FACTORS INFLUENCING THAI ADOLESCENTS' EATING BEHAVIOUR

Kamonporn Patcheep

A thesis submitted in fulfilment of the requirements

for the degree of Doctor of Philosophy

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Abstract

Cardiovascular disease (CVD) has been the leading cause of premature death in adults in Thailand. Promoting healthy eating in adolescents is one way of helping to maintain health and lower risk of CVD in later life. This mixed methods study aimed to identify the factors influencing Thai adolescents' eating behaviour, so that they could be used in the future to develop a healthy eating intervention programme.

Quantitatively, the theory of planned behaviour (TPB) was used as the theoretical framework to identify factors influencing adolescents' eating behaviour and dietary intake. 184 urban and 152 rural adolescents from public high schools in Ratchaburi Province, Thailand were recruited to complete the Thai Eating Questionnaire (TEQ) developed based on the TPB. It included a brief food frequency questionnaire (FFQ). Digital photography and 24-hour dietary recall were used to explore the eating behaviour of 20 males and females. Focus groups examined factors influencing adolescents' eating behaviour, and thematic analysis was used.

Using stepwise regression analyses, urban adolescents' eating behaviour was predicted by perceived behavioural control (PBC) (r^2=.050), while their eating intention was significantly predicted by attitude towards eating behaviour (r^2=.241). Rural adolescents' subjective norm was a significant predictor of eating intention (r^2=.058), which was a significant predictor of eating behaviour (r^2=.055). Factors perceived as influencing all adolescents included food preference, convenience, price, important role of mother, perceived outcomes of eating behaviour, food availability at home and community, and advertising.

Adolescents' fruit and vegetable intake assessed by FFQ was overestimated, and protein intake underestimated when compared with the 24-hour dietary recall.

Rural adolescents would benefit from interventions designed to increase personal motivation and social approval by involving significant others such as parents and peers. Urban adolescents would benefit from interventions designed to increase facilitators and decrease barriers to healthy eating and increase self-efficacy to do this.

Acknowledgements

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Abbreviations and acronyms

AHA	American Heart Association
BMI	Body mass index
CHD	Coronary heart disease
CVD	Cardiovascular disease
CVI	Content validity index
DALY	Disability adjusted life years
FFQ	Food frequency questionnaire
GDP	Gross domestic product
HBM	Health belief model
I-CVI	Content validity index for items
Kcal	Kilocalories
KFC	Kentucky Fried Chicken
PBC	Perceived behavioural control
PMT	Protection motivation theory
QUAL	Qualitative
QUAN	Quantitative
SCT	Social cognitive theory
S-CVI	Content validity index for scales
SD	Standard deviation
SPSS	Statistical package for social science
TEQ	Thai Eating Questionnaire
TPB	Theory of planned behaviour
TRA	Theory of reasoned action
UK	United Kingdom
UN	United Nations
USA	United States of America
WHO	World Health Organization
YLDs	Years lived with disability conditions
YLLs	Years of life lost

Glossary of terms

Attitude towards eating behaviour	the participants' beliefs or feeling about positive or negative outcomes of own performance eating behaviour and the evaluation of the importance of these outcomes
Eating behaviour	the participants' dietary intake, including the variety and amount of food
Eating intention	the intention to perform eating behaviour
Fast food	Food that can be cooked and served quickly, and are high in saturated fat, meat products and carbohydrates, but low in fruit and vegetables: examples include fried chicken, meatballs, and burgers.
Healthy food	Foods including fruit, vegetables, complex carbohydrates, and whole grains, but limited in fat, sugar and salt: examples include vegetable salad, steamed rice with chicken, and wholemeal bread.
PBC over eating behaviour	the participants' perception of factors that can facilitate and impede performance of their eating behaviour, and perception of the ease or difficulty of performing eating behaviour
Rural high school	a public high school supervised by the Ministry of Education, Thailand, namely Suanphung Wittaya School, in Aumphur Suanphung, Ratchaburi Province, Thailand
Rural Thai adolescents	Thai adolescents aged 15 to 18 years old attending Matayom 4 to 6 (Grade 10 to 12) in Suanphung Wittaya School
Subjective norm regarding eating behaviour	the participants' perception of social pressure from important others to perform or not perform specific eating behaviours and their motivation to comply with the referents
Unhealthy Food	Food that is high in saturated fat, sugar and salt, and low in fruit and vegetables: examples include fried belly pork, chips and fizzy sugar laden carbonated drinks, and pizza.
Urban high school	a public high school supervised by the Ministry of Education, Thailand, namely Benjamarachutit Ratchaburi School, in Amphur Muang, Ratchaburi Province, Thailand
Urban Thai adolescents	Thai adolescents aged 15 to 18 years old attending Matayom 4 to 6 (Grade 10 to 12) in Benjamarachutit Ratchaburi School

Chapter 1

Introduction

The aim of this study is to examine eating behaviour and the objective is to identify factors influencing Thai adolescents' eating behaviour. Eating behaviour that relates to health and illness has become a focus of research in psychology and other health-related disciplines since the mid-1980s (Conner & Norman, 2007).

In this study, different theoretical disciplines, including nursing science, health psychology, and nutrition were integrated and used to inform and underpin this study to gain further understanding of the reasons why Thai adolescents select the types of food that they eat. This is essential as a first step to develop a healthy eating intervention programme and promote health in Thai adolescents.

This chapter introduces the background and the potential importance of this study. It gives an overview of the prevalence of cardiovascular disease (CVD) around the world with a focus on Thailand. It is followed by the importance of promoting healthy eating behaviour during adolescence, so as to reduce the prevalence of CVD. The dearth of research regarding the factors influencing Thai adolescents' eating behaviour is identified. If factors were identified they could be important to use in the development of an educational campaign to promote adolescents' healthy eating behaviour. It also outlines the research methods that were used in this study. This study was conducted in Thailand, therefore information about Thailand is presented in the final part of the chapter to help the understanding of the context of the country.

1.1 Background and significance of this study

CVD is the class of diseases that affect the structure and function of the heart or blood vessels, including coronary heart disease (CHD), heart failure, cerebrovascular disease, and peripheral vascular disease (Paterson, Wong, Parthasarathy, & Rafiq, 2010). CVD has been a major cause of disability and premature death worldwide for

many years, and it has contributed considerably to escalating health care costs (Hamer & Mishra, 2010). Approximately 17.1 million people die from CVD annually around the world (World Health Organization, 2010). For example, in a developed nation such as the United Kingdom (UK) (Paterson et al., 2010), CVD appears to be a major cause of death (198,000 deaths each year). Approximately half (48%) of all deaths from CVD are from CHD and just over a quarter (28%) are from stroke (Allender, Peto, Scarborough, Kaur, & Rayner, 2008). CVD is also the most common cause of death in the United States (USA) (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003), of more than 1.2 million people each year, with health care costs and lost productivity due to CVD-related disability and death that totalled $300 billion in 2001 (Veer, Jansen, Klerk, & Kok, 2000). However, the CVD epidemic is not restricted to developed countries, as it is increasing steadily in developing countries (Bundhamcharoen, Odton, Phulkerd, & Tangcharoensathien, 2011; Zhang, Lu & Liu, 2008). The World Health Organization (WHO) (2010) reported that over 80 % of CVD deaths occur in low-and middle-income nations. The Indian subcontinent including India, Pakistan, Bangladesh, Sri Lanka, and Nepal may have the greatest rate of CVD in the world (Goyal & Yusuf, 2006). CHD is the second cause of death in China, and accounts for 22 % in urban areas and 13 % in rural areas (Zhang et al, 2008). One of the greatest challenges faced by public health today across the world is the task of prevention and control of CVD.

The symptoms and complications of CVD usually appear in middle aged or elderly adults (Wood & Kotseva, 2004). Atherosclerosis, the main pathophysiological process, that underlines the majority of coronary artery disease begins in childhood, and accelerates through adolescence and early adulthood (Wheatcroft, Noronha, & Kearney, 2005; Wood & Kotseva, 2004). The process of atherosclerosis evolves over the years, and it is widely accepted that the rate of progression of atherosclerosis is influenced by multiple risk factors such as an unhealthy diet, alcohol consumption, sedentary lifestyle, and tobacco use (Schenck-Gustafsson, 2009; Wheatcroft et al., 2005; Wood & Kotseva, 2004).

Diet is believed to be central to the aetiology of CVD contributing to atherosclerosis, and hypertension (Wheatcroft et al., 2005). Many studies have shown a strong relationship between CVD and diet. One study that examined dietary patterns and cardiovascular risk markers in UK was conducted by Hamer and Mishra (2010) and

indicated that a healthy eating pattern, including high fibre, and a diet rich in fruit and vegetables, was associated with lower CVD risk. This is consistent with a study that examined fruit and vegetable consumption in the prevention of cancer and cardiovascular disease conducted by Veer and colleagues. The results indicated that high consumption of fruit and vegetables is associated with a 16 % lower risk of CVD (Veer et al., 2000). A review that examined fruit and vegetable intake, and CVD reported that fruit and vegetables have a strong protective effect against stroke and CHD (Ness & Powles, 1997). Allender et al. (2006) stated that a diet high in fat, particularly saturated fats, sugar and sodium, and low in fruit, vegetables and complex carbohydrates increases the risk of chronic disease, particularly CVD. Allender et al. (2008) also mentioned that CVD was associated with increased consumption of food containing saturated fat, cholesterol, and salt (Allender et al., 2008). Iso (2010) stated that there is a relationship between Japanese life styles, particularly eating behaviour and CVD. Consumption of food with low sodium and saturated fat (meat), and high n3 poly unsaturated fat (fish) may contribute to lower risk of CVD in Japanese people.

Although CVD is a serious disease, it is also a potentially preventable disease. Consequently, in order to prevent and reduce mortality, disability and premature death due to CVD, a wide variety of strategies have been employed to increase public awareness of the major risk factors, including an unhealthy diet. As a result, the incidence and prevalence rate of CVD in some countries have declined. For example, the UK has seen a significant reduction in the incidence of CHD with an estimated decline of 40% in people under 75 years old in the last 10 years, and a 58% mortality decrease in CVD during the past 3 decades attributable to a reduction in major risk factors (Paterson et al., 2010)

Thailand is now facing a serious situation with the increase in CVD (Bundhamcharoen et al., 2011). However, unlike the UK, the incidence and prevalence rate of CVD has not been reduced. For example, the prevalence rate of heart disease has doubled over 6 years from 317.7 (x100,000) in 2001 to 690.8 (x100,000) in 2007.

Figure 1.1 Prevalence rate of heart disease in Thailand
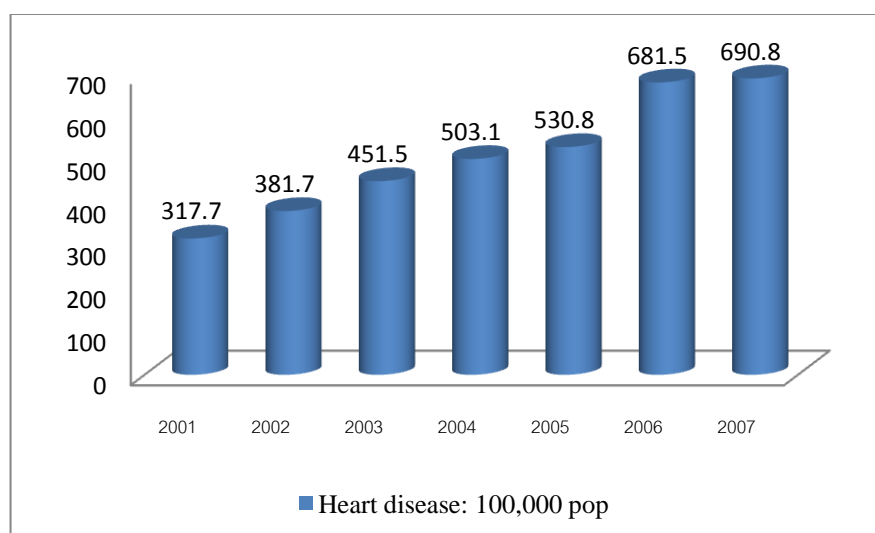
Source: Bureau of Policy and Strategy, Ministry of Public Health, Thailand (2009a)

In addition, the mortality rates for stroke per 1,000 was 26.1for women and 23.8 for men, and the mortality rate for ischaemic heart disease per 1,000 was 11.5 for women and 13.2 for men. Disability adjusted life years (DALY) is the sum of the years lost due to premature deaths or years of life lost (YLLs) and years lived with disability conditions (YLDs) that reflect the "Investing in Health" as a summary measure of population health (Bundhamcharoen et al., 2011). Stroke and ischaemic heart disease were the first and fifth-ranked in women, while stroke and ischaemic heart disease were the third and sixth-ranked in men (Bundhamcharoen et al., 2011) (Table 1.1).

Table 1.1 Top ten causes of DALY loss, in Thailand in 2004

Top 10 ranking in women	Death (x1,000)	YLLs (x1,000)	YLDs (x1,000)	Top 10 ranking in men	Death (x1,000)	YLLs (x1,000)	YLDs (x1,000)
1.Stroke	26.1	267.0	48.5	1.HIV/AIDS	26.4	634.2	17.7
2.HIV/AIDS	11.0	279.5	15.1	2.Traffic accidents	23.5	548.6	42.7
3.Diabetes	14.0	183.7	108.8	3.Stroke	23.8	282.6	54.0
4.Depression	0.0	0.0	191.5	4.Alcohol dependence/ harmful use	1.0	18.1	315.2
5.Ischeamic heart disease	11.5	129.6	10.7	5.Liver cancer	18.8	277.3	3.1
6.Osteoarthritis	0.2	1.2	129.9	6.Ischaemic heart disease	13.2	168.4	15.6
7.Traffic accident	5.1	115.4	10.8	7.COPD	13.5	124.8	58.6
8.Liver cancer	8.7	123.9	1.7	8.Diabetes	8.2	101.6	79.3
9.Anaemia	-	-	110.7	9.Cirrhosis	8.2	140.5	4.3
10.COPD	0.0	0.2	109.3	10.Depression	-	-	136.9

While two common types of CVD, CHD and stroke, have continually increased, adopting a healthier diet has been set as a key part of current Thailand health education and policy (Wibulpolprasert, 2008). In addition, Thailand's current "Food-Based Dietary Guidelines" or "Rules of Dietary-Intake" have been promoted since 1998 to create public awareness about healthy eating and offer suggestions for improving one's diet, and reducing illness from diet-related illness such as heart disease, hypertension, diabetes mellitus, and cancer. These guidelines encourage Thai people to:

(i)   eat a variety of foods from each of the 5 food groups (meat, rice-starchy foods, vegetables, fruit, and fat), and maintain proper weight

(ii)   eat an adequate amount of rice or alternative carbohydrate sources

(iii)   eat plenty of vegetables and fruit regularly

(iv)   eat fish, lean meats, eggs, legumes and pulses regularly

(v)   drink milk in appropriate quality and quantity for one's age

(vi)   eat a diet containing appropriate amounts of fat

(vii)   avoid sweet and salty foods

(viii)   eat clean and safe food

(ix)   avoid or reduce the consumption of alcoholic beverages

Source: Working Group on Food-Based Dietary Guidelines for Thai People, (2001)

However, Thai people have reported a low adherence to healthy eating behaviour, especially adolescents. For example, 60 % of Thai adolescents preferred western fast food which is high in meat and saturated fats compared to local or Thai food that contains high fibre (Wibulpolprasert, 2008). Areekul and colleagues (2005) conducted a study of dietary behaviour and nutritional status with 298 adolescents in a secondary school in a rural area of Thailand. They found that 74% of children preferred unhealthy popular snacks such as crisps that usually contain monosodium glutamate to healthy snacks. In addition, the results also indicated that there was 63.3% of the children who preferred drinking carbonated beverages. An examination of nutritional data from Thai adolescents living in suburban Bangkok by Pawloski (2006) indicated that consuming a diet high in fat and calories contributed to a high percentage of overweight adolescents. Moreover, according to Kosulwat (2002), the overall eating patterns of the Thai population has shifted from a traditional Asian diet that is cereal based and low-fat to a more Westernised diet characterised by increased consumption of animal products, fats, and sugar and decreasing consumption of complex carbohydrate foods.

Clearly, many Thai adolescents do not consume diets that comply with the national nutritional recommendations, although the food-based dietary guidelines have been promoted in Thailand for over a decade (Working Group on Food-Based Dietary Guidelines for Thai People, 2001). Until now, it has not been clearly understood why Thai adolescents eat an unhealthy diet, and it is important that promoting healthy eating behaviour should start in childhood to promote health and prevent some chronic diseases, including CVD.

There has been a lack of research on factors influencing both urban and rural Thai adolescent eating behaviour. Urban and rural areas of Thailand may provide different environments for eating behaviour (e.g. the higher number of fast food restaurants and convenient stores are in the city/ urban areas) that may affect Thai adolescents' eating behaviour in different ways. The environment (social and physical) has been identified as a factor influencing adolescents' food choice in previous western studies, for example Story, Neumark-Sztainer, & French (2002), and therefore, to identify factors influencing Thai adolescents' eating behaviour, urban and rural adolescents' should be recruited to this study.

Therefore, understanding "Why Thai adolescents eat what they eat?" is a major question, and may be very interesting to explore. Indeed, it is necessary to understand the important factors that predict eating behaviour and this could be the first step in the development of an effective educational campaign to promoting healthy eating behaviour to reduce the risk of CVD.

Eating behaviour is very complex and influenced by many factors. For example, native American girls' healthy eating behaviour was most predicted by barriers to healthy eating (e.g. healthy foods are not around, parents do not buy healthy food, junk foods taste better, and healthy foods are not filling), while Native American boys' eating behaviour was best predicted by subjective norm (the social pressure perceived by individual to perform or not perform behaviour, and individual's motivation to comply with the referents) (Fila & Smith, 2006). Healthy eating among 10-13-year-old New Zealand children was predicted by their healthy eating intention (Hewitt & Stephens, 2007). In Swedish children aged 11-15 years, intention was a predictor of the consumption of milk and high-fibre bread and for milk (also predicted by perceived behavioural control (PBC). PBC is an individual's perception of factors that can facilitate and impede performance of behaviour, and perception of the ease or difficulty of performing behaviour (Berg, Jonsson & Conner, 2000). Adolescents' soft drink and snack consumption were positively associated with attitude, subjective norm, parental and peer modelling, and intention according to a study by Horst, Timperio, Crawford, Roberts, Brug, & Oenema (2008). Therefore different approaches and methodologies have been used to investigate adolescent beliefs and behaviour in this area, such as surveys (Fila & Smith, 2006; Hewitt & Stephens, 2007), focus group discussion (Neumark-Sztainer, Story, Perry, & Casey,

1999; O'Dea, 2003), and individual interviews (Giskes, Patterson, Turrell, & Newman, 2005).

The determinants of eating behaviour have been studied mostly from a social psychological perspective. Theories have been developed to explain individual dietary behaviour in relation to the people around them, including theoretical models developed in health psychology to explain day to day decision making in relation to healthy behaviour (Conner & Norman, 2007; Ogden, 2010; Thirlaway & Upton, 2009). One model based on cognitive decision-making is the theory of planned behaviour (TPB) (Ajzen, 1991). According to the TPB, the intention to perform behaviour is explained by three constructs, composed of attitudes towards behaviour (an individual's perception of the positive and negative outcomes of behaviour, and their importance), subjective norm regarding behaviour, and PBC over behaviour. Both an individual's intention and PBC are a direct influence on behaviour (Ajzen, 1991). The TPB has been applied to a wide range of adolescents' dietary behaviours including healthy eating, food choices, fruit and vegetable intake, soft drink consumption, fish intake, and breakfast consumption. Several preliminary studies have shown that the TPB is a very useful model in predicting dietary intake with a wide range of findings (Berg et al., 2000; Blanchard, Fisher, Sparling, Sharks, Nehl, Rhodes et al., 2009, Fila & Smith, 2006; Kassem, Lee, Modeste, & Johnston, 2003; Pawlak & Malinauskas, 2008; Prell, Berg, & Jonsson, 2002). Although the TPB has been also successfully applied to the prediction of a wide range of eating behaviour (Conner & Norman, 2007; Fila & Smith, 2006; Hewitt & Stephens, 2007; Prell et al., 2002), measuring eating behaviour using self-report measures such as the TPB have been found to be inaccurate (Fila & Smith, 2006). According to Hebert and colleagues, self report of dietary intake can be biased by social desirability or approval (Berg et al., 2000; Bowling & Ebrahim, 2005; Hebert, Clemow, Pbert, Ockene, & Ockene, 1995; McClain, Chappuis, Nguyen-Rodriguez, Yaroch, & Spruijt-Metz, 2009). For example, participants answered a questionaire to denote healthy foods rather than what they actually ate (MacNicol, Murray, & Austin, 2003). Consequently, researchers, suggest that multiple measurements of eating behaviour should be employed to avoid potential inaccuracies in self-report in studies that use the TPB (Armitage & Conner, 2001; Fila & Smith, 2006). Furthermore, several studies found that dietary behaviour was influenced by mood (Neumark-

Sztainer et al., 1999; O'Dea, 2003). However, the TPB is a cognitive model that examines the role of thinking and perception and may overlook emotions such as fear, and negative and positive mood (Ajzen, 1991). Most research undertaken within a cognitive perspective uses a quantitative approach and questionnaires based on an existing model. This means that the cognitions being investigated are selected by the researcher rather than offered by the participants. It is possible that many important cognitions are missed which may be central to understanding dietary behaviour (Ogden, 2010). Therefore, other research methods should be used together in a study that aims to explore factors influencing eating behaviour that using the TPB model.

Focus groups are used in qualitative research as this method has a number of advantages, particularly for exploring and understanding people's knowledge, perspective, and experiences (Dixey, Sahota, Atwal, & Turner, 2001; Kitzinger, 1995). Focus groups were found to be a more effective method than questionnaires for data collection to enable more indepth discussion of children's attitude and behaviours regarding healthy eating (Dixey et al., 2001; Neumark-Sztainer, et al., 1999). The study by Neumark-Sztainer et al. (1999) of factors influencing food choices of American adolescents used focus group discussion. The results not only demonstrated the broad range of factors influencing their food choices, but also illustrated the relationships between these factors such as personal (e.g. taste, food preferences, body image), behavioural (e.g. vegetarian lifestyle), and socio environmental (e.g. parental influence, and food availability). In addition, some factors clearly reflected the complex interrelationship of all three domains in an adolescent's life (e.g. factors related to time consideration, availability of food and convenience). Furthermore, the results showed that mood was found to be one of the factors influencing the food choice of adolescents that cannot be identified from a study based on the TPB. They proposed that focus group discussions can provide a significant amount of knowledge and beliefs regarding healthy eating, and were found to provide rich and indepth data (Croll, Neumark-Sztainer, & Story, 2001). However, using focus groups has some limitations. The results obtained from focus groups cannot be generalised beyond the group of participants as it may not represent a wider population (Croll et al., 2001; Monge-Rojas, Garita, Sanchez, & Munoz, 2005). There is no one best method for developing knowledge regarding dietary behaviour, so a variety of methods were required in this research.

Therefore, mixed methods (quantitative and qualitative) techniques were used in this study that planned to identify factors influencing both urban and rural Thai adolescents' eating behaviour.

1.2 Thailand background

The Kingdom of Thailand, a country of about 514,000 square kilometres, is part of the Indochina Peninsula located in the continent of Southeast Asia, just north of the equator. Thailand is the third largest country in Southeast Asia, after Indonesia and Myanmar (Burma). The northernmost part is bordered by Myanmar and the Laos Democratic Republic. The southernmost part is bordered by Malaysia and the Gulf of Thailand. The east is adjacent to the Laos Democratic Republic and Cambodia. The western most point is bordered by Myanmar (Wibulpolprasert, 2008). (Figure 1)

The population of Thailand was estimated at 67 million in 2008 with approximately one-third of the population living in urban areas. They are almost all residents (98.1%) with Thai nationality. The rest are composed of other nationalities such as Chinese, Burmese and people from Laos. For communication purposes, the official national language of Thailand is Thai, while the use of English language tends to play a greater role particularly in the business sector (Wibulpolprasert, 2008).

Figure 1.2 Map of Thailand

Source: Provided by www.Phukhao.com

During the period of 2010-2015, the life expectancy at birth of the Thai population was 71.3 years for males and 77.5 years for females, and it will reach 74.8 years for males and 80.3 years for females by the year 2025. The WHO Report in 2008 reported that Thailand's life expectancy at birth was 74 years which is higher than the regional and global average. In addition, Thailand's healthy life expectancy at birth was 62 years, while the regional and global rates were 57 and 59 years. The infant mortality rate (per 1,000 live births) rapidly declined from 84.3 in 1964 to 11.3

during 2005-2006. The child mortality rate (aged <5 years per 1,000 live births) has declined from 12.8 in 1990 to 10.4 in 2006. The population growth has continuously dropped from 3.2% prior to 1970 to 0.41% in 2006 probably because of the success of Thailand's family planning campaigns. Moreover, the number of adults of working age and the elderly population has increased. This has affected the number and age structure of the population, so that the age structure will change from a pyramid-like shape or wide-based to a constricted or narrow-based one, similar to those in developed countries. Therefore, Thailand demonstrates the tendency to very rapidly change to an elderly society within the next 20 years (Wibulpolprasert, 2008).

Economic growth can be a major determining factor of the social change of a nation. Over the 30 years before 1997, Thailand has experienced steady economic growth with an average annual economic growth higher than 7% and the gross domestic product (GDP) per capital increased 28-fold (Kosulwat, 2002; Wibulpolprasert, 2008). After the 1997 Asian economic crisis, the annual economic growth rate declined to -1.7% in 1997 and -10.8% in 1998 that clearly affected the GDP per capita. Therefore, Thailand has adopted a number of monetary and financial measures to resolve the economic problems, resulting in a positive economic growth of 4.2% in 1999, 2.1 % in 2001, 7.1% in 2003, and a drop again to 4.5% in 2007 (Wibulpolprasert, 2008).

Thailand has been faced with the phenomena that the percentage of industrial and service sectors grew faster than the agricultural sector over the past three decades (Kosulwat, 2002; Wibulpolprasert, 2008). As a result of the rapid economic growth, it has increased the urbanisation of society in Thailand (Craven & Hawks, 2006). The social structure and lifestyle has changed from a rural society to a more urbanised society which has included adopting a different dietary pattern. The food consumption patterns of the Thai population have altered according to the changing lifestyle, and within Thailand there are differences between urban and rural communities and food consumption (Craven & Hawks, 2006; Kosulwat, 2002). Urban residents tend to consume more meat and fats, while they eat less fruit and vegetables. More hurried lifestyles have resulted in Thai people eating ready-to-eat meals or semi-prepared (convenience) food. This trend is rising in both urban and rural areas. In addition, according to the Thailand Health Profile 2005-2007, Thai

adolescents preferred Western food to local or Thai food (Wibulpolprasert, 2008). Similarly, according to Kosulwat (2002), the dietary patterns of the Thai population have shifted from traditional Thai cereal-based, high fibre and low fat food (as Figure: 1.3, 1.4, and 1.5) to a more Westernised diet (Figure 1.6, 1.7, and 1.8) characterised by increased consumption of meat, high fat, sugar, and salty foods, and low consumption of fruit and vegetables (Kosulwat, 2002; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). Moreover, fast-food restaurants such as Kentucky Fried Chicken (KFC), McDonalds, and Burger King can be found in every province in Thailand, particularly in the cities. Many Thai adolescents like to eat in fast-food restaurants because they are perceived by them as fashionable (Wibulpolprasert, 2008). Finally, a study of the total Thai population consumption of food over three years by the Institute of Nutrition, Mahidol University, Thailand found that the nine most popular foods were deep-fried banana, deep-fried doughstick, bread with cream, chinese sausage, doughnuts, Thai rice crackers, bread crackers, and chips, which are all high in fat, sugar and calories (Komchadluek, 2008). These dietary patterns are linked to CVD (Kosulwat, 2002; Stevenson et al., 2007).

Figure 1.3 Traditional Thai foods; steamed rice, Thai omelette mixed with green vegetable, mixed boiled vegetables (carrot, baby corn, and green vegetables) with spicy shrimp plate, spicy stir-fries petai beans/sataw with shrimp plate, and fried fish

Figure 1.4 Traditional Thai single dish; vermicelli with meat, liver, and vegetables (long green beans, bean sprouts, and spring onions)

Figure 1.5 Traditional Thai fast food; papaya spicy salad

Figure 1.6 Thai breakfast with western influence; sliced white bread, fried ham, fried egg, and green apple

Figure 1.7 Supermarket ready-to-eat food; grilled teriyaki chicken

Figure 1.8 Thai single dish with western influence; stir-fried pasta with minced pork

Permission was granted by the study participants to use the photographs.

1.3 Conclusion

CVD is the leading cause of premature death in adults in Thailand (Bundhamcharoen et al., 2011). Atherosclerosis is the most common cause of CVD, and that begins in childhood and accelerates during adolescence (Wheatcroft et al, 2005; Wood & Kotseva, 2004). CVD risk is associated with multiple factors, including poor diet, and sedentary behaviour (Veer et al., 2000; Wood & Kotseva, 2004). As a result of the rapid socio-economic development in Thailand, urban and rural Thai people's living lifestyles have changed from a rural orientation to a more urbanised society, including changing dietary pattern such as eating more Western fast foods rather than local or Thai plant-based food, and eating more Thai ready-to-eat meals that are high in meat and fat and low in vegetables (Figure 1.7) (Kosuwat, 2002) contributing to dietary patterns that increase the risk of CVD (Veer et al., 2000). Healthy eating behaviour in the adolescent period helps to maintain good health and lower the risk of CVD in later life. Therefore, factors influencing Thai adolescents' eating

behaviour should be identified in the proposed study and this could help to promote healthy eating behaviour. The information that is necessary for carrying out this study will be presented in the next chapter.

Chapter 2

Literature review

The purpose of this chapter is to provide the literature as background evidence for this study. The chapter starts by examining issues related to adolescents and eating behaviour including what factors are important to promoting healthy eating in adolescents. It is followed by dietary recommendations and related dietary assessment methods that were considered in planning the measurement of adolescents' eating behaviour in this study. Then, social cognition models related to eating behaviour are explored and discussed, with a focus on the TPB model. Finally, factors influencing adolescents' eating behaviour and food choices are presented at the end of this chapter.

2.1 Adolescents and eating behaviour

Why promote healthy eating in adolescents?

Generally, healthy eating is very important throughout the entire life course however it should be promoted in the early years such as in childhood or adolescence (Brug & Klepp, 2007). Adolescence is the transitional stage between childhood and adulthood (Langley-Evans, 2009), and it is defined as the period of life between 11 and 21 years old (Stang, Feldman, & Story, 2008; Trew, Clark, McCartney, Barnett, & Muldoon, 2006). There are many reasons to support why healthy eating should be promoted in the adolescent period. Firstly, adolescence is one of the key periods for growth and development, with the total nutritional intake needs higher than at any other period during the life cycle (Brug & Klepp, 2007; Langley-Evans, 2009). Together with this, many studies also identify that adolescents lack any concern about their health. For example, one qualitative study of American adolescents demonstrated that eating a healthy diet does not rate highly enough by them to worry about. This was because they think that they are too young to be concerned about

their health, and that they will only worry when they get older and have a health condition such as heart disease (Neumark-Sztainer et al., 1999). Although adolescents may be perceived as generally healthy, the foundation for many health conditions affecting adults may begin in adolescence or earlier, particularly diet-related diseases such as CVD, type 2 Diabetes Mellitus, and hypertension (World Health Organization, 2009). Lastly, adolescence is a time of establishing independence from the family when individuals want to make their own decisions about food choice. Adopting healthy dietary habits in this period will shape adolescents' early experiences, and they are more likely to be maintained in adulthood (Brug & Klepp, 2007; Ogden, 2010; Trew et al., 2006; World Health Organisation, 2005) Therefore, this period of life is suitable to begin to identify dietary behaviour because eating habits established in adolescence may provide the basis of lifelong dietary preferences and are critical to the maintenance of good health and to the prevention of dietary-related diseases such as CVD in adulthood or later life (Brug & Klepp, 2007).

Healthy eating is one of the significant factors in the promotion and maintenance of good health, and it is recommended as one of the main strategies to reduce the incidence, level of disability, and mortality related to CVD. In order to promote healthy eating, many countries have food-based dietary guidelines to help their general population to understand and engage with healthy eating behaviour. Generally, food-based dietary guidelines are composed of simple information and advice on a healthy diet that aims to promote a food consumption pattern and nutritional well-being at the public health level (Lawrence & Robertson, 2007). In the late 1960s, the first dietary guidelines were developed in Scandinavia, and since that time, dietary guidelines have been published by UN agencies and governments of countries, including Australia, Canada, New Zealand, United Kingdom, and the United States. However, it is important that food-based dietary guidelines be developed and based on the socio cultural context of each country (Anderson & Zlotkin, 2000; Gibney & Wolmarans, 2007). In the next section, the Thailand dietary guidelines will be examined and studies related to the dietary recommendations for adolescents will be discussed.

Thai dietary recommendations

The food-based dietary guidelines for the Thai population and the Thailand Nutrition Flag were designed in 1996 by the Division of Nutrition, the Department of Health, Ministry of Public Health, the Institute of Nutrition at Mahidol University, other nutritionists and health personnel from other universities (Sirichakwal & Sranacharoenpong, 2008). The main aim of developing food-based dietary guidelines was to assist the Thai population from the age of 6 years old in making healthy food choices for the promotion of nutritional well-being and disease prevention, particularly chronic conditions such as heart disease, type 2 Diabetes Mellitus, and hypertension (Sirichakwal & Sranacharoenpong, 2008). It was published in 1998, and the current food based dietary guidelines are a revision of the 2001version (Working Group on Food-Based Dietary Guidelines for Thai People, 2001). The food-based dietary guidelines for Thai population consists of two components. These are the qualitative part which is composed of nine guidelines and a quantitative component which is a food guide called the "Thailand Nutrition Flag" (Sirichakwal & Sranacharoenpong, 2008; Working Group on Food-Based Dietary Guidelines for Thai People, 2001).

Qualitative component of food-based dietary guidelines

According to the Working Group on Food-Based Dietary Guidelines for Thai People (2001), there are 9 guidelines as follows.

Rule No. 1: Eat a variety of foods from each of the five food groups and maintain a proper weight

There are five basic food groups:

Group 1: All types of meat, poultry, fish, milk, eggs, legumes, and sesame seeds contributing to the growth and maintenance of body tissues

Group 2: Rice, cereals, starchy foods, including sugar for providing energy

Group 3: Vegetables to assist regular body function

Group 4: Fruit which has similar function to group 3

Group 5: Oil and fats from plant and animals for providing energy and bodily warmth

Each type of food is composed of many nutrients such as protein, carbohydrates, minerals, vitamins, and fat that helps the body function effectively. All types of food contain different nutrients, and no single food can supply all of the necessary nutrients. Therefore, a variety of foods from each of the 5 groups should be consumed each day, in order to obtain the nutrients that the body needs.

