SOCIOECONOMIC INEQUALITIES IN ORAL HEALTH-RELATED BEHAVIOURS AMONG THAI ADULTS DURING THE HEALTH SYSTEM IN TRANSITION

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A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Dental Public Health
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พฤติกรรมที่เกี่ยวข้องกับสุขภาพช่องปากของประชากรผู้ใหญ่ไทยที่มีความไม่เท่าเทียมกันทางเศรษฐกิจและสังคมในช่วงการเปลี่ยนผ่านของระบบสุขภาพ

นายพงศ์สิน พงษ์สุภาธนานนท์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต
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Thesis Title	SOCIOECONOMIC INEQUALITIES IN ORAL HEALTH-RELATED BEHAVIOURS AMONG THAI ADULTS DURING THE HEALTH SYSTEM IN TRANSITION
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Field of Study	Dental Public Health
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พงศ์สิน พงษ์สุภาธนานนท์ : พฤติกรรมที่เกี่ยวข้องกับสุขภาพช่องปากของประชากรผู้ใหญ่ไทยที่มีความไม่เท่าเทียมกันทางเศรษฐกิจและสังคมในช่วงการเปลี่ยนผ่านของระบบสุขภาพ (SOCIOECONOMIC INEQUALITIES IN ORAL HEALTH-RELATED BEHAVIOURS AMONG THAI ADULTS DURING THE HEALTH SYSTEM IN TRANSITION) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ทพ. ดร. เทวฤทธิ์ สมโคตร, 184 หน้า.

การสูบบุหรี่ การดื่มแอลกอฮอล์และการบริโภคอาหารที่มีน้ำตาลในปริมาณที่สูง เป็นสาเหตุทำให้เกิดผลเสียก่อโรคเรื้อรังต่างๆมากมายเช่นโรคหัวใจ โรคเบาหวาน โรคมะเร็ง รวมทั้งยังส่งผลให้เกิดโรคในช่องปากได้ นอกจากนี้การใช้บริการทันตกรรมยังเป็นอีกปัจจัยที่ส่งเสริมให้มีสุขภาพช่องปากและส่งผลต่อสุขภาพร่างกายตลอดจนทำให้มีคุณภาพชีวิตที่ดีขึ้น โดยงานวิจัยนี้มีจุดประสงค์เพื่อศึกษาการกระจายตัวของพฤติกรรมที่เป็นปัจจัยเสี่ยงร่วมทำให้เกิดโรคเรื้อรังต่างๆดังที่กล่าวมา รวมทั้งพฤติกรรมการใช้บริการทันตกรรมในกลุ่มประชากรวัยผู้ใหญ่ไทยที่มีอายุตั้งแต่ 20-59 ปี และเพื่อหาความสัมพันธ์ของปัจจัยเหตุทางสังคมและพฤติกรรมดังกล่าวข้างต้น โดยทำการศึกษาข้อมูลกลุ่มตัวอย่าง จากแบบสำรวจอนามัยและสวัสดิการซึ่งจัดทำขึ้นโดยสำนักงานสถิติแห่งชาติ ในปี พ.ศ. 2546 จำนวน 27,554 คน ปี พ.ศ. 2548 จำนวน 22,310 คน ปี พ.ศ. 2549 จำนวน 23,844 คน ปี พ.ศ. 2552 จำนวน 21,976 คน และปี พ.ศ. 2556 จำนวน 19,899 คน โดยนำเสนอข้อมูลเชิงปริมาณด้วยสถิติการกระจายความถี่ของพฤติกรรมสุขภาพต่างๆได้แก่ การสูบบุหรี่ การบริโภคเครื่องดื่มแอลกอฮอล์ การบริโภคขนมขบเคี้ยว การบริโภคเครื่องดื่มที่รสหวานและการใช้บริการทันตกรรม และใช้สถิติการวิเคราะห์การถดถอยโลจิสติก เพื่อเปรียบเทียบความสัมพันธ์ระหว่างปัจจัยเหตุทางสังคมและพฤติกรรมสุขภาพข้างต้น ผลการศึกษาปรากฏว่า มีความไม่เท่าเทียมกันที่เกี่ยวข้องกับสถานะทางสังคมและเศรษฐกิจเกิดขึ้นในกลุ่มประชากรวัยผู้ใหญ่ไทย โดยกลุ่มที่มีเศรษฐฐานะต่ำจะพบการสูบบุหรี่และการบริโภคเครื่องดื่มแอลกอฮอล์เป็นประจำมากกว่ากลุ่มที่มีระดับเศรษฐฐานะเหนือกว่า ในทางตรงกันข้ามกลุ่มที่มีระดับเศรษฐฐานะสูงกลับพบว่ามีการบริโภคขนมขบเคี้ยว การบริโภคเครื่องดื่มที่รสหวานเป็นประจำหรือเกือบทุกวันและการใช้บริการทันตกรรมมากกว่ากลุ่มอื่นๆ นอกจากนี้ยังพบว่า ดัชนีความก้าวหน้าของคน ปัจจัยทางสังคมและเศรษฐกิจ ปัจจัยทางภูมิศาสตร์ และปัจจัยที่เกี่ยวกับสุขภาพด้านอื่นๆส่งผลต่อความไม่เท่าเทียมกันดังกล่าว ผลการวิจัยนี้สรุปว่า ถึงแม้ว่าประเทศไทยมีมาตรการควบคุมและลดปัจจัยเสี่ยงทางสุขภาพตลอดระยะเวลา 10 ปีที่ทำการศึกษาแต่กลับพบว่าพฤติกรรมเสี่ยงทางสุขภาพข้างต้นมีการเปลี่ยนแปลงเพียงเล็กน้อย และพบว่าความแตกต่างทางเศรษฐกิจ สังคมและสิ่งแวดล้อม ทำให้ประชากรวัยผู้ใหญ่ไทยได้รับปัจจัยเสี่ยงที่แตกต่างกัน ดังนั้นการวางแผนควบคุมปัจจัยเสี่ยงทางสุขภาพควบคู่กับมาตรการส่งเสริมสุขภาพควรตระหนักและให้ความสำคัญกับบริบทต่างๆที่เกี่ยวข้องซึ่งจะส่งผลให้ประชากรไทยทุกกลุ่มมีสุขภาพที่ดีและคุณภาพชีวิตที่เท่าเทียมกันต่อไปในอนาคต

ภาควิชา ทันตกรรมชุมชน ลายมือชื่อนิสิต .....

สาขาวิชา ทันตสาธารณสุข ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

ปีการศึกษา 2558

5376452232 : MAJOR DENTAL PUBLIC HEALTH
KEYWORDS: SOCIAL DETERMINANTS, ORAL HEALTH RELATED BEHAVIORS, SOCIOECONOMIC INEQUALITY, THAI ADULTS,COMMON RISK FACTORS

PONGSIN PONGSUPATHANANON: SOCIOECONOMIC INEQUALITIES IN ORAL HEALTH-RELATED BEHAVIOURS AMONG THAI ADULTS DURING THE HEALTH SYSTEM IN TRANSITION. ADVISOR: ASST. PROF. TEWARIT SOMKOTRA, D.D.S.,Ph.D., 184 pp.

Background: Smoking, alcoholic consumption, sugary dietary habits associated with non-communicable diseases (NCDs). In addition, dental care utilization is one of the vital components for achieving optimal oral health. Objective: this study aimed to assess oral health related behaviors among Thai adults and to determine its association with social determinants. Materials and Methods: This study employed the data from Thai Health and Welfare Survey(HWS) of Thai adults aged 20-59 years covering the years(N) 2003(27,554), 2005(22,310), 2006(23,844), 2009(21,976) and 2013(19,899) respectively. Odds ratios and 95% confidence intervals were employed to determine the association between oral health-related behaviors and social determinants. Results: Over the period of assessment, the proportion of current smokers is slightly dropped. The prevalence of alcoholic beverage consumption among male is slightly changed with increasing trend among female drinkers. Trend of sweetened beverage and snack/confectionary consumption is slightly decreased particular among the high frequency intake groups. Moreover, socioeconomic inequalities in aforementioned habits among Thai adults existed, the gradient of current smokers concentrated among the less-well off compared to their counterparts and regular alcoholic drinkers were more concentrated among the lower socio-economic status groups (SES) with increasing trends. By contrast, high frequency consumption of sweetened beverage and snack/confectionary groups revealed reverse gradients as these habits were more common among those of higher SES hierarchy with decreasing tendency. Likewise, dental care utilization tended to favour the more affluent residents. Certain Human Achievement Index, socioeconomic, geographic and demographic characteristics were associated with such inequalities. Conclusion: Despite implementation of extensive control measures together with the universal coverage policy in Thailand, socioeconomic inequalities in oral health-related behaviors exist among the Thai adults. These findings may be helpful in reorientation control policies by incorporate a more optimistic approach and strengthening the primary health-care system aim to provide more effective benefits for the entire population.

Department:	Community Dentistry	Student's Signature	.....
Field of Study:	Dental Public Health	Advisor's Signature	.....
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CHAPTER I

INTRODUCTION

1.1 Background and Rationale

Demographic transition in Southeast Asian countries such as fertility reductions, population ageing, and rural-to-urban migration result in people life style to a more westernized. Increasing of tobacco use, unhealthy diet, and inadequate physical activity shift burden of disease from infectious to chronic diseases (Chonsuvivatwong et al., 2011). Chronic non-communicable diseases responsible for nearly 61.5% of deaths in these countries (Dans et al., 2011). These countries face increasing problems of unplanned urbanization, marketing of unhealthy food, and inadequacies in public health policies, therefore so that a narrow traditional clinical preventive approach is ineffective. Thus, a more radical public health preventive approach is being adopted focusing on promoting health by controlling a small number of identifiable risk factors that may impact on a large number of diseases at potentially minimal health care cost (Sheiham and Watt, 2000; Petersen, 2010). Common risk factors refer to modifiable risk factors that are common to many chronic non-communicable diseases including oral diseases. Several major common risk factors, such as tobacco consumption, alcohol consumption or high sugar intake associated with a wide range of chronic diseases, such as diabetes, cardiovascular diseases, cancers and oral diseases (Machuca et al., 2000; Sheiham and Watt, 2000; Paula, 2005; Johnson et al., 2011). Many studies have suggested that individual lifestyles are not always freely chosen but may be determined by the social and environmental conditions in which people live and work, broadly designated as social determinants of health (Cockerham, 2014; Frohlich et al., 2001; Wilkinson and Marmot, 2003; Watt, 2007). Indeed many authors have argued that, apart from knowing about the health consequences from risk behaviors, many people adopting

and maintaining such habits are ruled by certain socioeconomic factors (Assanangkornchai et al., 2000; Assanangkornchai et al., 2009; Alves et al., 2015). A search of literature reveals evidence that major risk behaviors have two interesting characteristics, firstly they disproportionately affect disadvantage groups in society (Marques-Vidal and Dias, 2005; Dias et al., 2011; Nagelhout et al., 2012; Akande et al., 2015; Lund, 2015; Palipudi et al., 2012) and, secondly, co-occur among risk behaviors particularly smoking, alcohol and unsatisfactory dietary choices that tend to exist in clusters with adverse synergistic interactions (Ma et al., 2000; Leon et al., 2007; Padrao et al., 2007; Kristjansson et al., 2011; Verhagen et al., 2015).

In a recent publications, most of the studies played attention to health outcomes, for example, rate of tooth loss, self-rated oral health and dental care utilization was measured (Jamieson and Thomson, 2006), the relationship between income and incidence of tooth loss was studied(Holst, 2008), Jamieson et al. investigated distribution of DMFT among different socioeconomic status (Jamieson et al., 2006). There was study evaluated inequalities in distribution of dental caries in Brazil(Antunes et al., 2004). Moreover, some studies performed in Thailand (Petersen et al., 2001; Somkotra, 2011).

Several of studies have investigated health behaviors in high income countries, for example a study on the distribution of fruit and vegetable consumption and tobacco use in European and north American countries (Richter et al., 2009), one studied tooth brushing, dental visit, smoking, intake of soft drink and snack among Korean adolescent (Jung et al.,2010) and another evaluated the role of smoking, dental visiting and frequency of eating fruits and vegetables among different socioeconomic status groups in the United States (Sabbah et al.,2009). However less of the literatures studied about oral health-related behaviors and its relation to

surrounding social determinants in developing countries especially in Southeast Asia region.

The objective of this study is to address the social determinants that may conceivably relate to oral health-related behaviors. It was thus the structure of the study including four principle oral health-related behaviors composed of tobacco consumption, alcohol consumption, high sugar intake and dental care utilization. Therefore this study is attempts to linking oral health with general health by studying the determinants of the 'causes of causes 'of oral and general diseases by assess the distribution of oral health-related behaviors among adults population during the health system has been in transition, after universal coverage policy implementation and the paradigm has shifted to more focus in health promotion strategy. The findings may provide trends of health risk behaviors among Thai adults. Moreover, as Thailand is one source of references country in Southeast Asia region that success in strengthen public health via health promotion at local and national level, the study would assist heath prevention/promotion programs and advocacy strategies to maximizing the substantial investments in the control and support of related health and oral health compromising and enhancing behaviors.

1.2 Research question

What are the distributions of oral health-related behaviors among Thai adults during the health during 2003 and 2013?

Are there any association between social determinants and oral health related behaviors among Thai adult?

1.3 Research Objective

This study aimed to assess the distribution of oral health-related behaviors, and to determine the associations between oral health-related behaviors and social determinants among Thai male and female adults.

1.4 Hypothesis

According to research question and objective, this study set the hypothesis that there is not difference in distribution of oral health-related behaviors and there is not any association between social determinants and oral health related behaviors among Thai adults.

1.5 Operational definition

Thai adults (Salyacheewan 1983)

Thai adults: refer to individuals aged 20-59 years, Thai adults were further categorized into 3 groups as following:

-20-34 years

- 35-44 years

-45-59 years

Health system in transition

The transition of health system in Thailand referred to the major changes for the reform of the Thai health care system. When Ottawa Charter identifies five health promotion areas: build healthy public health policy; create supportive environments; develop personal skills; strengthen community action; and reorient health services. Thailand has also adopted the five action areas, especially “building Healthy Public Health Policy” which is reflected in the legislative measures toward curbing tobacco consumption. This was followed by the paradigm of “Health for All by the Year 2000” and the emerging concept of primary health-care. In 2001, the government was taken into consideration objectives and characteristics of the Universal Health

Care Coverage Policy (UCS) which is focused on creating universal health insurance coverage for the entire population. Then, in 2004, the government has launched the "Healthy Thailand" Policy as one component of the National Agenda to use as a guideline to reduce behavioral health risk and major health problems. In 2005, Thailand has established the Bangkok Charter on Health Promotion putting the country as a leader in the field of health-care promotion which strengthen public health through health-care promotion at individual level and extended to the national levels (Bureau of Policy and Strategy,2009).

Oral health-related behaviors

Oral health-related behaviors refer to health behaviors that are influenced to both oral health and general health which comprising of:

- Smoking habits considered as oral health-related behaviors because cigarette smoking associated with a wide range of chronic disease such as cardiovascular disease, cancer and periodontal disease (Natto et al, 2005; Johnson and Hill, 2004; Machuca et al., 2000; Sheiham and Watt, 2000; Paula, 2005; Johnson et al., 2011).

-Alcohol consumption considered as oral health-related behaviors due to alcohol associated with cancer of oral cavity, pharynx, larynx and impaired development of craniofacial and dental structure. Moreover, road traffic injuries also related to harmful use of alcohol (Roswall and Weiderpass, 2015; Sant' Anna, 2006; FDI,2015)

-Consumption of snack and sweetened beverages, both diets contained with added sugar and sugar consumption related to weight-gain, incidence of diabetes mellitus and positively associated with dental caries development (Malik et al., 2010; Imamura et al., 2016; Sheiham, 2001; WHO, 2015).

-Dental care utilization is one of the vital components for achieving optimal oral health and considered as oral health related behavior due to oral health is integral and essential to general health and is one of determining factors for quality of life (Petersen, 2003).

Socioeconomic status

The socioeconomic status in this study defined by the assets index, educational level attainment and occupation to identified socioeconomic hierarchy (Adler and Newman, 2002).

The assets index is a proxy measure of living standards. Although the living standard can be directed measure from income, expenditure or consumption (O'Donnell et al., 2008). However, the shortage of income information from Thai Health and Welfare Survey leading this study to use a proxy measurement by employed principal components analysis to construct an index of wealth from information on household ownership of durable goods comprising television, VDO player, mobile phone, computer, refrigerator, microwave oven, washing machine, air conditioners, car, motorcycle and pick- up tractor.

Socioeconomic inequalities in oral health-related behaviors

Socioeconomic inequalities in oral health-related behaviors refer to differences in the distribution of alcohol consumption, tobacco consumption, sweetened consumption and dental care utilization that arise from socioeconomic factors including income, education and occupation.

1.6 Conceptual framework

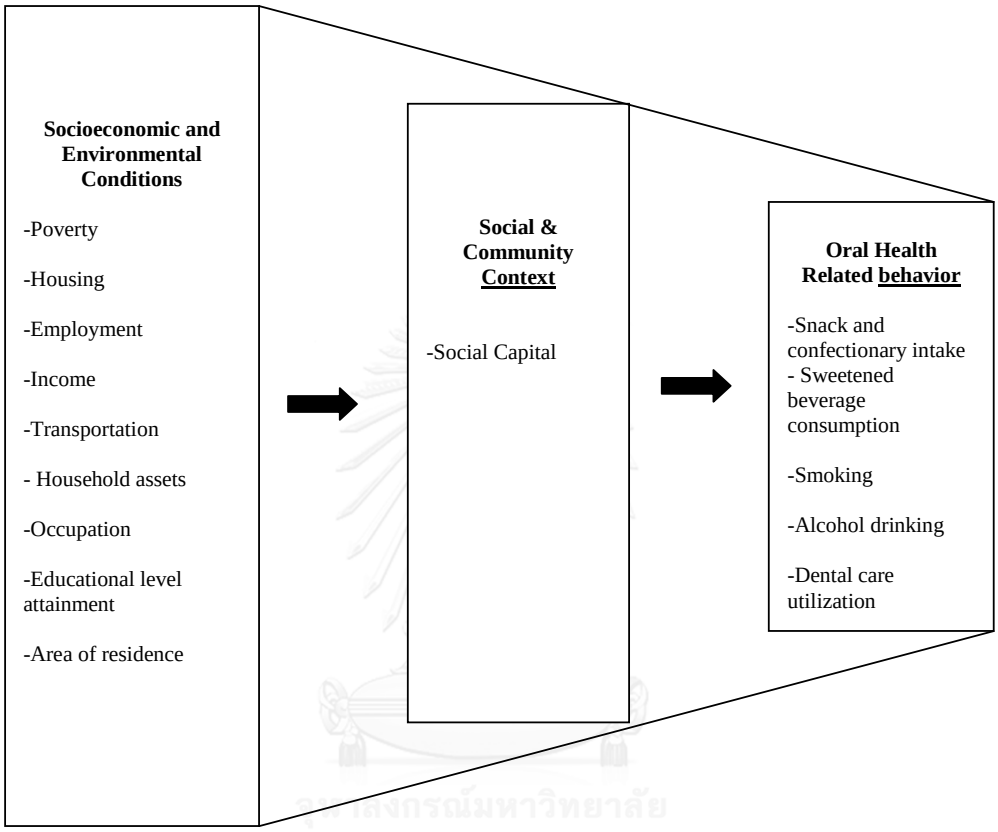

Figure 1: Conceptual framework adapted from Watt's social determinants of oral health Model.

A conceptual framework of the pathway where the socioeconomic and environmental condition contribute to oral health-related behaviors then interact with social and community context characteristics leading to either desirable or undesirable oral health behaviors. It is implied in this framework that oral health-related behaviors such as dietary choices, hygiene, injury, health services use, smoking and alcohol consumption are influenced by intermediate and structural social determinants (Watt and Fuller, 2007).

1.7 Scope of the Research

1.7.1 Population

Thai adults aged 20-59 years in Thailand.

1.7.2 Sample

The nationally representative Thai adults aged 20-59 years recruited from Thailand Health and Welfare Surveys.

1.7.3 Variables

Independent variables: social determinants of health including structural determinants and intermediate determinants that is associated with health.

Dependent variables: oral health related behaviors including both health enhancing and health compromising behaviors.

1.8 Research Design

Analytical study using five waves of nationally representative Thais surveys.

1.9 Limitations of the Research

The study had some limitations since the data was cross-sectional and interpretation relied on correlation between variable subgroups, inferring observed associations to population are not causal interferences. It should be noted that question on reasons for initiation of aforementioned behaviors were not provided, and control interventions may have different role depend on individual perception, therefore, the explanations about socioeconomic determinants and control measures should be made cautiously.

1.10 Ethical Considerations

The study protocols was approved by the research Ethics committees of Faculty of Dentistry, Chulalongkorn University.

1.11 Expected Benefits from the Study

The trends and determinants of oral health related behaviors in this study could be used to support policy makers for planning a suitable public health policies or interventions to control tobacco consumption, alcoholic beverage drinking, and sugar-based dietary among adult population in Thailand. In addition, oral health planner could have a clear picture for redistributed dental care services to entire population. Moreover, the findings may be used to develop the further studies.

1.12 Keywords

Thai adult, health behaviors, oral health related behavior, social determinants socioeconomic inequalities.

CHAPTER II

REVIEW OF LITERATURE

2.1 Social determinants of health

The Commission on Social Determinants of Health (CSDH) has adopted the perspective of the 'causes of the causes' which referred to the surrounding underlying factors which influenced to the cause of health and well-being of the population (Sheiham et al., 2011). This perspective relies on the concept of social determinant of health (SDH) which is the factors that influenced to the cause of ill health and exists in the psychosocial, economic, environmental and political circumstances (Navarro, 2009). SDH affecting to population health because it is the context where the people live, work and growth for all their life. According to figure 2, can be Illustrated in two perspectives, firstly represent social determinant of health which refer to the distribution in health and well-being of population is influenced by the material circumstances, social cohesion, psychosocial factors, behaviors and biological factors. Others determinants such as social position, education, occupation, income, gender, and ethnicity/race have also influenced to differences in health and well-being, moreover the socioeconomic and political determinants are more relevant influencing factors. Secondly represent social determinant of health inequities which derived from health inequalities in specific perspective which explained the differences in health and well-being is influences by the differences of underlying social determinant. For example, people lives with worst material and social conditions faced worst health status especially in region where health care system with improper public health expenditure managed and allocated in different proportion and do not redistribute the health resource for the

disadvantage groups. It is noted that there are interaction between and within social factors and distribution of health and well-being (WHO,2010).

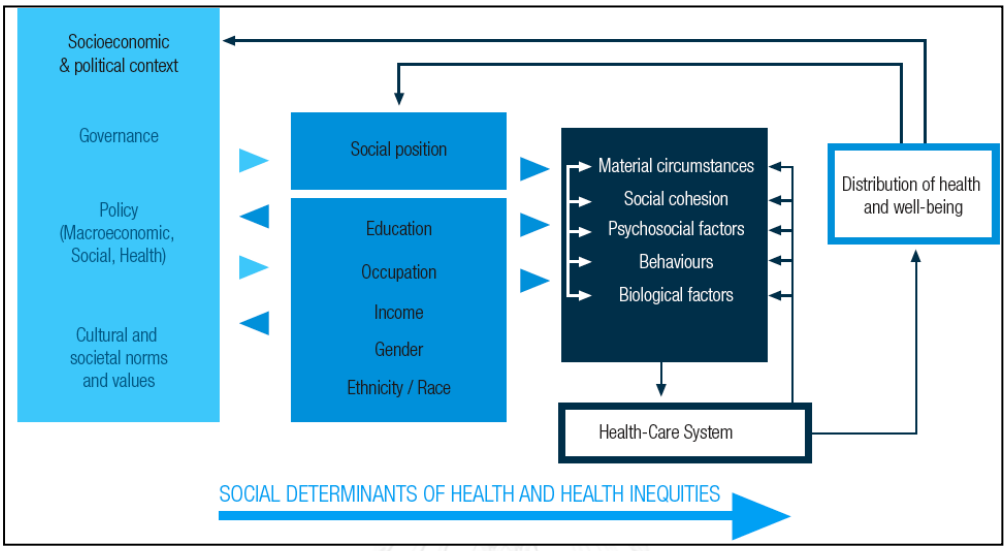

Figure 2: Social determinants of health and health equities

The World Health Organization Regional Office for Europe has summarized and published 'The Solid Facts' which identified ten social determinants such as , the social gradient, stress, early life, social exclusion, work, unemployment, social support, addiction, food and transport. For instances, the social gradient refers to society's social hierarchy or social ladder. People with higher positions in social hierarchy have better life expectancy and health outcomes than people in lower status. Stress refers to psychological factors that influenced decision to manage their resources effectively. Early life is a determinant of health affected to adult health experienced from childhood or prenatal life. Social exclusion refers to the situation when people have difficulty in social participation which may be occurring from the basis of deprivation, ethnicity, disability or discrimination. Work can determine health status by affecting opportunities for health promotion and income received, job security, and the level of autonomy and skill discretion (Wilkinson and Marmot,

2003). The more explanation of others important social determinants are illustrated as following.

2.1.1 Social capital and health

Social capital referred to 'features of social organization, such as civic participation, norms of reciprocity, and trust in others that facilitate co-operation for mutual benefit. Social capital can determine the level of social trust that operates within a community, how safe people feel together, how much help people give each other and the degree of involvement in social and community issues such as voting and participation in community groups. Varying levels of social capital have been used as an explanation for differing life expectancy rates between different countries (Watt, 2002). Assessing social capital and health emphasized in social class, social position social support and social network.

2.1.2 Social Class and health

Numerous studies (Gundgaard, 2006; Lopez et al., 2006; Bower et al., 2007; Perera and Ekanayake, 2008) have demonstrated that the health of individuals from the lower end of the socioeconomic scale is markedly worse than that of individuals from the upper end. This relationship exists across a broad range of health indicators including dental health. The term 'social class' represented the same purpose in socioeconomic status indicated by social disadvantage, socioeconomic status and occupation interchangeably, all of these influences to the way of life and living standards (Naidoo and Wills, 2009).In health perspectives, it was found that the worse morbidity and mortality rates have been reported at the lower level of social hierarchy. And also found its commonalities in dental caries (Perera and Ekanayake, 2008), periodontal diseases (Lopez et al., 2006), self-reported numbered of edentulous areas (Haugejorden et al., 2008) perceived oral health (Perera and Ekanayake, 2011)and self-rated oral health(Pattussi et al., 2007).The study in Korean

adolescent revealed that oral health-enhancing behaviors such as brushing teeth, visiting dental clinic were associated with family affluent in the upper hierarchy (Jung et al., 2010).Survey among high school children in the Third national Health and Nutrition Examination Survey (NHANES III) have confirmed the relationship of the lower social class and the poor oral and general health especially periodontal disease, and ischemic heart disease in the United States (Sabbah et al., 2007).

2.1.3 Social position

Social position has strong relationship to health of the population. Occupation, income and wealth determine social positions in society; education, housing, area of residence and material deprivation have also been used as important indicators. In some developing countries, land ownership, type of vehicles, possession of consumer durables such as shoes and televisions, type of school attended and number of cars can reflect economic status, which in turn has an impact on social position. In some cultures other attributes, such as gender, age, religious affiliation, military ranking and celebrity status, may also influence individuals' social standing (WHO,2008).

2.1.4 Social support and social network

The definition of social support is refers to esteemed, valued of people provided by other persons in social. The term social support is similarly to social network, however social network refer to the social contacts of group of persons. Such contact can be described in terms of number of contacts and frequency of contacts. The functional aspects of support from social network member can be defined as the quality and type of support. There are two mechanisms take action of social support on health. Firstly, refer to direct effects of support on health either positive effects or lack of support resulting from social isolation, have direct effects on people's health. The second mechanism operates through the so-called

“buffering effect” which support does not have any direct effect on health but helps to moderate the impact of the acute and chronic stressors on health. Social support and good social relations make an important contribution to health. Social support helps give people the emotional and practical resources they need. Belonging to a social network of communication and mutual obligation makes people feel cared for, loved, esteemed and valued. This has a powerful protective effect on health. Supportive relationships may also encourage healthier behavior patterns. There are the relationships between social support and personal behavior if stressed individual disturbed with unhappy or disruptive early relationship to social and may leads to the development of abnormal or excessive responses to stress or through the adoption of unhealthy behaviors such as excessive eating, drinking, or smoking. Social support has a wide range of action on health, from influencing mortality at one end, through physical morbidity to psychological morbidity at the other end. At the level of society, social cohesion can have a powerful effect on health which transcends that available from individual social relationships. This has implication for improving the health of communities. In term of improving the general health of population, it is important to recognize that many economic and fiscal policies may influence the social cohesion of a society. Those policies that increase income inequalities are likely to increase health inequalities. On a slightly smaller scale, the design of the built environment may also influence possibilities for social interaction which may subsequently influence health (Marmot and Wilkinson, 2006).

2.1.5 Income and health

Low income or poverty can be affected to health directly due to affordability for good nutritional dietary choices, access to clean water and medical services. Study in Sri Lanka found that poor perceived oral health were higher in low-income groups compared to high income groups, in contrast, some health behaviors such as

tooth brushing frequency, consumption of sugary sweetened behaviors were more common among the high-income groups (Perera and Ekanayake, 2011).

2.1.6 Housing and health

Housing have a profound impact to health as it was reported that children living in the cold and damp housing tends to have respiratory illness, infection and stress (Naidoo and Wills, 2009).

2.1.7 Geographic differences and health

Places and different of death rate might be related to the area of residence, the area with high mortality rate being the area with greater proportion of people in lower socioeconomic groups. Evidence shown that the prevalence of daily consumption of sugar-based drink (soda), sweet flavored tea/coffee, cakes/biscuits and chocolate were significantly higher among the urban than rural residents (Blay et al., 2000).

There is some evidence shown a relationship between oral health and area deprivation in adults. Adults living in the affluent areas had more number of sound teeth than those living in deprived area (Bower et al., 2007).Research has confirmed that geographic characteristics can provide a useful data of inequalities in oral health (Locker, 2000).

2.1.8 Educational level and health

Generally, it was believed the high educated individual the greater acceptance of health promotion campaigns. However, higher parents' educational level reported to associated with higher level of consuming soda and chocolate/sweets of adolescent (Blay et al., 2000).

2.1.9 Socioeconomic status

Socioeconomic factors determine where people and communities live, the kind of environment they inhabit, how they are treated by others, the goods and services they can provide for themselves, and what their society can provide for them (WHO,2010). Socioeconomic status (SES) can be defined by education, income and occupation. Education is the most basic SES component since it shapes future occupational opportunities and earning potential. It also provides knowledge and life skills that allow better-educated persons to gain more ready access to information and resources to promote health. Income providing means for purchasing health care, higher incomes can provide better nutrition, housing, schooling, and recreation (Adler and Newman, 2002). Occupation reflects educational level, provides income, and indicates social standing and affect to health both harmful exposure and health-enhancing factors depended on the job characteristics including workplace environment, job strain, workplace social support and job satisfaction (Fujishiro et al, 2010).

The aforementioned social circumstances are the explanation of social determinant of health which influenced to the distribution of different health status of population. The unequal distribution of health and well-being related to socioeconomic status indicated inequality in health.

2.2 Health Inequality

. Health inequality is the generic term used to identified differences and variations in the health achievements of individuals and groups and refers to differences in health that arise from socioeconomic factors including income, work, education and occupation. The people in lower social classes believed to be choose more unhealthy ways of living, or due to having low incomes will prevent them adopting a healthy lifestyle and cause them to live in unhealthy condition. Health

inequality is a dimensional concept and can be measured by the quantities of health status of the population. Health and health inequality influenced by different determinants. Determinants of health are more related to proximal causes, such as smoking, alcohol consumption and so on, whereas health inequality refers to the variation in health indicators which associated with socio-economic status. Health inequalities can be determined by differences of related factors such as 1)natural, biological variation 2)differential health-compromising behavior that is freely chosen 3)differential health-promoting behavior that is freely chosen 4)differential health-compromising or health-promoting behavior, where choices are restricted 5)differential exposure to unhealthy, stressful conditions 6)inadequate access to basic social and essential health services and 7)health-related social mobility (Marmot, 2005). Moreover, health inequality is a descriptive term that need not imply moral judgment (Kawachi et al., 2002).

Explanations the relationship between social status and health have been documented by The Black report of 1980,a comprehensive and widely cited assessment of the evidence explained the inequalities in health between social classes in four broad types: artifact, social selection, cultural/behavioral and materialist/structural and more recently explanation focused in psychosocial and life course that suggest the adverse environmental conditions at different points can lead to ill health (Petersen, 2007).This is in accordance with, Sisson who presented four explanations for inequalities in oral health (Sisson, 2007) including cultural/ behavioral ,materialist explanations, psychosocial and the life course explanations. Thus, various perspectives relate to meaning of health inequality illustrated as following;

2.2.1 Health inequalities as an artifact

This explanation believed that the widening gap in mortality figures between the social classes is not real, but is a result of the way in which class and health are measured which may reflected to the artifact of data. Sometimes, the higher mortality rate of lower socioeconomic groups may link to continuing of social mobility which contains greater proportion of older people at risk for dying in the class compared to higher socioeconomic group. However, there are amount of researches supports that the relationship of social class and health is a real phenomenon not only the artifact of data, even when change the indicators of disadvantage such as housing, access to a car, education, household possessions and income which show a similar pattern of health inequalities of different social classes (Petersen, 2007).

2.2.2 Health inequalities as a selection process

Social selection believed that health determines the people's class. People with illness pushing them into the lower social scale and further increase mortality rate and disability of lower social groups. Chronic illness can cause manual workers moved out from the job and less likely to finding a new jobs resulting in decrease social position due to insufficient income. However, health is a static property rather than a shifting state of being which is influenced by social and economic circumstance. Because of the genetic health potential in some people, they are able to overcome disadvantage and climb out of poverty (Petersen, 2007).

2.2.3 Health inequalities as a result of life styles

The social distribution of ill health is related to risk behaviors because smoking, high alcohol consumption, lack of exercise, high fat and high sugar diet are

more common in lower social class. A study on smoking in women is associated with stress due to poverty and isolation (Petersen, 2007).

2.2.4 Health inequalities as a consequence of life course

The life course perspective states that health status is resulting from interaction of materialist, behavioral and psychosocial factors from prior living condition overtime. Early life circumstances predict future morbidity and mortality rate. Parental income and education determine housing conditions, food quality and employment and thus the future socioeconomic position of the child. There are two models to explain this argument that are1) the accumulation model suggested that exposure during childhood to poverty, health status and education achievement can influence health status due to accumulation of risk and 2) the critical period model or latent effect mode suggested that chronic disease such as heart disease, stroke and oral cleft have origin during critical periods of embryological development which can determine health status in adult life. Evidence of the life course perspective stated that socioeconomic status and biological risk factors in early life influenced to adulthood and developed life style behavior such as smoking, diet, willingness of exercise and related to chronic diseases particularly dental illness(Nicolau et al., 2007). The cohort study from birth to 26 years of age in New Zealand revealed that children who grew up from low socioeconomic status backgrounds had poorer cardiovascular health, high rate of periodontal disease and dental caries (Poulton et al., 2002).

2.2.5 Health inequalities as a consequence of psychosocial factors

Psychosocial perspective suggested that lower socioeconomic background experience higher stress result from higher negative life event, lower social support, less control at work, less job security and living in lower level of trust and higher level of crime with antisocial behavior community. The relative inequalities in

income and material resources, coupled with the resulting social exclusion and marginalization, which related to poor health due to increasing in level of psychosocial stress can lead to an increase in smoking and/or an increase in the consumption of sugar-based diets (chocolate, confectionary). It is believed that stress related in reducing potential of host to fight against infection, and was found leading to increase inflammatory conditions and impaired wound healing which may related to periodontal diseases development (LeResche and Dworkin, 2000).

2.2.6 Health inequalities as a result of material disadvantage

The materialist explanation emphasizes the role of external environment and factors beyond individual control. The term “material” refer to the relationship between socioeconomic position and access to tangible resources such as food, shelter, services and amenities, income and wealth are direct, main determinant of health inequalities (Sisson, 2007).

The distribution of health and ill health in the population reflects unequal distribution of resources in society. The ill health individual usually is the disadvantage group, least educated, least money and fewest resources. This can be explained by the case of access to dental services which is limited by 1) cost of treatment 2) costs incurred in accessing treatment. In non-industrialized countries, the access of dental care is restricted by cost of transportation of hospitals, whereas in industrialized countries it’s restricted by high cost of treatment. Regular dental attendance believed to improve oral health but others reported increased in DMFT scores and greater impact of the social and psychosocial aspect of lives because better oral status in higher socioeconomic status (SES) may be contributes to the lifestyle, attitude, behavior and access to health providing product, foods, and services rather than due to effectiveness of preventive dentistry. In industrialized countries, lower SES groups required energy-dense food tends to purchase higher

amounts of sugars, preserve and refined carbohydrate. Moreover water fluoridation can reduce inequalities in oral health in children which is role by political and ethical issue not associated with individual's position in social structure, level of income or education (Watt and Fuller, 2007).

2.2.7 Cultural/behavioral explanations

Traditional behavioral explanation suggested that low SES group is more likely to engage in behaviors that damaging to their health (poor diet, lack of exercise, smoking and alcohol consumption). However, alternative model argued that behavior are not freely chosen but are influenced by cultural norms of behavior.Evidence of cultural/behavioral explanations revealed that behavior-change intervention (Brushing for life, Five-a-day campaign in England) could alteration in role of alcohol and tobacco consumption, diet and dental self-care but this intervention was not successful in altering caries rates and resulting to widened the health gap between the rich and poor. Only considering behavioral change intervention alone without addressing underlying social, political and economic determinants of health may not improve oral health successfully. A comprehensive evaluation of the literature has confirmed that conceptual framework used in mainstream epidemiology which suggests complex causal pathways between social structure and health via interlinking material, psychosocial and behavioral pathways can be applied to oral epidemiological research (Newton and Bower, 2005).

2.3 Social determinants and health inequality

All societies have social hierarchies in which economic and social resources, including power and prestige, are distributed unequally. The unequal distribution of resources affects people's freedom to lead lives they have reason to value, which in turn has a powerful effect on health and its distribution in society. According to figure 3, inequalities in health can arise from two perspectives of social determinants. First,

at the level of general socioeconomic, cultural and environmental conditions, people in disadvantaged communities are more likely to live in inadequate housing, to be engaged in more risky occupations in polluted and hazardous environments, to have fewer resources to secure the necessities for health, and to experience more barriers to healthy lifestyle choices. The avoidable social determinants also arise from daily activities that experienced to stress or pollution. Moreover, the community resources and health behaviors especially cigarette smoking, diet and physical activity, all influenced to health inequalities. Secondly, at the individual level, genetic and demographic factors are naturally orientation and cannot be freely chosen. It can be concluded that, health inequality are the differences in health between groups of people. These differences might be due to avoidable factors such as socioeconomic status or unavoidable factors such as age sex (Sheiham et al.,2011).

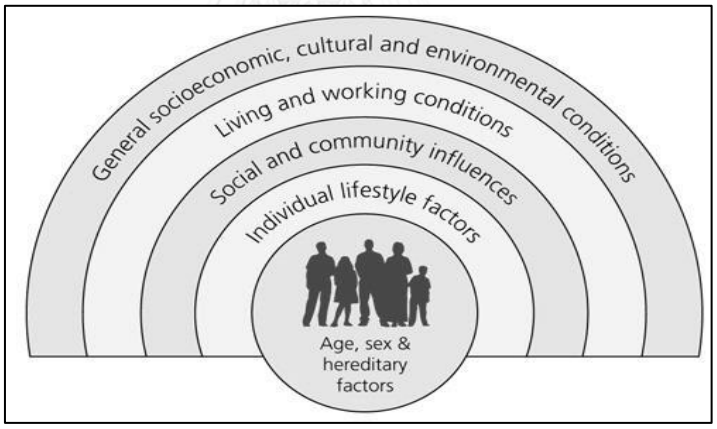

Figure 3: Determinants of health and policies and strategies to promote social equity in health

2.4 Social determinants and oral health inequality

The current pattern of oral disease is related to living conditions, behavioral and environmental factors. The risk of oral disease increases with age and, together with the lifelong exposure to risk factors, and has a disproportionate effect on elderly people, compounded by socioeconomic and psychological factors. Older people are

more susceptible to root caries, gum disease, tooth loss, oral cancer, mucosal diseases, oral infections and salivary gland dysfunction. They are more likely to suffer from poor nutrition and chronic disorders and to require multiple medications with adverse side-effects, all of which are damaging to oral health. The influence of educational levels is also significant in oral health; the higher the number of years of education, the lower the chance of experiencing total tooth loss and the greater the likelihood of retaining 20 functional teeth in old age. Females tend to take better care of their oral health than males and are more likely to have regular dental check-ups. Men are more often affected than women by oral cancer, attributable to higher exposure to risk factors such as smoking, drinking and poor diet. Taking social determinants of oral health in consideration, reduction in oral health inequalities should be focused on the underlying social, economic and environmental causes of dental disease (Watt and Sheiham, 1999).

When the traditional oral health prevention model based on the biomedical concepts focusing on individual risk factors is found to be ineffective in achieving sustainable oral health improvements among the population and may not reducing the oral health inequalities (Kay and Locker, 1996). Figure 4, showed a paradigm shifted for effective oral health prevention that has re-orientation to the concept which could addresses the underlying social determinants of oral health of population through a socio-medical concepts by emphasize the implementation at local, national and international levels (Watt and Fuller, 2007).

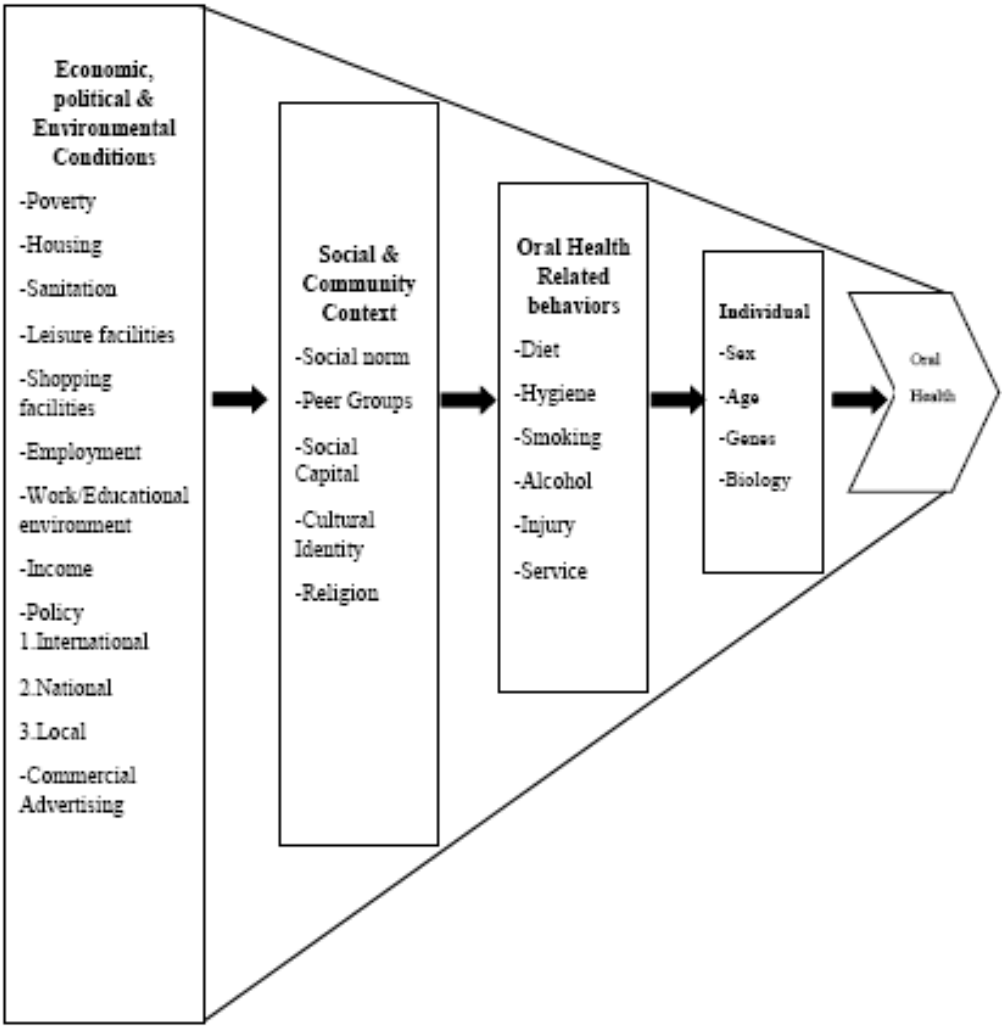

Figure 4:Social determinant of oral health

Beck defined risk factors as an environmental, behavioral, or biologic factor which are involved in disease onset, but not necessarily in its future progression or resolution. For example, if risk factors present directly it will increases the probability of a disease occurring, and if absence or removed, it can reduces the probability (Beck, 1998). From the concept of modifiable risk factor it can be concluded that smoking is a risk factor. In contrast, age, gender, and race/ethnicity are the non-modifiable risk factors(Burt, 2005). It is important to assess risk of oral health before planning promotion and intervention programs. The following figure 5, presents a conceptual framework for assessing risks to oral health. Oral health outcomes are

related to distal socio-environmental factors and influenced by oral health services availability and modifiable risk behaviors such as oral hygiene practices, dietary habits, tobacco use and excessive consumption of alcohol (Petersen, 2003).

