (APC) in 2014 was 7.1 liters of pure alcohol per person aged 15 years or older, ranking 4th in Asia following the Republic of Korea (12.3), Laos (7.3), and Japan (7.2). The National Health and Welfare survey 2015 found that most Thai drinkers (60% of all drinkers) are occasional drinkers. Drinking is seasonal and also varies by days of the week, holidays, and other special events (e.g., cultural events, birthday, or Buddhist Lent). Only 3.4% of Thai drinkers (6.1% of male and 1.0% of female) were medium- to high-risk drinkers (>40 g/day for males, >20 g/day for females).

An accurately measured alcohol consumption survey provides information on the levels, patterns, and contexts of alcohol consumption and alcohol-related harm and can help to determine relevant harm reduction interventions [5]. The WHO recommended that alcohol survey components include the volume of alcohol consumed, drinking pattern, and drinking context (e.g., festive drinking, the proportion of drinking events when getting drunk, drinking with meals, drinking in a public place, and drinking intensity) [6].

There are several alcohol consumption measuring instruments, which have strong and weak points for capturing the volume, pattern, and context of drinking at individual and population levels. The beverage-specific quantity-frequency (BSQF) instrument is a modification of the quantity-frequency (QF) instrument, which is the most widely applied and simplest method. The QF method estimates the usual frequency and amount of drinking in a 30-day or one-year time frame, whereas the BSQF asks for their usual frequency and amount of each specific beverage. The BSQF instrument has some advantages over the traditional QF instrument in terms of increasing recall ability [7], higher total volume estimation [8], and average daily intake [9].

Contextual factors are associated with drinking behaviors and consequences such as drinking events (e.g., weekend, holiday, and cultural event), partners (e.g., friends, family, and strangers), and location (e.g., house, pub/bar, restaurant, and workplace) [10–12]. For instance, a higher level of alcohol consumption was associated with going on spring break trips with friends among college students [13]. Drinking at a large party or having parents who provide alcohol were associated with heavy episodic drinking [11]. Also, there are complex relationships between alcohol-related harm and alcohol consumption. A neglect of the drinking contexts in these relationship pathways could lead to a misinterpretation of the association between alcohol consumption and harm in the sense that some drinking patterns are more harmful than others [14].

The last few decades have seen a trend of increased use of a contextual approach technique in alcohol surveys. The specific social context technique for alcohol consumption survey was originally developed in 1973 [15]. After that, there have been many studies that focused on the contextual approach, for example, different drinking locations (home, bar, restaurant) [16, 17], times (work days, weekends) [18], and situations (evening meal in a restaurant, organization meeting, party at home, picnic, while watching television, and while spending a quiet evening at home) [19, 20]. Lastly, a within-location beverage-specific consumption instrument, which was developed by International Alcohol Control Study (IAC) in New Zealand and used to estimate the APC, accounted for 94% of the estimated taxable alcohol available for consumption [21].

Despite of the high benefits of the contextual approach in specifying drinking situation, there are some setbacks of this approach, for example, double counting of the overlapping

drinking events [20, 22] and response burden when a respondent has to answer several loops of questions for various drinking situations [22]. Thus, this makes such approach less used in general population surveys, and studies comparing the context-specific technique to the traditional BSQF have not been available.

In this study we developed a context-specific quantity-frequency (CSQF) questionnaire that aimed to accurately measure alcohol consumption using questions that probe the context of drinking. The CSQF will be useful to identify drinking environments associated with high-risk alcohol consumption in a general population survey.

The two methods used most often to test the validity of consumption are convergent validity and a comparison with data on taxable alcohol available (sales data) for consumption [21]. The convergent validity method assesses the individual level consistency between these measures and the other survey measures (i.e. correlation of alcohol consumption between two measurement tools). The comparisons with taxable alcohol available for consumption are derived/import from data on production, import/export from the revenue department, and taxation office. Most studies found that the results from a population-based survey could account for 40% to 60% of taxable alcohol available [23–25].

This study aimed to compare the CSQF and BSQF to estimate total alcohol consumption at the individual level and average daily intake, 3-month per drinker, and 3-month per capita consumption at the sample level.

Materials and methods

Study design and population

A community-based cross-sectional study was conducted among a population aged 15 years and older. We recruited current drinkers and non-current drinkers that included lifetime abstainers and former drinkers who drank but had not drunk during the previous three months because we desired to assess the 3-month per capita consumption at the sample level as well. A multistage sampling technique was used. In the first stage, four sub-districts in both urban and rural areas in Songkhla Province in southern Thailand were selected randomly. In the second stage, eight villages were selected with probability proportional to size. In the third stage, households within each village were listed and 50 to 52 households were selected by systematic random sampling procedure. In the fourth stage, two participants in each household were selected using the Kish selection grid [26]. The final sample comprised 804 participants. Although 818 people were selected, only 804 agreed to participate in the interview which resulted in the response rate of 98.3%.

Data collection and instruments

A structured questionnaire covering demographic characteristics and alcohol consumption was used. A face-to-face interview with paper-and-pencil administration was performed by trained interviewers. The actual time spent in completing the survey was measured by recording the starting and ending points. Furthermore, the perceived burden of the respondents to answer each instrument was measured using a 5-point rating scale: *"Did you find it easy or burdensome to answer the questions?"*

The alcohol consumption part comprised two instruments: the BSQF and the CSQF. A retrospective time frame of three months was set for both instruments. The instruments were employed in a random sequence to diminish recall bias. Pictures of various kinds of alcoholic beverages and containers were used to increase recall ability of the alcohol volume consumed by the respondents.

The BSQF asked three questions separately for each specific beverage consumed in the previous 3 months. The first question determined the frequency level and the other questions defined the usual amount of each beverage actually consumed. The CSQF instrument (item 5 to 7 of the CSQF) used a similar question format and response categories as the BSQF (item 2 to 4 of the BSQF). However, it asked more about the drinking context (item 2 to 4 of the CSQF). The questions elicited information on location, partner, beverage, quantity, and frequency for each common drinking situation or event (Table 1). The CSQF can provide a maximum of three drinking locations in each situation, with a total of five drinking situations. So,

Table 1. Questions used for the BSQF and CSQF instruments.

Instrument	Question	Answer
BSQF	1. "During the last 3 months, did you drink these kind of beverages*?"	
	2. How often did you usually have . . . (for specified beverage) . . . in the last three months?"	• Every day • 5 to 6 days/week • 3 to 4 days/week • 1 to 2 days/week •1 to 3 days/3 month (can choose one frequency category).
	3. On those days when you had . . . (for specified beverage). . ., which containers did you usually use?	The interviewer shows pictures of various kinds of containers to the interviewee (can choose one drinking container type).
	4. And, how much did you usually have . . . (for specified beverage). . . per day in that container?	Answered in terms of the number of containers (can answer only one number).
	These four questions were asked in a loop for seven common kinds of beverages (i.e., beer, white spirits, whisky, local beverage, wine, wine coolers and vodka)* *Pictures of beverage in each category were provided.*	
CSQF	1. "During the last 3 months, did you drink in these situations**?"	
	2. Where did you usually drink . . . (for specified situation). . . in the last three months?	Own house, someone else's house, restaurant, pub/bar, workplace, religious place, local shop (can choose a maximum of three locations for each situation).
	3. With whom did you usually drink in . . . (for each unique combination of situation(s) and location(s). . .?"	Alone, family, male friends, female friends, strangers, colleagues (can choose one drinking partner(s)).
	4. What beverage did you usually drink at . . . (for each unique combination of situation(s), location (s), and partner(s)) . . .?	The interviewer provides pictures of common beverage of each type; beer, white spirits, whisky, local beverage, wine, wine coolers and vodka (can choose one type of beverage).
	5. How often did you usually have . . . (for each unique combination of situation(s), location(s), partner(s), and beverage type(s)) . . . in the last three months?	• Every day • 5 to 6 days/week • 3 to 4 days/week • 1 to 2 days/week • 1 to 3 days/3 month (can choose one frequency category).
	6. On those days when you had . . .(for each unique combination of situation(s), location(s), partner(s), beverage type(s), and frequency categories). . ., which containers did you usually use?	The interviewer shows pictures of various kinds of containers to the interviewee (can choose one drinking container type).
	7. And, how much did you usually have . . . (for each unique combination of situation(s), location (s), partner(s), beverage type(s), frequency categories, and container type(s)). . . per day in that container?	Answered in terms of the number of containers (can answer only one number).
	*These seven questions were asked in a loop for five common situations*** (i.e., usual drinking, holiday, party, cultural event, and music/sport event)*	

https://doi.org/10.1371/journal.pone.0202756.t001

each participant had the chance to respond to 15 types (3×5 = 15) of drinking events. A drinking event was a unique combination of one specified drinking situation, location, drinking partner(s), beverage type(s), and volume consumed.

Alcohol consumption index measures

In this study, we investigated alcohol consumption at two levels of analysis: the individual level and the sample level.

For the individual level analysis,

- **"Total consumption"** was calculated for each participant in grams of pure alcohol per three months (g/3 months). The two instruments have different methods to estimate the total consumption. Regarding BSQF, the midpoint was used to represent each frequency level. For example, "1 to 2 days/week" level was converted to 1.5 days/week or 1.5 × 13 = 19.5 days/three months. The sum of the midpoint frequencies multiplied by the quantities for all types of beverages reflected the total consumption in the last three months. The quantities can be determined by multiplying the percentage volume of pure alcohol (i.e. 5% for beer, 6% for wine coolers, 13% for wine, and 40% for white spirit, whisky, local beverage, and vodka based on the local market) and volume of beverage consumed (in milliliters), and then multiplying by 0.789 (the specific gravity of ethyl alcohol). The container size was converted into milliliters based on the standard size of alcoholic beverage containers popularly used in Thailand (i.e. 1 regular beer can = 330 mL, 1 small whisky cup = 300 mL, 1 regular cup = 50 mL). The volume consumed was calculated by the container volume (item 3) multiplied by the actual number of those containers (item 4). For CSQF, the total consumption was the sum over all situations of the product of consumption amount and frequency in the last three months for each situation.