In addition, the appropriate amount of each food group should be considered to promote a balanced diet. The key to a balanced diet is that grains, cereal, vegetables, and fruits are needed in greater proportion than foods from the meat and oil/fat groups.

Body weight is an important indicator of each individual's health status. Each person should maintain a proper weight for their age and height. Generally, underweight people tend to be physically weaker and may have less resistance to illness. On the other hand, overweight people are at risk of coronary heart disease, hypertension, type 2 diabetes mellitus, and some types of cancer.

Rule No.2: Eat adequate amounts of rice or alternative carbohydrate sources

Rice and starchy foods are primary sources of energy, and rice is the staple food of Thai people. The main nutrients in rice are carbohydrate and protein, particularly brown or unpolished rice that contains protein, fat, dietary fibre, minerals, and vitamins. Rice and starchy food should be consumed daily in appropriate quantities. The quantity of food from the rice and carbohydrate group needed for consumption depends on the age, sex, and the level of physical activity.

Rule No.3: Eat plenty of vegetables and fruit regularly

Fruit and vegetables contain high level of vitamins, minerals, and fibre which are necessary for good health. Different coloured fruit and vegetables provide different nutrients, for example, carrot, cabbage, and broccoli. Fruit and vegetables are also generally low in calorific energy. As a result, eating a wide variety of fruit and vegetables on a daily basis is one way to both promote health and reduce the risk of obesity and chronic conditions such as coronary heart disease, hypertension, and type 2 Diabetes Mellitus. Therefore, it is recommended that fruit and vegetables should be included in every meal.

Rule No.4: Eat fish, lean meat, eggs, legumes, and pulses regularly

Fish, lean meat, eggs, legumes, and pulses are good sources of protein. Good quality proteins are need for the growth, function, and, maintenance of the body. Protein is also needed to improve neuronal response and supply energy. The amount of food from the meat and bean group required depends on age, sex, and level of physical activity.

Rule No.5: Drink milk in appropriate quality and quantity for one's age

Milk is an excellent source of calcium and phosphorus which are essential for building strong bones and teeth. It also provides essential nutrients such as potassium, protein, vitamins A, D, and B12 which are important for optimal health.

Rule No.6: Eat a diet containing appropriate amounts of fat

Fat is an essential foods for health, supplying energy and warmth. It is also necessary to help the absorption of specific fat soluble vitamins. There are two kinds of fat comprising saturated fat (e.g. fat from meat and animal skin) and unsaturated fat (e.g. fat from vegetables). In general, almost all foods contain fat in different amounts such as meat, fish, beans and vegetables, but fat is a concentrated energy source, and little else nutritionally. Individuals should consume lower fat foods from each group, and reduce the use of saturated fats, in order to prevent a greater risk of obesity and some chronic diseases such as coronary heart disease, and hypertension.

Rule No.7: Avoid sweet and salty foods

Eating salty and sweet foods can have fewer health benefits. Sweet foods usually contain high calories and sugar, which may be a threat to an individual's health. Eating too many sweet foods may become the main reason for obesity and some diseases such as type 2 Diabetes Mellitus. Salty foods contain high sodium and that can contribute to hypertension.

Rule No.8: Eat clean and safe food

There are several sources of contamination such as chemicals, bacteria such as E. coli, and parasites in the process of food production, preparation, cooking and handling. Some foods may contain non-permitted additives and preservatives, for

example, adding borax to meat balls and using formalin in the preservation of seafoods, textile dyes in preparing foods and desserts, and using insecticides to make fruit and vegetables more attractive.

Rule No.9: Avoid or reduce the consumption of alcoholic beverage

Alcoholic beverages include spirits, beer, wine, and brandy, and moderate to high alcoholic beverages consumption is harmful to health. It is associated with some diseases such as cirrhosis, hypertension, and peptic ulcers. It may also lead to loss of life and property such as driving whilst under the influence of alcohol and causing a fatal road traffic accident.

Source: Working Group on Food-Based Dietary Guidelines for Thai People, (2001)

Quantitative component of food-based dietary guidelines for the Thai population

The Thailand Nutrition Flag includes simple guidance on the composition of a healthy diet designed to help Thai people put the food-based dietary guidelines into practice. The Thailand Nutrition Flag (2001) illustrates the concepts in a useful and imaginative way in relation to the amount of foods that the Thai population should eat from the five major food groups every day. Food groups and recommended units are illustrated as follows (Figure 2.1) (Sirichakwal & Sranacharoenpong, 2008)

- Rice and starchy food 8-12 rice-serving spoons/day
- Vegetables 4-6 rice-serving spoons/day
- Fruit 3-5 portions/day
- Milk 1-2 glass(es)/day
- Meat 6-12 table spoons /day
- Oil, sugar and salt eat in limited amount/day

Within the Thai Nutritional Flag model, foods are divided into different groups. There are rice-starchy food, meat, vegetables, fruit, milk and foods containing fat and sugar. It is suggested that the intake of foods from the rice-starchy food group and the fruit and vegetables outweigh the intake of meat, milk and food containing fat. The advice is to base the meal content on rice-starchy foods, to consume 4-6 rice-serving spoons of vegetables per day, to have 3-5 portions of fruit per day, to eat 6-

12 spoons of meat per day, to drink 1-2 glass/es of milk per day, and to have a low intake of foods containing oil, fat, sugar, and salt (Working Group on Food-Based Dietary Guidelines for Thai People, 2001).

Figure 2.1 Thailand Nutrition Flag-Healthy Eating for Thai Populations

Source: Working Group on Food-Based Dietary Guidelines for Thai People, (2001)

The amount of food recommended in the Thailand Nutrition Flag is measured in household units such as a table spoon or a rice-serving spoon that is practical to use in daily life. This is explained as follows (Working Group on Food-Based Dietary Guidelines for Thai People, 2001):

Rice serving spoon

Rice-serving spoon is used to measure rice, starchy food and the vegetable groups.

- One rice serving-spoon of cooked rice or noodles is about 60 g.

- One rice serving-spoon of sticky rice equals two rice-serving spoons of cooked rice.

- One slice of bread equals one rice-serving spoon or about 30 g.

- One rice-serving spoon of cooked vegetable is about 40 g.

Table spoon

A table spoon is used to measure the meat/ protein group.

- One for cooked meat is about 12 g.

- One egg equals two table spoons.

- One mackerel equals two table spoons.

- One quarter of tofu equals one table spoon.

Portion

Portions are used to measure the fruit group.

-One portion of fruit equals either one banana, one orange, four rambutans, half of a guava, or six to eight pieces of papaya or pineapple.

Figure 2.2 Household units used in the Thailand Nutrition Flag

Source: Working Group on Food-Based Dietary Guidelines for Thai People, (2001)

Although the Thailand Nutritional flag was designed for all Thai people aged 6 and
older, it was also developed for specific age groups based on their different
nutritional needs per day. There are three levels of calorific requirement per day for
each group of people. Firstly, 1,600 Kilocalories (Kcal) per day is recommended for
children between 6-13 years, working women of 25-60 years, and the elderly (> 60
years). Secondly, 2,000 Kcal each day is recommended for adolescents and young
adults 14-25 years, and working men of 25-60 years. Lastly, 2,400 Kcal is
recommended for very physically active males and females who expend more energy
such as farmers, labours, and athletes. The recommended amount for the various
food groups for each day varies depending on calorific needs as follows (Table 2.1).

Table 2.1 Number of portions for each food group based on level of energy
consumption

Food group	Measuring unit	Level of daily calorie requirement		
		1,600 [1)] Kcal/ day	2,000 [2)] Kcal/day	2,400 [3)] Kcal/day
Rice-starchy	Rice-serving spoon	8	10	12
Vegetables	Rice- serving spoon	4(6)*	5	6
Fruit	Portion	3(4)*	4	5
Meat	Table spoon	6	9	12
Milk	Glass	2(1)*	1	1
Sugar, salt, fat, and oil	Tea spoon	only a limited amount	only a limited amount	only a limited amount

Source: Working Group on Food-Based Dietary Guidelines for Thai People, 2001

Note:

[1)]*1,600 Kcal for children 6-13 years, working women of 25-60 years, elderly, over 60 Years*

[2)]*2,000 Kcal for teenager 14-25 years, working men of 25-60 years*

[3)]*2,400 Kcal for females-males who needs more energy such as farmers, labours, athletes*

(number)*: recommended for adult

Food-based dietary guidelines have been identified by developed and developing countries with the aim of providing nutritional knowledge in related to making healthy food choices for their respective population. They were based on each country's socio cultural environment and locally available foods. Therefore, there is diversity in the guidelines and the visual representations used in the food guides. For example "MyPyramid" of the United State, the "UK Eatwell plate", the "Australian Guide to Healthy Eating", "Food Guide Pagoda" of China, and "Thailand Nutrition Flag" (Lawrence & Robertson, 2007). However, there are similarities, for example, all guidelines tend to provide science-based advice to promote health and lower the risk of diet-related chronic diseases. The common core recommendations of all food-based dietary guidelines includes eating a variety of different foods, eating plenty of fruit and vegetables, choosing complex carbohydrates, consuming low fat by eating lean meat, and limiting salt and sugar.

Like other countries, the Thai food-based dietary guidelines were designed not only to promote well-being but also to prevent food-related diseases such as CVD. Dietary factors are considered a major determinant of CVD and include the consumption of high; fat, cholesterol and sodium, and a low intake of fruit and vegetables (Wood & Kotseva, 2004). Therefore, to reduce CVD risk, healthy eating is needed for the prevention of CVD. Therefore, the Thai food-based dietary guidelines may be an effective strategy to prevent CVD in Thailand, particularly in relation to the rules as follows.

Rule No. 1:   Eat a variety of foods from each of the five food groups and maintain proper weight

Rule No. 2:   Eat adequate amount of rice or alternative carbohydrate sources

Rule No. 3:   Eat plenty of vegetables and fruit regularly

Rule No. 4:   Eat fish, lean meat, eggs, legumes and pulses regularly

Rule No. 6:   Eat a diet containing appropriate amounts of fat

Rule No. 7:   Avoid sweet and salty foods

The relationship between CVD and diet has been studied intensively, and many studies appear to support the food-based dietary guidelines for Thai people in relation to lowering the dietary risk of CVD.

The association between dietary fibre and mortality from CVD in a Japanese population was examined in a prospective study by Eshak and Colleagues (2010). 58,730 Japanese male and females aged 40-79 years were included and their dietary fibre consumption was examined by a food frequency questionnaire (FFQ). They were followed up from 1988-1990 to the end of 2003. The results indicated that fruit and fibre consumption were inversely associated with the risk of mortality from CHD. The authors suggested that increasing dietary fibre intake may reduce the mortality risk from CHD.

A Japanese cohort study was conducted by Nagura and colleagues (2009) to examine the association of plant-based food intake with CVD and mortality. In total 25, 206 male and 34,279 females aged 40-79 years old were recruited to this study, and their fruit, vegetable, and bean intakes were assessed by a self-administered questionnaire at baseline in 1988-1990. Then, they were followed up for 13 years. The results showed that fruit intake was inversely associated with mortality from stroke, followed by CVD, and mortality. Vegetable consumption was inversely associated with total CVD. Their bean intake was inversely associated with other CVD, total CVD, and total mortality. Overall, plant-based foods, particularly fruit intake, were associated with reduced mortality from CVD among the Japanese adults.

Hu and Willet (2002) reviewed metabolic, epidemiologic, and clinical trials regarding diet and CHD prevention by searching the Medline database in May 2002. The epidemiology and clinical investigations of the main dietary factors (fat,

cholesterol, omega-3 fatty acids, trans-fatty acids, carbohydrates, glycaemic index, fibre, folate, specific foods, and dietary pattern) and CHD were searched. The included 147 studies related to original investigations and reviews of metabolic and epidemiologic studies, as well as dietary intervention trials of diet and CHD. The results indicated that diets containing unsaturated fats as the predominant form of dietary fat, whole grains as the main form of carbohydrates, plenty of fruit and vegetables, and adequate omega-3 fatty acids can offer significant protection against CHD.

A review that examined the relationship between the consumption of fruit and vegetables, and CHD was conducted by Ness and Powel (1997). All ecological, case-control, and cohort studies were included in the study. The findings reported that for CHD, nine of ten ecological studies, two of three case-control studies, and six of sixteen cohort studies found a significant protective association with fruit and vegetables or surrogate nutrient intake. In addition, three of five ecological studies and six of eight cohort studies reported a significant protective association with fruit and vegetables or surrogate nutrient intake with stroke. For total circulatory disease, one of two cohort studies found a significant positive association between fruit and vegetable consumption and CHD. Overall, the findings support the view that fruit and vegetable intake has a strong protective effect for stroke and CHD.

Similarly, Veer and colleagues (2000) reviewed over 250 observational studies on cancer and CVD. Fourteen studies were on CVD (three case-control studies and eleven prospective studies). The odds ratio or relative risks for high versus low consumption of fruits and vegetables were obtained. The results reported that consumption of a diet containing a high amount of fruit and vegetables is associated with 16 % lower risk of CVD, (ranging from 6-22%).

In addition, a review study related to how natural dietary antioxidants in fruit, vegetables and legumes promote vascular health indicated that consumption of these three groups of plant-based foods may contribute to cardiovascular health promotion. Eating all three categories of plant-based foods together provide more positive effects on cardio vascular health than consuming one alone (Wang, Melnyk, Tsao, & Marcone, 2011).

Another epidemiologic follow-up study examined the relationship between fruit and vegetable intake and the risk of CVD in 9,608 American adults. They were aged 25-74 years old and were not experiencing CVD when they were recruited to the study. The participants' fruit and vegetable intake at baseline was measured by completing a FFQ. The results demonstrated that over an average period of 19 years, there were 888 strokes (including 218 deaths), 1,786 ischaemic heart disease events (639 deaths), 1,145 other CVD deaths, and 2,530 all-case deaths. Consuming fruit and vegetables ≥3 times/day compared with <1 time/day was related to a 27% lower incidence of stroke, 42% lower stroke mortality, 24% lower ischemic heart disease mortality, 27% lower CVD mortality, and a 15% lower all-cause mortality. Overall, the results indicated that there was a strong inverse association between fruit and vegetable consumption and the risk of CVD and all cause mortality (Bazzano, He, Ogden, Loria, Vupputuri, Myers et al., 2002).

A cross-sectional study in Iran aimed to identify whether, and to what extent, the intake of fruit and vegetables is inversely associated with CVD risk factors. A representative sample of 840 adults (361 men and 479 women) aged between 18 to 74 years was randomly recruited to this study. Dietary consumption was assessed by the use of a FFQ. Risk factors for CVD were measured including serum/intake of cholesterol, blood pressure, glucose homeostasis, and body mass index (BMI). The results found that fruit and vegetable intake was inversely associated with CVD risk factors, and it also related to lower concentrations of total and low-density lipoprotein cholesterol (Mirmiran, Noori, Zavareh, & Azizi, 2009).

The Thai dietary guidelines contain some information that is similar to the recommendation for reducing the CVD risk as recommended by the American Heart Association (AHA) (Lichtenstein, Apple, Brands, Carnethon, Daniels, Franch et al., 2006). The AHA 2006 diet and lifestyle recommendations for CVD risk reduction are as follows;

-Balance calorie intake and physical activity to achieve or maintain a healthy body weight

-Consume a diet rich in vegetables and fruit

-Choose whole-grain, high-fibre foods

-Consume fish, especially oily fish, at least twice a week

-Limit your intake of saturated fat to <7% of energy, trans fat to <1% of energy, and cholesterol to <300 mg per day by choosing lean meats and vegetable alternatives; selecting fat-free (skimmed), 1% fat, and dairy products; and minimizing the intake of partially hydrogenated fats.

-Minimise your intake of beverages and foods with added sugars

-Choose and prepare food with little or no salt.

-If you consume alcohol, do so in moderation.

-When you eat food that is prepared outside of the home, follow the AHA diet and lifestyle recommendations.

Source: The American Heart Association, (2006) (Cited in Lichtenstein et al., 2006)

Therefore, it may be concluded that some of the information from the Thai food-based dietary guidelines relates to the lowering of risk of CVD.

2.2 Social cognition models related to eating behaviour

There are several psychological models and theories including the health belief model (HBM), protection motivation theory (PMT), social cognitive theory (SCT), the theory of reasoned action (TRA) and the theory of planned behaviour (TPB) that have been widely used to explain and predict an individual's health behaviour including eating behaviour (Brug & Klepp, 2007; Conner & Norman, 2007). Research studies using one or more of these provide a wide variety of results to help explain eating behaviour and food choice (Åstrøm & Okullo, 2004; Åstrøm & Rise, 2001; Fila & Smith, 2006; Hewitt & Stephens, 2007; Kassem, Lee, Modeste, & Johnston, 2003).In this section, all the key models/ theories are outlined, including

each model's conceptual approach to determining behaviour. Then, a comparison of these models is presented.

Health Belief Model

The HBM is perhaps the oldest psychology model and widely used in health psychology (Conner & Norman, 2007). It was developed initially by Irwin M. Rosenstock in 1966, and further by Becker and colleagues throughout the 1970s and 1980s (Becker, 1974). The HBM was designed to explain and predict preventative health behaviours. The original constructs of the model included perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, while cues to action, and health motivation have been added to the model in an attempt to improve its ability to predict health behaviour (Becker, 1974).

Figure 2.3 Schematic representation of the HMB (Becker, 1974; illustrated by Conner & Norman, 2007)
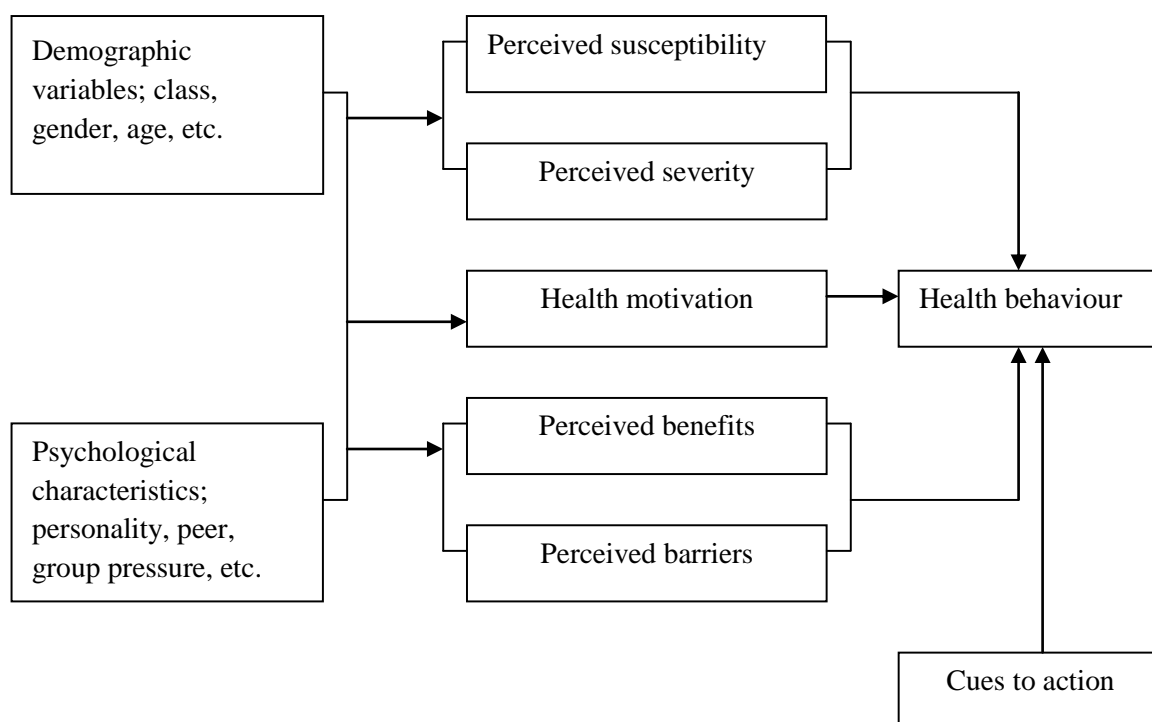
The HBM key principle is that an individual's belief that there is a personal threat to his/her health together with a belief in the effectiveness of the proposed preventative behaviour that will then predict the likelihood of that health behaviour occurring (Becker, 1974). The overall belief in personal threat was constructed as two key beliefs, the perceptions of susceptibility and the severity of the disease. The belief in effectiveness of the behaviour consisted of two distinct set of beliefs, perceived benefits and perceived barriers regarding that health behaviour (Becker, 1974). Demographic variables (e.g. gender, age, ethnicity, and occupation) and psychological characteristics (e.g. personality, and peer group) have an influence in the model on individuals' perception of their core beliefs (Becker, 1974). Cues to action and health motivation have been added to include other factors that explain behaviour (Becker, 1974). Cues to action refer to triggers including individual perception of symptoms, social influence, and social campaigns (Becker, 1974). Health motivation refers to a readiness to be concerned about health in general (Becker, 1974).

The HBM has been applied to the prediction of a broad range of health behaviours including condom use (Laraque, Mclean, Brown-Peterside, Ashton et al., 1997), breast self-examination (Umeh, & Rogan-Gibson, 2001), bicycle helmet use (Lajunen & Räsänen, 2004) dental patients' brushing and flossing (Buglar, White, & Robinson, 2010), and healthy eating (Deshpande, Basil, & Basil, 2009). Laraque and colleagues found that the strongest predictor of consistent condom use were partner preference for condoms, perceived benefit of avoidance of pregnancy, and support for birth control. The results from Lajunen and Räsänen also indicated that the perceived barriers and cues to action components were the strongest predictor of bicycle helmet use among adolescents. The findings of the study by Deshpande and colleagues (2009) showed that Canadian university students' healthy eating was influenced by barriers, rather than benefits. Specially, barriers had a strong influence on efficacy. The results from these studies generally support the use of the HBM to predict health behaviour. However, the review of the HBM by Sheeran and Abraham (1996) showed that although, overall some variables (susceptibility, severity, benefits, and barriers) were significant predictors of behaviour, their effect was small. The model has been developed specifically to predict health behaviour, including breast self-examination, cervical cancer screening, and condom use

(Norman & Conner, 2007), and its use may be limited in the prediction of behaviour which is not simply health behaviour such as dietary behaviour. Eating behaviour is complex and influenced by many factors including, taste of food, time availability, perceived benefits of eating behaviour, as well as social influences such as parents, and peers (Neumark-Sztainer et al., 1999). While social and environmental influences have been identified as major predictors of dietary behaviours (Giskes et al., 2005; McGee et al., 2008; Neumark-Sztainer et al., 1999), it seems to be that social and environmental variables have not been included in the HBM (Becker, 1974). However, demographic background (e.g. gender, age, class) and psychosocial characteristics (e.g. personality, peer group pressure) included in this model can help to explain dietary behaviour as social factors. The absence of environmental factors may still be a weakness in this model in relation to dietary behaviour because dietary behaviours are influenced by environmental factors (e.g. the number of shops and restaurants, opening times, food availability). Within each society, whether western or Thai, there is a specific environment that influences the individual's dietary consumption.

Protection Motivation Theory

PMT was originally created by Rogers in 1975 to provide conceptual clarity to the understanding of fear appeals that may influence attitude and behaviour (Roger, 1983). It has been widely used to study related health behaviour in two forms. Firstly, PMT has been used as a framework to develop and evaluate persuasive communication campaigns. Secondly, the PMT has been used as a social cognition model to predict health behaviour (Conner & Norman, 2007).

Figure 2.4 Schematic representation of the PMT (Roger, 1983; illustrated by Conner & Norman, 2007)
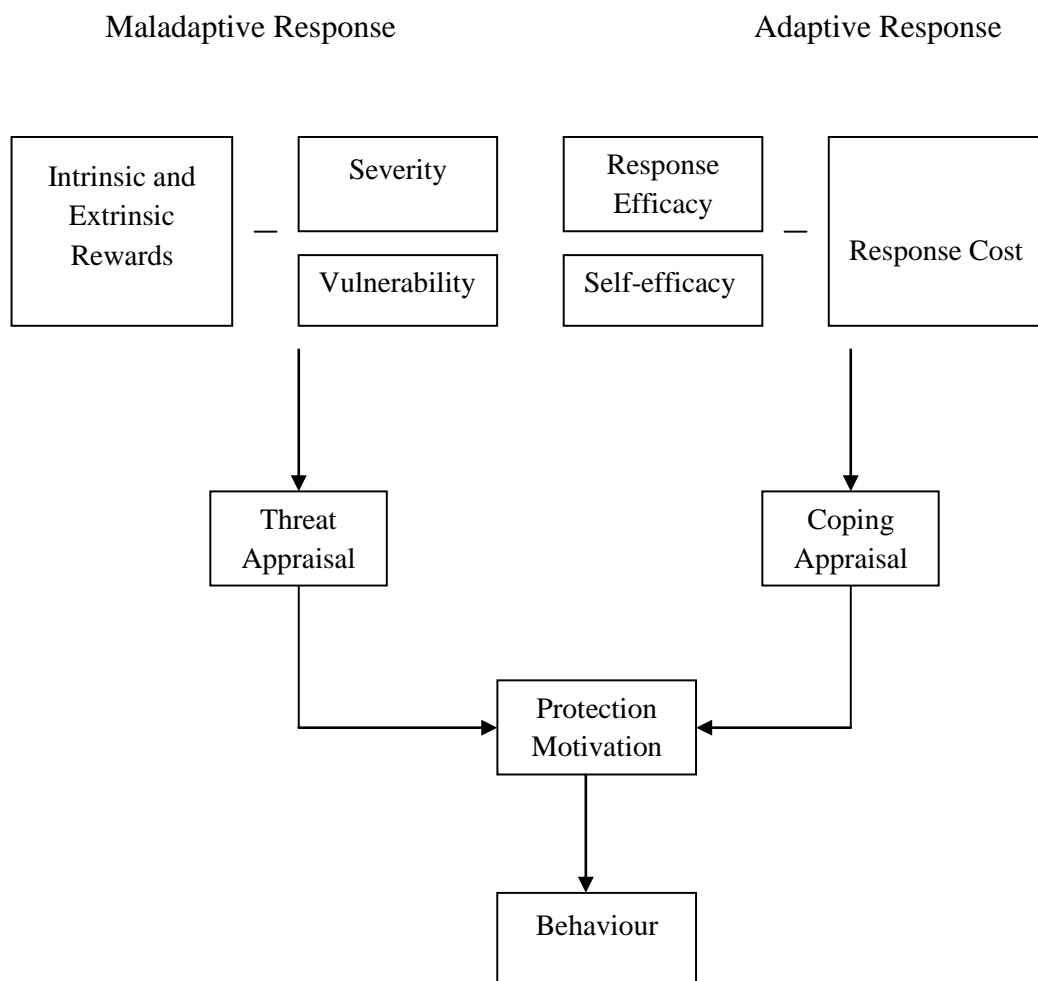
The PMT proposes that an individuals' intention to engage in health behaviour, or protection motivation , results from the two appraisal processes; threat appraisal which includes perceived severity, perceived vulnerability and perceived rewards associated with maladaptive behaviour; and coping appraisal which includes self-efficacy, response efficacy, and attitudes towards the potential cost associated with performing adaptive behaviour (Roger, 1983). The protection motivation is a positive function of individuals' perceptions of severity, vulnerability, response efficacy, and self-efficacy, while it also includes a negative function of individuals' perceptions of rewards associated with maladaptive processes and response costs of adaptive behaviour (Roger, 1983).

This model has been developed specifically to predict health behaviour (Roger, 1983). For example, the PMT was used to predict aerobic exercise among Canadian adults with type 2 diabetes mellitus (Plotnikoff, Trinh, Courneya, Karunamuni et al., 2009) and safe sun exposure of UK university students (Grunfeld, 2004). Plotnukoff and Colleagues (2009) found that the PMT accounted for 43% ($p<.001$) and 56% ($p<.001$) of variance respectively for aerobic exercise and resistance training intentions. Grunfeld (2004) found that the threat appraisal construct of the PMT was a stronger predictor of intention to perform safe sun exposure behaviour, and explained 15% of variance while the coping appraisal construct, explained 3% of variance. Overall, it seems that the PMT has been moderately successful in predicting health-protective behaviour. Studies on the PMT have been the subject of narrative reviews and these have summarised that coping appraisal, especially self-efficacy, provided the strongest predictor of protection motivation and behaviour (Conner & Norman, 2007; Floyd, Prentice-Dunn, & Roger, 2000). The PMT includes many of the key social cognitive determinants of health behaviour, and its variables are shared with other social cognition models. For example, the HBM includes perceived vulnerability and severity, as well as the perceived benefits of, and barrier to performing a health behaviour which are similar to the response efficacy and response costs components of the PMT. The PMT also includes protection motivation (e.g. the intention component in the TPB) and self-efficacy which have been found to be among the most powerful predictors of health behaviour (Becker, 1974, Conner & Norman, 2007, Roger, 1983). However, Ogden (2007; p 29) stated that "the PMT assumes that individuals are conscious information processors; it does not account for habitual behaviour, nor does it include a role for social and environmental factors". As social and environmental factors are major predictors of dietary consumption (Giskes et al., 2005; McGee et al., 2008; Neumark-Sztainer et al., 1999), the PMT could not be applied as a conceptual framework to a study about dietary behaviour.

Social Cognition Theory

The original social cognition theory (SCT) was developed by Bandura in1977, and further revised in 1986 (Bandura, 2000). The SCT provides a framework for explaining, predicting and changing behaviour. It proposes individual behaviour as an interrelationship between behaviour, person factors, and environmental factors.

Figure 2.5 Schematic representation of the SCT (Bandura, 2000; illustrated by Conner & Norman, 2007)
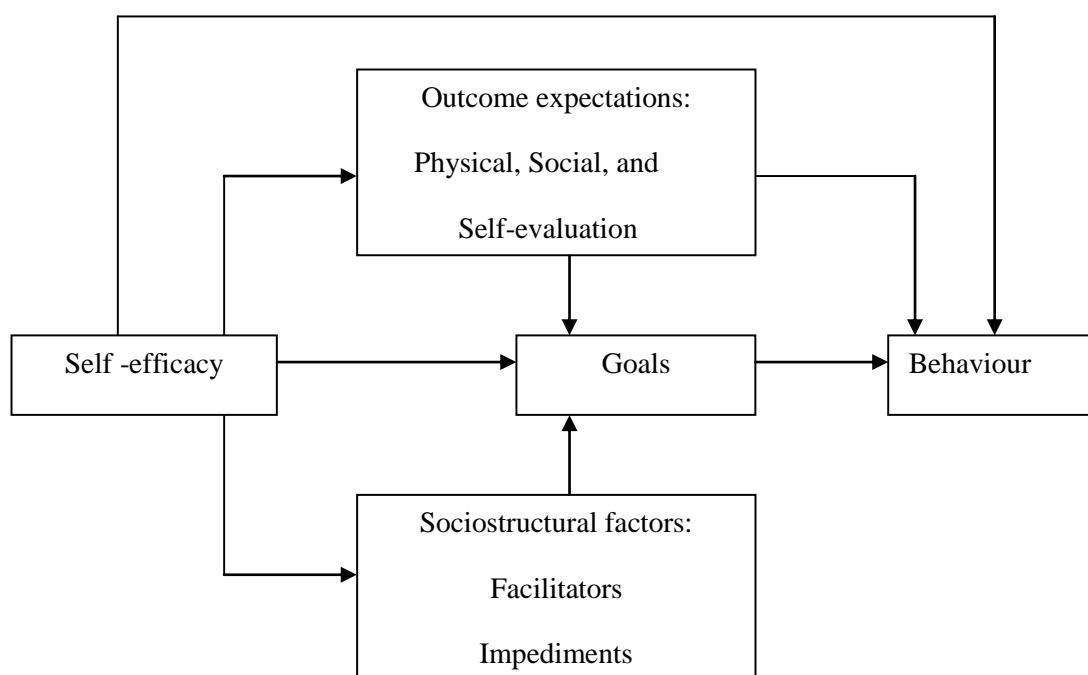
According to the SCT, there are a number of important factors that influence behaviour. Self-efficacy (confidence in own ability to successfully engage in a behaviour) is considered as the most important prerequisite for behaviour change. Outcome expectancies are the other major component of SCT which are concerned with individuals' belief about possible consequences of their actions. Positive and negative outcome expectancies encourage the decision to change one's behaviour. Beside these two constructs, SCT also includes goals or intentions and socio structural factors. Goals or intention are seen as direct and sometimes sufficient predictor of behaviours. Socio structural factors refer to social barriers and facilitators that influence target behaviour (Bandura, 2000).

The SCT has been applied to a wide range of health behaviours such as condom use (Dilorio, Dudley, Kelly, Soet et al., 2001), exercise (Rovniak, Anderson, Winett, & Stephens, 2002), smoking (Van Zundert, Nijhof, & Engels, 2009) and dietary behaviour (Reynold, Hinton, Shewchuk, &Hickey (2009). Reynold and colleagues

found that school childrens' fruit and vegetable consumption was influenced by its availability and their motivation (i.e., self-efficacy, outcome expectancies, food preference). Van and colleagues also found that a strong endorsement of the advantages of smoking, low self-efficacy to quit, and baseline smoking status significantly predicted relapse within 3 weeks after giving up smoking. Overall, the results of the studies based on the SCT found that self-efficacy was the most powerful factor in predicting the process of behaviour change, including dietary behaviour. SCT also shares some components (outcome expectations and socio-structural factors including facilitators and impediments) with other social cognition models such as the HBM, PMT, and the TPB that have an influence on behaviour. Socio-structure factors refer to facilitators (help) and impediments (hinder) that are present in living conditions, health systems, economic and the environmental system (Bandura, 1997). These factors were mentioned as an important factors influencing adolescents' dietary consumption, particularly in a western study (Shepherd, Harden, Rees, Brunton, Garcia, Oliver & Oakley, 2006). Therefore, the models that include socio-structural variables may be appropriate for the study of adolescents' eating behaviour in a Thai context. However, one of the limitations of the SCT, is that it minimises emotional response (Conner & Norman, 2007), and some behaviours are the result of an emotional response such as eating behaviour (Neumark-Sztainer, 1999).

Theory of Reasoned Action

The theory of reasoned action was originally developed in order to explain the relationship between attitude and behaviour by Fishbein and Ajzen (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), then was further refined and is currently known as the TRA. It is composed of three components: attitude towards behaviour, subjective norm regarding behaviour, and behavioural intention.