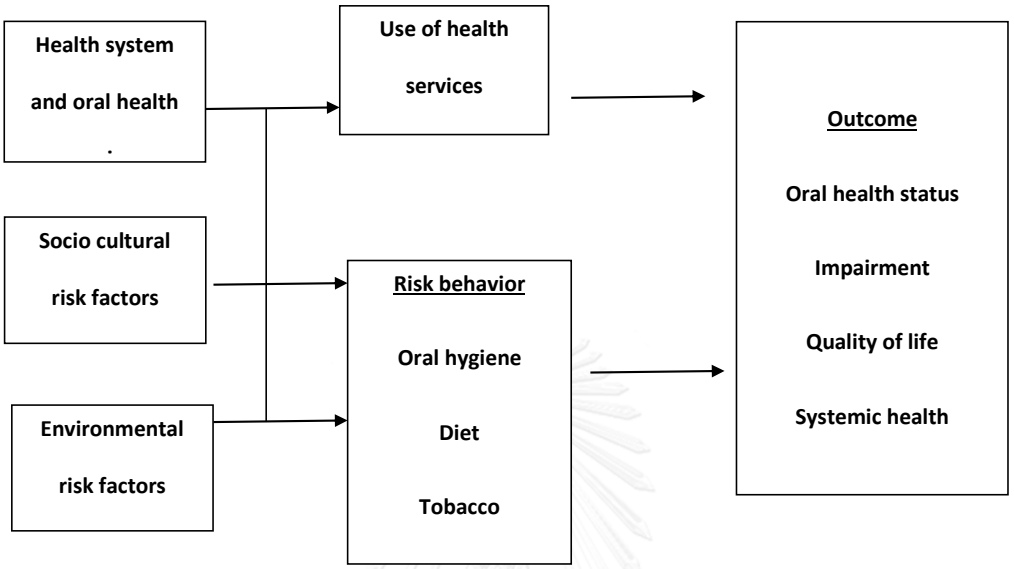

Figure 5: The risk factor approach in promotion of oral health

2.5 Relationship between general health and oral health

Oral disease shares numerous modifiable risk factors that are common to other chronic non-communicable diseases, which are referred to common risk factors (Sheiham and Watt, 2000). Major common risk factors, such as tobacco use, physical inactivity and diet high in fat, salt and sugar, contribute to a range of chronic diseases, such as obesity, diabetes, cardiovascular diseases and oral diseases. The World Health Organization (WHO) Global Oral Health Programme was reoriented according to a common risk factor approach (CRFA) of integration with chronic disease prevention and general health promotion (Petersen, 2009).The key concept underlying the integrated common risk approach is that promoting general health by controlling a small number of risk factors may have a major impact on a large number of diseases at a lower cost (Sheiham and Watt, 2000).

The major risk factors associated to chronic diseases for example, particular diets those high in saturated fatty acids, non-milk extrinsic sugars (NMES) are associated with conditions such as coronary heart disease, stroke, diabetes, cancers, obesity and dental caries. Smokers were reported experiencing more cancers of the lung, mouth, throat, pancreas, kidney and urinary tract, coronary heart disease and stroke, respiratory diseases, diabetes and ulcers than do non-smokers. Excessive alcohol consumption increases the risk of a wide variety of conditions such as raised blood pressure, liver cirrhosis, cardiovascular disease and cancers of the mouth, pharynx and esophagus (Sheiham and Watt, 2000).

It was claimed that common risk factor approach is a new public health strategy for the effective prevention of oral disease with coordinated action on a set of shared risk conditions and their associated behaviors (Petersen, 2005; Watt, 2007). This may call for integrated approaches in general health promotion strategies (Petersen and Kwan, 2010).

2.6 Health profile of Southeast Asia countries including Thailand

2.6.1. Chronic Non-Communicable Diseases in Southeast Asia Countries

The diversity of geography and history, including social, cultural, and economic differences, have contributed to highly divergent health status and health systems across and within countries of southeast Asia. Demographic transition is taking place at among the fastest rates compared with other regions of the world, whether in terms of fertility reductions, population ageing, and rural-to-urban migration. Rapid epidemiological transition is also occurring, with the disease burden shifting from infectious to chronic diseases (Chonsuvivatwong et al., 2011).

The problem of chronic non-communicable diseases (NCDs) has affected in Southeast Asia region. The most common NCDs are cardiovascular diseases, diabetes,

cancer and chronic respiratory diseases, it was found that in 2005 the burden of disease according to disability adjusted life years lost (DALYs lost) due to chronic NCDs was 50% of all diseases, higher proportion belong to diabetes and cardiovascular diseases followed by cancer and chronic respiratory diseases (Figure 6). This situation related to environmental factors that promote tobacco use, unhealthy diet, and inadequate physical activity which affected to the most disadvantaged populations group and resulting to financial burden in families, however its further affected to entire economies problem (Dans et al., 2011).

Group of diseases	Percent of DALYs lost	
	2005	2015
Cardiovascular disease and diabetes	12	13
Cancer	5	6
Chronic respiratory diseases	4	5
All chronic NCDs	50	55

Figure 6: Proportion of disability adjusted life years (DALYs) lost due to chronic NCDs among peoples in 23 developing countries including Thailand

2.6.2 Health profile in Thailand

The reduction in infant and maternal mortality rates among children under the age of 5 years (1990–2006) over the past 30 years reflects the success in basic health care of the Thailand (Rohde et al., 2008). During the period 1964-2010, Thai's life expectancy at birth substantially increased both male and female (Figure 7). The infant mortality rate decreased from 84.3 per 1,000 live births in 1960 to 12.5 per 1,000 live births in 2009 affecting in the number and age structure of population with rising of adult and elderly groups (Figure 8). The changes in population structure resulting in the trends of population health and illness, as a result of the duration of health risk exposure, the more the people live the more they will experience the chronic diseases. A study on major burdens of diseases of Thai people conducted in 1999 and 2004 by the International Health Policy Programme (IHPP), revealed that

unsafe sex, alcohol use and tobacco use result in high levels of DALYs and most of such risk factors are associated with health behaviors and related to chronic non-communicable diseases (Figure 9).It is noteworthy that the major and rising causes of death among Thai citizens in all age groups except younger children are non-communicable diseases (Figure 10). As a result of rising incidence of NCDs, risk factors related to behavior clearly create a high burden of disease so it is important to review the distribution of health behavior which affected to Thais health.

Year	Males	Females
1964 - 1965[1]	55.9	62.0
1974 - 1976[1]	58.0	63.8
1985 - 1986[1]	63.8	68.9
1989[1]	65.6	70.9
1991[1]	67.7	72.4
1995 - 1996[1]	69.9	74.9
2005 - 2006[1]	69.9	77.6
2005 - 2010[2]	70.6	77.5
2010 - 2015[2]	71.9	78.8
2015 - 2020[2]	77.3	80.1
2020 - 2025[2]	74.6	81.4
2025 - 2030[2]	76.0	82.7

Figure 7: Life expectancy at birth (in years) of Thai people

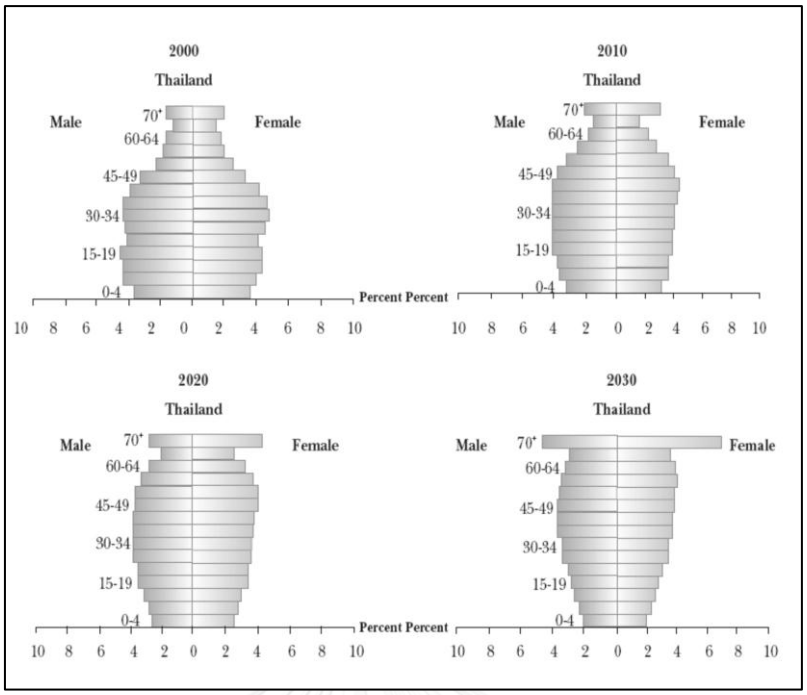

Figure 8: Population pyramids of Thailand in 2000, 2010, 2020 and 2030

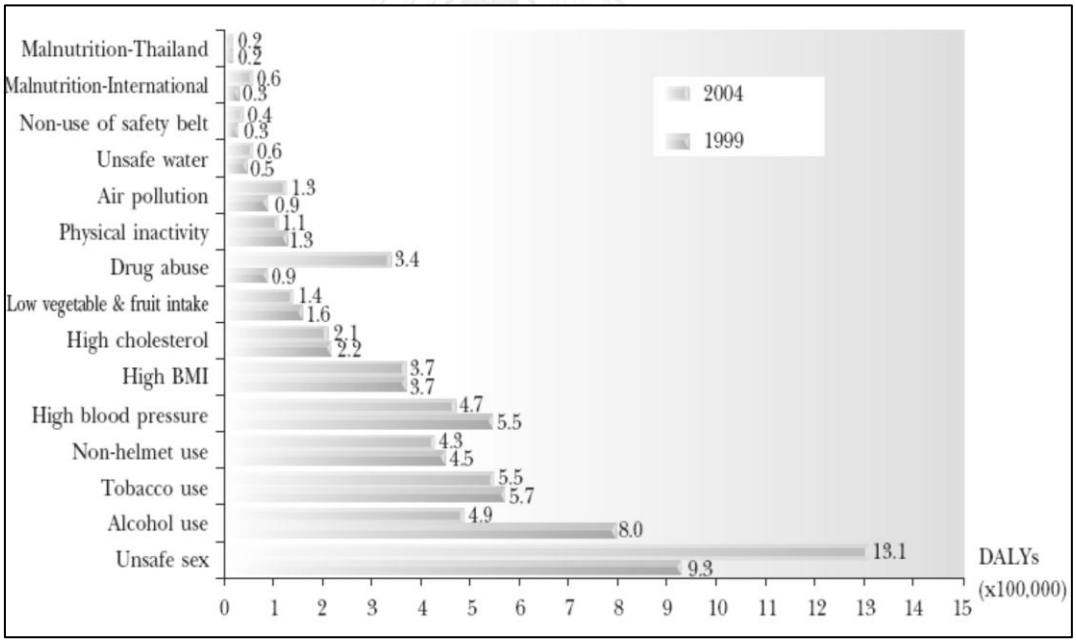

Figure 9: Patterns of burden of disease among Thai people, 1999 and 2004

Cause of DALYs lost	Percentage of DALYs lost by age group					
	0 - 4	5 - 14	15 - 44	45 - 59	60 and over	Total
- Communicable diseases	55.3	33.6	25.6	14.6	10.3	20.2
- Non-communicable diseases	32.9	34.7	50.7	73.7	85.8	65.1
- Accidents	11.7	31.6	23.7	11.7	3.9	14.8

Figure 10: Percentage of causes of disability-adjusted life years (DALYs) lost among Thai people by age group, 2004

2.7 Oral health-related behaviors

Oral health-related behavior is the broad concept implying actions undertaken by people which have positive or negative consequences to health, for example effective tooth cleaning practices are indicative of positive oral health behavior whereas frequent consumption of sugary foods represents negative health behavior or risk behavior (Watt and Fuller, 2007). Many literatures revealed the role of behavioral factors affecting socioeconomic inequalities in general health in both adolescents and adults. Studies have shown that behavioral factors, such as smoking, dietary habits, physical activity and alcohol use, are accountable for social inequalities in health (Paula, 2005; Chokviwat, 2007; Hammond et al., 2008; Sirichotiratana et al., 2008).

There is strong and consistent evidence for an association between alcohol consumption and cancers of the oral cavity, pharynx, larynx and female breast cancers (Roswall and Weiderpass, 2015). A researcher has reviewed the effect of alcohol to embryonic development and concluded that the prenatal alcohol exposure has a direct toxic effect to developing craniofacial and dental structures (Sant' Anna, 2006)

Epidemiological studies stated that smoking associated with periodontal disease (Natto et al, 2005; Johnson and Hill, 2004). The pathogenic mechanisms

related to toxic substances from cigarette including nicotine, carbon monoxide, oxidizing radicals and carcinogens such as nitrosamine and smoking has a causal effect in impairing healing of periodontal wound (Genco and Borgnakke, 2000) .

Internationally and nationally report about the distribution of health behaviors which recognized as common risk factors for general health and oral health are illustrated as following;

2.7.1 Alcohol consumption

Alcoholic beverages have been a source of both pleasure and harm in human society. This pleasure is enjoyed individually and in groups. From a point of view in public health, alcohol consumption is associated with numerous adverse consequences, including health problems and the social consequences such as “drink-driving” with alcohol-related road-traffic accidents, or family violence and other unacceptable social behaviors. Alcohol use increases risk of many chronic diseases (cardiovascular diseases, cancer, neuro-psychiatric conditions, liver cirrhosis, diabetes, oral diseases, etc.). Alcohol-related burden of disease is considered to be 3.9% of global burden of disease, causing 2.7 million annual deaths (Ezzati and Riboli, 2013).

Alcoholic consumption are widely distributed throughout the world, Globally, there is large variation exists in adult per capita consumption in different parts among countries. The highest consumption levels can be found in the developed world. Medium consumption levels can be found in southern Africa. Low consumption levels can be found in the countries of North Africa and sub-Saharan Africa, the Eastern Mediterranean region, and southern Asia and the Indian Ocean (WHO,2011). However, In all regions worldwide, men consume more alcohol than women do, although the exact ratio varies, with women in high-income countries

consuming a larger proportion than those in low-income countries (Rehm et al., 2009).

In Thailand, during the past decade, Thais people tend to consume more alcoholic beverages; alcohol use rose from 37.9 liters/person/year in 1997 to 45.7 liters/person/year in 2008 (Thai health profile 2008-2010). A survey conducted by the NSO revealed the proportion of alcoholic beverage drinkers remain stable overtime, although the consumption is slightly drop from 32.7% in 2001 to 30.0% during 2006, and slightly increased to 31.5% in 2010. It is noteworthy that Thai male showed higher proportion of alcohol use over time compared to female, with men aged 20–59 years having the high prevalence of consumption. Although the prevalence of alcohol consumption was very low among all women; however the proportion of female drinkers is on the rise in all age groups (Thammarungsri,2010).

The Thailand health report 2008-2010 has estimated that alcohol consumption is the third most common attributable factor in ill-health with 8.0% in disability adjusted life years lost (DALYs) (Ezzati and Lopez, 2003). Thai government employs a variety of strategies to reduce alcohol consumption and to prevent alcohol-related harms ranging from regulation of access and availability, to partial regulation of use in advertisements, and drink-driving counter-measures. In 2001, the Thai Health Promotion Foundation Act established a financial mechanism for health promotion. Thai Health was to receive income from a 2% surcharge on alcohol and tobacco purchases in order to fund major health promotion tasks such as Alcohol Consumption Control Program. In 2008, a National control policy was adopted with the Alcohol Beverage Control Act B.E. 2551 together with the National Alcohol Strategy in 2009 which was inspired by the strategy “Triangle the Moves the Mountain” with the key concept focuses on strengthening and integrating the three

partnerships included “Creating of knowledge”, “Social movement”, and Political involvement” aim to reduce the impact from alcohol in three areas:

(1) reduce the number of new drinkers by increasing the age that youth start drinking,

(2) reduce the overall consumption of the population, and

(3) reduce harm from alcohol consumption such as accidents, violence, and health problems.

Accessibility and purchase of alcohol drinks was by limiting the time for the sale of alcohol to only during 11.00-14.00 and 17.00 -24.00 hrs. The age of buyers and drinkers also had to be at least 18 years and alcohol is banned from being sold in certain places such as school or universities, temples, and gas service stations. The measure to limit drinking prohibits alcohol to be sold to those who are drunk and prohibits those under 20 years of age to enter pub or night club. The measure to reduce accidents prohibits drink-driving with high penalties. Moreover, development of alcohol excise taxation implemented under the Liquor Act B.C. 1950 was found to potentially reduce alcohol consumption and prevent drinking initiation among the youth (Sornpaisarn et al., 2012).

2.7.2 Tobacco use

Tobacco use remains a significant public health problem across Europe. The prevalence and types of tobacco use vary considerably across Europe, although in many countries overall rates of use have declined in recent years. However, tobacco use among women and young people is rising in several European countries. Tobacco use behavior is influenced by an array of factors, Tobacco use disproportionately affects males and lower socioeconomic groups in developed and developing countries, and is increasingly prevalent in poorer parts of the world. Poor

households in low-income countries carry a particular heavy burden from tobacco use, with significant health, educational, housing and economic opportunity costs. Negative social gradients in tobacco use translate into substantial negative gradients in relation to premature death and disease. Data from the World Health Survey 2003 indicate that the poorest individuals in the lowest-income countries appear to exhibit a markedly higher level of tobacco smoking relative to their richer counterpart. The World Health Survey data also show that poorer groups in low-income countries seem to smoke more tobacco in terms of quantity compared to higher-income quintiles. The important conclusion to draw is that poor households in low-income countries are likely to be carrying a heavier burden of the tobacco epidemic because tobacco smoking is more prevalent among them and they also consume greater quantities of tobacco compared to higher-income groups (Figure 11) (WHO,2010).

Current cigarette smoking	**Adults (15 years and older)**	
WHO Region	**Males**	**Females**
Africa	14.93	1.50
Americas	29.70	18.65
Eastern Mediterranean	28.21	2.05
Europe	46.09	24.62
South-East Asia	35.07	2.22
Western Pacific	56.08	4.95
Current tobacco use	**Adults (15 years and older)**	
Income group	**Males**	**Females**
High	33.3	21.4
Upper middle	44.4	18.3
Lower middle	51.7	4.6
Low	30.1	4.0

Figure 11: Cigarette smoking/tobacco use prevalence (%) by sex, age, WHO region and country income groups

Thailand, as a middle-income country in Southeast Asia, has advocated a comprehensive approach for tobacco consumption control for over three decades

through collaborative efforts from all sectors including government, non-government organizations (NGOs), and civil society. The first decade started in 1986, with adoption of a "No-Smoking Campaign Project" with media campaign targeting Bangkok, culminating in the 1992 Tobacco control Act of B.E.2535 to prohibit sale to persons under 18 years of age and more intensive measures to regulate tobacco products and to protect non-smokers' health by setting limits on tobacco advertising and restrictions on smoking in public places as partial or complete smoke-free zones, with mandated penalties for violations. In subsequent years, smoking was banned in public transportation and elevators in schools and in restaurants (the latter were allowed designated smoking rooms). Starting the second decade of tobacco consumption control (1996-2005) in 1998, Thailand has expanded smoking bans in workplace and service business. In 2001, 2% tax on all cigarettes and alcoholic beverages was earmarked for the Thai Health Promotion Foundation (ThaiHealth) to provide grants for many health promotion activities including tobacco control campaigns and researches. In 2002, smoking was banned in all enclosed restaurants and shopping areas (no designated smoking rooms allowed). The availability of cigarettes at point of purchase was limited and in 2005 cigarette manufacturers were required to re-label their cigarette packaging with health warnings labeling and illustrations of health harm that cover at least 50% of all sides of their packaging (Termsirikulchai et al.,2008). In 2008, Thailand reorganized a National Quit Line with proactive and reactive services. Also, the pictorial health warning labeling was increased to cover 85% of cigarette packaging together with more intensive public awareness and anti-tobacco campaigns through mass-media messages(Chantornvong and McCargo,2001;Hamann et al., 2012). Interestingly, the Thai government has further regulated the tobacco industry, and the excise tax rate on the wholesale tobacco prices has steadily increased from 55%, to 62%, 72%, 75% and 85% from 1992 to 2010(Visaruthvong,2010). In summary, Thailand has advocated following the

comprehensive WHO MPOWER approach for tobacco consumption control through six important measures as illustrated in table 1.

Table 1: The MPOWER chronology of Thailand (WHO,2003)

Year	Situation/Action according to MPOWER package
	M:Monitor tobacco use and prevention policies
2005,2009	First and second survey of Global Youth tobacco Control Survey(GYTS)
2009,2011,2013	First, second and third survey of Global Adult Tobacco Surveillance(GATS)
	P:Protect people from tobacco smoke
1992	The Non-smoker's Health Protection Act, of B.E.2535
2002 to 2007	Smoking was banned in all public places including restaurants, pubs, bars, market places
	O:Offer help to quit tobacco use
1993 to 2008	Smoking cessation process in Thailand includes health care settings with cessation services, Thai health Professional Alliance against Tobacco, Nicotine Replacement Therapy(NRT) and Quit line
	W:Warn about the dangers of tobacco
1992 to 2004	Increase health warning massage from 25% to 50% covering package
2005	Replace health warning massage with health harm pictures that cover at least 50% of all sides of packaging
2006,2008	Added information about toxic ingredient on cigarette packs and warning picture was increased to cover 85% of cigarette packaging in 2008
	E:Enforce bans on tobacco advertising, promotion and sponsorship
1992	The Tobacco Product Control Act of B.E.2535
2005	The availability of cigarettes at point of purchase was limited by prohibit display of cigarette pack, logo and advertising
	R:Raise taxes on tobacco
1993 to 2005	Regularly increase cigarette tax from 55% to 79%
2007 to 2013	Increase cigarette tax from 80% to 87%

Nevertheless, despite the great increase of tobacco control measures over the past three decades, a Comparative Risk Assessment (CRA) estimated that smoking is the second most significant risk factor attributable to the burden of diseases, with causing 42,989 Thai male deaths(BOD,2009) and impact on health of tobacco use reducing national gross product (GDP) by 0.78% (Bundhamcharoen et al., 2012).

2.7.3 Snack and Sweetened beverage consumption

Snack and sweetened beverage soft drink can be considered as sugar-based diets. Sugar is a nutrient, already available in all division of society, since it is cheap and pleasurable. However, from the point of view of its high consumption and pathological effects, sugar meets criteria requiring control. Reports reveal that habitual consumption of sugar sweetened beverages is related to weight-gain and is positively associated with incidence of type 2 diabetes (Malik et al., 2010; Imamura et al., 2016). Other than metabolic syndrome, sugar have detrimental effect to the liver and action in brain to promote subsequent excessive consumption leading to abuse potential similar to the effect of alcohol (Lustig,2010). Sugar has become a significant public health problem worldwide (Hu and Malik, 2010;Han and Powell, 2013 ; Louie et al., 2015; Imamura et al., 2016). Regulation at the population level may reduce cost of secondary and tertiary health cares. It was found that the consumption of sugar-sweetened beverages (SSBs) is sensitive to price changes, meaning that the implementation of taxes could be effective in reducing rate of consumption (Paraje,2016). Recently, many countries started to considering regulate sugar consumption; Denmark planned to tax sugar as well as previously taxed food high in fat. Canada, France, Belgium, Hungary and Mexico have imposed some form of tax on drinks with sugar ingredient (WHO,2016). The United States is currently considering taxing on soda(58% contains sugar)(Lustig et al., 2012) and Britain just announced to introduce a sugar levy on soft drinks in next two years(Reuters,2016). Other successful tobacco control strategy like health harm warning picture can be applied as food labeling or SSB warning labels, as one study has shown that warning labels are likely to reduce parents' perceptions of SSBs' healthful benefits, promoting perceptions of the health risks posed by SSBs, and decreasing parents' likelihood of buying SSBs(Roberto et al., 2016). Moreover, like limits availability of tobacco, availability for SSB should also be controlled.

Rapid economic development has transformed the social structure from an agricultural community to an industrial and commercial society, resulting in Thai personal and family lifestyle changes from a rural orientation to urbanization. The food consumption pattern has changed from traditional Thai diet to a more Westernized with increased trend in consumption of fats, sugars and animal products (Kosulwat, 2002). Over the past decade, epidemiological study has revealed trends of non-communicable diseases (NCD) such as obesity, hypertension, diabetes mellitus remained high in Thai adults (Aekplakorn et al., 2011).

International sugar-sweetened soft drink surveys revealed all popular soft drinks and hot flavored drinks that targeting to the more affluent sold are still in excess of recommended standard guidelines (Clarke,2016).Thai people like sugar, they choose sweet snacks, and add sugar to almost every type of food or beverage that they eat or drink on a daily basis. A comprehensive news service about Thailand stated that, most Thais get their sugar from beverages such as soft drinks, green tea and coffee, on average, Thai consumed twenty-six teaspoons or about 104 grams of sugar daily (ThailandBusiness News, 2015) which was considered over four times more than the recommended amount of 6 spoons per day, or limit to 10% of total energy intake as advised by WHO, this suggestion was based on evidence reviewed regarding the relationship between high sugar intake and comparable increase body weight together with higher rate of dental caries (WHO,2015), frequency of sugar consumption was also mentioned by Sheiham that eating sugar more than four times a day has increased risk of dental caries (Sheiham, 2001).

Previous ongoing and challenges for Thai national food labeling programs which have both direct and indirect impact in controlling of sugar intake in Thailand comprise:

1. Nutritional labeling. In 1998 the Ministry of Public Health introduced food labels on a voluntary basis aim to overcome both deficiency and over-consumption of food and related NCDs. The nutrition tables contain certain information, such as the amount of food per serving size, number of serving sizes per unit, nutrient content, and percentage of Thai Recommended Daily Intake (RDI) per serving size, per day. A full format nutrition table must contain at least the following 15 mandatory nutrients: total energy, total carbohydrate, total fat, energy from fat, saturated fat, cholesterol, protein, vitamin A, vitamin B1, vitamin B2, calcium, Iron, sodium, dietary fiber and sugars contents per serving in gram or milligram. However, this labeling technique has some problems due to difficulty to understand information about the percentage of nutrient in the serving for general consumers and because of labeling is voluntary for most food producers, generally, it is used to enhance the image of a food product look good but has little impact on knowledge about its nutrition and appropriate consumption (Chavasit, 2013).

2. Guideline of Daily Amounts (GDA). Thailand's Food and Drug Administration (FDA) implemented guidelines for recommended daily amounts (GDA) to be displayed on the front of the packaging by clearly declaring the nutrient content and the percentage of RDI per packaging unit aim to inform consumers to know about the amount of calories, sugars, fats, and sodium in food that they should be consuming daily. These guidelines are used for some ready-to-eat foods, including fried or baked potato chips, crackers or biscuits, and wafers with fillings. The aforementioned products must have nutrition and GDA labels, and must show the following statement: "Consume less and exercise for health" (Ratanakorn and Makayay, 2014). Thai GDA is different from nutritional labeling because the interpretation is based on one package, not for one serving. This application may be realistic only for snack products, since consumers almost always eat the entire package of a snack at one time. However, the Thai Food and Drug Administration (FDA) claimed that more than

50% of consumers in the survey have a good understanding about information of GDA (Yodtheun et al., 2012).

3. Traffic light labeling. Traffic light labeling symbols designation for at least three nutrients (i.e. saturated fatty acids, sugar and sodium). Food with a traffic light label showing how much fat, saturated fats, sugar, and salt are in that food by using the traffic light signals for high (red), medium (amber) and low (green) percentages for each of these ingredients. Foods with green indicators are healthier than those with amber and red color. The symbol is easy to sight on food packaging and makes more understanding regarding the nutritional values. During the last two decades academicians and consumer protection agencies made a request to the Ministry of Public Health to advocate this technique, however, other opposes them because of lack of agreement on the color of specific foods or typical amounts ingested and traffic light symbol may causing confusion and misleading consumers. As the middleman, the Thai FDA decided to supported the use of GDA for those three nutrient on a voluntary basis except for snack (Rimpeekool et al., 2015).

2.7.4 Dental care utilization

Thailand has good strategy to provide dental care service and retain oral health-care workforce to ensure adequate dental practitioners serving rural populations through many approaches, such as all graduate dentists from government institutes have three-year contract working in government sectors and provide the premium health insurance called the Civil Servant Medical Benefit Scheme (CSMBS) for them together with offering of compulsory services after gradation for dentist who have retained for at least 25 years. In addition to dental schools in universities, Praboromarajchanok Institute for Health Workforce Development (MOPH) is responsible for producing dental workers, especially dental nurses (two-year diploma trained). MOPH has launched a project to increase the

number of dental nurses, targeting 3200 dental nurses in 2012–2013. The project is funded at 30 million Baht a year by National Health Security Office (NHSO). Moreover, the Bureau of Dental Health, Department of Health is the key institute responsible for technical support and monitoring of the dental prevention programs. Funding for dental services from the UCS is bundled with the capitation outpatient budget to contracted hospitals. NHSO sets the dental fund to support comprehensive dental care, aiming to increase accessibility to services and to control oral health disease focusing on schoolchildren, pregnant women, dental prosthetics in older people, and improved oral health behavior in the population. In 2012, the budget for dental care was 1080 million Baht divided between dental care services (1005 million Baht) and for oral health prevention and promotion (75 million Baht) (WHO, 2015).

This country also has a multilevel health-care system aiming to improve geographical access of the population including the primary care, secondary care and tertiary care system. The referral system connects those three systems for effective health management and solves the problem of inadequate health resources. However, recent reforms since 2001 have had some negative consequences and have fragmented provision of public health services. The problems about quality of service and many patients in general or regional hospitals reflect improper redistribution of health resource. During 2010 and 2011 Ministry of Public Health pay attention in improving of health service system by introduce the service plan strategy with three keys strategies composed of seamless health service network, provincial health service network and referral hospital cascade. In this reform, many specialize health care including oral health care were top of concern in planning to increase the number of health-care workforce and medical equipment.

A health service use is an important factor for health status of the population. Thailand underwent health system in transition in many aspects. One of

major change related to development of health insurance scheme especially the Universal Coverage Scheme which was introduced to Thailand in April 2001 aims to increase accessibility for health care utilization by reducing the financial barriers and expanded nationwide in 2002. According to table 22 (on Appendix), three existing public health insurance schemes continued to cover the entire population including,

1) the Civil Servant Medical Benefit Scheme (CSMBS), a tax-financed non-contributory scheme designed to compensate the relatively lower salary (compared to market rate) for government employees plus their parents, spouse and up to two children age under 20 years,

2) the Social Security Scheme (SSS), a mandatory tripartite payroll-tax financed scheme equally contributed to by employers, employees and the government with entitlement for private sector employees, excluding dependents and

3) the Universal Coverage Scheme (UCS) to cover the rest of the population not covered by SSS and CSMBS.

In addition to three public insurances, there are those who prefer and can afford premiums for private health insurance.

Access to dental service among three public health insurances are different according to the scope of benefits coverage: the CSMBS users can access all public providers with no registration required and no limit to use of benefit packages covered both preventive and curative dental services; the SSS users can be reimbursed for dental care payment no more than twice a year (maximum 300 Baht per treatment) and only utilizing benefits through registered public and private competing contractors; and the UCS applicants assigned to use dental services at contracting units of primary care (CUP) of both public and private providers.

Unlike UCS and CSMBS, the present SSS are reimbursed on a fee-for-service basis, although SSS applicants are free to choose their preferred both public and private facilities, but budget was available for only two annual dental curative service reimbursement not more than 600 Baht in scaling, filling and extraction treatment.

While general improvements in oral health have been observed among people of industrialized countries over the past few decades, oral disease remains a global problem, particularly among disadvantaged populations in both industrialized and developing countries. Oral healthcare utilization in Thailand revealed that after universal coverage policy has implemented since 2001, oral healthcare utilization among children, adults and elderly is still under satisfactory ratio and more concentrated among the higher socioeconomic status group, whereas the lower socioeconomic status groups were more likely to utilize dental care at public facilities especially for primary health care service(Somkotra, 2011,2013;Somkotra and Detsomboonrat, 2009;Somkotra and Vachirarojpisan, 2009).

2.8 Health system in transition and Universal Health Care Coverage Policy (UC) in southeast Asia and Thailand

Universal coverage is developed to securing access by all citizens for appropriate promotion, prevention, curative, and rehabilitative services at an affordable cost and the consideration is give important of how best to cover and finance specific population groups: those in formal employment, the poor and vulnerable, and the informal sector and the rest of the population. In 2009, countries in southeast Asia with different levels of economic development and pace of expansion of health service coverage and financial protection were studied, the achievements in insurance coverage extension by 2009 for three population groups (including the informal sector and rest of population groups together) in six countries are illustrated; Laos faces challenges in coverage extension to all groups, whereas

Vietnam has fully covered the formal sector and the poor but has a major challenge covering the informal sector and the rest of the population through a contributory scheme. Cambodia has made good progress in using health equity funds to cover the poor, although this achievement needs to be sustained, introducing social health insurance for the formal sector and devising arrangements to cover the large informal sector is a huge challenge both for fiscal capacity and program management. The Philippines face two major challenges, to extend coverage to the poor by encouraging increased local government financial commitments, and to enroll the hard-to-reach informal sector into the individual contributory scheme. Huge challenges in Indonesia are also coverage extension to the informal sector and the rest of the population with a clear policy on sources of financing, while sustaining coverage of the poor and near-poor in a fully decentralized system. By contrast, Thailand and Malaysia have reached coverage for the whole population. In conclusion, this reported highlighted a huge gap of insurance coverage in region of Southeast Asia (Figure 12) (Tangcharoensathien et al., 2011).

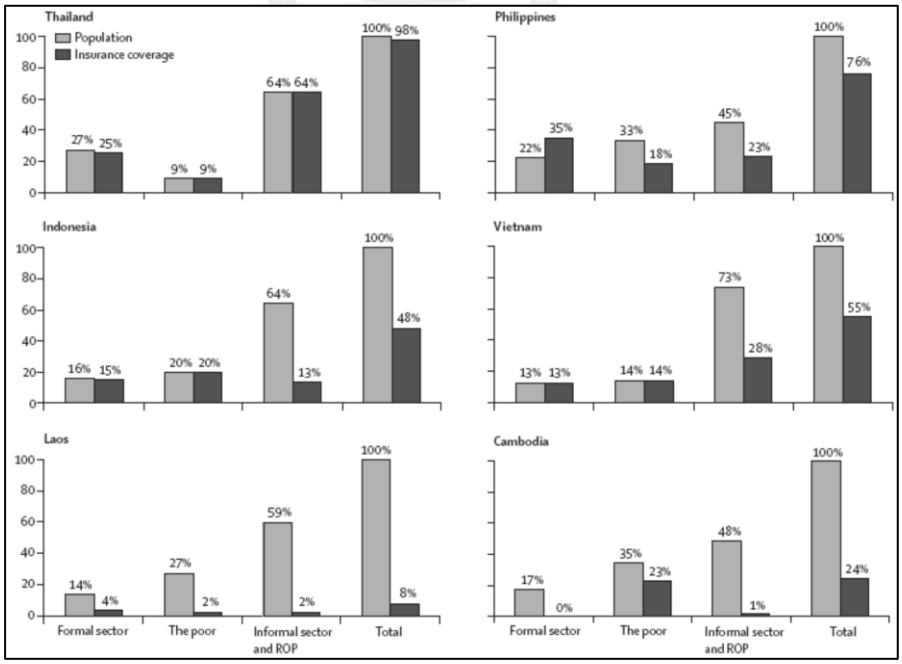

Figure 12: Insurance coverage for three population groups in 2009

Development of universal coverage in Thailand as one of developing countries, after the economic crisis in 1997, the government has started public sector reform included of national health system reform which began officially in 2000 and has fully implemented in October 2002. Thai national health system reform was established based on a “triangle that moves a mountain strategy”, stated by Dr. Prawase Wasi, this strategy emphasizing the linkages between knowledge building/management, social mobilization, and political support. One of the major changes for the reform of the Thai health care system were taken into consideration objectives and characteristics of the Universal Health Care Coverage Policy (UCS) which” is focused on creating universal health insurance coverage for the entire population. Prior to its implementation, 20% of the population was not covered by any insurance. After 2001, two types of universal coverage provision emerged: the UCS with fee exemption and the UCS with 30 Baht copayment. Then, from 2006, the government abolished the copayment. Policymakers use capitation payments for purchasing ambulatory care and Diagnosis Related Groups (a patient classification system for inpatients that has been used as a healthcare finance mechanism and National List of Essential Drug was adopted as the basis of pharmaceutical benefits). UCS mechanism focuses on health promotion and disease prevention through primary care network. It’s consists of three main benefit packages: a curative package covering most common diagnoses and treatments, a high-cost care package, and a preventive package. Thai study showed that the implementation of the UCS resulting increased overall use of health services (Coronini-Cronberg, 2007) and also changed patterns of health services use, particularly for rural people and the urban poor, by placing greater emphasis on primary healthcare and was confirmed that a UCS system substantially reduces the financial burden of health care among the poor (Yiengprugsawan et al., 2010).

Another major changes of health system reform in Thailand by participated the paradigm shifted from a conventional paradigm that focused on health curative services to preventive and health promotion paradigm as a key strategy for sustainable health development of individuals, families, communities, and society. When Ottawa Charter identifies five health promotion areas: build healthy public health policy; create supportive environments; develop personal skills; strengthen community action; and reorient health services. Thailand has also adopted the five action areas, especially “building Healthy Public Health Policy” which is reflected in the legislative measures toward curbing tobacco consumption. This was followed by the paradigm of “Health for All by the Year 2000” and the emerging concept of primary health-care. Then, Thailand, as a member of the World Health Organization (WHO), has adopted the WHO guidelines in implementing the national health policy. In November 2004, the government has launched the “Healthy Thailand” Policy as one component of the National Agenda to use as a guideline to reduce behavioral health risk and major health problems. In due course, the WHO chose Thailand to host the 6th Global Conference on Health Promotion in August 2005, which was concluded with the adoption of the Bangkok Charter on Health Promotion. In praising the country as a leader in the field of health-care promotion, Thailand was commended as a source of reference as to how to strengthen public health through health-care promotion at individual, grass-root, village, tambon, district, provincial, and national levels (Bureau of Policy and Strategy,2009).

2.9 A framework for public health actions: The health impact pyramid

The five-tier health impact pyramid can be used to describe the impact of different types of public health intervention and provides a framework to improve health. In the pyramid’s framework, interventions to address socioeconomic (e.g. poverty reduction, improved education) determinants located at the bottom level

representing population-wide intervention that have the greatest potential impact and ascending level with decreasing impact that represent interventions that change the environmental context to make healthy options the default choice(e.g. fluoridated water which is difficult to avoid when it is the public supply, as well as clean air, water, foods, and safe roads), followed by protective effort with long term outcomes (e.g. immunization) and ongoing primary, secondary and tertiary clinical care. At the top tier, health education and counseling designed to help individuals (Frieden, 2010).

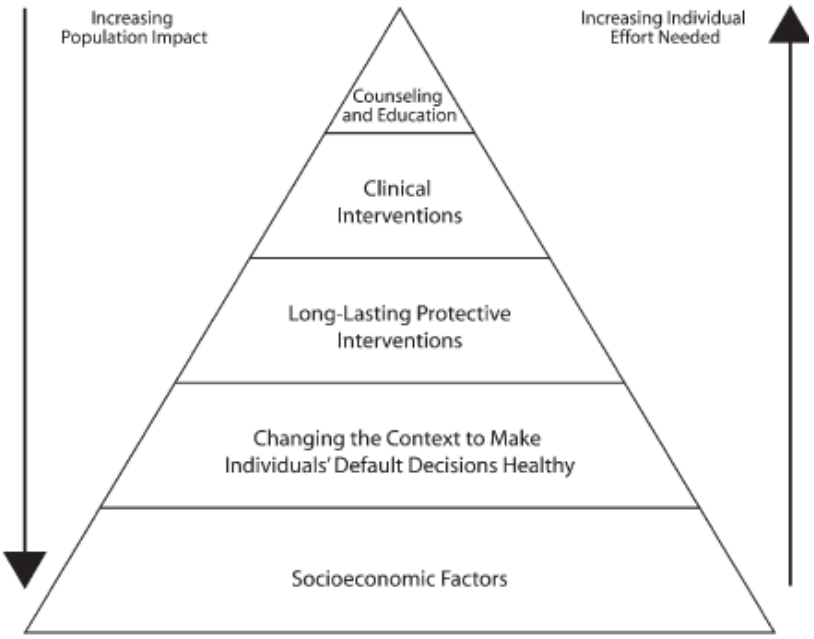

Figure 13: The health impact pyramid

2.10 Gender differences in tobacco use and alcohol consumption

There are differences between men and women in patterns for risk substance use. Generally, men have greater rate of tobacco and alcohol use than female, this situation appears to be linked to general features of sex roles. For example, most of

men had greater social power than women, and subsequently restrict on women's behavior, contributed to widespread social pressures against women's smoking or drinking. The patterns of gender differences in tobacco use in non-Western countries are similar to the patterns observed in Western societies. In traditional Thai life, women in Thai culture were discouraged from drinking or expected to drink less than male. Moreover, female smoking is unusual and is not decidedly be a role model as in males. Previous study has found the greater gender differences in tobacco smoking in Thailand (Thammarungsri, 2010). Therefore, evaluation of tobacco smoking and alcohol consumption among Thai population may have a clear pattern between male and female when concerning the role of gender differences.

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CHAPTER III

METHODOLOGY

3.1 Source of Data

The data will be taken from the nationally representative Health and Welfare Survey (HWS) waves in 2003 2005 2006 2007 2009 2011, which conducted by National Statistical Office of Thailand. The sampling frame of HWS covered non-institutional households residing in municipal (urban) and non-municipal areas (rural) of each province, using a two-stage stratified sampling and survey weights to represent the country's population. The primary sampling units in municipal and non-municipal areas were blocks and villages, respectively. It was selected separately and independently in each municipal and non-municipal area by using probability proportional to the total number of households in that block or village. The secondary sampling unit was households which were randomly selected from a list of households in each sample block or village of the sampling flame. Systematic random samples of 15 and 10 households were then selected from each sample block and village, respectively. HWS comprise data of individuals from selected households aged 1 year and over. Data of representative Thai adults (those aged 20 years and over) will be selected in this analysis.

The questions from HWS were applied to be dependent and independent variables of this study as shown in table 2. In addition, this research was applied Human Achievement Index (HAI) conducted by the United Nation Development Program(UNDP) to be a representative structural determinant by using 8 components of HAI namely health index, education index, employment index, income index, housing and living environmental index, family and community index, transport and

communication index, participation index. Analyzing have been done by combine the 2 bottom level of advancement (low and very low) and categorized as less advancement group whereas the remaining (medium, high and very high) were combined as higher advancement group.

Table 2: The list of questions from HWS to represent variables in this study

Variables	**Questions from HWS**
Snack consumption	- How often do you eat snacks last month (days/week)?
Sweetened beverage consumption	- How often do you drink sweetened beverages last month (days/week)?
Smoking	- Do you smoke?
Dental care utilization	- Have you ever utilized dental care during the past 12 months preceding the survey?
Alcoholic beverage consumption	-Do you drink alcoholic beverage?
Education	- What was your highest level of education?
Occupation	-What is your currently occupation?
Type of health insurance	- Which insurance scheme entitlement do you have?
Self-perceived stress	- Do you have emotional stress in last month?
Social capital	- Do you have a good relationship with family or community members? - Do you have good relationship to friends?