For sample level analysis, the alcohol consumption was assessed in three consumption indices [27].

- **"Average daily intake"** was a measure of the average quantity of consumption per day (g/drinker/day) of average drinkers. It was calculated by the average "total consumption" in three months divided by 92 days.

- **"3-month per drinker consumption"** was a measure of the average amount of alcohol consumed in grams of pure alcohol by each drinker during the last 3 months (g/drinker/3 months). This was obtained from the sum of "total consumption" of all drinkers divided by the number of drinkers.

- **"3-month per capita consumption"** was a measure of the amount of alcohol consumed in grams of pure alcohol in each given sample that included non-drinkers (g/capita/3 months). It was calculated by the sum of "total consumption" of all drinkers divided by the number of all respondents.

Validity testing

In this study, we applied the convergent validity method because the Thai Revenue Department reported total alcohol taxation only at the national level. In our study setting, taxation information is limited.

Statistical analysis

The statistical analysis included both continuous and categorized variables for alcohol consumption indices measured by the BSQF and CSQF instruments. The median and

interquartile range (IQR) were used to describe consumption indices as the alcohol consumption data were not normally distributed. The Wilcoxon signed-rank test was used to compare the alcohol consumption indices from different instruments within the same participant. Categorical variables were analyzed using a Chi-square or Fisher's exact test.

Linear regression analysis was used to identify the effects of the questionnaire variables (i.e. quantity and frequency ratio) between the CSQF and BSQF associated with calculated total alcohol consumption. Associations were expressed as standardized regression coefficients and partial regression coefficients. We used standardized regression coefficients to compare the effect size of logarithm-transformation ratios of drinking parameters between CSQF and BSQF. A logarithm-transformation was used to transform the skewed data to a symmetrical distribution more appropriate to the model. Only independent variables were standardized. They were transformed by subtracting the mean and dividing by the standard deviation. The standardized coefficient estimated the change in outcome associated with one standard deviation increase in the corresponding predictor variable.

All P values were two-tailed and significance was set at less than 0.05. All analyses were conducted using R version 3.3.2 with the epicalc [28] and the ggplot2 [29] contributed packages.

Data visualization

Fig 1 depicts the structure of a plot of the relationship between the logarithm of the drinking frequency ratio (X-axis) and the logarithm of the average quantity ratio (Y-axis) between the CSQF and BSQF instruments. The data are plotted in this structure as individual jittered points. The plot is jittered to clearly show individual points. Three lines divide the area into five zones.

In this paper, the terms "over-report" and "under-report" refer respectively to a higher and lower estimated level of drinking parameters by the specified instrument compared with the other instrument.

Line P is the "equality of effects line" which means that the over- or under-report between instruments is affected equally by both drinking frequency and average quantity. Line Q indicates that the total consumption reported by CSQF is more than 1.5 times higher than the BSQF while Line R indicates the opposite (i.e. the total consumption reported by BSQF is about 1.5 times higher than the CSQF).

Logarithm base 2 was applied to simplify the interpretation, in which a unit increase represents a ratio of 2. For example, if Log_2 (CSQF $_{quantity}$ /BSQF $_{quantity}$) = 1, then the CSQF over-reported the average quantity compared with the BSQF 2^1 = 2 times.

Participants in Zones A and B were those whose total consumption was over-reported by the CSQF, whereas participants in Zones C and D were those over-reported by the BSQF. Line P separates Zone A from B and Zone C from D. Zones A and C are where the discrepancy in the average quantity was greater than the discrepancy in frequency. Likewise, in Zones B and D, the discrepancy in frequency was greater than the discrepancy in the average quantity. A ratio of BSQF/CSQF or CSQF/BSQF $\leq$ 1.5 or within 1.5 times was considered to be within the range of equivalence and was represented in the figure by the area between Lines Q and R (Zone E).
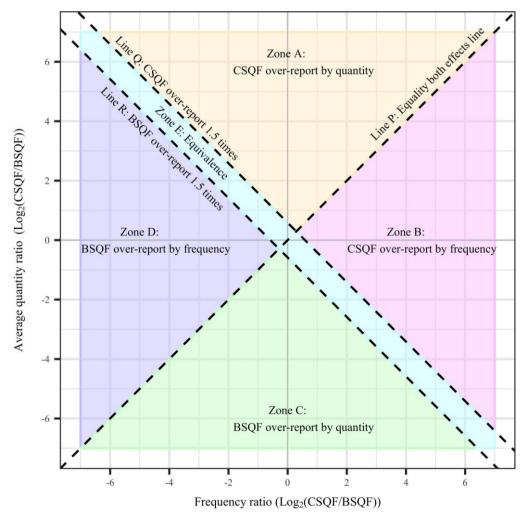
Ethical consideration

The study was approved by the ethics review committee for research on human subjects of the Faculty of Medicine, Prince of Songkla University (Ref no: 59-254-18-1). All of the researchers conducted the research according to the principles expressed in the Declaration of Helsinki. The objectives, benefits, and harms of the study were explained verbally and in written form to the potential participants. Written informed consent approved by the ethics committee was obtained from all study participants or parents/guardians of participants aged less than 18 years.

Results

Respondent characteristics

Among 804 participants, 183 (22.8%) had a history of drinking alcohol in the last three months. Most were male, aged 35 to 60 years, Buddhist, married, and had attained a primary school level of education. Most worked in agriculture and had a monthly income of between 10,000 and 26,500 Baht (30 Baht = 1 USD). About half were current smokers who started smoking at the age of 18 and had a smoking history of approximately 10 pack-years (Table 2).

Fig 1. Anatomy of jitter plot of frequency ratio and average quantity ratio with five zones.

https://doi.org/10.1371/journal.pone.0202756.g001

Table 2. Characteristics of the sample by drinking status (n = 804).

Characteristics	Non-current drinker* (n = 621), n (%)	Current drinker (n = 183), n (%)	p-value
Gender			
Male	169 (27.2)	156 (85.2)	< 0.001[a]
Female	452 (72.8)	27 (14.8)	
Age–Median (IQR)	52 (40–63)	47 (35–60)	< 0.001[b]
15–29	59 (9.5)	26 (14.2)	0.035[a]
30–44	157 (25.3)	54 (29.5)	
45–59	197 (31.7)	56 (30.6)	
60–69	116 (18.7)	34 (18.6)	
70–79	66 (10.6)	12 (6.6)	
80+	26 (4.2)	1 (0.5)	
Religion			
Buddhism	616 (99.2)	182 (99.5)	1.00[c]
Islam	5 (0.8)	1 (0.5)	
Marital status			
Married	497 (80)	149 (81.4)	0.023[a]
Single	74 (11.9)	29 (15.8)	
Widowed/divorced/separated	50 (8.1)	5 (2.7)	
Education level			
No formal education	40 (6.4)	3 (1.6)	< 0.001[a]
Primary school	349 (56.2)	83 (45.4)	
Junior high school	75 (12.1)	27 (14.8)	
Senior high school	57 (9.2)	31 (16.9)	
Vocational certificate	43 (6.9)	17 (9.3)	
Bachelor and above	57 (9.2)	22 (12.0)	
Occupation			
Laborer	85 (13.7)	34 (18.6)	< 0.001[a]
Agriculture	225 (36.2)	83 (45.4)	
Commercial	65 (10.5)	11 (6.0)	
Student	28 (4.5)	17 (9.3)	
Unemployed	164 (26.4)	16 (8.7)	
Others	54 (8.7)	22 (12.0)	
Income level (Baht/month) –Median (IQR)	10,000 (6,000–20,000)	15,000 (10,000–26,500)	< 0.001[b]
< 5,000	93 (15.0)	17 (9.3)	0.008[a]
5,000–9,999	151 (24.3)	27 (14.8)	
10,000–19,999	178 (28.7)	64 (35.0)	
20,000–29,999	99 (15.9)	32 (17.5)	
30,000–39,999	52 (8.4)	22 (12.0)	
≥ 40,000	48 (7.7)	21 (11.5)	
Smoking status			
Non-smoker	510 (82.1)	73 (39.9)	< 0.001[a]
Ex-smoker	29 (4.7)	24 (13.1)	
Current smoker (≥1 day/week)	20 (3.2)	9 (4.9)	
Current smoker (<1 day/week)	62 (10.0)	77 (42.1)	
Age at onset of smoking –Median (IQR)	18 (15.5–20.0)	18 (16.0–20.0)	0.287[b]

(*Continued*)

Table 2. (Continued)

Characteristics	Non-current drinker* (n = 621), n (%)	Current drinker (n = 183), n (%)	p-value
Pack-years of smoking –Median (IQR)	11 (3.8–21.9)	10.8 (4.4–20.0)	0.903$_b$

* Non-current drinkers included lifetime abstainers and former drinkers (those who drank but had not drunk during the previous three months).

$_a$ Chi-square test

$_b$ Wilcoxon rank-sum test

$_c$ Fisher's exact test

Comparisons of consumption indices between BSQF and CSQF within individuals.

Comparisons of drinking frequency, average quantity, and total consumption ratio are presented in Table 3. The CSQF instrument over-reported the average quantity in 39% to 50% of current drinkers, whereas the BSQF over-reported in 7% to 23%. More than half of the participants reported equivalent drinking frequency by the BSQF and CSQF: 62.2% for beer, 75.0% for white spirits, 55.6% for whisky, and 60.7% for other beverages.

Table 3. Comparisons of frequency, average quantity, and total consumption ratios reported using different instruments (CSQF and BSQF) within the same participant.