Figure 2.6 Schematic representation of the TRA (Ajzen & Fishbein, 1980)
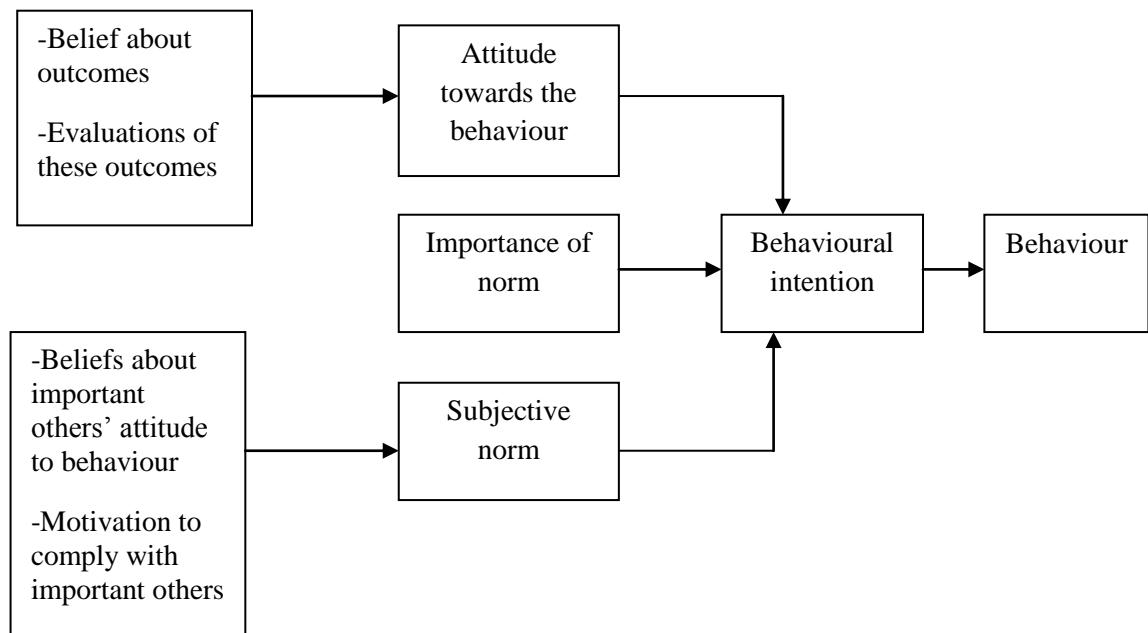
The TRA emphasized a central role for social cognitions in term of subjective norm or social expectation and included both beliefs and evaluations of these beliefs (attitude) (Fishbein & Ajzen, 1975). This theory illustrates that behaviour is influenced by behavioural intention, whilst intention is directly driven by attitude and subjective norm. In addition, Fishbein and Ajzen generally argued that most behaviour of social relevance is under volitional control that is individuals perform behaviours because they decide to perform them (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

The TRA has been applied to behaviour including smoking (Guo et al., 2007), online grocery buying (Hansen et al., 2004), and dietary consumption (McCarthy, O'Reilly, Cotter, & Boer; Verlegh & Candel, 1999). This study aimed to examine factors influencing the consumption of pork and poultry in the Irish market by McCarthy and colleagues, and found that intention to consume pork and poultry was influenced by both attitude towards poultry and pork consumption, and the subjective norm regarding poultry and pork consumption, but attitude was the stronger determinant. Verlegh and Candel (1999) examined the consumption of convenience foods in five different eating situations ("dinner on weekdays", "dinner at weekends", "dinner

alone", "dinner with family", and "dinner with friends"), and found that both attitude and subjective norm were predictors of intention to consume convenience food. Subjective norm was the stronger influence of intention than attitude in all the situations. However, one of the main limitations of the TRA is that it focuses on behaviour under volitional control (Ajzen, 1991, Conner & Norman, 2007). However, some behaviours are not completely under personal control, although the individual has an intention to perform the behaviour. For example, the results of the study aimed to examine soft drink consumption by Kassem and colleagues (2003) found that the PBC (external factors) was a predictor of adolescents' soft drink consumption. Since behaviours that are not completely under volitional control are also affected by an individual's perception of his or her ability to perform the behaviour, Ajzen extended the TRA by adding the PBC as an additional predictor of behavioural intentions and behaviour and named it the TPB (Ajzen, 1991). A comparison of studies comparing the utility of the TRA and the TPB to the prediction of behaviour found that the TPB was superior to the TRA (Guo et al., 2007, Haasen, 2004).

Theory of Planned Behaviour

The TPB is an extension of the TRA, which was proposed by Martin Fishbein together with Icek Ajzen in 1975 (Ajzen, 1991).

Figure 2.7 Schematic representation of the TPB (Ajzen, 2006)
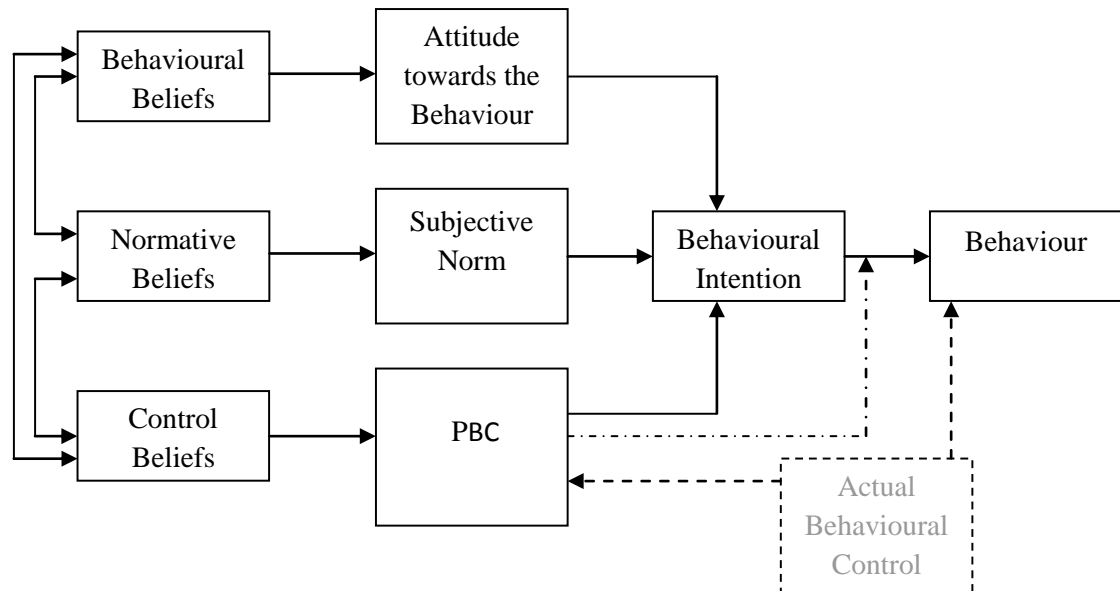
As in the TRA, a central factor is the individual's intention to perform a given behaviour. One's intention to perform a given behaviour is influenced by one's attitude towards the behaviour and subjective norm (Fishbein & Ajzen, 1975). The TRA is typically applied to predict individual's volitional behaviour or intention to perform behaviour (Ajzen, 1991; Ajzen & Fishbein, 1980). However, most behaviour is not under complete volitional control, and there are many factors outside an individual's control. Therefore, the PBC or control over performance of the behaviour was added as an additional predictor of behaviour not under volitional control (Ajzen, 1991).

The TPB has been applied to a wide range of behaviour such as dietary behaviour (Backman, 2002; Blanchard et al., 2009; Pawlak &Malinauskas, 2008), smoking (Guo et al., 2007), online grocery buying (Hansen et al., 2004), and cycle helmet use (Lajunen & Räsänen, 2004). A study by Backman et al. (2002) found that

adolescents' healthy dietary behaviour was predicted by intention. Intention was most influenced by attitude and then PBC and subjective norm. Blanchard et al. (2009) found that the fruit and vegetable intake of college students in the southern United States was predicted by intention, and intention was predicted by attitude and PBC. A study that aimed to identify the predictors of intention to eat 2.5 cups of vegetable among ninth-grade students attending public high school in Eastern North Carolina, USA by Pawlak and Malinauskas (2008) found that intention to eat 2.5 cups of vegetables was predicted by attitude, subjective norm, and PBC, explaining 77.2% of the variance. Attitude was the strongest predictor, followed by subjective norm and PBC. These studies found that the components of the TPB were very useful in explaining behavioural intention and behaviours to a wide range of results. This may depend on the behaviour examined and the populations included in the studies. The TPB shares some components (attitude; perceived advantages and disadvantages outcomes of behaviour, behaviour intention, and PBC; factors that facilitate or impede behaviour) with the HBM (perceived benefits of performing behaviour, and health motivation), and the SCT (outcome expectations, and socio-structural factors; facilitators and barriers to performing behaviour. Ogden critiqued that in contrast to the HBM and the PMT, the TPB attempts to address the problem of social and environmental factors (Ogden, 2007). Subjective norm was highlighted as a part of social factors that could influence adolescents' behaviour, including dietary consumption. Most western studies (Backman et al., 2002; Hewitt & Stephens, 2007) and a Thai study (Sangperm et al., 2008) reported that the subjective norm (mother, peer pressure) were reported as factors influencing eating behaviour. Therefore, models that include subjective norm should be applied to the study of eating behaviour in the Thai context. The TPB has limitations in that it is a cognitive model, and it may overlook emotions that influence eating behaviour (Neumark-Sztainer, 1999).

The evaluation of the models

All the social cognition models described earlier in this chapter share a similar construct, and they have been used and applied in studies that examine eating behaviour among a wide range of populations. No consensus exists regarding which is the best model for studying eating behaviour, and so a comparison of those models will be presented in this section.

One of the identified problems with both the health belief model and the protection motivation theory is that they assume that the behaviour under consideration is a purely health behaviour (Thirlaway & Upton, 2009). While behaviours like vaccination, breast self-examination and cervical screening could be argued to be behaviours carried out solely for health reasons (Thirlaway & Upton, 2009), behaviours such as eating have both health and non-health functions. For example, eating behaviour is undertaken for psychological and social reasons and is also influenced by food preference, availability of food, and benefits of food (Backman, Haddad, Lee, Johnton, & Hodgkin, 2002; Bissonnette & Contento, 2001; Fila & Smith, 2006; Hewitt & Stephens, 2007; Kassem et al., 2003). Therefore, a more general theory such as the SCT, TRA or the TPB may be more useful to help examine eating behaviour.

In addition, aspects of the TPB are conceptually similar to both the HBM and the PMT, but subjective norm can be considered unique to the TPB (Ajzen, 1991; Becker & Maiman, 1983; Roger, 1983; Thirlaway & Upton, 2009). According to a review of the TPB's application to eating behaviour in adolescents (Armitage & Conner, 2001), subjective norm was indicated as an important component that influenced eating behaviour of adolescents. For example, a study by Fila and Smith (2006) on healthy eating behaviour in urban Native American youths showed that the subjective norm was the best predictor of healthy eating in boys, and a study by Backman and colleagues (2002) indicated that mothers, brothers, sisters, and friends were identified as important predictors of the subjective norm of healthy dietary behaviour in adolescents. A study conducted with urban Thai adolescents in relation to predicting healthy eating behaviour also indicated that subjective norm was the only significant predictor in girls and boys (Sangperm, 2008).

Thai society is characterized by a hierarchical tradition in which Thai people occupy differently ranked social positions. Thai children are taught to respect older people and those who have a higher status than them such as parents, older relatives, and teachers and their advisers (Choowattanakorn, 1999). Therefore, although adolescence is a time of growing independence in many ways, Thai adolescents are still under the supervision of their parents and older relatives such as grandparents, aunts and uncles. Thai adolescents' eating behaviour may also be under the supervision of their parents, older relatives, and teachers. Therefore, a model that

includes subjective norm such as the SCT, TRA, and TPB is more appropriate for a study examining eating behaviour in Thai adolescents.

Some studies that compared the TPB and HBM on the prediction of behaviour also indicated that the TPB model showed a good fit with the data, whereas the fit of the HBM model was poor (Lajunen & Räsänen, 2004, Şimşekoĝlu & Lajunen, 2008).

In comparison with the TRA, the TPB is superior as according to the results of a study by Guo and colleagues (2007), the TPB can explain a greater proportion of the variation in smoking behaviour. This is consistent with findings from a study by Hansen and colleagues in relation to predicting online grocery buying intention (2004). Madden and colleagues (1992) hypothesized that the magnitude of differences between the TPB and the TRA depended upon the degree to which PBC affected the target behaviour. For behaviour under personal control, the differences between the TRA and the TPB were small. However, for behaviours that were not completely under volitional control, the TPB was significantly better than the TRA in predicting behaviour with its addition of the PBC.

Therefore, it seems to be that the TPB is more appropriate for the theoretical framework underpinning the planned study. The TRA examines behaviour that is under personal control, however eating behaviour is complex and may not be under complete voluntary control. Eating behaviour is influenced by many factors including personal (e.g. food preference, attitude etc.), and environmental factors (food availability, food accessibility) Therefore, although s/he intends to eat a healthy diet, sometimes s/he may not perform the behaviour. In addition, many studies indicated that the PBC, the new component added to the TPB, significantly predicted food choice and eating behaviour in children, adolescents, and young adults (Åstrøm & Okullo, 2004; Åstrøm & Rise, 2001; Hewitt & Stephens, 2007; Kassem et al., 2003).

The SCT includes all the components of the previous models, but self-efficacy is considered the most important prerequisite for behaviour change in this model. The SCT also has been applied to the study of health behaviour with a wide variety of results, and showed that self-efficacy seemed to be the best predictor in this model. However some studies found weak associations between components of the SCT and eating behaviour, and there is little evidence of association in studies examining

eating behaviour and self-efficacy. For example, a study examining fruit and vegetable intake by Resnicow and colleagues (1997) found that the fruit and vegetable intake of 1,398 children aged 7-11 years old was associated with preference and positive outcome expectations only, accounting for approximately 10-11% of the variance. The researchers also suggested that models incorporating factors be required to more fully explain children's eating behaviour.

Additionally, several studies have shown that the TPB successfully predicted food choice intentions and healthy dietary behaviour among adolescents (Åstrøm & Okullo, 2004; Backman et al., 2002; Fila & Smith, 2006; Wong & Mullan, 2009). There are also no studies regarding Thai adolescents' eating behaviour using all the constructs of the TPB, therefore the theory of planned behaviour was selected to be the theoretical framework in the quantitative phase of this study.

2.3 Theory of Planned Behaviour and the studies focusing on factors influencing adolescents' eating behaviour based on the TPB

One conceptual framework that has been successfully applied to health behaviour is the TPB (Conner & Norman, 2007). This model has proved useful in predicting and exploring a wide variety of different behaviours, several of which are food-related (Conner & Norman, 2007; Ogden, 2010; Thirlaway & Upton, 2009). There are 12 studies that have examined food-related behaviours in adolescents including healthy eating behaviour, food choice, fruit and vegetable consumption, fish consumption, and soft drink consumption (Backman et al., 2002; Conner & Norman, 2007; Fila & Smith, 2006; Kassem et al, 2003). The majority of them have a cross sectional design, and use self-report questionnaires to assess dietary consumption and the components of the TPB. An important element for promoting eating behaviour is applying the theoretical models that can explain the multiple factors that may affect eating behaviour (e.g. cognitive, and social).

Description of the model

The TPB is a theoretical framework used to identify predictors of behaviour of interest. The TPB proposes that behaviour is determined by the individual's intention to perform the behaviour and perceptions of control over the performance of the behaviour (Ajzen, 1991, 2006). Intention to perform behaviour, in turn, is influenced by three major components which include attitude towards the behaviour, subjective norm (social pressure), and PBC (Ajzen, 1991, 2006). Attitudes are determined by beliefs about the likely positive or negative outcomes of the behaviour and their importance (behavioural beliefs) (Ajzen, 1991, 2006). Subjective norms are determined by the social pressure perceived by individual to perform or not perform behaviour and individual's motivation to comply (normative beliefs) (Ajzen, 1991, 2006). The PBC is determined by control beliefs that can facilitate or impede performance of behaviour such as internal (e.g. skills, abilities, information) and external (e.g. obstacles, opportunities), and perception of the ease or difficulty of performing behaviour (Ajzen, 1991, 2006; Conner & Armitage, 1998). While attitude, subjective norm, and perceived behavioural control can have direct influence on behavioural intention, both behavioural intention and perceived behavioural control have direct influence on behaviour as described by Figure 2.7 (Ajzen, 1991, 2006). Therefore, people will intend to perform behaviour when they have a positive attitude towards the behaviour, perceive social pressure to perform the behaviour, and perceive it to be under their own control (Ajzen, 1991).

The TPB was used to identify factors influencing Thai adolescents' eating behaviour as the theoretical framework in the quantitative part of this study. Therefore, the literature related to factors influencing dietary consumption of adolescents based on the TPB was reviewed as follows.

Studies regarding factors influencing adolescents' dietary consumption based on the TPB

An electronic search of the literature was undertaken in order to identify and analyse the results of the studies that have examined factors influencing adolescents' dietary behaviour. This search included the electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, MEDLINE, PsycINFO, and the Cochrane Library (Appendix A). Key search terms used in combination

included "adolescent", "teen", "teenager", "youth", "young", "young people", "healthy eating", "eating behaviour", "eating behavior", "food consumption", "food intake", "nutrition", "diet", "the theory of planned behaviour", and "the theory of planned behavior". The search was completed in 2009, and limited to English-language full text articles published between 1991 (the TPB was developed in this year) and 2009 to capture the most recent studies of factors influencing adolescents' dietary consumption.

Table 2.2 Selection criteria for reviewed articles

Inclusion criteria	Exclusion criteria
-English language	-Comment, editorial
-Published between 1991 to 2009	-Adolescent groups; with CVD/
-Full-text availability	hypertension
-Quantitative (e.g. cross-sectional and longitudinal study) and qualitative (e.g. focus groups, interviews) studies with focus on factors influencing adolescents' dietary consumption based on all component of the TPB.	
-Adolescents aged between 13 to 18 years	

There was an initial search using these criteria for research undertaken in Thailand and South East Asia, but there were no articles related to factors influencing adolescents' dietary consumption based on the TPB. Therefore, the search was expanded to Europe and the world.

The key word search initially identified a total of 94 citations. After these publications were initially screened, 13 of them were duplicates, and 53 did not focus on dietary consumption. In the second round of the screening that included 28 articles, although 24 of them were related to dietary consumption, they were not focused on factors influencing dietary consumption based on all the TPB components. The remaining 4 were the studies that were based on factors influencing dietary consumptions and used the TPB as the theoretical framework. However, 1 of

the studies was not conducted in adolescents. Therefore, only 3 articles were included in the literature review.

Following this, the grey literature, and books were searched and relevant electronic sources such as journals and Google Scholar were also included. Each relevant article or document was reviewed including studies conducted in South East Asia. A search of the reference lists of the initially included articles and any other relevant articles from key journals (such as Journal of Nutrition Education and Behaviour, Health Psychology, International Journal of Behavioural Nutrition and Physical Activity, Psychology, Health & Medicine, Journal of Behavioural Medicine, Appetite, and Public Health Nutrition, and Asia Pacific Journal of Clinical Nutrition), text books, and theses related to health and nutrition was also conducted.

The search identified a further 8 studies that focused on factors influencing adolescents' dietary behaviour. This included 1 from the grey literature which was undertaken in Thailand (Sangperm, Phuphaibul, Tilokskulchai, Vorapongsathon, & Stein, 2008). Therefore in total 12 studies were included in the literature review. Of these, 1examined factors influencing fruit and vegetable consumption (Blanchard, Fisher, Sparling, Shanks, Nehl, Rhodes et al., 2009), 1 examined factors influencing vegetable intake only (Pawlak & Malinauskas, 2008), 5 examined factors influencing adolescents' healthy eating (Backman et al., 2002; Fila & Smith, 2006; Hewitt & Stephens, 2007; Pawlak, Malinauskas & Rivera, 2009; Sangperm et al., 2008), 1 examined factors regarding soft drink and snack consumption (Horst et. al., 2008). 2 examined factors influencing regular soda (soft drink) consumption (Kassem et al., 2003; Kassem & Lee, 2004), 1 examined factors influencing fish consumption (Prell et al., 2002), and 1examined factors influencing breakfast consumption (Berg et al., 2000). The search results were summarised as follows.

Figure 2.8 Number of articles retrieved in the literature search

Search results

Key words: "adolescent", "teen", "teenager", "youth", "young", "young people", "healthy eating", "eating behaviour", "eating behavior", "food consumption", "food intake", "nutrition", "diet", "theory of planned behaviour", and "theory of planned behavior"

Limit: Full-text; publication year from: 1991-2009; Age group: Adolescence, 13-18 years; Special Interest: Nutrition

Results:

Cochrane Library: n=23	**CINAHL (EbscoH): n=10**	**EMBASE (Ovid): n=6**
Medline (PubMed): n=21	**PsycINFO (COLC): n=34**	**Total=94 citations**

Reason for exclusion

-Duplication (n=13)

-No focus on eating behaviour (n=53)

Apply criteria to title and abstract

n= 28

Reason for exclusion

-Not based on the TPB components (n=16)

-Not focusing on factors influencing adolescents' dietary consumption (n=8)

Apply criteria to title and abstract

n= 4

Reason for exclusion

-Not conducted in adolescents groups (n=1)

Apply criteria to title and abstract

n= 3

Added to review via search from other relevant sources

n=9

Total included for review

n=12

Table 2.3 Summary of the 12 studies related to the TPB and adolescents' food consumption

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Blanchard et al. (2009), USA	Prospective design	511 college students with a mean age of 19.8 years attending fitness and health classes at 2 universities in the southern United States	-Participants were asked to complete a baseline TPB 5-A-Day questionnaire and fruit and vegetable consumption measure 1 week later. -Fruit and vegetable consumption were assessed by 6 open-ended scales. The 6 items were drink fruit juice, eat fruit, green salad, potato, carrots, and other vegetables.	Intention to eat fruit and vegetables were predicted by attitude (β=.16, p<.05), and PBC (β=.59, p<.05). Intention was a significant predictor of fruit and vegetable consumption (β=.32, p<.05).	-The used of self-administered questionnaire to assess food intake is well-known source of potential bias because of the false reporting or inability of some participants to describe their fruit and vegetable consumption accurately. -The generalisation of the findings may be limited to adolescents attending 2 universities in the southern United States.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Pawlak, Malinauskas, & Rivera (2009), USA	Cross-sectional study	108 undergraduate baseball players who participated during the spring 2006 league season from 5 of the Northern Division teams of the Coastal Plain League	Baseball players were asked to complete questionnaire designed to measure the components of the TPB.	Intention to eat a healthy diet was predicted by attitude (β=.383, p<.001), subjective norm (β=.291, p<.001) and PBC (β=.269, p<.05), together explaining 70% of the variance in behavioural intention to eat a healthy diet.	-This study was limited by its cross-sectional design that did not allow the determination of causal effects. -The findings were based on a convenience sample of student athletes. -The small size may limit the generalisation.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Horst et al. (2008), Australia	Cross-sectional study	1,293 adolescents aged 12-15 years from secondary schools	-Participants were asked to complete self- administered questionnaire designed to measure the constructs of the TPB. -Soft drink and snack consumption were assessed with self-administered questionnaire.	Adolescents' attitudes, subjective norm, parental and peer modelling, and intention were positively associated with soft drink and snack consumption. Inverse association was found between the distance to the nearest store and the number of small food stores with soft drink consumption.	-This study was limited by its cross-sectional design. -The used of self-administered questionnaire to assess food intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Pawlak & Malinauskas (2008), USA	Cross-sectional study	157 students with a mean age of 14.71 years attending grade 9 in public high schools, from 2 counties in North Carolina, USA	Self- administered questionnaire designed to measure the constructs of the TPB were completed by the students.	Vegetable intention was predicted by attitude (β=.434, p<.001), Subjective norm (β=.372, p<.001), and PBC (β=.159, p<.021).	-This study was limited by its cross-sectional design. -The findings was based on a convenience sample of students that may not be representative of all students attending in grade 9 in public high school , from 2 counties in North Carolina, USA. -The used of self-administered questionnaire to assess food intake in source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Sangperm et al. (2008), Thailand	Prospective design	191 Thai adolescents attending 7th, 8th, and 9th grade in public high school in Bangkok.	-Participants were asked to complete self- administered questionnaire designed to measure components of the TPB except PBC, as well as, two additional constructs, and self-schema. -Participants were asked to record the food and beverages that they consumed each day on two weekdays and one day at the weekend.	Subjective norm was only predictor of healthy eating intention in both boys and girls. Healthy eating intention was predicted by attitude in girls, while healthy eating intention was predicted by self-schema in boys.	-Generalisation of the study may be limited by the sample size of the population.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Hewitt & Stephens (2007), New Zealand	Cross-sectional study	261 children aged 10-13 years, and their parents or caregivers	-Self- administered questionnaire designed to measure the constructs of the TPB were completed by the children. Parents and caregivers were asked to complete self-reported questionnaire designed to measure child-feeding practices. -Self-report measure of behaviour was used to identify the children's eating behaviour in relation to five groups-fruit, vegetables, treat foods, fizzy drinks, and takeaways.	Children' healthy eating intention was predicted by their reported behavioural beliefs, attitude, subjective norm, and PBC. Children's self-reported dietary behaviours were predicted by intention, explaining 39% of variance in children's eating pattern. However parental influence did not increase the model's explanatory power.	-This study was limited by its cross-sectional design. -The used of self-administered questionnaire to assess food intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Fila & Smith (2006), USA	Cross-sectional study	139 urban Native American boys and girls in Minnesota	-Participants were asked to complete self- administered questionnaire designed to measure components of the TPB, as well as, two additional constructs, barriers and self-efficacy. - Healthy and unhealthy behaviour were assessed with self-administered questionnaire.	There was no association between intention and adolescents' healthy eating behaviour. The strongest barriers to healthy eating behaviour were the availability and taste of food. Girls' eating behaviour was most predicted by barriers, boys' eating behaviour was most predicted by norm.	-This study was limited by its cross-sectional design. -The small size may limit the generalisation of the finding. -The used of self-administered questionnaire to assess food intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Kassem & Lee (2004), USA	Cross-sectional study	564 male adolescents, aged 13-18 years, attending North Los Angeles County public high school	-Participants were asked to complete a group-administered questionnaire design to measure the construct of the TPB. -Soft drink consumption was assessed by self-reported questionnaire.	Attitude, PBC, and subjective norm were predictors of intention to drink regular soda and together explained 61% of its variance.	-Generalisation of the study may be limited by the sample size of study population. - The used of self-administered questionnaire to assess dietary intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Kassem et al. (2003), USA	Cross-sectional study	707 female adolescents, aged 13-18 years, attending North Los Angeles County public high school	Participants were asked to complete a group-administered questionnaire design to measure the construct of the TPB. -Soft drink consumption was assessed by self-reported questionnaire.	Attitude, PBC, and subjective norm were predictors of intention to drink regular soda and together explained 64% of its variance. The greatest predictor was attitude, followed by PBC, and subjective norm.	-Generalisation of the study may be limited by the sample size of study population. - The used of self-administered questionnaire to assess dietary intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Backman et al. (2002), USA	Longitudinal study	780 adolescents, aged 14-19 years, recruited from 4 public high schools in California's San Bernardino City Unified School District.	-Participants were asked to complete the initial self-report questionnaires designed to measure the components of the TPB. -FFQ was used to measure healthy dietary, and it was assessed again 1 month later.	Healthy dietary behaviour of adolescents was predicted by intention to eat a healthful diet. Intention was predicted most by attitude, and then by PBC and subjective norm.	-The generalisation of the findings may be limited to adolescents attending high school in San Bernardino, California, USA. -The used of self-administered questionnaire to assess food intake is source of potential bias.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Prell, Berg, & Jonsson (2002), Sweden	Cross-sectional study	162 students, aged approximately 14 years, attending the 8th grade from school located in the Göteborg area.	-Participants were asked to complete self- administered questionnaire designed to measure to component of the TPB. -Participants' fish consumption (actual behaviour) was also assessed by observation.	Intention to eat fish was predicted by attitude, friend's behaviour, and perceived control, and intention and perceived control were predictors of fish consumption. Negative attitude towards both fear of finding bones, their smell and the accompaniments were barriers to fish consumption.	- The actual behaviour (consumption of fish) was measured by observation 4 times.

Table 2.3 continued

Reference	Design	Study subjects and setting	Data collection	Key findings	Comments
Berg et al. (2000), Sweden	Longitudinal study	1,730 students, aged 11-15 year, attending 5th, 7th, 9th grades in Mölndal, Sweden.	-Participants were asked to complete self- administered questionnaire designed to measure to component of the TPB. -Participants were asked to complete a 7-day record of food consumed for breakfast.	Consumption of milk and high fibre bread was predicted by intention, and milk also by PBC. Intention was predicted by attitudes, perceptions of significant others' preferences, and perceived control.	-Participants' actual behaviours (milk and bread consumption) were measured by asking participant to fill in a 7-day record of food consumed for breakfast.

As indicated in Table 2.3, 7 of the 12 studies were conducted in the USA. The others were conducted in Sweden, Australia, and New Zealand. Only one study by Sangperm and colleagues (2008) was conducted in South East Asia (Thailand). There were only 2 longitudinal studies and the other studies used a cross-sectional study design, using a questionnaire to measure the TPB components.

In the next section, the 12 studies (Backman et al., 2002; Berg et al., 2000; Blanchard, Fisher, Sparling, Shanks, Nehl, Rhodes et al., 2009; Fila & Smith, 2006; Hewitt & Stephens, 2007; Horst et al., 2008; Kassem & Lee, 2004; Kassem et al., 2003; Pawlak& Malinauskas, 2008; Pawlak, Malinauskas & Rivera, 2009; Prell et al., 2002; Sangperm, Phuphaibul, Tilokskulchai, Vorapongsathon, & Stein, 2008) will be discussed based on the five constructs of the TPB model as follows.

Intention towards dietary behaviour

According to the TPB, the construct of intention is central to the TPB, and behavioural intention is defined as a plan to perform the behaviour of interest or the predictor of behaviour. In turn, behavioural intention is determined by attitude towards behaviour, subjective norm, and PBC over the behaviour (Ajzen, 1991). Behavioural intention is considered the most important direct predictor of behaviour. "Intentions are assumed to capture the motivational factors that influence a behaviour and they are indicators of how hard people are willing to try, of how much effort they are planning to exert, in order to perform a behaviour" (Ajzen, 1991; p.181). As a general rule, the stronger the intention to perform behaviour, the more likely it is to be performed (Ajzen, 1991).

A number of studies have revealed the association between intention and eating behaviour, but there has been variation in their results. For example, a longitudinal study by Backman et al. (2002) indicated that healthy dietary behaviour was predicted by intention in adolescents, and it explained 17% of the variance in healthy dietary behaviour , whereas healthy eating behaviour as assessed by a questionnaire (FFQ) was not influenced by the PBC. In addition, a cross-sectional study by Hewitt and Stephens (2007) conducted among Americans adolescents indicated that intention to eat a healthy diet of had a positive correlation with healthy eating behaviour, explaining 39% of the variance. Furthermore, Blanchard et al. (2009) found that fruit and vegetable intake of college students was predicted by intention

(β=.32, P<0.05). In addition, Berg and colleagues (2000) reported that consumption of milk and high-fibre bread for breakfast among Swedish children aged 11-15 years was predicted by intention. Prell et al. (2002) indicated that intention to eat fish was associated with its consumption in Swedish adolescents (r=0.66) (Prell, Berg, & Jonsson, 2002). A study examining soft drink consumption among female adolescents in North Los Angeles by Kassem et al. (2003) indicated that only intention to drink soft drinks was found to predict behaviour.

The review of the literature on psychological correlates of various dietary consumption, including fruit, vegetables, sugar snacking, sweetened beverage consumption, and other healthy and unhealthy dietary consumption in children and adolescents indicated that eating behaviours have the most consistent and positive association with dietary intention (McClain et al., 2009). This is in line with the results of a meta-analysis of 185 studies using the TPB as a theoretical framework which found that intention accounted for 25% variance in behaviour (Armitage & Conner, 2001).

In contrast, a cross-sectional study by Fila and Smith (2006) used the TPB to predict healthy eating behaviour in urban Native American adolescents aged 9-18 years and found no association between intention and healthy eating behaviour (Fila & Smith, 2006), while healthy eating behaviour was predicted by the PBC. Therefore, they suggested that American adolescents' healthy eating may be driven more by external factors, and so is not under complete volitional control. This is consistent with the study findings by Sangperm et al. (2008) that indicated that there was no correlation between intention and healthy eating behaviour in Thai adolescents.

In summary, although the evidence indicated that dietary intentions are a good predictor of behaviour in adolescents, some study results demonstrated the lack of association between intention and dietary behaviour. This showed that previous research results have been inconsistent in determining the association between behavioural intention and dietary behaviour. It seems reasonable to suggest that some dietary behaviours are under complete volitional control and that some behaviours can be influenced by an internal factor or intention, and that some are not under volitional control and so are influenced by external control factors, and not only personal motivation. This is consistent with the general rule of the TPB that if

behaviours are under volitional control, they can be predicted by intention with considerable accuracy (Ajzen, 1991).

Attitude towards dietary behaviour

According to the TPB, attitudes are perceived as the degree to which an individual's belief about the positive and negative consequences of engaging in the behaviour of interest and the individual's evaluation of these consequences are called their behavioural beliefs (Ajzen, 1991; Conner & Norman, 2007). For example, "Eating a healthier diet would make me physically fitter" and "Being physically fitter would be... (bad-good)" (Conner & Norman, 2007; p. 203). While behavioural beliefs are proposed to be the driving force behind the individual's attitude, in turn, behavioural intention is determined by attitude towards the behaviour (Ajzen, 1991, 2006).

A number of studies that used the TPB as a conceptual framework have found that attitude was often associated with eating behaviour. In several studies, attitude also was found to be one of the best predictor of eating intention. For instance, Backman et al. (2002) used the TPB to identify predictors of healthy dietary practices in adolescents in California, USA. They found that attitude was a stronger predictor of intention than both subjective norm and PBC, and it explained 29% of the variance in attitude. Similarly, Pawlak et al. (2009) conducted a study to investigate factors important to college baseball player regarding intention to eat a healthy diet using the TPB. They found that attitude had the strongest influence on intention to eat a healthy diet, and explained 38% of the variance. Moreover, Pawlak and Malinauskas (2008) conducted a study to identify beliefs about eating 2.5 cups of vegetables a day and to assess how well these beliefs predicted intentions to eat them. They argued that attitude was the strongest predictor of intention. Furthermore, Kassem and Lee (2004) found that attitude was the strongest predictor of intention to drink soft drinks in 564 male adolescents in a public high school in North Los Angeles. The strongest predictor of intention to drink regular soda was also attitude in female adolescents (Kassem et al., 2003). The finding of the study of Prell et al. (2002) showed that attitude had the greatest influence on intention to consume fish among Swedish adolescents.

In some studies, subjective norm, and the PBC are more important than attitude in explaining intention. For example, the study by Blanchard et al. (2009) regarding

fruit and vegetable consumption found that PBC (β=.59, p<.05) was the strongest predictor of intention to eat fruit and vegetables, and was followed by attitude (β=.16, p<.05).