3.2 Population

3.2.1 Population

The nationally representative Thais aged adults 20-59 years

3.2.2 Study Population

Thais adults aged 20-59 years of the national representative surveys of Health and Welfare Survey. General characteristics of the study population are shown in table 3.

Table 3: Distribution of general characteristics of study population during 2003 to 2013.

Characteristics	**2003** (n=27554)	**2005** (n=22310)	**2006** (n=23844)	**2009** (n=21976)	**2013** (n=19899)
Age (mean±SD)	39.48 ±0.06	40.36 ±0.07	39.35 ±0.06	41.76 ±0.07	42.72 ±0.07
Male	42.10%	39.39%	46.85%	39.56%	38.59%
Municipal dwellers	59.64%	60.10%	62.75%	60.53%	56.18%
Residence in region					
Bangkok	5.99%	5.44%	7.12%	6.21%	5.01%
Central	30.63%	31.98%	29.53%	31.83%	29.90%
North	21.73%	22.98%	22.57%	21.38%	21.94%
Northeast	25.79%	23.88%	27.06%	23.29%	25.29%
South	15.86%	15.72%	13.72%	17.30%	17.51%

3.3 Variables

3.3.1 Dependent(outcome) Variables

Oral health related behaviors comprise of snack consumption, sweetened beverage consumption, smoking, alcoholic beverage drinking and dental service utilization. Each of outcome variable obtained from HWS described as follows.

Table 4: Dependent variables

Variables	Categories	Definitions
Snack consumption (30 days preceding the survey)	Daily	Average frequency of snack consumption (everyday per week)
	Often	Average frequency of snack consumption (5-7 days per week)
	Sometime	Average frequency of snack consumption (1-4 days per week)
	None	No consumption of snacks
Sweetened beverage consumption (30 days preceding the survey)	Daily	Average frequency of sweetened beverages consumption (everyday per week)
	Often	Average frequency of snack consumption (5-7 days per week)
	Sometime	Average frequency of snack consumption (1-4 days per week)
	None	No consumption of sweetened beverages
Smoking (30 days preceding the survey)	Current smokers	Smoke daily or occasionally
	Former smokers	Ceased smokers
	Non-smokers	Never smoke
Alcohol drinking (during 12 months)	Current Drinkers	Current drinking in the past 12 months (occasionally and regularly drinkers)
	Regularly-	Drink at least 1-2 days in a week
	Occasionally -	Drink less than 1 day in a week
	Non-drinkers	Never drink alcoholic beverage
Dental care utilization (during 12 months)	Users	Utilized dental care in the past 12 month
	None	Subjects who have not received dental care service in the past 12 months

3.3.2 Independent Variables

The independent variables were proxies for social determinants comprising of structural determinants and intermediary determinants as indicated by WHO framework for social determinants of health (WHO, 2010) (shown in below figure 14)

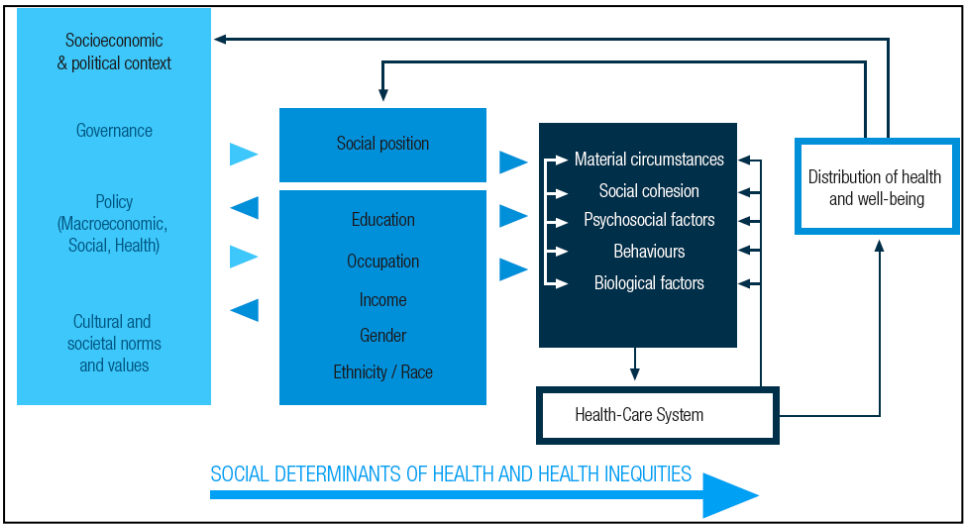


Figure 14: Social determinants of health

Structural determinants and intermediary determinants including Human Achievement Index for Thailand (HAI), and geographic characteristics, socioeconomic status (measured by household living standards quintiles and household head education attainment), type of health insurance entitlement, other health related information (shown in table 5, 6).

Human Achievement Index (HAI) which was independently calculated by UNDP Thailand that have structure covered human's life circumstances including health, education, income, housing and living environment, family and community life, transportation and communication context and participation in society. This index is a composite index composed of eight indices based on 40 indicators used to compare human development at the provincial level, it was first computed in 2003 and compiled again in 2007, 2009 and 2011 is the latest generation. HAI for each province is the proportion between the differences of actual value and minimum value compared to the differences between maximum value and minimum value. When the minimum value and maximum value are set as "goal posts" for each indicator for ten years, the index used secondary data that have national coverage from various sources including national sample survey (socioeconomic survey, labor force survey, health and welfare survey), registration systems (divorce incidence,

personal vehicle registration) and administrative records (school enrolment, person per physician, malnutrition in children under five) (UNDP, 2014) as illustrating in table 5.

Table 5: Human achievement index for Thailand

HAI Indices	Components	Indicators
1.Health	**1.Quality of life**	1.Underweight births(%)
		2.Population with physical illness(%)
		3.Population with disability(%)
		4.Mental score(%)
	2.Health promotion	5.Population with unhealthy behavior(%)
		6.Population that exercise regularly(%)
	3.Health infrastructure	7.Population per physician(persons)
2.Education	**4.Stock of education**	8.Mean years of schooling for population aged 15 and over(years)
	5.Flow of education	9.Upper secondary and vocational enrolment(%)
	6.Quality of education	10.Average IQ of students aged 6-15
		11.Average score of upper secondary students(%)
3.Employment	**8.Employment**	12.Unemployment(%)
		13.Underemployment(%)
	9.Labour protection	14.Employees covered by social security(%)
		15.Occupational injuries(per 1,000 members of the Workmen's Compensation Fund)
4.Income	**10.Income level**	16.Household income(Bath/month)
	11.Poverty	17.Poverty incidence(%)
	12.Debt	18.Households with consumption debts(%)
	13.Disparity	19.GINI

Continue.

HAI Indices	Components	Indicators
5.Housing and living environment	**14.Housing security**	20.Households living in own house and on own land(%)
	15.Basic appliances	21. Households with refrigerator (%)
	16.Living environment	22.Carbon footprint(ton/CO2/person)
		23.Population affected by drought(%)
		24.Population affected by flood(%)
6.Family and community life	**17.Family life**	25.Children in distress(per 100,000 population)
		26.Working children aged 15-17 years old(%)
		27.Single-headed households(%)
		28.Elderly living alone(%)
	18. Community safety	29.Reported crimes against life, body, property and sexual crimes(per 100,000 population)
		30.Drug-related arrests(per 100,000 population)
7.Transport and communication	**19.Transport**	31.Villages with all-season main road(%)
		32.Registered vehicles(per 1,000 population)
		33.Land traffic accidents(per 100,000 population)
	20.Communication	34.Households with access to TV(%)
		35.Population with mobile phone(%)
		36.Population with internet access(%)
8.Participation	**21.Political participation**	37.Voter turnout (%)
	22.Civil society participation	38.Community groups(per 100,000 population)
		39.Households participating in local groups(%)
		40.Households participating in community activities

Table 6: Description of other independent variables

Underlying determinants	Categories	Definitions
Geographic characteristics	Municipal residency	Live in municipal area
	Non-municipal residency	Live in non-municipal area
Residence in region	Bangkok	Live in Bangkok
	Central (exclude Bangkok)	Live in central region exclude Bangkok
	North	Live in north region
	Northeast	Live in northeast region
	South	Live in south region
Household living standards quintiles	Quintile 1	20% of the population with the lowest household asset index
	Quintile 2	Ranging from over 20 – 40% of the population with the low household asset index
	Quintile 3	Ranging from over 40 – 60% of the population with the low household asset index
	Quintile 4	Ranging from over 60 - 80% of the population with the high household asset index
	Quintile 5	20% of the population with the highest household asset index
Occupation	Economically inactive	Include housewife, elderly person, disabled person, unemployed, retired person
	Elementary	Sales and service elementary occupations, field/farm laborers,

Underlying determinants	Categories	Definitions
Occupation	Skilled-manual	Craft and related trades workers, Plant and machine operators and assemblers, Drivers and mobile-plant operators
	Agriculture/fishery	Skilled agricultural and fishery workers
	Skilled-non manual	Include clerks, service workers and shop and markets sales workers
	Professional	Include legislators, senior officials and managers, Professionals, Technicians and associated professionals, Armed forces
Education	Primary level	Up to primary level (grade 6)
	Secondary level	Up to secondary level (grade 12)
	Vocational diploma	Up to vocational diploma
	Tertiary or higher	Bachelor's degree or higher
Type of health insurance	UCS	Universal coverage scheme
	CSMBS	Civil servant medical benefits scheme
	SSS	Social security scheme
	Others	None of the above
Type of facilities	Public facilities	Government hospitals or units
	Private facilities	Private hospitals or clinics
Self-perceived stress	Very much	High or very high perceived stress level
	Not much	Low perceived stress level
Difficulty of social interaction	Very much	Very difficult to interact with people in daily life
	Not much	Not hard to interact with people in daily life

3.4 Data Analyses

Descriptive statistics was used to describe the prevalence/ distribution of oral health-related behaviors. Concentration index also used to describe the distribution of oral health-related behaviors across socioeconomic determinants, the concentration index can be defined as:

$$C = \frac{2}{n \cdot \mu} \sum_{i=1}^{n} y_i R_i - 1$$

When *y* is the oral health-related behaviors for *i* individual, μ refer to mean of *y*, *n* is number of persons and *R* refer to the ranking of person/household into socio-economic distribution. *C* takes on values ranging between -1 and +1, with 0 indicating no inequality, negative values indicating concentration among the less well-off and positive values indicating concentration among the better-off (O' Donnell et al., 2008). The detail of concentration index provided in the appendix.

Analytical statistic to assess association by the odds ratio(OR) including unadjusted or adjusted with 95% confidence interval (95% CI) was obtained from logistic regression analysis to shed light on the underlying determinants and to control the influence of other factors outside the selected determinants.

Descriptive and inferential statistics was performed by using STATA version 11 (Stata Corp, College Station, TX, USA) and the level of statistical significance was set at 5%($p<0.05$).

3.5 Budget

Total amount 80000 Baht

3.5.1 Research materials

-Photocopies 8000 Baht

-Office equipment 9000 Baht

-Statistical software 30000 Baht

-Data records 10000 Baht

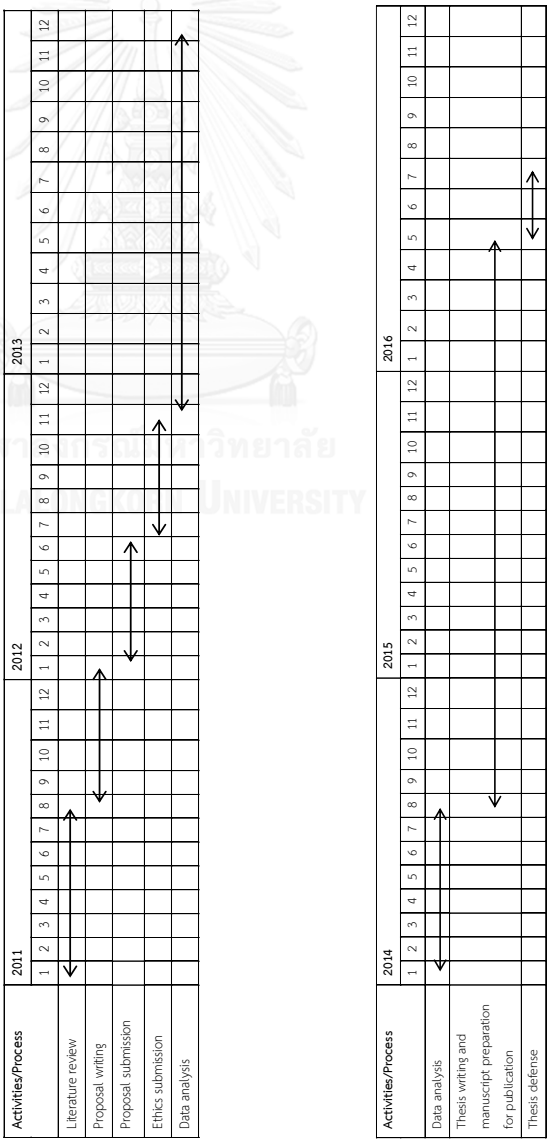
3.5.2 Publication and dissemination

-Printing and bonding of thesis 5000 Baht

-Publication 18000 Baht

Note: * This study was primarily supported by the 90th anniversary of Chulalongkorn University Fund (Ratchadaphiseksomphot Endowment Fund).

3.6 Time Frame



CHAPTER IV

RESULTS

The primary objective of this study was to address the social determinants of oral health-related behaviors. Thus the structure of the study included four principles oral health-related behaviors composed of tobacco consumption, alcoholic beverage consumption, sugary diet and dental care utilization. Each part of this Chapter is composed of two components including distribution and association between dependent variables and independent variables (underlying social determinants) among Thai adult population during 2003 to 2013. Also, the concentration index was used to measure socioeconomic-related inequality in the health-related behaviors. The index ranges from -1 to +1, which occur when the health-related variable is concentrated in the least and most advantageous persons. In addition, the clustering of health risks behaviors was also revealed. The association of principal outcome and associated variables were obtained from logistic regression analysis with 95% confidence interval (95% CI) adjusted for all covariates with multivariate logistic regression analysis utilized full and reduced model variable selection technic. In our study, association between oral-health related behaviors and Human Achievement Index (HAI) were further examined to provide overview effect from structural social determinants.

4.1 Distribution of Smoking and Association between Social Determinants and Smoking behavior among Thai Adults during 2003-2013

Table 7 showed an overview of the prevalence of current smokers among Thai male adults aged 20-59 years has slightly dropped from 48.9%, 43.4%, to 42.6% from 2003, 2006, to 2009 and remain unchanged in 2013 respectively. Distribution of current smokers across demographic determinants presented that the prevalence found to be more common among middle adult age (35-44 years) and widowed/separated/divorced groups. Analysis across socioeconomic status indicators found the highest prevalence being concentrated among lower SES hierarchy (1^{st} quintile) than other hierarchies, less educated, and mostly being elementary occupation. The concentration index (C_{Index}) of current smokers corroborate pro-poor socioeconomic inequalities in smoking habit as indicated by its negative values for four survey years suggest that those belonging to lower SES group smoking more than the better-off do. It is noteworthy that magnitude of the C_{Index} among male has decreased in the last three survey years. Distribution across geographic determinants revealed that those living outside municipal areas, especially male living in the Southern region of Thailand exhibited higher prevalence of current smoking than other areas. In addition to current smokers, the overall trend of former smokers is in an opposite way showed that percentage of male who had stopped smoking was concentrated among older adult age (45-59 years), married marital status, mostly belong to middle to high SES hierarchies and being professional occupation together with residing in the North region.

The Chi-square analyses of current smokers and macro-level social determinants indicate statistically differences at human achievement index (HAI) indicate that higher prevalence of current smokers was concentrated with less advancement of HAI and its eight components, in particular, health index, education

index, employment index, income index, housing and living condition index, and transportation index compared to the more superior counterpart (table 8).

Table 9 shows the odds ratios (ORs) for current smokers among Thai adults obtained from multivariate logistic regression model. After adjusting for age, marital status, education, occupation, household assets, areas of residence, health-related behaviors and social contexts. Odds ratios with 95% confidence interval indicated that current smokers of males were more likely to be of lower SES, less educated, residing outside municipal areas (as indicated by ORs in 2013) as well as living in Southern region of Thailand. In addition, current smokers were more likely to intake alcoholic and sweetened beverages compared to their counterparts. However, current smokers among aforementioned predictors have tendency to be reduced.

Table 10 illustrated prevalence of current and former smokers among Thai female adults, it presented that trends of both smoking status groups was in the same way as males. However, there were several gender different features with the prevalence among female is markedly lower than those in males, and found to be more common among older female groups (aged 45-59 years) whereas highest prevalence among males was distributed through the younger adults (aged 35-44 years) and female in North region exhibited higher prevalence of current smoking whereas male smokers accumulated in the South region. For instance, those female with lower household assets quintile (1^{st} quintile) together with elementary occupation have higher rate to quit smoking unlike in males. Structural determinants particularly health index in 2009 and education index in 2006 indicated that female living in less advancement areas have higher percentage of current smoking compared to living in more advancement areas (Table 11). During the period of assessment, odds ratios also confirmed that current smoking among female

associated with lower SES hierarchy, less educated and drink alcoholic beverage similarly to ORs among males (Table 12).

Table 7: Distribution of current- and former smokers across social determinant among Thai male adults aged 20-59 years during HWS 2003 and 2013

Deterministic variable	2003		2006		2009		2013	
	Current-N=5675 Proportion (95%CI)	Former-N=1450 Proportion (95%CI)	Current-N=4068 Proportion (95%CI)	Former-N=1217 Proportion (95%CI)	Current-N=3701 Proportion (95%CI)	Former-N=1660 Proportion (95%CI)	Current-N=3274 Proportion (95%CI)	Former-N=1398 Proportion (95%CI)
Overall	48.9(48.0,49.8)	12.5(11.9,13.1)	43.4(42.4,44.4)	13.0(12.3,13.7)	42.6(41.5,43.6)	19.1(18.3,19.9)	42.6(41.5,43.7)	18.2(17.3,19.0)
Demographic characteristics								
Age group(years)								
20-34	46.2(44.7,47.8)	8.3(7.4,9.1)	42.0(40.2,43.9)	8.9(7.8,10.0)	42.8(40.8,44.8)	12.6(11.3,13.9)	44.0(41.7,46.2)	10.3(8.9,11.7)
35-44	51.8(50.2,53.5)	11.9(10.9,13.0)	46.0(44.2,47.8)	12.3(11.1,13.5)	44.2(42.3,46.2)	17.2(15.7,18.6)	44.5(42.4,46.6)	15.8(14.2,17.3)
45-59	48.8(47.3,50.3)	16.8(15.6,17.9)	42.3(40.8,43.9)	16.2(15.0,17.4)	41.2(39.6,42.8)	24.5(23.1,25.9)	40.8(39.2,42.4)	23.4(22.1,24.8)
Marital status								
Single	42.5(40.5,44.6)	6.6(5.6,7.7)	38.7(36.3,41.1)	8.4(7.0,9.7)	39.7(37.4,42.1)	13.2(11.6,14.9)	43.1(40.7,45.6)	12.2(10.6,13.8)
Married	49.9(48.9,51.0)	14.0(13.3,14.8)	43.5(42.4,44.7)	14.2(13.4,15.0)	42.4(41.2,43.6)	20.7(19.7,21.7)	41.6(40.3,42.9)	19.8(18.7,20.8)
Widowed/separated/divorced	60.2(55.6,64.9)	10.5(7.6,13.4)	55.2(50.9,59.5)	9.3(6.7,11.8)	54.1(49.6,58.6)	17.0(13.6,20.3)	50.2(46.1,54.3)	18.9(15.7,22.1)

Deterministic variable	2003		2006		2009		2013	
	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)
Socioeconomic characteristics								
Household assets								
1st quintile(poorest)	63.5(61.3,65.6)	9.6(8.3,10.9)	59.1(56.8,61.3)	8.4(7.1,9.7)	55.1(52.8,57.5)	18.0(16.2,19.8)	53.1(50.9,55.2)	15.9(14.3,17.5)
2nd quintile	56.7(54.6,58.7)	12.3(10.9,13.6)	51.0(48.9,53.0)	12.5(11.1,13.8)	50.1(47.5,52.7)	18.6(16.5,20.6)	47.9(45.4,50.4)	17.5(15.6,19.4)
3rd quintile	53.4(51.4,55.5)	12.4(11.0,13.8)	46.2(43.9,48.5)	14.8(13.2,16.5)	47.8(45.4,50.2)	18.9(17.0,20.8)	42.7(40.0,45.3)	19.7(17.6,21.9)
4th quintile	45.9(43.9,47.8)	13.6(12.3,15.0)	33.4(31.3,35.6)	14.3(12.7,16.0)	37.4(35.2,39.6)	20.2(18.4,22.0)	37.1(34.6,39.6)	21.8(19.7,24.0)
5th quintile (richest)	32.2(30.5,33.9)	13.5(12.3,14.8)	25.8(23.8,27.8)	14.7(13.0,16.3)	27.3(25.4,29.3)	19.3(17.6,21.0)	25.0(22.6,27.4)	16.8(14.7,18.9)
Concentration Index	-0.292 (-0.317,-0.267)	0.101 (0.049,0.152)	-0.375 (-0.406,-0.343)	0.170 (0.108,0.231)	-0.340 (-0.375,-0.305)	0.022 (-0.025,0.070)	-0.325 (-0.364,-0.286)	0.066 (0.017,0.115)
Educational level attainment								
Up to Primary educational	56.5(55.4,57.7)	12.5(11.7,13.3)	51.8(50.4,53.3)	13.4(12.4,14.3)	48.6(46.7,50.5)	22.1(20.5,23.7)	49.0(47.4,50.5)	18.39(17.7,20.2)
Secondary education	44.5(42.8,46.3)	12.0(10.9,13.2)	43.2(41.2,45.2)	12.0(10.7,13.3)	48.6(46.8,50.4)	17.5(16.2,18.9)	43.3(41.1,45.4)	16.5(14.9,18.1)
Vocational education	38.5(35.0,42.0)	11.6(9.3,13.8)	34.4(31.4,37.3)	13.8(11.7,16.0)	38.3(35.8,40.8)	19.2(17.2,21.3)	36.6(31.4,41.7)	22.9(18.4,27.4)
Tertiary and higher	23.6(21.2,26.1)	14.0(12.0,16.0)	20.5(18.3,22.7)	12.4(10.6,14.2)	25.8(23.7,27.9)	16.8(15.0,18.6)	25.3(23.0,27.6)	17.4(15.4,19.3)
Occupation								
Economically inactive	36.2(32.7,39.7)	10.9(8.7,13.2)	34.5(30.3,38.8)	13.0(10.0,16.1)	31.5(27.8,35.2)	23.4(20.0,26.8)	31.6(27.2,35.9)	16.8(13.3,20.2)
Elementary	59.7(56.9,62.5)	11.6(9.7,13.4)	52.2(49.1,55.3)	10.3(8.5,12.2)	54.3(51.0,57.7)	17.2(14.6,19.7)	53.7(50.0,57.5)	14.1(11.5,16.7)
Skilled-manual	51.7(49.8,53.7)	11.7(10.5,13.0)	49.7(47.6,51.9)	12.5(11.1,13.9)	46.0(43.9,48.1)	19.2(17.6,20.9)	45.5(43.1,47.9)	17.8(15.9,19.6)
Agricultural/fishery	58.9(57.2,60.6)	11.5(10.4,12.6)	54.2(52.0,56.4)	12.5(11.1,14.0)	51.9(49.8,54.1)	19.0(17.3,20.7)	50.7(48.8,52.7)	18.7(17.2,20.2)
Skilled- non manual	40.1(37.7,42.5)	13.8(12.1,15.5)	34.6(32.1,37.1)	13.1(11.3,14.9)	35.0(32.7,37.2)	18.2(16.4,20.0)	33.2(30.8,35.6)	19.5(17.5,21.6)
Professional	36.7(34.7,38.6)	14.5(13.1,16.0)	31.5(29.6,33.3)	14.7(13.3,16.1)	28.8(26.2,31.4)	19.1(16.9,21.4)	27.4(24.6,30.3)	18.9(16.4,21.4)

Deterministic variable	2003		2006		2009		2013	
	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)
Geographic characteristics								
Residence in region								
South	55.7(53.4,58.0)	10.1(8.7,11.5)	52.5(49.8,55.2)	8.7(7.2,10.3)	52.3(49.8,54.9)	14.8(13.0,16.6)	50.9(48.3,53.5)	15.6(13.7,17.5)
Northeast	54.9(53.1,56.7)	13.6(12.3,14.8)	46.2(44.2,48.2)	13.6(12.2,14.9)	46.1(43.9,48.3)	22.3(20.4,24.1)	47.1(44.8,59.4)	19.6(17.8,21.4)
North	47.1(45.2,49.1)	16.2(14.8,17.7)	40.0(38.1,42.0)	18.9(17.3,20.5)	38.1(35.9,40.3)	22.1(20.2,24.0)	38.7(36.4,41.0)	19.7(17.8,21.6)
Central(except Bangkok)	43.7(42.0,45.3)	10.3(9.3,11.3)	41.1(39.2,42.9)	9.3(8.2,10.4)	40.8(39.0,42.6)	16.9(15.5,18.3)	38.5(36.5,40.5)	17.4(15.9,19.0)
Bangkok	38.1(34.6,41.7)	11.1(8.8,13.4)	35.7(31.7,39.6)	12.6(9.8,15.3)	27.5(23.9,31.1)	19.9(16.7,23.1)	33.3(28.8,37.8)	17.9(14.2,21.6)
Area								
Non-municipal area	55.2(53.7,56.6)	12.2(11.3,13.2)	51.7(50.0,53.3)	12.1(11.0,13.2)	49.3(47.6,51.0)3	19.3(17.9,20.6)1	49.2(47.5,50.9)	16.8(15.5,18.1)
Municipal area	44.5(43.3,45.7)	12.6(11.8,13.4)	38.6(37.3,39.8)	13.4(12.5,14.3)	8.1(36.8,39.4)	8.9(17.9,20.0)	37.4(36.0,38.9)	19.2(18.0,20.4)

Note; N- nationally representative sample; Proportion-proportion of current- and former smokers in adult population; 95% CI-95 % confidence interval ; the remainder corresponds to Non-smokers groups and not shown in the table

Table 8: Distribution of current smokers across HAI among Thai male adults aged 20-59 years in HWS 2003- 2013

Deterministic variable (=1 if yes, =0 if otherwise)	current smokers			
	2003	2006	2009	2013
	N,(%)	N,(%)	N,(%)	N,(%)
Overall prevalence	11601,(48.9)	9371,(43.4)	8693,(42.6)	7679,(42.6)
HAI Composite				
Less advancement	7242,(51.7)*	4931,(45.2)*	3868,(45.4)*	4234,(43.7)*
Higher advancement	4359,(44.3)	4440,(41.4)	4825,(40.3)	3305,(41.1)
8 components of HAI				
Health index				
Less advancement	4833,(51.6)*	4836,(45.0)*	4685,(42.9)	3873,(42.9)
Higher advancement	6485,(46.6)	4443,(41.7)	4008,(42.1)	3806,(42.4)
Education index				
Less advancement	6886,(51.3)*	4451,(44.6)*	4093,(45.2)*	3781,(45.1)*
Higher advancement	4715,(45.5)	4919,(42.4)	4600,(40.3)	3898,(40.3)
Employment index				
Less advancement	3555,(51.1)*	2730,(44.4)	2774,(44.2)*	2350,(43.7)
Higher advancement	8046,(47.9)	6641,(43.0)	5919,(41.8)	5329,(42.2)
Income index				
Less advancement	4826,(52.2)*	5751,(44.3)*	3783,(43.5)	4732,(43.4)
Higher advancement	6775,(46.6)	3620,(42.0)	4910,(41.9)	2947,(41.4)
Housing and living condition index				
Less advancement	5791,(52.0)*	4992,(44.5)*	4485,(43.7)*	4540,(40.6)
Higher advancement	5810,(45.8)	4379,(42.2)	4208,(41.4)	3139,(45.7)
Family and community index				
Less advancement	1582,(41.1)	3799,(42.9)	2849,(41.8)	3024,(42.6)
Higher advancement	10019,(50.2)	5572,(43.8)	5844,(42.9)	4655,(42.7)
Transportation and communication				
Less advancement	6210,(52.1)*	3990,(44.3)	4105,(45.2)*	4201,(45.6)*
Higher advancement	5391,(45.2)	5381,(42.7)	4588,(40.2)	3478,(39.1)
Participation index				
Less advancement	841,(37.3)	4543,(43.6)	4401,(42.9)	3525,(41.8)
Higher advancement	10760,(49.8)	4828,(43.3)	4292,(42.2)	4154,(43.4)

Note; N - nationally representative sample, (% of n) percentage of current smokers ,* denotes $p < .05$,

Table 9: Adjusted odds ratios (OR) with 95% confidence intervals (95%CI), for the associations between current smokers and underlying determinants among Thai male adults during HWS2003 and HWS2013

Deterministic variables	**2003**	**2006**	**2009**	**2013**
	Adjusted	**Adjusted**	**Adjusted**	**Adjusted**
(=1 if yes, =0 if otherwise)	**ORs (95% CI)**	**ORs (95% CI)**	**ORs (95% CI)**	**ORs (95% CI)**
Demographic characteristics				
Age group(years)				
20-34	0.96(0.86,1.08)	0.99(0.88,1.13)	-	1.22(1.05,1.41)*
35-44	1.16(1.05,1.28)*	1.10(0.99,1.23)	-	1.13(1.00,1.27)*
45-59(ref)	1	1	-	1
Marital status				
Single	0.88(0.79,0.99)*	0.82(0.71,0.94)*	0.96(0.85,1.10)	1.11(0.96,1.28)
Married(ref)	1	1	1	1
Widowed/separated/divorced	1.41(1.14,1.75)*	1.19(0.98,1.45)	1.41(1.15,1.73)*	1.28(1.06,1.55)*
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	2.24(1.92,2.60)*	2.52(2.12,2.99)*	2.18(1.85,2.58)*	1.85(1.53,2.25)*
2nd quintile	1.67(1.45,1.92)*	1.83(1.56,2.14)*	1.91(1.62,2.26)*	1.52(1.25,1.84)*
3rd quintile	1.66(1.46,1.90)*	1.55(1.32,1.82)*	1.72(1.47,2.02)*	1.31(1.08,1.59)*
4th quintile	1.33(1.17,1.50)*	1.07(0.91,1.25)	1.16(0.99,1.34)	1.19(0.99,1.43)
5th quintile (richest) (ref)	1	1	1	1
Educational level attainment				
Up to Primary educational	2.61(2.19,3.11)*	2.21(1.84,2.64)*	1.96(1.64,2.34)*	2.00(1.66,2.40)*
Secondary education	2.07(1.74,2.45)*	1.92(1.61,2.29)*	1.93(1.64,2.28)*	1.68(1.41,2.00)*
Vocational	1.74(1.41,2.15)*	1.61(1.32,1.96)*	1.48(1.24,1.76)*	1.26(0.96,1.67)
Tertiary and higher (ref)	1	1	1	1
Occupation				
Economically inactive	0.91(0.74,1.11)	1.18(0.94,1.49)	0.92(0.72,1.18)	1.01(0.76,1.33)
Elementary	1.32(1.12,1.57)*	1.29(1.09,1.53)*	1.46(1.17,1.83)*	1.48(1.16,1.89)*
Skilled-manual	1.10(0.96,1.26)	1.30(1.13,1.50)*	1.14(0.95,1.38)	1.28(1.04,1.57)*
Agricultural/fishery	1.16(1.01,1.33)*	1.32(1.13,1.53)*	1.26(1.03,1.53)*	1.37(1.11,1.68)*
Skilled- non manual	0.93(0.80,1.07)	1.00(0.85,1.16)	0.97(0.81,1.16)	0.94(0.77,1.16)
Professional(ref)	1	1	1	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2003 Adjusted ORs (95% CI)	2006 Adjusted ORs (95% CI)	2009 Adjusted ORs (95% CI)	2013 Adjusted ORs (95% CI)
Geographic characteristics				
Residence in region				
South	2.04(1.68,2.49)*	-	3.03(1.40,3.82)*	1.90(1.47,2.48)*
Northeast	1.33(1.10,1.60)*	-	1.68(1.35,2.10)*	1.12(0.86,1.45)
North	0.98(0.81,1.18)	-	1.24(0.99,1.56)	0.75(0.58,0.97)*
Central(except Bangkok)	1.05(0.87,1.26)	-	1.53(1.23,1.90)*	0.85(0.66,1.09)
Bangkok(ref)	1	-	1	1
Area				
Non-municipal area	1.08(0.99,1.18)	1.28(1.16,1.41)*	0.88(0.79,0.98*)	1.74(1.66,1.82)*
Municipal area(ref)	1	1	1	1
Health-related behavior				
Whether consumed alcoholic beverage	2.90(2.65,3.17)*	2.87(2.61,3.15)*	3.55(3.20,3.94)*	3.61(3.23,4.03)*
Whether having emotional stress in last month	1.58(1.10,2.26)*	-	-	1.22(0.98,1.50)
Whether intake snack daily	-	-	0.88(0.71,1.09)	0.85(0.76,0.95)*
Whether intake sweetened beverage daily	-	-	1.41(1.28,1.56)*	1.24(1.10,1.41)*
Social and community involved				
Whether have good relationship with				
-family members	-	-	-	1.18(0.88,1.57)
-friends	-	-	-	0.89(0.76,1.04)
- community members	-	-	-	0.936(0.83,1.05)
Whether have difficulty in social interaction	0.50(0.31,0.80)*	-	-	-

Note; ORs – Odds Ratios; 95% CI- 95% confidence interval; * p<0.05

Table 10: Distribution of current- and former smokers across social determinant among Thai female adults aged 20-59 years during HWS 2003 and 2013

Deterministic variable	2003 Current- N=507 Proportion (95%CI)	Former- N=131 Proportion (95%CI)	2006 Current- N=415 Proportion (95%CI)	Former- N=91 Proportion (95%CI)	2009 Current- N=319 Proportion (95%CI)	Former- N=148 Proportion (95%CI)	2013 Current- N=282 Proportion (95%CI)	Former- N=171 Proportion (95%CI)
Overall	3.2(2.9,3.5)	0.8(0.6,0.9)	2.9(2.6,3.1)	0.6(0.5,0.7)	2.4(2.1,2.6)	1.1(0.9,1.2)	2.3(2.0,2.5)	1.4(1.1,1.6)
Demographic characteristics								
Age group(years)								
20-34	1.8(1.4,2.1)	0.6(0.4,0.8)	1.8(1.4,2.2)	0.4(0.2,0.5)	1.4(1.0,1.8)	0.8(0.5,1.0)	1.7(1.2,2.2)	0.8(0.5,1.2)
35-44	3.1(2.6,3.5)	0.5(0.3,0.7)	2.5(2.1,3.0)	0.4(0.2,0.6)	2.2(1.7,2.7)	0.8(0.5,1.1)	1.9(1.5,2.4)	0.8(0.5,1.2)
45-59	4.5(4.0,5.1)	1.2(0.9,1.5)	3.8(3.3,4.3)	0.9(0.6,1.1)	3.0(2.6,3.4)	1.4(1.1,1.8)	2.7(2.3,3.1)	1.9(1.6,2.3)
Marital status								
Single	1.4(0.9,1.8)	0.6(0.2,0.9)	2.0(1.3,2.6)	0.3(0.0,0.5)	1.8(1.1,2.4)	0.7(0.3,1.1)	1.6(0.9,2.2)	1.1(0.6,1.6)
Married	3.1(2.7,3.4)	0.7(0.6,0.9)	2.8(2.5,3.1)	0.6(0.4,0.8)	2.2(1.9,2.5)	1.1(0.8,1.3)	2.2(1.9,2.5)	1.2(1.0,1.5)
Widowed/separated/divorced	5.9(4.8,7.1)	1.2(0.7,1.7)	3.8(2.9,4.6)	0.7(0.3,1.1)	3.9(3.0,4.8)	1.4(0.9,2.0)	3.3(2.4,4.2)	2.1(1.4,2.8)

Deterministic variable	2003		2006		2009		2013	
	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)
Socioeconomic characteristics								
Household assets								
1st quintile(poorest)	7.2(6.2,8.3)	1.5(1.0,2.0)	4.8(4.0,5.7)	0.9(0.5,1.3)	4.8(3.9,5.7)	1.6(1.1,2.1)	4.0(3.2,4.7)	1.9(1.4,2.4)
2nd quintile	4.3(3.5,5.0)	0.7(0.4,1.0)	3.6(2.9,4.2)	0.5(0.3,0.8)	3.4(2.7,4.2)	1.2(0.8,1.7)	2.6(2.0,3.2)	1.3(0.9,1.7)
3rd quintile	3.1(2.5,3.7)	0.8(0.5,1.2)	2.9(2.3,3.5)	0.7(0.4,1.0)	2.3(1.7,2.9)	1.5(1.0,1.9)	1.7(1.2,2.3)	1.5(1.0,2.0)
4th quintile	2.1(1.6,2.6)	0.5(0.3,0.8)	1.7(1.2,2.2)	0.6(0.3,0.9)	1.4(1.0,1.9)	0.5(0.3,0.8)	1.6(1.1,2.1)	1.1(0.7,1.6)
5th quintile (richest)	0.9(0.6,1.2)	0.6(0.3,0.8)	1.3(0.9,1.7)	0.2(0.0,0.3)	0.9(0.5,1.2)	0.7(0.4,1.0)	0.8(0.4,1.2)	0.8(0.4,1.2)
Concentration Index	-0.053 (-0.060,-0.045)	-0.021 (-0.032,-.008)	-0.038 (-0.047,-0.029)	-0.015 (-0.026,-0.004)	-0.044 (-0.053,-0.035)	-0.019 (-0.030,-0.009)	-0.038 (-0.048,-0.029)	-0.017 (-0.029,-0.006)
Educational level attainment								
Up to Primary educational	4.3(3.9,4.7)	1.0(0.8,1.2)	3.8(3.4,4.2)	0.7(0.5,0.9)	4.0(3.5,4.6)	1.6(1.3,2.0)	3.0(2.6,3.4)	1.7(1.4,2.0)
Secondary education	1.5(1.1,2.0)	0.5(0.3,0.8)	1.9(1.4,2.5)	0.6(0.3,0.9)	1.9(1.5,2.3)	0.8(0.5,1.1)	1.6(1.1,2.0)	1.1(0.7,1.5)
Vocational education	0.4(0.05,0.9)	0.4(0.05,0.9)	1.4(0.7,2.2)	0.5(0.1,1.0)	0.9(0.4,1.3)	0.8(0.4,1.3)	2.2(0.6,3.7)	0.0
Tertiary and higher	0.2(0.0,0.4)	0.1(0.0,0.3)	0.5(0.2,0.8)	0.04(0.0,0.1)	0.7(0.3,1.0)	0.5(0.2,0.8)	0.7(0.3,1.1)	0.7(0.4,1.1)
Occupation								
Economically inactive	3.0(2.4,3.6)	0.9(0.6,1.2)	2.8(2.2,3.4)	0.5(0.2,0.8)	2.7(2.1,3.2)	0.9(0.6,1.2)	2.0(1.4,2.6)	1.0(0.6,1.5)
Elementary	6.5(5.3,7.7)	1.2(0.6,1.7)	4.9(3.8,6.1)	1.4(0.8,2.1)	5.0(3.8,6.2)	1.8(1.1,2.6)	5.1(3.8,6.4)	2.5(1.6,3.4)
Skilled-manual	2.8(2.0,3.6)	1.0(0.5,1.5)	2.6(1.7,3.5)	0.3(0.0,0.7)	2.1(1.3,2.9)	1.5(0.8,2.2)	2.3(1.4,3.2)	1.3(0.6,2.0)
Agricultural/fishery	4.0(3.4,4.6)	1.0(0.7,1.4)	3.6(2.9,4.2)	0.6(0.3,0.8)	2.8(2.1,3.5)	1.2(0.8,1.7)	2.5(2.0,3.0)	1.4(1.0,1.8)
Skilled- non manual	2.1(1.6,2.6)	0.4(0.2,0.6)	2.3(1.8,2.8)	0.5(0.3,0.8)	1.3(1.0,1.7)	0.9(0.6,1.2)	1.5(1.0,1.9)	1.5(1.0,1.9)
Professional	1.2(0.7,1.6)	0.3(0.0,0.5)	1.4(0.9,1.9)	0.4(0.1,0.6)	1.4(0.8,2.1)	0.4(0.1,0.8)	1.2(0.5,1.8)	0.3(0.0,0.7)

Deterministic variable	2003		2006		2009		2013	
	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)	Current-Proportion (95%CI)	Former-Proportion (95%CI)
Geographic characteristics								
Residence in region								
South	2.8(2.1,3.4)	0.2(0.0,0.4)	2.9(2.1,3.6)	0.1(0.0,0.3)	2.0(1.4,2.6)	1.1(0.7,1.5)	1.8(1.2,2.3)	1.3(0.8,1.8)
Northeast	1.2(0.9,1.6)	0.4(0.2,0.6)	1.6(1.2,2.0)	0.2(0.0,0.3)	1.2(0.8,1.6)	0.5(0.3,0.8)	1.0(0.6,1.3)	0.6(0.4,0.9)
North	5.8(5.0,6.6)	2.1(1.6,2.5)	4.4(3.7,5.0)	1.5(1.1,1.9)	3.7(3.0,4.4)	1.9(1.4,2.4)	3.8(3.0,4.5)	2.6(2.0,3.2)
Central(except Bangkok)	3.3(2.8,3.8)	0.6(0.4,0.8)	2.9(2.3,3.4)	0.3(0.1,0.5)	2.6(2.2,3.1)	1.0(0.6,1.3)	2.6(2.1,3.1)	1.1(0.8,1.5)
Bangkok	2.0(14.1,2.9)	0.3(0.0,0.6)	1.5(0.7,2.4)	0.9(0.2,1.6)	1.4(0.5,2.2)	0.6(0.0,1.2)	2.4(1.1,3.6)	1.0(0.2,1.8)
Area								
Non-municipal area	4.1(3.6,4.5)	0.9(0.6,1.1)	3.4(3.0,3.9)	0.6(0.4,0.9)	3.1(2.7,3.6)	1.2(0.9,1.5)	2.9(2.4,3.3)	1.6(1.2,1.9)
Municipal area	2.5(2.2,2.8)	0.7(0.5,0.9)	2.4(2.1,2.8)	0.5(0.4,0.7)	1.8(1.5,2.1)	1.0(0.8,1.2)	1.8(1.5,2.1)	1.2(0.9,1.4)

Note; N- nationally representative sample; Proportion-proportion of current- and former smokers in adult population; 95% CI-95 % confidence interval ; the remainder corresponds to Non-smokers groups and not shown in the table

Table 11: Distribution of current smokers across HAI among Thai female male adults aged 20-59 years in HWS 2003- 2013

Deterministic variable (=1 if yes, =0 if otherwise)	current smokers			
	2003	2006	2009	2013
	N,(%)	N,(%)	N,(%)	N,(%)
Overall prevalence	15953,(3.2)	14473,(2.9)	13283,(2.4)	12220,(2.3)
HAI Composite				
Less advancement	10135,(3.2)	7772,(2.8)	6108,(2.5)	6944,(2.2)
Higher advancement	5818,(3.1)	6701,(3.0)	7175,(2.3)	5096,(2.4)
8 components of HAI				
Health index				
Less advancement	6689,(3.2)	7556,(2.9)	7355,(2.7)*	6212,(2.2)
Higher advancement	8896,(3.2)	6737,(2.8)	5928,(2.0)	6008,(2.4)
Education index				
Less advancement	6369,(3.3)	7008,(3.2)*	6333,(2.3)	6139,(2.2)
Higher advancement	9584,(3.1)	7465,(2.6)	6950,(2.5)	6081,(2.5)
Employment index				
Less advancement	4817,(3.0)	4316,(3.0)	4455,(2.4)	3862,(2.3)
Higher advancement	11136,(3.3)	10157,(2.8)	8828,(2.4)	8358,(2.3)
Income index				
Less advancement	6701,(2.9)	8969,(3.0)	5914,(2.5)	7804,(2.3)
Higher advancement	9552,(3.4)	5504,(2.7)	7369,(2.4)	4416,(2.4)
Housing and living condition index				
Less advancement	7972,(3.1)	7530,(2.6)	6934,(2.4)	7099,(2.3)
Higher advancement	7981,(3.2)	6943,(3.2)	6349,(2.5)	5121,(2.3)
Family and community index				
Less advancement	2104,(3.7)	5812,(3.0)	4209,(2.7)	4814,(2.2)
Higher advancement	13849,(3.1)	8661,(2.8)	9074,(2.3)	7406,(2.4)
Transportation and communication				
Less advancement	8575,(3.0)	6273,(3.1)	6449,(2.4)	6776,(2.1)
Higher advancement	7378,(3.4)	8200,(2.7)	6834,(2.4)	5444,(2.5)
Participation index				
Less advancement	1086,(2.2)	6861,(2.7)	6593,(2.4)	5464,(2.2)
Higher advancement	14867,(3.3)	7612,(3.1)	6690,(2.4)	6756,(2.4)