Comparison instrument by beverage	Alcohol consumption parameter, n, (%)			
	(1) Average quantity ratio	(2) Frequency ratio	(3) Total consumption ratio	Number (%) of respondents over-reporting total consumption $_a$
1. Beer				
CSQF over-report $_b$	38 (42.2)	29 (32.2)	42 (46.7)	31 (73.8) vs 10 (23.8) vs 1 (2.4)
BSQF over-report $_c$	21 (23.3)	5 (5.6)	21 (23.3)	17 (81.0) vs 4 (19.0) vs 0
Equivalence $_d$	31 (34.4)	56 (62.2)	27 (30.0)	-
Total	90	90	90	
2. White spirits				
CSQF over-report $_b$	12 (42.9)	5 (17.9)	14 (50.0)	11 (78.6) vs 2 (14.3) vs 1 (7.1)
BSQF over-report $_c$	2 (7.1)	2 (7.1)	4 (14.3)	2 (50.0) vs 2 (50.0) vs 0
Equivalence $_d$	14 (50.0)	21 (75.0)	10 (35.7)	-
Total	28	28	28	
3. Whisky				
CSQF over-report $_b$	41 (50.6)	26 (32.1)	41 (50.6)	26 (63.4) vs 11 (26.8) vs 4 (9.8)
BSQF over-report $_c$	6 (7.4)	10 (12.3)	10 (12.3)	5 (50.0) vs 5 (50.0) vs 0
Equivalence $_d$	34 (42.0)	45 (55.6)	30 (37.0)	-
Total	81	81	81	
4. Others (local beverage, wine, wine coolers or vodka)				
CSQF over-report $_b$	11 (39.3)	3 (10.7)	10 (35.7)	10 (100.0) vs 0 vs 0
BSQF over-report $_c$	2 (7.1)	8 (28.6)	8 (28.6)	1 (12.5) vs 7 (87.5)
Equivalence $_d$	15 (53.6)	17 (60.7)	10 (35.7)	-
Total	28	28	28	

$_a$ average quantity (Zones A, C) vs frequency (Zones B, D) vs both effects (Line P)

$_b$ parameter reported by CSQF is more than 1.5 times higher than the BSQF [Log_2 (CSQF/BSQF) > 0.58; CSQF/BSQF > 1.50]

$_c$ parameter reported by BSQF is more than 1.5 times higher than the CSQF [Log_2 (CSQF/BSQF) < -0.58; CSQF/BSQF < 1/1.50]

$_d$ parameter reported by CSQF or BSQF is within 1.5 times that of the other instrument [-0.58 ≤ Log_2 (CSQF/BSQF) ≤ 0.58; 1/1.50 ≤ CSQF/BSQF ≤ 1.50]

Regarding total consumption, over-reports by the CSQF were found in approximately 50% of current drinkers for almost all types of beverages except for "other beverages" comprising local beverage, wine, wine coolers or vodka (46.7% for beer, 50.0% for white spirits, 50.6% for whisky, and 35.7% for other beverages). The over-report of total consumption by the CSQF was mainly attributable to over-reported average quantity (average quantity effect vs. frequency effect: 73.8% vs. 23.8% for beer, 78.6% vs. 14.3% for white spirits, 63.4% vs. 26.8% for whisky, and 100% vs. 0% for other beverages). Interestingly, less than 30% of current drinkers reported higher average quantity, drinking frequency or total consumption by the BSQF instrument.

Fig 2 has four jitter plots for specific beverages depicting the relationships between drinking frequency ratio (X-axis), quantity ratio (Y-axis), and total consumption (CSQF over-report in Zones A and B and BSQF over-reports in Zones C and D, with equivalence in Zone E). These figures visualize the complex results from Table 3. Fig 2A, 2B and 2C highlight the preponderance of points in the CSQF over-report areas (Zones A and B) with more in Zone A (average quantity over-report) than in Zone B (frequency over-report).

Effects of CSQF-BSQF quantity and frequency ratios on total consumption ratios. The ratios of CSQF to BSQF total consumption could be explained more by the discrepancies in drinking frequency reported by the two methods for most types of beverages than by the discrepancies in drinking quantity (beta of frequency ratio vs. average quantity ratio = 1.309 vs. 1.099 or $2^{1.309}/2^{1.099} = 1.16$ times for beer, 1.02 times for whisky and 1.84 times for other beverages) except for drinking of white spirits (beta of frequency vs. average quantity ratio = 0.759 vs. 0.978 or $2^{0.759}/2^{0.978} = 0.86$ times). In a precise sense it revealed that a one standard deviation increase in the frequency variable ratio (as Log_2) between the instruments implied an expected difference of $2^{1.309} = 2.48$ times of ratio difference in the total consumption of beer, whereas a one standard deviation increase in the average quantity ratio (as Log_2) implied only $2^{1.099} = 2.14$ times of ratio difference in the total consumption of beer. The partial correlation coefficient trends in Table 4 are in conformity with the standardized regression coefficients.

Comparisons of alcohol consumption indices of the whole sample between CSQF and BSQF. A summary of the alcohol consumption indices for each instrument is presented in Table 5. There was no significant difference in the average daily intake, 3-month per drinker consumption or 3-month per capita consumption between instruments in the sample level analysis. However, the CSQF provided drinking contexts which the BSQF did not, while the interview duration and the burden of the participants to answer the questions for the CSQF were not significantly higher than those for the BSQF. The median time actually spent answering the instrument was 3 (interquartile range [IQR], <1 to 3) minutes for CSQF and 2 (IQR, <1 to 2) minutes for BSQF. The burden of the participants placed on both instruments was rated at 2 (IQR, 1 to 2) from a total score of five.

Discussion

Summary of results

The present study aims to compare the CSQF and BSQF for estimating alcohol consumption indices at the individual (i.e., total alcohol consumption) and sample levels (average daily intake, 3-month per drinker, and 3-month per capita). An instrument used in an alcohol survey should provide as accurately as possible the consumption indices. Several methodological issues influence the accuracy such as reference period, beverage-specific versus overall approach, open-ended versus categorical pattern, standard versus actual drink sizes, and interviewing methods (face-to-face versus telephone/computerized instruments) [30]. This study focused on the contextual approach technique.
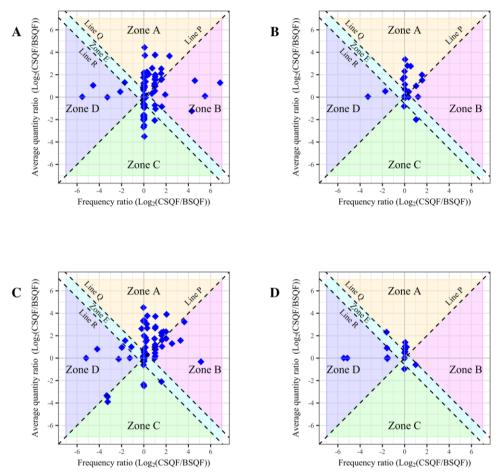
Fig 2. Jitter plots of drinking frequency ratio and average quantity ratio for beer (2A), white spirits (2B), whisky (2C), and other beverages (2D) Zone A represents CSQF over-report by average quantity, Zone B represents CSQF over-report by frequency, Zone C represents BSQF over-report by average quantity, Zone D represents BSQF over-report by frequency, and Zone E represents equivalence; Line P represents the equality of effect line, Line Q represents CSQF over-report of 1.5 times, and Line R represents BSQF over-report of 1.5 times.

https://doi.org/10.1371/journal.pone.0202756.g002

To the best of our knowledge, this is the first study to compare the contextual approach method (i.e. the CSQF instrument) and the BSQF instrument to assess alcohol consumption at individual and sample levels. We found that asking about the volume of alcohol consumption specific to the context, including situation, place, and partner, provided higher consumption volume in the past three months compared to the standard BSQF method, while the interview duration and burden on the participant to answer the questions were not significantly higher. This is in keeping with previous findings that motivation and a location-specific approach can

Table 4. Multiple linear regression analysis of the Log$_2$ ratio of total consumption (dependent variable) against Log$_2$ ratio of frequency and Log$_2$ ratio of average quantity (independent variables) between the CSQF and BSQF.

Variable	Standardized coefficient		Unstandardized coefficient				Partial correlation
	Beta	p-value	B	se	t value	p-value	
1. Beer							
Intercept	0.197	0.009	-0.414	0.077	-5.366	<0.001	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.309	<0.001	0.850	0.048	17.598	<0.001	0.884
Average quantity ratio between CSQF and BSQF (Log$_2$)	1.099	<0.001	0.716	0.048	14.781	<0.001	0.846
	R^2 = 0.877, Adjusted R^2 = 0.874						
2. White spirits							
Intercept	0.295	0.033	-0.373	0.153	-2.443	0.022	
Frequency ratio between CSQF and BSQF (Log$_2$)	0.759	<0.001	0.830	0.147	5.663	<0.001	0.750
Average quantity ratio between CSQF and BSQF (Log$_2$)	0.978	<0.001	0.821	0.112	7.299	<0.001	0.825
	R^2 = 0.796, Adjusted R^2 = 0.780						
3. Whisky							
Intercept	0.427	<0.001	-0.446	0.078	-5.724	<0.001	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.406	<0.001	0.923	0.050	18.415	<0.001	0.902
Average quantity ratio between CSQF and BSQF (Log$_2$)	1.375	<0.001	0.832	0.046	18.014	<0.001	0.898
	R^2 = 0.933, Adjusted R^2 = 0.932						
4. Others (local beverage, wine, wine coolers or vodka)							
Intercept	-0.896	<0.001	-0.417	0.136	-3.069	0.007	
Frequency ratio between CSQF and BSQF (Log$_2$)	1.464	<0.001	0.859	0.062	13.772	<0.001	0.958
Average quantity ratio between CSQF and BSQF (Log$_2$)	0.583	<0.001	0.786	0.143	5.486	<0.001	0.799
	R^2 = 0.933, Adjusted R^2 = 0.926						

estimate higher total consumption in the previous week than the traditional QF or recent occasion methods [20]. Questions asking about the most typical locations or occasions of drinking also provided a higher total alcohol consumption than did the QF, L7D, and two recent occasions methods [17].