However, there were a few studies that found no relationship between attitude and intention. For instance, the study conducted by Sangperm et al. (2008) among Thai adolescent showed that healthy eating intention was not associated with attitude in female adolescents.

Subjective norm regarding dietary behaviour

According to the TPB, subjective norms are defined as the perceived social pressure from important persons or others to perform or not perform the behaviour of interest, and one's willingness to comply with those referents (Ajzen, 1991).

According to a review of its application to health related eating behaviour, the subjective norm construct often had less influence on behaviour than the attitude and PBC constructs (Backman et al., 2002; Conner & Norman, 2007; Kim, Reicks, & Sjoberg, 2003). For example, a longitudinal study conducted among adolescents aged 14-19 years by Backman et al. (2002) indicated that intention to eat a healthy diet was predicted primarily by attitude, and then followed by PBC and subjective norm. In addition, Berg et al. (2000) indicated that Swedish adolescents' intention to consume milk and high-fibre was influenced mostly by attitude, subjective norm or perceptions of significant others' preference, and PBC, respectively. Moreover, Pawlak and Malinauskas (2008) conducted a study to identify beliefs about eating 2.5 cups of vegetables a day and to assess how well these beliefs predicted intentions to eat them. The finding illustrated that subjective norm mediated the predictors of intention (β=0.372, P<0.001), while attitude (β=0.434, P<0.001) and PBC (β=0.159, P<0.001) were the strongest and weakest predictors of intention, respectively (Pawlak & Malinauskas, 2008). Similarly, Pawlak et al. (2009) conducted a study to investigate factors important to college baseball players regarding intention to eat a healthy diet using the TPB. The results found that the subjective norm influence on intention to eat a healthy diet, explained 29% of the variance. Similarly, subjective norm had an influence on intention (β=0.291, P<0.001), followed by PBC (β=0.269, P<0.001) whereas attitude had the strongest influence on intention (β=0.383, P<0.001). This is consistent with the study of soft drink consumption among female

adolescent in North Los Angeles by Kassem et al. (2003) that showed that the main predictor was attitude followed by PBC and subjective norm.

However, some studies found that there was no interrelationship between subjective norm and dietary intention. For example, Wong and Mullan (2009) who used the TPB to identify factors influencing adolescents' breakfast consumption showed that intention to eat breakfast was not predicted by subjective norm (Wong & Mullan, 2009). Similarly, the study of Blanchard et al. (2009) showed that intention to eat fruit and vegetables of college students was not predicted by subjective norm.

In contrast, the study of Sangperm et al. (2008) regarding predicting Thai adolescents' healthy eating behaviour illustrated that only subjective norm was a significant predictor of healthy eating intention of both Thai male and female.

It appeared that subjective norm or social influence was a less important determinant of intention than attitude and perceived control in most dietary research conducted among adolescents. However, the subjective norm plays an important role in adolescents' dietary behaviour in a few studies.

Perceived behavioural control over dietary behaviour

According to the TPB, PBC describe the perceived ease or difficulty of performing the behaviour of interest. In general, PBC predicts behavioural intention, and also has a direct effect on behaviour (Ajzen, 1991). Ajzen added PBC to the TRA and developed the TPB in order to increase the power of predicting intention and behaviour (Ajzen, 1991).

PBC is considered as TPB predominant as it was significantly associated with intention and behaviour (Ajzen, 1991; Armitage & Conner, 2001). This is consistent with the findings of many studies regarding dietary behaviours. For example, the study regarding soft drink consumption among female adolescents by Kassem et al. (2003) indicated that intention was predicted by PBC, and soft drink consumption was predicted by both intention and PBC, which together explained 28% of the variance in regular soda consumption (Kassem et al., 2003). In addition, Pawlak and Malinauskas (2008) identified belief s about eating 2.5 cups of vegetables and assessed how well these beliefs predicted the intention to eat them. The finding illustrated that PBC was one of the predictors of intention (β=0.159, P<0.021),

however, the association between PBC and behaviour was not examined in this study. Similarly, Pawlak et al. (2009) investigated factors important to college baseball player regarding intention to eat a healthy diet using the TPB and found that the PBC was a predictor of intention to eat a healthy diet, and it explained 27% of the variance.

The result of some studies showed that PBC was a predictor of dietary intention, but was not associated with dietary consumption. For example, the study by Blanchard et al. (2009) showed that consumption of fruit and vegetables of college students was not influenced by the PBC, whereas PBC was the strongest predictor of intention to eat fruit and vegetable. Similarly, a longitudinal study by Backman et al. (2002) indicated that healthy dietary behaviour was predicted by intention only in adolescents aged 14-19 years. In these studies, PBC did not contribute directly to the prediction of dietary behaviour.

Therefore, PBC plays a more important role in directly explaining adolescents' dietary behaviour and intention. In term of behaviour, the TPB suggests that intention will be the strongest predictor of behaviour when it is perceived to be under the individuals' volitional control, whereas the PBC will be the greatest predictor when it is not considered to be under their volitional control (Ajzen, 1991). The results of the majority of the studies discussed are consistent with this. The lack of consistency from the results of different studies may be due to the examination of different types of dietary behaviour, populations, and environments that affect adolescents' making decision about their dietary behaviour. In terms of intention, the studies regarding dietary behaviours generally found that dietary intentions were often predicted by the PBC. It appeared that not only were dietary intentions influenced by personal motivation, but also by external control factors.

In addition, other studies were undertaken to examine factors influencing adolescents' dietary behaviour and food choices, and they were as follows.

2.4 Factors influencing adolescents' eating behaviour and food choices

According to the literature review thus far on adolescents' dietary behaviour, particularly in western studies, eating behaviour is identified as complex and it is influenced by a wide variety of factors some of which are described as follows.

Taste and preferences

Taste appeared to be a crucial factor in making decision about food choice and eating behaviour among adolescents in many studies. (Brug & Klepp, 2007; Neumark-Sztainer et al., 1999). For example, results from a focus group of American adolescents identified that taste was mentioned the most frequently and extensively when they talked about why they eat specific foods (Neumark-Sztainer et al., 1999). Another qualitative study examined health and nutrition beliefs and perceptions in 29 male and female Australian adolescents aged 13-15 years by Giskes et al. (2005). This indicated that the greatest barrier to Australian adolescents' healthy eating was that healthy foods were less tasty (n=21). Similarly, a study by O'Dea (2003) also demonstrated that adolescents perceived taste as the barrier to healthy eating.

Generally, expectations about short-term consequences of eating behaviour including taste, satiety, and pleasure are more important than longer-term outcomes in making food-choice decisions of adolescents (Brug & Klepp, 2007). For example, taste and appearance are short-term outcomes of major significance that were frequently and extensively mentioned by 141 adolescents from 2 urban high schools in Minnesota, USA, when they discussed why they selected their food choices. The results also demonstrated that a lack of sense of urgency about personal health (long-term outcome) is perceived as a barrier to eating more fruit and vegetables (Neumark-Sztainer et al., 1999). Similarly, taste (lack of) is the biggest impediment to eating a healthy diet in 106 children in Northern Ireland, United Kingdom (McKinley, Lowis, Robson, Wallace, Morrissey, Morrissey et al., 2005).

Time consideration

Adolescents tend to feel constrained in terms of time as they are involved in academic and extracurricular activities such as busy social programmes, part-time jobs, and sporting activities. These activities increase the need for social and peer contact and approval that may leave a little time for them to sit down to eat a meal

(Stang et al., 2008). This means that adolescents who are buying their own food choose fast or easy to prepare food and buy without thinking about whether it is healthy or unhealthy (Langley-Evans, 2009). In addition, focus group discussion with adolescents in the study by Neumark-Sztainer and colleagues (1999) indicated that they do not want to wait in a long lunch queue, preferring to eat fast food because it was served quickly, and also selected food to cook that can be prepared quickly when they are doing the cooking.

Convenience

Convenience is one of the major factors that influence adolescents' eating behaviour and their food choices. Many studies identify that the convenience of foods is very important in adolescent food choice. For example, the study by Neumark-Sztainer and colleague (1999) indicated that adolescents prefer convenience foods identified as easy to find or prepare, that does not demand preparation and cleaning, that can be brought onto the bus or kept in a backpack, and can be delivered or picked up at a drive-through. Focus groups of American students aged 7-17 years were used to identify why children and adolescents eat healthy food (O'Dea 2003) which showed that convenience of less healthy alternatives was discussed as a major barrier to healthy eating in American children and adolescents.

Health concern

Health concern or health-related outcome expectation does not appear to be a significant factor in making decisions about food choices in adolescents (Brug & Klepp, 2007). It was mentioned as a barrier to adolescent healthy eating behaviour in some studies. For example, American adolescents stated that a healthy diet does not rate highly enough to worry because they think they are too young to be concerned about their health, as they will worry about their health when they get older and get diseases such as heart disease (Neumark-Sztainer et al., 1999). A focus group of UK participants conducted by Chambers et al. (2008) found that health consideration was a more important reason for food choices for older people. Focus group findings from American participants regarding the perceptions of factors influencing their healthy food consumption behaviour showed that participants' healthy eating consumption was influenced by many factors, including their health concern or

perceived benefits of healthy eating. In addition, health conditions were strong motivators influencing respondents to make in dietary pattern (McGee et al., 2008).

Cost

Adolescents are taking responsibility for finding and buying their own foods according to Langley-Evans, (2009), and therefore it is not surprising that the cost of food affects their decisions about food choices (Neumark-Sztainer et al., 1999). Many studies have indicated that there was an association between price and food choice and consequent dietary behaviour. In focus groups of American adolescents, it was found that price was considered when they buy food. For example, they liked fast food because it was inexpensive, and they felt full for a few dollars, whereas eating healthy food in the same restaurant such as salad and milk costs more (Neumark-Sztainer et al., 1999). However, price was mentioned as a minor barrier to eating a healthy diet in a study by O'Dea (2003) who examined perceived benefits and barriers to healthy eating and physical activity among children and adolescents, but this may have been because they were not purchasing their own food.

Mood and emotion

Adolescents' eating behaviour was associated with emotional state, particularly emotional distress. For example, in the focus group study by Neumark-Sztainer et al., (1999) it was found that adolescents' eating behaviour was influenced by their mood. For example, they ate differently, when they were bored, depressed, stressed or angry. Furthermore, focus groups (students aged 7-17 years) were also used to identify why children eat healthy food in a study by O'Dea (2003) which showed that the dietary behaviour of adolescents was influenced by mood and emotion. For example, stress was relieved by over eating less healthy foods such as chocolate and some junk food, and unhealthy foods are more perceived as fun and exciting.

Body image

Perceived body image of adolescents was found to be an important influence on adolescents' eating behaviour in some studies. For example, the findings from a study of 18,177 American adolescents that examined the determinants of adolescents' consumption of fruit, vegetables, and dairy foods indicated that those who perceived themselves to be overweight were significantly more likely to report

eating nothing for breakfast as an attempt to control their weight (Videon & Manning, 2003). In addition, Australian research on health and nutritional beliefs and perception in 29 male and female adolescents aged 13-15 years by Giskes et al. (2005) indicated that adolescents' who make decisions to lose weight sometimes starve themselves. A study examining to susceptibility to the thin ideal shape in the media and eating styles was undertaken with Dutch university students by Anschutz and colleagues (2008). They found that susceptibility to the cultural beauty standards provided by the media was associated with eating behaviour. The food choices of American adolescents were influenced by their concern about being too fat, skinny, or short (Neumark-Sztainer et al., 1999).

Age

Age was linked with individuals' eating behaviour in some previous studies. For example, Verbeke and Vackier (2003) used the TPB to investigate individual determinants of fish consumption. They found that fish intake frequency was associated with increasing age. Chambers and colleagues (2008) conducted focus group discussions to examine the influence of age and gender on food choice in UK participants. The results showed that people aged between 18-30 years old were less concerned about their health, and older respondents were more likely to make their food choices based on their health concerns.

Knowledge

The association between adolescents' knowledge in relation to eating behaviours and their actual eating behaviour has been found in previous research. For example, Giskes et al. (2005) conducted qualitative interviews of health and nutrition beliefs and perceptions in 29 male and female Australian adolescents aged 13-15 years. The finding indicated that a minority of adolescents (n=4) lacked knowledge of diet related diseases and the nutritional composition of foods were perceived as barriers to a healthy diet. McGee et al. (2008) stated that Americans needed more knowledge and skills to change their dietary consumption such as preparing appealing food, and meal planning. In addition, they also perceived that providing information on healthy eating was indicated as a way to improve their healthy eating behaviour.

Parents and family

Parents were found to play a primary role in their adolescents' nutrition and eating behaviour. For example, a study conducted to examine the relationship between social support (family and friends) and fat and fibre consumption in 1,942 rural American adolescents indicated that family support had a positive association with fibre consumption, whereas no independent relationship was found between family support and dietary fat intake (Stanton, Green, & Fries, 2007). The findings of a study conducted to examine family meal patterns and associations with socio demographic characteristics and dietary intake in American adolescents showed that the frequency of family meals was positively correlated with the consumption of vegetables, fruit, grains, and calcium-rich foods and negatively associated with soft drink consumption (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003). Pearson et al. (2008) found that parental intake was positively associated with adolescents' fruit and vegetable consumption. The qualitative study of health and nutrition beliefs and perceptions in 29 male and female Australian adolescents by Giskes et al. (2005) found that some adolescents (n=14) mentioned a parent or other family members as barriers to eating a healthy diet. Simply if the parents or other family member did not eat a healthy diet, it may not be purchased and so was not available at home. Parents or other family members also noted that they did not have enough time to buy and prepare healthy foods. Maternal concern for eating a healthy diet as reported by the adolescents' mothers was not associated with adolescents' dietary behaviour, but adolescents' perception of maternal concern for eating healthily was positively associated with adolescents' fruit and vegetable intake (Boutelle, Birkeland, Hannan, Story, & Neumark-Sztainer, 2007).

Peers

Peers (friends) have been found to be strongly associated with adolescents' dietary behaviour, particularly the unhealthy diet of fast food, and soft drinks. For example, a study that examined the relationship between social support (family and friends) and fat and fibre intake in 1,942 rural American adolescents indicated that friends eating behaviour was positively associated with dietary fat consumption and fibre intake (Stanton et al., 2007). Additionally, Wouters et al. indicated that snack and

soft drink consumption were associated with specific combinations of consumption by peers (Wouters, Larsen, Kremers, Dagneli, & Geenen, 2010).

Mass media

Adolescents live in a world where there is strong interest and engagement with the media and that influences their lifestyle, including dietary behaviour and food choices (Brown & Witherspoon, 2002). Adolescents are considered the biggest target group for fast-food restaurants and so their marketing is aimed at them via television, magazines, and the radio (Langley-Evans, 2009). For example, in the qualitative study of health and nutritional beliefs and perceptions of 29 male and female adolescents by Giskes et al. (2005), it showed that adolescents (n=8) mentioned advertising on TV, magazines and the movies as an impediment to eating a healthy diet. Brown and Witherspoon (2002) stated that American adolescents were affected by the unrealistic body image (being thin) promoted by the mass media that influenced their eating behaviour and food choices. The mass media also affected American adolescents' by increasing the desirability and consumption of high fat and high sugar foods so making it more difficult to develop their healthy eating behaviour.

Opportunity: Availability and accessibility of food choices

Availability and accessibility of food are linked with adolescents' dietary behaviour. For example, Pearson and colleagues found that fruit and vegetables availability in the home was positively associated with children's fruit and vegetable consumption (Pearson, Biddle, & Gorely, 2008). Additionally, Wouters et al. (2010) indicated that snack and soft drink consumptions were associated with easy availability at school. The association between school environment and adolescent soft drink and snack consumption were examined in a cross-sectional study of 1,293 adolescents aged between 12-15 years by Horst et al (2008). They found that soft drink consumption was influenced by the distance to the nearest store and the number of small food stores, however snack consumption was not influenced by their availability in school canteens. Furthermore, Neumark-Sztainer and colleagues (2003) also found that home availability of fruit and vegetable, explained 45% of the variance in adolescent fruit and vegetable intake. Similarly, the qualitative study of health and nutritional beliefs and perceptions in 29 male and female Australian adolescents by Giskes et al.

(2005) showed that one third of them (n=10) discussed the non availability of healthy foods as a barrier. They also stated that healthy foods were not always available in shops or school canteen.

In this planned study, Thai adolescents' eating behaviour needed to be examined to find out the relationship between their eating behaviour and the factors involved in their decision making. There were three dietary measurements included to do this and they included the FFQ, the 24-hour dietary recall, and digital photographs, and they are discussed in this chapter as follows.

2.5 Dietary assessment

A variety of methods have been used in studies such as dietary records, FFQ, the 24-hour dietary recall, and digital photograph technique to measure dietary consumption, including dietary habit, and portion size (Berg et al., 2000; Fila & Smith, 2006; Sangperm et al., 2008). Each dietary assessment also has some strengths and limitations (Thompson & Subar, 2008). For example, the accuracy of portion size is difficult to measure, and is susceptible to a response from the participant that is consistent with the expected norm (social approval bias). This is especially in relation to self-reported dietary intake such as the FFQ (Hebert et al., 1995). Therefore, if the self-reported dietary assessment was being used, the researchers suggested that multiple measurements may help participants more accurately estimate the amount of foods consumed (Fila& Smith, 2006). In this study, FFQ was included in the main instrument (the TEQ) aimed to assess Thai adolescents' eating behaviour. Therefore, two more dietary assessments were used to assist FFQ to measure dietary intake. The following methods have been selected for the assessment of eating behaviour in this study.

Food Frequency Questionnaire

FFQ is a retrospective dietary method design to measure a respondent's usual dietary intake of each food from a list of foods during a period of time. Many FFQs that are already designed are available. However, many continue to be adjusted and developed for different objectives and different populations (Thompson & Subar, 2008). Respondents indicate how many times a day, week, month, or year that they

usually consume the foods. FFQs are designed to collect dietary information from a large number of participants. Dietary information is collected on frequency to assess food habits and sometimes portion size, but little detail is collected on other characteristics of the food eaten such as the methods of cooking. FFQs normally ask about dietary intake within a given time frame (e.g. in the past 2 weeks, 6 months, 1 year, or longer) (Lee & Nieman, 2007; Thompson & Subar, 2008).

There are many strengths of the FFQ approach. It is inexpensive to administer and process and aims to estimate the respondent's usual intake of food for a specific period of time. FFQ approach has become a simple way to estimate usual dietary intake in a large scale survey. There is also low respondent burden in that it is easy to complete, and it also does not affect respondent's eating behaviour (Lee & Nieman, 2007; Thompson & Subar, 2008). The major limitation of the FFQ approach is that it contains some measurement error. For example, many details of usual dietary intake may not be measured because of the incomplete listing of all possible foods. The quantification of usual dietary intake may not be as accurate as recall (the 24 hour dietary recall) and records (dietary record) because of error in frequency and usual serving size estimation (Thompson & Subar, 2008). Finally, using the FFQ to assess dietary intake is susceptible to social approval bias (Miller, Abdel-Maksound, Crane, Marcus, & Byers, 2008).

The 24-hour Dietary Recall

The 24-hour dietary recall is the most commonly used self-reporting dietary assessment method (Lee & Nieman, 2007), and has been used widely in studies of adolescents (Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003; Wang, 2004). The respondents are asked to recall all food and beverages consumed in the preceding 24 hours or in the preceding day (Lee & Nieman, 2007; Thompson & Subar, 2008). The recall typically is undertaken by interview, in person or by telephone using a paper-and-pencil form. It is an estimated actual intake with detailed description of food and beverages, including ingredients, dishes, brand names, and portion size. Household measurements such as tablespoons, cup, glass, and portion are used to estimate the quantity.

The 24-hour dietary recall technique has several strengths. It is inexpensive, less time consuming (20 minutes or less), and can be applied to various populations. There is

also low respondent burden and requires only short-term memory recall. It also does not affect respondent's eating behaviour (Thompson & Subar, 2008). Its limitations are that it is susceptible to under and over estimation of dietary intake because it may not be completed immediately and then inaccuracy in recall may occur. However, when the 24-hour dietary recall was compared with other dietary measurement such as the FFQ, it might be less susceptible to the effects of social approval bias because answers are reported according to the memory of the previous day's consumption rather than more generic memory (Lee & Nieman, 2007; Ma et al., 2009). Food consumption is found to vary for most people between weekdays and weekends (Gibson, 2005), and reported dietary consumption were higher on weekend than during the week (Ma et al., 2009). A single 24-hour recall may not capture the usual dietary intake (Ma et al., 2009). More than one or two days record of the 24 hour dietary recall is needed to reflect the individual's usual dietary intake (Thompson & Subar, 2008), and Ma and colleagues suggested that 3 different days of the 24-hour recall should be undertaken so as increase the accuracy of dietary intake assessment across the week to include both the weekend and weekdays (Ma et al., 2009; Baxter, Smith, Nichols, Guinn, & Hardin, 2006). This would then contribute to valid estimates of dietary intake (Poirier, Giles, Bray, Hong, Stern, Pi-Sunyer et al., 2006; Zhang, 2010).

The Digital Photographic Record

Most of the self-report dietary methods such as 24-hour dietary recall, and FFQ rely on the participants' recall of food and beverage consumed, and the ability to keep accurate records (Lee & Nieman, 2007). The digital photography record is an individual dietary assessment that is available due to technological advances (Lee & Nieman, 2007; Schenck-Gustafsson, 2009; Williamson, Allen, Martin, Alfonso, Gerald, & Hunt, 2003). This technique is used to estimate detail and portion size of dietary intake to negate the tendency to over or underestimate portion size (Hampl, Dixon, & Hall, 2003; Schenck-Gustafsson, 2009; Williamson et al., 2003). Furthermore, there are several advantages to support the use of digital photography technique including that it is less time consuming (than 24-hour dietary recall), has low respondent burden, convenience for the participants and researcher, and provides vivid details including portion size. For the researcher, it provides time to identify food and beverage intake that can be studied retrospectively in the photographs

(Hampl et al., 2003; Lee & Nieman, 2007; Schenck-Gustafsson, 2009). In addition, pictures can be printed out with a date and time when taken (Hampl, Dixon, & Hall, 2003). The limitations of digital photography is that it is costly, and the sophisticated equipment may be lost or complex to manage (Lee & Nieman, 2007).

2.6 Conclusion

This chapter included the key information that sets the scene for this study including adolescents eating behaviour and the factors, that may influence this and how this related to CVD. The psychological model was identified as the TPB, and dietary assessments were identified to be used in the planned study.

To summarise, healthy eating is one of the significant factors that should be promoted in the adolescent period to promote good health and reduce the incidence, disability, and mortality rated to CVD. According to the literature on adolescents' healthy eating and dietary behaviours, adolescents' eating consumption was influenced by a wide variety of factors, including personal (e.g. age, mood and health concern), social (e.g. parents and family, and peers), and physical environmental (e.g. food availability at home and school) factors. In addition, a literature review of the studies that examined dietary behaviour using the TPB have shown an association between psychological factors, including attitude, subjective norm, PBC, intention, and the target eating behaviour in a wide variety of populations and countries.

In term of dietary assessment, the FFQ was selected as an instrument for this study. The use of the FFQ to assess dietary intake is susceptible to substantial social approval bias (Hebert et al., 1995, Miller et al. 2008) and therefore, two more dietary assessments including the 24-hour dietary recall and photography technique were used with the FFQ to measure actual dietary intake.

Therefore, the dietary assessments used in this study and the examination of factors influencing Thai adolescents' eating behaviour will assist the researcher to better understand eating behaviour in Thai adolescents.

In the next chapter, the methodology and design will be described to illustrate how the research will be undertaken.

Chapter 3

Methodology and methods

The main aim of this chapter is to provide information regarding the research methodology and method. This chapter starts with the aim, research questions, and the purpose of the study. Then the research methodology; research paradigm and approach is presented. It then goes on to describe the research methods; including the quantitative approaches and qualitative methods. This is followed by the integration of the quantitative and qualitative components.

3.1 Aim of the study

The aim of this study was to examine the factors influencing Thai adolescents' eating behaviour.

3.2 Research questions

This study had the following main research question:

What factors influence adolescents' eating behaviour in urban and rural areas of Thailand?

To examine this in detail there are six secondary questions.

1. Do the components of the TPB help to predict urban and rural Thai adolescents' eating behaviour?

2. What are the differences between urban and rural Thai adolescents' predictors of eating behaviour when based on the TPB?

3. Are there differences in eating behaviour when they are assessed by different methods?

4. What are the perspectives on eating behaviour of urban and rural adolescents?

5. What are the similarities and differences between urban and rural Thai adolescents' perspectives regarding eating behaviour?

6. What are the similarities and differences in factors influencing Thai adolescents' eating behaviour between the studies conducted based on the TPB and adolescents' perspectives?

3.3 The objectives of the study

This study was designed:

1. To identify factors influencing Thai adolescents' eating behaviour in urban and rural areas of Thailand.

2. To compare factors influencing urban and rural Thai adolescents' eating behaviour.

3.4 Research paradigms

A paradigm can be defined as "the consensual set of beliefs and practice that guide a field (Morgan, 2007; p. 49). It can be used to reflect a researchers' beliefs about what reality is (ontology), how we know what we know (epistemology), how we gain knowledge (methodology) and the values we hold (axiology) (Doyle, Brady, & Byrne, 2009; Gelo, Braakmann, & Benetka, 2008; Teddlie & Tashakkori, 2009). The research paradigm will guide or influence the choice of methodology that will be employed to answer the research questions (Doyle et al., 2009). In general, there are three main groups of paradigms and philosophy used within social and behavioural science research, comprising quantitative, qualitative and mixed methods research approaches (Doyle et al., 2009; Morgan, 2007; Teddlie & Tashakkori, 2009), and they each have a different foundation as follows:

Positivist is the foundation for quantitative research (Doyle et al., 2009). The positivist is principally interested in quantitative methods which are defined as "the techniques associated with the gathering, analysis, and interpretation of numerical information" (Teddlie & Tashakkori, 2009; p. 5). The positivist contends that reality is single, tangible, and fragmentable (ontology), and it can be examined through objective measurement and quantitative analysis (Doyle et al., 2009; Gelo et al., 2008). In terms of epistemology, the positivist believes that the knower (the researcher) and the known (participant) are independent when the study is conducted.

In contrast, the naturalistic, interpretative or constructivist paradigm is the foundation of qualitative research (Doyle et al., 2009). Constructivism is principally interested in qualitative methods defined as "the techniques associated with the gathering, analysis, and interpretation of narrative information" (Teddlie & Tashakkori, 2009; p. 6). Constructivists see that reality is multiple, constructed, and holistic (ontology). In addition, constructivists believe that the knower and the known are inseparable and interactive (epistemology). They work together to answer the research problem. Therefore, different interpretations may result from the relationship between researcher and participant (Doyle et al., 2009; Gelo et al., 2008).

The pragmatic paradigm is the foundation for mixed methods research (Doyle et al., 2009; Morgan, 2007). Pragmatists focus on the research problem, and all techniques will be used to gain more understanding of the research problem and study phenomena, whether they are quantitative or qualitative methods. Whereas, for the positivist or constructivist paradigm, the researcher is given a menu of research design to answer the research question (Teddlie & Tashakkori, 2009).

In addition, before the study is conducted, not only a paradigm, but also research questions will be considered to inform the design, methodology, and outline the study. The researcher needs to consider whether their research question requires a monomethod or mixed methods design. If the research question cannot be answered by either a quantitative or qualitative method, mixed methods design may be appropriate for the study (Kroll & Neri, 2009; Teddlie & Tashakkori; 2009). In this study, the research questions cannot be fully answered by either quantitative or qualitative method as explained by the following.

A quantitative approach to examine the TPB was selected to answer the secondary research questions 1, 2 and 3;

1. Do the components of the TPB help to predict urban and rural Thai adolescents' eating behaviour?

2. What are the differences between urban and rural Thai adolescents' predictors of eating behaviour when based on the TPB?

3. Are there differences between reported eating behaviour when assessed by different methods?

However, a qualitative approach was suggested to explore the human perspective and experience (Teddlie & Tashakkori, 2009) and was selected as appropriate to answer research question numbers 4 and 5;

4. What are the perspectives on eating behaviour of urban and rural adolescents?

5. What are the similarities and differences between urban and rural Thai adolescents' perspectives regarding eating behaviour?

In addition, question number 6; *What are the similarities and differences in factors influencing Thai adolescents' eating behaviour between the studies conducted based on the TPB and adolescents' perspectives?* was examined by comparing the results from both the quantitative and qualitative approaches.

According to previous studies regarding eating behaviour, quantitative and qualitative approaches provided different strengths as stated in chapter 1 (p. 7-9).

Therefore, this study was conducted based on a pragmatic paradigm, and a mixed methods design was used to guide the methodology as following (Kroll & Neri, 2009; Teddlie & Tashakkori, 2009).

3.5 Research methodology

In general, a research methodology is an approach to scientific inquiry involving preferences for broad components of the research process, including general

preference for design, sampling logic, data collection, and analytical strategies that will be used to guide the research method (Teddlie & Tashakkori, 2009). It is essential to understand the key concepts of mixed methods in relation to this study.

Mixed methods has been defined as "research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or programme of inquiry" (Tashakkori & Creswell, 2007; p. 4). In another definition, it is described as "a research design with a philosophical assumption as well as a method of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone" (Creswell & Clark, 2007; p. 5).

When data collection is considered, the association of quantitative and qualitative methods can be concurrent or sequential. In a concurrent study, the quantitative and qualitative methods are undertaken at the same time, whereas, in a sequential study, quantitative or qualitative method follows each other. In this study, the implementation of the sequence of quantitative and qualitative methods was identified by the research questions, research purpose, and the rationale for the data collection (Kroll & Neri, 2009; Teddlie & Tashakkori, 2009). In terms of priority, quantitative or qualitative design is considered in terms of which one is greater than the other, or that they are equal. Their priority is based on the research questions, including which methods suit and are appropriate to answer each research question (Kroll & Neri, 2009; Teddlie & Tashakkori, 2009). Integration can occur at any stage of the study such as data collection, analysis, or data interpretation. The mix and balance of quantitative and qualitative depends on when and how to integrate, and this is associated with the research question (Kroll & Neri, 2009; Teddlie & Tashakkori, 2009).

In summary, this study was designed by the researcher based on the main research question and existing mixed methods designs, with consideration of the key issues

including, the implications of data collection, the priority between quantitative and qualitative methods, and stage of integration. The research method is outlined as follows.

3.6 Research methods

In this study, mixed methods were considered, and the study design was outlined as follows.

Figure 3.1 The concept design of this study
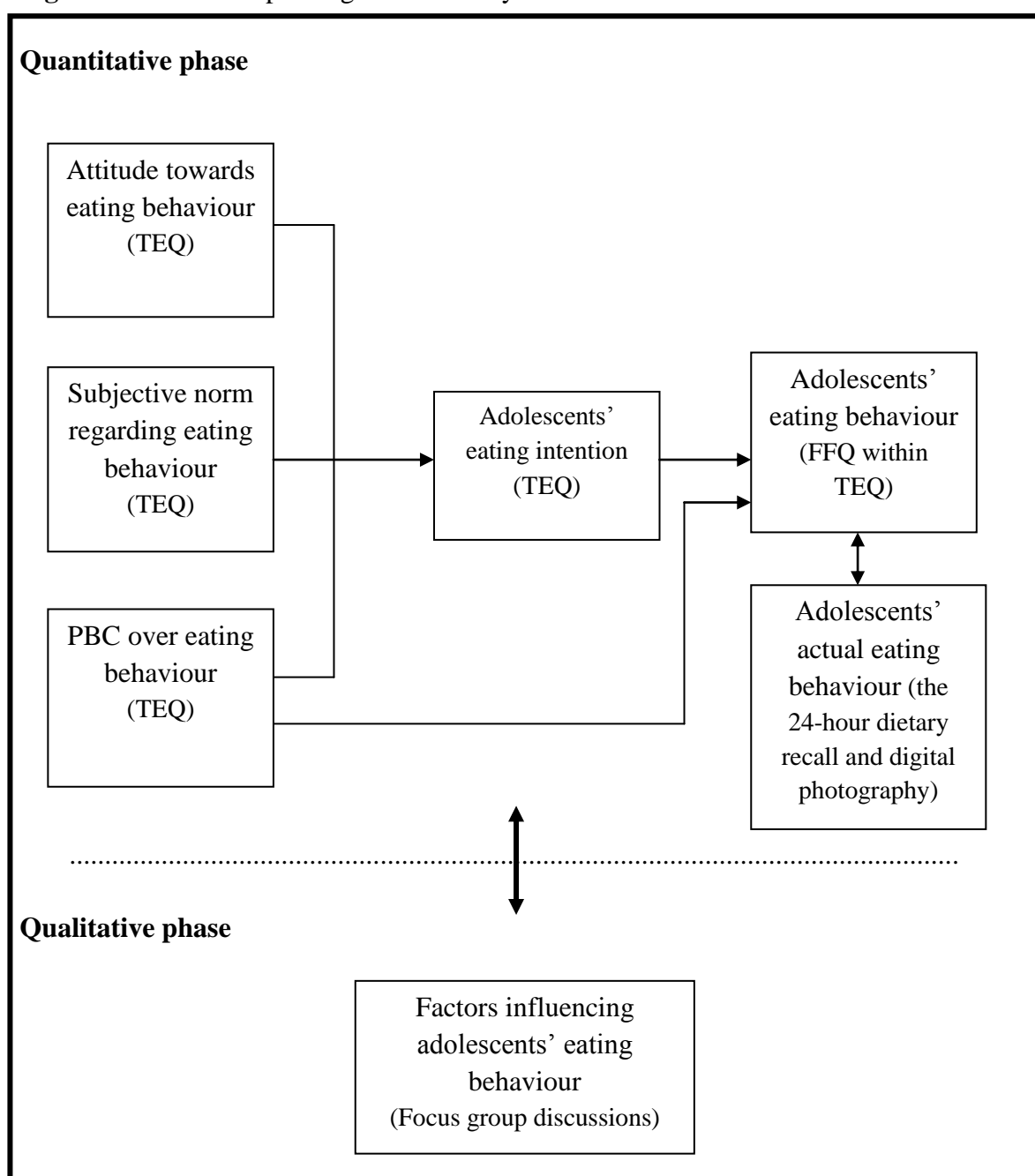
Quantitative process:

-To identify factors influencing adolescents' eating behaviour, urban and rural Thai adolescents completed the questionnaire that was developed based on the TPB, namely the Thai Eating Questionnaire (TEQ). Adolescents' eating behaviour and the constructs of the TPB including, attitude, subjective norm, perceived behavioural control, and intention regarding eating behaviour were measured. After that, they were analysed to identify what factors influence adolescents' eating behaviour.

- Multiple dietary assessments including the 24-hour dietary recall and digital photography were used to further explore the eating behaviour of adolescents.

Qualitative process:

-Focus groups were used to further examine factors influencing adolescents' eating behaviour.