Note; N - nationally representative sample, (% of n) percentage of current smokers ,* denotes $p < .05$,

Table 12: Adjusted odds ratios (OR) with 95% confidence intervals (95%CI), for the associations between current smokers and underlying determinants among Thai female adults during HWS2003 and HWS2013

Deterministic variables (=1 if yes, =0 if otherwise)	**2003 Adjusted ORs (95% CI)**	**2006 Adjusted ORs (95% CI)**	**2009 Adjusted ORs (95% CI)**	**2013 Adjusted ORs (95% CI)**
Demographic characteristics				
Age group(years)				
20-34	0.47(0.36,0.62)*	0.53(0.39,0.72)*	-	0.76(0.51,1.14,)
35-44	0.69(0.55,0.86)*	0.61(0.48,0.78)*	-	0.75(0.55,1.01)
45-59(ref)	1	1	-	1
Marital status				
Single	0.90(0.61,1.33)	-	1.29(0.85,1.96)	0.84(0.52,1.35)
Married(ref)	1	-	1	1
Widowed/separated/divorced	1.37(1.07,1.77)*	-	1.45(1.08,1.95)*	1.12(0.80,1.55)
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	5.15(3.50,7.56)*	2..40(1.60,3.58)*	3.54(2.24,5.60)*	3.77(2.10,6.78)*
2nd quintile	2.84(1.92,4.19)*	1.63(1.09,2.43)*	2.48(1.55,3.96)*	2.29(1.27,4.12)*
3rd quintile	2.10(1.42,3.12)*	1.24(0.82,1.87)	1.49(0.93,2.40)	1.59(0.85,2.96)
4th quintile	1.50(1.01,2.24)*	0.87(0.56,1.36)	1.17(0.71,1.92)	1.67(0.91,3.05)
5th quintile (richest) (ref)	1	1	1	1
Educational level attainment				
Up to Primary educational	7.65(2.69,21.76)*	4.31(2.27,8.19)*	4.46(2.37,8.40)*	2.22(1.15,4.30)*
Secondary education	4.90(1.70,14.09)*	2.95(1.51,5.77)*	2.38(1.25,4.53)*	1.58(0.81,3.09)
Vocational	1.68(0.36,7.67)	2.25(1.01,4.99)*	1.23(0.58,2.64)	2.59(1.04,6.46)*
Tertiary and higher (ref)	1	1	1	1
Occupation				
Economically inactive	1.16(0.72,1.86)	-	0.80(0.44,1.45)	0.91(0.44,1.86)
Elementary	1.34(0.83,2.17)	-	0.81(0.44,1.50)	1.47(0.55,2.38)
Skilled-manual	0.82(0.48,1.40)	-	0.43(0.22,0.86)*	0.64(0.29,1.39)
Agricultural/fishery	0.96(0.60,1.55)	-	0.57(0.31,1.06)	0.81(0.41,1.66)
Skilled- non manual	0.92(0.57,1.49)	-	0.42(0.23,0.77)*	0.61(0.30,1.24)
Professional(ref)	1	-	1	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2003 Adjusted ORs (95% CI)	2006 Adjusted ORs (95% CI)	2009 Adjusted ORs (95% CI)	2013 Adjusted ORs (95% CI)
Geographic characteristics				
Residence in region				
South	1.46(0.84,2.53)	2.45(1.28,4.67)*	1.41(0.70,2.86)	0.91(0.46,1.80)
Northeast	0.27(0.15,0.48)*	0.68(0.36,1.29)	0.38(0.18,0.78)*	0.23(0.11,0.46)*
North	1.27(0.76,2.12)	1.58(0.86,2.92)	1.24(0.63,2.43)	0.85(0.45,1.59)
Central(except Bangkok)	1.23(0.73,2.06)	1.78(0.96,3.30)	1.31(0.67,2.54)	0.91(0.49,1.69)
Bangkok(ref)	1	1	1	1
Area				
Non-municipal area	1.17(0.96,1.44)	-	0.71(0.55,0.92)*	1.73(0.56,1.95)
Municipal area(ref)	1	-	1	1
Health-related behavior				
Whether consumed alcoholic beverage	7.31(5.98,8.94)*	9.39(7.56,11.67)*	8.89(6.93,11.42)*	7.99(6.13,10.42)*
Whether having emotional stress	1.68(1.02,2.78)*	1.85(1.09,3.15)*	-	1.10(0.67,1.78)
Whether intake snack daily	-	-	-	0.80(0.60,1.05)
Whether intake sweetened beverage daily	-	-	1.84(1.45,2.35)*	1.34(1.01,1.77)*
Social and community involved				
Whether have good relationship with				
-family members	-		-	0.71(0.41,1.24)
-friends	-	-	-	1.14(0.77,1.67)
- community members	-	-	-	0.84(0.63,1.11)
Whether have difficulty in social interaction	0.61(0.17,2.13)	-	-	-

Note; ORs – Odds Ratios; 95% CI- 95% confidence interval; * p<0.05

4.2 Distribution of Alcohol Consumption and Association Between Alcohol Consumption and Underlying Determinants.

Table 13 showed the overall prevalence of occasionally alcoholic beverage consumption among Thai male adults was slightly changed from 52.5% to 44.5%, 46.1%, 44.4% whereas trends among regularly drinkers nearly unchanged during 2003-2013. In general, occasionally drinkers was more concentrated among adults aged 20-34 years, single marital status and residing in Northeast region of Thailand whereas regularly drinkers more common among adults aged 35-44 years, windowed/separated/divorced marital status. Interestingly, the percentage of distribution showed that regularly drinking was more concentrated among lower, middle SES hierarchies (1^{st}, 2^{nd}, 3^{rd} and 4^{th} quintiles), less educated, being elementary and skilled manual type of occupation, this situation consistent with the concentration index analysis that corroborate pro-poor socioeconomic inequalities in routine drinking habit as indicated by its negative values during 2003 and 2013 suggest that those belonging to lower SES group intake alcoholic beverage more frequent than the better-off do. Interestingly, the magnitude of C_{Index} among male with regularly drinkers has increased during 2003 and 2013. Moreover, those living in North region of Thailand exhibited higher prevalence of regularly drinkers than other areas.

To determine contribution of structural determinants to behaviors of current drinkers (occasionally and regularly), the human achievement index (HAI) and its eight components were employed. The Chi-square analyses of alcoholic beverage drinkers revealed statistically differences at human achievement index (HAI) indicate that higher prevalence of current drinkers was concentrated with less advancement of HAI and its eight components particularly health index, education

index, employment index, income index, housing and living condition index, and transportation index compared to high level of aforementioned indices (Table 14).

Table 15 shows association between current alcohol drinkers and underlying determinants among male incorporating all variables in the table. After adjusting for age, marital status, household living standard quintile, education, occupation, geographic characteristics, health-related variables and social context, the adjusted ORs show that current drinkers were more likely to be among the younger adult ages, living in North and Northeast region. In addition, current drinkers were more likely to be current smokers compared to their non-drinkers counterparts.

Table 16 showed the overall prevalence of occasionally alcoholic beverage consumption among female adults has reduced between 2003 to 2006, then the trend among female is slightly increased, the increasing trends of occasionally drinkers was also consistent with regularly drinkers. Generally, trends of occasionally and regularly drinkers among female was similarly to trends among males. The results showed that the prevalence of regularly drinking was more concentrated among lower SES hierarchies (1^{st}, 2^{nd} quintiles), less educated, being elementary type of occupation which was consistent with the negative value of concentration index in the four survey years. However, there were several gender different features with the prevalence among female is lower than those in males, and occasionally drinkers found to be more common among middle adult female groups (aged 35-44 years) whereas highest prevalence of occasionally drinkers among males was distributed through the younger adults (aged 20-34 years). In addition, female with widowed/separated/divorced marital status exhibited higher prevalence of occasionally drinkers whereas male drinkers accumulated in single marital status group. Table 17 showed the Chi-square analyses of current alcoholic beverage drinkers revealed statistically differences at human achievement index (HAI)

indicate that higher prevalence of current drinkers among female was concentrated with less advancement of HAI same as trends among males. Multiple logistic regression model revealed association between female drinkers and several type of demographic, socioeconomic, geographic factors and health related measures. It is noteworthy that female drinkers are strongly associated with current smoking habits (Table 18).

Table 13: Distribution of occasionally- and regularly alcoholic beverage drinkers across social determinant among Thai male adults aged 20-59 years during HWS 2003 and 2013

Deterministic variable	2003		2006		2009		2013	
	Occasionally N=6086 Proportion (95%CI)	Regularly N=2013 Proportion (95%CI)	Occasionally N=4174 Proportion (95%CI)	Regularly N=1731 Proportion (95%CI)	Occasionally N=4011 Proportion (95%CI)	Regularly N=1533 Proportion (95%CI)	Occasionally N=3411 Proportion (95%CI)	Regularly N=1419 Proportion (95%CI)
Overall	52.5(51.5,53.4)	17.4(16.6,18.0)	44.5(43.5,45.5)	18.5(17.7,19.3)	46.1(45.1,47.2)	17.6(16.8,18.4)	44.4(43.3,45.5)	18.5(17.6,19.3)
Demographic characteristics								
Age group(years)								
20-34	56.4(54.9,58.0)	14.5(13.4,15.7)	49.6(47.8,51.5)	16.9(15.5,18.4)	52.4(50.4,54.4)	15.3(13.9,16.7)	49.6(47.3,51.9)	16.1(14.5,17.8)
35-44	52.9(51.2,54.5)	18.8(17.5,20.1)	45.9(44.1,47.7)	20.1(18.6,21.6)	47.3(45.4,49.3)	19.8(18.2,21.3)	46.1(44.0,48.2)	19.3(17.7,21.0)
45-59	48.3(46.8,49.8)	18.6(17.4,19.8)	39.9(38.3,41.4)	18.2(17.0,19.4)	41.2(39.6,42.8)	17.5(16.3,18.8)	40.8(39.2,42.4)	19.0(17.8,20.3)
Marital status								
Single	53.4(51.3,55.4)	13.3(11.9,14.7)	46.0(43.5,48.4)	17.2(15.4,19.1)	46.8(44.4,49.2)	17.0(15.2,18.8)	46.8(44.4,49.3)	17.5(15.6,19.4)
Married	52.4(51.3,53.4)	18.0(17.2,18.8)	44.5(43.4,54.7)	17.9(17.1,18.8)	46.4(45.2,47.6)	17.1(16.1,18.0)	44.2(42.9,45.5)	17.7(16.7,18.7)
Widowed/separated/divorced	48.1(43.3,52.8)	23.1(19.1,27.1)	39.5(35.3,43.7)	28.8(24.9,32.7)	39.8(35.4,44.2)	26.7(22.8,30.7)	38.9(34.9,42.9)	28.1(24.4,31.8)

Deterministic variable	2003		2006		2009		2013	
	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)
Socioeconomic characteristics								
Household assets								
1st quintile(poorest)	52.8(50.5,55.0)	19.3(17.6,21.1)	42.0(39.7,44.3)	23.1(21.2,25.1)	47.1(44.7,49.4)	20.8(18.9,22.7)	43.9(41.7,46.0)	20.7(19.0,22.5)
2nd quintile	55.0(52.9,57.1)	18.2(16.5,19.8)	46.4(44.4,48.5)	17.0(15.4,18.6)	44.6(42.0,47.2)	18.6(16.6,20.7)	42.5(40.1,45.0)	21.0(19.0,23.0)
3rd quintile	51.6(49.6,53.7)	17.7(16.1,19.3)	44.2(41.9,46.5)	20.3(18.4,22.1)	45.6(43.1,48.0)	19.0(17.1,21.0)	45.6(43.0,48.3)	18.0(15.9,20.0)
4th quintile	51.5(49.5,53.4)	18.5(16.9,20.0)	45.1(42.8,47.4)	17.4(15.7,19.2)	45.0(42.8,47.3)	17.9(16.1,19.6)	45.7(43.2,48.3)	18.0(16.0,20.0)
5th quintile (richest)	51.6(49.7,53.4)	14.0(12.7,15.2)	44.2(41.9,46.5)	14.7(13.0,16.3)	47.6(45.4,49.7)	12.8(11.3,14.2)	44.6(41.8,47.3)	12.4(10.6,14.3)
Concentration Index	-0.018 (-0.037,-0.001)	-0.120 (-0.174,-0.065)	0.011 (-0.014,0.038)	-0.168 (-0.228,-0.107)	0.009 (-0.018,0.036)	-0.212 (-0.278,-0.145)	0.020 (-0.009,0.050)	-0.208 (-0.278,-0.139)
Educational level attainment								
Up to Primary educational	50.9(49.7,52.1)	19.5(18.6,20.5)	41.6(40.1,43.0)	20.8(19.6,22.0)	40.3(38.5,42.2)	20.1(18.5,21.6)	41.7(40.2,43.3)	20.1(18.8,21.3)
Secondary education	54.1(52.4,55.9)	15.3(14.0,16.6)	47.6(45.6,49.6)	18.4(16.8,19.9)	47.3(45.5,49.1)	19.0(17.6,20.4)	45.8(43.6,48.0)	19.7(17.9,21.4)
Vocational education	55.2(51.6,58.7)	14.9(12.3,17.4)	48.7(45.6,51.8)	17.4(15.0,19.7)	50.2(47.6,52.8)	16.6(14.6,18.5)	47.3(41.9,52.6)	20.5(16.2,24.8)
Tertiary and higher	54.9(52.0,57.7)	11.5(9.7,13.4)	46.2(43.5,48.9)	10.9(9.2,12.6)	49.5(47.1,51.9)	12.1(10.5,13.6)	49.0(46.4,51.6)	11.6(9.9,13.3)
Occupation								
Economically inactive	42.6(39.0,46.1)	10.0(7.8,12.1)	32.9(28.6,37.1)	12.6(9.6,15.6)	33.0(29.2,36.7)	13.3(10.6,16.0)	29.5(25.3,33.8)	14.5(11.2,17.8)
Elementary	51.0(48.2,53.9)	22.3(20.0,24.7)	42.9(39.8,45.9)	23.6(21.0,26.2)	45.3(41.9,48.7)	23.5(20.6,26.4)	41.5(37.8,45.2)	26.9(23.6,30.2)
Skilled-manual	53.0(51.1,55.0)	20.4(18.8,21.9)	46.2(44.0,48.3)	22.0(20.2,23.7)	48.0(45.9,50.1)	21.6(19.9,23.3)	45.4(43.0,47.8)	21.7(19.7,23.7)
Agricultural/fishery	55.6(53.9,57.3)	16.7(15.4,18.0)	44.1(42.0,46.3)	17.6(15.9,19.2)	47.7(45.5,49.8)	15.4(13.8,16.9)	45.3(43.3,47.2)	18.0(16.5,19.5)
Skilled- non manual	50.9(48.5,53.4)	15.1(13.3,16.8)	46.4(43.7,49.0)	15.9(13.9,17.8)	43.6(41.3,45.9)	16.8(15.0,18.5)	44.6(42.1,47.2)	15.5(13.7,17.4)
Professional	52.2(50.2,54.2)	16.1(14.7,17.6)	45.3(43.3,47.3)	16.5(15.0,18.0)	50.7(47.9,53.6)	13.2(11.3,15.1)	48.9(45.7,52.1)	14.0(11.8,16.2)

Deterministic variable	2003		2006		2009		2013	
	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)
Geographic characteristics								
Residence in region								
South	42.5(40.2,44.7)	10.8(9.4,12.3)	32.3(29.7,34.8)	13.8(11.9,15.6)	36.9(34.5,39.3)	10.9(9.3,12.4)	34.4(32.0,36.9)	12.0(10.3,13.7)
Northeast	62.0(60.3,63.8)	17.7(16.3,19.1)	53.2(51.2,55.1)	16.3(14.8,17.7)	57.7(55.5,60.0)	17.5(15.8,19.2)	52.9(50.6,55.1)	16.5(14.8,18.2)
North	56.5(54.6,58.4)	22.7(21.1,24.4)	47.5(45.4,49.5)	24.3(22.5,26.0)	47.8(45.5,50.1)	21.1(19.2,22.9)	44.9(42.5,47.3)	25.6(23.6,27.7)
Central(except Bangkok)	46.9(45.3,48.6)	17.4(16.2,18.7)	38.9(37.0,40.7)	18.6(17.2,20.1)	42.9(41.0,44.7)	19.3(17.8,20.7)	43.0(41.0,45.0)	19.4(17.8,21.0)
Bangkok	50.2(46.6,53.9)	12.2(9.8,14.6)	50.0(45.9,54.2)	12.7(10.0,15.5)	41.4(37.4,45.4)	16.2(13.2,19.2)	45.8(41.0,50.5)	13.9(10.5,17.2)
Area								
Non-municipal area	53.4(52.0,54.8)	16.9(15.8,17.9)	42.8(41.2,44.5)	19.3(17.9,20.6)	47.9(46.2,49.6)	16.7(15.5,18.0)	44.5(42.8,46.2)	19.1(17.7,20.4)
Municipal area	51.7(50.6,52.9)	17.6(16.7,18.5)	45.5(44.2,46.7)	17.9(17.0,18.9)	44.9(43.6,46.2)	18.1(17.1,19.2)	44.3(42.8,45.7)	17.9(16.8,19.1)

Note; N- nationally representative sample; Proportion-proportion of occasionally (less than 1 day/week) and regularly(at least 1-2 day/week) alcoholic beverage drinkers in adult population; 95% CI-95 % confidence interval; the remainder corresponds to non-drinkers groups and not shown in the table

Table 14: Distribution of current alcoholic beverage drinkers across HAI among Thai male adults aged 20-59 years in HWS 2003- 2013

Deterministic variable	**Current drinkers**			
(=1 if yes, =0 if otherwise)	**2003**	**2006**	**2009**	**2013**
	N,(%)	**N,(%)**	**N,(%)**	**N,(%)**
HAI Composite				
Less advancement	7242,(73.3)*	4931,(66.8) *	3868,(67.2) *	4234,(64.0) *
Higher advancement	4359,(64.0)	4440,(58.8)	4825,(61.0)	3305,(60.8)
8 components of HAI				
Health index				
Less advancement	4836,(73.9) *	4836,(69.0) *	4685,(66.0) *	3873,(65.2) *
Higher advancement	6485,(66.9)	4445,(56.2)	4008,(61.1)	3806,(60.5)
Education index				
Less advancement	6886,(72.5) *	4452,(64.5) *	4093,(64.4) *	3781,(64.7) *
Higher advancement	4715,(65.9)	4919,(61.7)	4600,(63.2)	3898,(61.1)
Employment index				
Less advancement	3555,(70.6)	2730,(60.8) *	2774,(60.6) *	2350,(60.8) *
Higher advancement	8046,(69.5)	6641,(63.9)	5919,(65.3)	5329,(63.8)
Income index				
Less advancement	4826,(74.3) *	5751,(66.9) *	3783,(69.8) *	4732,(65.4) *
Higher advancement	6775,(66.6)	3620,(56.9)	4910,(59.2)	2947,(58.9)
Housing and living condition index				
Less advancement	5791,(75.7) *	4992,(66.6) *	4485,(70.5) *	4540,(65.7) *
Higher advancement	5810,(64.0)	4379,(58.9)	4208,(56.6)	3139,(58.9)
Family and community index				
Less advancement	1582,(63.5)	3799,(58.5)	2849,(57.6)	3024,(62.5)
Higher advancement	10019,(70.8)	5572,(66.1)	5844,(66.8)	4655,(63.2)
Transportation and communication				
index	6210,(74.6) *	3990,(67.8) *	4105,(66.5) *	4201,(65.7) *
Less advancement	5391,(64.3)	5381,(59.5)	4588,(61.3)	3478,(59.6)
Higher advancement				
Participation index	841,(61.8)	4547,(61.2)	4401,(63.4)	3525,(62.5)
Less advancement	10760,(70.4)	4824,(64.8)	4292,(64.2)	4154,(63.2)
Higher advancement				

Note; * p<0.05; current alcoholic beverage drinkers corresponds to occasionally and regularly drinkers

Table 15: Adjusted odds ratios (OR)), obtained from multivariate logistic regression, for the associations between current alcoholic beverage drinkers and underlying determinants among Thai male adults during HWS2003 and HWS2013

Deterministic variables (=1 if yes, =0 if otherwise)	**2003 Adjusted ORs (95% CI)**	**2006 Adjusted ORs (95% CI)**	**2009 Adjusted ORs (95% CI)**	**2013 Adjusted ORs (95% CI)**
Demographic characteristics				
Age group(years)				
20-34	1.45(1.29,1.64)*	1.60(1.40,1.82)*	1.53(1.34,1.75)*	1.24(1.07,1.45)*
35-44	1.22(,1.10,1.36)*	1.38(1.24,1.54)*	1.39(1.23,1.57)*	1.20(1.06,1.36)*
45-59(ref)	1	1	1	1
Marital status				
Single	0.85(0.75,0.96)*	0.99(0.86,1.14)	-	1.01(0.87,1.17)
Married(ref)	1	1	-	1
Widowed/separated/divorced	1.02(0.80,1.28)	1.27(1.03,1.57)*	-	1.16(0.95,1.43)
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	0.91(0.77,1.07)	0.88(0.74,1.05)	-	1.12(0.92,1.35)
2nd quintile	1.07(0.91,1.24)	0.92(0.79,1.08)	-	1.17(0.97,1.42)
3rd quintile	0.98(0.85,1.13)	1.03(0.88,1.21)	-	1.20(1.00,1.45)
4th quintile	1.10(0.97,1.26)	1.06(0.91,1.23)	-	1.23(1.04,1.47)*
5th quintile (richest) (ref)	1	1	-	1
Educational level attainment				
Up to Primary educational	0.83(0.69,0.98)*	0.99(0.83,1.16)	0.83(0.70,0.99)*	0.76(0.63,0.91)*
Secondary education	0.93(0.79,1.10)	1.18(1.00,1.38)	0.91(0.78,1.07)	0.99(0.83,1.17)
Vocational	1.08(0.87,1.34)	1.37(1.14,1.66)*	1.13(0.95,1.33)	1.30(0.98,1.71)
Tertiary and higher (ref)	1	1	1	1
Occupation				
Economically inactive	0.53(0.43,0.64)*	0.46(0.37,0.58)*	0.44(0.35,0.56)*	0.43(0.33,0.57)*
Elementary	1.09(0.90,1.31)	1.00(0.84,1.20)	0.96(0.76,1.20)	1.11(0.86,1.43)
Skilled-manual	1.19(1.03,1.39)*	1.09(0.94,1.26)	1.12(0.93,1.34)	1.05(0.86,1.28)
Agricultural/fishery	1.04(0.90,1.22)	0.81(0.69,0.94)*	0.89(0.73,1.08)	0.92(0.75,1.13)
Skilled- non manual	0.87(0.75,1.01)	0.93(0.79,1.08)	0.81(0.68,0.96)*	0.89(0.74,1.08)
Professional(ref)	1	1	1	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2003 Adjusted ORs (95% CI)	2006 Adjusted ORs (95% CI)	2009 Adjusted ORs (95% CI)	2013 Adjusted ORs (95% CI)
Geographic characteristics				
Residence in region				
South	0.56(0.46,0.68)*	0.41(0.33,0.51)*	0.48(0.39,0.59)*	0.42(0.33,0.54)*
Northeast	2.24(1.85,2.70)*	1.38(1.13,1.70)*	2.15(1.75,2.65)*	1.51(1.17,1.93)*
North	2.36(1.95,2.86)*	1.66(1.35,2.04)*	1.73(1.41,2.12)*	1.72(1.34,2.21)*
Central(except Bangkok)	1.06(0.86,1.27)	0.75(0.61,0.92)*	1.08(0.89,1.31)	1.06(0.84,1.34)
Bangkok(ref)	1	1	1	1
Area				
Non-municipal area	0.95(0.83,1.02)	-	-	1.03(0.92,1.15)
Municipal area(ref)	1	-	-	1
Health-related behavior				
Current smoking	2.89(2.64,3.16)*	-	-	3.56(3.19,3.98)*
Whether eating snack everyday	-			1.23(1.10,1.38)*
Whether drink sweetened beverage everyday	-	-	-	1.51(1.33,1.71)*
Whether having emotional stress	0.73(0.50,1.06)	-	-	0.73(0.59,0.90)*
Social and community involved				
Whether have good relationship with				
-family members	-	-	-	0.71(0.52,0.97)*
-friends	-	-	-	1.17(1.01,1.37)*
- community members	-	-	-	1.15(1.02,1.29)*
Whether have difficulty in social interaction	0.45(0.28,0.73)*	-	-	-

Note; * p<0.05; current alcoholic beverage drinkers corresponds to occasionally and regularly drinkers

Table 16: Distribution of occasionally- and regularly alcoholic beverage drinkers across social determinant among Thai female adults aged 20-59 years during HWS 2003 and 2013

Deterministic variable	2003		2006		2009		2013	
	Occasionally N=2590 Proportion (95%CI)	Regularly N=250 Proportion (95%CI)	Occasionally N=1748 Proportion (95%CI)	Regularly N=243 Proportion (95%CI)	Occasionally N=1763 Proportion (95%CI)	Regularly N=220 Proportion (95%CI)	Occasionally N=1675 Proportion (95%CI)	Regularly N=234 Proportion (95%CI)
Overall	16.2(15.6,16.8)	1.6(1.3,1.7)	12.1(11.5,12.6)	1.7(1.5,1.8)	13.3(12.7,13.8)	1.7(1.4,1.8)	13.7(13.1,14.3)	1.9(1.6,2.1)
Demographic characteristics								
Age group(years)								
20-34	16.5(15.5,17.5)	0.9(0.6,1.1)	12.3(11.4,13.3)	1.1(0.7,1.4)	13.2(12.0,14.3)	0.8(0.5,1.1)	13.4(12.2,14.7)	1.6(1.1,2.0)
35-44	18.2(17.1,19.3)	1.9(1.5,2.3)	14.3(13.3,15.4)	1.6(1.3,2.0)	15.7(14.5,16.8)	1.7(1.3,2.1)	15.8(14.6,17.0)	1.6(1.2,2.0)
45-59	14.1(13.2,15.0)	1.8(1.4,2.1)	9.9(9.1,10.6)	2.1(1.7,2.4)	11.6(10.8,12.4)	2.0(1.6,2.4)	12.5(11.7,13.4)	2.2(1.8,2.5)
Marital status								
Single	13.6(12.2,15.0)	1.0(0.6,1.4)	11.4(9.9,12.8)	1.0(0.5,1.4)	12.4(10.8,14.0)	0.6(0.2,1.0)	12.0(10.3,13.6)	2.1(1.4,2.8)
Married	16.3(15.6,16.9)	1.5(1.3,1.7)	11.8(11.2,12.5)	1.6(1.3,1.8)	13.3(12.6,14.0)	1.6(1.4,1.9)	13.8(13.1,14.5)	1.7(1.4,2.0)
Widowed/separated/divorced	19.0(17.2,20.9)	2.4(1.6,3.1)	13.7(12.2,15.3)	2.5(1.8,3.3)	13.6(12.1,15.2)	2.4(1.7,3.1)	14.2(12.6,15.9)	2.5(1.7,3.2)

Deterministic variable	2003		2006		2009		2013	
	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)
Socioeconomic characteristics								
Household assets								
1st quintile(poorest)	17.0(15.5,18.5)	2.4(1.8,3.0)	10.6(9.3,11.8)	2.3(1.7,2.9)	12.6(11.2,13.9)	3.1(2.4,3.8)	13.3(12.1,14.6)	2.7(2.1,3.3)
2nd quintile	16.9(15.5,18.2)	1.6(1.2,2.1)	12.8(11.7,14.0)	1.7(1.2,2.1)	12.9(11.5,14.4)	1.8(1.2,2.3)	14.2(12.9,15.4)	1.9(1.4,2.5)
3rd quintile	16.4(15.1,17.8)	1.4(1.0,1.9)	13.8(12.5,15.0)	1.6(1.1,2.1)	15.1(13.7,16.5)	1.5(1.0,1.9)	14.6(13.1,16.1)	1.4(0.9,1.9)
4th quintile	16.3(15.1,17.5)	1.4(1.0,1.8)	12.3(11.1,13.5)	1.5(1.0,2.0)	12.8(11.6,14.0)	1.3(0.9,1.7)	13.2(11.9,14.6)	1.9(1.3,2.4)
5th quintile (richest)	15.0(13.9,16.1)	1.1(0.7,1.4)	10.3(9.2,11.4)	1.2(0.8,1.6)	12.7(11.6,13.8)	0.9(0.6,1.2)	12.9(11.4,14.3)	1.1(0.7,1.6)
Concentration Index	-0.016 (-0.028,-0.004)	-0.027 (-0.042,-0.012)	-0.004 (-0.019,0.009)	-0.023 (-0.039,-0.007)	-0.004 (-0.019,0.012)	-0.054 (-0.072,-0.036)	-0.002 (-0.019,0.013,)	-0.034 (-0.053,-0.014)
Educational level attainment								
Up to Primary educational	16.2(15.5,16.9)	1.8(1.6,2.1)	12.1(11.4,12.7)	2.0(1.7,2.3)	12.7(11.8,13.6)	2.5(2.0,2.9)	13.4(12.6,14.2)	2.4(2.1,2.8)
Secondary education	15.9(14.6,17.1)	1.4(1.0,1.8)	12.6(11.3,13.8)	1.4(1.0,1.9)	13.6(12.5,14.6)	1.5(1.2,1.9)	15.4(14.1,16.8)	1.3(0.9,1.7)
Vocational education	18.0(15.1,20.9)	0.1(0.1,0.4)	13.5(11.4,15.6)	1.1(0.5,1.8)	14.9(13.2,16.7)	1.0(0.5,1.5)	12.8(9.3,16.2)	1.3(0.1,2.6)
Tertiary and higher	15.9(14.2,17.5)	0.4(0.1,0.7)	10.4(9.1,11.8)	0.6(0.3,1.0)	12.5(11.2,13.8)	0.4(0.1,0.6)	12.2(10.7,13.6)	0.8(0.4,1.2)
Occupation								
Economically inactive	11.2(10.1,12.2)	1.2(0.8,1.6)	8.1(7.1,9.2)	1.4(1.0,1.9)	10.1(9.1,11.2)	1.3(0.9,1.7)	8.2(7.1,9.4)	1.3(0.9,1.8)
Elementary	20.2(18.3,22.2)	2.7(1.9,3.5)	15.7(13.8,17.5)	2.8(1.9,3.6)	16.1(14.1,18.1)	3.5(2.5,4.5)	15.4(13.3,17.5)	3.4(2.3,4.5)
Skilled-manual	16.9(15.0,18.8)	1.2(0.6,1.8)	11.6(9.9,13.4)	1.4(0.8,2.1)	16.0(14.0,18.0)	1.2(0.6,1.8)	16.2(13.9,18.4)	2.2(1.3,3.1)
Agricultural/fishery	17.1(15.9,18.3)	1.4(1.0,1.8)	12.8(11.6,13.9)	1.1(0.7,1.5)	12.4(11.0,13.7)	1.5(1.0,2.1)	15.2(14.1,16.4)	1.7(1.3,2.2)
Skilled- non manual	17.2(15.9,18.4)	1.5(1.1,1.9)	12.0(10.9,13.1)	2.0(1.5,2.5)	14.4(13.3,15.5)	1.7(1.3,2.1)	14.3(13.0,15.5)	1.8(1.3,2.3)
Professional	17.2(15.6,18.8)	1.5(1.0,2.0)	13.5(12.2,14.9)	1.4(0.9,1.9)	13.1(11.3,14.9)	0.7(0.3,1.2)	13.3(11.2,15.3)	1.6(0.8,2.3)

Deterministic variable	2003		2006		2009		2013	
	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)	Occasionally Proportion (95%CI)	Regularly Proportion (95%CI)
Geographic characteristics								
Residence in region								
South	5.1(4.2,5.9)	0.5(0.2,0.8)	2.8(2.1,3.5)	0.9(0.5,1.3)	3.9(3.1,4.6)	0.3(0.1,0.6)	2.6(2.0,3.3)	1.0(0.5,1.4)
Northeast	19.7(18.5,21.0)	1.5(1.1,1.9)	13.3(12.2,14.4)	1.4(1.0,1.7)	19.2(17.9,20.6)	1.9(1.4,2.3)	18.6(16.8,19.5)	1.8(1.4,2.3)
North	29.0(27.5,30.5)	2.2(1.7,2.6)	22.0(20.7,23.4)	2.3(1.8,2.8)	22.6(21.1,24.2)	2.1(1.5,2.6)	22.5(20.9,24.1)	2.5(1.9,3.1)
Central(except Bangkok)	10.7(9.8,11.6)	1.7(1.3,2.1)	7.0(6.3,7.8)	1.8(1.4,2.2)	8.0(7.2,8.8)	2.0(1.5,2.4)	9.6(8.6,10.5)	2.1(1.6,2.6)
Bangkok	12.2(10.1,14.3)	1.0(0.4,1.7)	10.3(8.2,12.5)	0.6(0.0,1.2)	9.8(7.7,11.9)	0.6(0.0,1.2)	15.0(12.1,17.9)	0.8(0.1,1.6)
Area								
Non-municipal area	15.2(14.4,16.1)	1.5(1.2,1.8)	11.5(10.6,12.3)	1.5(1.2,1.8)	13.7(12.9,14.4)	1.6(1.3,1.8)	13.6(12.7,14.5)	1.7(1.3,2.0)
Municipal area	16.8(16.1,17.6)	1.5(1.3,1.8)	12.4(11.7,13.0)	1.7(1.4,2.0)	12.5(11.6,13.4)	1.7(1.3,2.0)	13.7(12.9,14.5)	2.0(1.7,2.4)

Note; N- nationally representative sample; Proportion-proportion of occasionally (less than 1 day/week) and regularly(at least 1-2 day/week) alcoholic beverage drinkers in adult population; 95% CI-95 % confidence interval; the remainder corresponds to non-drinkers groups and not shown in the table

Table 17: Distribution of alcoholic beverage drinkers across HAI and social determinants among Thai female adults aged 20-59 years in HWS 2003- 2013

Deterministic variable	Current drinkers			
(=1 if yes, =0 if otherwise)	2003	2006	2009	2013
	N,(%)	N,(%)	N,(%)	N,(%)
HAI Composite				
Less advancement	10135,(21.0) *	7772,(16.6) *	6108,(20.5) *	6944,(17.4) *
Higher advancement	5818,(12.2)	6701,(10.5)	7175,(10.2)	5096,(13.3)
8 components of HAI				
Health index				
Less advancement	6687,(22.0) *	7556,(18.8) *	7355,(18.0) *	6212,(19.4) *
Higher advancement	8896,(14.7)	6737,(8.3)	5928,(11.2)	6008,(11.8)
Education index				
Less advancement	9584,(19.7) *	7008,(15.4) *	6333,(18.4) *	6139,(17.3) *
Higher advancement	6369,(15.0)	7465,(12.2)	6950,(11.7)	6081,(14.0)
Employment index				
Less advancement	4817,(15.9) *	4316,(14.4)	4455,(12.8) *	3862,(15.5)
Higher advancement	11136,(18.6)	10157,(13.5)	8828,(16.0)	8358,(15.7)
Income index				
Less advancement	6701,(20.3) *	8969,(17.3) *	5914,(21.0) *	7804,(17.4) *
Higher advancement	9252,(16.0)	5504,(8.1)	7369,(10.0)	4416,(12.4)
Housing and living condition index				
Less advancement	7972,(21.8) *	7530,(14.6) *	6934,(21.0) *	7099,(18.2) *
Higher advancement	7981,(13.8)	6943,(12.8)	6349,(8.3)	5121,(12.0)
Family and community index				
Less advancement	2104,(14.1)	5812,(12.0)	4209,(9.6)	4814,(11.0)
Higher advancement	13849,(18.4)	8661,(14.9)	9074,(17.4)	7406,(18.7)
Transportation and communication				
index	8575,(21.1) *	6273,(16.7) *	6449,(19.3) *	6776,(17.7) *
Less advancement	7378,(14.0)	8200,(11.5)	6834,(10.8)	5444,(13.1)
Higher advancement				
Participation index	1086,(12.8)	6861,(13.7)	6573,(15.4)	5464,(14.9)
Less advancement	14867,(18.2)	7612,(13.8)	6690,(14.5)	6756,(16.2)
Higher advancement				

Note; * p<0.05; current alcoholic beverage drinkers corresponds to occasionally and regularly drinkers

Table 18: Adjusted odds ratios (OR)), obtained from multivariate logistic regression, for the associations between current alcoholic beverage drinkers and underlying determinants among Thai female adults during HWS2003 and HWS2013

Deterministic variables	**2003**	**2006**	**2009**	**2013**
(=1 if yes, =0 if otherwise)	**Adjusted**	**Adjusted**	**Adjusted**	**Adjusted**
	ORs (95% CI)	**ORs (95% CI)**	**ORs (95% CI)**	**ORs (95% CI)**
Demographic characteristics				
Age group(years)				
20-34	1.42(1.26,1.60)*	1.52(1.32,1.76)*	1.28(1.09,1.50)*	1.19(1.01,1.39)*
35-44	1.46(1.31,1.63)*	1.59(1.41,1.80)*	1.46(1.27,1.67)*	1.23(1.09,1.39)*
45-59(ref)	1	1	1	1
Marital status				
Single	0.81(0.70,0.93)*	0.97(0.82,1.15)	-	0.90(0.76,1.08)
Married(ref)	1	1	-	1
Widowed/separated/divorced	1.24(1.08,1.42)*	1.30(1.12,1.51)*	-	1.10(0.94,1.28)
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	1.02(0.86,1.20)	1.04(0.85,1.27)	1.00(0.83,1.20)	1.03(0.85,1.26)
2nd quintile	1.03(0.89,1.21)	1.25(1.05,1.50)*	1.08(0.90,1.30)	1.09(0.88,1.30)
3rd quintile	1.11(0.96,1.28)	1.34(1.12,1.60)*	1.22(1.03,1.44)*	1.11(0.91,1.35)
4th quintile	1.10(0.96,1.26)	1.18(0.99,1.39)	1.02(0.87,1.20)	1.02(0.85,1.23)
5th quintile (richest) (ref)	1	1	1	1
Educational level attainment				
Up to Primary educational	1.11(0.92,1.33)	1.40(1.14,1.73)*	1.24(1.00,1.53)	1.23(1.00,1.53)
Secondary education	1.17(0.98,1.41)	1.45(1.18,1.78)*	1.16(0.96,1.40)	1.37(1.12,1.68*)
Vocational	1.30(1.01,1.67)*	1.64(1.28,2.09)*	1.28(1.04,1.57)*	1.12(0.79,1.58)
Tertiary and higher (ref)	1	1	1	1
Occupation				
Economically inactive	0.55(0.46,0.66)*	0.51(0.42,0.62)*	0.68(0.54,0.86)*	0.55(0.42,0.71)*
Elementary	0.98(0.81,1.19)	0.86(0.70,1.05)	1.18(0.92,1.53)	1.00(0.75,1.33)
Skilled-manual	0.84(0.69,1.03)	0.65(0.52,0.82)*	1.08(0.83,1.39)	1.07(0.81,1.41)
Agricultural/fishery	0.79(0.66,0.95)	0.63(0.52,0.77)*	0.82(0.64,1.05)	0.97(0.75,1.25)
Skilled- non manual	0.87(0.74,1.02)	0.73(0.62,0.86)*	1.07(0.87,1.32)	1.01(0.80,1.27)
Professional(ref)	1	1	1	1
Geographic characteristics				
Residence in region				
South	0.38(0.29,0.49)*	0.27(0.19,0.38)*	0.35(0.26,0.49)*	0.19(0.13,0.27)*
Northeast	1.93(1.56,2.39)*	1.46(1.13,1.89)*	2.62(2.03,3.38)*	1.54(1.19,2.01)*
North	2.93(2.37,3.62)*	2.56(1.99,3.29)*	2.90(2.25,3.74)*	1.92(1.48,2.49)*
Central(except Bangkok)	0.92(0.74,1.14)	0.74(0.57,0.96)*	0.89(0.68,1.15)	0.68(0.52,0.88)*
Bangkok(ref)	1	1	1	1
Area				
Non-municipal area	0.84(0.76,0.93)*	0.90(0.80,1.01)	-	1.08(0.97,1.21)
Municipal area(ref)	1	1	-	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2003 Adjusted ORs (95% CI)	2006 Adjusted ORs (95% CI)	2009 Adjusted ORs (95% CI)	2013 Adjusted ORs (95% CI)
Health-related behavior				
Current smoking	7.36(6.04,8.98)*	9.85(7.92,12.24)*	8.80(6.87,11.27)*	8.12(6.26,10.55)*
Whether consumed snack daily in a week	-	-	-	1.38(1.23,1.54)*
Whether consumed sweetened beverage daily	-	-	1.50(1.35,1.67)*	1.62(1.44,1.82)*
Whether having emotional stress	1.58(1.19,2.08)*	-	-	1.30(1.05,1.61)*
Social and community involved				
Whether have good relationship with				
-family members	-	-	-	0.70(0.52,0.94)*
-friends	-	-	-	0.99(0.84,1.17)
- community members	-	-	-	0.93(0.82,1.05)
Whether have difficulty in social interaction	0.36(0.16,0.79)*	-	-	-

Note; * p<0.05; current alcoholic beverage drinkers corresponds to occasionally and regularly drinkers

4.3 Distribution of Snack/Confectionary Consumption and the Association between Social Determinants and Snack Consumption

Table 19 illustrated distributions of three consumption categories including sometime consumption (1-4 day per week), often consumption (5-7 days per week) and non-consumption groups among Thai adults aged 20-59 years (data obtained from HWS2005, 2009 and 2013). An overview the proportion of sometime consumption group has slightly increased from 2005 to 2013 whereas the more often consumption group have tendency to be decreased. On average, trends of snack/confectionary consumption were more common among younger aged group (20-34 years), single marital status and females consumed more than males with a minor degree of difference. When several type of socioeconomic status indicators were examined, the results showed that the distribution of both categories was more concentrated among higher SES groups (4^{th} and 5^{th} quintiles), high educated, and professional type of occupation subgroups, this is consistent with the positive value of concentration index which indicates pro-rich socioeconomic inequalities in snack/confectionary intake. It is noted that the degree of C_{Index} for aforementioned groups has increased during the period of assessment. Moreover, the higher proportion of consumers has accumulated in Bangkok metropolis and residents in municipal areas.

Investigation between this unhealthy diet consumption daily in a week and the human achievement index (HAI), the results in 2013 revealed that living in more development areas of HAI, Thai adults were exposed to unhealthy snacks more than residents in less advancement areas especially in health, education, transportation and communication aspects (Table 20).

Apart from the distribution of aforementioned behaviors, after adjusting for all covariates accepted by multivariate logistic regression model, the adjusted odds

ratios (ORs) with 95% confidence intervals (95% CI) revealed the association between daily snack consumption and certain variables indicating the more likelihoods of snack consumption among younger female and being single marital status subgroups. There is unclear effect from SES indicators (household assets, educational level attainment and occupation) and geographic determinants since household assets (2005 and 2013) as well as type of municipality (2009 and 2013) disappeared when incorporated into multivariate logistic regression model. Interestingly, odds ratios presented that daily snack consumer were more likely to drink sweetened beverage and associated with emotional stress subjects compared to non-consumption groups (Table 21).