We also found that the quantity of consumption contributed to the difference of total consumption measured by the two instruments. The higher volume of consumption reported by

Table 5. Summary drinking variables by measurement instruments (BSQF and CSQF; n = 804 with 183 current drinkers).

Alcohol indices and others	CSQF	BSQF	Median difference (95% CI) [a]
Drinking indices			
Average daily intake (n = 183) (g/drinker/day), Median (IQR)	8.66 (3.11–27.34)	7.54 (2.36–24.61)	0.56 (-0.30, 2.50)
3-month per drinker consumption (n = 183) (g/drinker/3 months), Median (IQR)	796.32 (286.18–2,515.46)	693.23 (217.15–2,264.53)	51.82 (-27.93, 229.89)
3-month per capita consumption (n = 804) (g/capita/3 months), Mean, (SD)	472.85 (1,651.41)	412.77 (1,550.92)	51.82 (-27.93, 229.89)
Interview duration (n = 183) (minute), Median (IQR)	*3 (<1–3)*	*2 (<1–2)*	1.00 (0, 1.00)
Participation's burden (n = 183) (total score = 5), Median (IQR)	*2 (1–2)*	*2 (1–2)*	1.00 (0, 1.00)

[a] Wilcoxon signed-rank test

the CSQF might be because the context-specific questions increased the recall ability by stimulating the respondents to think of all the different situations they consumed alcohol [31], whereas the BSQF could only capture usual or average drinking events.

However, in terms of variability, our study revealed that variation in drinking frequency had a greater effect on the ratios of CSQF to BSQF total consumption than the average quantity. The variability of frequency categories and time frame is one important dimension for alcohol consumption assessment [32]. In this study, we measured the average quantity of drinking using open-ended questions based on the number of containers the drinkers usually took for drinking (e.g., glass, cup, bottle, and can). On the other hand, drinking frequency was based on a ordinal item as it was reported to provide easier, higher alcohol consumption estimates and less item-missing data than reporting in an open-ended question [33]. However, it might be that the frequency categories we used, which were based on those used in other instruments, might not capture all drinking frequencies by all groups of drinkers. Thus, we suggest subdividing the frequency category into more categories. For example, adding "2 to 3 days/month (every fortnight)" to fill the gap between "1 to 2 days/week (every week)" and "1 to 3 days/3months (every month)".

Strengths and limitations

This study has several strengths. First, using the same retrospective time frame in both instruments possibly minimized the measurement errors from adjusted drinking frequencies. A past-year reference period was previously suggested to link a alcohol drinking pattern with alcohol-related harm [34]. A 12-month time frame is recommended by some studies because it is appropriate for drinking cultures where alcohol is used seasonally or influenced by various festive activities [27, 34]. The 12-month time frame attributes to usual drinking more than a detailed memory of actual drinking events [30]. Hence, a 3-month time frame was applied in this study because we supposed that it would be the average timeframe over which most drinkers would be able to remember their drinking history with less recall bias effect. This 3-month reference period covered (i) usual days, (ii) Christmas and New Year's Day (celebration), (iii) Constitution Day (holiday), and (iv) Buddhist Lent and a Thai festival at the end of 10th lunar month (cultural event). These days commonly have different drinking situations in Thailand. In Thailand, New Year's Day and the Buddhist Lent are the periods of greatest and lowest alcohol consumption, respectively. Second, both individual and sample level analyses were done in this study. An accurate estimate at the individual level would facilitate an accurate estimate at the sample level. Last, the actual time and burden in responding to the questionnaires were measured. An increased response burden may result in a low response rate, incomplete questionnaire, and reduced data quality. One important questionable disadvantage of the contextual approach is a greater response burden because of longer and more complex questions [21]. Based on the guideline for Minimizing Perceived Respondent Burden, response burden can be divided into actual and perceived burdens [35]. In this study, the actual and perceived response burden in completing the CSQF was not significantly higher than that of the BSQF in either dimension. This finding was consistent with a meta-analysis study revealing weak support for an association between questionnaire length and response burden in medical and public health questionnaires [36].

We also acknowledge that our study may have some limitations. It is generally known that there is no definite "gold standard method" to estimate alcohol consumption and validate a new instrument such as the CSQF [23, 24]. Researchers typically want the criterion validity to be measured against a gold standard, but the convergent validity method is another powerful method which was applied in this study because there is no specific gold standard to assess

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alcohol consumption. Prospective data collection can be more accurate in measuring alcohol drinking history using a self-recorded diary, mobile application or telephone interview by trained staff [37]. Since prospective data collection was not a feasible method in our study sample, a retrospective inquiry of consumption in the previous 3-month period was used instead to minimize recall bias, and the comparison between two instruments was reported rather than a comparison with a "gold standard". Second, drinking situations in the CSQF are not mutually exclusive. Although the CSQF provides examples of each drinking situation to minimize the double counting effect, some participants were confused concerning the situation categories (e.g., drinking at a New Year' party can be considered as drinking on a holiday or during a celebration). Therefore, the CSQF-over-report could be explained by this double counting. Third, both the CSQF and BSQF assess the same construct, which is the amount of alcohol consumption and they both have some identical questions. This may overestimate the concordance between the two measures and limit the chance that occasional influencing factors affect self-reports. However, both the CSQF and BSQF in our study asked about the consumption in the same time frame of the past three months, which is a relatively short period. It was not possible to separate the interview into two occasions at 2–3 days apart. Fourth, the actual number of drinking days could not be accurately estimated by either instrument. The actual number of drinking days is an important variable to calculate "drinking intensity" which has many clinical benefits. However, the main purpose of the CSQF development is for public health implication. Fifth, when population-level indices were compared, there were no significant differences between the two instruments. This might be due to the small number of drinkers in this study, which resulted in insufficient power to reveal the significant differences by the Wilcoxon Signed-Rank Test. Last, the generalizability of this study is limited by the small–scale, localized single population which possibly has culture-specific drinking patterns. The alcohol consumption level and drinking patterns have high variability among WHO regions due to different drinking cultures and contexts [38]. The WHO Eastern Mediterranean Region (EMR) and South-East Asia Region (SEAR) including Thailand are regions of the lowest consumption levels and most drinkers are occasional drinkers (less than one day per week). In contrast, in other regions there are high levels of alcohol consumption and most drinkers are regular drinkers [39]. However, our aim was to initially test the hypothesis on a small scale. Had we found a significant result, we would draw a sample from many provinces in a further study. Nevertheless, this localized study has provided information with important implications for alcohol-related policy at the particular site.

Implications and further studies

The findings of our study have considerable managerial implications for the health-care sector and the alcohol survey manager who will select the appropriate instrument to estimate alcohol consumption in each survey. A full picture of drinking behaviors from the CSQF has several valuable advantages. Specific alcohol policies can be more directly specific to some target populations or situations. For example, if strategies to prevent underage drinking are launched, the CSQF can provide the specific conditions such as the occasion (when), location (where), partner (with whom), and types of beverages (what), that are strongly associated with underage drinking. Consequently, alcohol specified-group rules or interventions can be framed.

Our suggestions for CSQF users are to use a technology-assisted technique such as personal cellphones, functionalities (e.g., text, calls, internet, GPS, sound recorders, and applications), skipping function or sequence of items to minimize human errors caused by the complexity of the questionnaire and to ask questions in a loop within each context to ease recall. Technology

and other innovative ways for data collection purposes in alcohol research have many advantages (e.g., matching date, location via GPS with alcohol consumption, possibility of response to previous answers, enhancing repeated measurements, and minimizing recall bias [40–42]. Categorical responses should be modified to suit each country in terms of drinking cultures such as local beverage types, cultural or regional events or containers.

Lastly, additional methodological studies are needed to further explore the inter-interviewer reliability and test-retest reliability of the instruments using the same retrospective timeframe. The acceptability in multiple languages and cultures needs to be demonstrated in the future. Data collection from taxable alcohol available for consumption is another useful source to validate the survey results and can be used for cross-country comparison [22, 27]. However, in our study we could not obtain the taxation data.

Conclusions

The inclusion of drinking context in harm reduction surveys is recommended. The CSQF appears to be appropriate for an alcohol consumption survey because it provides significantly higher total alcohol consumption than the BSQF at the individual level and provides drinking contexts (situation, place, and partner), which are not part of the BSQF. The major effect of the difference between two instruments was the over-reporting of average quantity. However, there was no significant difference in the average daily intake, 3-month per drinker consumption or 3-month per capita consumption between instruments in the sample level analysis. The interview duration and participant's perceived burden to answer the questions for the CSQF were not significantly higher than those for the BSQF.

The methodological research on measuring alcohol consumption generally values the instrument which estimates the highest alcohol consumption. However, an instrument which captures drinking context can provide more useful information with public health implication than the one that simply estimates the highest alcohol consumption indices.

Acknowledgments

Author Contributions

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References

1. Baan R, Straif K, Grosse Y, Secretan B, El Ghissassi F, Bouvard V, et al. Carcinogenicity of alcoholic beverages. The Lancet Oncology. 2007; 8(4):292–3. PMID: 17431955

2. Shield KD, Parry C, Rehm J. Chronic diseases and conditions related to alcohol use. Alcohol Research: Current Reviews. 2014; 35(2):155–71. PubMed PMID: PMC3908707.

3. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2013; 380 (9859):2224–60.

4. Anderson P, Chisholm D, Fuhr DC. Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. The Lancet. 2009; 373(9682):2234–46. https://doi.org/10.1016/S0140-6736(09)60744-3

5. World Health Organization. Global strategy to reduce the harmful use of alcohol. 2010.

6. World Health Organization. Global status report on alcohol and health 2014: World Health Organization; 2014.

7. Dawson DA. Patterns of alcohol consumption: beverage effects on gender differences. Addiction. 1993; 88(1):133–8. PMID: 8448504

8. Serdula MK, Mokdad AH, Byers T, Siegel PZ. Assessing alcohol consumption: beverage-specific versus grouped-beverage questions. Journal of Studies on Alcohol. 1999; 60(1):99–102. PMID: 10096314

9. Williams GD, Proudfit AH, Quinn EA, Campbell KE. Variations in quantity-frequency measures of alcohol consumption from a general population survey. Addiction. 1994; 89(4):413–20. PMID: 8025494

10. Holyfield L, Ducharme LJ, Martin JK. Drinking contexts, alcohol beliefs, and patterns of alcohol consumption: Evidence for a comprehensive model of problem drinking. Journal of Drug Issues. 1995; 25 (4):783–98.