Although, the study design seemed to be a sequential mixed methods design, the results of the quantitative phase were not be used to inform the qualitative phase of this study as per the sequential design. The rationale for collecting both quantitative and qualitative data was to bring together the strengths of both approaches to inform the results and to provide enhanced insight into eating behaviour as stated in chapter 1 (p. 6-9). When the research questions and methods were considered, the quantitative part was given priority rather than the qualitative phase. The results regarding factors influencing adolescents' eating behaviour from the two phases of this study were separately analysed because they require different types of analyses. However, the results of the separate analysis were then integrated (Onwuegbuzie & Leech, 2004).

The next section presents the methods and procedures used to collect and analyse the data from the quantitative and qualitative parts. It also includes ethical issues, the conceptual framework, the study setting, target population, samples, data collection, and methods of data analyses.

Ethical issues

In United Kingdom

This study proposal (Appendix: B) has been approved by the Faculty of Health Ethics Research Committee of the University of East Anglia, United Kingdom (Appendix: C).

In Thailand

The School of Nursing Sciences, University of East Anglia on behalf of the researcher sent a letter to two directors (head teachers of schools) asking permission for the study to be undertaken in their schools. The researcher also went to the schools to explain two secondary schools were required for this study. Information was provided to gain their co-operation for this study, and the researcher gave them an information sheet and consent form. Then the study was considered by both the directors and the management committees of the two schools, and they both gave permission to undertake this study in their schools.

Quantitative design and methods

There were two parts to the quantitative phase of the study. The first part aimed to identify factors influencing Thai adolescents' eating behaviour and adolescents' eating behaviour based on the TEQ. The second part aimed to further explore adolescents' behaviour using dietary assessments including the 24-hour dietary recall, and digital photography. The conceptual framework of the quantitative phase of this study was identified as following;

Figure 3.2 The conceptual framework of quantitative phase
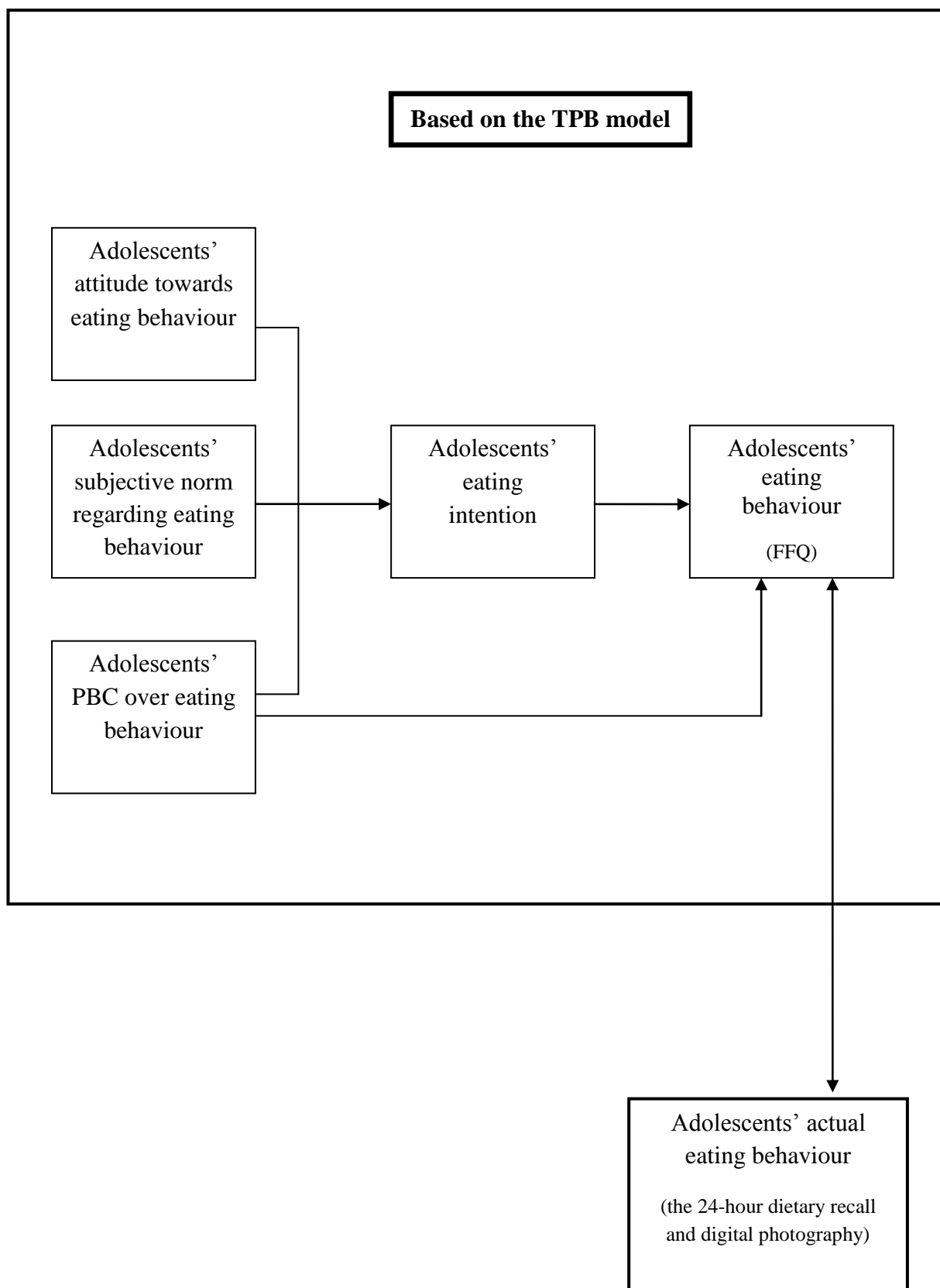
Hypotheses of the quantitative phase

It was hypothesized that the psychosocial variables in the TPB would significantly predict both urban and rural Thai adolescents' eating intention and eating behaviour. The research hypotheses were as follows:

1. Urban adolescents' attitude towards eating behaviour will significantly predict eating intention.

2. Rural adolescents' attitude towards eating behaviour will significantly predict eating intention.

3. Urban adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.

4. Rural adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.

5. Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.

6. Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.

7. Urban adolescents' eating intention will significantly predict eating behaviour.

8. Rural adolescents' eating intention will significantly predict eating behaviour.

9. Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.

10. Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.

11. Explore whether examining eating behaviour using different quantitative methods (FFQ, 24-hour dietary recall, and digital photography) may produce different results.

Setting

The study was conducted in Ratchaburi province, in the central part of Thailand which includes both urban and rural areas. It is located 80 kilometres west of Bangkok, the capital of Thailand, and borders on Myanmar (Burma). The researcher is a lecturer in a nursing college in Ratchaburi Province, and has developed good contacts with local public health and the schools which were utilised for this study. The cost and operationalisation of this research is expedited by examining the area in which the researcher works.

Purposive sampling techniques were used to recruit two public high schools to this study. Purposive sampling is also described as non probability sampling which refers to the process of case selection rather than random selection. This technique relies on the researcher's judgment to select units that are "typical" or "representative" of the population. This technique is more appropriate and practical than probability sampling. However, it does not control for bias in the selection of a unit (Singleton & Straits, 2005).

The two public high schools under the Ratchaburi Educational Service Area Office I, Ministry of Education were approached to take part in this study. The first named Benjamarachutit Ratchaburi School was selected from other urban public high schools because it is the largest,it provided a wide range of students from different economic backgrounds (1,670 pupils in grades 10-12) and was located in the central city of Muang Ratchaburi. The other school is Suanphung Wittaya School, and it was selected from other rural public high schools because it is located in Suanphung district which is further away from the central city of Muang Ratchaburi and is also nearer the border between Thailand and Myanmar (Burma).

Figure 3.3 Map of Ratchaburi Province, Thailand
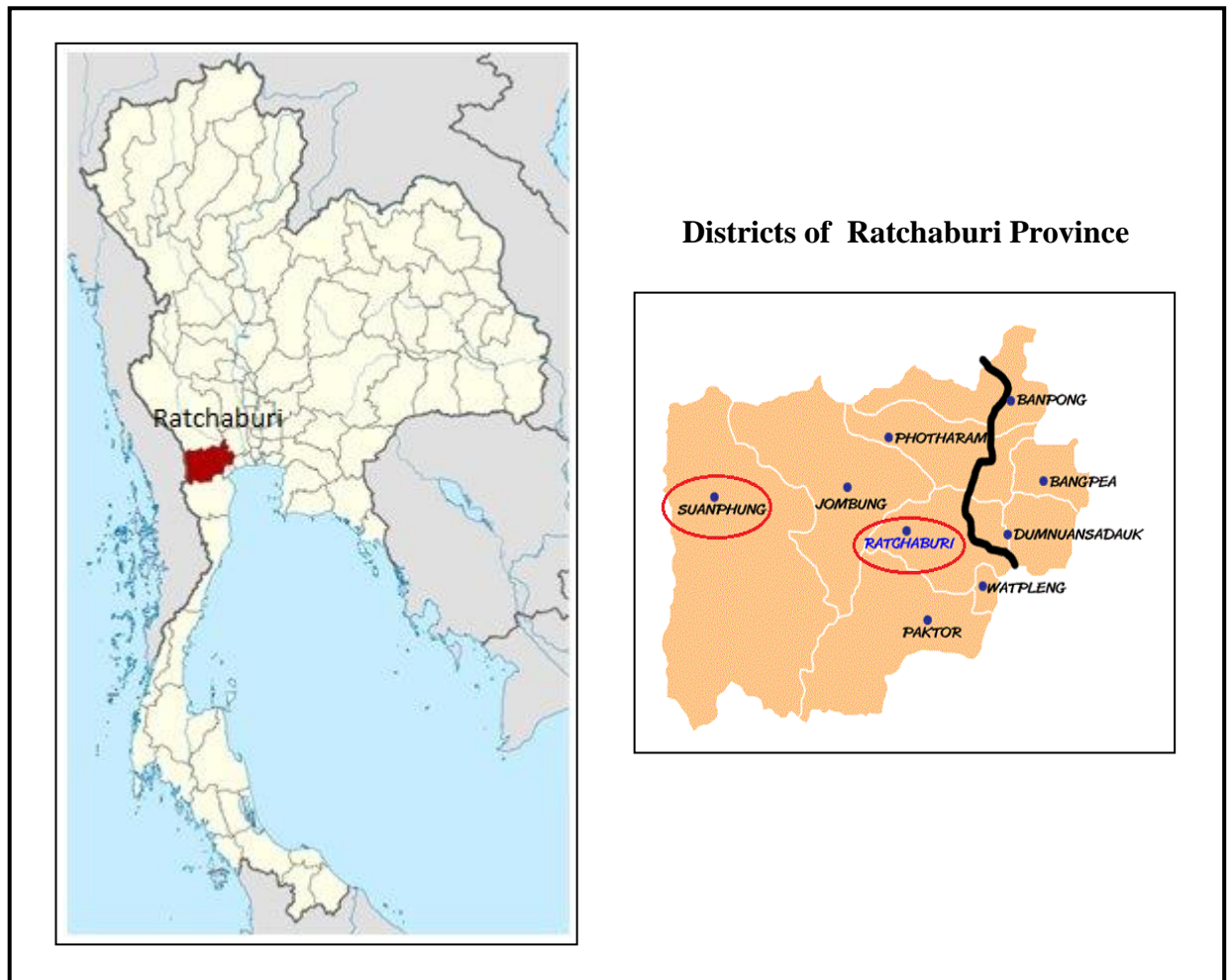
Participants

According to Rashidian and colleagues (2006), an effective sample size for regression analyses of the TPB questionnaire part of the study is 148. That is calculated by the variance inflation factor method (α=.05; power= 80%). However, samples for a survey should include at least 15 (10% of sample) to account for the chance of incomplete data and participant withdrawal. Therefore, the number of participants from each of the urban and rural public high schools needs to be at least 163 because data obtained from them will be separately analysed. Therefore, the total number of participants in this study was planned to be 326.

Convenience sampling is a non-probability type of sampling that was used to recruit the participants into this study. In this form of sampling, the subjects are selected

because of their convenient accessibility. Therefore, this method of case selection is easy and quick to carry out. However, the participants were not selected at random, and this inherent bias in convenience sampling technique means that the sample is unlikely to be representative of the population being studied (Singleton & Straits, 2005). In this study, participants were recruited from 15-18 year-old male and female students, attending grades 10 to 12 in Benjamarachutit Ratchaburi School and Suanphung Wittaya School, Ratchaburi Province, Thailand. It was a convenience sample because the researcher approached the students during school time and some students had only limited time for participation in the study. However, inclusion and exclusion criteria were used.

For section 2 of the quantitative phase, after completing the questionnaire, the students were asked to participate in the second part to further identify their eating behaviour. The first 10 male and 10 female volunteers from the participants in the first part were recruited from each school to complete the 24-hour dietary recall form and were asked to take photographs of their meals and beverages.

Inclusion criteria

The inclusion criteria were adolescents of 15-18 years who can read and write. The participants from Benjamarachutit Ratchaburi School (urban) also needed to live within Muang Ratchaburi (town boundaries), and the participants from Suanphung Wittaya School (rural) needed to live within Suan Phung district to reflect the city (urban) or rural environment.

Exclusion criteria

Exclusion criteria included severe mental illness and learning disability.

Tools and materials

There were four main tools and materials in this phase as follows:

Questionnaire based on the TPB

The TEQ (Appendix: C) was developed by the researcher based on the TPB according to standard methodology. It assessed the Thai adolescents' eating

behaviour, and the construct of the TPB regarding eating behaviour. The development of the TEQ and its detail will be described in Chapter 4.

Anthropometric measurements

Anthropometry is the assessment of the physical dimension and the gross composition of the body for assessing a person's weight status (Lee & Nieman, 2007). Three instruments were used to measure the weight, height, and waist circumference of all participants as follows:

1. The digital weight instrument
2. The portable height instrument
3. The portable waist instrument

The 24-hour dietary recall

To further identify urban adolescents' eating behaviour, 10 male and 10 female participants from each school who took part in the survey and agreed to further participate (complete the 24-hour dietary recall, digital photographs, and focus group discussion) until the end of this study were also asked to write down what they ate in the last 24 hours and how much they ate. To do this each participant was informed about household units used to measure the portion size such as serving spoons, table spoons, glasses, and portions. According to the Working Group on Food Based Dietary Guidelines for Thailand, a serving spoon is used for measuring rice and the starchy food group and vegetables. A table spoon is used to measure the food in the protein group, and a portion is suitable to measure fruit consumption. Participants were asked to complete the 24-hour dietary recall form (Appendix E) three times with at least one day from the weekend, and two days from the week. This will reflect the way that eating behaviour may change at the weekend and during the school week (Gibson, 2005; Ma et al., 2009). In addition, serving sizes were consistent with the Thailand Nutrition Flag. For examples; 1 egg was equal to 2 table spoons, 1 sliced bread was equal 1 to serving spoon, and 1 Numwa banana (small) was equal to 1 portion. The 24-hour dietary recall used in this study was tested with five students in the same school where the TEQ was piloted. The students took approximately 7-10 minutes to complete them. All of the students asked about household measurements such as the table spoon, serving spoon, and portion of fruit

when completing the 24-hour dietary recall. Therefore, examples of the table spoon, serving spoon, some food including fruit, and figure 2.5 (Household units used in the Thailand Nutrition Flag) were used by the researcher in this phase of the study.

Photographic method

The participants used digital cameras to take photos of their meal time food and beverages because digital photograph technique is one technique used in order to assess dietary intake and portion size that has been recommended in previous studies (Carnoske & Martin, 2005; Hampl et al., 2003; Williamson et al., 2003). Digital photographs can provide an accurate record of dietary intake portion size. The digital photography also helps to reduce over and under estimation of portion size of food. Photographs of food and beverages also provide vivid actual detail of food and beverages rather than verbally describe and writing down the information on food and beverages (Carnoske & Martin, 2005; Hampl et al., 2003). Therefore, digital photographs of foods were planned to quantify the portion size of foods to reflect participants' dietary behaviour, and to confirm the dietary intake of Thai adolescents assessed by the FFQ used in the TEQ and the 24-hour dietary recall. Similar to other dietary assessments, collecting dietary data for more than 1 day is required for assessing the pattern of dietary intake. In this study, participants were asked to take photographs of their food and beverages for three days including at least one day from weekend, and two days from the week.

Quantitative data collection

Firstly, the high school head teachers were asked for their co-operation with the study using an introductory letter explaining the project. They were also asked to inform the students in their classes about the study. Then the information sheet (Appendix: F) and consent form (Appendix: G) were distributed by the researcher who waited in the school canteen or classroom to explain the study. The 184 students from the urban high school and 152 students from the rural high school who agreed to take part in this study had to return the consent form with their signature and their parent's signatures. The age of consent in Thailand is 20 years old. They completed the questionnaires at lunch time or self study time (self directed). The participants were seated in a quiet area, and the researcher explained the purpose of the survey which was to find out what they do and think about eating behaviour. Therefore,

there was no right or wrong answers. They were asked to read each question carefully and select only one response. The researcher also informed participants about household units used to measure the serving size of their food and beverages. In addition, serving sizes were consistent with the Thailand Nutritional Flag. For example; 1 chicken drumstick was equal to 2 table spoons, 1 ear of corn was equal to 1 serving spoon, and 1 orange was equal to 1 portion. Then, each participant was given an identification number and completed the TEQ questionnaire in around 20-25 minutes.

After completing the questionnaire, their weight, height and waist circumference were measured by the researcher in a private room provided by the schools. Participants were in light clothing, and they were asked to take off their shoes. Participants' weight and then their height was measured while they were in position with their head horizontal, knees straight, and arms loosely in a straight line by their side. Their waist circumference was measured at umbilical level.

After that, ten male and ten female students from each school who agreed to take part in this part of the study went to meet the researcher as per their appointments. Before completing the 24-hour dietary recall form, each participant was given an explanation about the objective of this method and the instructions for completing the 24-hour dietary recall form. Each participant was also reminded again about household units which were used to identify the serving size of their food and beverages. Each participant was asked to complete the 24-hour dietary form for the first time. After that, the researcher make two further appointments with the participants to complete the 24-hour dietary recall form on 2 further occasions. They all completed the 24-hour dietary recall from for three days as required. In this study, participants filled the 24-hour dietary recall form (not the researcher) because of the time limitation in the lunch break time when the students participated in this phase at the same time. However, the researcher was available to the participants to answer any questions which may occur from completing the 24-hour dietary recall. In addition, self-report of dietary intake may be influenced by social desirability and researcher expectation. Anonymity and avoiding face to face interview between the researcher and participant may help to reduce this bias (Kassem & Lee, 2004).

Then ten male and ten female students from both schools who agreed to take part attended an appointment with the researcher. The researcher gave the participants digital cameras to take photographs of their food and beverages. Each participant was given an explanation about the objective for this method and the instructions for using the digital camera. The researcher also informed each participant that they had to take photographs of their food and beverages over three days, including one day from the weekend. After completing the photographs, the digital cameras with images of food were returned to the researcher and uploaded onto the researcher's computer with password protection. The images on the digital cameras were deleted from the memory card before giving the digital camera to the next participant.

Quantitative data analysis

Data obtained from the TEQ

In the first part, all data were analysed with the Statistical Package for Social Science (SPSS version 15.0 SPSS Inc. Chicago, IL, USA).

Descriptive statistics, including percentages, mean, and standard deviation, were used to examine the demographic data and study variables, of eating behaviour, eating intention, attitude towards eating behaviour, subjective norm regarding eating behaviour, and PBC over eating behaviour.

Inferential statistics were used to analyse the following:

-Stepwise regression analyses were undertaken to predict eating intention (dependent variable) by attitude, subjective norm, and the PBC, and eating behaviour (dependent variable) by PBC, and eating intention (Field, 2009; Rashidian et al., 2006).

- T-tests were used to compare the differences in demographic data (height of participants) when they were normally distributed (Field, 2009).

- A Mann-Whitney test was used to compare the differences in demographic data (age, weight, and waist circumference) and food consumption between urban and rural participants when they were not normally distributed (Field, 2009).

- A Wilcoxon signed-rank test analysis was used to compare the difference in food consumption between the data from the TEQ and the 24-hour dietary recall for 40 participants when there was not normal distribution (Field, 2009).

Before using Pearson's product-moment correlation coefficient analyses and multiple regression, several assumption tests, including normality, linearity, multicollinearity, and homoscedasticity, were required to ensure the validity and reliability of statistical calculations as follows (Field, 2009).

-Assumption of normality

Normality assumption indicated that a data set comes from a normal distribution of the population. In statistics, a normality test can be examined by several methods such as computing the Skewness and Kurtosis, using a histogram with a normal probability plot, and a Kolmogorov-Smirnov test. In this study, Fisher Skewness Coefficient, Fisher Kurtosis Coefficient and histogram with a normal plot were used to present the normality of each variable. The results of the Fisher Skewness Coefficient and Fisher Kurtosis Coefficient were interpreted as having a normal distribution of between -1.96 and +1.96.

$$\text{Fisher Skewness Coefficient} = \frac{\text{Skewness}}{\text{Standard Error of Skewness}}$$

$$\text{Fisher Kurtosis Coefficient} = \frac{\text{Kurtosis}}{\text{Standard Error of Kurtosis}}$$

The histogram with a normality probability plot can be examined visually. In this study, normality of attitude towards eating behaviour, subjective norm regarding eating behaviour, PBC over eating behaviour, eating intention, and eating behaviour were computed, and presented as a number between -1.96 and -1.96 (Appendix: H).

In addition, a histogram of all the variables also showed normal distribution (Appendix I). Thus, all variables in this study were normally distributed (Field, 2009).

-Assumption of linearity

In statistics, linearity testing is used to examine the association between independent and dependent variables as a straight line. Their linearity can be tested by scatter plot graph, and then examined visually. In this study, no evidence was found of the violation of this assumption (Appendix J) (Field, 2009).

-Assumption of multicollinearity

Pearson's product-moment correlation coefficient analyses were used to identify the association between the scales for the 5 variables including attitude, subjective norm, PBC, intention, and behaviour regarding eating behaviour (Field, 2009; Harris & Taylor, 2008). Multicollinearity indicates high intercorrelation among the independent variables. If there is a strong correlation ($r \geq 0.85$) present between the independent variables, the data set may not be reliable for analyses. One way to assess multicollinearity among independent variables is to perform correlations. If a correlation coefficient illustrates a correlation of 0.85 or higher, this may demonstrate multicollinearity. In this study, there was no evidence that the independent variables were highly associated with each other (Appendix: K) (Field, 2009).

-Assumption of homoscedasticity

Homoscedasticity demonstrated that variance of the dependent variables is the same for all data of the independent variable. Homoscedasticity can be tested by scatter plots, and then examined visually. The plot should be presented around the regression line. In this study, scatter plots illustrated no violation in this assumption (Appendix: L) (Field, 2009).

All study variables were tested for assumption testing, before correlation analysis, and then stepwise multiple regression analyses were undertaken. The results indicated that there was no evidence of the violation of the assumption of correlations and multiple regressions.

The descriptive and inferential statistics in this study were suggested and approved by Dr Patrick Musonda, BSc (Hons), MSc (Medstats), PhD, Norwich Medical School, University of East Anglia.

The Thai adolescents' weight status was classified by using the weight-for-height growth charts of the Division of Nutrition, Department of Health, Ministry of Public Health, Thailand (2000) (Appendix: M). Typically, this standard growth chart was developed to determine the weight status of Thai children and adolescents 5-18 years. In this study, the weight and height of the participants were plotted on those charts and were compared with the standardised national nutrition status for the Thai population who were aged 5-18 years old. Then, adolescents were classified into six categories according to their weight-for-height as follows.

1. Under weight   (<-2 SD of the standard population)
2. Pre-under weight   (SD from -2 to <-1.5 SD of the standard population)
3. Normal weight   (SD from -1.5 to + 1.5 SD of the standard population)
4. Over weight   (SD from > +1.5 to +2 SD of the standard population)
5. Pre-obesity   (SD from> +2 to +3 SD of the standard population)
6. Obesity   (> +3 SD of the standard population)

Data obtained from the 24-hour dietary recall

Forty participants completed the 24-hour dietary recall and they also completed the FFQ. The 24-hour dietary recall provides quantitative data such as the serving size of food and beverages. It also provides qualitative data including kinds of food and beverages, and when and where the participants ate. This was converted to numerical data based on the household units of the Thai Nutrition Flag. For examples; 1 chicken drumstick was equal to 2 table spoons, 1 bar of corn was equal to 1 serving spoon, and 1 orange was equal to 1 portion.

The serving sizes of four main food groups including food in the protein group, rice and starchy foods, fruit, and vegetables were entered in to SPSS, version 15. Descriptive statistical analyses including mean, and percentages were used to quantify the serving size of foods. Inferential statistics, Wilcoxon signed-rank test was used to compare dietary consumption of the 40 participants assessed between the FFQ (within the TEQ) and the 24-hour dietary recall form.

Data obtained from food and beverage photographs

Participants' food photographs were analysed by examining food choices and estimating their portion size (Gibson, 2005; Hampl et al., 2003). The photographs were planned to be used as a triangulation technique to confirm the adolescents' eating behaviour with the 24-hour food recall and the FFQ within the TEQ.

Quality of the quantitative component

The validity of this study meant that the findings gained from the sample were generalise able to a population. To achieve this, the instrument used needed to be reliable and valid (Creswell & Clark, 2007). In this study, the TEQ was developed based on the TPB as a new instrument as stated in chapter 4 (section 4.2). Therefore, its validity and reliability were investigated to establish its accuracy, and then the validity of data and the results of this study can be confirmed.

Validity

The TEQ had a very good content validity index (CVI 0.98).

Internal consistency reliability and test-retest reliability

Overall, the results of reliability testing for the TEQ showed that Cronbach's alpha of each part was acceptable between 0.80-0.86 (Appendix: N). Pearson's correlation analysis showed an association of test-retest reliability coefficient of each part of the TEQ between 0.53 and 0.71. This means that they had a reasonable to high correlation (Harris & Taylor, 2008). More details of the results of reliability testing are stated in chapter 4, table 4.6.

Qualitative design and method

A qualitative method was used for the second part of the study to determine factors influencing Thai adolescents' eating behaviour.

According to the literature review, the focus group method is an effective data collection strategy in the field of health research (Neumark-Sztainer et al., 1999; O'Dea, 2003). In addition, it has been widely used as a research tool for collecting data regarding eating behaviour in adolescents (Korwanich, Sheiham, Srisuphan, & Srisilapanan, 2007; Monge-Rojas et al., 2005; Neumark-Sztainer et al., 1999;

Stevenson et al., 2007). Focus groups were also found to be an effective strategy for data collection with children to obtain more in depth discussion of children's attitude and behaviour regarding eating behaviour (Dixey et al., 2001). Traditionally, the aim of conducting focus groups is to generate qualitative data regarding people's feeling, opinions, beliefs and experiences in their own words (Kitzinger, 1995; Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009). Focus group techniques have been conducted on a wide variety of topics (Stewart, Shamdasani, & Rook, 2007). They are a very useful technique for some participants who may feel like they have nothing to say or may be reluctant to participate in an individual interview. So, this technique may encourage their participation in the group discussion. Many researchers usually propose that 5 to 10 participants are appropriate for conducting effective group discussion. Typically, semi-structured interview questions (Appendix: O) are developed to guide the group discussion (Stevenson et al., 2007), and ensure consistency in questions asked across groups (Neumark-Sztainer, et al., 1999). While the initial question should be very broad, and be related to the topic (such as the meaning) the later questions should focus on main issues that can help the researcher answer their research questions (Teddlie & Tashakkori, 1999).

Setting

The qualitative phase was also conducted in Saunphung Wittaya School and Bejamarachutit Ratchaburi School, Ratchaburi Province, Thailand.

Participants

To further identify their eating behaviour and the factors influencing eating behaviour, four focus group discussions using single-sex groups of boys and girls were used to facilitate the discussion of eating behaviour. The forty students who participated in section 2 of the quantitative part (completing the 24-hour dietary recall form and photographing their food and beverages) were selected to participate in the focus group discussion. In addition, as individuals with different weight status may have different food choices, therefore within each group it was also planned to included participants with different weight status; underweight, normal weight, and overweight in equal members. However, this was not possible and so the different weight status criteria could not be met because the rest of the participants did not wish to participate further as they had little spare time. One male and one female

rural student withdrew from the study after completing the 24-hour dietary recall and photographs of their food and beverages. Therefore, the remaining participants were divided into two separate male/female groups of nine or ten individuals to provide a comfortable and relaxed environment to discuss eating behaviour freely (Billson, 2006; Bowling, 1997; Stewart et al., 2007).

Finally, a total of 4 focus groups, representing 38 participants, with 9-10 individuals per group, were recruited using two variables; sex (male vs female) and setting (urban vs rural), that were most likely to influence respondent data (Billson, 2006). The design is represented as follows:

Table 3.1 Focus group structure**s**

Urban public high school	Rural public high school
Group 1 (10 males)	Group 3 (9 males)
Group 2 (10 females)	Group 4 (9 females)

Tool and materials in qualitative phase

There were two main tools and material in this phase as follows:

Worksheet

A small worksheet was developed by the researcher prior to the group discussion to give to the participants. This worksheet was designed to help participants' think about their food and factors influencing their eating behaviour. It also encouraged their independent thinking before the discussion (Neumark-Sztainer et al. 1999). The worksheet consisted of two questions as follows:

1. What foods do you eat often?
2. Why do you always eat them?

Semi-structured interview questions

The aim of conducting focus groups in this study was to explore urban and rural Thai adolescents' perceptions of their eating knowledge, eating behaviour and factors influencing their eating behaviour. Focus group discussions are guided by a semi-structured interview schedule concerning their perception of eating behaviour and factors influencing eating behaviour. The schedule consists of 5 core questions as follows:

1. What is healthy eating behaviour in your opinion?
2. What are the advantages of healthy eating for you?
3. Do you know about food based dietary guidelines for Thai people?
4. What kind of food do you eat each day and how much do you eat?
5. Why do you eat those foods (healthy and unhealthy foods)?

Qualitative data collection

The consent forms were signed by participants and their parents. Before starting the focus group discussion, the participants were requested to keep confidentiality within the groups and signed the confidentiality form (Appendix: P).

The two single-sex focus groups were conducted on the 22nd and 24th of July 2009 in Suanphung Wittaya School. One group was composed of 9 male students, and another group consisted of 9 female students. Both groups were undertaken in school time in the personal study period (3.15-4.15 pm) before going home. Each group was scheduled to last 45 minutes to one hour. The groups were held in the teachers meeting room of Suanphung Wittaya School.

The other two single-sex group discussion were undertaken on the 28th and 30th of July 2009 in Benjamarachutit Ratchaburi School. One group was composed of 10 male students, and another group consisted of 10 female students. The groups were undertaken in school time in the personal study period before lunch time (11.15-12.15 pm). Each group was scheduled to last 45 minutes to one hour. The groups were held in the teachers meeting room of Benjamarachutit Ratchaburi School.

The first part of the four focus group discussions began by asking participants to complete a worksheet which includes a series of questions to help adolescents to

think about what foods and beverage they often eat and why they eat them, and encourage independent thinking before group discussion (Neumark-Sztainer et al., 1999).

After that the participants were asked to share what they wrote. The researcher also wrote the key issues on a flip chart (Kitzinger, 1995) and the participant were asked about their own concepts of healthy eating. The researcher facilitated the group with a note taker (work colleagues experienced in research) (Appendix: G). They were also audio-recorded. At the end of the discussion, the researcher summarised the main issues raised by the group. They were shown to the group members, and were then checked by participants to confirm data accuracy (Creswell & Miller, 2000; Grbich, 1999).

Qualitative data analysis

Thematic analysis was used for the analysis of data derived from the focus group discussions on eating behaviour and factors influencing Thai adolescent' s eating behaviour. The data from focus group discussions were analysed following the six steps of thematic analysis developed by Braun and Clarke (2006). The six guidelines are outlined following the translation of the data from Thai to the English language.

First of all, the focus group discussions were transcribed in Thai and then translated into English by the researcher. After that, they were checked by Dr Benjawan Sriyotin who is proficient in Thai and English. Then in the first step, the researcher started to familiarise herself with the data by reading, and reading transcript line by line, word by word in an active way as a search for meaning. In the second step, the researcher generated initial codes and in this study, coding was "data-driven" which means that the codes and themes will depend on the data set rather than from a top down process. Coding was performed manually by writing notes on the text that were being analysed, by using coloured pens to indicate potential patterns. The researcher generated an initial list of ideas based on what is in the data and what is interesting about it. Codes were identified, and then were matched with data extracts that demonstrated the code. Thirdly, the researcher searched for themes. In this phase, the researcher started to analyse a long list of different codes identified across the data set and considered how different codes may combine to form an overarching theme. Initial thematic maps were outlined to present the relationship between:

codes, themes, and between the different levels of themes (main and sub-themes). While some codes contributed main themes, other codes formed sub-themes. Then, the themes were reviewed. In this phase, the researcher checked the themes worked in relation to the coded extracts and the entire data set. Initial thematic maps of the analysis were refined. The researcher also further reviewed and refined the coding many time until the researcher was satisfied with thematic maps. After refining the specific of each theme, the researcher defined and named each theme. Lastly, the results of the thematic analysis of this study will be reported in chapter 6.

Rigour in the qualitative component

In a qualitative study, many techniques are used to ensure the validity of the results as follows.

Credibility

The credibility of a qualitative study is established by many techniques; Triangulation, member checking, peer debriefing, and prolonged engagement (Lincoln & Guba, 1985).

In this study:

Triangulation: The TEQ and focus groups with semi-structured interviews were used for gathering data to examine factors influencing Thai adolescents' eating behaviour, and they confirm the results of each other.

Prolonged engagement: The researcher spent at least one month in each public high school all day (school time) for data collection in the qualitative phase and preparing for data gathering in the qualitative phase. In that time, the researcher would sit around the same area in front of the school building (informal area). It meant that it was easy to find the researcher, if any student wanted to meet the researcher. Many students and most of the participants came to talk with many stories and they asked many questions related to this study and the process of a PhD study. This situation can help the researcher to make a good relationship and build trust before undertaking the focus group with them (Lincoln & Guba, 1985).

Member checking: At the end of the group discussion, the researcher summarized the main issues in related to the questions. They were shown to the group members, and

were then checked by the participants to confirm data accuracy (Creswell & Miller, 2000)

Peer debriefing: This study has been conducted by the researcher under the supervision of the research supervisors: Dr Janet Ramjeet, Dr Lee Hooper, and Dr Jill Robinson. Three supervisors have provided feedback and comments on the findings of this study as peer debriefers (Creswell & Miller, 2000).

Transferability

In order to achieve transferability, this thesis provided a clearly description of design, data collection, data analyses, and the findings in order to enable the reader's understanding of this study (thick description), and they will then consider whether the findings can be applied to their own area (Lincoln & Guba, 1985).