Table 19: Distribution of snack/confectionary consumption across social determinant among Thai adults aged 20-59 years during HWS 2005 and 2013

Deterministic variable	2005			2009			2013		
	none	sometime	often	none	sometime	often	none	sometime	often
	N=14808	N=6293	N=1209	N=13588	N=7136	N=1252	N=12322	N=6703	N=874
	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)	Proportion (95 %CI)
Overall	66.4(65.7,66.9)	28.2(27.6,28.8)	5.4(5.1,5.7)	61.8(61.2,62.5)	32.5(31.8,33.1)	5.7(5.4,6.0)	61.9(61.2,62.6)	33.7(33.0,34.3)	4.4(4.1,4.7)
Demographic characteristics									
Age group(years)									
20-34	49.4(48.2,50.6)	41.2(40.0,42.4)	9.3(8.6,10.0)	41.5(40.3,42.8)	47.2(45.9,48.4)	11.0(10.3,11.9)	40.4(39.0,41.8)	50.2(48.8,51.6)	9.2(8.4,10.0)
35-44	69.9(68.8,71.0)	25.6(24.5,26.6)	4.4(3.9,4.9)	63.0(61.8,64.2)	32.1(30.9,33.2)	4.8(4.2,5.3)	59.9(58.6,61.2)	36.2(35.0,37.5)	3.7(3.2,4.2)
45-59	77.2(76.3,78.1)	19.7(18.8,20.5)	3.0(2.6,3.4)	73.4(72.5,74.3)	23.6(22.7,24.4)	2.9(2.5,3.2)	73.5(72.6,74.4)	24.0(23.1,24.8)	2.3(2.0,2.6)
Gender									
Male	68.6(67.7,69.6)	26.7(25.8,27.6)	4.5(4.1,4.9)	63.1(62.1,64.2)	31.6(30.7,32.6)	5.1(4.6,5.5)	62.7(61.7,63.8)	33.2(32.2,34.3)	3.9(3.4,4.3)
Female	64.8(64.0,65.6)	29.1(28.3,29.9)	5.9(5.5,6.3)	60.9(60.1,61.7)	32.9(32.1,33.7)	6.0(5.6,6.4)	61.3(60.5,62.2)	33.9(33.0,34.7)	4.6(4.3,5.0)
Marital status									
Single	49.8(48.1,51.4)	40.3(38.6,41.9)	9.8(8.9,10.0)	45.4(43.7,47.1)	43.7(42.0,45.3)	10.0(9.8,11.9)	44.5(42.7,46.2)	47.4(45.6,49.2)	8.0(7.0,9.0)
Married	69.2(68.5,69.9)	26.0(25.4,26.7)	4.6(4.4,4.9)	64.6(63.9,65.3)	30.5(29.8,31.2)	4.7(4.4,5.0)	64.7(63.9,65.5)	31.4(30.7,32.2)	3.7(3.4,4.0)
Widowed/separated/divorced	71.2(69.2,73.1)	24.8(23.0,26.6)	3.9(3.1,4.7)	65.9(64.0,67.9)	29.3(27.4,31.2)	4.6(3.8,5.5)	67.0(65.1,68.9)	29.5(27.6,31.4)	3.4(2.6,4.1)

Deterministic variable	2005			2009			2013		
	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)
Socioeconomic characteristics									
Household assets									
1st quintile(poorest)	69.5(67.9,71.1)	26.1(24.5,27.6)	4.3(3.6,5.0)	66.9(65.4,68.4)	29.0(27.6,30.4)	4.0(3.4,4.6)	64.5(63.2,65.9)	31.2(29.8,32.5)	4.2(3.6,4.8)
2nd quintile	68.8(67.3,70.4)	25.5(24.1,27.0)	5.5(4.7,6.3)	62.2(60.6,63.8)	32.1(30.5,33.6)	5.6(4.8,6.3)	67.4(66.0,68.7)	29.0(27.6,30.3)	3.5(3.0,4.1)
3rd quintile	66.1(64.7,67.5)	28.5(27.2,29.8)	5.2(4.6,5.9)	62.4(61.0,63.9)	31.6(30.2,33.0)	5.8(5.1,6.5)	61.7(60.1,63.3)	33.7(32.2,35.3)	4.5(3.8,5.2)
4th quintile	66.2(65.0,67.5)	28.3(27.1,29.5)	5.3(4.7,5.9)	61.1(59.7,62.5)	32.1(30.8,33.4)	6.6(5.9,7.3)	59.5(57.9,61.0)	35.5(34.0,37.0)	4.9(4.2,5.6)
5th quintile (richest)	63.3(62.1,64.6)	30.5(29.3,31.7)	6.1(5.4,6.7)	57.9(56.5,59.2)	36.1(34.8,37.3)	5.9(5.3,6.6)	53.8(52.1,55.5)	41.2(39.5,42.8)	4.9(4.2,5.7)
Concentration Index	-0.017 (-0.022,-0.011)	0.033 (0.021,0.046)	0.040 (0.012,0.068)	-0.024 (-0.030,-0.018)	0.039 (0.027,0.051)	0.066 (0.035,0.098)	-0.033 (-0.039,-0.027)	0.069 (0.056,0.082)	0.050 (0.013,0.086)
Educational level attainment									
Up to Primary educational	72.5(71.7,73.3)	23.7(23.0,24.5)	3.6(3.3,4.0)	73.8(72.8,74.8)	23.3(22.3,24.2)	2.8(2.4,3.1)	71.2(70.3,72.0)	25.9(25.1,26.8)	2.7(2.4,3.0)
Secondary education	58.4(57.1,59.7)	33.5(32.2,34.7)	7.9(7.2,8.7)	59.1(57.9,60.2)	34.5(33.4,35.6)	6.2(5.7,6.8)	52.2(50.8,53.6)	40.8(39.4,42.2)	6.9(6.1,7.6)
Vocational education	54.4(51.4,57.3)	36.8(34.0,39.7)	8.6(7.0,10.0)	51.0(49.3,52.8)	40.2(38.4,41.9)	8.6(7.6,9.6)	47.3(43.6,51.0)	45.8(42.1,49.6)	6.7(4.8,8.6)
Tertiary and higher	57.3(55.4,59.1)	35.3(33.5,37.1)	7.3(6.3,8.2)	52.0(50.4,53.5)	40.1(38.6,41.6)	7.8(7.0,8.6)	48.9(47.2,50.6)	45.5(43.8,47.2)	5.4(4.7,6.2)
Occupation									
Economically inactive	64.7(63.1,66.4)	28.7(27.1,30.3)	6.4(5.6,7.3)	61.7(60.1,63.2)	31.9(30.4,33.4)	6.3(5.5,7.1)	58.6(56.7,60.4)	34.6(32.8,36.4)	6.7(5.7,7.6)
Elementary	70.4(68.5,72.3)	25.5(23.7,27.3)	3.9(3.1,4.8)	65.9(63.9,67.9)	29.8(27.8,31.7)	4.2(3.4,5.1)	66.2(64.0,68.4)	30.1(28.0,32.3)	3.5(2.7,4.4)
Skilled-manual	66.0(64.4,67.7)	28.2(26.6,29.8)	5.7(4.8,6.5)	59.4(57.8,61.0)	35.2(33.7,36.8)	5.2(4.5,6.0)	57.3(55.4,59.2)	37.4(35.6,39.3)	5.1(4.3,6.0)
Agricultural/fishery	70.9(69.7,72.2)	25.3(24.2,26.5)	3.6(3.1,4.1)	70.5(69.2,71.9)	25.4(24.1,26.7)	3.9(3.3,4.5)	71.9(70.8,73.0)	25.5(24.4,26.6)	2.4(2.0,2.8)
Skilled- non manual	61.7(60.3,63.2)	31.2(29.9,32.6)	6.9(6.2,7.6)	57.4(56.1,58.7)	35.5(34.3,36.8)	7.0(6.3,7.6)	55.5(54.1,57.0)	39.0(37.5,40.4)	5.4(4.7,6.0)
Professional	64.6(63.1,66.1)	29.5(28.1,30.9)	5.8(5.0,6.5)	56.6(54.7,58.5)	36.7(34.9,38.6)	6.5(5.6,7.5)	51.1(48.9,53.3)	44.0(41.9,46.2)	4.7(3.8,5.7)

Deterministic variable	2005			2009			2013		
	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)
Geographic characteristics									
Residence in region									
South	68.4(66.8,69.9)	25.8(24.3,27.2)	5.5(4.9,6.5)	63.7(62.2,65.2)	30.9(29.4,32.4)	5.2(4.5,5.9)	62.4(60.8,64.0)	33.6(32.0,35.1)	3.9(3.2,4.5)
Northeast	59.5(58.2,60.8)	33.8(32.6,35.1)	6.5(5.9,7.2)	58.4(57.0,59.7)	35.9(34.6,37.2)	5.6(5.0,6.2)	65.5(64.1,66.8)	30.3(29.0,31.6)	4.1(3.6,4.7)
North	68.5(67.3,69.8)	26.5(25.3,27.7)	4.9(4.3,5.5)	66.7(65.4,68.1)	28.4(27.1,29.7)	4.7(4.1,5.3)	69.3(67.9,70.7)	28.2(26.8,29.5)	2.4(1.9,2.9)
Central(except Bangkok)	69.3(68.3,70.4)	26.0(25.0,27.0)	4.5(4.0,5.0)	62.5(61.4,63.7)	31.3(30.2,32.3)	6.0(5.5,6.6)	55.0(53.7,56.3)	39.1(37.9,40.4)	5.7(5.1,6.3)
Bangkok	63.4(60.7,66.1)	29.9(27.3,32.4)	6.6(5.2,8.0)	48.3(45.7,51.0)	43.4(40.8,46.1)	8.1(6.6,9.5)	50.5(47.3,53.6)	41.9(38.9,45.0)	7.5(5.8,9.1)
Area									
Non-municipal area	68.3(67.3,69.2)	26.7(25.7,27.6)	4.9(4.5,5.4)	64.9(63.9,65.9)	30.1(29.2,31.1)	4.8(4.4,5.3)	64.4(63.4,65.4)	31.8(30.8,32.8)	3.7(3.3,4.1)
Municipal area	65.0(64.2,65.8)	29.1(28.4,29.9)	5.7(5.3,6.1)	59.8(58.9,60.6)	33.9(33.1,34.7)	6.2(5.8,6.6)	59.9(59.0,60.8)	35.1(34.2,36.0)	4.8(4.4,5.2)

Note; N- nationally representative sample; Proportion-proportion of sometime(1-4 days in a week) and often(5-7 days in a week) snack/confectionary consumption in adult population; 95% CI-95 % confidence interval ; d/w- day per week; none- non-consumers

Table 20: Distribution of daily snack/confectionary consumption across HAI and social determinant among Thai adults aged 20-59 years in HWS 2005- 2013

Deterministic variable	Daily consumption		
	2005	2009	2013
	N,(%)	N,(%)	N,(%)
HAI Composite			
Less advancement	11171,(5.8)	9976,(5.5)	11176,(3.1) *
Higher advancement	11139,(4.9)	12000,(5.7)	8723,(5.2)
8 components of HAI			
Health index			
Less advancement	10544,(5.6)	12040,(5.7)	10085,(3.2) *
Higher advancement	11536,(4.8)	9936,(5.5)	9814,(5.5)
Education index			
Less advancement	10264,(5.7)	10426,(5.9)	9920,(3.5)*
Higher advancement	4806,(4.3)	11550,(5.4)	9974,(5.1)
Employment index			
Less advancement	7062,(4.3)	7232,(5.8)	6212,(4.4)
Higher advancement	15248,(5.7)	14744,(5.5)	13687,(4.3)
Income index			
Less advancement	13188,(5.5)	9697,(5.1)	12536,(4.1)
Higher advancement	9122,(4.9)	12279,(6.0)	7364,(4.8)
Housing and living condition index			
Less advancement	11030,(5.9)	11419,(5.5)	11639,(4.9)
Higher advancement	11280,(4.7)	10557,(5.8)	8260,(3.5)
Family and community index			
Less advancement	10029,(5.2)	7058,(6.6)	7838,(4.3)
Higher advancement	12281,(5.4)	14913,(5.2)	12061,(4.4)
Transportation and communication			
Less advancement	8936,(6.2)	10554,(5.0)	10977,(3.5)*
Higher advancement	13374,(4.7)	11422,(6.1)	8922,(5.3)
Participation index			
Less advancement	10605,(5.2)	10914,(5.8)	8989,(4.4)
Higher advancement	11705,(5.4)	10982,(5.5)	10910,(4.3)

Note; * p<0.05

Table 21: Adjusted odds ratios (OR) and association between snack/confectionary consumption daily in a week and underlying social determinants among Thai adults aged 20-59 years during HWS2005 and HWS 2013

Deterministic variables (=1 if yes, =0 if otherwise)	2005 Adjusted OR (95% CI)	2009 Adjusted OR (95% CI)	2013 Adjusted OR (95% CI)
Demographic characteristics			
Age group(years)			
20-34	2.45(2.08,2.90)*	3.24(2.70,3.90)*	3.12(2.58,3.78)*
35-44	1.33(1.12,1.58)*	1.47(1.22,1.77)*	1.40(1.15,1.70)*
45-59(ref)	1	1	1
Sex			
Male	0.67(0.59,0.77)*	0.75(0.65,0.85)*	0.76(0.65,0.88)*
Female(ref)	1	1	1
Marital status			
Single	1.62(1.40,1.88)*	1.69(1.46,1.95)*	1.39(1.17,1.65)*
Married(ref)	1	1	1
Widowed/separated/divorced	0.97(0.76,1.23)	1.25(1.01,1.55)*	1.05(0.82,1.35)
Socioeconomic characteristics			
Household assets			
1st quintile(poorest)	-	0.85(0.68,1.06)	-
2nd quintile	-	1.06(0.86,1.30)	-
3rd quintile	-	1.16(0.96,1.40)	-
4th quintile	-	1.27(1.07,1.51)*	-
5th quintile (richest) (ref)	-	1	-
Educational level attainment			
Up to Primary	0.78(0.63,0.97)*	0.78(0.61,1.00)	0.91(0.72,1.15)
Secondary education	1.16(0.95,1.42)	0.98(0.81,1.19)	1.29(1.05,1.60)*
Vocational	1.18(0.90,1.54)	1.12(0.93,1.36)	1.19(0.84,1.69)
Tertiary and higher (ref)	1	1	1
Occupation			
Economically inactive	1.14(0.91,1.42)	1.18(0.93,1.49)	1.43(1.07,1.91)*
Elementary	0.88(0.66,1.16)	0.82(0.61,1.10)	0.89(0.62,1.29)
Skilled-manual	1.09(0.87,1.38)	0.88(0.68,1.13)	1.06(0.78,1.44)
Agricultural/fishery	0.85(0.66,1.08)	0.99(0.76,1.28)	0.81(0.59,1.10)
Skilled- non manual	1.11(0.92,1.36)	1.08(0.88,1.33)	1.17(0.90,1.53)
Professional(ref)	1	1	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2005 Adjusted OR (95% CI)	2009 Adjusted OR (95% CI)	2013 Adjusted OR (95% CI)
Geographic characteristics			
Residence in region			
South	0.95(0.72,1.25)	0.62(0.48,0.80)*	0.55(0.40,0.74)*
Northeast	1.46(1.12,1.89)*	0.91(0.72,1.16)	0.83(0.62,1.11)
North	1.02(0.78,1.33)	0.76(0.59,0.97)*	0.44(0.32,0.60)*
Central(except Bangkok)	0.76(0.59,0.99)*	0.79(0.63,1.00)	0.85(0.65,1.11)
Bangkok(ref)	1	1	1
Area			
Non-municipal area	0.78(0.68,0.90)*	-	-
Municipal area(ref)	1	-	-
Health-related behaviors			
Whether have emotional stress	-	1.32(1.10,1.58)*	1.91(1.51,2.41)*
Whether drink sweetened beverage everyday	2.17(1.92,2.47)*	2.25(1.99,2.55)*	2.07(1.80,2.39)*

Note; ORs – Odds Ratios; 95% CI- 95% confidence interval; * $p<0.05$

4.4 The Distribution of Sweetened Beverage Consumption and the Association between Social Determinants and Sweetened Beverage Consumption

Results from HWS 2005, 2009 and 2013 showed trend of the often consumption group (5-7 days per week) of sweetened beverage among Thai adults has slightly dropped from 2005 to 2013 whereas the sometime consumption group (1-4 days per week) nearly unchanged. Analysis of the less often group show similarly results to trend of snack consumption that younger adult especially aged 20-34 years consumed more than the older group. In contrast to snack consumers, the analysis of the more often group shows that males consumed sugary beverage more than females and the consistency of the gradient of consumption was found among several SES indicators with the high SES (5^{th} quintiles), higher educated (tertiary or higher educational level attainment) and professional occupation subjects being sugary beverage drinkers more than their counterparts, this was consistent with the positive values of concentration index in three survey years. It is noted that the degree of C_{Index} for aforementioned groups has increased during the period of assessment. Moreover, the prevalence also more common among residents in municipal areas and almost every survey, the highest percentage of the more often group was found among residents in the South region and Bangkok metropolis (Table 22).

Table 23 provided more details about the distribution between daily sugary consumption (7 days in a week) and structural determinants. The analysis of human achievement index (HAI) revealed that living in well development areas of HAI particularly in health, education, income, transportation and communication indices, Thai adult intake sugary beverages more than residents living in those less well-advantaged areas. Whereas, the areas with less development of employment, family

and community aspects, respondents consume sweetened beverages more than whom living in the more superior area counterparts.

Multiple logistic regression analysis revealed that most of the variables in the table were associated with daily sugary drinks consumption. Adjusted ORs indicating that Thai male adults with high SES, high educated, professional occupation, living in South region and municipal areas were more likely to intake sweetened beverages compared to their counterparts. Beside, odds ratios also revealed that daily sweetened beverage drinkers were more likely to eat snack and smoking compared to non-consumption groups. It is noteworthy that during 2005 and 2013 ORs among males is increased indicating high tendency to drinks sugary beverage among male (Table 24).

Interaction between high frequency consumption of snack and sweetened beverages were also examined. The results in table 25 showed that over the period of assessment, daily consumers and 5-6 days in a week consumers of both diets were concentrated in Central region of Thailand particularly Thai adults living in municipal areas.

Table 22: Distribution of sweetened beverage consumption across social determinant among Thai adults aged 20-59 years during HWS 2005 and 2013

Deterministic variable	2005			2009			2013		
	none	sometime	often	none	sometime	often	none	sometime	often
	Proportion (95 %CI) N=5566	Proportion (95 %CI) N=7424	Proportion (95 %CI) N=9320	Proportion (95 %CI) N=5771	Proportion (95 %CI) N=7089	Proportion (95 %CI) N=9116	Proportion (95 %CI) N=5867	Proportion (95 %CI) N=6519	Proportion (95 %CI) N=7513
Overall	24.9(24.2,25.5)	33.3(32.6,33.9)	41.8(41.1,42.4)	26.3(25.6,26.8)	32.3(31.6,32.9)	41.5(40.8,42.1)	29.5(28.8,30.1)	32.8(32.1,33.4)	37.8(37.7,38.4)
Demographic characteristics									
Age group(years)									
20-34	20.7(19.7,21.7)	37.5(36.3,38.6)	41.7(40.5,42.8)	20.8(19.8,21.9)	36.8(35.6,38.0)	42.2(41.0,43.5)	27.3(26.1,28.6)	36.8(35.4,38.2)	35.7(34.3,37.1)
35-44	24.1(23.1,25.1)	32.7(31.6,33.8)	43.0(41.9,44.2)	23.3(22.3,24.4)	32.5(31.3,33.6)	44.0(42.8,45.3)	25.6(24.4,26.7)	33.0(31.8,34.3)	41.2(40.0,42.5)
45-59	29.0(28.0,29.9)	30.2(29.2,31.2)	40.7(39.6,41.7)	31.5(30.5,32.4)	29.2(28.3,30.1)	39.2(38.2,40.2)	32.7(31.8,33.7)	30.5(29.6,31.4)	36.6(35.6,37.6)
Gender									
Male	22.5(21.6,23.4)	32.2(31.2,33.2)	45.1(44.1,46.2)	20.9(20.1,21.8)	30.9(30.0,31.9)	48.0(46.9,49.1)	21.5(20.6,22.4)	33.9(32.8,34.9)	44.5(43.4,45.6)
Female	26.4(25.7,27.2)	33.9(33.1,34.7)	39.5(38.7,40.3)	29.7(28.9,30.5)	33.0(32.2,33.8)	37.1(36.3,38.0)	34.4(33.6,35.3)	32.0(31.2,32.8)	33.4(32.6,34.3)
Marital status									
Single	19.2(17.9,20.5)	36.0(34.4,37.6)	44.7(43.0,46.3)	20.9(19.5,22.2)	36.6(34.9,38.2)	42.4(40.8,44.1)	24.5(23.0,26.0)	38.2(36.5,39.9)	37.1(35.4,38.9)
Married	25.9(25.2,26.6)	32.7(32.0,33.4)	41.3(40.5,42.0)	26.7(26.0,27.3)	31.2(30.5,31.9)	42.0(41.3,42.8)	29.7(28.9,30.4)	32.0(31.2,32.7)	38.2(37.4,39.0)
Widowed/separated/divorced	26.6(24.8,28.5)	32.9(30.9,34.9)	40.3(38.2,42.4)	31.0(29.1,32.9)	33.1(31.1,35.0)	35.8(33.9,37.8)	34.4(32.5,36.4)	30.0(28.1,31.9)	35.5(33.5,37.4)

Deterministic variable	2005			2009			2013		
	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)
Socioeconomic characteristics									
Household assets									
1st quintile(poorest)	38.6(36.9,40.3)	35.4(33.7,37.1)	25.9(24.3,27.4)	37.5(36.0,39.0)	34.6(33.1,36.0)	27.8(26.4,29.2)	37.1(35.7,38.4)	33.7(32.3,35.0)	29.1(27.9,30.4)
2nd quintile	33.9(32.3,35.5)	36.2(34.6,37.8)	29.8(28.3,31.3)	28.8(27.3,30.3)	33.5(32.0,35.1)	37.5(35.9,39.1)	32.4(31.0,33.8)	33.0(31.6,34.4)	34.5(33.1,35.9)
3rd quintile	27.7(26.4,29.0)	35.0(33.7,36.4)	37.1(35.7,38.5)	27.5(26.2,28.8)	34.0(32.5,35.4)	28.4(36.9,39.8)	28.8(27.3,30.3)	33.3(31.8,34.9)	37.7(36.1,39.3)
4th quintile	21.3(20.2,22.3)	33.9(32.6,35.1)	44.7(43.4,46.0)	23.8(22.6,25.0)	31.1(29.8,32.4)	45.0(43.5,46.4)	25.9(24.5,27.3)	31.7(30.3,33.2)	42.3(40.7,43.8)
5th quintile (richest)	13.2(12.3,14.1)	28.2(27.1,29.4)	58.4(57.1,59.7)	17.4(16.4,18.4)	29.2(28.0,30.4)	53.2(51.9,54.9)	19.2(17.9,20.6)	31.4(29.8,33.0)	49.2(47.5,50.9)
Concentration Index	-0.181 (-0.193,-0.170)	-0.043 (-0.054,-0.032)	0.165 (0.156,0.174)	-0.115 (-0.125,-0.105)	-0.035 (-0.047,-0.024)	0.132 (0.121,0.142)	-0.094 (-0.104,-0.084)	-0.017 (-0.029,-0.005)	0.116 (0.104,0.128)
Educational level attainment									
Up to Primary educational	31.6(30.8,32.4)	34.4(33.6,35.2)	33.8(33.0,34.7)	36.0(34.9,37.1)	30.9(29.9,31.9)	33.0(31.9,34.0)	35.0(34.1,35.9)	31.3(30.4,32.1)	33.6(32.7,34.5)
Secondary education	17.5(16.4,18.5)	34.0(32.8,35.3)	48.4(47.0,49.7)	24.6(23.6,25.6)	34.4(33.3,35.5)	40.9(39.8,42.0)	25.6(24.4,26.9)	35.4(34.0,36.7)	38.9(37.5,40.2)
Vocational education	12.9(10.9,14.9)	32.0(29.2,34.8)	54.9(52.0,57.9)	19.1(17.7,20.5)	33.4(31.8,35.1)	47.3(45.5,49.1)	20.0(17.0,22.9)	34.2(30.7,37.7)	45.7(42.0,49.4)
Tertiary and higher	12.5(11.2,13.7)	26.6(25.0,28.3)	60.8(58.9,62.6)	16.1(15.0,17.2)	30.0(28.6,31.4)	53.8(52.3,55.3)	19.0(17.7,20.3)	33.2(31.6,34.8)	47.6(45.9,49.3)
Occupation									
Economically inactive	27.1(25.6,28.7)	33.9(32.3,35.6)	38.8(37.1,40.5)	36.9(35.4,38.5)	32.8(31.3,34.3)	30.1(28.6,31.6)	39.8(38.0,41.7)	31.7(30.0,33.5)	28.3(26.6,30.0)
Elementary	29.2(27.3,31.1)	35.6(33.6,37.6)	35.0(33.0,37.0)	27.2(25.3,29.1)	34.0(32.0,36.0)	38.7(36.6,40.7)	28.4(26.4,30.5)	33.8(31.7,36.0)	37.6(35.3,39.8)
Skilled-manual	21.6(20.2,23.1)	33.8(32.2,35.5)	44.4(42.7,46.2)	22.9(21.5,24.3)	33.2(31.6,34.7)	43.8(42.2,45.5)	21.6(20.0,23.1)	31.6(29.8,33.3)	46.7(44.8,48.6)
Agricultural/fishery	38.0(36.7,39.5)	35.6(34.3,36.9)	26.3(25.1,27.4)	34.2(32.8,35.7)	32.9(31.5,34.3)	32.7(31.3,34.1)	36.9(35.7,38.1)	32.3(31.2,33.5)	30.6(29.5,31.8)
Skilled- non manual	17.4(16.3,18.5)	32.3(30.9,33.6)	50.2(48.7,51.6)	19.3(18.2,20.3)	31.9(30.7,33.2)	48.6(47.3,49.9)	23.1(21.8,24.3)	34.8(33.4,36.2)	42.0(40.5,43.5)
Professional	14.0(12.9,15.1)	28.7(27.2,30.1)	57.2(55.7,58.8)	15.7(14.3,17.1)	28(26.2,29.7)	56.2(54.3,58.1)	17.8(16.1,19.4)	31.2(29.1,33.2)	50.9(48.7,53.1)

Deterministic variable	2005			2009			2013		
	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)	none Proportion (95 %CI)	sometime Proportion (95 %CI)	often Proportion (95 %CI)
Geographic characteristics									
Residence in region									
South	15.1(13.9,16.2)	30.5(29.0,32.1)	54.2(52.6,55.9)	17.6(16.3,18.8)	29.9(28.4,31.3)	52.4(50.8,54.0)	19.5(18.2,20.8)	32.6(31.1,34.2)	47.7(46.1,49.4)
Northeast	33.9(32.6,35.2)	32.9(31.7,34.2)	33.0(31.8,34.3)	36.9(35.6,38.2)	30.4(29.1,31.6)	32.6(31.3,33.9)	40.7(39.3,42.0)	32.0(30.7,33.3)	27.2(25.9,28.4)
North	30.6(29.3,31.9)	31.6(30.4,32.9)	37.6(36.3,38.9)	32.8(31.4,34.1)	32.2(30.9,33.5)	34.9(33.5,36.2)	31.4(30.0,32.8)	33.7(32.3,35.1)	34.7(33.3,36.1)
Central(except Bangkok)	20.1(19.2,21.1)	36.4(35.3,37.6)	43.3(42.1,44.4)	20.5(19.5,21.4)	33.8(32.6,34.6)	45.6(44.4,46.8)	26.1(24.9,27.2)	32.3(31.1,33.5)	41.5(40.3,42.8)
Bangkok	17.7(15.6,19.9)	30.0(27.4,32.6)	52.1(49.3,54.9)	16.9(14.9,18.9)	37.7(35.1,40.3)	45.3(42.6,47.9)	19.7(17.3,22.2)	34.8(31.8,37.8)	45.3(42.2,48.4)
Area									
Non-municipal area	32.4(31.4,33.4)	35.8(34.8,36.8)	31.7(30.7,32.7)	32.2(31.2,33.2)	33.1(32.1,34.1)	34.6(33.6,35.6)	31.1(30.2,32.1)	32.9(31.9,33.9)	35.8(34.8,36.8)
Municipal area	19.9(19.2,20.6)	31.5(30.7,32.3)	48.4(47.5,49.2)	22.3(21.6,23.0)	31.6(30.8,32.4)	45.9(45.1,46.8)	28.1(27.3,29.0)	32.5(31.7,33.4)	39.2(38.3,40.1)

Note; N- nationally representative sample; Proportion-proportion of sometime(1-4 days in a week) and often(5-7 days in a week) sweetened beverage consumption in adult population; 95% CI-95 % confidence interval; d/w- day per week; none- non-consumers

Table 23: Distribution of daily sweetened beverage consumption across HAI and social determinant among Thai adults aged 20-59 years in HWS 2005- 2013

Deterministic variable	Daily consumption		
	2005	2009	2013
	N,(%)	N,(%)	N,(%)
HAI Composite			
Less advancement	11171,(39.1)*	9976,(39.9)*	11876,(35.4)*
Higher advancement	11139,(45.6)	12000,(45.7)	8728,(44.1)
8 components of HAI			
Health index			
Less advancement	10549,(38.6)*	12040,(40.1)*	10085,(34.0)*
Higher advancement	11541,(46.0)	9936,(45.7)	9814,(44.2)
Education index			
Less advancement	10261,(40.95)	10426,(40.6)*	9920,(33.6)*
Higher advancement	12046,(43.6)	11550,(44.4)	9979,(44.4)
Employment index			
Less advancement	7062,(43.2)*	7229,(46.4)*	6212,(39.5)
Higher advancement	15248,(42.1)	14747,(40.8)	13687,(38.8)
Income index			
Less advancement	13188,(38.4)*	9697,(36.6)*	12536,(36.4)*
Higher advancement	9122,(48.2)	12279,(47.4)	7363,(43.5)
Housing and living condition index			
Less advancement	11030,(41.2)	11419,(38.1)*	11639,(37.9)
Higher advancement	11280,(43.6)	10557,(47.5)	8260,(40.7)
Family and community index			
Less advancement	10029,(45.2)*	7058,(48.7)*	7838,(43.8)*
Higher advancement	12281,(40.2)	14918,(39.8)	12061,(36.0)
Transportation and communication			
Less advancement	8936,(38.4)*	10554,(38.3)*	10977,(34.4)*
Higher advancement	13374,(45.1)	11422,(46.6)	8922,(44.7)
Participation index			
Less advancement	10605,(43.6)	10994,(42.8)	8989,(39.7)
Higher advancement	11705,(41.4)	10982,(42.5)	10910,(38.5)

Note; * p<0.05

Table 24: Adjusted odds ratios (OR) and association between sweetened beverage consumption daily in a week and underlying social determinants among Thai adults aged 20-59 years during HWS2005 and HWS 2013

Deterministic variables (=1 if yes, =0 if otherwise)	**2005 Adjusted OR (95% CI)**	**2009 Adjusted OR (95% CI)**	**2013 Adjusted OR (95% CI)**
Demographic characteristics			
Age group(years)			
20-34	0.81(0.75,0.88)*	0.87(0.79,0.94)*	0.82(0.75,0.89)*
35-44	0.99(0.92,1.06)	1.01(0.94,1.09)	1.10(1.02,1.18)*
45-59(ref)	1	1	1
Sex			
Male	1.27(1.20,1.35)*	1.30(1.21,1.40)*	1.51(1.42,1.61)*
Female	1	1	1
Marital status			
Single	0.89(0.82,0.97)*	0.82(0.75,0.89)*	0.86(0.78,0.94)*
Married(ref)	1	1	1
Widowed/separated/divorced	1.30(0.93,1.14)	0.86(0.78,0.95)*	0.97(0.88,1.07)
Socioeconomic characteristics			
Household assets			
1st quintile(poorest)	0.41(0.37,0.46)*	0.46(0.42,0.51)*	0.51(0.45,0.57)*
2nd quintile	0.49(0.44,0.54)*	0.67(0.60,0.74)*	0.66(0.59,0.73)*
3rd quintile	0.59(0.54,0.65)*	0.67(0.61,0.74)*	0.72(0.65,0.80)*
4th quintile	0.71(0.66,0.78)*	0.83(0.76,0.90)*	0.83(0.75,0.92)*
5th quintile (richest) (ref)	1	1	1
Educational level attainment			
Up to Primary	0.63(0.56,0.70)*	0.70(0.62,0.78)*	0.86(0.77,0.96)*
Secondary education	0.83(0.74,0.92)*	0.85(0.77,0.94)*	0.92(0.82,1.02)
Vocational	0.90(0.78,1.05)	0.93(0.84,1.04)	1.04(0.87,1.23)
Tertiary and higher (ref)	1	1	1
Occupation			
Economically inactive	0.71(0.63,0.79)*	0.53(0.47,0.60)*	0.53(0.46,0.61)*
Elementary	0.76(0.67,0.86)*	0.80(0.70,0.92)*	0.88(0.76,1.03)
Skilled-manual	0.96(0.86,1.08)	0.81(0.71,0.92)*	1.05(0.92,1.21)
Agricultural/fishery	0.58(0.52,0.65)*	0.61(0.54,0.70)*	0.63(0.55,0.72)*
Skilled- non manual	0.97(0.88,1.07)	0.92(0.82,1.02)	0.83(0.74,0.94)*
Professional(ref)	1	1	1

Continue.

Deterministic variables (=1 if yes, =0 if otherwise)	2005 Adjusted OR (95% CI)	2009 Adjusted OR (95% CI)	2013 Adjusted OR (95% CI)
Geographic characteristics			
Residence in region			
South	1.70(1.48,1.96)*	1.78(1.56,2.03)*	1.42(1.22,1.65)*
Northeast	0.68(0.59,0.78)*	0.76(0.67,0.87)*	0.59(0.51,0.69)
North	0.79(0.69,0.91)*	0.83(0.72,0.94)*	0.79(0.68,0.92)*
Central(except Bangkok)	0.96(0.84,1.09)	1.29(1.14,1.46)*	1.00(0.86,1.15)
Bangkok(ref)	1	1	1
Area			
Non-municipal area	1.41(0.32,1.50)	0.76(0.71,0.81)*	-
Municipal area(ref)	1	1	-
Health-related behavior			
Currently smoking	-	1.52(1.39,1.65)*	-
Whether have emotional stress	-	-	0.75(0.65,0.85)*
Whether eating snack everyday	2.19(1.93,2.49)*	2.27(2.01,2.57)*	2.05(1.77,2.37)*

Note; ORs – Odds Ratios; 95% CI- 95% confidence interval; * p<0.05

Table 25: Distribution of high frequent consumption of snack/confectionary and sweetened beverage across geographic characteristics among Thai adults aged 20-59 years in HWS 2005- 2013

Frequency of consumption habits (days/week)	Bangkok	Central	North	North-east	South	Municipal	Non-Municipal
	%	%		%	%	%	%
2005							
Snack+ sweetened beverage intake							
Daily + Daily	7.2	28.9	4.1	23.2	19.8	69.1	30.9
5-6 + Daily	7.7	31.2	19.2	23.8	18.2	70.4	29.7
5-6 + 5-6	4.5	31.6	22.8	28.8	12.4	57.2	42.1
Daily + 5-6	5.4	26.8	22.1	33.7	12.2	56.4	43.7
Others	3.8	27.5	29.8	29.6	9.4	47.5	52.6
2009							
Snack+ sweetened beverage intake							
Daily + Daily	8.7	37.9	15.2	19.6	18.7	68.3	31.8
5-6 + Daily	8.5	33.1	16.6	22.6	19.3	68.8	30.2
5-6 + 5-6	9.6	31.3	19.8	24.7	14.9	60.7	39.4
Daily + 5-6	9.8	30.3	21.5	25.3	13.2	63.3	36.7
Others	5.1	31.5	23.0	23.1	17.4	17.4	41.9
2013							
Snack+ sweetened beverage intake							
Daily + Daily	10.6	41.0	11..5	21.7	15.2	63.4	42.1
5-6 + Daily	6.7	37.2	16.6	18.7	20.9	60.0	40.0
5-6 + 5-6	6.8	33.8	18.9	22.8	17.8	57.4	42.6
Daily + 5-6	8.3	38.1	13.2	23.3	17.3	60.8	39.4
Others	2.6	23.8	25.6	36.5	11.3	51.8	48.2

Note; N - nationally representative sample , (% of n)- percentage of consumers,

4.5 Rate of Dental Care Utilization and the Association with Social Determinants

According to table 26, the HWS 2003, 2006, 2009, and 2013 were employed to investigate the distribution of dental care utilization among Thai adults group. Generally, rate of dental care utilization among Thai adults during the ten years was nearly unchanged. The result showed that dental care utilization was more common among female respondents. Likewise, analysis across SES indicators indicated that the highest SES (5^{th} quintile), high educated and professional occupation subgroups utilized dental care more often than the remaining groups similarly to the positive value of concentration index which indicating that dental care services were utilized by the richest respondents more frequent than the poorest counterpart. It is noted that the magnitude of C_{Index} from four survey years has gradually increased.

Take data from table 30 (on Appendix) into consideration, percentage of utilization all over Thailand was not increased following the improvement of dentist-to-population and dental nurse-to-population ratios, except that residents in Bangkok showed increased rate of use between 2003 and 2013 from 14.4% to 18.6%. It is noteworthy that Northeastern region, rate of oral health care utilization is lowest in almost every surveys following the lowest dentist proportion whereas dental nurses density is highest. During ten years, majority of dental care utilizers accounted for residents who living in municipal areas compared to non-municipal dwellers.

Table 27 presents the distribution of utilization according to five socioeconomic status (SES) levels (1^{st} to 5^{th} quintile); there were disparities of dental care use across quintiles over the period of assessment. Results showed that the highest SES (5^{th} quintile) subgroup utilized dental care more often than the lowest

SES (1st quintile) subgroup. The results also revealed that higher SES respondents had the highest proportion of utilization at both public and private facilities. Among various type of public facilities, the lowest SES subgroup(1st quintile) utilized dental care more at community hospitals with increasing trend in choosing private sectors, whereas tertiary care facilities (central, regional and university hospitals) were more often used by the highest SES subgroup. The rate of dental care service used according to type of insurance entitlement highlighted that Social Security Scheme (SSS) was more utilized by the richest respondents than the poorest counterpart.

In addition, table 28 confirmed the association between rate of dental care utilization and certain demographic, socioeconomic and geographic determinants. An adjusted odds ratios (ORs) revealed a steady increase in ORs from the lowest to the highest quintile indicated that Thai adults belonging to lowest quintile (1st quintile) had a lower likelihood of dental care utilization compared to the higher quintile respondents.

Table 26: Distribution of dental care utilization across social determinant among Thai adults aged 20-59 years during HWS 2003 and 2013

Deterministic variable	2003 N=27554 Proportion (95%CI)	2006 N=23844 Proportion (95%CI)	2009 N=21976 Proportion (95%CI)	2013 N=19899 Proportion (95%CI)
Overall	**12.2(11.7,12.5)**	**11.6(11.1,11.9)**	**12.9(12.5,13.4)**	**11.2(10.7,11.7)**
Demographic characteristics				
Age group(years)				
20-34	11.4(10.7,12.0)	11.5(10.8,12.3)	12.9(12.0,13.7)	12.1(11.2,13.1)
35-44	11.6(10.9,12.3)	10.9(10.2,11.6)	11.8(11.0,12.6)	10.1(9.3,10.9)
45-59	13.2(12.6,13.9)	12.0(11.3,12.6)	13.5(12.9,14.2)	11.3(10.7,12.0)
Gender				
Male	9.8(9.3,10.3)	9.6(9.0,10.2)	9.9(9.3,10.6)	8.8(8.2,9.4)
Female	13.8(13.2,14.3)	12.8(12.2,13.3)	14.8(14.2,15.4)	12.7(12.1,13.2)
Marital status				
Single	12.9(11.9,13.9)	14.3(13.1,15.4)	15.9(14.7,17.1)	13.3(12.1,14.5)
Married	12.0(11.6,12.5)	11.0(10.5,11.5)	12.2(11.7,12.7)	10.7(10.2,11.2)
Widowed/separated/divorced	11.1(9.8,12.5)	11.4(10.1,12.7)	13.1(11.7,14.5)	11.1(9.8,12.4)
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	7.0(6.3,7.8)	7.3(6.6,8.1)	8.3(7.5,9.2)	6.5(5.8,7.2)
2nd quintile	8.3(7.5,9.1)	8.9(8.2,9.7)	9.6(8.6,10.5)	8.7(7.8,9.5)
3rd quintile	11.2(10.4,12.1)	10.6(9.7,11.4)	10.6(9.7,11.5)	10.8(9.8,11.8)
4th quintile	12.0(11.2,12.8)	12.7(11.8,13.7)	12.9(11.9,13.8)	14.1(13.0,15.2)
5th quintile (richest)	18.6(17.7,19.5)	18.0(16.9,19.1)	20.0(19.0,21.1)	18.3(17.0,19.7)
Concentration Index	0.196(0.177,0.216)	0.177(0.156,0.198)	0.188(0.167,0.209)	0.216(0.192,0.239)
Educational level attainment				
Up to Primary educational	9.5(9.1,10.0)	8.8(8.3,9.3)	10.3(9.7,11.0)	8.5(8.0,9.0)
Secondary education	13.2(12.3,14.0)	10.4(9.6,11.2)	10.0(9.3,10.7)	10.7(9.8,11.6)
Vocational education	14.7(12.8,16.5)	13.4(11.9,14.9)	13.9(12.7,15.2)	12.0(9.6,14.5)
Tertiary and higher	23.1(21.6,24.6)	22.7(21.3,24.2)	21.6(20.3,22.8)	20.2(18.8,21.5)
Occupation				
Economically inactive	12.6(11.6,13.6)	10.8(9.7,11.8)	12.9(11.9,14.0)	12.8(11.6,14.1)
Elementary	8.8(7.7,9.8)	8.1(7.0,9.2)	8.3(7.2,9.5)	8.4(7.1,9.6)
Skilled-manual	9.4(8.5,10.3)	8.5(7.5,9.4)	9.9(8.9,10.9)	8.4(7.4,9.5)
Agricultural/fishery	8.8(8.1,9.5)	8.1(7.4,8.9)	9.5(8.6,10.4)	8.3(7.6,9.0)
Skilled- non manual	14.5(13.5,15.4)	13.4(12.4,14.3)	14.4(13.5,15.3)	13.3(12.3,14.3)
Professional	18.6(17.4,19.7)	17.7(16.6,18.7)	22.8(21.1,24.4)	19.4(17.7,21.2)

Continue.

Deterministic variable	2003 Proportion (95%CI)	2006 Proportion (95%CI)	2009 Proportion (95%CI)	2013 Proportion (95%CI)
Geographic characteristics				
Residence in region				
South	13.3(12.3,14.3)	10.9(9.9,12.0)	12.1(11.0,13.1)	12.1(11.0,13.2)
Northeast	10.7(10.0,11.4)	10.7(9.9,11.4)	11.9(11.0,12.8)	9.4(8.6,10.2)
North	13.0(12.2,13.9)	12.4(11.6,13.3)	12.9(12.0,13.9)	11.6(10.7,12.6)
Central(except Bangkok)	11.6(10.9,12.2)	11.8(11.1,12.6)	12.9(12.1,13.7)	10.5(9.7,11.3)
Bangkok	14.4(12.7,16.1)	10.8(9.1,12.5)	18.2(16.2,20.3)	18.6(16.2,21.0)
Area				
Non-municipal area	10.2(9.6,13.4)	9.3(8.7,9.9)	10.2(9.6,10.8)	10.3(9.7,10.9)
Municipal area	13.4(12.9,13.9)	12.8(12.3,13.4)	14.6(14.0,15.2)	11.8(11.2,12.4)

Note; N- nationally representative sample; Proportion-proportion of dental care utilization in adult population; 95% CI-95 % confidence interval

Table 27: Distribution of dental care utilization among Thai adults aged 20-59 years, HWS2003-2013

Household living standards quintiles	Poorest %	2nd quintile %	3rd quintile %	4th quintile %	Richest %
Year 2003(N)	**4255**	**5018**	**5286**	**5940**	**7055**
By type of facility utilized					
Public facilities	5.8	6.8	7.9	7.8	8.8
PCU	1.3	1.5	1.7	1.3	1.2
Community	3.4	4.2	4.5	4.5	2.3
Central/University	1.1	1.9	2.0	2.3	4.0
Private facilities	1.3	1.6	3.4	4.2	9.8
By type of insurance utilized					
No insurance	1.7	1.9	3.3	4.1	9.2
UCS	4.8	5.4	5.4	5.1	2.3
CSMBS	0.1	0.2	1.2	1.7	5.3
SSS	0.5	0.8	1.2	1.1	1.4
Private	0.1	0.1	0.1	0.1	0.3
Year 2006(N)	**4206**	**5546**	**4758**	**4651**	**4683**
By type of facility utilized					
Public facilities	5.0	6.0	7.2	7.4	7.4
PCU	1.1	1.3	1.3	1.3	1.2
Community	2.9	3.4	4.2	3.7	3.2
Central/University	1.2	1.5	1.9	2.8	3.9
Private facilities	2.4	3.0	3.5	5.4	10.6
By type of insurance utilized					
No insurance	2.4	2.6	3.1	4.8	10.0
UCS	3.7	4.6	5.2	3.5	1.3
CSMBS	0.4	0.5	0.9	2.8	5.1
SSS	0.9	1.2	1.3	1.5	0.7
Private	0.1	0.1	0.1	0.2	10.0

Continue.