11. Kaplan LM, Karriker-Jaffe KJ, Greenfield TK. Drinking context and alcohol's harm from others among men and women in the 2010 US National Alcohol Survey. Journal of Substance Use. 2017; 22(4):412–8. https://doi.org/10.1080/14659891.2016.1232758 PubMed PMID: PMC5530256. PMID: 28757805

12. Reboussin BA, Song E-Y, Wolfson M. Social influences on the clustering of underage risky drinking and its consequences in communities. Journal of Studies on Alcohol and Drugs. 2012; 73(6):890–8. PubMed PMID: PMC3469043. PMID: 23036206

13. Grekin ER, Sher KJ, Krull JL. College spring break and alcohol use: Effects of spring break activity. Journal of Studies on Alcohol and Drugs. 2007; 68(5):681–8. PMID: 17690801

14. Stockwell T, Single E, Hawks D, Rehm J. Opinion piece: sharpening the focus of alcohol policy from aggregate consumption to harm and risk reduction. Addiction Research. 1997; 5(1):1–9.

15. Room R, Roizen R. Some notes on the study of drinking contexts. Drinking and Drug Practices Survey. 1973; 8:25–32.

16. Single E, Wortley S. Drinking in various settings as it relates to demographic variables and level of consumption: findings from a national survey in Canada. Journal of Studies on Alcohol. 1993; 54(5):590–9. PMID: 8412149

17. Wyllie A, Zhang JF, Casswell S. Comparison of six alcohol consumption measures from survey data. Addiction. 1994; 89(4):425–30. PMID: 8025496.

18. Romelsjo A, Leifman H, Nystrom S. A comparative study of two methods for the measurement of alcohol consumption in the general population. Internaltional Journal of Epidemiology. 1995; 24(5):929–36. Epub 1995/10/01. PMID: 8557449.

19. Hilton ME. Inconsistent responses to questions about alcohol consumption in specified settings. The American Journal of Drug and Alcohol Abuse. 1986; 12(4):403–13. PMID: 3826026.

20. Single E, Wortley S. A comparison of alternative measures of alcohol consumption in the Canadian National Survey of alcohol and drug use. Addiction. 1994; 89(4):395–9. PMID: 8025491.

21. Casswell S, Huckle T, Pledger M. Survey data need not underestimate alcohol consumption. Alcoholism: Clinical and Experimental Research. 2002; 26(10):1561–7. https://doi.org/10.1097/01.ALC.0000034390.38886.14 PMID: 12394290

22. Gmel G, Rehm J. Measuring alcohol consumption. Contemporary Drug Problems. 2004; 31(3):467–540.

23. Midanik L. The validity of self-reported alcohol consumption and alcohol problems: a literature review. Addiction. 1982; 77(4):357–82. https://doi.org/10.1111/j.1360-0443.1982.tb02469.x

24. Rehm J. Measuring quantity, frequency, and volume of drinking. Alcoholism: Clinical and Experimental Research. 1998; 22:4s–14s. https://doi.org/10.1111/j.1530-0277.1998.tb04368.x

25. Parnanen K. Validity of survey data on alcohol use. Research Advances in Alcohol and Drug Problems. 1974; 1:355–74.

26. Kish L. A Procedure for objective respondent selection within the household. Journal of the American Statistical Association. 1949; 44(247):380–7. https://doi.org/10.2307/2280236

27. World Health Organization. International guide for monitoring alcohol consumption and related harm: Geneva: World Health Organization; 2000.

28. Virasakdi C. epicalc: epidemiological calculator. R package version. 2012; 2(1.6).

29. Wickham H. ggplot2: elegant graphics for data analysis: Springer; 2016.

30. Dawson DA. Methodological issues in measuring alcohol use. Alcohol Research and Health. 2003; 27 (1):18–29. PMID: 15301397

31. Dawson DA, Room R. Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpö conference overview. Journal of Substance Abuse. 2000; 12(1–2):1–21. PMID: 11288465

32. Room R. Measuring alcohol consumption in the United States. Research Advances in Alcohol and Drug Problems: Springer; 1990. p. 39–80.

33. Ivis FJ, Bondy SJ, Adlaf EM. The effect of question structure on self-reports of heavy drinking: closed-ended versus open-ended questions. Journal of Studies on Alcohol. 1997; 58(6):622–4. PMID: 9391922

34. Wilson VB, Allen JP. Assessing alcohol problems: a guide for clinicians and researchers: National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism; 2003.

35. Hedlin D, Dale T, Haraldsen G, Jones J. Developing methods for assessing perceived response burden. Statistics Swden/Statistics Norway/UK Office for National Statistics, February. 2005.

36. Rolstad S, Adler J, Ryden A. Response burden and questionnaire length: is shorter better? A review and meta-analysis. Value in health: the journal of the International Society for Pharmacoeconomics and Outcomes Research. 2011; 14(8):1101–8. https://doi.org/10.1016/j.jval.2011.06.003 PMID: 22152180.

37. Lemmens P, Knibbe RA, Tan F. Weekly recall and diary estimates of alcohol consumption in a general population survey. Journal of Studies on Alcohol. 1988; 49(2):131–5. PMID: 3361905

38. Rehm J, Rehn N, Room R, Monteiro M, Gmel G, Jernigan D, et al. The global distribution of average volume of alcohol consumption and patterns of drinking. European Addiction Research. 2003; 9(4):147–56. https://doi.org/10.1159/000072221 PMID: 12970583

39. World Health Organization. Global status report on alcohol and health: World Health Organization; 2014.

40. Kuntsche E, Labhart F. The future is now—using personal cellphones to gather data on substance use and related factors. Addiction. 2014; 109(7):1052–3. https://doi.org/10.1111/add.12540 PMID: 24754712

41. Kuntsche E, Labhart F. Using personal cell phones for ecological momentary assessment: An overview of current developments. European Psychologist. 2013; 18(1):3.

42. Kuntsche E, Dietze P, Jenkinson R. Understanding alcohol and other drug use during the event. Drug and Alcohol Review. 2014; 33(4):335–7. https://doi.org/10.1111/dar.12171 PMID: 25041512

Annex 7 Manuscript II

Vichitkunakorn P, Geater A, Assanangkornchai S. Is" light alcohol drinking" associated with the health-related quality of life (HRQoL)?: a population-based nested case-control design. ASEAN Journal of Psychiatry. 2018 Jan 1;19(1). *(Published)*

ORIGINAL ARTICLE

IS "LIGHT ALCOHOL DRINKING" ASSOCIATED WITH THE HEALTH-RELATED QUALITY OF LIFE (HRQOL)?: A POPULATION-BASED NESTED CASE-CONTROL DESIGN

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Abstract

Objective: To test the hypothesis that drinking alcohol even at a low level is associated with low-to-moderate health-related quality of life (HRQoL) compared to abstainers. *Methods:* A nested case-control study was conducted in Songkhla Province, Thailand. The adult respondents (≥15 years) with low-to-moderate HRQoL scores (EQ-5D index ≤0.8, n = 108) were assigned to be a case group and those with high HRQoL (EQ-5D index >0.8, n = 443) a control group. The average alcohol consumption was estimated by the beverage-specific quantity-frequency (BSQF) questionnaire. Multivariate logistic regression models were used to evaluate the association between low-moderate HRQoL and drinking behavior. The model was adjusted for socio-demographic variables. *Results:* Compared with lifetime abstention, light drinking (0.1-7 drinks/week) was significantly associated with low-moderate HRQoL (Odds ratio, OR = 3.16, 95% confidence interval, CI, 1.08-9.20); however, no significant associations were found for moderate to heavy drinking (OR = 3.55; 95% CI, 0.49-25.49) or past 12-month abstinence (OR = 0.86; 95% CI, 0.45-1.63).Furthermore, significantly associated modifiable factors for low-moderate HRQoL were being unemployed (OR = 5.82, 95% CI, 2.21-15.32), regular smokers (≥1 time/week) (OR = 5.26; 95% CI, 1.65-16.77) and former smokers (OR = 3.92; 95% CI, 1.50-10.20). By contrast, the low-moderate HRQoL were significantly less likely for having a junior (OR = 0.10; 95% CI, 0.02-0.42) or senior high school education (OR = 0.21; 95% CI, 0.05-0.82), compared with being illiterate. *Conclusion:* The finding indicates that alcohol drinking at a low level was associated with a reduced HRQoL compared with lifetime abstinence.

Keywords: alcohol drinking, light drinker, health-related quality of life, EQ-5D

Introduction

Alcohol can have several effects on all health dimensions. Drinking alcohol is a causal factor for more than 200 diseases, including injury, infection, malignancy and psychological diseases [1]. Moreover, the Constitution of the World Health Organization that came into force in 1948 stated that "Health is state of complete physical, mental and social well-being" [2]. The important issues are to have an understanding of health from the patient's perspective and to evaluate the patient's subjective experience of their symptoms and impact of illness on their quality of life.

There are several instruments to measure health-related quality of life (HRQoL) of individuals with and without disease. The examples are EQ-5D and SF-36, which have been used widely for measuring the quality of life in research in the clinical field, economic evaluation of population health survey, community health intervention or health technology assessment [3].

Over the past decades, some studies have shown that consumption of alcohol at a low level was associated with a lower incidence of cardiovascular diseases and their mortality in some populations. The American Heart Association; however, mentioned that the associations may be due to other lifestyle factors (e.g., physical activity, fruits/vegetables diet, lower in saturated fats) rather than alcohol consumption itself [4]. Moreover, a recent

meta-analysis of 87 studies shows that reduction in alcohol consumption, even among previous low-volume drinkers (1.30 to <25 g/day) is beneficial for CVD prevention [5].