Dependability

In order to achieve dependability, the different data collections in this study (focus groups with semi-structured questions, the TEQ) were conducted to help determine the dependability of responses from the participants (Lincoln & Guba, 1985). For example, four focus groups with 5 semi-structured questions were used to ensure the consistency in the question asked across each group. In addition, completing the 24-hour dietary recall form and taking the photographs of food and beverages were conducted for at least three days to confirm or reflect adolescents' eating behaviour at both the weekend and during the school week.

Confirmability

In order to achieve confirmability, triangulation strategies were employed in this study to confirm the accuracy of findings (Lincoln & Guba, 1985). According to the mixed methods design of this study, survey and focus groups were conducted to examine factors influencing Thai adolescent healthy eating behaviour, while the survey, the 24-hour dietary recall technique, and photographic methods were carried out to investigate Thai adolescents' eating behaviour.

Stage of quantitative and qualitative data integration

In the design of this study, parallel mixed data analysis was used to determine factors influencing Thai adolescents' eating behaviour. The quantitative data collected from the questionnaire and qualitative data collected from focus groups were analysed separately. In the quantitative strand, multiple regressions analyses were used to examine the predictors of eating behaviour and eating intention. In the qualitative strand, thematic analysis was used to analyse narrative data collected from focus groups identifying factors that influenced eating behaviour. The results were then integrated in the interpretative phase of this study for deeper insight and understanding in the analysis of the study results (Onwuegbuzie & Leech, 2004).

Figure 3.4 Parallel mixed data analysis
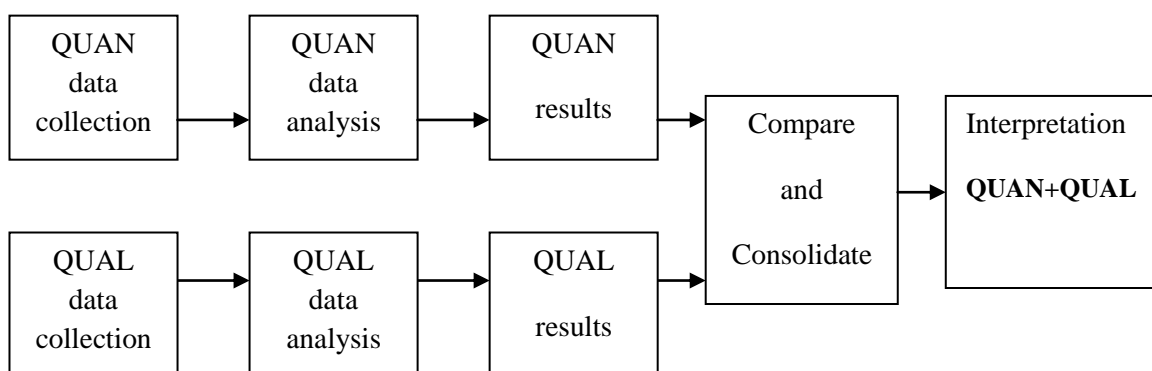
3.7 Conclusion

In order to examine factors influencing Thai adolescents' eating behaviour and their eating behaviour, mixed methods were selected and employed to examine the data collected. The mixed methods design selected did not exactly fit with any existing design. This was because the methodology of this study was informed by the ideas of the researcher based on the research questions, literature review regarding mixed methods and studies related to eating behaviour. This study was divided into two phases. In the first phase, there was a cross-sectional survey of urban and rural Thai adolescents' eating behaviour and factors influencing their eating behaviour in both urban and rural areas of Thailand using the component of the TPB. Two more dietary

assessments comprising the 24-hour dietary recall and digital photograph technique were used to further explore Thai adolescents' eating behaviour.

In the second phase, the factors influencing urban and rural Thai adolescents' eating behaviour were further explored by using the focus groups. Quantitative and qualitative data were analysed separately, and then they were drawn together in the interpretative phase.

Chapter 4

Development and validation of the Thai Eating Questionnaire (TEQ)

This chapter discusses the development and validation of a questionnaire (TEQ) regarding eating behaviour based on the TPB for use with adolescents in Thailand. This chapter is presented in three sections. Firstly, the background for the development of the questionnaire is described, and then the development of the TEQ is presented. Finally, the results of the development and validation of the questionnaire is summarised.

4.1 Background for development a questionnaire

Eating behaviour is associated with the health of all age groups (Theobald, 2004). Therefore, factors influencing eating behaviour need to be examined in order to promote healthy eating behaviour, particularly in adolescents, because adolescence may be the most effective period for the successful prevention of adulthood chronic diseases such as CVD, hypertension, and type 2 diabetes (World Health Organization, 2005). Dietary behaviour is complex and influenced by many factors, including psychosocial factors (Kim et al., 2003; Neumark-Sztainer et al., 1999). Theories have been developed to explain dietary behaviour including cognitive models developed in health psychology to explain day to day decision making in relation to health behaviours, including eating behaviour. One model based on cognitive decision-making is the TPB (Ajzen, 1991). While eating behaviour needed to be examined for promotion of a healthy diet, the studies which have examined healthy eating intention and healthy eating behaviour reported that the components of the TPB were a useful predictor of healthy eating intention and healthy eating behaviour with varying degrees of success (Conner & Norman, 2005). However no instrument has been developed in regard to eating behaviour that includes all the

component of the TPB for use with adolescents in Thailand. Therefore, the new questionnaire, namely the TEQ needed to be developed for this study.

4.2 Development of the TEQ

There were four phases for the development and validation of this questionnaire, comprising:

Phase 1:   Constructing a preliminary questionnaire based on the TPB
Phase 2:   Assessing content validity index
Phase 3:   The questionnaire translation process
Phase 4:   Reliability testing and results as follows

Phase 1: Constructing a preliminary questionnaire based on the TPB

When the TPB is used as a framework for the development of a questionnaire, the questionnaire should be developed according to the steps suggested by Ajzen who developed this model (Ajzen, 2006). Ajzen recommended that a questionnaire based on the TBP should be initially derived from pilot work in the setting for data collection so as to enable the capturing of specific circumstances and factors involved in the behaviour from the target population in question. In terms of its content, open-ended questions are suggested by Ajzen to be used to generate common beliefs about behaviour. Then, those beliefs will be used to develop the instrument.

Therefore, formative assessment included both a review of the literature and then a pilot study to generate common beliefs (behavioural, normative, and control beliefs) related to eating behaviour. The pilot interview used 8 open-ended questions regarding healthy eating behaviour and was conducted with 10 female and 10 male students, aged 15 to 18 years, from 2 high schools (used for the main study) in Ratchaburi Province, Thailand, in November 2008. However, the students who participated in the development of the TEQ pilot study were not recruited to the main study.

The participants were interviewed using the following questions:

(1)What do you believe are the advantages or positive outcomes for undertaking healthy eating behaviour every day in the future?

(2) What do you believe are the disadvantages or negative outcomes for undertaking healthy eating behaviour every day in the future?

(3) Are there any individuals or groups who would approve of your practicing healthy eating behaviour every day in the future?

(4) Are there any individuals or groups who would disapprove of your practicing healthy eating behaviour every day in the future?

(5) What factors or circumstances would enable you to practice healthy eating behaviour every day in the future?

(6) What factors or circumstances would make it difficult or impossible for you to practice healthy eating behaviour every day in the future?

(7) Is there anything else that comes to mind when you think about healthy eating behaviour?

(8) Is there anything else that comes to mind when you think about unhealthy eating behaviour?

Then, common beliefs from the responses to 8 open-ended questions were elicited and frequencies were measured as follows.

Table 4.1 Behavioural beliefs regarding healthy eating behaviours of Thai adolescents

Behavioural beliefs	Frequency		Total frequency (n=40)
	Urban adolescents (n=20)	Rural adolescents (n=20)	
Healthy feeling	17	18	35
Avoiding chronic disease	10	10	20
Help excretion system	9	11	20
Healthy weight	4	11	15
Ingesting insecticide	12	3	15
Maintaining good shape	7	7	14
Affect immune system	6	8	14
Healthy skin	9	4	13
Fresh feeling	8	5	13
Getting hungry easily	5	2	7
Good physical growth	3	2	5
Good body system	2	1	3
Live longer	-	2	2
Delayed ageing process	-	1	1

Table 4.2 Normative beliefs regarding healthy eating behaviours of Thai adolescents

Normative beliefs	Frequency		Total frequency (n=40)
	Urban adolescents (n=20)	Rural adolescents (n=20)	
Parents	19	19	38
Relatives	14	19	33
Teachers	13	20	33
Health care professionals	8	13	21
Friends	7	12	19
Mass media	16	-	16

Table 4.3 Control beliefs regarding healthy eating behaviours of Thai adolescents

Control beliefs	Frequency		Total frequency (n=40)
	Urban adolescents (n=20)	Rural adolescents (n=20)	
Taste	20	19	39
Availability of foods	14	16	30
Convenience	13	17	30
Cost	10	19	29
Knowledge regarding eating	5	15	20
School policy	5	12	17
Motivation	9	7	16
Advertising	9	2	11
Boredom factor	5	5	10
Appearance or packaging of food	6	3	9
Time	5	3	8
Fashionable	6	1	7
Support or encouragement	-	5	5
Community based campaign regarding eating	3	-	3
Away from home	2	1	3
Force	3	-	3
Role models	1	-	1

Then, the common beliefs from the pilot study were used to develop the preliminary TEQ (part 4-6). The first draft of the TEQ was developed in English based on the five constructs of the TPB. It is composed of 112 items divided into 6 parts as follows.

Questionnaire format

Part I: Personal information

Personal information was assessed using nine items. The items were room number, the school year, name of school, home location, age, sex, weight, height, and waist circumference (weight, height, waist circumference were measured by the researcher).

Part II: Eating behaviour

Scale

The eating behaviour scale was developed based on the Thailand Nutrition Flag together with a review of the literature. Eating behaviour was assessed using 9 questions in relation to food and beverages including vegetables, fruit, food in the protein group, rice and starchy foods, milk, fast foods, snacks (sweet and savoury), and sweet drinks. This part of the questionnaire was developed as a FFQ (food frequency questionnaire). There are two formats for the scale. Firstly, the questions were used to identify how many household units of food, comprising portion (fruit), serving spoon (vegetables and starchy foods), and a table spoon (protein group) were used to measure food consumption: question numbers 1 to 5. They were rated from 1 to more than 10. Secondly, the questions asked how many days over the last week did the respondents consume fast food, sweets, savoury snacks, and sweet drinks: questions numbers 6 to 9. They were rated from: 0 (no consumption) to 7 (seven days per week) as the end points.

Questionnaire examples:

---

1. How many rice-serving spoons of vegetables do you eat each day?

rice-serving spoons											
0	1	2	3	4	5	6	7	8	9	10	> 10

6. How many days over the last week did you eat fast foods such as burgers, sausages, pizzas, fried chicken, and meat balls?
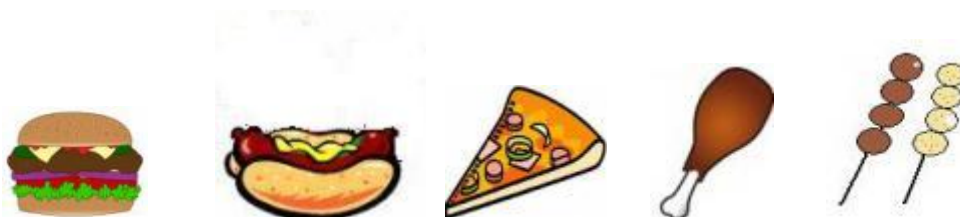
Days							
0	1	2	3	4	5	6	7

Scoring

The scoring for the food consumption (based on the Thailand Nutritional Flag) indicated that people aged between 14-25 years should consume:

- Vegetables at least 5 serving spoons per day

- Fruit at least 4 portions per day

- Food in protein group approximately 9 table spoons per day

- Rice and starchy foods approximately 10 serving spoons per day

- Milk and yogurt approximately 1 to 2 glass/es per day

Therefore,

- For vegetables, the higher number reflects higher consumption, and therefore answers of 0 to 10 score 0 to 10 (serving spoon), and answers of more than 10 (serving spoon) become scores of 11.

- For fruit, the higher number reflects higher consumption, therefore answers of 0 to 10 (portion) score 0 to 10, and answers of more than 10 (serving spoon) become scores of 11.

- For food in the protein group, answers of 0 to 9 (table spoons) score 0 to 9. Answers of 10 and more than 10 (table spoons) reflect higher than recommended consumption, and these scores should be lower than the highest score (9). Scoring for rating of 10 (table spoon) should be lower than 9, and 8 is an appropriate score because a rating of 10 is different from a rating of 9 (table spoon) only one table spoon less, like a rating of 8 (table spoon). Whilst ratings of more than 10 can be any number, its score can be 0 to 7. In numerical terms, 4 is an appropriate score for a rating of more than 10 (table spoon) because the median score of 0 to 7 is 3.5 or approximately 4.

- For rice and starchy foods, answers of 0 to 10 (serving spoon) remain as scored 0 to 10. Ratings of more than 10 (serving spoon) reflect higher than recommended consumption, and can be any number (serving spoon). However, this score needed to be lower than the highest score (10), so this would be on a scale of 0 to 9. For example a score of 5 is appropriate for a rating of more than 10 because the median from 0 to 9 is 4.5 or approximately 5.

- For milk and yogurt, answers of 0 (glass) remains at a score of 0. Answers of 1 and 2 (glass/es) are scored at 10 (the highest score). Answers 3 and above reflect higher than recommended consumption, and so should be scored lower than the optimum score (10). Therefore answers of 3 to 6 (glass) were scored as 5 because the

median from 0 to 9 is 4.5 or approximately 5, and answers of 7 to >10 (glass) become scores of 0.

Scoring of eating consumption are summarised on the table 4.4 as follows.

Table 4.4 Scoring of food consumption

1. How many rice-serving spoons of vegetables do you eat each day?											
Serving spoon/s	0	1	2	3	4	5	6	7	8	9	10	> 10
Scoring	0	1	2	3	4	5	6	7	8	9	10	11
2. How many portions of fruit do you eat each day?											
Portion/s	0	1	2	3	4	5	6	7	8	9	10	> 10
Scoring	0	1	2	3	4	5	6	7	8	9	10	11
3. How many table spoons of meat or protein do you eat each day?											
Table spoon/s	0	1	2	3	4	5	6	7	8	9	10	> 10
Scoring	0	1	2	3	4	5	6	7	8	9	8	4
4. How many rice–serving spoons of rice-starchy foods do you eat each day?											
Serving spoon/s	0	1	2	3	4	5	6	7	8	9	10	> 10
Scoring	0	1	2	3	4	5	6	7	8	9	10	5
5. How many glasses of milk and cups of yogurt do you eat each day?											
Serving spoon/s	0	1	2	3	4	5	6	7	8	9	10	> 10
Scoring	0	10	10	5	5	5	5	0	0	0	0	0

The questions number 6 to 9 were rated on: 0 (no consumption) to 7 (seven days per week) as the end points, and answers of 0 to 7 become scores of 7 to 0, respectively. For example, an answer of 2 becomes a score of 5, and answers of 5 become a score of 2.

Part III: Eating intention

Scale

Eating intention was also developed based on both the Thailand Nutrition Flag and literature review. Eating intention was assessed using 9 questions in relation to intention to eat healthily and avoid unhealthy food. They were all positive questions, and each question was measured on scales running from 1 (strongly agree) to 7 (strongly disagree) at the end points.

Questionnaire examples:

2. I intend to eat more fruits in the future.

___1___:___2___:___3___:___4___:___5___:___6___:___7____

   strongly agree   strongly disagree

7. I intend to avoid sweet snacks in the future
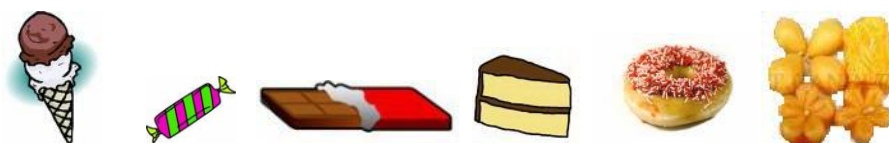
___1___:___2___:___3___:___4___:___5___:___6___:___7____

   strongly agree   strongly disagree

Scoring

The lower rated number reflects the higher attention to performing healthy eating behaviour. Therefore, the scoring for answers 1 to 7 was reversed and became scores of 7 to 1, respectively. For example, an answer of 3 was scored 5, and an answer of 5 was scored 3, while an answer of 4 was scored at 4.

Part IV: Attitude towards eating behaviour

Attitude towards eating behaviour subscale questions was developed from behavioural belief responses to the open-ended questions from the pilot study. It was composed of two subscales: A. Beliefs about outcomes regarding eating, and B. Importance of the outcomes regarding eating.

A. Belief about outcomes regarding eating

Scale

The belief about outcomes regarding eating subscale is assessed using 13 questions in relation to beliefs about outcomes of healthy and unhealthy eating behaviour. The questions have negative and positive words regarding the outcomes of eating behaviour, and they were measured on a scale from 1 (healthier) to 7 (less healthy). However, there were nine positive questions: (1, 2, 4, 5, 7, 8, 10 &, 11) and four negative questions (3, 6, 9, 12, and 13).

Questionnaire examples:

Positive question:

1. Eating more fruit and vegetables will make me

____1____:____2____:____3____:____4____:____5____:____6____:____7____

healthier   the same   less healthy

Negative question:

3. Eating more savoury snacks and sweet drinks will give me

____1____:____2____:____3____:____4____:____5____:____6____:____7____

a better   the same   a worse

immune system   immune system

Scoring

For positive questions, the lower number reflects a higher positive attitude towards health eating behaviour. Therefore, for answers of 1 to 7 they were reverse scored 7 to 1, respectively. For example, an answer of 3 was scored 5, and an answer of 5 was scored 3, while an answer of 4 was scored as 4. For negative questions, the lower number reflects a higher negative attitude, so that answers of 1 to 7 were scored 1 to 7.

B. Importance of the outcomes regarding eating

Scale

The beliefs about the importance of the outcomes regarding eating behaviour subscale were assessed using 12 questions. They were measured on a scale ranging from 1 (extremely unimportant) to 7 (extremely important). However, there were ten positive questions: (1-10), and two negative questions (11 & 12).

Questionnaire examples:

    Positive question:

  1. To me, being healthy is:

    _____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely

  unimportant   important

    Negative question:

  2. To me, the enjoyment of food is:

    _____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely

  unimportant   important

Scoring

For positive questions, the higher number answered reflects the stronger beliefs regarding the importance of outcomes of healthy eating. Therefore, answers for 1 to 7 were scored 1 to 7. For negative questions, answers of 1 to 7 were reverse scored 7

to 1, respectively. (An answer of 3 was scored at 5, and an answer of 5 was scored at 3, while an answer of 4 remains scored at 4).

Part V: Subjective norm regarding eating behaviour

Subjective norm regarding eating behaviour subscale questions was developed from normative beliefs listed on the open-ended questions from the pilot study. It was composed of two subscales: A. Beliefs about your important people's thinking regarding eating, and B. Influence of people who are important to you.

A. Beliefs about your important people's thinking

Scale

Beliefs about your important people's thinking subscale was assessed using 12 questions in relation to six categories, comprising parents, relatives, teachers, friends, health care professionals, and the mass media, as well as beliefs about the social pressure to perform or not perform healthy eating behaviour. They were measured on a scale from 1 (I should not...) to 7 (I should…) as the end points. There were six questions regarding healthy eating behaviour (1, 3, 5, 7, 9, & 11) and six questions regarding unhealthy eating behaviour (2, 4, 6, 8, 10, & 12).

Questionnaire examples:

Question regarding healthy eating behaviour:

  1. My parent/s or guardian/s think/s that

    I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

<div align="center">eat more fruit and vegetables in the future</div>

Question regarding unhealthy eating behaviour:

  2. My parent/s or guardian/s think/s that

    I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

<div align="center">eat savoury snacks and sweet drinks in the future</div>

Scoring

For the questions regarding healthy eating behaviour, the higher rated number reflected the higher level of social pressure to perform healthy eating behaviour. Therefore, for scoring, the answers 1 to 7 were scored 1 to 7. For questions regarding unhealthy eating behaviour, the lower rated number reflects the higher level of social pressure to perform healthy eating behaviour. Therefore, for the scoring of answers 1 to 7 they were reverse scored 7 to 1, respectively.

B. Influence of people who are important to you

Scale

Influence of people who are important to you subscale was assessed using six questions in relation to person's willingness to comply with important others' expectation. They were measured on a scale from 1 (strongly disagree) to 7 (strongly agree) at the end points.

Questions example:

---

1. With regard to eating, I want to do what my parent/s or my guardians think I should do

   Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

---

Scoring

The higher rated number reflects the higher degree of individual's motivation to comply. Therefore, for scoring, the answers of 1 to 7 were scored 1 to 7.

Part VI: Perceived behavioural control over eating behaviour

PBC over eating behaviour was developed from control beliefs listed on the open-ended questions from the pilot study. It was composed of two subscales: A. Control belief factors regarding eating, and B. Control beliefs perceived power.

A. Control belief factors

Scale

The control belief factors subscale was assessed using 21 questions in relation to internal and external factors or situations that may facilitate or impede healthy eating behaviour. They were measured on a scale from 1 (strongly disagree) to 7 (strongly agree) at the end points. There were seven positive questions: (1, 3, 5, 7, 10, 13, & 16) and fourteen negative questions: (2, 4, 6, 8, 9, 11, 12, 14, 15, & 17 to 21).

Questions examples:

Positive question:

1. Fruit and vegetables are available.

      Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

Negative question:

2. Fast foods, savoury and sweet snacks, and sweet drinks are available.

      Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

---

Scoring

For positive questions, the lower rated number reflects the higher beliefs about facilitators of healthy eating behaviour. Therefore, for scoring, answers of 1 to 7 were scored 1 to 7. For negative questions, the higher rated number reflects the higher level of inhibitors of healthy eating. Therefore, for scoring, answers of 1 to 7 they were reversed scored 7 to 1, respectively.

B. Control belief perceived power

Scale

Control belief perceived power subscale was assessed using 21 questions in relation to the perceived ease or difficulty to perform healthy eating behaviour. They were rated on 1 (strongly disagree) to 7 (strongly agree) at the end points. There were seven positive questions (1, 3, 5, 7, 10, 13, & 16) and fourteen negative questions (2, 4, 6, 8, 9, 11, 12, 14, 15, & 17 to 21).

Questions examples:

Positive question:

1. It is easy to eat more fruit and vegetables because they are available.

   Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

Negative question:

2. It is hard to eat more fruit and vegetables because fast foods, savoury and sweet, snacks, and sweet drinks are available.

   Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

---

Scoring

For positive questions, the higher number reflected the stronger beliefs about the control belief perceived power to perform healthy eating behaviour. Therefore, for scoring, the answers 1 to 7 were scored 1 to 7. For negative questions, the lower rated number reflects the higher beliefs about the control belief's perceived power to perform healthy eating behaviour. Therefore, for scoring answers of 1 to 7 they were reversed and scored 7 to 1, respectively.

After the preliminary draft TEQ was developed by the researcher, its validity and reliability were examined to ensure its accuracy. They will be presented in phases 2 and 4.

Phase 2: Assessing content validity index of the TEQ

When a new instrument is developed, its validity and reliability are important to establish to reflect the accuracy of an instrument (Pilot & Beck, 2006). Validity refers to how well variables of interest are measured by an instrument (Thomson &

Panacek, 2007). Traditionally, there are three types of validity, comprising the content validity index, construct validity, and criterion validity (Rubio et al., 2003). Firstly, content validity refers to how well the item in the instrument measures the content or meaning of the variable (Rubio et al., 2003; Thomson & Panacek, 2007). Secondly, construct validity refers to how well the instrument measures the theoretical construct or component of interest (Rubio et al., 2003; Thomson & Panacek, 2007). Lastly, the criterion validity refers to the comparison of differences between the new instrument and others when measuring the same variables (Rubio et al., 2003). Content validity is important as the primary step in the development of the new measurement, particularly because it is self-report. The content validity index has been widely used to report measures of quantifying content validity in nursing research (Rubio et al., 2003), and it also contributes to the construct validity (Pilot, Beck, & Owen, 2007). There are three steps to conducting the content validity index after the preliminary work on a new instrument in development (Rubio et al., 2003).

The first step: Selecting of a panel of experts.

The literature provides differing numbers for the total of content experts required for assessing content validity (from two to twenty experts). However some researchers agree that the panel of experts should comprise of at least 3 professionals (Pilot et al., 2007; Rubio et al., 2003). In addition, the panel of experts should be comprised of content and lay experts. The content experts are professionals who have work experience and publications relevant to the measure and the lay experts are people who do not work in the area but can advise on language and understanding. The content experts are invited to determine how an item represents the constructs or variables used to develop the instrument.

The second step: Experts' participation on the response form

After identifying a panel of experts, the preliminary draft of the new instrument with a response form was sent to a panel of experts for assessing the CVI. The experts were asked to rate each question in terms of relevance to the underlying constructs or the components used. Question ratings traditionally use 4-point ordinal scales for avoiding a neutral and ambivalent midpoint: 1=*not relevant*, 2= *somewhat relevant*, 3=*quite relevant*, and 4=*highly relevant* (Pilot et al., 2007).

The third step: Calculating the CVI

Typically, there are two types of content validity index: the content validity index for items (I-CVI), and the content validity index for scales (S-CVI) (Pilot & Beck, 2006; Pilot et al., 2007). The I-CVI is defined as the number of experts giving a rating of either *quite relevant* or *highly relevant* for each item. The I-CVI is computed using a number of experts who rated on 3 *(quite relevant)* or 4 *(highly relevant*) divided by the total number of experts for each item (Pilot & Beck, 2006; Pilot et al., 2007). The I-CVIs were used to indicate the revision and deletion of items.

The S-CVI is defined as the proportion of items on the questionnaire that achieved a rating of *quite relevant* and *highly relevant* by the panel of experts. The S-CVI is computed using a number of items judged to be 3 *(quite relevant)* or 4 *(highly relevant*) divided by the total number of items in the questionnaire. The majority of the literature agrees that a content validity index of 0.90 or higher is acceptable (Pilot & Beck, 2006; Pilot et al., 2007).

In this study, three content experts in the fields relevant to the questionnaire were asked to rate each question of the Thai Eating Questionnaire in terms of relevance to the underlying constructs of the TPB. Dr Janet Ramjeet is an expert in Health Psychology, and Dr Lee Hooper is an expert in Nutrition, in the Faculty of Health, University of East Anglia, United Kingdom and Dr Prannarat Sangperm is an expert in Paediatric Nursing, Faculty of Nursing, Mahidol University, Thailand, and has undertaken published research on Thai adolescents' healthy eating behaviour including some constructs of the TPB. There were only two questions from one hundred and three related to the constructs of the TPB which were rated 2 (somewhat relevant) from an expert.

Next the content validity index was calculated (101 divided by 103). The result of the content validity index calculation was 0.98, (nearly perfect). In addition, two post graduate students who studied Economics and Information Technology, at the University of East Anglia were asked as lay experts to read the TEQ. Minor formatting and wording of the questionnaire was adjusted following content and lay expert advice.

Phase 3: Questionnaire translation process

In this study, the TEQ was initially developed in English because the researcher is an international student and under the supervision of three academics from the University of East Anglia, UK. However, the TEQ was going to be used for data collection in Thailand. Therefore, it was necessary to translate the TEQ from English into a Thai version.

Instrument Translation Process

An instrument translation process is used to ensure the equivalence of meaning between the original and target language of the instrument and thus the results (Chang, Chau, & Holroyd, 1999; Maneesriwongul & Dixon, 2004). There are different procedures for the instrument translation process employed in individual studies (Maneesriwongul & Dixon, 2004). However, Maneesriwongul and Dixon (2004) in a review of 47 studies and their applications of the instrument translation process from English to other language such as Chinese, Spanish, and Korea, identified that the instrument translation process could be classified into six different categories (Table 4.5).

Table 4.5 Hierarchical category of instrument translation process and description
(Maneesriwonggul & Dixon, 2004; p.178)

Category (No)	Description
1. Forward-only translation	Instrument was translated from the source language into the target language without using back-translation technique.
2. Forward translation with testing	Category 1 plus a pre-test of the target language.
3. Back translation	Instrument was translated from the source language into the target language by a translator. Then the target language version was translated back into the source language by other translators. Then, 2 source language versions were compared.
4. Back translation and monolingual test	Category 3 plus test of the target language version among monolingual (target language) subjects.
5. Back translation and bilingual test	Category 3 plus test of the source and target language version among bilingual subjects.
6. Back translation and monolingual & bilingual tests	Category 3 plus test of the target language version among monolingual (target language) subjects, and test of the source and target language version among bilingual subject.

Although, there were no standard guidelines for instrument translation process,
multiple techniques are recommended to be used in the translation process
(Maneesriwongul & Dixon, 2004). Maneesriwongul & Dixon (2004) recommended
that the minimum standard for applying an instrument in another language should
include back-translation and monolingual testing. In addition, back-translation,
monolingual and bilingual testing have been widely used in health research (Chen,
Snyder, & Krichbaum, 2002; Koller, Aaronson, Blazely, Bottomley, Dewolf, and
Fayers, 2007; Willgerodt, Kataoka-Yahiro, Kim, & Ceria, 2005; Yu, Lee, & Woo,

2003). While back-translation aims to ensure the equivalence between the translated and original versions of an instrument (Chang et al., 1999; Maneesriwongul & Dixon, 2004), pilot-testing with participants provides understanding of the instrument and their feedback can be used to revise and clarify the meaning of a question (Chen et al., 2002). Furthermore, pilot-testing the instrument with the participants will also assist the reliability of the new instrument (Maneesriwongul & Dixon, 2004). Therefore, back-translation with pilot-testing is necessary as a part of the translation process to indicate the clarity and appropriateness of the target language version (Chang et al., 1999; Maneesriwongul & Dixon, 2004). Back-translation with pilot-testing was undertaken in this study.

Back-translation

According to Maneesriwongul and Dixon (2004), the process of back-translation should start with forward-translation of the instrument from the source language into the target language by a bilingual translator who is sufficiently familiar with both cultures and is also knowledgeable about the content area of the instrument (Chen et al., 2002). Then, the translated version of the instrument is back-translated into the source language by another bilingual translator who is blinded to the original version of the instrument (Maneesriwongul & Dixon, 2004).

Equivalence testing

After translation and back translation of the instrument, the equivalence of the original and the back-translated version need to be examined and compared by a monolingual judge who will examine the differences found in the back-translation. Typically, two types of evaluation are mostly used for measuring the equivalence of the instrument translation process in nursing research, namely semantic and content equivalence (Willgerodt et al., 2005). Semantic equivalence is used to ensure that the content of each item in the two versions of the instrument keep the same meaning (Chen et al., 2002; Maneesriwongul & Dixon, 2004), while content equivalence is used to ensure that the content of each item in the two versions of the instrument have consistent cultural relevance.

Pilot testing

After achieving semantic and content equivalence of the tool, pilot-testing is necessary to provide participants' understanding of the instrument and their feedback so that it can be used to revise or clarify the meaning of the question (Chen et al., 2002). Although, the back translation process is undertaken to ensure the validity of the translated version of an instrument, the reliability of the original version should not necessarily be assumed as applying to the translated version. However the reliability of the instrument in the target language version should be measured, and in the pilot-testing, the participants can assist the reliability of the new instrument (Maneesriwongul & Dixon, 2004).

In this study, four components of the translation process of the TEQ were undertaken, comprising translation, back-translation, equivalence testing and monolingual testing.

Step 1: Translation of the TEQ (English to Thai)

Firstly, the TEQ was developed in an English version with an acceptable content validity index. It was then translated to Thai by the researcher as a translator because the researcher is an international student who has sufficient knowledge to understand both English and the Thai language. Additionally, the researcher works as a nursing instructor in a community health nursing department in a nursing college in Thailand and has experience in regard to the content area of the TEQ: namely eating behaviour.

Step 2: Back translation of the TEQ (Thai to English)

Then, the TEQ Thai version was back translated into English by Associate Professor Dr. Surintorn Kalampakorn, Faculty of Public Health, Mahidol University, Thailand who was knowledgeable in both Thai and the English language.

Step 3: Equivalence testing between original and back-translated version

After that, examination and comparison of the semantic and content equivalence between the retranslated English version with the original English was carried out by Dr Janet Ramjeet who can use the English language only (monolingual judge). The results of back-translation indicated that there was no difference in the meaning of

the words or concepts between the two English versions of the instrument (source, and back-translated version).

Step 4: Pilot-testing the TEQ

After achieving the semantic and content equivalence of the TEQ, it was piloted with Thai students who can use only the Thai language from Ratchaborikanukhro School, Ratchaburi Province Thailand. First of all, the head teacher was asked for his co-operation using the letter from the School of Nursing Sciences, University of East Anglia. This school is nearby to the schools that were approached for the study. The TEQ Thai version was piloted with 34 Thai students in May 2009. They were able to complete the TEQ within 25 to 35 minutes. Feedback from the 34 students was summarised as follows.

     1. TEQ was easy to understand and complete.

     2. The pictures of food and beverages in the TEQ helped the students to easily understand the items in Part II: eating behaviour and Part III: eating intention.

     3. The pictures of food and beverages in the TEQ helped participants to reduce their boredom when they completed the TEQ.

     4. Before completing the questionnaire, understanding in regard to household measurement of food and beverages (portion, serving spoon, table spoon, and glass) were needed (informed by the researcher).

     5. There are many questions in the TEQ (112items).

The translation process of the TEQ is summarised as follows.