Household living standards quintiles	Poorest %	2nd quintile %	3rd quintile %	4th quintile %	Richest %
Year 2009(N)	**3999**	**3506**	**4278**	**4706**	**5487**
By type of facility utilized					
Public facilities	6.4	6.7	7.2	7.6	8.5
PCU	1.3	1.4	1.2	1.3	1.0
Community	3.3	3.6	4.0	4.1	3.9
Central/University	1.8	1.9	2.3	2.5	4.7
Private facilities	2.0	2.9	3.4	5.4	11.6
By type of insurance utilized					
No insurance	2.0	2.3	2.7	4.8	9.0
UCS	5.8	6.5	7.1	6.3	5.1
CSMBS	0.0	0.1	0.1	0.0	0.3
SSS	0.5	0.7	0.7	1.6	5.2
Private	0.1	0.1	0.1	0.2	0.5
Year 2013(N)	**4813**	**4378**	**3563**	**3862**	**3283**
By type of facility utilized					
Public facilities	4.4	6.3	7.1	8.2	7.0
PCU	1.1	1.6	1.5	1.8	1.1
Community	1.8	2.9	3.5	3.6	2.8
Central/University	1.6	1.9	2.4	3.3	4.0
Private facilities	2.1	2.4	3.7	6.0	11.4
By type of insurance utilized					
No insurance	1.6	1.9	3.4	5.1	9.0
UCS	3.5	5.0	5.5	5.3	2.2
CSMBS	0.1	0.4	0.7	1.8	4.5
SSS	1.0	1.1	1.0	1.6	2.1
Private	0.1	0.1	0.1	0.2	0.5

Note; dental care utilization reported as percentage; UCS: Universal Coverage Scheme, CSMBS- Civil Servant Medical Benefit Scheme, SSS- Social Security Scheme, No- out of pocket payment; PCU- Primary Care Unit

Table 28: Adjusted odds ratios (OR) with 95% confidence intervals (95%CI) for the associations between dental care utilization and underlying determinants among Thai adults

Deterministic variable	2003 Adjusted OR 95% CI	2006 Adjusted OR 95% CI	2009 Adjusted OR 95% CI	2013 Adjusted OR 95% CI
Demographic characteristics				
Age group				
20-34	0.73(0.66,0.81)*	0.85(0.76,0.95)*	0.80(0.71,0.91)*	0.92(0.81,1.04)
35-44	0.77(0.70,0.84)*	0.84(0.76,0.93)*	0.80(0.72,0.89)*	0.81(0.73,0.91)*
45-59 (ref)	1	1	1	1
Sex				
Male	0.67(0.61,0.72)*	0.69(0.62,0.77)*	0.64(0.58,0.71)*	0.66(0.62,0.74)*
Female (ref)	1	1	1	1
Socioeconomic characteristics				
Household assets				
1st quintile(poorest)	0.58(0.45,0.61)*	0.63(0.54,0.74)*	0.57(0.49,0.67)*	0.49(0.42,0.59)*
2nd quintile	0.60(0.52,0.69)*	0.75(0.65,0.86)*	0.63(0.55,0.73)*	0.65(0.55,0.76)*
3rd quintile	0.77(0.69,0.87)*	0.84(0.73,0.96)*	0.69(0.61,0.79)*	0.78(0.67,0.92)*
4th quintile	0.78(0.70,0.87)*	0.87(0.77,0.98)*	0.78(0.70,0.88)*	0.94(0.82,1.07)
5th quintile (richest) (ref)	1	1	1	1
Educational level attainment				
Up to Primary educational	0.49(0.43,0.56)*	0.44(0.38,0.50)*	0.61(0.52,0.71)*	0.52(0.45,0.61)*
Secondary education	0.68(0.60,0.77)*	0.51(0.44,0.58)*	0.66(0.57,0.75)*	0.63(0.54,0.73)*
Vocational	0.71(0.60,0.85)*	0.62(0.53,0.73)*	0.82(0.71,0.94)	0.63(0.49,0.81)*
Tertiary and higher (ref)	1	1	1	1
Occupation				
Economically inactive	0.84(0.73,0.96)*	0.71(0.61,0.82)*	0.73(0.62,0.85)*	0.89(0.74,1.06)
Elementary	0.79(0.66,0.93)*	0.70(0.58,0.83)*	0.57(0.47,0.70)*	0.79(0.63,0.99)*
Skilled-manual	0.84(0.72,0.97)*	0.75(0.64,0.88)*	0.72(0.60,0.85)*	0.75(0.62,0.92)*
Agricultural/fishery	0.81(0.70,0.94)*	0.75(0.64,0.87)*	0.76(0.64,0.90)*	0.75(0.62,0.90)*
Skilled- non manual	0.91(0.81,1.03)	0.90(0.79,1.02)	0.74(0.65,0.85)*	0.89(0.76,1.04)
Professional (ref)	1	1	1	1
Geographic characteristics				
Residence in region				
South	1.03(0.87,1.23)	1.20(0.97,1.49)	0.72(0.61,0.87)*	0.70(0.56,0.88)*
Northeast	0.88(0.74,1.05)	1.13(0.92,1.37)	0.75(0.63,0.89)*	0.59(0.45,0.76)*
North	1.07(0.90,1.27)	1.33(1.09,1.61)*	0.80(0.68,0.95)*	0.65(0.50,0.83)*
Central(except Bangkok)	0.89(0.76,1.05)	1.32(1.08,1.60)*	0.79(0.67,0.93)*	0.56(0.46,0.68)*
Bangkok (ref)	1	1	1	1
Area				
Non-municipal area	0.99(0.91,1.08)	0.91(0.82,1.00)	1.09(0.99,1.20)	0.88(0.79,0.97)*
Municipal area (ref)	1	1	1	1

Note; * p<0.05

4.6 Oral Health Related Behaviors and Prolong Living in Less Advancement of HAI

Table 29 provides additional information about association between oral health related behaviors among people living in areas with less advancement of HAI for ten years. The variables were generated in case of respondents living in province with same category of low and very low level of human development during 2003, 2006, 2009 and 2013. The results showed that prolong living in less development areas of education and employment aspects respondents were more likely to smoke than living in more superior areas. Alcoholic beverage drinking also has the same manner in areas with less development of health index. Thai adults living in less development of HAI areas especially in health and education aspects for a decade also associated with underutilized dental care and less likely to consume snack/confectionary and sweetened beverage, or on the other hand, these drawing a figures of living in high level development of HAI associated with higher consumption of sugary diets and visits dental clinics more often than their counterparts.

Table 29: Age-adjusted odds ratios (OR) with 95% confidence intervals (95%CI) for the associations between oral health-related behaviors and human achievement index (HAI)

Oral health-related behaviors = 1 if yes, =0 if otherwise	HAI Odds ratio (95% CI)	Health Odds ratio (95% CI)	Education Odds ratio (95% CI)	Employment Odds ratio (95% CI)	Income Odds ratio (95% CI)	Housing Odds ratio (95% CI)	Transportation Odds ratio (95% CI)
Smoking	0.95(0.86,1.04)	0.98(0.88,1.11)	1.11(1.01,1.21)*	1.43(1.17,1.75)*	0.79(0.55,1.15)	0.87(0.72,1.03)	0.79(0.70,0.89)
Alcohol	1.04(0.96,1.11)	1.32(1.21,1.44)*	0.97(0.89,1.05)	0.89(0.74,1.07)	0.87(0.65,1.15)	1.09(0.95,1.25)	1.12(1.02,1.23)*
Snack/confectionary	0.79(0.66,0.95)*	0.61(0.47,0.78)*	0.64(0.52,0.79)*	0.53(0.31,0.95)*	0.29(0.09,0.92)*	1.09(0.81,1.48)	1.05(0.85,1.29)
Sweetened beverage	0.77(0.72,0.82)*	0.75(0.69,0.82)*	0.65(0.60,0.71)*	0.77(0.64,0.93)*	0.24(0.16,0.36)*	0.63(0.55,0.73)*	0.69(0.63,0.76)*
Dental care utilization	0.82(0.73,0.93)*	0.84(0.73,0.97)*	0.74(0.66,0.84)*	0.89(0.67,1.19)	1.22(0.83,1.81)	1.19(0.99,1.45)	1.03(0.89,1.18)

Note; Table not shown data for family and community index, participation index due to no observation(n=0) **,*** indicate odds ratios value with statistical significant at p<.05 (references group = otherwise)

CHAPTER V

DISCUSSION

The proportionate universalism concept suggests to changes the slope of social gradient in health by considering appropriate actions that are universal to the whole population with scale and intensity proportionate to different levels of disadvantage circumstances (Sheiham et al., 2011). Therefore, there are three levels of public health interventions were recommended to achieve sustainable health improvements between and within the population. Firstly, a treatment level effort emphasizing individualistic factors called ‘downstream measure’ focus on the individual lifestyle and biological risk factors which is primarily based on the assumption that changing in individual behavior can be altered through delivering of education interventions and improvement of personal health skills. However, from public health perspective, this effort has many limitations and costly because it rely on treatment modalities, patient education programs, and involved in many clinical personnel. Moreover, the nature of lifestyle intervention could be closed to ‘victim-blaming’ intentions which believed that individual lifestyle are freely chosen and can be adjusted depended on personal responsibility in spite of the fact that risky or healthier choices are larger determined by the circumstances where people live and work. Secondly, related to level of preventive intervention known as ‘midstream measure’ involve prevention effort targeting individuals and groups of people consist of primary prevention which aim to protect people from negative health experiences and secondary prevention that attempt to reduce the risk levels and minimal harmful to vulnerable individuals and communities. Thirdly, refers to a more radical effort namely ‘upstream population measure’ accompany with a broader public

health policy intervention aim to address the underlying causes of disease across the entire population by focus on social environment or social context circumstances in which people live and work. The main action of this forces place emphasizes upon wider social policies toward the implementation of healthy public policies, legislation, regulation and fiscal measures aims to enable the healthier choices to be the easier choices resulting in create social environment that will ensure good health and reduce the overall level of risk in the whole population (McKinlay,1998; Watt, 2007).

To obtain a long-lasting protective interventions, several options have been documented. Firstly, the high-risk approach provides prevention effort to altered cause of disease especially risky behaviors targeting on high-risk individuals which are identified by risk assessment methods. However, practically, this approach has many limitations due to it required effective screening test to identify sick individual and less effective in preventing emerging of a new high-risk cases because the intervention is not directed at the root of the cause. Next options refers to a broader population approach, a population-based method which address the underlying conditions that creating diseases across the whole population by implementing social, economic and public health interventions to lower down the overall level of risk among population and shifting the curve of disease distribution to the left. The last options is called geographic targeting or directed population approach which pay attention to group of high-risk people or subpopulations which were defined by epidemiological or socio-demographic data and no need to use screening methods (Watt, 2007).

Demographic transitions in Southeast Asian countries such as fertility reductions, population ageing, and rural-to-urban migration, result in people's life-style becoming more Westernized. Increasing tobacco use, unhealthy diet, and

inadequate physical activity shift the burden of disease from infectious to chronic diseases (Chongsuvivatwong et al., 2011). Chronic non-communicable diseases are responsible for nearly 61.5% of deaths in these countries (Dans et al., 2011). These countries face increasing problems of unplanned urbanization, marketing of unhealthy foods, and inadequacies in public health policies, so that a narrow traditional clinical preventive approach is ineffective. Thus, a more radical public health preventive approach at potentially minimal health care cost is being adopted, focusing on promoting health by controlling a small number of identifiable risk factors that may impact on a large number of diseases (Watt and Fuller,2007; Sheiham and Watt, 2000; Petersen, 2009). The Common Risk factor Approach (CRFA) is the cornerstone of population approach that collaborate enabling policies that address the underlying causes of disease and facilitates working between many health partnerships and coalitions. CRFA place attention upon a set of shared risk factors such as smoking, obesity, and heavy drinking which are primary cause of illness, as well as focus in the fundamental cause of these risk conditions which influenced by social determinants and the environments. Therefore, changing in social and environment circumstances is required to change people's behaviors by adopted the policies that make healthier choices the easier choices and risky choices more difficult and socially unacceptable (Milio, 1988). Several major common risk factors, such as tobacco consumption, alcohol consumption or sugar dietary associated with a wide range of chronic diseases, such as diabetes, cardiovascular diseases, cancers and oral diseases (Machuca et al., 2000; Sheiham and Watt, 2000; Paula, 2005; Johnson et al., 2011). Indeed many authors have argued that, apart from knowing about the health consequences from risk behaviors, many people adopting and maintaining such habits are ruled by certain socioeconomic factors, housing and living environment, as well as public policies; these all play important roles as crucial structural determinants of population behaviors (Watt and Fuller,2007;

McPherson et al., 2013).There is evidence from empirical studies in high-income countries that implementation of comprehensive policies of tobacco control have shown that reduction in smoking prevalence is associated with improved individual socioeconomic position, educational level attainment, occupation, area of residence (Pierce et al., 1989; Smith et al., 2009; Nagelhout et al., 2012; Bacigalupe et al., 2013;Alves et al., 2015; Verhagen et al., 2015.). In addition, studies in many countries have found that co-occurrence among risk behaviors of smoking and alcohol tend to exist in clusters with adverse synergistic interactions (Ma et al., 2000; Leon et al., 2007; Padrao et al., 2007; Kristjansson et al., 2011; Verhagen et al., 2015).

Thailand has been through big socioeconomic and political development; for example, increased average per capita income, children attaining more years of education, healthcare insurance covering everyone by the Universal Coverage Scheme, expanded other forms of social security, increased access to safe water and basic sanitation, increased political participation, improved transportation and connectivity. However, Thailand has also faced the downsides of changes: family and community under pressure from the stresses of change, inadequate quality of education, and improper management of natural resources (UNDP,2014). These changes may influence a health risk transition moving from malnutrition and infectious diseases to chronic disease.

The primary objective of this study was to address the social determinants that may conceivably relate to oral health-related behaviors. This report deals with the survey findings for adult arising from examination of the data from Health and Welfare Surveys (HWS) carried out throughout Thailand during the period 2003 to 2013 with three further objectives: (i) to determine the distribution of oral health-related behaviors among Thai adults from 2003 to 2013,and (ii) to examine the associations between oral health-related behaviors and social determinants.

5.1 Smoking Consumption in Thailand

This study examined changes in prevalence of current and former smokers across various possible predictors among adults in Thailand between 2003 and 2013. Although an overall prevalence among male and female has declined, this study found evidence of socioeconomic inequality in smoking habits among Thai adults. The gradient of current smokers indicated higher concentration of smokers with lower socioeconomic status (SES), this is consistent with previous studies in Thailand (Mekrungrongwong et al., 2011; Zhao et al., 2015), Southeast Asian, and other low-to-middle-income countries (Kishore et al., 2013; Sreeramareddy et al., 2014;Palipudi et al., 2012) and Western countries (Nagelhout et al., 2012; Alveset al.,2015). The greater prevalence of tobacco smoking among the poorer Thai male adults may be related to childhood circumstances since poor children growing up in disadvantage families and in communities had role models of most male adults being smokers. So, cigarette smoking has been modeled as normal male adult behavior. Moreover, inadequate resources for maximizing planned control measures may allow this situation to continue since the Global Adult Tobacco Surveys (GATS-2009) reported that lower SES Thai residents were less likely to be exposed to, or be aware of, anti-smoking messages (WHO,2009). However, decreasing of C_{Index} among the lower SES smokers indicated that the epidemic of smoking within this advantage group is declining. It is fortunate that, in traditional Thai life, female smoking is unusual. Female smoking is not decidedly “cool” as in males. This tradition can be observed with prevalence of smoking is remarkably more profound in males than females.

The study has used public health survey data from the second and third decades of tobacco consumption control. Overall, more recently, smoking prevalence between 2003 and 2013 was noticeably reduced in every subgroups. This may indicate that policies implemented, including establishment of the Thai Health

Foundation which providing funds for health promotion measures combined with officially reduced availability of cigarettes dispensers and implementation of pictorial health warning labeling on cigarette packaging, had some impact on smoking behavior. It is difficult to distinguish the respective effects from many tobacco control policies which were implemented over the period of assessment, however, computer simulation modeling predicted that one of the most effective methods to prevent tobacco consumption in Thailand has been increasing the price of cigarettes through taxation (Levy et al., 2008; van Walbeek, 2010).This study has consistent findings with smoking prevalence showing high reduction among smokers who can least afford to smoke whereas the lowest reduction is found among the richest smokers who may bear a disproportionate share of the financial burden from tobacco pricing. There are other important social determinants associated with inequality correlated to tobacco use, particularly educational level attainment and type of occupation. The reason that the lowest prevalence of male smokers and high percentage of former smokers found among middle to high SES particularly those with highly educated Thai subjects than their less-well educated counterparts can be explained by the high educated respondents have greater acceptance of health promotion campaigns, particularly those focusing on tobacco control. Interesting evidence is disclosed that compared to the lowest educational level attainment, smoking prevalence among the more highly educated population subgroup may even be increasing, the underlying reason may relate to increasing numbers who have to find the way out for coping with higher stress during their study by tobacco smoking as a stress suppressor, or a modern tendency among some adolescents and young adults to adopt rebellious behaviors. There is also evidence of an association between higher prevalence of smoking and belonging to elementary, skilled-manually as well as agricultural/fishery occupations, confirming socioeconomic inequality in smoking.

Geographic determinants play important roles in smoking epidemics. Distribution of current smokers favored respondents in municipal areas more than non-municipal area over the period of assessment and was consistent with the recent report from the Thai cohort study (Zhao et al., 2015). The restriction on public areas for smoking indicated that previous public campaigns and activities, as well as law enforcement relating to tobacco packaging and encourage smoking cessation, have been most easily implemented among urban residents, but maybe starting to reach rural populations. GATS-2009 also provided evidence that urban residents were more exposed to anti-smoking message than rural residents (WHO,2009). Moreover, type of tobacco product may have a crucial role for rural smokers because it was reported that the users of a typical less expensive hand-rolled tobacco, were more likely to live in rural than urban areas, particularly male in the rural South (Benjakul et al., 2013).

Results from multivariate logistic regression indicated that current smokers among Thai male adults not only associated to socioeconomic and geographic characteristics, but it also associated with age groups and marital status, this results support findings of Mekrungrongwong et al. in 2011 (Mekrungrongwong et al., 2011). In addition, male and female smokers are more likely to drink alcoholic beverages than non-smokers do, this finding confirmed a well-known clustering between smoking and alcohol consumption (Ma, 2000;Wetzels et al., 2003; Verhagen et al., 2015.). There are many mechanisms have explained this relationship (Shiffman and Balabamis, 1995), an interesting possible explanation relates to childhood experiences among family and peers who smoke and drink, so that the childhood situation may influence adoption of the same behaviors as adults (Drobes,2002).

5.2 Alcoholic Beverage Consumption in Thailand

Alcohol is associated with periodontal disease and cancers in the mouth and surrounding organs (Roswall and Weiderpass, 2015). The acidity and high sugar content of alcoholic beverage can cause tooth erosion and decay. It also increase the risk of dental and facial injuries due to harmful drinking for example, injury from falls, road traffic accident or violence from drunkenness (FDI,2015). Over a decade, Thailand has implemented a well control of alcohol under the Alcohol Control Act, BE 2551 (2008) endorsed by the government, the government has a comprehensive tax for control alcohol pricing, reducing or banning alcohol advertisement and regulate availability by limiting hours and day of sale as well as implementing zero-tolerance policies for drink driving. Moreover, bars, clubs and retailers be prohibited from selling alcoholic beverages within 300-metre radius of higher educational institutions.

The effects of enforcement impact of alcohol control measures in Thailand can be observed in this study. The result showed overall prevalence of alcohol consumption slightly changed between 2003 and 2013 which was considered consistent with reports from Western countries (Greenfield et al., 2000;Marques-Vidal, 2005). Formerly, women in Thai culture were discouraged from drinking, or expected to drink less than male often with less alcohol content and sweeter than the masculine drink. This claim exists in this analysis with the prevalence of females alcohol consumers is markedly less than males, However, while prevalence among males has remain unchanged, female drinking is increasing. There are several perspectives to this phenomenon: firstly, there is trend of teenager culture to be permeated with cheap, easy to drink, attractively decorated new widely available products like “smoothies mixed with alcohol”. It is very easy for Thais to access shops that sell alcohol with more than 500,000 shops having alcohol sales licenses

(ThaiHealth, 2010). Moreover, there are many occasions for Thai social activities encourage drink, as alcohol drinking is considered to be the norm, particularly on the celebration occasions and cultural events.

In Thailand, two most common reasons for initiate drinking among modern young adult males appears to peer influence and the desire to participate in social events (Assanangkornchai et al., 2000). These influences were found in this study, the highest prevalence concentrated among adult males with lower education level attainment, this consistent with finding in Thailand (Assanangkornchai et al., 2009). The prominent of regularly alcoholic beverage drinking accumulated among elementary workforce and skilled manual type of occupation underlines the alienation of these labor workforces to relieve the overwhelming pressure after their work and gratified their social need because most of drinking occasions be accompanied with their friends (Singer, 1986).

The socioeconomic inequality associated with drinking was also found, the concentration index together with distribution of the regularly drinkers indicated that the less-well off consumed more than their better-off counterparts and increasing in size of socioeconomic inequality among male regularly drinking highlighted alcohol consumption still be more prevalent among the poor. . This situation may be linked to the prices of alcoholic beverages is remain lowered or slightly increased while the employment minimum wage has remarkable increased during the past decade (CAS,2013). Thus, rising incomes and higher affordable to purchase may increase occasional drinking among alcohol addiction individuals.

Alcohol consumption among Thai males and females in this study was strongly associated with tobacco use. This feature is also found from the Thai cohort study which provided more details about the relationship between heavy drinkers

and other health risks for NCDs including poor diet and sedentary behavior such as more sitting time, watching television and less time for exercise (Wakabayashi et al., 2015).

This finding has confirmed the BOD reports that regularly alcohol drinking epidemic to the Northern parts and contributed to the highest risk factor attributed to ill-health for males in aforementioned region and accounted for 8.8% of DALY lost in 2013 (BOD, 2013). The newspapers, post family violence and road traffic accident related to alcohol use almost every days. Thai health and well-being are at risk from alcohol-related harm. Leaving it without effective control will kill Thai habitants and destroy family structure more and more.

The ways to solving alcohol problems in Thailand has already set up, with four related ministerial regulations, namely the draft notification of the Prime Minister's Office regarding restrictions on the methods for selling alcohol B.E. 2552: the first draft prohibits the sale of alcohol in the form of mixing with sweetened drinks, and fruit-flavored drinks. The second draft involves the designation of alcohol-free zones which prohibits the sale of alcohol 500 meters away from schools and universities, the third draft involves the ban on drinking activities at certain places such as state enterprises, government offices and on public transport, the last draft involves labels or warning messages, and provide warnings to consumers of the false belief that the alcoholic beverages are safe, good for health. So, it's important to strictly and sincerely reinforce all of the four drafts into Thai society immediately. Moreover, oral health professional should consider the strategies help inform the patient with alcohol use by provide harm and health impacts information to the patients. Focusing the common risk factors approach for NCDs and working with other health professionals may provide a better control of alcohol consumption.

5.3 Snack and Sweetened Beverage Consumption

Thailand's attempt to wean its people off sugary drinks is part of a growing trend in Asia, where increasingly calorie-rich diets and sedentary lifestyles are producing health complications that threaten national budgets. Recent studies in Thailand revealed problems from over-consumption of sugar related to overweight and obesity plus diabetes (Aekplakorn et al., 2011; Lim et al., 2014).

Oral health professionals have an important role in addressing NCDs and oral diseases by promoting healthy eating. Transparency in food labeling and encouraging healthy consumer choices as well as regulating the advertising of energy-rich foods and restricting their availability.

Frequency distribution of snack and sweetened beverage consumption in this study indicated socioeconomic inequality manifested among Thai adults with the more affluent being the majority in consumption of such diets compared to the less-well-off. Increasing tendency of C_{Index} indicate trends for both sugary diets consumption among the high SES population are elevated. The variation in socioeconomic pattern is similar to the consumption pattern in developed countries in Asia like South Korea (Han et al., 2013) unlike those in the United States which the less effluent are the majority of consumption (Ogden et al., 2011). The rural/urban differences are also presented. Urban dwellers keep the same trend in consume more snack and sweetened beverage than villagers as previously reported (Kosulwat, 2002). Bangkokians were most at risk in top rank consumption of snacks and Southerners are in the first rank for consumption of sweetened beverages, these situations can be explained by the evidence that most of Bangkok residents which considered as high income people have tendency to buy food at modern supermarket which provided less healthy foods compared to an inconvenient fresh markets (Kelly et al., 2015). The regional differences in this study was also found in

developed country(Park et al., 2015). The distribution of both sugary diets associated with socioeconomic and geographic characteristics in our study suggested that individual dietary choices are not only freely chosen but also influenced by the social and environment in which people live and work namely social determinants of health. Its implied that dental policy makers and oral health promoters should focus the future interventions that adopt a common risk factors approach incorporate with social and environmental aspects which are the underlying root causes of the problem, this may help in minimizing burden of disease from many chronic non-communicable diseases including oral diseases and will improve oral health, general health status and quality of life of population more effectively.

Considering between our analysis and DMFT index distribution from the 5th, 6th and 7th Thailand national oral health surveys indicated prevalence of dental caries experience is more pronounced in areas with greater percentage of sugar-based diets consumption addressing sugar-caries relationship vary by geographic region.

Previous sugar consumption control programs in Thailand can be linked to three levels of intervention measure, firstly at the downstream level, Thai consumers were informed about harmful from excessive intake of added sugar diets and were motivated for behavioral change to choose a more healthy meal options via nutrition education and media campaigns. Secondly, at the midstream level, availability of unhealthy foods and drinks were limited to a certain places and implemented food labeling regulations to facilitate informed food choices. Lastly at the upstream level, the food products processing in the industry were voluntary projected to decrease sugar added products and produce more healthy packages. However, those attempts faces several obstacles because there are insufficient funds to continue the campaigns, limits availability can be implemented in only school and hospital but not expanded to other public places, and manufacturing sugar containing food

producers concern about their sell volume in a new healthy less sweet taste products. The result of this study presented that percentage of sugary diets consumption remain in high level indicated Thailand need a more effective radical population approach especially implement taxation method for packaged drinks according to their sugar contents. Control of sugar price claimed to provide more satisfactory results as tax pricing control in tobacco and alcohol, supportive evidences can be observed from a meta-analysis which revealed that increase price are associated with lower demand for sugar sweetened beverage (Cabrera Escobar et al., 2013). However, the advantages and disadvantages subsequent to sugar taxation that will happen to producers, consumers and government sectors should be evaluated. The main advantage link to the government revenue will be increase similarly to 2% surcharge tax from tobacco and alcohol, in response to customers paying more for upswing costs in sugar products, income from sugar tax should provide fund for health promotion activities as a compensation. The taxation method may also beneficial for food or sweet drinks business outside manufactured markets, if the industrial sweet product become more expensive, consumers may choose a cheaper sweet ready-mixed beverage from these shops or drink kiosk providers, to bring this situation under control, government should continue put pressure on raw sugar or refined sugar prices to increase cost of production outside industrial markets. On the other hand, sugar taxation may limit affordability of consumers in choosing their usually sweet drink menu, however, in a different perspective, this limitation might help to alter the demand of unhealthy drinks and considered more cheaper alternatives such as naturally sweet fruits or bottle water, in this point of view, controlling of sweet drinks price should be simultaneously promote together with increased availability and control the price of a more healthy replacement. In addition, industrial food processing sectors may be affected due to rising input cost and issue of inequality to be apparent because manufactured soft drink supposed to

be more costly whereas the street-side market are not interfered. In addition, reduction of sweet drink consumption may affect sugarcane growers, to overcome this consequences, this problem can minimizing by suggest the sugar processors to produce ethanol from cane juice and use as renewable energy that support Thai government policies to replace gasoline with bio-fuels.

The more affluent respondents in this study are majority of snack/confectionary and sweetened beverage consumption. Taxation methods may not diminished their choices, however main benefit of this strategy may accounted for the less well-off respondents aids in reduce their household spending for unnecessary food products and increase their capacity to buy a more necessary healthy food. Focusing the more affluent as a target group to performed a better healthy choices, the food retail sectors that dominated by the urban dwellers such as hypermarkets, supermarkets, and convenient stores should provide a variety and more attractive packaging of healthy food products. Another pathway can be focused to inconvenient traditional fresh markets which supply affordable, healthy, livelihoods and repositories of Thai foods require government assistance to become more established to make it easy to visit for every customer.

In addition to taxation methods, much of the sugars consumed today are hidden in processed foods that are not usually seen as sweets. For example, 1 tablespoon of ketchup contains around 4 grams (1 teaspoon) of free sugars. A single can of sugar-sweetened soda contains up to 40 grams (10 teaspoons) of free sugars. In response to consumers paying more interested in dietary nutritional values, food labeling should provide more information about sugar-added to manufactured foods together with health harm warning picture which may promote perceptions of the health risks posed by sugary products in the markets.

It’s essential for Thailand to regulate sugar-based diets by employ the population approach either with tax control for sugar consumption or food labeling control along with feasible and suitable nutrition programs which may lead to successful control as tobacco and alcohol.

5.4 Dental Care Utilization among Thai Adults

Dental services in Thailand can be provided in many levels of public facilities, such as primary health care unit (PCU), community, regional, provincial and university hospitals. Dental service providers comprise dentists and dental nurses. The latter work for the government sector and mainly provide dental service at PCU level, with both service groups taking responsibility in delivering dental treatment and preventive measures at hospital level. Among Thai dentists, half of them work in the private sector especially in Bangkok and municipality areas (Bureau of Dental Health,2013). This study also provides evidence that respondents living in municipal area have higher rate of dental service used more than non-municipal residents, and the highest rate was found in Bangkok metropolis, the region with easy access for dental service due to most of population have higher income and crowded with many private dental clinics.

Between 2003 and 2013, the proportion of dentists in Thailand increased but the rates of service utilization have remained unchanged. This flaw may be related to the majority of Thai population living mostly in rural and marginal urban regions with shortage of oral health professional. This finding suggested that the lowest rate of dental care was used by Northeastern residents where dentist density was lower than other regions. It is noteworthy that the proportion of dental nurses in the Northeastern region is highest in every survey years, but rate of utilization are lowest, the inconsistency of this distribution may be linked to reason that dental nurses were mainly work in health promotion and prevention especially schoolchildren

other than the adult age patients. To substantiate this phenomenon, training of government dental nurse in dental treatment for adult and elderly at primary health care unit may redistribute the rate of utilization to the entire population.

Over the ten years covered in this study, socioeconomic inequality in dental care utilization among Thai adult population has continued even after the country implemented universal coverage policy. Likewise, this figure is similarly to the recent studies among Thai children, adults, and elderly (Somkotra, 2011,2013;Somkotra and Detsomboonrat, 2009;Somkotra and Vachirarojpisan, 2009). During the period of assessment, the C_{Index} for the adult population are elevated indicate widening gap between the rich and the poor in the use of dental care in Thailand. This evidence is contrast to finding from European countries which suggested that socioeconomic inequalities in dental care services tend to be lower in countries where there was some degree of public coverage (Palecia et al. 2014). The gradient of dental care utilization in this study and C_{Index} indicated that the better-off are more often to visit dental clinics than the less well-off counterpart. This figure is opposite to the gradient of current smokers which concentrated among the less well-off residents. Therefore, smoking cessation at dental clinics may not reach the target population, this situation suggesting oral health professionals moving from a downstream intervention to a more radical effort of tobacco control measure which will lead to a greater potential impact for the majority of smoking population. Pro-poor oral health care utilization at primary care units was also observed, this evidence may be aid in driven strategy that integrate primary oral health care at the district level to achieve the population health outcome particularly the disadvantage subgroup in remote areas.

The reasons underneath the popularity of UCS for dental care utilization among the poorest SES in this study may result from the financial barriers for dental

services were diminished at government and sub-contract facilities. Tackle oral health problems under UCS should be success for over ten years of implementation. However, the 5th, 6th and 7th national oral health surveys provide detail data that severity and prevalence of dental caries remain under satisfactory rate. Thus, several perspectives can be explained for such existing. Firstly, the oral health services system under UCS emphasize on curative purpose particularly scaling, filling and extraction treatment services while preventive packages at the population level is far from expected. Secondly, even though dental health manpower were improve during the period of UCS, but rate of dental care utilization has no maximizing, this imbalance may related to improving of oral health infrastructure especially dental units might not be a top of the concern of the system. Inadequate of dental equipment suggesting implementation of "service plan strategy" which focuses on redistribution of health resources both manpower and materials may create a balancing between dental professional and dental units.

Access to dental service among three public health insurances are different according to the scope of benefits coverage: the CSMBS users can access all public providers with no registration required and no limit to use of benefit packages covered both preventive and curative dental services; the SSS users can be reimbursed for dental care payment no more than twice a year (maximum 300 Baht per treatment) and only utilizing benefits through registered public and private competing contractors; and the UCS applicants assigned to use dental services at contracting units of primary care (CUP) of both public and private providers. Unlike UCS, the present SSS are reimbursed on a fee-for-service basis, and budget was available for only two annual dental service reimbursements not more than 600 Baht for basic curative treatment. This amount of individual budget is considered relatively much less compared to the dental fee rates, especially at private facilities.

Reimbursement of fee-for-service payment may be another barrier to dental care accessibility among low-income workers when they have to pay in cash. This situation can be observed in our results in almost every survey year, where the rate of dental service utilization among the poorest SES subjects was less than the richest SES subjects.

In looking at the type of providers for oral health care, the results revealed that public facilities are a major source for the low-income group, particularly at community hospital level, whereas private facilities are responsible for the high-income group. After 2002, access to dental services was improved by dental funds which were bundled with the capitation outpatient budget from the Universal Coverage Scheme (UCS). However, results between 2003 and 2013 indicate that the poor show increasing trend in choosing private clinics. This evidence may reflect that distribution of human resources and accessibility to dental services in contracted hospitals is still challenging. On the other hand, other aspects that should not overlooked: the increasing trend of the poor to review opportunity costs in favor of seeking more oral health care in the private sector for themselves and families. Other captor in greater take-up of private sector care may be rural regions becoming relatively more urbanized with improving economic conditions and with more private dental practitioners moving into less densely populated regions. Meanwhile, inconvenience of service appointment times and lengths of waiting time for public-funded oral care may be incentives to willingness of the poor to pay for private outlets.

Although attempt was made to improve oral health status of Thai population, but national oral health surveys revealed that caries prevalence among Thai adult population aged 35-44 years is still high. This feature pointed out that previous implementation of many measures to improve oral health of the population either

promote use of fluoride tooth paste and increase accessibility for dental care service by reduce the financial barrier through various types of health insurance scheme and increase the number of oral health practitioners distributed toward the rural areas unable to comprehend the entire population, or because of the major cariogenic factor especially sugar diets was not tackled. Most of prevention programs focused primarily on strengthening of tooth structure and removal of bacterial plague but place too little emphasis on influences of cariogenic diets. While high consumption of sugar-contained diets considered as one of common risk factors affecting health, especially dental caries development. Nowadays, there are increases in marketing of soft drink, confectionary and sugar-contained food target every age groups in Thailand. Successful reduction in caries prevalence is important to recognize approach which limits population sugar consumption simultaneously with previously ongoing preventive programs.

In the past, oral health system separated from health system. WHO is a major top-down pushing force to driven the concept of integrated oral health to general health. The reasons related to this concept, including the facts that oral health is integral and essential to general health, is one of determining factors for quality of life. Moreover both shared the same common risk factors such as smoking, alcohol abuse, sugar consumption (Petersen,2003). Thus improving oral health will results in reducing mortality rate. Based on a common risk factors approach, oral health care delivery may be facilitated by collaboration between dental personnel and other medical professional in oral health promotion and prevention to reach all populations will achieve good oral health together with general health, which can lead to improve quality of life.

5.5 Association Between Oral Health-related Behaviors and Human Achievement Index(HAI)

This study had some potential strength. The analysis used very large, representative samples of the Thai population over the period of ten years. Therefore, changes in SES differences over time could be detected and potentially applicable to the whole Thai population. Also, we were able to examine relationship of health habits with multiple SES determinants and to combine information from diverse sources through the HAI. The result was a more detailed picture of the health risks situation derived through structural determinants. As of the HAI index was independently calculated by UNDP and used secondary data that have national coverage from various sources including national sample survey (socioeconomic survey, labor force survey, health and welfare survey), registration systems (divorce incidence, personal vehicle registration) and administrative records (school enrolment, person per physician, malnutrition in children under five) (UNDP,2014), it is possible to incorporate them into this study as supplementary structural determinants. This finding is emerging that people living in a less advanced human development area are more likely to smoke and drink alcoholic beverage than those living at the top HAI level and the association is contrary to the distribution of snack and sweetened beverage consumption. These results may reflect the broad social determinants over Thailand because the HAI includes all aspects related to population health and well-being. According to the Thai human development report of 2014 which was used in this analysis, 33 Provinces were ranked at the bottom of HAI rankings. Taking social determinants of health into consideration, the integration of tobacco control together with alcohol consumption control policies in these deprived areas should be counteracted with advancing human development strategies, particularly in health, education, employment, housing and living

condition, income, family and community, transportation and communication, and social participation aspects.

5.6 Suggestion

A framework for public health action should apply concept from the health impact pyramid because interventions to control health risk behaviors in this study require programs which impact at all levels of the pyramid. For instance, people with low SES, educational level attainment and living in area with less advancement of HAI have higher rate of smoking and alcohol drinking than do the people with higher status. The reason of this association may related to general characteristic of poverty, less educated and relative deprivation increase exposure to stress conditions and unhealthy environments. Intervention that address social determinants of health, such as improving educational aspects both quality and level of education, resolve unemployment problems together with reduce household expenditure and focus in human development aspects may eliminate those health risk exposures. Context-changing interventions, such as increase price of tobacco and alcohol products via taxation strategy, established smoke-free in all public places or zoning sale shops, enforce zero tolerance for drunk driving together with changing social norms through media campaign and enforce bans on advertising, promotion and sponsorship may limit availability of aforementioned health risks factors. Regulating of advertising and promotion also provide effect of social immunization against smoking and drinking. Clinical interventions that include cessation medication can help quitting for individual and curb alcohol use. Education about harmful use of alcohol and warn about danger of tobacco provide information help to change behaviors.

Although poverty increases ill health within a society, economic development can also increase morbidity and mortality rate from chronic disease and road accidents. People with high SES, and living in more advancement of HAI in this study

have higher rate of snack and sweetened beverage consumption. Therefore, intervention at socioeconomic level can be emphasize in providing more healthy nutritional options by increased availability of natural and indigenous products with good nutritional values over the present of processed food in supermarket, hypermarket and convenient store as well as readjusted infrastructure and increase access to fresh market. At the second upper tier, restrict sales of unhealthy foods and drinks by increase taxation, limit the serving sizes and ban sugar-sweetened beverages and snack in government offices and make healthy meal options available may change the social context which targeted by those sugar-base diets. Promote consumption of sweet from natural product or replace sweet drinks with pure water or dental sealant will have a long lasting protective effect from sugar intake. At the clinical intervention level, treatment of hypertension, obesity, diabetes and dental caries may prevent harmful effects for many individuals. At the top level with less effective to entire population including dental health education, diets counseling or provide consumer-friendly food-labeling can facilitate informed food choices.

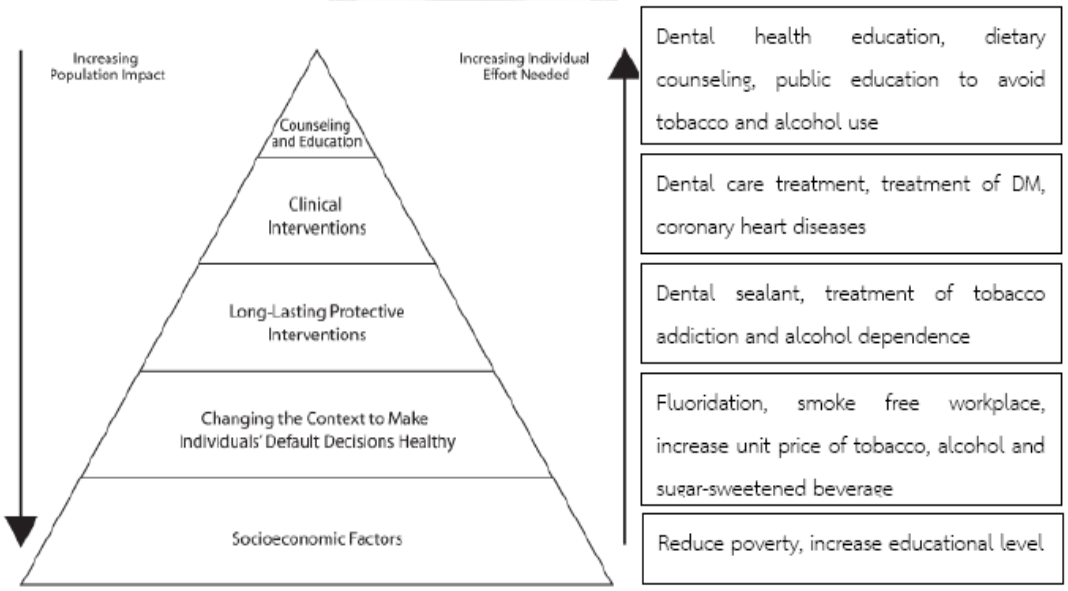


Figure 15: The health impact pyramid (adapted from Frieden,2010)

CHAPTER VI

SUMMARY AND CONCLUSION

This study suggests socioeconomic inequality in oral health-related behaviors persisted among Thai adult during the health system in transition, both intermediary and structural social determinants exhibited some degree of association. The less affluent respondents are at risk from smoking and regular alcoholic beverage drinking whereas the majority of the more affluent consume sugar-based diets more frequently and tend to utilized dental care service more often than their counterpart. Co-occurrence among risk behaviors particularly smoking, alcohol and unsatisfactory dietary choices tend to exist in clusters with adverse synergistic interactions.

In conclusion, this study finding has certain implications for public health. Existing of socioeconomic inequality identifying the underlying root causes of oral health-related behaviors, this evidence may be helpful in reorientation control policy by incorporate social and environmental aspect aims to provide more effective intervention in reducing health risks factors among Thai population. It is important for public health perspective to considered alternative approach because the trend of smoking and drinking was slightly change, despite extensively implementation of control measures, to alleviate these, factory products labeling with the more optimistic massage related to health or benefit from smoking cessation, alcohol withdrawal and sugar free snacks or drinks deserve particular attention. Additional findings the co-occurrence between risk factors suggesting future interventions that focus in a common risk factors approach by controlling multiple unhealthy behaviors

which may help in minimizing burden of disease from many chronic non-communicable diseases in Thailand.