Some studies have shown a lower quality of life among individuals with alcohol dependence when compared with not only with the general healthy population but also with those with other chronic medical conditions [6]. Furthermore, the quality of life was even worse if they were unemployed and had many serious somatic or psychiatric diseases [7]. Most studies have focused on people with alcohol abuse or alcohol dependence, which are severe stages of the alcohol problem spectrum. There are more drinkers with lower levels of consumption and related problems in the society. However, less information has been reported on the quality of life of light or moderate drinkers. A variety of studies have reported inconsistent results regarding the associations of drinking alcohol with HRQoL, depending on instruments and age group [8-10]. Recent studies have shown the association between alcohol consumption and better physical HRQoL at baseline, but no association was found after 3.3 years of follow-up [11]. Tremendous attempts have been done to reduce per-capita consumption in Thailand aiming at the general population, who mostly are non-drinkers, light or moderate drinkers rather than alcohol dependents. Evidence on the relationship between alcohol drinking and quality of life would be beneficial for policy advocacy and can be used for public education to promote non-drinking in the country.

This study thus aimed to test the hypothesis that drinking alcohol even at a low level is associated with low-to-moderate health-related quality of life (HRQoL) compared to abstainers.

Methods

Study design

This study is a part of a larger community-based survey in Songkhla Province, Thailand to compare two questionnaires for estimating alcohol consumption indices. The final sample comprised 804 subjects with 98.3% response rate; 184 of them were alcohol drinkers. The present study applies a nested case-control design using data of the original study. In a larger survey, 13.4% of respondents had low-to-moderate HRQoL. The respondents with low-to-moderate HRQoL (EQ-5D index ≤0.8, n = 108) were assigned to be a case group. Taking a case and control ratio of 1:4, respondents with high HRQoL (EQ-5D index >0.8, n = 443) whose households were nearest to the cases' houses were assigned as a control group. This sample size was deemed adequate for testing the hypothesis when an odds ratio (OR) was set at 3.0 and the probability of drinking among low-to-moderate HRQoL group (case) was set at 5.0% with a power of 80.0% and a standard error of 5.0%.

Data collection

A semi-structured questionnaire including demographic characteristics and alcohol consumption was used for face-to-face interview by trained interviewers. Only the demographic data, HRQoL, and alcohol consumption sections were included in this analysis. The HRQoL part was developed from the EQ-5D-5L instrument and alcohol consumption part from the beverage-specific quantity- frequency (BSQF) instrument.

Dependent variables

Health-Related Quality of Life (HRQoL) was the primary dependent variable. The data were collected using the 5-level EQ-5D version (EQ-5D-5L) [12]. This version was introduced by the EuroQol Group in 2009 to improve the instrument's sensitivity and to reduce the ceiling effects as compared to the EQ-5D-3L [13]. This instrument is made up of five items distributed into five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each domain has five levels: no problems, slight problems, moderate problems, severe problems and extreme problems. The EQ-5D index was calculated by the Crosswalk Index Value (Thai population value set) suggested by Pattanaphesaj et al. [14], with the total score ranging from 0 (dead) to 1 (perfect health).

As suggested by Golicki [15] the relative HRQoL states were categorized into good (>0.8), moderate (0.4–0.8) and low (<0.4)

HRQoL states. In this study, we applied the cutoff value of >0.8 to classify the EQ-5D index into "high HRQoL" (EQ-5D index >0.8) and "low-to-moderate HRQoL" (EQ-5D index ≤0.8).

Independent variables

The predictor of main interest was alcohol drinking status, categorized by drinking history and average daily consumption (g/day), which was measured by the beverage-specific quantity-frequency (BSQF) questionnaire. Drinking status was defined according to the World Health Organization recommendation for research [16, 17] and divided into five mutually exclusive groups; (i) lifetime abstainers: people who had never consumed alcohol, (ii) past 12-month abstainers: people who did not drink any alcohol during the previous 12-month period, (iii) light drinkers (0.1-7 drinks/week), (iv) moderate drinkers (7.1-14 drinks/week), high drinkers (>14.1-28 drinks/week) or heavy drinkers (>28 drinks/week) and (v) heavy episodic drinkers. A heavy episodic drinker was described as a person who consumed not less than 60 grams of pure alcohol on at least one single occasion at least monthly [18]. One standard drink was assumed to be 12 grams of pure ethanol in Thailand.

The BSQF instrument is a modification of the quantity-frequency (QF) instrument where usual frequency and amount of consumption are asked for each specific beverage in a 30-day or one-year time frame. There are some advantages of the BSQF over the traditional QF in terms of increasing recall ability [19] and higher total volume estimation [20] and average daily intake [21].

Socio-demographic variables were collected including gender, age, religion, marital status, education level, occupation, monthly household income level in Thai Baht (THB) (30 THB = 1 USD), and smoking status.

Data analysis

All analyses were conducted using R version 3.3.2. Binary logistic regression analysis was conducted to measure the association between the independent variables and the low-to-moderate HRQoL. The significance was set at less than 0.05.

Ethical consideration

The study was approved by the ethics review committee for research in human subjects of the Faculty of Medicine, Prince of Songkla University (Ref no: 59-254-18-1). Participants signed an informed consent form prior to their participation in the study.

Results

Respondent characteristics

Table 1 shows a summary of the demographic characteristics of the sample. The case and control groups were not significantly different in terms of gender and religion (p-value >0.05). There were significant differences in age group, marital status, education level, occupation, monthly household income level and smoking status between case and control groups.

Table 1. Characteristics of the participants by Health-Related Quality of Life (HRQoL) group (n = 551)

Characteristics	Low-to-moderate HRQoL (n = 108), n (%)	High HRQoL (n = 443), n (%)	p-value
Gender			
Male	40 (37.0)	138 (31.2)	0.290 a
Female	68 (63.0)	305 (68.8)	
Age (year)			
Mean (SD)	63.0 (15.4)	49.1 (15.9)	<0.001* b
15-29	2 (1.9)	51 (11.5)	
30-44	13 (12.0)	124 (28.0)	<0.001* a
45-59	24 (22.2)	148 (33.4)	
≥60	69 (63.9)	120 (27.1)	
Religion			
Buddhism	106 (98.1)	441 (99.5)	0.174 c
Muslim	2 (1.9)	2 (0.5)	
Marital status			
Married	85 (78.7)	351 (79.2)	
Single	7 (6.5)	59 (13.3)	0.013* a
Widowed/divorced/separated	16 (14.8)	33 (7.4)	
Education level			
Illiterate	16 (14.8)	16 (3.6)	
Primary school	75 (69.4)	232 (52.4)	
Junior high school	3 (2.8)	62 (14.0)	<0.001* a
Senior high school	4 (3.7)	54 (12.2)	
Vocational certification	2 (1.9)	35 (7.9)	
Bachelor and above	8 (7.4)	44 (9.9)	
Occupation			
Laborer	7 (6.5)	66 (14.9)	
Agriculture	32 (29.6)	164 (37.0)	
Commercial	7 (6.5)	53 (12.0)	<0.001* a
Unemployment	57 (52.8)	89 (20.1)	
Others	5 (4.6)	71 (16)	
Household income level (Baht/month)			
Median (Q_1, Q_3)	10,000 (4,752, 20,000)	10,000 (7,000, 20,000)	0.095 d
<5,000	27 (25.0)	54 (12.2)	
5,000-9,999	21 (19.4)	110 (24.8)	0.008* a
10,000-19,999	26 (24.1)	134 (30.2)	

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ASEAN Journal of Psychiatry, Vol. 19 (1), January - June 2018: 2231-7805

Characteristics	Low-to-moderate HRQoL (n = 108), n (%)	High HRQoL (n = 443), n (%)	p-value
≥20,000	34 (31.5)	145 (32.7)	
Smoking status			
Non-smoker	73 (67.6)	358 (80.8)	
Ex-smoker	12 (11.1)	17 (3.8)	
Current smoker (≥1 time/week)	9 (8.3)	10 (2.3)	<0.001[*][a]
Current smoker (<1 time/week)	14 (13.0)	58 (13.1)	
Drinking status			
Lifetime abstainer	67 (62.0)	287 (64.8)	
Past 12-month abstainers	31 (28.7)	134 (30.2)	
Light drinker (0.1-7 drinks/week)	8 (7.4)	17 (3.8)	0.325[c]
Moderate to heavy drinker (>7 drinks/week)	2 (1.9)	5 (1.1)	
Heavy episodic drinking status			
Lifetime abstainer	67 (62.0)	287 (64.8)	
Past 12-month abstainers	31 (28.7)	134 (30.2)	
No heavy episodic drinker	4 (3.7)	8 (1.8)	0.314[c]
Non-regular (<1 time/week)	3 (2.8)	4 (0.9)	
Regular (>1 time/week)	3 (2.8)	10 (2.3)	

[a] Chi-square test, [b] t-test, [c] Fisher's exact test, [d] Mann–Whitney U test, [*] p-value<0.05

Health-Related Quality of Life (HRQoL) and influencing predictors.

Primary predictor: alcohol drinking status

Table 2 displays the results of univariate and multivariate binary logistic regression on the predictors for low-to-moderate HRQoL. After adjusting for other variables, light drinkers were 3.16 times (95% CI, 1.08-9.20) as likely to have low-to-moderate HRQoL, compared to lifetime abstainers. However, no significant associations were found for moderate to heavy drinking (OR = 3.55; 95% CI, 0.49-25.49) and past 12-month abstinence (OR = 0.86; 95% CI, 0.45-1.63).