Figure 4.1 Translation procedure of the TEQ

0
```
┌─────────────────┐
│ The TEQ in       │──────────────┐
│ original English │              │
│ version          │              │
└─────────────────┘              │
        │                        ▼
1       ▼                 3 ┌──────────────┐   4 ┌──────────────┐
┌─────────────────┐        │ The TEQ in    │     │ TEQ pilot-    │
│ The TEQ English  │       │ original      │────▶│ testing with  │
│ version was      │       │ English       │     │ Thai 34       │
│ translated into  │       │ version was   │     │ adolescents,  │
│ Thai             │       │ compared with │     │ and again 1   │
└─────────────────┘        │ back-         │     │ week later    │
        │                  │ translated    │     └──────────────┘
        ▼                  │ version       │
2 ┌─────────────────┐      └──────────────┘
│ The TEQ Thai     │              ▲
│ version back     │──────────────┘
│ translated into  │
│ English          │
└─────────────────┘
```
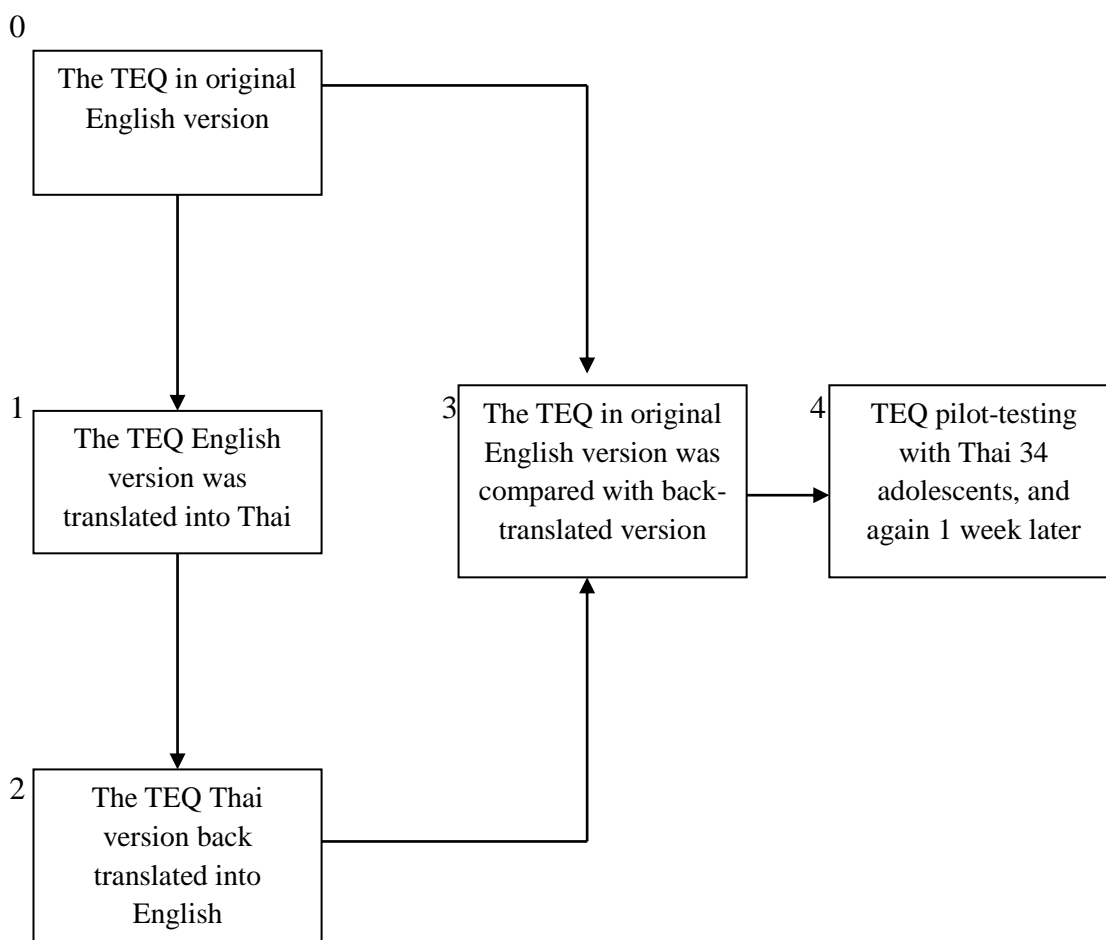
Phase 4: Reliability testing and results

Reliability refers to the degree of consistency of an instrument (Netemeyer, Bearden, & Sharma, 2003).There are several procedures available to measure reliability which are frequently described in the literature, including internal consistency and test-retest reliability. Internal reliability refers to whether the questions in an instrument all measure the same construct, and it is investigated using Cronbach's alpha coefficient (Bissonnette & Contento, 2001; Fila & Smith, 2006; Hewitt & Stephens, 2007; Netemeyer et al., 2003). Cronbach's alpha coefficient should be at least 0.7 or higher for an acceptable scale (Netemeyer et al., 2003). Test-retest reliability of the instrument refers to the consistency of the instrument on two occasions with the same participants (Marx, Menezes, Horovitz, Jones, & Warren, 2003; Netemeyer et al., 2003). It is investigated by comparing the results on the two occasions that the

instrument is used, with the time between for the re-test generally ranging from 2 days to 2 weeks (Marx et al., 2003). Inter-item Pearson correlations were calculated to measure the association between test-retest reliability (Sepulveda, Whitney, Hankins, & Treasure, 2008).

The TEQ was tested with 34 students as the first step of the translation process on May 2009, and it was administered again one week later. The sample consisted of 10 males (29.4%) and 24 females (71.6%). The age of the participants ranged from 15 - 16, and the mean age was 15.4 years with a standard deviation of 0.5. All subscales indicated excellent reliability, (Bissonnette & Contento, 2001), and Cronbach's Alphas ranged from 0.80 to 0.86 (Appendix M). Inter-item Pearson Correlation analysis showed a reasonable to high association (Harris & Taylor, 2008) of test and retest reliability coefficient of each part that ranged from 0.53 to 0.71(reasonable to high correlation; Table 4.6). The total score of test-retest reliability coefficient was 0.74 ($p < 0.001$).

Table 4.6 Mean, Standard deviation, Test-retest reliability, and Cronbach's alpha of internal reliability for the TEQ on two occasions (n=34)

Constructs of the TPB	Time 1		Time 2		Correlation (Time1 and Time2)		Cronbach's Alpha
	Mean	SD	Mean	SD	r	p	
Eating behaviour	3.8	1.3	4.2	1.4	0.713	0.000	0.83
Eating intention	2.4	0.9	2.5	1.0	0.642	0.000	0.86
Attitude towards eating behaviour	2.3	0.5	2.2	0.5	0.581	0.000	0.80
Subjective norm regarding eating behaviour	3.3	0.4	3.2	0.6	0.527	0.001	0.80
PBC over eating behaviour	3.4	0.6	3.4	0.6	0.705	0.000	0.86
Total					0.737	0.000	0.87

The size and meaning of a correlation (Harris & Taylor, 2008)

r = 0-0.2 : very low probably meaningless

r = 0.2-0.4 : a low correlation that might warrant further investigation

r = 0.4-0.6 : a reasonable correlation

r = 0.6-0.8 : a high correlation

r = 0.8-1.0 : a very high correlation. Possibly too high. Check for errors or other reasons for such a high correlation

4.3 Conclusion

In conclusion, as the TPB was used as the conceptual framework, and there was no instrument currently developed based on all components of the TPB that was available for use with Thai adolescents. Therefore, the new questionnaire, namely the TEQ was developed by the researcher who aimed to identify factors influencing Thai adolescents' eating behaviour. The TEQ was developed according to the steps suggested by Ajzen who developed the TPB model, and a translation process was also used to develop the TEQ from English to the Thai language. The results of the development of the TEQ showed that the TEQ had a very good content validity index (0.98). All subscales indicated an acceptable reliability, and the Cronbach's alpha of each part was between 0.80 - 0.86. Pearson's correlation analysis showed a high association of test-retest reliability coefficient for each part of the TEQ of between 0.53 and 0.71. The total score of the test-retest reliability coefficient was high at 0.74. The TEQ appears to be a valid and a reliable instrument that is suitable for use in research with Thai adolescents from both urban and rural areas in Thailand.

Chapter 5

The results of quantitative phase

The focus of this chapter is to provide the results from the quantitative part of the study which is based on the TPB model and aims to identify factors influencing Thai adolescents' eating behaviour and eating behaviour. The findings are presented separately in three parts. The first part presents factors affecting adolescents' eating behaviour. Then, it is followed by the dietary behaviour of adolescents assessed by three different methods comprising the TEQ, the 24-hour dietary recall, and digital photograph technique.

5.1 Factors influencing Thai adolescents' eating behaviour (results from the TEQ)

The questionnaire (TEQ) was distributed in classrooms in both urban and rural public high schools to adolescents who attended grade 10 to 12 and volunteered to participate in this study between May to August 2009. In total, 200 urban adolescents and 170 rural adolescents were recruited and following their consent completed the questionnaire. The questionnaires took approximately 25 to 35 minutes to complete. Then, they were returned to the researcher and checked for data accuracy and completion. There were 184 questionnaires from the urban adolescents and 152 questionnaires from the rural adolescents that were fully answered, and the completion rates were 92% and 89.4% respectively. Therefore the final included number of participants was 184 urban adolescents and 152 rural adolescents. The majority of participants in both urban (64.4%) and rural (61.2%) public high schools were female. The mean age of urban adolescents was 16.2 years (SD=0.8), and the mean age of rural adolescent was 16.7 years (SD=0.9). The largest number of urban (40.2%) and rural (43.3%) adolescents attended grade 10. Most of the urban adolescents (69%) and rural adolescents (80.3%) had a normal weight.

Characteristics of participants

Table 5.1 Characteristics of Thai adolescents

Variables	Urban adolescents (n=184)		Rural adolescents (n=152)	
	n	**%**	**n**	**%**
Sex				
Male	67	36.4	59	38.8
Female	117	64.6	93	61.2
Age				
15	41	22.3	15	9.9
16	63	34.2	47	30.9
17	78	42.4	55	36.2
18	2	1.1	35	23.0
Level				
10	42	22.8	66	43.4
11	68	37.0	39	25.7
12	74	40.2	47	30.9

The results showed that the 64.6% and 36.4%, and 61.2% and 38.8% between urban and rural adolescent females/males was similar at approximately 2:1. The largest number of urban (42.4%) and rural (36.2%) adolescents were 17 years old. However, the largest number of urban adolescents (40.2%) attended grade 12, and the largest number of rural adolescents (43.4%) attended grade 10.

Table 5.2 Comparison of mean age, weight, waist, and height of urban and rural adolescents

Variables	Urban adolescents (n=184)		Rural adolescents (n=152)		Mann-Whitney U Test		T-test	
	Mean /Median	SD	Mean /Median	SD	z	Sig. (2-tailed)	T	Sig. (2-tailed)
Age (years)	16.2	0.8	16.7	0.9	-4.767	0.000	-	-
Weight (kg.)	57.0	12.6	53.4	13.2	-3.689	0.000	-	-
Waist circumference (cm.)	77.4	9.3	72.7	9.7	-5.306	0.000	-	-
Height (cm.)	165.1	8.7	161.5	8.5	-	-	3.801	0.000

p-value .000

The results showed that the rural participants were older on average than the urban participants (16.7 vs. 16.2 years, z= -4.767, and *p*=0.000), but despite this were shorter in height (161.49 vs. 165.06 cm, t= 3.801, and *p*=0.000), weighed less (53.4 vs. 57.0 kg, z=-3.689, and *p*=0.000) and had a smaller waist circumference (72.7 vs. 77.4 cm, z=-5.306, and *p*=0.000).

Figure 5.1 Weight status of urban (n=184) and rural (n=152) Thai adolescents
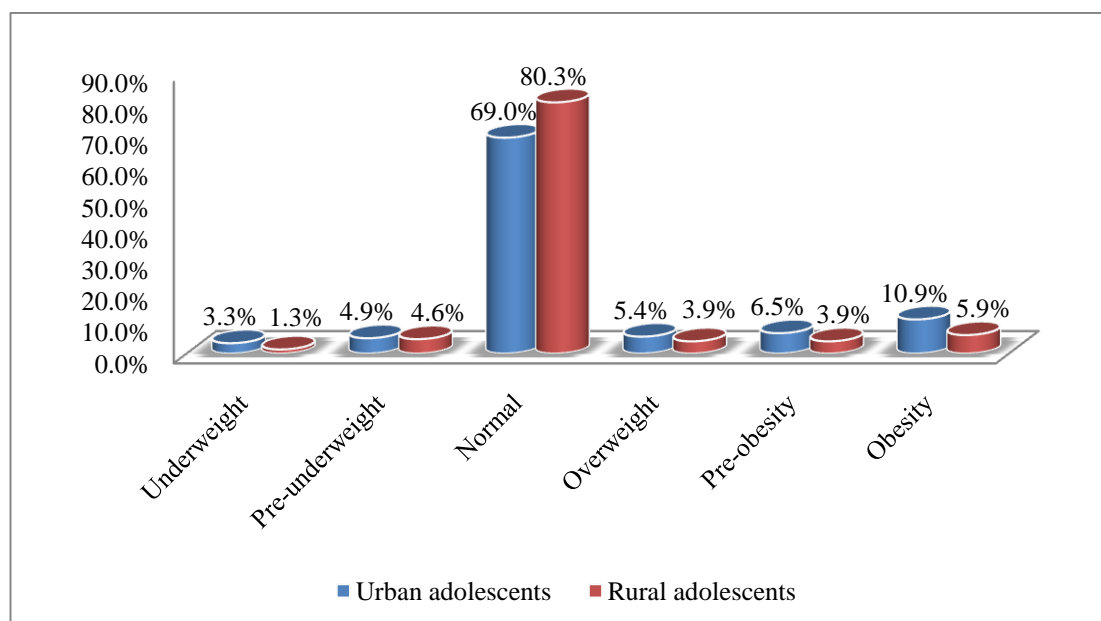
Figure 5.1 shows that the percentage of rural adolescents with normal weight (approximately 80%) was higher than that of urban adolescent (69%), while fewer rural adolescents were overweight, pre-obese, and obese (approximately 4% vs 5%, 4% vs 6%, and 6% vs 11%). In addition, fewer rural compared to urban adolescents were underweight and pre-underweight (approximately 1% vs 3%, and 5% vs 5%)

Factors influencing Thai adolescents' eating behaviour

Several assumption tests, including Normality, Linearity, Multicollinearlity, and Homoscedasticity, are required in multiple regression analyses to ensure the validity and reliability of statistical calculation. All study variables were tested for assumption testing, before correlations and then stepwise multiple regression analyses were undertaken for data analyses. The results indicated that no evidence was found of the violation of the assumption of correlations and multiple regressions. Factors affecting adolescents' eating behaviour will be presented based on hypotheses as following.

Table 5.3 Mean and standard deviation of constructs' score of the TPB

The TPB construct	Urban adolescent (n=184)		Rural adolescent (n=152)	
	Mean	**SD**	**Mean**	**SD**
Eating behaviour (score 0-79)	43.5	7.2	40.2	7.8
Eating intention (score 9-63)	50.7	6.6	48.2	8.0
Attitude towards eating behaviour (score 25-175)	141.7	10.8	140.4	13.1
Subjective norm regarding eating behaviour (score 18-126)	105.5	12.1	101.4	13.6
Perceived behavioural control (PBC) over eating behaviour (score 42-294)	178.4	26.8	180.5	27.7

The mean scores of the 4 components of the TPB of the urban adolescents were slightly higher than that of rural adolescents, including eating behaviour (Mean=43.5, SD=7.2 VS Mean=40.2, SD=7.8), eating intention (Mean=50.7, SD=6.6 VS Mean= 48.2, SD=8.0), attitude towards eating behaviour (Mean= 141.7, SD=10.8 VS Mean=140.4, SD=13.1), and subjective norm regarding eating behaviour (Mean=105.5, SD=12.1 VS Mean=101.4, SD=13.6). Only the PBC towards eating behaviour of rural adolescents was slightly higher than that of urban adolescents (Mean=178.4, SD=26.8 VS Mean=180.5, SD=27.7).

Table 5.4 Pearson Correlation matrix between the TPB variables

	HEB	HEI	AT	SN	PBC
Urban adolescents (n=184)					
1. Eating behaviour (HEB)	-				
2.Eating intention (HEI)	.151*	-			
3. Attitude toward eating behaviour (AT)	.126	.491**	-		
4.Subjective norm regarding eating behaviour (SN)	.080	.368**	.411**	-	
5.PBC over eating behaviour	.224**	.271**	.321**	.198**	-
Rural adolescents (n=152)					
1. Eating behaviour (HEB)	-				
2.Eating intention (HEI)	.234**	-			
3. Attitude toward eating behaviour (AT)	.089	.144	-		
4.Subjective norm regarding eating behaviour (SN)	.133	.241**	.453**	-	
5.PBC over eating behaviour	.115	-.019	.354**	.401**	-

**p<.01

Pearson's correlation coefficient showed that urban adolescents' eating behaviour had a very low correlation with eating intention (r=.151), and was weakly associated with PBC over eating behaviour (r=.224). Eating intention was reasonably correlated with attitude towards eating behaviour (r=.491), but had a low correlation with subjective norm regarding eating behaviour (r=.368), and PBC over eating behaviour (r=.271). Attitude towards eating behaviour was reasonably associated with subjective norm regarding eating behaviour (r=.411), and it had a weak correlation with PBC over eating behaviour (r=.321). Subjective norm had a very weak association with PBC over eating behaviour (r=.198).

For rural adolescents, the results indicated that only eating intention was significantly correlated with eating behaviour, but this association was low ($r=.234$), while eating intention had a low correlation with their subjective norm regarding eating behaviour ($r=.241$). Their attitude towards eating behaviour had a reasonable association with the subjective norm ($r=.453$), and there was a weak low correlation with PBC over eating behaviour ($r=.354$). The subjective norm regarding eating behaviour was reasonably associated with the PBC over eating behaviour ($r=.401$).

The results indicated that as there were no high correlations between each components of the TPB, and the data were sufficiently reliable for regression analysis.

Table 5.5 Stepwise multiple regression analyses of the TPB variables on eating intention, and eating behaviour

Predictors	B	Beta	Estimate	R square	P value	95% CI
<u>Urban adolescents</u>						
Dependent variable:						
Eating intention						
Independent variables:						
Attitude toward eating behaviour	0.025	0.408	0.300	0.241	0.000	(0.222, 0.378)
Subjective norm regarding eating behaviour	0.109	0.200	0.109	0.274	0.005	(0.034, 0.184)
Constant = 3.826						
Dependent variable:						
Eating behaviour						
Independent variables:						
PBC over eating behaviour	0.059	0.224	0.059	0.050	0.002	(0.022, 0.097)
Constant = 32.907						
<u>Rural adolescent</u>						
Dependent variable:						
Healthy eating intention						
Independent variables:						
Subjective norm regarding eating behaviour	0.141	0.241	0.141	0.058	0.003	(0.050, 0.233)
Constant = 33.805						
Dependent variable:						
Eating behaviour						
Independent variables:						
Eating intention	0.230	0.234	0.230	0.055	0.004	(0.076, 0.384)
Constant = 29.078						

The stepwise regression analyses of eating intention of urban adolescents on three constructs of the TPB (attitude, subjective norm, and PBC) showed that attitude toward eating behaviour, and subjective norm regarding eating behaviour together

predicted 27% of variance (r^2=.274). Whereas attitude towards eating behaviour predicted 24% of variance (p=.000), and subjective norm regarding healthy eating added just another 3% (p=.005). For rural adolescents, the results showed that only subjective norm regarding eating behaviour predicted 5.8% of variance only (r^2=.058, p=.003). The results of stepwise regression analyses of eating behaviour of urban adolescents are on two components of the TPB (eating intention, and PBC) and showed that only PBC over eating behaviour predicted 5.0% of variance (r^2=.050, p=.002). However, rural adolescents' eating behaviour was predicted by only eating intention, which explained 5.5% of variance (r^2=.055, p=.004).

The results of stepwise multiple regression were used to answers hypothesis of the study as follows.

Hypothesis testing

Hypothesis I: Urban adolescents' attitude towards eating behaviour will significantly predict eating intention.

The results from the stepwise multiple regression analysis showed that eating intention was significantly predicted by attitude towards eating behaviour (r^2=.241), and accounted for 24.1% of the variance.

Hypothesis II: Rural adolescents' attitude towards eating behaviour will significantly predict eating intention.

The results from the stepwise multiple regression analysis found that attitude towards eating behaviour did not predict eating intention.

Hypothesis III: Urban adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.

The results from the stepwise multiple regression analysis indicated that eating intention was significantly predicted by subjective norm regarding eating behaviour. Additionally, attitude toward eating behaviour (r^2=.241) and subjective norm regarding eating together explained 27.4% of the variance (r^2=.274) in eating intention, and subjective norm added another 3.3%.

Hypothesis IV: Rural adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.

The results from stepwise multiple regression showed that rural adolescents' eating intention was only predicted by subjective norm regarding eating behaviour (r^2=.058), and explained 5.8% of the variance.

Hypothesis V: Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.

The results from the stepwise multiple regression analysis showed that perceived behavioural control over eating behaviour did not predict eating intention.

Hypothesis VI: Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.

The results from the stepwise multiple regression analysis found that perceived behavioural control over eating behaviour did not predict eating intention.

Hypothesis VII: Urban adolescents' eating intention will significantly predict eating behaviour.

The results from the stepwise multiple regression analysis showed that eating intention did not predict eating behaviour in urban adolescents.

Hypothesis VIII: Rural adolescents' eating intention will significantly predict eating behaviour.

The results from stepwise regression analysis indicated that rural adolescents' eating behaviour was significantly predicted by eating intention (r^2=.055), and explained 5.5 % of the variance.

Hypothesis IX: Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.

The results from stepwise multiple regression analysis indicated that urban adolescents' eating behaviour was significantly predicted by perceived behavioural control over eating behaviour (r^2=.050), and explained 5.0% of the variance.

Hypothesis X: Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.

The result of stepwise regression analysis indicated that perceived behavioural control over eating behaviour did not predict eating behaviour.

The results are summarised, and only the statistics for significant relationships were reported as in figures 5.2 and 5.3.

Figure 5.2 Factors influencing urban Thai adolescents' eating behaviour

Attitude towards eating behaviour		

$(\beta=.408)$ $(p=.000)$

Subjective norm regarding eating behaviour

$(\beta=.200)$ $(p=.005)$

Eating intention

$R^2 =.274$ (27.4%)

Eating behaviour

$R^2 =.050$ (5.0%)

PBC over eating behaviour

$(\beta=.224)$ $(p=.002)$
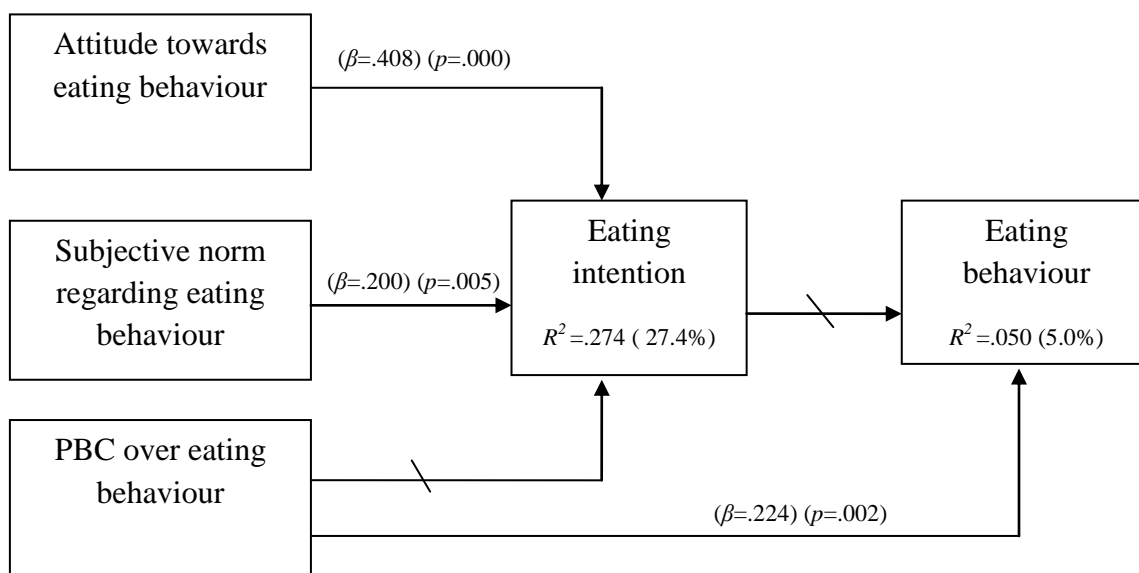
No association

Have an association

Figure 5.3 Factors influencing rural Thai adolescents' eating behaviour

| Attitude towards eating behaviour |
| Subjective norm regarding eating behaviour | $(\beta=.241)\ (p=.003)$ | Eating intention $R^2=.058\ (5.8\%)$ | $(\beta=.234)\ (p=.004)$ | Eating behaviour $R^2=.055\ (5.5\%)$ |
| PBC over eating behaviour |

No association

Have an association
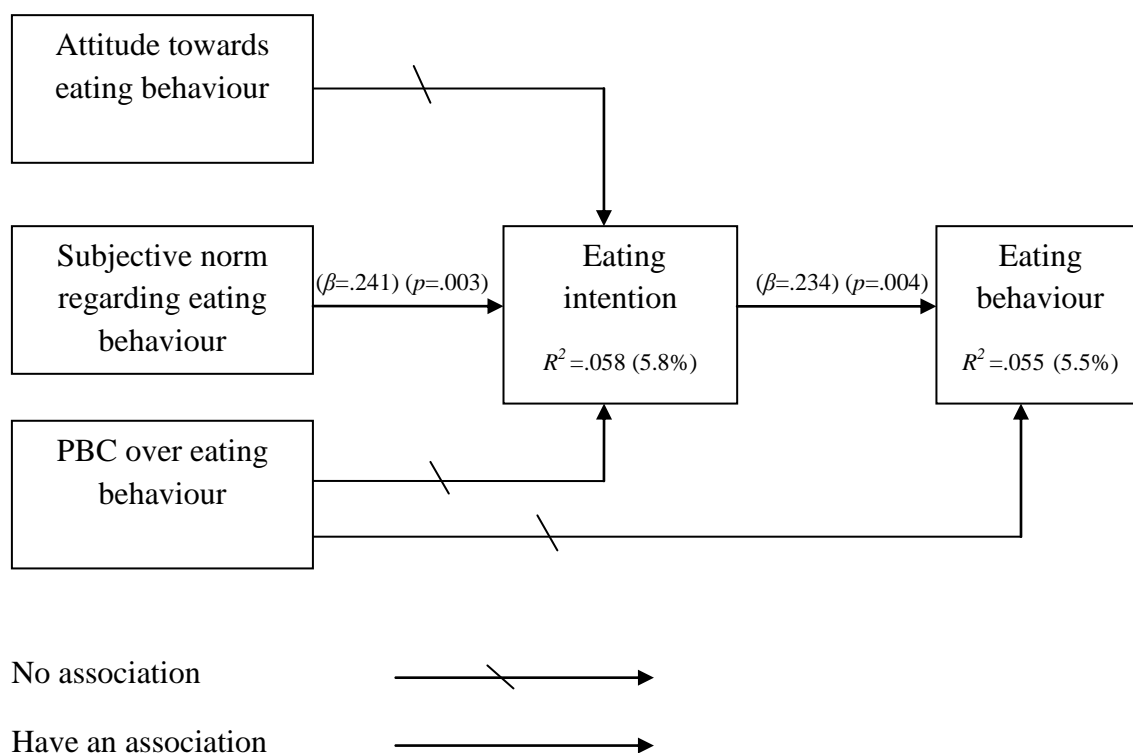
5.2 Thai adolescents' eating behaviour

As stated in chapter 3, the first ten males and females who participated in the survey from each school further explored their eating behaviour by completing the 24 hour dietary recall and digital photographs. Therefore, a sub-group of the participants (20 urban and 20 rural adolescents) explored their eating behaviour with three methods comprising of the FFQ within the TEQ, the 24-hour dietary recall, and digital photograph techniques. The portion sizes of foods assessed by the three different methods were estimated to reflect adolescents' eating behaviour by comparison and these were protein, starchy-foods, vegetables and fruit. However, only the portion size or dietary intake assessed by the FFQ and the 24-hour recall were used to reflect participants' eating behaviour, while the digital photographs of foods were not used because they could not provide the detail necessary for an individual's dietary intake.

The findings for this part are presented in three sections. Firstly, the characteristics of the 40 adolescents are described. Then, it is followed by the comparison of the

dietary intake of participants assessed by the FFQ (used in the TEQ) and the 24-hour dietary recall. Finally, the reasons why digital photographs of foods cannot be used to reflect participants' eating behaviour will be presented.

Characteristics of participants

Table 5.6 Characteristics of Thai adolescents (sub-group, n=40)

Variables	Urban adolescents (n=20)		Rural adolescents (n=20)	
	n	**%**	**n**	**%**
Sex				
Male	10	50.0	10	50.0
Female	10	50.0	10	50.0
Age				
15	11	55.0	3	15.0
16	2	10.0	5	25.0
17	7	35.0	6	30.0
18	-	-	6	30.0
Level				
10	10	50.0	8	40.0
11	3	15.0	6	30.0
12	7	35.0	6	30.0

The result of the study showed that half of the adolescents in urban and rural area were male (50%). The largest number of urban adolescents was 15 years old (55%), and rural adolescent were 17 and 18 years old (30%). Most of the urban and rural Thai adolescents attended grade 10 (50% and 40% respectively).

Table 5.7 Weight, height and waist circumference of Thai adolescents (sub-group, n=40)

Variables	Urban adolescents (n=20)		Rural adolescents (n=20)	
	Mean	**SD**	**Mean**	**SD**
Age (years)	15.8	1.0	16.8	1.1
Weight (kg.)	59.4	18.6	57.1	16.6
Height (cm.)	163.7	8.8	164.3	10.9
Waist circumference (cm.)	80.4	13.4	74.3	11.5

The rural participants were older on average than urban participants (16.8 vs 15.8), but despite this were lighter (57.1 vs 59.4) with a smaller waist circumference (74.3 vs 80.4). However, they were taller than the urban adolescents (164.3 vs 163.7).

Figure 5.4 Weight status (sub-group, n=40)
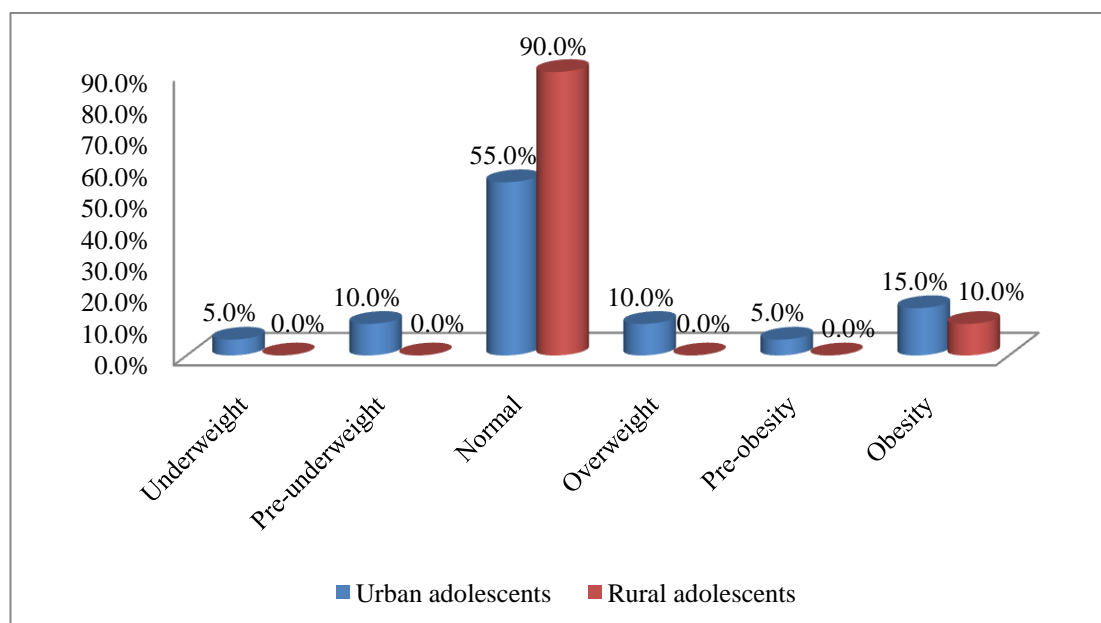
The results showed that most of the rural adolescents (90%) had a normal weight, while only approximately half of urban adolescents (55%) had a normal weight. In addition, urban adolescents with an unhealthy weight were 5 times more common than the rural adolescents.

Eating behaviour of Thai adolescents

Figure 5.5 Vegetable consumption (sub-group, n=40)
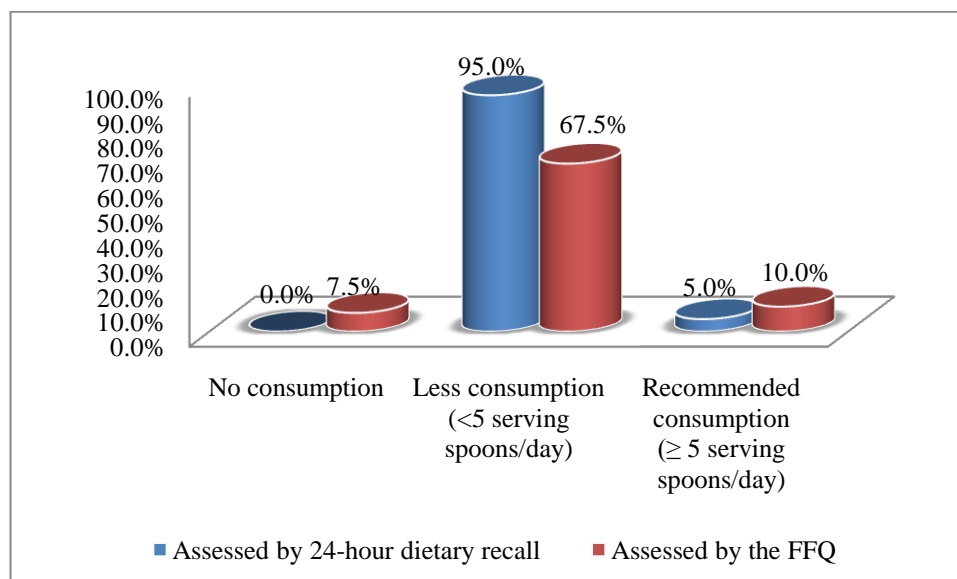
The results illustrated that the percentage of adolescents with lower vegetable consumption assessed by the 24-hour dietary recall was higher than that assessed by the FFQ (approximately 30%), while the percentage of adolescents with both the recommended vegetable intake and no vegetable consumption assessed by the 24-hour dietary recall was lower than that assessed by the FFQ.

Figure 5.6 Fruit consumption (sub-group, n=40)
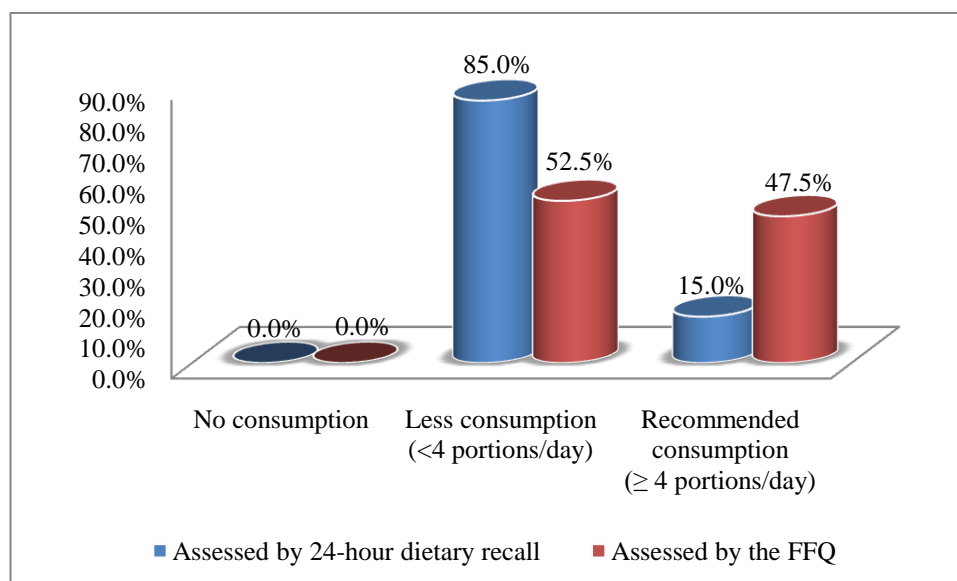
The results illustrated that the percentage of adolescents with lower fruit consumption assessed by the 24-hour dietary recall was higher than that that assessed by the FFQ (approximately 30%), while the percentage of adolescents with the recommended fruit intake assessed by the 24-hour dietary recall was smaller than that assessed by the FFQ (approximately 30%).