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APPENDIX

Table **30:** Oral health status and distribution of dental personnel from national oral health surveys in Thailand

	Average	BKK	C	N	NE	S	Municipal	Non-Municipal
	%	%	%		%	%	%	%
Oral health status								
Caries rates (%)								
2000-2001	85.6	90.5	93.0	80.2	80.6	89.6	89.7	83.3
2006-2007	89.6	94.8	95.2	92.4	80.8	94.3	90.8	88.1
2012	86.7	89.6	94.3	91.4	76.7	92.6	89.9	84.7
Mean DMFT index								
2000-2001	6.1	8.8	8.5	5.0	3.9	7.2	7.2	5.4
2006-2007	6.7	9.2	9.0	6.6	4.2	7.6	7.5	6.0
2012	6.0	7.0	8.2	5.8	3.9	6.8	7.4	4.7
Community Periodontal Index(CPI=4)								
2000-2001	10.5	6.8	12.6	10.1	8.9	14.6	10.4	10.9
2006-2007	15.5	20.9	21.5	16.3	15.8	23.7	15.5	19.5
2012	4.7	3.0	2.2	3.5	5.1	9.0	4.1	5.2
Dental personnel to population ratio								
Density of dentists								
2005	1:15047	1:1305	1:10494	1:11830	1:21120	1:11877	-	-
2006	1:7086	1:1266	1:9967	1:11571	1:20527	1:11118	-	-
2009	1:6400	1:1167	1:8945	1:9858	1:17663	1:10143	-	-
2012	1:5553	1:1039	1:7649	1:8202	1:14247	1:8515	-	-
Density of dental nurses								
2005	1:17932	1:225365	1:15996	1:16111	1:16740	1:16831	-	-
2006	1:16883	1:1711483	1:15416	1:15595	1:15299	1:15979	-	-
2009	1:14729	1:158405	1:14170	1:13670	1:12903	1:13793	-	-
2012	1:12912	1:69190	1:13104	1:12282	1:11283	1:11498	-	-

Note: DMFT-Decayed, Missing, Filled tooth , Caries rate and DMFT selected from data of Thai adults age 35-44 years

BKK-Bangkok, C-Central, N-North, NE-Northeast, S-South

Table 31: Benefit package of three public health insurance scheme

Benefit Package	UCS	SSS	CSMBS
Health service utilization	At contracting unit of primary care (CUP) both public and private	At registered main contractor hospital (>100 beds), public or private	At any public hospital for outpatient services; or private hospital, except accident and emergency. Only public hospitals for admission services
Health services	Ambulatory and inpatient care including accident and emergency and rehabilitation services, and preventive and health promotion services Note: prevention and health promotion for beneficiaries in all three schemes	Both ambulatory and inpatient care, including accident and emergency and rehabilitation services. No preventive services are provided, but NHSO manages prevention and health promotion for beneficiaries in all three schemes	Both ambulatory and inpatient care, including accident and emergency and rehabilitation services. No preventive services are provided, but NHSO manages prevention and health promotion for beneficiaries in all three schemes
Medicines	Limited; only essential drugs (ED)	Limited; only ED	Limited; only ED, but the use of nonessential (NED) can be approved by 3 doctors in the hospitals
Maternity (Delivery)	Limited; only 2 deliveries	Limited; only 2 deliveries and payment in cash(lump sum 13 000 Baht per delivery inclusive of ANC and PNC services)	No limit
Dental care	Covered, both preventive and curative dental services	Reimburse no more than twice a year (max 300 Baht/treatment)	Covered, no limitation specified (not include orthodontic and esthetic treatments)

UCS- Universal coverage scheme, SSS-social security scheme, CSMBS- civil servant medical benefit scheme, NHSO -National Security Office

The Concentration Index

Definition

The concentration index is calculated from twice the area between the concentration curve and the line of equality (the 45-degree line). So, if there is no socioeconomic-related inequality, the concentration index is zero. The index will have a negative value when the concentration curve lies above the 45-degree line, indicating disproportionate distribution of the health variable among the poor, and a positive value when it lies below the line of equality.

Formally, the concentration index is defined as

$$C = 1\text{-}2 \int_0^1 L_h(p)dp.$$

The index is bounded between –1 and 1. For a discrete living standards variable, it can be written as

$$C = \frac{2}{N\mu} \sum_{i=1}^{n} h_i r_i - 1 - \frac{1}{N},$$

Where *hi* is the health sector variable, μ is its mean, and *ri=i /N* is the fractional rank of individual *i* in the living standards distribution, with *i* = 1 for the poorest and *i* = N for the richest. For computation, a more convenient formula for the concentration index defines it in terms of the covariance between the health variable and the fractional rank in the living standards distribution,

$$C = \frac{2}{\mu} \text{cov}(h,r).$$

Note that the concentration index depends only on the relationship between the health variable and the rank of the living standards variable. A change in the degree of income inequality will not affect the concentration index measure.

Properties

The properties of the concentration index depend on the measurement characteristics of the variable of interest. The index is an appropriate measure of socioeconomic-related health inequality when health is measured on a ratio scale with nonnegative values. The concentration index is invariant to multiplication of the health sector variable of interest by any scalar. So, for example, if we are measuring inequality in payments for health care, it does not matter whether payments are measured in local currency or in dollars; the concentration index will be the same. Similarly, it does not matter whether health care is analyzed in terms of utilization per month or if monthly data are multiplied by 12 to give yearly figures..

Point estimate of the concentration index

The concentration index (*C*) can be computed very easily from microdata by using the "convenient covariance" formula. If the sample is not self-weighted, weights should be applied in computation of the covariance, the mean of the health variable, and the fractional rank. Given the relationship between covariance and ordinary least squares (OLS) regression, an equivalent estimate of the concentration index can be obtained from a "convenient regression" of a transformation of the health variable of interest on the fractional rank in the living standards distribution . Specifically,

$$2\sigma^2_r\left(\frac{hi}{\mu}\right) = \alpha + \beta r_i + \varepsilon_i ,$$

where σ^2_r is the variance of the fractional rank. The OLS estimate of β is an estimate of the concentration index. This method gives rise to an alternative interpretation of the concentration index as the slope of a line passing through the heads of a parade of people, ranked by their living standards, with each individual's height proportional to the value of his or her health variable, expressed as a fraction of the mean.

Demographic standardization of the concentration index

Measuring socioeconomic related inequality in a health variable after controlling for the confounding effect of demographics is of interested. To estimate a standardized concentration index, one could use either method of standardization to generate a predicted health variable purged of the influence of demographics across socioeconomic groups, then compute the concentration index for this standardized variable. In the case that one wishes to standardize for the full correlation with confounders, and so there are no control (*z*) variables, a shortcut method of obtaining an indirectly standardized concentration index is simply to include the standardizing variables directly in the convenient regression. This is precisely what is being done in the literature that makes use of the relative index of inequality. From the regression

$$2\sigma^2_r\left(\frac{hi}{\mu}\right) = \alpha_2 + \beta_{2r_i} + \sum_j \delta j \qquad x_{ji} + \upsilon_i,$$

Where x_j are the confounding variables, for example, age, sex, and so on, the OLS estimate $\hat{\beta}_2$ is an estimate of the indirectly standardized concentration index. Computation requires simply adding the confounding variables to the regression commands discussed above.

Sensitivity of the concentration index to the living standards measure

It is therefore important to consider whether the chosen measure of living standards influences the measured degree of socioeconomic-related inequality in the health variable of interest. When the concentration index is used as a summary measure of inequality, the question is whether it is sensitive to the living standards measure. As noted above, the concentration index reflects the relationship between the health variable and living standards rank. It is not influenced by the variance of the living standards measure. In some circumstances, this may be considered a disadvantage. For example, it means that, for a given relationship between income and health, the concentration index cannot discriminate the degree of income-related health inequality in one country in which income is distributed very unevenly from that in another country in which the income distribution is very equal. On the other hand, when one is interested in inequality at a certain place and time, it is reassuring that the differing variances of alternative measures of living standards will not influence the concentration index. However, the concentration index may differ if the ranking of individuals is inconsistent across alternative measures. Previous study demonstrate that the concentration index will differ across alternative living standards measures if the health variable is correlated with changes in an individual's rank on moving from one measure to another. The difference between two concentration indices *C*1 and *C*2, where the respective concentration index is calculated on the basis of a given ranking ($r_{1i}$and r_{2i}), for example, consumption and a wealth index can be computed by means of the regression

$$2\sigma^2_{\Delta r}\left(\frac{hi}{\mu}\right) = \alpha + \gamma\Delta r_{i+}\varepsilon_{i,}$$

Where $\Delta ri = r_{1i} - r_{2i}$ is the reranking that results from changing the measure of socioeconomic status, and $\sigma^2_{\Delta_r}$ is its variance. The OLS estimate of γ provides an estimate of the difference ($C1 - C2$). Significance of the difference between indices can be tested by using the standard error of γ .

The concentration curve defined

The two key variables underlying the concentration curve are the health variable, the distribution of which is the subject of interest, and a variable capturing living standard against which the distribution is to be assessed. Measurement of key health sector variables and of household living standards has been considered in the aforementioned aspect. The health variable must be measured in units that can be aggregated across individuals. This is not necessary for the living standards measure, which is used only to rank individuals from richest to poorest. The data could be at the individual level (e.g., raw household survey data), in which case values of both the health variable and the living standards variable are available for each observation. Alternatively, the data could be grouped, in which case, for each living-standard group (e.g., income quintile), the mean value of the health variable is observed. The ranking of the groups (which group is poorest, which group is second poorest, and so on) and the percentage of the sample falling into each group are known. In the case of grouped data, the only advantage of the concentration curve over a table of group means is that it gives a graphical representation of the data. The concentration curve plots the cumulative percentage of the health variable (y-axis) against the cumulative percentage of the population, ranked by living standards, beginning with the poorest, and ending with the richest (x-axis). In other words, it plots shares of the health variable against quintiles of the living standards variable. So, for example, the concentration curve might show the cumulative percentage of health subsidies accruing to the poorest *p* percent of the population. If everyone,

irrespective of his or her living standards, has exactly the same value of the health variable, the concentration curve will be a 45-degree line, running from the bottom left-hand corner to the top right-hand corner. This is known as the line of equality. If, by contrast, the health sector variable takes higher (lower) values among poorer people, the concentration curve will lie above (below) the line of equality. The farther the curve is above the line of equality, the more concentrated the health variable is among the poor. Concentration curves for the same variable in different countries or time periods can be plotted on the same graph. Similarly, curves for different health sector variables in the same country and time period can be plotted against each other. For example, the analyst may wish to assess whether inpatient care is more unequally distributed than primary care. If the concentration curve for one measure (or time period or health service) lies everywhere above than for the other, the first curve is said to dominate the second, and the ranking by degree of inequality is unambiguous. Alternatively, curves may cross, in which case neither distribution dominates the other. It is then still possible to make comparisons of degrees of inequality but only by resorting to a summary index of inequality, which inevitably involves the imposition of value judgments concerning the relative weight given to inequality arising at different points in the distribution. Rankings by degree of inequality can then differ depending on the inequality index chosen.

Concentration curves can be used to identify whether socioeconomic inequality in some health sector variable exists and whether it is more pronounced at one point in time than another or in one country than another. But a concentration curve does not give a measure of the magnitude of inequality that can be compared conveniently across many time periods, countries, regions, or whatever may be chosen for comparison. The concentration index which is directly related to the concentration curve, does quantify the degree of socioeconomic related

inequality in a health variable. It has been used, for example, to measure and to compare the degree of socioeconomic-related inequality in child mortality child immunization child malnutrition, adult health, health subsidies and health care utilization. Many other applications are possible.

Human Achievement Index (HAI)

Human Achievement Index (HAI) which was independently calculated by UNDP Thailand that have structure covered human's life circumstances including health, education, income, housing and living environment, family and community life, transportation and communication context and participation in society. This index is a composite index composed of eight indices based on 40 indicators used to compare human development at the provincial level, it was first computed in 2003 and compiled again in 2007, 2009 and 2011 is the latest generation.

The HAI methodology, used in the UNDP global Human Development Reports. For each indicator, the following calculation is used for each of the provinces:

$$\frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}}$$

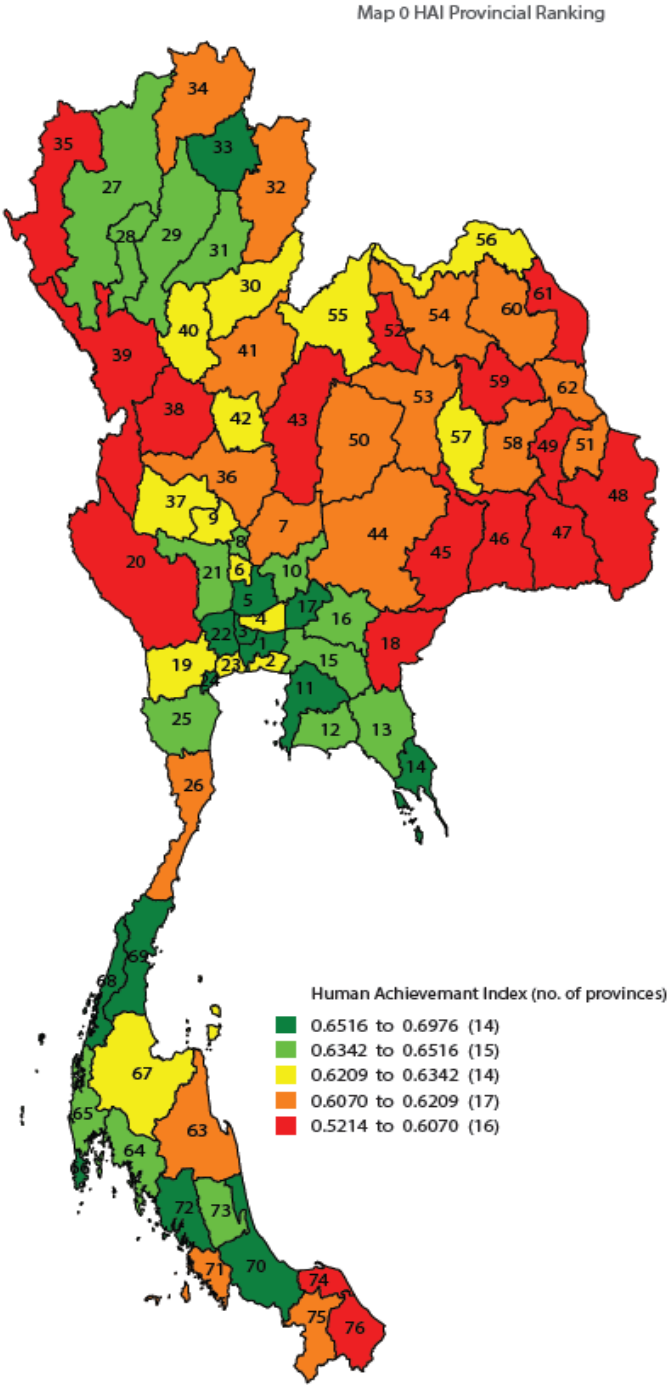
The minimum and maximum values are set for each indicator to serve as "goal post" which covers a range that can accommodate all possible values for that indicator in the next ten years.

HAI Structure, minimum and maximum values, and data

HAI Indices	Components	Indicators	Min. value	Max. value	Data/Year
1. Health	1. Quality of life	1. Underweight births (%)	6	18	Bureau of Health Policy and Strategy, 2011
		2. Population with physical illness (%)	6	47	Health and Welfare Survey, NSO, 2011
		3. Population with disability (%)	1	5	Office for Empowerment of Persons with Disability, MSDHS, 2012
		4. Mental health score (%)	45	100	Department of Mental Health and NSO, 2012
	2. Health promotion	5. Population with unhealthy behaviour (%)	14	49	Smoking and Alcohol Consumption Survey, NSO, 2011
		6. Population that exercise regularly (%)	8	52	Survey of Exercise Behaviour, NSO, 2011
	3. Health Infrastructure	7. Population per physician (persons)	683	12,242	Bureau of Health Policy and Strategy, 2010
2. Education	4. Stock of education	8. Mean years of schooling for population aged 15 and over (years)	5	14	Office of the Education Council, Ministry of Education, 2011
	5. Flow of education	9. Upper secondary and vocational enrolment (%)	33	100	ICT Center, Ministry of Education, 2011
	6. Quality of education	10. Average IQ of students aged 6-15	66	136	Department of Mental Health, Ministry of Public Health, 2011
		11. Average score of upper secondary students (%)	21	51	O-Net test score, National Institute of Educational Testing Service (Public Organization), 2011
3. Employment	8. Employment	12. Unemployment (%)	0	3	Labour Force Survey, NSO, 2011
		13. Underemployment (%)	0	12	Labour Force Survey, NSO, 2011
	9. Labour protection	14. Employees covered by social security (%)	3	100	Social Security Office, 2011
		15. Occupational injuries (per 1,000 members of the Workmen's Compensation Fund)	2	44	Social Security Office, 2011
4. Income	10. Income level	16. Household income (Baht/month)	6,768	61,203	Household Socio-economic Survey, NSO, 2011
	11. Poverty	17. Poverty incidence (%)	1	75	NESDB, 2011
	12. Debt	18. Households with consumption debts (%)	7	100	Household Socio-economic Survey, NSO, 2011
	13. Disparity	19. GINI	20	72	Poverty Map, NSO, 2009
5. Housing and living environment	14. Housing security	20. Households living in own house and on own land (%)	19	100	Household Socio-economic Survey, NSO, 2011
	15. Basic appliances	21. Households with a refrigerator (%)	47	100	Household Socio-economic Survey, NSO, 2011
	16. Living environment	22. Carbon footprint (ton /CO2/person)	0	19	Healthy Public Policy Foundation, 2011
		23. Population affected by drought (%)	0	100	Department of Disaster Prevention and Mitigation, 2011
		24. Population affected by flood (%)	0	100	Department of Disaster Prevention and Mitigation, 2011

HAI Indices	Components	Indicators	Min. value	Max. value	Data/Year
6. Family and community life	17. Family life	25. Children in distress (per 100,000 population)	0	300	NRC 2C, Community Development Department, 2011
		26. Working children aged 15-17 years old (%)	1	51	Labour Force Survey, NSO, 2011
		27. Single-headed households (%)	10	41	Household Socio-economic survey, NSO, 2011
		28. Elderly living alone (%)	3	17	Survey of Elderly Population, NSO, 2011
	18. Community safety	29. Reported crimes against life, body, property and sexual crimes (per 100,000 population)	29	335	Royal Thai Police, 2012
		30. Drug-related arrests (per 100,000 population)	48	2,182	Royal Thai Police, 2012
7.Transport and communication	19. Transport	31. Villages with all-season main road (%)	27	100	NRC 2C, Community Development Department, 2011
		32. Registered vehides (per 1,000 population)	60	1,622	Department of Land Transport, 2012
		33. Land traffic accidents (per 100,000 population)	11	760	Department of Disaster Prevention and Management, referring to the Royal Thai Police, 2011
	19. Communication	34. Households with access to TV (%)	59	100	Household Socio-economic Survey, NSO, 2011
		35. Population with mobile phone (%)	28	100	Household ICT Survey, NSO, 2011
		36. Population with internet access (%)	12	55	Household ICT Survey, NSO, 2011
8.Participation	20.Political participation	37. Voter turnout (%)	51	100	National Election Commission, 2011
	21. Civil society participation	38. Community groups (per 100,000 population)	39	871	Community Organizations Development Institute, 2012
		39. Households participating in local groups (%)	64	100	Basic Minimum Needs, Community Development Department, 2011
		40. Households participating in community activities	71	100	Basic Minimum Needs, Community Development Department, 2011

Map of HAI Provincial Ranking in 2011



Rank		Code
1	Bangkok	1
2	Phuket	66
3	Nonthaburi	3
4	Trang	72
5	Phayao	33
6	Nakhon Nayok	17
7	Nakhon Pathom	22
8	Songkhla	70
9	Phra Nakhon Si Ayutthaya	5
10	Samut Songkhram	24
11	Chon Buri	11
12	Chumphon	69
13	Ranong	68
14	Trat	14
15	Phrae	31
16	Lamphun	28
17	Chiang Mai	27
18	Sing Buri	8
19	Phang-nga	65
20	Phatthalung	73
21	Saraburi	10
22	Lampang	29
23	Krabi	64
24	Rayong	12
25	Phetchaburi	25
26	Chachoengsao	15
27	Chanthaburi	13
28	Prachin Buri	16
29	Suphan Buri	21
30	Pathum Thani	4
31	Uttaradit	30
32	Maha Sarakham	57
33	Uthai Thani	37
34	Nong Khai	56
35	Phichit	42
36	Chai Nat	9
37	Sukhothai	40
38	Ratchaburi	19
39	Samut Prakan	2
40	Samut Sakhon	23
41	Loei	55
42	Surat Thani	67
43	Ang Thong	6
44	Udon Thani	54
45	Lop Buri	7
46	Yala	75
47	Nan	32
48	Phitsanulok	41
49	Prachuap Khiri Khan	26
50	Khon Kaen	53
51	Chaiyaphum	50
52	Nakhon Sawan	36
53	Chiang Rai	34
54	Amnat Charoen	51
55	Mukdahan	62
56	Nakhon Ratchasima	44
57	Satun	71
58	Roi Et	58
59	Sakon Nakhon	60
60	Nakhon Si Thammarat	63
61	Ubon Ratchathani	48
62	Kamphaeng Phet	38
63	Narathiwat	76
64	Nong Bua Lam Phu	52
65	Kalasin	59
66	Yasothon	49
67	Phetchabun	43
68	Kanchanaburi	20
69	Pattani	74
70	Buri Ram	45
71	Sa Kaeo	18
72	Surin	46
73	Nakhon Phanom	61
74	Si Sa Ket	47
75	Tak	39
76	Mae Hong Son	35

HAI by Index and Province in 2011

Rank	Health	Education	Employment	Income	Housing and Living Environment	Family and Community Life	Transport and Communication	Participation	HAI	HAI value
1	Bangkok	Bangkok	Phuket	Bangkok	Suphan Buri	Maha Sarakham	Phuket	Chai Nat	Bangkok	0.6974
2	Songkhla	Nakhon Nayok	Pathum Thani	Nonthaburi	Chaiyaphum	Buri Ram	Bangkok	Lamphun	Phuket	0.6909
3	Phang-nga	Chon Buri	Rayong	Phuket	Yala	Surin	Pathum Thani	Amnat Charoen	Nonthaburi	0.6709
4	Samut Sakhon	Nonthaburi	Chon Buri	Chachoeng sao	Uttaradit	Udon Thani	Chon Buri	Sing Buri	Trang	0.6659
5	Chumphon	Chiang Mai	Bangkok	Samut Sakhon	Ranong	Nonthaburi	Nonthaburi	Nan	Phayao	0.6659
6	Yala	Nakhon Pathom	Samut Sakhon	Samut Prakan	Trang	Phetchabun	Rayong	Trat	Nakhon Nayok	0.6659
7	Krabi	Lampang	Phra Nakhon Si Ayutthaya	Chumphon	Narathiwat	Loei	Trang	Mukdahan	Nakhon Pathom	0.6658
8	Trang	Ranong	Lamphun	Chon Buri	Nong Bua Lam Phu	Phrae	Sing Buri	Uthai Thani	Songkhla	0.6647
9	Rayong	Phuket	Prachin Buri	Nakhon Pathom	Kamphaeng Phet	Roi Et	Nakhon Pathom	Nakhon Nayok	Phra Nakhon Si Ayutthaya	0.6639
10	Satun	Phrae	Mae Hong Son	Surat Thani	Pattani	Nong Bua Lam Phu	Songkhla	Maha Sarakham	Samut Songkhram	0.6636
11	Chon Buri	Lamphun	Trat	Phang-nga	Phitsanulok	Uttaradit	Phra Nakhon Si Ayutthaya	Phayao	Chon Buri	0.6634
12	Phatthalung	Sing Buri	Phayao	Yala	Krabi	Nan	Ang Thong	Sukhothai	Chumphon	0.6571
13	Saraburi	Lop Buri	Samut Songkhram	Phichit	Phatthalung	Si Sa Ket	Saraburi	Chumphon	Ranong	0.6556
14	Phuket	Phitsanulok	Chaiyaphum	Trat	Chai Nat	Kalasin	Phrae	Phrae	Trat	0.6548
15	Nonthaburi	Phetchaburi	Loei	Ranong	Phayao	Samut Prakan	Samut Sakhon	Samut Songkhram	Phrae	0.6516
16	Nakhon Sawan	Prachin Buri	Sakon Nakhon	Trang	Nakhon Nayok	Phayao	Lampang	Lampang	Lamphun	0.6497
17	Chanthaburi	Phra Nakhon Si Ayutthaya	Prachuap Khiri Khan	Krabi	Phang-nga	Yasothon	Samut Songkhram	Chiang Mai	Chiang Mai	0.6493
18	Prachuap Khiri Khan	Nan	Nakhon Pathom	Phra Nakhon Si Ayutthaya	Songkhla	Prachin Buri	Nakhon Nayok	Phang-nga	Sing Buri	0.6486
19	Nakhon Pathom	Chachoeng-sao	Nonthaburi	Chantha-buri	Sakon Nakhon	Uthai Thani	Phetchaburi	Chantha-buri	Phang-nga	0.6479
20	Trat	Samut Songkhram	Chachoeng-sao	Songkhla	Nakhon Si Thammarat	Sakon Nakhon	Samut Prakan	Sa Kaeo	Phatthalung	0.6471
21	Maha Sarakham	Trang	Krabi	Sing Buri	Ubon Ratchathani	Nong Khai	Phang-nga	Prachin Buri	Saraburi	0.6453
22	Ratchaburi	Ratchaburi	Saraburi	Rayong	Samut Songkhram	Samut Songkhram	Phayao	Nong Khai	Lampang	0.6450
23	Pattani	Khon Kaen	Mukdahan	Chiang Mai	Ratchaburi	Amnat Charoen	Trat	Ang Thong	Krabi	0.6449
24	Phetchaburi	Ang Thong	Kalasin	Phayao	Lampang	Samut Sakhon	Ratchaburi	Ranong	Rayong	0.6448
25	Narathiwat	Phatthalung	Khon Kaen	Saraburi	Uthai Thani	Phichit	Chanthaburi	Phetchaburi	Phetchaburi	0.6434
26	Khon Kaen	Chumphon	Surat Thani	Suphan Buri	Phichit	Nakhon Ratchasima	Phitsanulok	Ratchaburi	Chachoeng-sao	0.6409
27	Ranong	Prachuap Khiri Khan	Chumphon	Phetchaburi	Sukhothai	Sa Kaeo	Chachoeng-sao	Saraburi	Chanthaburi	0.6408
28	Chachoeng-sao	Phayao	Chanthaburi	Pathum Thani	Phetchabun	Satun	Udon Thani	Loei	Prachin Buri	0.6376
29	Lop Buri	Songkhla	Samut Prakan	Nakhon Nayok	Phrae	Narathiwat	Chiang Mai	Phattha-lung	Suphan Buri	0.6349

Continue.

Rank	Health	Education	Employment	Income	Housing and Living Environment	Family and Community Life	Transport and Communication	Participation	HAI	HAI value
30	Nakhon Si Thammarat	Pathum Thani	Kamphaeng Phet	Phatthalung	Lop Buri	Bangkok	Uttaradit	Chaiyaphum	Pathum Thani	0.6342
31	Suphan Buri	Uttaradit	Yasothon	Samut Songkhram	Chiang Mai	Nakhon Phanom	Lamphun	Nong Bua Lam Phu	Uttaradit	0.6324
32	Phra Nakhon Si Ayutthaya	Saraburi	Suphan Buri	Narathiwat	Ang Thong	Songkhla	Phatthalung	Lop Buri	Maha Sarakham	0.6320
33	Nan	Samut Prakan	Ranong	Kamphaeng Phet	Kanchana-buri	Ubon Ratchathani	Chiang Rai	Pattani	Uthai Thani	0.6308
34	Surat Thani	Maha Sarakham	Buri Ram	Loei	Chumphon	Sukhothai	Satun	Phra Nakhon Si Ayutthaya	Nong Khai	0.6285
35	Samut Prakan	Nakhon Si Thammarat	Phrae	Nakhon Sawan	Chanthaburi	Trang	Prachuap Khiri Khan	Yasothon	Phichit	0.6259
36	Phichit	Chiang Rai	Phattha-lung	Sukho-thai	Chiang Rai	Trat	Krabi	Songkhla	Chai Nat	0.6241
37	Sing Buri	Phang-nga	Uthai Thani	Chai Nat	Nakhon Sawan	Nakhon Sawan	Surat Thani	Kamphaeng Phet	Sukhothai	0.6239
38	Amnat Charoen	Rayong	Chiang Mai	Udon Thani	Lamphun	Khon Kaen	Pattani	Kalasin	Ratchaburi	0.6229
39	Ang Thong	Trat	Tak	Uttaradit	Nong Khai	Mae Hong Son	Lop Buri	Chachoeng-sao	Samut Prakan	0.6227
40	Prachin Buri	Chanthaburi	Nakhon Nayok	Nong Khai	Nakhon Pathom	Kamphaeng Phet	Chai Nat	Chiang Rai	Samut Sakhon	0.6225
41	Ubon Ratchathani	Nong Khai	Nong Khai	Nakhon Si Thammarat	Surin	Tak	Sukhothai	Krabi	Loei	0.6224
42	Mukdahan	Udon Thani	Songkhla	Nakhon Ratchasima	Phetchaburi	Phra Nakhon Si Ayutthaya	Yala	Phichit	Surat Thani	0.6222
43	Chiang Mai	Surat Thani	Amnat Charoen	Chiang Rai	Roi Et	Krabi	Khon Kaen	Si Sa Ket	Ang Thong	0.6215
44	Pathum Thani	Nakhon Ratchasima	Maha Sarakham	Satun	Surat Thani	Chiang Rai	Prachin Buri	Trang	Udon Thani	0.6209
45	Nong Khai	Sukhothai	Phetchaburi	Lamphun	Sa Kaeo	Nakhon Si Thammarat	Suphan Buri	Kanchana-buri	Lop Buri	0.6206
46	Lampang	Si Sa Ket	Lop Buri	Prachin Buri	Nakhon Ratchasima	Sing Buri	Loei	Roi Et	Yala	0.6182
47	Uthai Thani	Yasothon	Kanchana-buri	Ang Thong	Phra Nakhon Si Ayutthaya	Chaiya-phum	Chumphon	Suphan Buri	Nan	0.6173
48	Nakhon Nayok	Nakhon Sawan	Nakhon Ratchasima	Kanchana-burii	Satun	Pattani	Phichit	Buri Ram	Phitsanulok	0.6171
49	Samut Songkhram	Suphan Buri	Lampang	Lampang	Saraburi	Phetchaburi	Nakhon Sawan	Khon Kaen	Prachuap Khiri Khan	0.6170
50	Nakhon Ratchasima	Chai Nat	Phitsanulok	Prachuap Khiri Khan	Buri Ram	Nakhon Nayok	Nan	Udon Thani	Khon Kaen	0.6169
51	Udon Thani	Roi Et	Ubon Ratchathani	Phrae	Sing Buri	Phuket	Nakhon Phanom	Nakhon Pathom	Chaiyaphum	0.6162
52	Chiang Rai	Mukdahan	Roi Et	Mukdahan	Amnat Charoen	Phatthalung	Ranong	Ubon Ratchathani	Nakhon Sawan	0.6160
53	Phayao	Amnat Charoen	Trang	Nan	Prachuap Khiri Khan	Pathum Thani	Nong Khai	Narathiwat	Chiang Rai	0.6130
54	Kalasin	Nakhon Phanom	Udon Thani	Chaiya-phum	Nakhon Phanom	Lampang	Nakhon Ratchasima	Uttaradit	Amnat Charoen	0.6107
55	Roi Et	Surin	Sukhothai	Roi Et	Si Sa Ket	Rayong	Kamphaeng Phet	Phetchabun	Mukdahan	0.6104

Continue.

Rank	Health	Education	Employment	Income	Housing and Living Environment	Family and Community Life	Transport and Communication	Participation	HAI	HAI value
56	Nong Bua Lam Phu	Sakon Nakhon	Uttaradit	Khon Kaen	Tak	Chiang Mai	Nakhon Si Thammarat	Surin	Nakhon Ratchasima	0.6097
57	Nakhon Phanom	Uthai Thani	Ratchaburi	Phitsanulok	Maha Sarakham	Ratchaburi	Ubon Ratchathani	Prachuap Khiri Khan	Satun	0.6082
58	Chaiyaphum	Kalasin	Sa Kaeo	Uthai Thani	Kalasin	Nakhon Pathom	Roi Et	Sakon Nakhon	Roi Et	0.6077
59	Loei	Buri Ram	Nakhon Sawan	Ubon Ratchathani	Udon Thani	Suphan Buri	Sa Kaeo	Nakhon Phanom	Sakon Nakhon	0.6071
60	Phitsanulok	Phetchabun	Si Sa Ket	Lop Buri	Chon Buri	Saraburi	Mukdahan	Phitsanulok	Nakhon Si Thammarat	0.6070
61	Tak	Loei	Surin	Maha Sarakham	Yasothon	Yala	Uthai Thani	Nakhon Ratchasima	Ubon Ratchathani	0.6067
62	Sa Kaeo	Satun	Chiang Rai	Nong Bua Lam Phu	Khon Kaen	Phitsanulok	Sakon Nakhon	Nakhon Sawan	Kamphaeng Phet	0.6056
63	Kanchana-buri	Ubon Ratchathani	Phichit	Sakon Nakhon	Loei	Mukdahan	Phetchabun	Satun	Narathiwat	0.5996
64	Yasothon	Krabi	Nong Bua Lam Phu	Phetchabun	Trat	Lamphun	Nong Bua Lam Phu	Rayong	Nong Bua Lam Phu	0.5988
65	Chai Nat	Phichit	Chai Nat	Nakhon Phanom	Prachin Buri	Kanchana-buri	Yasothon	Tak	Kalasin	0.5920
66	Uttaradit	Samut Sakhon	Yala	Ratchaburi	Chachoengsao	Lop Buri	Tak	Samut Sakhon	Yasothon	0.5917
67	Lamphun	Kanchana-buri	Narathiwat	Yasothon	Mukdahan	Chachoeng-sao	Maha Sarakham	Surat Thani	Phetchabun	0.5910
68	Sukhothai	Chaiyaphum	Nakhon Si Thammarat	Surin	Nan	Phang-nga	Kanchana-buri	Nakhon Si Thammarat	Kanchana-buri	0.5891
69	Sakon Nakhon	Kamphaeng Phet	Ang Thong	Si Sa Ket	Bangkok	Surat Thani	Chaiyaphum	Phuket	Pattani	0.5884
70	Phetchabun	Pattani	Phetchabun	Tak	Phuket	Chai Nat	Narathiwat	Nonthaburi	Buri Ram	0.5874
71	Phrae	Yala	Satun	Sa Kaeo	Mae Hong Son	Ranong	Kalasin	Samut Prakan	Sa Kaeo	0.5864
72	Mae Hong Son	Sa Kaeo	Nakhon Phanom	Kalasin	Pathum Thani	Chumphon	Buri Ram	Yala	Surin	0.5860
73	Surin	Mae Hong Son	Phang-nga	Amnat Charoen	Nonthaburi	Chanthaburi	Amnat Charoen	Mae Hong Son	Nakhon Phanom	0.5784
74	Buri Ram	Tak	Sing Buri	Buri Ram	Rayong	Prachuap Khiri Khan	Surin	Pathum Thani	Si Sa Ket	0.5714
75	Si Sa Ket	Nong Bua Lam Phu	Nan	Pattani	Samut Prakan	Ang Thong	Si Sa Ket	Chon Buri	Tak	0.5650
76	Kamphaeng Phet	Narathiwat	Pattani	Mae Hong Son	Samut Sakhon	Chon Buri	Mae Hong Son	Bangkok	Mae Hong Son	0.5214

Example of questionnaire from Health and Welfare Survey 2005 (HWS 2005)

ลับ

สอส.
(แบบแจงนับ)

รหัสแบบ	แผนที่
	01

ชุดที่.....ในจำนวน.....ชุดของครัวเรือนนี้

การสำรวจอนามัยและสวัสดิการ พ.ศ. 2548

1. ภาค..... จังหวัด.....
2. อำเภอ / เขต..... ตำบล / แขวง.....
3. บ้านเลขที่..... ถนน..... ตรอก / ซอย.....
4. ในเขตเทศบาล ED..... BLK.....
   นอกเขตเทศบาล ED..... หมู่ที่..... ชื่อหมู่บ้าน.....
5. ลำดับที่ชุมรุมอาคาร / หมู่บ้านตัวอย่าง.....
6. เดือน เมษายน พ.ศ. 2548
7. ลำดับที่ครัวเรือนตัวอย่าง..... ประเภทสำรวจบุคคล
8. จำนวนสมาชิกในครัวเรือน ขั้นแจงนับ/..... คน
9. ผลการแจงนับครัวเรือนตัวอย่างนี้ (บันทึกรหัส)

REG	CWT			1 - 3
AMP	TMB			4 - 7
AREA		ED		8 - 11
BLK_TYP				12 - 13
PSU_NO				14 - 17
MONTH_YR	0	4	4	8	18 - 21
HH_NO			TYPE	1	22 - 24
MEMBERS				25 - 26
RESULT				27 - 28

ได้ข้อมูล		รหัส	ไม่ได้ข้อมูล		รหัส
ขั้นนับจด	ขั้นแจงนับ		ขั้นนับจด	ขั้นแจงนับ	
1. เป็นครัวเรือนตัวอย่าง			1. เป็นครัวเรือนตัวอย่าง	ไปสามครั้งไม่พบ	
1.1 มีครัวเรือนอาศัยอยู่	แจงนับได้	11		ผู้ตอบสัมภาษณ์	21
	รื้อถอน ไฟไหม้	12		ไม่ให้ความร่วมมือ	22
	เป็นบ้านว่าง	13		ทายบ้านไม่พบ	23
1.2 เป็นบ้านว่าง	เป็นบ้านว่าง	14			
	มีครัวเรือน (แจงนับได้)	15			
2. ไม่เป็นครัวเรือนตัวอย่าง (ครัวเรือนใหม่อยู่แทนครัวเรือนเดิมที่เป็นตัวอย่าง)	แจงนับได้	16	2. อื่น ๆ (ระบุ).....		24

แจงนับวันที่.....เดือน เมษายน พ.ศ. 2548
ชื่อตัว - ชื่อสกุล.....
พนักงานแจงนับ

บรรณาธิกรและลงรหัสวันที่.....เดือน เมษายน พ.ศ. 2548
ชื่อตัว - ชื่อสกุล.....
พนักงานบรรณาธิกรและลงรหัส

ลายมือชื่อ.....ผู้ตรวจ
(.....)
ตำแหน่ง.....