Table 2. Analysis of influencing predictors for low-to-moderate HRQoL by univariate and multivariate logistic regression models (n = 551)

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value (Wald's test)	p-value (LR-test)
Age group (year) [ref.=15-29]				0.012
30-44	2.67 (0.58, 12.27)	2.54 (0.48, 13.28)	0.270	
45-59	4.14 (0.94, 18.10)	2.70 (0.53, 13.88)	0.234	
≥60	**14.66 (3.46, 62.07)**	**5.63 (1.12, 28.28)**	0.036	
Education status [ref.=Illiterate]				0.006
Primary school	**0.32 (0.15, 0.68)**	0.55 (0.25, 1.24)	0.150	
Junior high school	**0.05 (0.01, 0.19)**	**0.10 (0.02, 0.42)**	0.002	
Senior high school	**0.07 (0.02, 0.25)**	**0.21 (0.05, 0.82)**	0.025	
Vocational certification	**0.06 (0.01, 0.28)**	0.25 (0.04, 1.38)	0.111	
Bachelor and above	**0.18 (0.07, 0.51)**	0.65 (0.18, 2.29)	0.503	
Occupation [ref.=Laborer]				<0.001
Agriculture	1.84 (0.77, 4.37)	1.91 (0.74, 4.97)	0.184	
Commercial	1.25 (0.41, 3.77)	1.83 (0.54, 6.16)	0.331	
Unemployment	**6.04 (2.59, 14.09)**	**5.82 (2.21, 15.32)**	<0.001	
Others	0.66 (0.20, 2.19)	1.01 (0.26, 3.94)	0.984	
Smoking status [ref.=Non-smoker]				0.004
Former-smoker	**3.46 (1.59, 7.56)**	**3.92 (1.50, 10.20)**	0.005	
Regular smoker (≥1 time/week)	**4.41 (1.73, 11.24)**	**5.26 (1.65, 16.77)**	0.005	
Occasional smoker (<1 time/week)	1.18 (0.63, 2.24)	1.27 (0.56, 2.84)	0.568	
Drinking status [ref.=Lifetime abstainer]				0.089
Past 12-month abstainers	0.99 (0.62, 1.59)	0.86 (0.45, 1.63)	0.646	
Light drinker (0.1-7 drinks/week)	2.02 (0.83, 4.87)	**3.16 (1.08, 9.20)**	0.035	
Moderate to heavy drinker (>7 drinks/week)	1.71 (0.33, 9.02)	3.55 (0.49, 25.49)	0.208	

Low-to-moderate HRQoL group had higher proportions of elderly aged ≥60 years (63.9% vs 27.1%), widowed/divorced/separated (14.8% vs 7.4%), unemployed (52.8% vs 20.1%), having a monthly household income <5,000 Baht/month (25.0% vs 12.2%), regular current smokers (8.3% vs 2.3%) and light drinkers (7.4% vs 3.8%).

Other predictors

Elderly age group (≥60 years) was associated with the risk of low-to-moderate HRQoL (OR = 5.63, 95% CI, 1.12-28.28), compared to adolescence and young adult group (15-29 years). Unemployed individuals were about 5.82 times (95% CI, 2.21-15.32) the odds of low-to-moderate HRQoL compared to laborers. Regular smokers (≥1 time/week) (OR = 5.26; 95% CI, 1.65-16.77) or former smokers (OR = 3.92; 95% CI, 1.50-10.20) were more likely to have low-to-moderate HRQoL, compared to non-smokers. The interaction between smoking and drinking status was not significant (p-value = 0.49).

On the other hand, education status was a significant protective predictor, having a junior or senior high school education decreased the odds of low-to-moderate HRQoL about 10 times (OR = 0.10; 95% CI, 0.02-0.42) and 4.8 times (OR = 0.21; 95% CI, 0.05-0.82), compared with being illiterate, respectively.

Health-Related Quality of Life domains and drinking status

Table 3 indicated that there was a statistically significant association between pain/discomfort domain of the EQ-5D and drinking status (p-value = 0.01). Pain/discomfort was the most frequently reported domain, followed by mobility domain.

Table 3. Proportion of EQ-5D domains by drinking status (n = 551)

Drinking status	EQ-5D domains, n (%)									
	1st domain Mobility		2nd domain Self-care		3rd domain Usual activities		4th domain Pain/discomfort		5th domain Anxiety/depression	
	Yes $_1$	No $_2$	Yes $_1$	No $_2$	Yes $_1$	No $_2$	Yes $_1$	No $_2$	Yes $_1$	No $_2$
Lifetime abstainer	78 (62.9)	276 (64.6)	15 (71.4)	339 (64.0)	47 (68.1)	307 (63.7)	150 (66.7)	204 (62.6)	32 (57.1)	322 (65.1)
Past 12-month abstainers	37 (29.8)	128 (30.0)	6 (28.6)	159 (30.0)	17 (24.6)	148 (30.7)	55 (24.4)	110 (33.7)	19 (33.9)	146 (29.5)
Light drinker (0.1-7 drinks/week)	7 (5.6)	18 (4.2)	-	25 (4.7)	4 (5.8)	21 (4.4)	16 (7.1)	9 (2.8)	4 (7.1)	21 (4.2)
Moderate to heavy drinker (>7 drinks/week)	2 (1.6)	5 (1.2)	-	7 (1.3)	1 (1.4)	6 (1.2)	4 (1.8)	3 (0.9)	1 (1.8)	6 (1.2)
Total	124	427	21	530	69	482	225	326	56	495
p-value	0.89 $_a$		0.84 $_b$		0.65 $_b$		*0.01* $_b$*		0.43 $_a$	

$_1$ Problem: score = 2 (slight problems) to 5 (extreme problems)

$_2$ No problem: score = 1

$_a$ Chi-square test, $_b$ Fisher's exact test, * p-value<0.05

Discussion

This epidemiological study provides support for the hypothesis that drinking alcohol even at a low level can decrease HRQoL. The strength of the evidence is underscored by the strongly significant association (OR = 3.16; 95% CI, 1.08-9.20) between alcohol drinking in a light level with low-to-moderate HRQoL, independently of other factors. This confirms previous findings of lower quality of life among alcohol drinkers compared with non-drinkers [22-25], especially in those with heavy episodic drinking pattern [26-28] and the improvement of the quality of life when drinking was decreased [29]. Nevertheless, our study did not find a significant association between moderate to heavy drinking or heavy episodic drinking and low HRQoL. The reason may be due to the small numbers of those with higher levels of drinking, which is typical for the Thai population.

Considering other measurement methods, some have found that non-current drinkers had a lower HRQoL than lifetime abstainers for SF-36 score [30]. Those who drank higher alcohol volume in the previous one month had a higher HRQoL or physical and mental health using HIPOP-OHP (High-risk and Population Strategy for Occupational Health Promotion Study) compared to lifetime abstainer [31]. However, this contrast with earlier findings may be due to different measurement instruments and populations.

Lower quality of life was also found among current and former smokers, compared to non-smokers in this study. This result lends support to previous findings in the literature [23, 32]. It is very common for drinkers to be smokers as well [33]. The increased consumption of alcohol and tobacco are among the four most important risk factors for non-communicable disease (NCD) [34]. Both substances work by similarly addictive mechanisms in the brain and dramatically increase the risk of various cancers [35]. We found no significant interaction of smoking and drinking status in this study. This can be explained by the very low proportion of subjects who drank and smoked (16 subjects in the total of 551 subjects; 2.90%). This proportion did not represent the drinking and smoking status in the population because this study was a case-control study.

General demographic characteristics also had an influence on HRQoL and this is consistent with other surveys. EQ-5D index was lower for increasing age groups and lower education level in the U.S population [36]. Among the Australian population, age and employment status affected lower EQ-5D index while higher education level predicted better score on a visual analogue scale (EQ-VAS) [37].

This study is a part of a larger community-based survey, and some limitations inevitably could not be avoided. First, the EQ-5D instrument may not be appropriate for measuring quality of life among alcohol drinkers whose concerns are more on social aspects such as appearance and relationships with family and friends [38]. The EQ-5D mainly measures physical discomfort, ability and activities. It is likely to underestimate other aspects of problems with well-being suffered by drinkers (e.g., stress, self-esteem and life satisfaction) [39]. This limitation is demonstrated in our study by the fact that most subjects had high EQ-5D index scores (1.1% had <0.4, 0.9% had 0.4-0.59, 4.1% had 0.6-0.79 and 93.9% had ≥0.8) and the selected cut-off of 0.8 and less for lower HRQoL might inadequately reflect meaningful clinical significance. In addition, other factors could have affected a person's quality of life, such as the presence of some diseases (e.g., diabetes, asthma, hypertension, heart disease, stroke and emphysema) [36]. However, these could not be adjusted for in this study.

Notwithstanding these limitations, the finding from our study that alcohol consumption even at a low level could lower drinker's quality of life is significant. It is especially useful for public health workers or policy makers who seek evidence to promote alcohol abstinence among the general population. As strongly evidenced, alcohol is one of the four significant risk factors for non-communicable diseases (NCD) [40] and a crucial threat to achieving the 2030 Agenda for Sustainable Development Goals (SDG) [41]. In many nations where more people are light drinkers than heavy drinkers or alcohol dependents a public health strategy to reduce drinking in the general population is far more essential than selective interventions for those with alcohol use disorders. Integration of health messages on the impacts of alcohol not only on NCD and SDG but also on an individual's general well-being is therefore imperative.

To overcome limitations related to the EQ-5D instrument used in our study, we suggest more research employing a specific alcohol-related quality of life measure, such as the AlQoL 9 [42], which is claimed to be valid and reliable in drinkers of various patterns. Further research with a larger sample size, especially in moderate to heavy drinkers is needed to provide sufficient power to determine the dose-response effect between the alcohol consumption level and HRQoL.

Conclusion

Alcohol drinking in light level (0.1-7 drinks/week) was associated with a reduced Health-Related Quality of Life (HRQoL) compared with lifetime abstinence, controlling for general characteristics. Based on the assumption that decreasing HRQoL could be influenced by alcohol drinking, and not vice versa, people should be discouraged from the idea that they may get any health benefits from alcohol, even if keeping their drinking at a light or moderate level. Instead, we should promote regular aerobic exercise, eating of healthy food, good sleep hygiene and quitting smoking behavior.

Acknowledgements

Conflict of interest: None declared

References

1. Shield KD, Parry C, Rehm J. Chronic Diseases and Conditions Related to Alcohol Use. Alcohol Research : Current Reviews. 2014;35(2):155-71.
2. World Health Organization. Preamble to the Constitution of the World Health Organization, as adopted by the International Health Conference, New York, pp. 19-22 (June 1946): signed on 22 July 1946 by the Representatives of 61 States,(Official Records of the World Health Organization, No. 2 p. 100) and Enterd into Force on 7 April 1948. http://wwwwhoint/about/mission/en/. 1948.
3. Brazier JE, Yang Y, Tsuchiya A, Rowen DL. A review of studies mapping (or cross walking) non-preference based measures of health to generic preference-based measures. The European journal of health economics. 2010;11(2):215-25.
4. American Heart Association. Alcohol and Heart Health2015 January 12, 2015. Available from: http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Nutrition/Alcohol-and-Heart-Health_UCM_305173_Article.jsp.
5. Stockwell T, Zhao J, Panwar S, Roemer A, Naimi T, Chikritzhs T. Do "Moderate" Drinkers Have Reduced Mortality Risk? A Systematic Review and Meta-Analysis of Alcohol Consumption and All-Cause Mortality. Journal of Studies on Alcohol and Drugs. 2016;77(2):185-98.
6. Donovan D, Mattson ME, Cisler RA, Longabaugh R, Zweben A. Quality of life as an outcome measure in alcoholism treatment research. Journal of Studies on Alcohol, Supplement. 2005(15):119-39.
7. Morgan MY, Landron F, Lehert P. Improvement in quality of life after treatment for alcohol dependence with acamprosate and psychosocial support. Alcoholism: Clinical and Experimental Research. 2004;28(1):64-77.
8. Chan AM, von Mühlen D, Kritz-Silverstein D, Barrett-Connor E. Regular alcohol consumption is associated with increasing quality of life and mood in older men and women: the Rancho Bernardo Study. Maturitas. 2009;62(3):294-300.
9. Mathiesen E, Nome S, Eisemann M, Richter J. Drinking patterns, psychological distress and quality of life in a Norwegian general population-based sample. Quality of Life Research. 2012;21(9):1527-36.
10. Kaplan MS, Huguet N, Feeny D, McFarland BH, Caetano R, Bernier J, et al. Alcohol use patterns and trajectories of health-related quality of life in middle-aged and older adults: a 14-year population-based study. Journal of studies on alcohol and drugs. 2012;73(4):581-90.

11. Ortolá R, García-Esquinas E, Galán I, Rodríguez-Artalejo F. Patterns of alcohol consumption and health-related quality of life in older adults. Drug Alcohol Depend. 2016;159:166-73.
12. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of life research. 2011;20(10):1727-36.
13. Janssen M, Pickard AS, Golicki D, Gudex C, Niewada M, Scalone L, et al. Measurement properties of the EQ-5D-5L compared to the EQ-5D-3L across eight patient groups: a multi-country study. Quality of Life Research. 2013;22(7):1717-27.
14. Pattanaphesaj J, Thavorncharoensap M, Teerawattananon Y, Tongsiri S. Health-related Quality of Life Measure (EQ-5D-5L): Measurement Property Testing and Its Preference-based Score in Thai Population: Mahidol University; 2014.
15. Golicki D, Niewada M, van Hout B, Janssen M, Pickard AS. Interim EQ-5D-5L value set for Poland: first crosswalk value set in Central and Eastern Europe. Value in Health Regional Issues. 2014;4:19-23.
16. World Health Organization. Global strategy to reduce the harmful use of alcohol. 2010.
17. World Health Organization. International guide for monitoring alcohol consumption and related harm: Geneva : World Health Organization; 2000 2000.
18. Larsson SC, Wallin A, Wolk A. Alcohol consumption and risk of heart failure: meta-analysis of 13 prospective studies. Clinical Nutrition. 2017.
19. Dawson DA. Methodological issues in measuring alcohol use. Alcohol Research and Health. 2003;27(1):18-29.
20. Serdula MK, Mokdad AH, Byers T, Siegel PZ. Assessing alcohol consumption: beverage-specific versus grouped-beverage questions. Journal of Studies on Alcohol. 1999;60(1):99-102.
21. Williams GD, Proudfit AH, Quinn EA, Campbell KE. Variations in quantity-frequency measures of alcohol consumption from a general population survey. Addiction. 1994;89(4):413-20.
22. Kim K, Kim J-S. The association between alcohol consumption patterns and health-related quality of life in a nationally representative sample of South Korean adults. PloS one. 2015;10(3):e0119245.
23. Brønnum-Hansen H, Juel K, Davidsen M, Sørensen J. Impact of selected risk factors on quality-adjusted life expectancy in Denmark. Scandinavian Journal of Social Medicine. 2007;35(5):510-5.
24. Maheswaran H, Petrou S, Rees K, Stranges S. Estimating EQ-5D utility values for major health behavioural risk factors in England. J Epidemiol Community Health. 2012:jech-2012-201019.
25. Saarni SI, Joutsenniemi K, Koskinen S, Suvisaari J, Pirkola S, Sintonen H, et al. Alcohol consumption, abstaining, health utility, and quality of life–a general population survey in Finland. Alcohol & Alcoholism. 2008;43(3):376-86.
26. Okoro CA, Brewer RD, Naimi TS, Moriarty DG, Giles WH, Mokdad AH. Binge drinking and health-related quality of life: do popular perceptions match reality? Am J Prev Med. 2004;26(3):230-3.
27. Dussaillant F, Fernandez M. Alcohol's harm to others' well-being and health: a comparison between Chile and Australia. Alcohol and alcoholism. 2015;50(3):346-51.
28. Livingston M, Wilkinson C, Laslett A-M. Impact of heavy drinkers on others' health and well-being. Journal of studies on alcohol and drugs. 2010;71(5):778-85.
29. Kraemer KL, Maisto SA, Conigliaro J, McNeil M, Gordon AJ, Kelley ME. Decreased Alcohol Consumption in Outpatient Drinkers Is Associated with Improved Quality of Life and Fewer Alcohol-related Consequences. Journal of general internal medicine. 2002;17(5):382-6.
30. Stranges S, Notaro J, Freudenheim JL, Calogero RM, Muti P, Farinaro E, et al. Alcohol drinking pattern and subjective health in a population-based study. Addiction. 2006;101(9):1265-76.
31. Saito I, Okamura T, Fukuhara S, Tanaka T, Suzukamo Y, Okayama A, et al. A cross-sectional study of alcohol drinking and health-related quality of life among male workers in Japan. Journal of occupational health. 2005;47(6):496-503.
32. Rezaei S, Hajizadeh M, Kazemi A, Khosravipour M, Khosravi F, Rezaeian S. Determinants of health-related quality of life in Iranian adults: evidence from a cross-sectional study. Epidemiology and Health. 2017;39:e2017038.

33. Bobo JK, Husten C. Sociocultural influences on smoking and drinking. Alcohol Research and Health. 2000;24(4):225-32.
34. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T, et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. The Lancet. 2013;381(9867):670-9.
35. Pelucchi C, Gallus S, Garavello W, Bosetti C, La Vecchia C. Cancer risk associated with alcohol and tobacco use: focus on upper aero-digestive tract and liver. Alcohol Research & Health. 2006;29(3):193-9.
36. Lubetkin EI, Jia H, Franks P, Gold MR. Relationship among sociodemographic factors, clinical conditions, and health-related quality of life: examining the EQ-5D in the US general population. Quality of Life Research. 2005;14(10):2187-96.
37. McCaffrey N, Kaambwa B, Currow DC, Ratcliffe J. Health-related quality of life measured using the EQ-5D–5L: South Australian population norms. Health Qual Life Outcomes. 2016;14(1):133.
38. Reaney MD, Martin C, Speight J. Understanding and assessing the impact of alcoholism on quality of life. The Patient: Patient-Centered Outcomes Research. 2008;1(3):151-63.
39. Günther O, Roick C, Angermeyer MC, König H-H. The EQ-5D in alcohol dependent patients: relationships among health-related quality of life, psychopathology and social functioning. Drug Alcohol Depend. 2007;86(2):253-64.
40. World Health Organization. Global status report on noncommunicable diseases 2010: Geneva: World Health Organization; 2011.
41. Collin J, Casswell S. Alcohol and the Sustainable Development Goals. Lancet. 2016;387(10038):2582.
42. Malet L, Llorca P-m, Beringuier B, Lehert P, Falissard B. AlQoL 9 for measuring quality of life in alcohol dependence. Alcohol and Alcoholism. 2006;41(2):181-7.

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Scholarship Awards during Enrolment

1. Full scholarship from Faculty of Medicine, Prince of Songkla University for Ph.D. training on Epidemiology at Prince of Songkla University, 2016 to 2019 (4 years).

2. Full scholarship (Graduate scholarship) from Faculty of Medicine, Prince of Songkla University to attend short course training in Drug Health Services, Royal Prince Alfred Hospital and Sydney Medical School, the University of Sydney, Sydney, Australia, 12th February to 12th May 2018 (4 months).

List of Publication and Proceeding

International level

1. Vichitkunakorn P, Balthip K, Geater A, Assanangkornchai S. Comparisons between context-specific and beverage-specific quantity frequency instruments to assess alcohol consumption indices: Individual and sample level analysis. PLOS ONE. 2018;13(8):e0202756. doi: 10.1371/journal.pone.0202756 *(Published)*

2. Vichitkunakorn P, Geater A, Assanangkornchai S. Is" light alcohol drinking" associated with the health-related quality of life (HRQoL)?: a population-based nested case-control design. ASEAN Journal of Psychiatry. 2018 Jan 1;19(1). *(Published)*