2 | 1 | REC_NO 01 | ตัวอย่างการเขียนตัวเลข 1 2 3 4 5 6 7 8 9 0

ตอนที่ 1 ลักษณะทั่วไปของสมาชิกในครัวเรือน

ถามทุกคน					ถามเฉพาะผู้ที่มีอายุตั้งแต่ 15 ปีขึ้นไป	ถามเฉพาะผู้ที่มีอายุตั้งแต่ 6 ปีขึ้นไป	
						การศึกษา	
ลำดับที่	ชื่อ-นามสกุล	ความเกี่ยวพันกับหัวหน้าครัวเรือน บันทึกรหัส หัวหน้าครัวเรือน.....1 สามีหรือภรรยา.....2 บุตรที่ยังไม่สมรส.....3 บุตรที่สมรสแล้ว.....4 บุตรของบุตรชาย/หญิง.....5 บุตรของบุตร.....6 พ่อ แม่ พ่อตา แม่ยาย.....7 ญาติอื่น ๆ .....8 ผู้อาศัย และคนรับใช้.....9	เพศ บันทึกรหัส ชาย.....1 หญิง.....2	อายุ บันทึกอายุเต็มปี ถ้าต่ำกว่า 1 ปี บันทึก "0"	สถานภาพสมรส บันทึกรหัส โสด.....1 สมรส.....2 ม่าย.....3 หย่า.....4 แยกกันอยู่.....5 เคยสมรส แต่ไม่ทราบสถานภาพ.....6	"....(ชื่อ)....จบการศึกษาสูงสุดชั้นใด?" บันทึก ชั้น ปี และประกาศนียบัตรหรือปริญญาที่สำเร็จมาโดยละเอียด ถ้ากำลังเรียนมหาวิทยาลัย ศึกษาธิการ (สายวิชาการศึกษา) หรืออาชีวศึกษา ให้บันทึกระดับการศึกษาสูงสุดก่อนเข้าเรียน และชื่อสถาบันที่กำลังเรียน ถ้าจบมหาวิทยาลัย ศึกษาธิการ (สายวิชาการศึกษา) หรืออาชีวศึกษา ให้บันทึกชื่อสถาบันที่เรียนจบ ถ้า ไม่เคยเรียน บันทึก "ไม่เคยเรียน"	ถามเฉพาะผู้ที่จบ "มหาวิทยาลัยศึกษาธิการ (สายวิชาการศึกษา) หรืออาชีวศึกษา)" ใน F7 จำนวนปีของหลักสูตร
F1	F2	F3	F4	F5	F6	F7	F8

3 | | | | | | 0 | 2 |

ตอนที่ 2 ลักษณะการทำงานระหว่าง 12 เดือนก่อนวันสัมภาษณ์

ถามเฉพาะผู้ที่มีอายุตั้งแต่ 15 ปีขึ้นไป

อาชีพ	อุตสาหกรรม	สถานภาพการทำงาน	ถามเฉพาะผู้ที่บันทึกรหัส 1,2,4,5,6,7 ใน F11		ถามเฉพาะผู้ที่บันทึก "ไม่ทำ" ใน F9
			รายได้		เหตุผลที่ไม่ทำงาน
"ระหว่าง 12 เดือนก่อนวันสัมภาษณ์.... (ชื่อ).....ทำงานอะไร?" ถ้า ทำงาน ให้บันทึกอาชีพหรือตำแหน่งหน้าที่การงานที่มีชั่วโมงการทำงานสูงสุด (ถามต่อไป) ถ้า ไม่ทำงาน ให้บันทึก "ไม่ทำ" (ข้ามไปถาม F14)	"กิจกรรมหลักที่....(ชื่อ).....ทำอยู่เป็นกิจกรรมหรือผลิตอะไร?" ให้บันทึกประเภทของกิจการหรือลักษณะของงานให้ชัดเจน	"....(ชื่อ).....ทำงานในฐานะอะไร?" บันทึกรหัส นายจ้าง.....1 ประกอบธุรกิจส่วนตัว โดยไม่มีลูกจ้าง.....2 ช่วยธุรกิจในครัวเรือน โดยไม่ได้รับค่าจ้าง.....3 ลูกจ้างรัฐบาล.....4 ลูกจ้างรัฐวิสาหกิจ.....5 ลูกจ้างเอกชน.....6 การรวมกลุ่ม.....7 (ถ้าบันทึกรหัส 3 ข้ามไปถาม F13)	"....(ชื่อ)....มีรายได้จากการทำงานหรือการลงทุน *ที่เป็นตัวเงิน* เฉลี่ยประมาณเดือนละเท่าไร?" ให้บันทึกรายได้สุทธิหลังจากหักค่าใช้จ่ายในการทำงานหรือการลงทุนโดยบันทึกจำนวนเงินเป็นหน่วยเป็นบาท ถ้าจากทุนหรือไม่มีรายได้ ให้บันทึก "0"	"....(ชื่อ)....มีรายได้จากการทำงานหรือการลงทุน *ที่เป็นสิ่งของ* เฉลี่ยประมาณเดือนละเท่าไร?" ให้ประมาณราคาสิ่งของที่ได้รับจากการทำงาน รวมทั้งการนำสินค้าหรือบริการจากการทำธุรกิจหรือการเกษตรมาบริโภคหรือใช้สอยในครัวเรือน โดยบันทึกจำนวนเงินมีหน่วยเป็นบาท ถ้าไม่มีให้บันทึก "0"	"....(ชื่อ).... ไม่ทำงานเพราะสาเหตุใด?" บันทึกรหัส ทำงานบ้าน.....1 เรียนหนังสือ.....2 กำลังหางานทำ.....3 ยังเด็กหรือชรา.....4 ป่วย พิการ ฯลฯ จนไม่สามารถทำงานได้.....5 ไม่สมัครใจทำงาน...6 อื่น ๆ (ระบุ).....7
F9	F10	F11	F12	F13	F14

4

ตอนที่ 3 หลักประกันด้านสุขภาพ (สวัสดิการค่ารักษาพยาบาล)

ถามทุกคน		ถามเฉพาะผู้บันทึกรหัส 0 หรือ 5 หรือ 6 หรือ 7 ใน F15	ถามเฉพาะผู้บันทึกรหัส 1 หรือ 2 ใน F15/F16 สดมภ์ใดสดมภ์หนึ่ง			
"......ชื่อ......มีสวัสดิการค่ารักษาพยาบาลหรือไม่?" "ถ้ามี ได้รับจากแหล่งใด?" ในสดมภ์ F15 ให้บันทึก *สวัสดิการหลักของตนเองที่ได้จากรัฐก่อน (รหัส 1 - 4)* แต่ถ้าไม่ได้รับสวัสดิการจากรัฐ ***ให้บันทึกสวัสดิการอื่น ๆ ที่มี (รหัส 5 - 7)*** แต่ถ้าได้รับสวัสดิการมากกว่า 1 แห่ง ***ให้บันทึกรหัสเพิ่มใน สดมภ์ F16*** ถ้าไม่มีเลย **บันทึก "0" ใน F15 เท่านั้น** บันทึกรหัส ไม่มีสวัสดิการค่ารักษาพยาบาล........0 มีบัตรประกันสุขภาพ (บัตรทอง) ประเภทมี ท. (ไม่เสีย 30 บาท)........1 ประเภทไม่มี ท. (เสีย 30 บาท)........2 มีประกันสังคม/กองทุนเงินทดแทน........3 มีสวัสดิการข้าราชการหรือข้าราชการบำนาญ/รัฐวิสาหกิจ...4 มีประกันสุขภาพกับบริษัทประกัน........5 มีสวัสดิการโดยนายจ้าง........6 อื่น ๆ (ระบุ)........7		"...ชื่อ...ไม่มีสวัสดิการฯ ใด ๆ หรือไม่ได้รับสวัสดิการฯ จากรัฐ เพราะเหตุใด?" ให้ระบุสาเหตุที่<u>สำคัญที่สุด</u> บันทึกรหัส ไม่รู้ว่าได้รับบัตรทอง........1 รู้ว่าได้รับบัตรทอง - ได้รับแจ้งให้ไปรับบัตรแต่ไม่ได้ไป เนื่องจาก • หลักฐานไม่ครบ........2 • ไม่ได้อยู่ในภูมิลำเนาที่จะรับบัตร........3 • คิดว่าจะไม่ใช้สิทธิ์........4 - ไม่ได้รับแจ้งให้ไปรับบัตรหรือยังไม่ได้ติดต่อขอรับสวัสดิการฯ........5 อื่น ๆ (ระบุ)........6	"ในบัตรประกันสุขภาพ (บัตรทอง) ของ ....(ชื่อ)....ระบุชื่อสถานพยาบาลใด?" ให้บันทึกชื่อและประเภทสถานพยาบาล เช่น สอ.ดอนตาล รพ.พระนั่งเกล้า (รัฐ) รพ.ศิครินทร์ (เอกชน) เป็นต้น และบันทึกรหัสลงใน ☐ **โดยบันทึกชื่อสถานพยาบาลตามลำดับที่ระบุบนบัตร** บันทึกรหัส สถานีอนามัย/ศูนย์บริการสาธารณสุข/ศูนย์สุขภาพชุมชน........1 รพ.ชุมชน (ระบุชื่อ)........2 รพ.ทั่วไป/ศูนย์ (ระบุชื่อ)........3 รพ.ของมหาวิทยาลัย (ระบุชื่อ)........4 รพ.สังกัดอื่นของรัฐ (ระบุชื่อ)........5 คลินิกเอกชน........6 รพ.เอกชน (ระบุชื่อ)........7 อื่น ๆ (ระบุ)........8		ถามเฉพาะ *ผู้ตอบสัมภาษณ์ด้วยตนเอง* ที่มีอายุตั้งแต่ 15 ปีขึ้นไป "...(ชื่อ)... พอใจในสถานพยาบาลที่ระบุในบัตรทองหรือไม่?" "ถ้าไม่พอใจ เพราะสาเหตุใด?" บันทึกความพึงพอใจให้ตรงกับสถานพยาบาลใน F18 และ F19 บันทึกรหัส พอใจ........ ไม่พอใจ ไม่มั่นใจในบริการ........ เดินทางไม่สะดวก........ สถานพยาบาลอยู่ห่างไกล........ ไม่ได้อยู่ในภูมิลำเนาที่ใช้สิทธิ์........ อื่น ๆ (ระบุ)........ ไม่แน่ใจ........	
			คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 1	คำตอบที่ 2
F15	F16	F17	F18	F19	F20	F21

					0	3

5

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข

ก. ความเจ็บป่วยระหว่าง 1 เดือนก่อนวันสัมภาษณ์ (เฉพาะการป่วยที่ ไม่ ต้องนอนโรงพยาบาล)

ถามทุกคน	ถามเฉพาะผู้บันทึกรหัส 1 ใน F22				
"ระหว่าง 1 เดือนก่อนวันสัมภาษณ์...(ชื่อ)...มี *อาการป่วยหรือรู้สึกไม่สบาย* หรือไม่?" บันทึกรหัส ป่วยหรือรู้สึกไม่สบาย....1 (ถามต่อไป) ไม่ป่วย........2 (ข้ามไปถาม F38)	"ระหว่าง 1 เดือนก่อนวันสัมภาษณ์.....(ชื่อ).....มีอาการป่วยหรือรู้สึกไม่สบายกี่ครั้ง?" ให้บันทึกจำนวนครั้งที่ป่วย ถ้าป่วยตั้งแต่ 8 ครั้งขึ้นไปให้บันทึก "8"	"ถ้าป่วยหรือรู้สึกไม่สบายครั้งสุดท้าย.....(ชื่อ).....ป่วยเป็นโรคอะไรหรือมีอาการอย่างไร?" ให้บันทึกชื่อโรค (ถ้าทราบ) หรืออาการของโรคที่ป่วยครั้งสุดท้าย *เพียงชื่อ/อาการเดียว* เช่น หอบหืดหลอดลมอักเสบ ไข้หวัด โรคกระเพาะ โรคข้อไม่อักเสบ ท้องเดิน ไข้เลือดออก โรคหอบหืด โรคเบาหวาน โรคความดันโลหิตสูง ฯลฯ	"ใครเป็นผู้บอกว่า.....(ชื่อ).....ป่วยเป็นโรค...(ชื่อโรคที่ระบุใน F24)...?" บันทึกรหัส รู้ด้วยตนเอง........1 ญาติ/เพื่อน/เพื่อนบ้าน........2 หมอพื้นบ้าน/หมอแผนโบราณ........3 อาสาสมัครสาธารณสุข (อสม.)........4 เจ้าหน้าที่สถานีอนามัย/ศูนย์บริการสาธารณสุข/ศูนย์สุขภาพชุมชน....5 แพทย์โรงพยาบาลของรัฐ........6 แพทย์ที่คลินิก/โรงพยาบาลเอกชน........7 อื่น ๆ (ระบุ)........8	"ในการป่วยครั้งสุดท้าย...(ชื่อ)...ป่วยจนต้องหยุดกิจวัตรประจำวันหรือไม่?" บันทึกรหัส หยุด........1 (ถามต่อไป) ไม่หยุด........2 (ข้ามไปถาม F28)	ถามเฉพาะผู้บันทึกรหัส 1 ใน F26 "ถ้าต้องหยุดกิจวัตรประจำวัน ...(ชื่อ)....หยุดนานกี่วัน?" บันทึกจำนวนวันที่ต้องหยุดปฏิบัติกิจวัตรประจำวันในการป่วยครั้งสุดท้าย ถ้าป่วยและหยุดกิจวัตรประจำวันตั้งแต่ก่อน 1 เดือนก่อนวันสัมภาษณ์ให้นับจำนวนวันที่หยุดติดต่อกัน
F22	F23	F24	F25	F26	F27

6

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)

ก. ความเจ็บป่วยระหว่าง 1 เดือนก่อนวันสัมภาษณ์ (เฉพาะการป่วยที่ ไม่ ต้องนอนโรงพยาบาล) (ต่อ)

ถามเฉพาะผู้บันทึกรหัส 1 ใน F22

"ในการป่วยครั้งสุดท้าย...(ชื่อ)...มีวิธีการรักษาพยาบาลอย่างไร?"

บันทึกรหัสได้มากกว่า 1 คำตอบแต่ไม่เกิน 3 คำตอบตามลำดับการรักษา

ถ้าในการป่วยครั้งสุดท้ายรักษามากกว่า 3 วิธี ให้บันทึก 3 วิธีสุดท้าย

บันทึกรหัส

ไม่ได้รักษา.......1

ใช้ยาแผนโบราณ/ยาสมุนไพร.......2

ไปหาหมอพื้นบ้าน/หมอแผนโบราณ.......3

ซื้อยากินเอง.......4

ไปสถานีอนามัย/ศูนย์บริการสาธารณสุข/ศูนย์สุขภาพชุมชน.......5

ไป รพ.ชุมชน (ระบุชื่อ).......6

ไป รพ.ทั่วไป / รพ.ศูนย์ (ระบุชื่อ).......7

ไป รพ.ของมหาวิทยาลัย (ระบุชื่อ).......8

ไป รพ.สังกัดอื่นของรัฐ (ระบุชื่อ).......9

ไปคลินิกเอกชน.......10

ไป รพ.เอกชน (ระบุชื่อ).......11

อื่นๆ (ระบุ).......12

"ค่าใช้จ่ายเพื่อการรักษาพยาบาลที่.......(ชื่อ).......รักษาตัวในการป่วยครั้งสุดท้ายเป็นเท่าไร?"

ให้บันทึกจำนวนเงิน (หน่วยเป็นบาท) ที่จ่ายเพื่อการรักษาพยาบาลให้ตรงกับวิธีการรักษา ใน F28-F30

ถ้ารักษาฟรี หรือนำไปเบิกจากหน่วยงานได้ทั้งหมดให้บันทึก "0"

ถ้าต้องจ่ายส่วนเกินจากที่เบิกจากหน่วยงานได้ให้บันทึก**เฉพาะส่วนที่จ่ายเงิน**

คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 3	คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 3
F28	F29	F30	F31	F32	F33

						0	4

7

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)

ก. ความเจ็บป่วยระหว่าง 1 เดือนก่อนวันสัมภาษณ์ (เฉพาะการป่วยที่ ไม่ ต้องนอนโรงพยาบาล) (ต่อ)

ถามเฉพาะผู้บันทึกรหัส 1 ใน F22

".......(ชื่อ).......ได้ใช้สวัสดิการค่ารักษาพยาบาลที่มีสิทธิหรือไม่?"

บันทึกสวัสดิการฯ ที่ใช้ให้ตรงกับวิธีการรักษาใน F28-F30

บันทึกรหัส

ไม่มีสวัสดิการฯ.......0

มีและใช้สวัสดิการฯ ที่จัดโดย

บัตรประกันสุขภาพ (บัตรทอง)

ประเภทมี ท. (ไม่เสีย 30 บาท).......1

ประเภทไม่มี ท. (เสีย 30 บาท).......2

ประกันสังคม/กองทุนเงินทดแทน.......3

สวัสดิการข้าราชการหรือข้าราชการบำนาญ/รัฐวิสาหกิจ.......4

ประกันสุขภาพกับบริษัทประกัน.......5

สวัสดิการจัดโดยนายจ้าง.......6

อื่น ๆ (ระบุ).......7

(ถ้าบันทึกรหัส 0 - 7 ข้ามไปถาม F38)

มีสวัสดิการฯ แต่ไม่ใช้.......8

(ถามต่อไป)

คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 3
F34	F35	F36

ถามเฉพาะผู้บันทึกรหัส 8 ใน F34/F35/F36 ช่องใดช่องหนึ่ง

".......(ชื่อ).......ไม่ใช้สิทธิที่มีเพราะเหตุใด?"

ให้ระบุสาเหตุที่สำคัญที่สุด

บันทึกรหัส

เจ็บป่วยเพียงเล็กน้อย.......1

เดินทางไม่สะดวก.......2

สถานพยาบาลอยู่ไกล.......3

ไม่สะดวกไปในเวลาทำการของสถานพยาบาลที่มีสิทธิ.......4

ไม่มีคำพาหนะ.......5

รอนาน.......6

ไม่แน่ใจในบริการ.......7

ถูกเลือกปฏิบัติ/บริการไม่ดี.......8

แพทย์ พยาบาลดุ.......9

แพทย์ไม่มีเวลาให้ซักถามอาการ/ไม่ให้ข้อมูล.......10

แพทย์วินิจฉัยโรคไม่เก่ง/รักษาไม่หาย.......11

ไม่แน่ใจคุณภาพยา.......12

ไม่ได้อยู่ในภูมิลำเนาที่ใช้สิทธิ.......13

อื่น ๆ (ระบุ).......14

F37

8

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)					
จ. การใช้บริการสาธารณสุขอันเนื่องจากโรคเรื้อรังหรือโรคประจำตัวตามที่แพทย์นัด					
ถามทุกคน	ถามเฉพาะผู้บันทึกรหัส 1 ใน F38				
"......(ชื่อ)......มีโรคเรื้อรังหรือโรคประจำตัวหรือไม่?" บันทึกรหัส มี............1 (ถามต่อไป) ไม่มี............2 (ข้ามไปถาม F48)	"............(ชื่อ)............มีโรคเรื้อรังหรือโรคประจำตัวอะไรบ้างและเป็นมานานเท่าใด?" (ให้ตอบได้ไม่เกิน 2 คำตอบ) F39 และ F41 ให้บันทึกชื่อโรคเรื้อรังหรือโรคประจำตัวที่เป็น F40 และ F42 ให้บันทึกรหัสระยะเวลาที่เป็นตามโรคที่ระบุใน F39 และ F41 รหัสคำตอบของ F40 และ F42 น้อยกว่า 3 เดือน............1 3 เดือนขึ้นไปแต่ไม่ถึง 6 เดือน............2 6 เดือนขึ้นไป............3				"ระหว่าง 1 เดือนก่อนวันสัมภาษณ์ แพทย์ได้นัดพบหรือไม่?" "ถ้านัด.....(ชื่อ).....ได้ไปใช้บริการตามที่นัดหรือไม่?" (เป็นการนัดพบแพทย์นอกเหนือจากการเจ็บป่วยในตอน ค.) บันทึกรหัส นัด ไปใช้บริการ............1 (ถามต่อไป) ไม่ไปใช้บริการ............2 ไม่นัด............3 (ถ้าบันทึกรหัส 2-3 ข้ามไปถาม F48)
	คำตอบที่ 1		คำตอบที่ 2		
	ชื่อโรค	รหัสระยะเวลา	ชื่อโรค	รหัสระยะเวลา	
F38	F39	F40	F41	F42	F43

					0	5

9

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)				
จ. การใช้บริการสาธารณสุขอันเนื่องจากโรคเรื้อรังหรือโรคประจำตัวตามที่แพทย์นัด (ต่อ)				
ถามเฉพาะผู้บันทึกรหัส 1 ใน F43				ถามเฉพาะผู้บันทึกรหัส 8 ใน F47
"ระหว่าง 1 เดือนก่อนวันสัมภาษณ์ .....(ชื่อ).....ไปใช้บริการตามที่แพทย์นัดกี่ครั้ง?" ถ้า 8 ครั้งขึ้นไป ให้บันทึก "8"	".....(ชื่อ).....ไปใช้บริการครั้งสุดท้ายที่ใด?" บันทึกรหัส สถานีอนามัย/ศูนย์บริการสาธารณสุข/ศูนย์สุขภาพชุมชน............1 รพ.ชุมชน (ระบุชื่อ)............2 รพ.ทั่วไป/ศูนย์ (ระบุชื่อ)............3 รพ.ของมหาวิทยาลัย (ระบุชื่อ)............4 รพ.สังกัดอื่นของรัฐ (ระบุชื่อ)............5 คลินิกเอกชน............6 รพ.เอกชน (ระบุชื่อ)............7 อื่น ๆ (ระบุ)............8	"ค่าบริการที่.....(ชื่อ).....จ่ายในการไปใช้บริการครั้งสุดท้ายเป็นเงินเท่าไร?" ให้บันทึกจำนวนเงิน (หน่วยเป็นบาท) ถ้ารักษาฟรี หรือนำไปเบิกจากหน่วยงานได้ทั้งหมดให้บันทึก "0" ถ้าต้องจ่ายส่วนเกินจากที่เบิกหน่วยงานได้ให้บันทึก เฉพาะส่วนที่จ่ายเงิน	".....(ชื่อ).....ไปใช้บริการครั้งสุดท้ายใช้สิทธิสวัสดิการค่ารักษาพยาบาลใด?" บันทึกรหัส ไม่มีสวัสดิการฯ............0 มีและใช้สวัสดิการฯ ที่จัดโดย บัตรประกันสุขภาพ (บัตรทอง) ประเภทมี ท. (ไม่เสีย 30 บาท)...1 ประเภทไม่มี ท. (เสีย 30 บาท)...2 ประกันสังคม/กองทุนเงินทดแทน...3 สวัสดิการข้าราชการหรือข้าราชการบำนาญ/รัฐวิสาหกิจ............4 ประกันสุขภาพกับบริษัทประกัน.....5 สวัสดิการจัดโดยนายจ้าง............6 อื่น ๆ (ระบุ)............7 (ถ้าบันทึกรหัส 0 - 7 ข้ามไปถาม F48) มีสวัสดิการฯ แต่ไม่ใช้............8 (ถามต่อไป)	"............(ชื่อ)............ไม่ใช้สิทธิที่มีเพราะเหตุใด?" ให้ระบุสาเหตุที่สำคัญที่สุด บันทึกรหัส เจ็บป่วยเพียงเล็กน้อย............1 เดินทางไม่สะดวก............2 สถานพยาบาลอยู่ไกล............3 ไม่สะดวกไปในเวลาทำการของสถานพยาบาลที่มีสิทธิ...4 ไม่มีคนพาไป............5 รอนาน............6 ไม่แน่ใจบริการ............7 ถูกเลือกปฏิบัติ/บริการไม่ดี............8 แพทย์ พยาบาลดุ............9 แพทย์ไม่มีเวลาให้ซักถามอาการ/ไม่ให้ข้อมูล............10 แพทย์วินิจฉัยโรคไม่เก่ง/รักษาไม่หาย............11 ไม่แน่ใจคุณภาพยา............12 ไม่ได้อยู่ในภูมิลำเนาที่ใช้สิทธิ............13 อื่น ๆ (ระบุ)............14
F44	F45	F46	F47	F48

10 | 2 | REC_NO 81

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)

ค. การเข้าพักรักษาตัวในสถานพยาบาลระหว่าง 12 เดือนก่อนวันสัมภาษณ์ (คนไข้ใน)

ถามทุกคน	ถามเฉพาะผู้บันทึกรหัส 1 ใน F49					
"ระหว่าง 12 เดือนก่อนวันสัมภาษณ์ .....(ชื่อ)..... เคยป่วยจนต้องนอนในสถานพยาบาล (รวมทั้งการคลอดบุตร) หรือไม่?" บันทึกรหัส เคย.....1 (ถามต่อไป) ไม่เคย.....2 (ข้ามไปถาม F61)	"ระหว่าง 12 เดือนก่อนวันสัมภาษณ์ .....(ชื่อ)..... ป่วยจนต้องนอนในสถานพยาบาลกี่ครั้ง?"	"ระหว่าง 12 เดือนก่อนวันสัมภาษณ์.....(ชื่อ).....เข้าพักรักษาในสถานพยาบาลใด?" บันทึกได้มากกว่า 1 คำตอบแต่ไม่เกิน 3 คำตอบตามลำดับครั้งที่เข้าพักรักษา (ถ้าเข้าพักมากกว่า 3 ครั้ง ให้บันทึกรายละเอียดของสถานพยาบาลที่เข้าพัก 3 ครั้งสุดท้าย) บันทึกรหัส โรงพยาบาลชุมชน (ระบุชื่อ).....1 โรงพยาบาลทั่วไป/ศูนย์ (ระบุชื่อ).....2 โรงพยาบาลของมหาวิทยาลัย (ระบุชื่อ).....3 โรงพยาบาลสังกัดอื่นของรัฐ (ระบุชื่อ).....4 โพลีคลินิกเอกชน.....5 โรงพยาบาลเอกชน (ระบุชื่อ).....6 อื่น ๆ (ระบุ).....7			"......(ชื่อ).....ป่วยจนต้องนอนสถานพยาบาลครั้งสุดท้ายด้วยโรคอะไร?" ให้บันทึกชื่อโรคที่ป่วยจนต้องเข้าพักรักษาครั้งสุดท้าย ถ้าคลอดบุตร ให้บันทึก "คลอดบุตร"	"ทำไม....(ชื่อ)....จึงเลือกเข้าพักรักษาในสถานพยาบาลสุดท้าย?" ให้ระบุสาเหตุที่สำคัญที่สุด บันทึกรหัส เลือกใช้ตามระบุในประกันสังคม/บัตรทอง.....1 ได้รับการส่งต่อจาก ร.พ.....2 สถานพยาบาลอยู่ใกล้/เดินทางสะดวก.....3 บริการรวดเร็ว ทันใจ.....4 ค่ารักษาพยาบาลไม่แพง.....5 มีแพทย์ผู้เชี่ยวชาญ.....6 มีเครื่องมือแพทย์ทันสมัย.....7 เข้ารักษาฉุกเฉิน.....8 มีฐานะยากจน.....9 อื่น ๆ (ระบุ).....10
		คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 3		
F49	F50	F51	F52	F53	F54	F55

| | | | | | | 0 | 6 | 11

ตอนที่ 4 การเจ็บป่วยและการไปรับบริการสาธารณสุข (ต่อ)

ค. การเข้าพักรักษาตัวในสถานพยาบาลระหว่าง 12 เดือนก่อนวันสัมภาษณ์ (คนไข้ใน) (ต่อ)

ถามเฉพาะผู้บันทึกรหัส 1 ใน F49				ถามเฉพาะผู้บันทึกรหัส 8 ใน F59
"....(ชื่อ)...เข้าพักรักษาในสถานพยาบาลสุดท้ายเป็นเวลากี่วัน?" ถ้าเข้าพักรักษาตั้งแต่ 98 วันขึ้นไป ให้บันทึก "98"	"ค่าใช้จ่ายสำหรับพาหนะไปและกลับทั้งหมดที่....(ชื่อ).... จ่ายในการเข้าพักรักษาในสถานพยาบาลสุดท้ายเป็นเงินเท่าไร?" ให้บันทึกค่าพาหนะสำหรับการรับ - ส่งผู้ป่วย ถ้าใช้รถส่วนตัวให้ประมาณเหมือนค่ารถรับจ้างในท้องถิ่น	"ค่ารักษาพยาบาลที่.....(ชื่อ).....จ่ายในการเข้าพักรักษาในสถานพยาบาลสุดท้ายรวมเป็นเงินเท่าไร?" ให้บันทึกจำนวนเงิน (หน่วยเป็นบาท) ถ้ารักษาฟรี หรือเบิกจากหน่วยงานได้ทั้งหมดให้บันทึก "0" ถ้าต้องจ่ายส่วนเกินจากที่เบิกจากหน่วยงานได้ให้บันทึกเฉพาะส่วนที่จ่ายเงิน	"การเข้าพักรักษาในสถานพยาบาลสุดท้าย...(ชื่อ) ได้ใช้สวัสดิการค่ารักษาพยาบาลที่มีสิทธิ์หรือไม่?" บันทึกรหัส ไม่มีสวัสดิการฯ.....0 มีและใช้สวัสดิการฯ ที่จัดโดย บัตรประกันสุขภาพ (บัตรทอง) ประเภทมี ท. (ไม่เสีย 30 บาท).....1 ประเภทไม่มี ท. (เสีย 30 บาท).....2 ประกันสังคม/กองทุนเงินทดแทน.....3 สวัสดิการข้าราชการหรือข้าราชการบำนาญ/รัฐวิสาหกิจ.....4 ประกันสุขภาพกับบริษัทประกัน.....5 สวัสดิการจัดโดยนายจ้าง.....6 อื่น ๆ (ระบุ).....7 (ถ้าบันทึกรหัส 0-7 ข้ามไปถาม F61) มีสวัสดิการฯ แต่ไม่ใช้.....8 (ถามต่อไป)	"....(ชื่อ)....ไม่ใช้สิทธิที่มีเพราะเหตุใด?" ให้ระบุสาเหตุที่สำคัญที่สุด บันทึกรหัส เจ็บป่วยฉุกเฉิน.....1 เดินทางไม่สะดวก.....2 สถานพยาบาลอยู่ไกล.....3 ไม่มีพาหนะ.....4 ไม่แน่ใจในบริการ.....5 ถูกเลือกปฏิบัติ/บริการไม่ดี.....6 แพทย์ พยาบาลดุ.....7 แพทย์ไม่มีเวลาให้ซักถามอาการ/ไม่ให้ข้อมูล.....8 แพทย์วินิจฉัยโรคไม่เก่ง/รักษาไม่หาย.....9 ไม่แน่ใจในคุณภาพยา.....10 ไม่ได้อยู่ในภูมิลำเนาที่ใช้สิทธิ์.....11 สิทธิประโยชน์ไม่ครอบคลุม.....12 อื่น ๆ(ระบุ).....13
F56	F57	F58	F59	F60

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ตอนที่ 5 ภาวะทุพพลภาพและความพิการ

ถามเฉพาะผู้ที่มีอายุตั้งแต่ 13 ปีขึ้นไป		ถามเฉพาะผู้ที่บันทึกรหัส 1 ใน F62		
"เมื่อเปรียบเทียบสุขภาพ ....(ชื่อ).... ในวันนี้กับสุขภาพเมื่อปีที่แล้ว เป็นอย่างไร?" บันทึกรหัส แย่กว่ามาก....1 แย่กว่าเล็กน้อย....2 เหมือนเดิม....3 ดีกว่าเล็กน้อย....4 ดีกว่ามาก....5	"....(ชื่อ)....มีปัญหาสุขภาพหรือความเจ็บป่วยที่เป็นต่อเนื่องมาตั้งแต่ 6 เดือนขึ้นไป หรือมีความพิการหรือไม่?" บันทึกรหัส ไม่มี....0 (ข้ามไปถาม F68) มี....1 (ถามต่อไป)	"....(ชื่อ)....มีปัญหาหรือความลำบากในการมองเห็น (แม้ใส่แว่นสายตาหรือคอนแทคเลนส์) หรือไม่?" บันทึกรหัส ไม่มี....0 มี มองไม่เห็นแสงจากภายนอกว่ามาทางทิศไหน (ด้านทางประตู หน้าต่าง)....1 ไม่สามารถมองเห็นรูปร่างลักษณะเฟอร์นิเจอร์ได้....2 ไม่สามารถมองเห็นและอ่านหนังสือขนาดใหญ่ เช่น หัวข่าวหนังสือพิมพ์....3 มีความลำบากในการอ่านตัวอักษรขนาดธรรมดา เช่น ตัวหนังสือขนาดธรรมดาในหนังสือพิมพ์....4 มีปัญหาหรือความลำบากนอกเหนือจากรหัส 1-4....5 มีปัญหาหรือความลำบาก แต่ไม่ทราบรายละเอียด....6	"....(ชื่อ)....มีปัญหาหรือความลำบากในการได้ยินหรือไม่?" บันทึกรหัส ไม่มี....0 มี ไม่ได้ยินเสียงใด ๆ เลย....1 มีความลำบากในการได้ยินเสียงตะโกนแม้จะอยู่ในที่เงียบ....2 มีความลำบากในการได้ยินเสียงพูดคุยธรรมดาในที่เงียบ....3 มีปัญหาหรือความลำบากนอกเหนือจากรหัส 1-3....4 มีปัญหาหรือความลำบากแต่ไม่ทราบรายละเอียด....5	"....(ชื่อ)....มีปัญหาหรือความลำบากในการพูดจาสื่อสารกับผู้อื่นหรือไม่?" บันทึกรหัส ไม่มี....0 มี พูดคุยกับคนในบ้านหรือญาติสนิทไม่รู้เรื่องหรือไม่เข้าใจกันเลย....1 พูดคุยกับคนแปลกหน้าไม่รู้เรื่องหรือไม่เข้าใจกันเลย....2 พูดคุยกับคนในบ้านหรือญาติสนิทเข้าใจแต่รู้เรื่องบ้างไม่รู้เรื่องบ้าง....3 พูดคุยกับคนแปลกหน้าเข้าใจแต่รู้เรื่องบ้างไม่รู้เรื่องบ้าง....4 มีปัญหาหรือความลำบากนอกเหนือจากรหัส 1-4....5 มีปัญหาหรือความลำบากแต่ไม่ทราบรายละเอียด....6
F61	F62	F63	F64	F65

					0	7

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ตอนที่ 5 ภาวะทุพพลภาพและความพิการ (ต่อ)

ถามเฉพาะผู้ที่บันทึกรหัส 1 ใน F62		ถามทุกคน		
"....(ชื่อ)....มีปัญหาหรือความลำบากในการเดินหรือการเคลื่อนที่หรือไม่?" บันทึกรหัส ไม่มี....0 มี ต้องนอนอยู่กับที่ พลิกตัวไม่ได้....1 เดินไปมาในบ้านได้ แต่ต้องมีคนคอยช่วยพยุง....2 เดินไปมาในบ้านได้เอง แต่ต้องใช้อุปกรณ์ช่วย เช่น ไม้ค้ำยันรักแร้ ไม้เท้าเป็นต้น....3 เคลื่อนที่ในบ้านได้โดยใช้รถนั่งหรือลากเอา....4 เดินทางไปนอกบ้านได้เอง แต่ต้องใช้อุปกรณ์ช่วย เช่น ไม้ค้ำยันรักแร้ ไม้เท้า เป็นต้น....5 เดินทางไปนอกบ้านได้เอง แต่ต้องใช้รถนั่ง คนพิการ....6 มีปัญหาหรือความลำบากนอกเหนือจากรหัส 1-6....7 มีปัญหาหรือความลำบาก แต่ไม่ทราบ รายละเอียด....8	"....(ชื่อ)....มีปัญหาหรือความลำบากในการทำกิจวัตรประจำวันด้วยตนเอง (เช่น การกินอาหาร การแต่งตัว การทำความสะอาดร่างกาย การขับถ่าย เป็นต้น) หรือไม่?" บันทึกรหัส ไม่มี....0 มี ทำได้เอง....1 ทำได้เองแต่ต้องมีคนช่วย....2 ทำไม่ได้เลยต้องมีคนทำให้....3	"ในครัวเรือนนี้มีผู้ที่มีลักษณะดังต่อไปนี้หรือไม่?" บันทึกรหัสได้มากกว่า 1 คำตอบ แต่ไม่เกิน 3 คำตอบ บันทึกรหัส ตาบอดข้างเดียว....1 ตาบอดสองข้าง....2 สายตาเลือนลางข้างเดียว....3 สายตาเลือนลาง 2 ข้าง....4 หูหนวกข้างเดียว....5 หูหนวก 2 ข้าง....6 หูตึงข้างเดียว....7 หูตึง 2 ข้าง....8 สื่อความหมายโดยการพูดและการฟังไม่ได้....9 ใบ้....10 พูดผิดปกติ....11 สื่อความหมายไม่ได้เพราะสมองพิการ....12	บันทึกรหัส แขนขาด / ด้วน....13 ขาขาด / ด้วน....14 มือขาด / ด้วน....15 นิ้วมือขาด / ด้วน....16 นิ้วเท้าขาด / ด้วน....17 แขน ขา ลีบ / เหยียดงอไม่ได้....18 แขน ขา มือ ลำตัว คดงอ เกร็ง โก่ง กระดูก สั้น....19 เท้าปุก เท้าจะแคง เท้าสับ....20 อัมพาต....21 อัมพฤกษ์....22 โรคจิต / วิกลจริต....23	บันทึกรหัส ออทิสติก....24 สมองพิการ หรือ ซี พี....25 สมองพิการจนสื่อความหมายไม่ได้....26 ปัญญาอ่อน....27 พิการทางการเรียนรู้....28 ปากแหว่ง และ / หรือ เพดานโหว่....29 ศีรษะใหญ่ผิดปกติ....30 อื่น ๆ (ระบุ)....31
		ถ้าไม่มีลักษณะความพิการให้บันทึกรหัส "0" ใน F68 เท่านั้น		
		คำตอบที่ 1	คำตอบที่ 2	คำตอบที่ 3
F66	F67	F68	F69	F70

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ตอนที่ 6 พฤติกรรมการบริโภคอาหาร

ถามเฉพาะผู้ที่มีอายุตั้งแต่ 6 ปีขึ้นไป

"ปกติ...(ชื่อ)....กินอาหารมื้อหลักวันละกี่มื้อ?" บันทึกรหัส	"ปกติ......(ชื่อ)......ล้างมือก่อนกินอาหารแต่ละมื้อทุกครั้งหรือไม่?" บันทึกรหัส	"ปกติ...(ชื่อ)...ชอบกินอาหารรสชาติใดมากที่สุด?" บันทึกรหัส	"ปกติ...(ชื่อ)...ชอบกินอาหารที่ปรุงด้วยวิธีการใดมากที่สุด?" บันทึกรหัส	"ในระหว่าง 1 เดือนก่อนวันสัมภาษณ์...(ชื่อ)... ได้บริโภคอาหารกลุ่มต่างๆ เหล่านี้ โดยเฉลี่ยสัปดาห์ละกี่วัน?" รหัสคำตอบของ F75-F76: ไม่กิน ..... 1; กิน 1-2 วัน/สัปดาห์ ..... 2; กิน 3-4 วัน/สัปดาห์ ..... 3; กิน 5-6 วัน/สัปดาห์ ..... 4; กินทุกวัน 5	
กินครบ 3 มื้อ ..... 1 กิน 2 มื้อ งดมื้อเช้า ..... 2 กิน 2 มื้อ งดมื้อกลางวัน ..... 3 กิน 2 มื้อ งดมื้อเย็น ..... 4 กินเพียง 1 มื้อเท่านั้น ..... 5 กินมากกว่า 3 มื้อ 6	ทุกครั้ง ..... 1 เป็นบางครั้ง ..... 2 ไม่เคยล้างมือเลย 3	จืดๆ ..... 1 หวาน ..... 2 เค็ม ..... 3 เผ็ด ..... 4 เปรี้ยว ..... 5 อื่นๆ (ระบุ) 6	ต้ม หรือลวกสุก ..... 1 ตุ๋น ..... 2 ผัด ..... 3 ทอด ..... 4 นึ่ง ..... 5 ลวกแบบสุกๆ ดิบๆ ..... 6 ปิ้ง ย่าง ..... 7 อื่นๆ (ระบุ) 8	**กลุ่มเนื้อสัตว์และผลิตภัณฑ์** ได้แก่ อาหารทอด ไข่, เนื้อสัตว์ปนมัน, เครื่องในสัตว์ สำหรับผลิตภัณฑ์เนื้อสัตว์ เช่น เบคอน กุนเชียง หมูยอ ไส้กรอกอีสาน ไส้อั่ว แหนม เป็นต้น	**กลุ่มอาหารไขมันสูง** ได้แก่ อาหารต่างๆ ที่ปรุงด้วยวิธีการผัด, การทอด, แกงที่ใส่กะทิ, ขนมเบเกอรี่ เช่น ขนมเค้ก โดนัท คุกกี้ ขนมปังทาเนย/แยม เป็นต้น
F71	F72	F73	F74	F75	F76

| | | | | | | | 0 | 8 | 15

ตอนที่ 6 พฤติกรรมการบริโภคอาหาร (ต่อ)

ถามเฉพาะผู้ที่มีอายุตั้งแต่ 6 ปีขึ้นไป

"ในระหว่าง 1 เดือนก่อนวันสัมภาษณ์...(ชื่อ)... ได้บริโภคอาหารกลุ่มต่างๆ เหล่านี้ โดยเฉลี่ยสัปดาห์ละกี่วัน?"

รหัสคำตอบของ F77-F82

ไม่กิน 1
กิน 1-2 วัน/สัปดาห์ 2
กิน 3-4 วัน/สัปดาห์ 3
กิน 5-6 วัน/สัปดาห์ 4
กินทุกวัน 5

กลุ่มขนมสำหรับกินเล่นหรือขนมกรุบกรอบ	กลุ่มอาหารประเภทจานด่วน เช่น พิซซ่า แซนวิช แฮมเบอร์เกอร์ เป็นต้น	กลุ่มผักและผลไม้	กลุ่มเครื่องดื่มประเภทน้ำอัดลมและเครื่องดื่มที่มีรสหวาน เช่น โอวัลติน กาแฟ ชา น้ำผลไม้ที่ใส่น้ำตาล เป็นต้น	กลุ่มอาหารแปรรูปต่างๆ ได้แก่ อาหารแปรรูปประเภทใส่เกลือเป็นหลัก เช่น เนื้อเค็ม หมูเค็ม ปลาเค็ม ปลาร้า บูดู เป็นต้น ผลไม้กระป๋องชนิดต่างๆ ผลไม้แปรรูปอื่น ๆ ที่ทำเป็นในรูป เชื่อม กวน แช่อิ่ม ดอง เป็นต้น	กลุ่มผลิตภัณฑ์เสริมอาหาร คือ ผลิตภัณฑ์ที่ใช้กินโดยนอกเหนือจากอาหารที่กินทุกวัน มักอยู่ในรูปแคปซูล ผง เกล็ด ของเหลว เช่น ซุปไก่สกัด รังนก สาหร่ายอัดเม็ด น้ำมันตับปลา เป็นต้น
F77	F78	F79	F80	F81	F82

3 REC_NO 81

0 9 17

ตอนที่ 7 ลักษณะของที่อยู่อาศัย

ให้บันทึกรหัสของใน

1. ลักษณะของที่อยู่อาศัย
   - ตึก ..... = 1
   - ไม้ ..... = 2
   - ครึ่งตึกครึ่งไม้ ..... = 3
   - ไร้วัตถุไม่อาจวางในทางอื่น ..... = 4
   - ไร้วัตถุใช้แล้ว เช่น ทับ ลัง ..... = 5
   - อื่น ๆ (ระบุ) ..... = 6

   H1 (col.32)

2. สถานภาพการครอบครองที่อยู่อาศัย
   - เป็นเจ้าของบ้านและที่ดิน ..... = 1
   - เป็นเจ้าของบ้านแต่เช่าที่ดิน ..... = 2
   - เป็นเจ้าของบ้านบนที่ดินสาธารณะ ..... = 3
   - เช่าซื้อ ..... = 4
   - เช่า ..... = 5
   - อยู่โดยผู้อื่นเสียค่าเช่าให้ ..... = 6
   - อยู่โดยไม่ต้องเสียค่าเช่า ..... = 7

   H2 (col.33)

3. จำนวนห้อง
   - ห้องทั้งหมด (ไม่เป็นห้องน้ำ ห้องครัว) H3 (col.34)
   - ห้องที่ใช้นอน H4 (col.35)

4. ไฟฟ้าภายในที่อยู่อาศัย
   (รวม ไฟที่ที่ต่อจากแบตเตอรี่และเครื่องกำเนิดไฟที่อื่น ๆ)
   - มี ..... = 1
   - ไม่มี ..... = 0

   H5 (col.36)

5. เชื้อเพลิงที่ใช้ในการประกอบอาหาร (บันทึกที่ใช้เป็นส่วนใหญ่)
   - ไม่มีการทุกครั้ง ..... = 0
   - ถ่าน ..... = 1
   - ไม้ฟืน ..... = 2
   - น้ำมันก๊าด ..... = 3
   - แก๊ส ..... = 4
   - ไฟฟ้า ..... = 5
   - อื่น ๆ (ระบุ) ..... = 6

   H6 (col.37)

6. การใช้ส้วม (บันทึกประเภทที่ใช้เป็นส่วนใหญ่)
   - ส้วมซึมโครก ..... = 1
   - ส้วมซึม ..... = 2
   - ส้วมซึมโครกและส้วมซึม ..... = 3
   - ส้วมหลุม ถัง บ่อปลา ร่องแม่น้ำลำคลอง หรือ ส้วมลักษณะอื่น ๆ โดยมีห้องกั้น ..... = 4
   - ไม่มีส้วม ..... = 6

   H7 (col.38)

7. น้ำดื่ม (บันทึกประเภทที่ใช้เป็นส่วนใหญ่)
   - น้ำที่มีบรรจุขวด ..... = 1
   - น้ำประปาต่อท่อเข้าบ้าน ..... = 2
   - น้ำบาดาลต่อท่อเข้าบ้าน ..... = 3
   - น้ำประปานอกบ้าน ..... = 4
   - น้ำบ่อหรือน้ำบาดาล ..... = 6
   - น้ำจากแม่น้ำลำธาร หรือ คลอง ..... = 6
   - น้ำฝน ..... = 7
   - อื่น ๆ (ระบุ) ..... = 8

   H8 (col.39)

8. น้ำใช้ (บันทึกประเภทที่ใช้เป็นส่วนใหญ่)
   - น้ำที่มีบรรจุขวด ..... = 1
   - น้ำประปาต่อท่อเข้าบ้าน ..... = 2
   - น้ำบาดาลต่อท่อเข้าบ้าน ..... = 3
   - น้ำประปานอกบ้าน ..... = 4
   - น้ำบ่อหรือน้ำบาดาล ..... = 6
   - น้ำจากแม่น้ำลำธาร หรือ คลอง ..... = 6
   - น้ำฝน ..... = 7
   - อื่น ๆ (ระบุ) ..... = 8

   H9 (col.40)

9. วิธีกำจัดขยะภายในครัวเรือน (ตอบได้ไม่เกิน 2 คำตอบ)
   - เก็บรวบรวมให้พนักงานนำไปทิ้ง ..... = 1
   - เผา ..... = 2
   - ฝังกลบ ..... = 3
   - นำไปเลี้ยงสัตว์ ..... = 4
   - ทำปุ๋ยหมัก ..... = 5
   - ทิ้งลงแม่น้ำ ลำคลอง ..... = 6
   - ทิ้งตามที่ว่าง ที่สาธารณะ ..... = 7
   - อื่น ๆ (ระบุ) ..... = 8

   H10 (col.41)
   H11 (col.42)

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ตอนที่ 7 ลักษณะของที่อยู่อาศัย (ต่อ)

10. สมาชิกในครัวเรือนคนใดคนหนึ่งเป็นเจ้าของสิ่งต่าง ๆ ดังต่อไปนี้หรือไม่

ถ้าเป็นเจ้าของ ให้ระบุจำนวนสิ่งของแต่ละรายการที่มีทั้งหมดในครัวเรือนลงใน ☐

ถ้าไม่มีหรือมีไว้ใช้แต่ไม่เป็นเจ้าของ ให้บันทึก "0" ลงใน ☐ (ถ้าผู้ตอบนอกครัวเรือนให้ยืมมาจะถือว่า "ไม่เป็นเจ้าของ")

เตียงนอนไม้หรือโลหะ	☐	H12 (col. 43)	เครื่องปรับอากาศ	☐	H26 (col. 56)
เตาทุกชนิดอาทิตย์ - แก๊ส	☐	H13 (col. 44)	เครื่องทำน้ำร้อน / น้ำอุ่น ในห้องน้ำ	☐	H26 (col. 57)
- ไฟฟ้า	☐	H14 (col. 45)	เครื่องคอมพิวเตอร์	☐	H27 (col. 58)
เตาอบไมโครเวฟ	☐	H15 (col. 46)	โทรศัพท์ (รวมเครื่องต่อพ่วง POT)	☐	H28 (col. 59)
กระติกต้มน้ำไฟฟ้า	☐	H16 (col. 47)	โทรศัพท์เคลื่อนที่	☐	H29 (col. 60)
ตู้เย็น	☐	H17 (col. 48)	โทรสาร	☐	H30 (col. 61)
เตารีดไฟฟ้า	☐	H18 (col. 49)	รถยนต์ส่วนบุคคล	☐	H31 (col. 62)
หม้อหุงต้มอาหารไฟฟ้า	☐	H19 (col. 50)	รถบรรทุกเล็ก / รถปิกอัพ / รถตู้	☐	H32 (col. 63)
พัดลม	☐	H20 (col. 51)	รถยนต์แท็กซี่ และรถอื่น ๆ ประเภทเดียวกัน	☐	H33 (col. 64)
วิทยุ	☐	H21 (col. 52)	เรือยนต์	☐	H34 (col. 65)
โทรทัศน์	☐	H22 (col. 53)	รถจักรยานยนต์	☐	H35 (col. 66)
เครื่องเล่นวิดีโอ / ซีดี	☐	H23 (col. 54)	รถจักรยาน	☐	H36 (col. 67)
เครื่องซักผ้า	☐	H24 (col. 55)			

VITA

Mr. Pongsin Pongsupathananon was born on August 5th 1973 in Kalasin Province, Thailand. He graduated Doctor of Dental Surgery and Master Science in Orthodontics from Khonkaen University in 1998 and 2006 respectively. He work as a dentist for Health Promotion Center Region 7 Ubonratchathanee since 1998 until 2014, after that he started private clinic until present. He is now studying doctoral degree in Community Dentistry at faculty of Dentistry, Chulalongkorn University.