Figure 5.7 Protein consumption (sub-group, n=40)
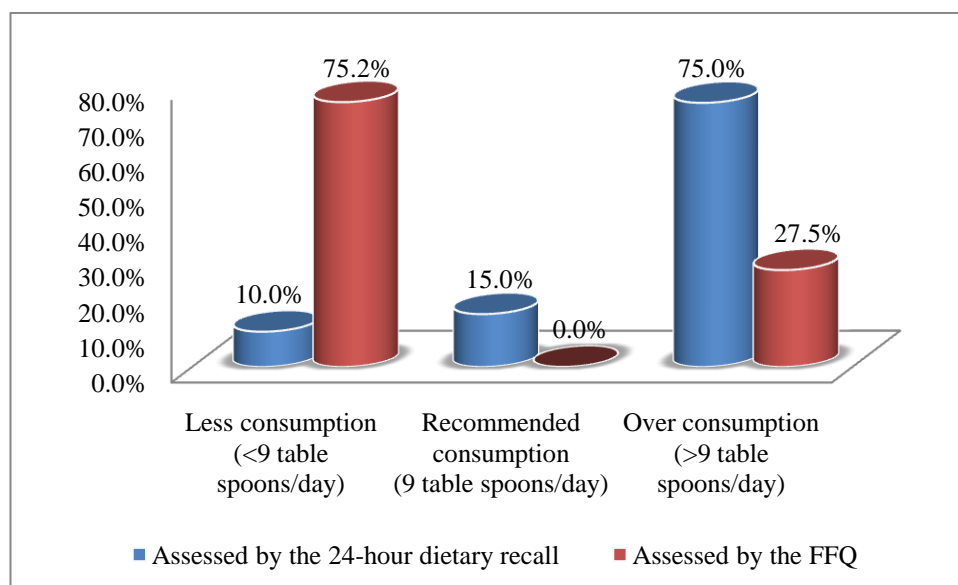
The results illustrated that the percentage of adolescents with less protein consumption assessed by 24-hour dietary recall was lower than that assessed by the FFQ (approximately 65%). Conversely, the percentage of adolescents reporting over consumption of protein intake assessed by the 24-hour dietary recall was higher than that assessed by the FFQ (approximately 50%).

Figure 5.8 Rice-starchy food consumption (sub-group, n=40)
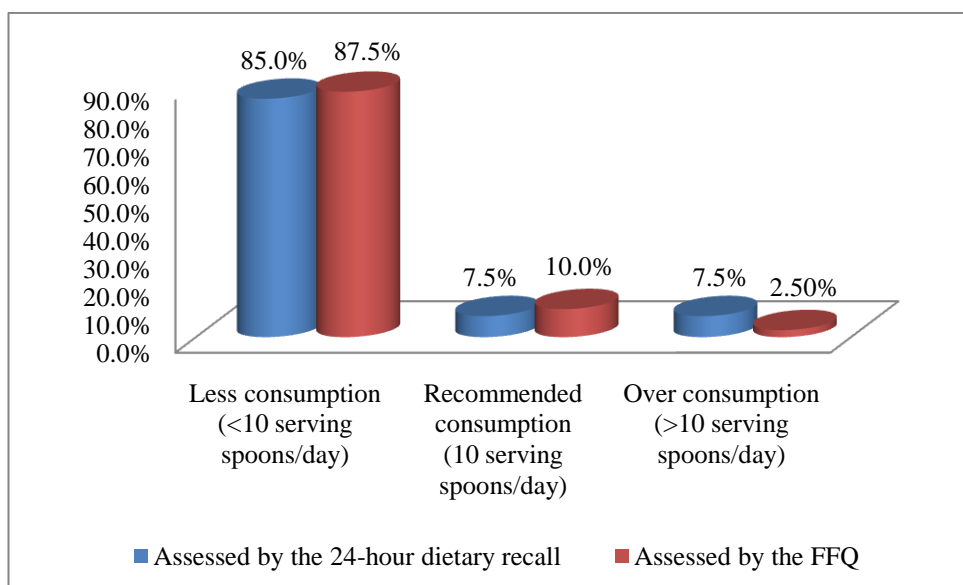
The results showed that the percentage of adolescents with lower, or recommended or over consumption levels of rice and starchy foods varied minimally from each other.

Table 5.8 Food consumption of Thai adolescents (sub-group, n=40)

Food group	Assessed from 24-hour dietary recall (n=40)		Assessed from the FFQ (n=40)		Wilcoxon signed-ranks Test	
	Mean	SD	Mean	SD	Z	*P*
Vegetable (serving spoons/day)	2.4	1.3	3.3	2.2	-2.35	0.019
Fruit (portions/day)	1.8	1.8	3.7	2.1	-4.32	0.000
Foods in protein group (table spoons/day)	13.3	4.2	6.9	2.9	-5.11	0.000
Rice and starchy food (serving spoons/day)	6.8	2.3	5.8	2.7	-1.75	0.081

P<0.05

The results showed that the average number of serving spoons of vegetable intake assessed by the FFQ (Mean=3.3, SD=2.2) was higher than (Z=-2.35, *p*=0.019) than that assessed by the 24-dietary recall (Mean=2.4, SD=1.3). Similarly, the average number of portions of fruit measured by the FFQ (Mean=3.7, SD=2.1) was significantly higher (Z=-4.32, *p*=0.000) than that assessed by the 24-hour dietary recall (Mean=1.8, SD=1.8). Conversely, the average number of table spoons of protein intake assessed by FFQ (Mean=6.9, SD=2.9) was significantly lower (Z=-5.11, *p*=0.000) than that measured by the 24-hour dietary recall (Mean=13.3, SD=4.2). Rice and starchy foods intake assessed by the 24-hour dietary recall and the FFQ was not significantly different (Z=-1.75, *p*=0.081).

Digital photographs of food analysis

The digital photographs of food were planned to quantify the portion size of foods to reflect the participants' eating behaviour or dietary pattern. They were also planned for use to confirm participants' dietary intake pattern assessed from the FFQ and the 24-hour dietary recall.

The digital photographs taken by all participants included a variety of food including from the five food groups, snacks, and beverages. There were 595 digital photographs taken by 20 urban students, or nearly 30 photographs per student, and 530 photographs from rural students or 26 photographs per student. Photographs of four kinds of major food groups (protein, rice-starchy foods, fruit, and vegetable) were analysed to reflect the participants' eating behaviour. However, digital photography was difficult to use to quantify dietary consumption and portion size in this study. The reasons why the photographs of foods were not used to quantify dietary intake and clarify the social context of Thai adolescents' eating behaviour will be presented as follows.

First of all, some photographs taken by participants were family meals (Figure 5.9 and 5.10), and not individual meals. After some participants took the photographs of their food, the food was shared by them with their friends. For example, the fruit intake of one participant cannot be estimated by the photographs because fruit was consumed by a student and his friends (Figure 5.11). Another example is where the food of one participant (Figure 5.12) was shared by her friends. Therefore, portion size cannot be estimated for each participant's dietary intake.

Secondly, some meals were difficult to clarify as to what they were because of the characteristics of the foods (covered in batter for example). Therefore, the researcher could not be clear about what kind of food was eaten and how much participants consumed themselves (Figure 5.13 and 5.14). In addition, some photographs showed only food surface (for example the contents of a bun was unclear), and so they could not provide sufficient detail (Figure 5.15).

Lastly, whereas some participants seemed to consume all the food in the photograph, others said that they leave some food that they did not like on their plate such as vegetables. Therefore, it would have been inaccurate to use the photographs to

estimate dietary consumption. For example, one participant took a photograph containing some vegetables (Figure 5.16), but did not eat any vegetables. Therefore, he left them on his plate after he ate the food that he preferred.

In summary, the results from the photographs used in the process of data collection could not provide accuracy in portion size, and dietary consumption. This was because only the digital cameras were used without writing down the information related to food consumed. The digital photography method also used different days to the 24-hour dietary recall. Information written down in the 24-hour dietary recall form could have helped to quantify the participants' dietary intake and clarify the characteristic of foods, if both two techniques were used on the same day.

Figure 5.9 Traditional Thai family meals

Figure 5.10 Family meals when eating out

Figure 5.11 Fruit

Figure 5.12 Fried balls

Figure 5.13 Hot and spicy soup

Figure 5.14 Soup possibly including intestines and cow's liver

Figure 5.15 Bun

Figure 5.16 Spicy sliced pork salad with some vegetables

5.3 Conclusion

This chapter provided the findings of the study where two sets of data from the 184 urban adolescents and 152 rural adolescents were used to examine the hypotheses.

Firstly, the TPB model construct was examined and found there was no violation of the assumption of correlation and stepwise multiple regression statistics.

Stepwise multiple regression analyses were conducted to examine the prediction of eating intention as dependent variables by three constructs of the TPB; attitude towards eating behaviour, subjective norm regarding eating behaviour, and PBC over eating behaviour. For urban adolescents, the results indicated attitude towards eating behaviour and subjective norm regarding eating behaviour were each significant predictors of eating intention, and together explained 27.4% of variance, whereas attitude towards eating predicted 24.1% of variance, and subjective norm regarding eating added another approximate 3.3%. Therefore, attitude towards eating behaviour was a stronger predictor compared with subjective norm regarding eating behaviour

in the model. For rural adolescents, only subjective norm regarding eating intention significantly predicted 5.8% of variance on eating intention.

Stepwise regression analyses of eating behaviour as the dependent variable, the results showed that urban adolescents' eating behaviour as assessed by FFQ significantly predicted 5.0% of variance by only PBC over eating behaviour, while the rural adolescents' eating behaviour predicted 5.5 % of variance by eating intention. Therefore, hypothesis I: Urban adolescents' attitude towards eating behaviour will significantly predict eating intention, hypothesis III: Urban adolescents' subjective norm regarding eating behaviour will significantly predict eating intention, hypothesis IV: Rural adolescents' subjective norm regarding eating behaviour will significantly predict eating intention, hypothesis IX: Urban adolescents' PBC over eating behaviour will significantly predict eating behaviour, and hypothesis VIII: Rural adolescents' eating intention will significantly predict eating behaviour, were supported.

The comparison of the FFQ with the 24-hour dietary recall data showed that adolescents' fruit and vegetables intake reported in the FFQ seem to be overestimated, and the adolescents' food in the protein group consumption measured by the FFQ was likely be underestimated when they were compared with the results assessed by the 24-hour dietary recall.

Dietary intake from digital photography was planned to use as part of a triangulation technique to confirm dietary intake assessed between the FFQ and 24-hour dietary recall. Photograph of meals without recording the detail of foods could not be analysed to estimate the portion sizes in this study because it was difficult to quantify the individual's portion size.

Therefore, hypothesis XI: Explore whether examining eating behaviour using different quantitative methods (FFQ, the 24-hour dietary recall, and digital photography) may produce different results) was accepted.

The discussion of these findings will be presented in chapter 7.

Chapter 6

The results of qualitative phase

This chapter provides the results of the focus group discussion. The findings are presented in five sections. Firstly, the focus group procedure is summarised, followed by the characteristics of the participants. Thirdly, focus groups are reported under three headings; adolescents' perception about the concept of healthy eating, the consequences of healthy eating behaviour, and factors influencing their eating behaviour. This is followed by a discussion and, lastly the main findings are summarised.

6.1 Summary of groups

Focus groups were held in Benjamarachutit Ratchaburi School and Suanphung Wittaya School, representing the urban and rural high schools respectively. They were held during school time from 22nd to 30th July 2010. A total of 38 participants participated in 4 focus groups, and 9-10 participants per group, were recruited. Each focus group was single sex, with an age range of 15-18 years (school years 10 to 12). The groups lasted approximately 45-50 minutes.

Group: Rural male participants

This focus group discussion was conducted on 22nd July 2009 during their self directed study time. This group consisted of nine male students and the discussion took approximately 50 minutes.

Group: Rural female participants

This focus group discussion took place on 24th July 2009 during their self directed study time. This group consisted of nine female students and this discussion took approximately 45 minutes.

Group: Urban female participants

This focus group discussion took place on 28th July 2009 during self directed study time. This group consisted of eleven female students, and this discussion took approximately 45 minutes.

Group: Urban male participants

This focus group discussion took place on 30th July 2009 during self directed study time. This group consisted of thirteen male students, and this discussion took approximately 45 minutes.

6.2 Characteristics of participants

Table 6.1 Characteristics of urban and rural Thai adolescents who participated in focus group discussions

Variables	Urban adolescents		Rural adolescents	
	n (20)	Percentage (%)	n (18)	Percentage (%)
Gender				
Male	10	50.0	9	50.0
Female	10	50.0	9	50.0
Age				
15	11	55.0	3	16.7
16	2	10.0	5	27.8
17	7	35.0	5	27.8
18	-	-	5	27.8
	Mean=15.8 SD= 1.0		Mean=16.6 SD=1.1	
Level				
10	10	50.0	7	38.9
11	3	15.0	6	33.3
12	7	35.0	5	27.8
Weight status				
Under weight [1]	1	5.0	-	-
Pre-underweight [2]	2	10.0	-	-
Normal weight [3]	11	55.0	16	88.8
Overweight [4]	2	10.0	-	-
Pre-obesity [5]	1	5.0	-	-
Obesity [6]	3	15.0	2	12.5

Note:

[1] (<-2 SD of the standard population)

[2] (SD from -2 to <-1.5 SD of the standard population)

[3] (SD from -1.5 to + 1.5 SD of the standard population)

[4] (SD from > +1.5 to +2 SD of the standard population)

[5] (SD from> +2 to +3 SD of the standard population)

[6] (> +3 SD of the standard population)

Source: The Division of Nutrition, Ministry of Public Health, Thailand (2000)

Table 6.1 showed that ten male (50%) and ten female (50%) urban students were recruited to participate in focus group discussions. The majority of urban participants (55%) were 15 years old, and they (50%) attended grade 10. Whereas, nine male and nine female rural students were recruited for focus group discussion, and the minority of rural participants were 15 years old (16.7%). The largest number of rural respondents (38.9%) studied in grade 10. Approximately half of the urban students (55%) and a majority of rural student (88.8%) had normal weight status (SD from -1.5 to + 1.5 SD of the standard population).

6.3 Results of the focus group transcription

The main aim of the focus group discussion was to generate a list of factors influencing adolescents' eating as viewed by the participants. The aim was to identify the themes directly from the students rather than ask structured questions based around the variables of the TPB. So the type of response they gave was data driven. This meant that the themes identified from the focus groups were the voices of the student rather than driven by the TPB or the researcher's agenda (Braun & Clarke, 2006). According to Throne and colleagues (2002), qualitative analysis is influenced by the researcher's background such as perception, knowledge (theoretical framework and methodology orientation), and experiences. Therefore, in this study, thematic analysis may be influenced by the researcher's perception, knowledge and professional experience. Moreover, the body of knowledge from reviewing the literature in relation to the TPB and dietary behaviour of adolescents may have influenced the researcher when undertaking thematic analysis. However,

the researcher minimized these influences by a data driven approach with the aim of exploring the topic with a fresh perspective rather than following the components of the TPB.

The focus group discussion results will be reported under three headings; adolescents' perception about healthy eating, benefits of healthy eating, and factors influencing adolescents' healthy eating. The results of the analyses are presented separately for the groups of urban and rural respondents.

Urban and rural adolescents' perception about concept of healthy eating

Figure 6.1 below shows the thematic map developed from the findings related to the concept of healthy eating, showing one main theme and five sub-themes that have emerged from the group of urban adolescents and one main theme and four sub-themes that were identified from the responses from the group of rural adolescents.

Figure 6.1 Thematic map of adolescents' perception about concept of healthy eating
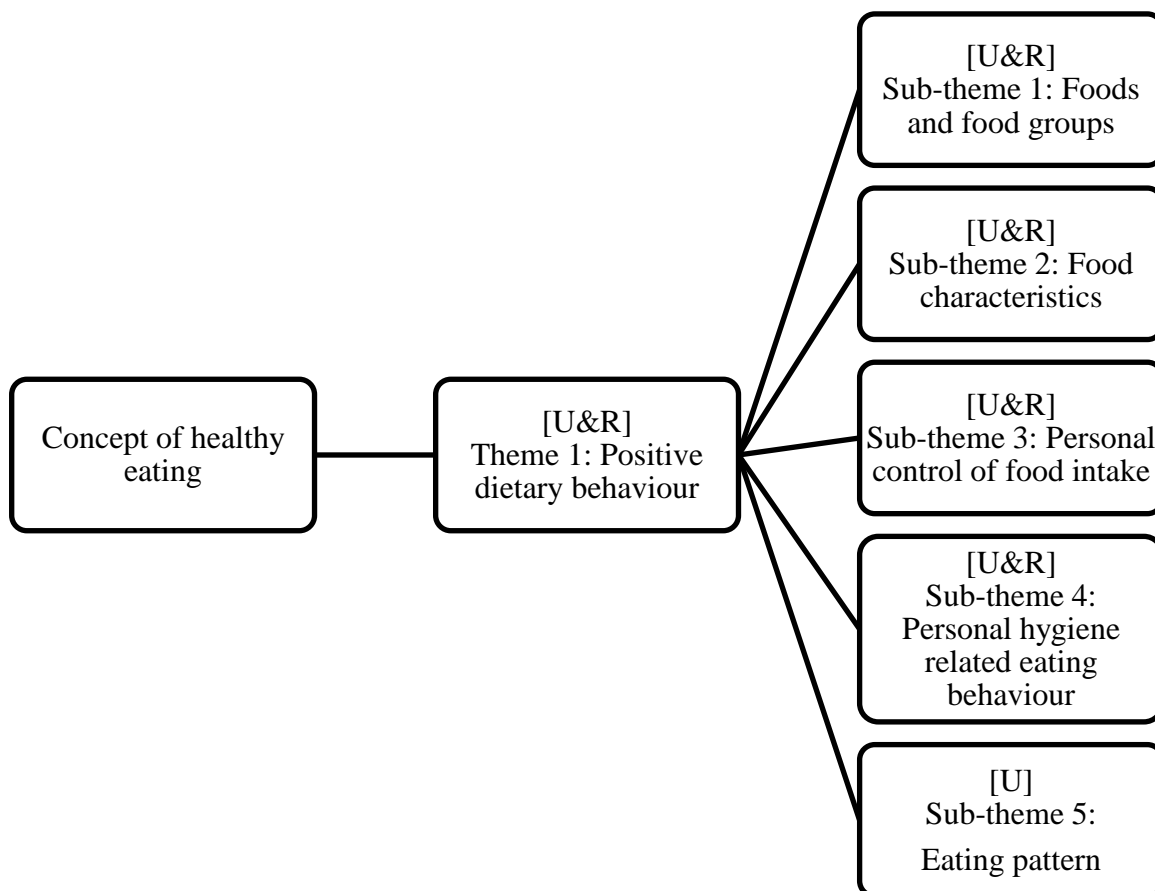
[U]:   Theme or sub-theme identified from urban adolescents

[R]:   Theme or sub-theme identified from rural adolescents

[U&R]:   Theme or sub-theme identified from urban and rural adolescents

Theme 1: Positive dietary behaviour

Sub-theme 1: Food or food groups

Eating a selection of food and food groups was frequently mentioned by urban students when they discussed the concept of healthy eating. Some of the participants defined healthy eating as eating foods from the five food groups. This view is reflected in the following statements.

Where *UM* = Urban male, *UF*= Urban female, *RM* = Rural male, *RF*= Rural female

   -Eating the five food groups [UM 4]

   -Eating all kind of food [UF 9] ...All kind of food? [Moderator] ...I meant all of the five food groups [UF 9]

Similarly, healthy eating was frequently described as consuming some food and food groups by several rural respondents when they were asked about the concept of healthy eating. Some of them broadly explained that healthy eating was eating the five food groups, and some nutrients. Related responses were as follows.

   -Eating useful diet such as the five food groups [RM 1, 9]

   -Having diet enriched with minerals [RM 4]

   -Having diet enriched with vitamins [RM 1]

   -Consuming useful diet such as food containing protein and nutrients [RF6] ...such as food from the five food groups. [RF 4, 7]

Additionally, consuming a large amount of fruit and vegetables which are central to healthy eating were also mentioned by some urban respondents, and statements which illustrate this are as follows.

   -Eating a lot of vegetables [UM 8]

-Eating a lot of fruit [UM 8]

-Focusing on eating a lot of vegetables [UF 9]

Some rural adolescents defined healthy eating as eating fruit and vegetables. Responses are as follows.

-Eating vegetables and fruit [RM 4]

-Eating a lot of vegetables and fruit. [RM 5]

In addition, in term of healthy eating perceived by many urban adolescents, some kinds of food were identified as unhealthy such as junk food, fast food, carbonated and sweet drinks, alcoholic beverages, and snacks. Related comments by participants include:

-Not drinking carbonated drinks such as Pepsi [UM 4, 5]

-Not having junk food… fast food [UM 6]

-Avoid eating snacks…they are quite salty and sweet. [UF 7]

-Avoid carbonated drinks, sweet drinks, and liquors [UF 7]

Likewise, some of the rural adolescents said that healthy eating is avoiding some foods such as salty foods and snacks, carbonated drinks, and alcoholic beverages. This view can be seen in the following statements.

-Avoiding eating preserved food using salt [RM 6]

-Avoiding eating snacks [RM 4]…What are they? [Moderator]…Potato chips [RM 9]…Such as "Lay"' and "Testo" (brand of potato crisps in Thailand)…They are quite salty. [RM 6]

-Do not drink carbonated drinks [RM 6]

-Avoiding drinking alcoholic beverage [RM 1, 5]

Moreover, drinking an energy drink was believed to be a part of healthy eating by a couple of rural participants. Related comments by respondents were:

-Drinking energy drinks. [RM 2] ...Yes [RM 9] ... I drink "Sponsor" (a band of energy drink in Thailand) after having exercise... It makes me feel fresh and stronger. [RM 9]

Sub-theme 2: Food characteristics

Healthy eating was also defined as consuming some foods that have specific characteristics by many urban respondents. Some used descriptive words such as "clean", "cooked", "fresh", "new", "hygienic" to explain food that should be consumed in term of healthy eating. Examples of comments are as follows.

-Eating cooked food [UM 4]

-Eating fresh and new food [UM 3]

-Eating hygienic food [UM 6]

-Eating freshly cooked food [UM 4]

Similarly, food characteristics were indicated by many rural adolescents in order to explain more about the concept of healthy eating. As per the urban students, some rural students used descriptive words such as "clean", "cooked", and "useful" to describe characteristic of foods that should be eaten in term of healthy eating. Statements by participants were as follows.

-Consuming clean food [RF 4] ...for example, before we eat fruit and vegetables, we put a little bit salt in the water and then soak them in it. [RF 2]

-Eating cooked food [RF 3, 4]

-Eating freshly cooked food [RF 4]

-Having a useful diet. [RF 2]

Moreover, the quality of foods was mentioned by one urban student to explain more about food characteristics. The response is as follows.

-Eating food which has Or-Yor (Or-Yor is a symbol which is illustrated on food packaging for guaranteed food quality (nutritional characteristic, cleanliness and safety given by the Thai Ministry of Public Health). [UM6]

Food without additives was also mentioned by one urban participant as a part of healthy eating, for example:

-Not eating artificially colourful food ...natural colour is better [UM 4]

In addition, some of the urban adolescents indicated taste as a consideration when discussing the definition of healthy eating. Tastes such as sweet, spicy and salty were frequently stated as a concern in terms of healthy eating. This belief is reflected in the following statements.

-Not eating food with strong tastes such as spicy, salty, sour, and sweet foods. [UM 4]

-Not eating food with strong taste and...not too sweet [UF 2]

-The taste of food should not be spicy and salty [UF 2, 6]

While raw food was mentioned as an unhealthy food that should be avoided by some rural adolescents. A statement in this regard is:

-Do not consume uncooked food [RF 7]...Yes [RF 1]...such as spicy pork salad with blood topping. [RF 9]

Sub-theme 3: Personal control of food intake

Several urban students expressed healthy eating as controlling the amount of food intake. Some of them used some words such as "a lot", "control", "not too much", and "not too little" to explain their ideal, as statements by the participants include:

-Do not eat too much [UF 3]

-Stopping to eat when you feel full [UF 3]

-Control quantity of food intake [UF 3]

-Control eating [UF 5]

However, rural students talked about the concept of healthy eating, and the quantity of the food intake was raised to discuss in the group as a consideration. A specific word "Sufficiency" was used to describe the quantity of the food intake, as can be seen in the following statements.

- Sufficiency *[RM 9]…it means eating not too much but not too little…stop eating when full. [RM 4, 9]*

- Sufficiency *…It means eating not too much but not too little. Eating too much will cause flatulence. If I eat too little, I will get hungry quite often. [RF 1]*

As with the urban participants, one specific word "Sufficiency" was frequently used to explain more about limiting the food intake. Some statements are as follows.

- Sufficiency *…it means… do not eat too much and do not eat too little [UF 9]*

-*If we said "not fat" we should include "*Sufficiency*" in the meaning of eating as well [UM 4]….do not eat too much, but not too little. [UM 8]*

In contrast, a couple of urban respondents suggested healthy eating was high consumption of fruit and vegetables, flour was named by one of the urban participants as a substance that needed to be controlled, but they were not mentioned by rural adolescents. Related comments are:

-*Eating a lot of vegetables [UM 8]*

-*Eating a lot of fruit [UM 8]*

-*Focusing on eating a lot of vegetables [UM 9]*

- *Control flour [UM 3]*

Sub-theme 4: Personal hygiene behaviour related eating behaviour

Hygiene behaviour related to eating behaviour such as hand-washing, and using a serving spoon were also mentioned by some urban participants as a part of healthy eating. This view is reflected in the following statement.

-*…using a serving spoon, and washing hands before having a meal [UM 4]…Yes [UM 7, 8]*

Similarly, using a serving spoon and hand-washing behaviour were mentioned in order to explain the breadth of detail about healthy eating in the group of rural participants. A statement re this as follows.

-…using a serving spoon, and washing hands before having a meal [RF 4]…Yes [RF 1, 3]

Sub-theme 5: Eating pattern

Some eating patterns such as having a meal on time and eating a wide variety of vegetables were identified by one urban respondent in order to further explain the meaning of healthy eating. Statements in relation to this include:

-Having a meal on time. [UF 2]

-Consuming vegetables which have different colours such as red, violet, green, yellow, and orange…they provide different kinds of minerals. [UF 7]

However, this sub theme did not immerge in the group of rural students.

Urban and rural adolescents' perceptions regarding the benefits of healthy eating

Figure 6.2 below shows the thematic map developed from the findings related to adolescents' perception of the benefits of healthy eating behaviour. This shows the three main themes and four sub-themes that were identified from the group of urban adolescents. Only one main theme and three sub-themes emerged from the group of rural adolescents.

Figure 6.2 Thematic map of adolescents' perceptions regarding the benefits of healthy eating

```
                                                    ┌──────────────────┐
                                                    │      [U&R]       │
                                                    │   Sub-theme 1:   │
                                                    │  General health  │
                                                    └──────────────────┘
                                                    ┌──────────────────┐
                                                    │      [U&R]       │
                                                    │   Sub-theme 2:   │
                                                    │Disease prevention│
                              ┌──────────────────┐  └──────────────────┘
                              │      [U&R]       │  ┌──────────────────┐
                              │ Theme 1: Expected│  │      [U&R]       │
                              │ physical benefits│  │   Sub-theme 3:   │
                              └──────────────────┘  │   Body image     │
┌──────────────────┐         ┌──────────────────┐  └──────────────────┘
│ Benefits of healty│        │       [U]        │  ┌──────────────────┐
│      eating      │         │     Theme 2:     │  │       [U]        │
└──────────────────┘         │  Psychological   │  │   Sub-theme 4:   │
                             │     benefit      │  │ Cosmetic benefit │
                             └──────────────────┘  └──────────────────┘
                             ┌──────────────────┐
                             │       [U]        │
                             │Theme 3: Financial│
                             │     benefit      │
                             └──────────────────┘
```
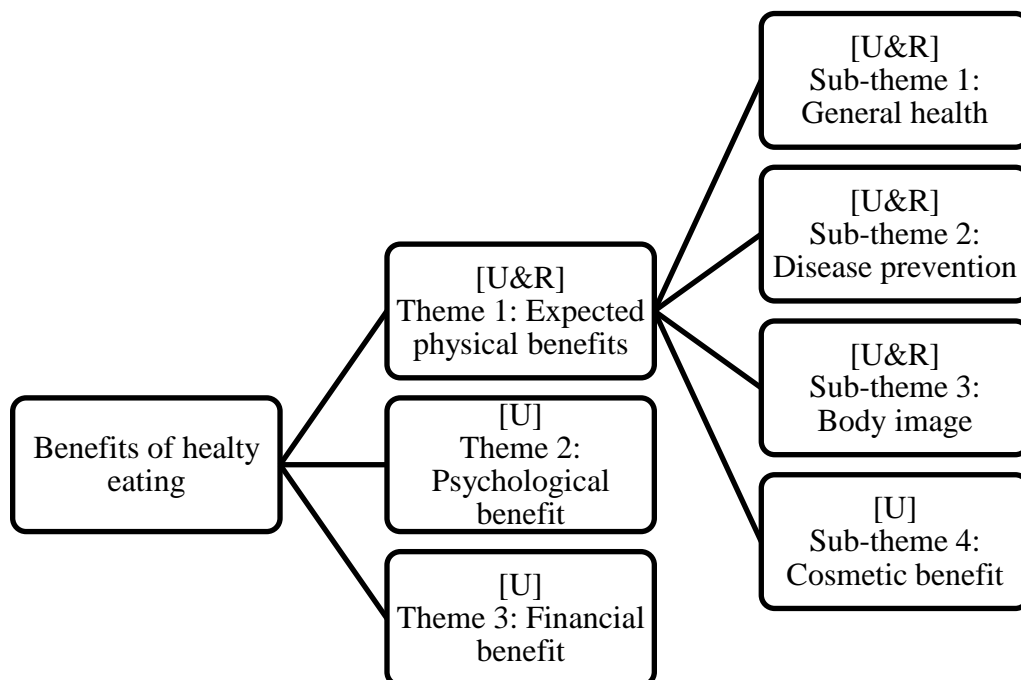
Theme 1: Expected physical benefits

Sub-theme 1: General health

The majority of urban participants believed that healthy eating played an important role in general health. Statements by participants included:

-*It makes me stay healthy. [UM 6]*

-*I will stay healthy [UF 9]*

-*It provides body immunity. [UM 4]*

- *I will have a good immune system. [UF 9, 10]*

-*Making the body grow [UM 4]*

-They (healthy foods) will make me live longer. [UFS 2] ...For example, my grandfather like to eat vegetables...he is over 100 years old now.

-They (healthy foods) make us have a good brain...maintaining brain. [UF 1] ...such as fish and Omega 3 [UF 3]

-Maintain good eyesight [UF 6]

-Um...to help us to eliminate easily waste products from the body because fruit and vegetables contain high fibre. [UF 7]

Some rural participants said that healthy eating will make them grow and healthy. Statements by participants include:

-It helps us have a healthy body...and makes us grow [RF 3]

-It makes us grow. [RM 9]

-It makes us healthy. [RM 4]

Similarly, some rural residents also expressed the view that healthy eating can provide immunity, as in the following statements.

-It provides body immunity. [RM 3]

-Supporting our immune system [RF 4]

-If you eat too little, you will be thin and have no energy. [RF 2] ...If we are so thin, our immune levels are low. [RF 2] ...Yes [RF 3, 9]

-If we cannot eat as mentioned (healthy eating), we will have no immunity, and it is easy to get diseases. [RF 9]

In addition, living longer was mentioned as the benefit of healthy eating behaviour by a student. The statement is:

-We can live longer. [RF 4]

Sub-theme 2: Disease prevention

Some urban students stated that practicing healthy eating can help them prevent some conditions such as cancer, joint degeneration (arthritis), and osteoporosis. This view is reflected in the following statement.

-Eating carrots provides an antioxidant substance. [UM 4] ...preventing cancer [UM 3, 4]

-Eating freshly cooked food, using a serving spoon, and washing hands...It is for the 2009 Influenza prevention [UM 4].

-I have a good immune system...and it is not easy for me to get sick. [UF 9, 10]

-No drinking carbonated drinks ...It will protect me from knee joint degeneration and osteoporosis. [UF 2]

Similarly, when talking about the benefits of healthy eating, several rural participants expressed the view that it can prevent them from developing some conditions such as diabetes, hypertension, and joint degeneration. Statements by participants include:

-We do not get fat...but not too thin as well. [RF 1] ...Yes, if we get fat, it can cause a lot of diseases. [RF 9] ...such as diabetes and hypertension [RF 2] ...and joint degeneration [RF 1]

Sub-theme 3: Body image

Some urban participants explained that they will not get fat or thin if they practise healthy eating. Responses include:

-Eating a lot of meat and lipids can make me fat [UM 6] ...healthy eating cannot make me fat. [UM 4, 6]

-...and I will not get fat...but I won't be thin. [UF 9]

Body image including weight so being overweight or thin was also mentioned as the result of healthy eating by some of the rural adolescents.

- We will not get fat. [RM 6]

- We will not get fat…will not be too thin as well [RF 1]

Sub-theme 4: Cosmetic benefits

A cosmetic benefit such as a healthy skin was mentioned by some urban adolescents when they talked about the advantage of healthy eating. In contrast, this benefit was not mentioned by rural students. Statements in this regard are as follows.

-Eating a lot of fruit and vegetables…make me have a healthy skin. [UM 4]

-Vegetables such as tomato and cucumber can maintain a healthy skin. [UF 7]…Yes, I agree…[UF 6, 9]

Theme 2: Psychological benefit

Expected psychological benefits were mentioned as benefits of healthy eating by urban adolescents, where as some respondents stated that practicing healthy eating behaviour such as eating fruit and vegetables makes them feel good about themselves. However they were not mentioned by rural participants. Examples are:

-I have a good feeling. [UF 2, 3]

-I feel good about myself…when eating fruit and vegetables [UF 3]

-Fruit and vegetables…eating them makes me feel healthy. [UF 2]

Theme 3: Financial benefit

Interestingly, only one urban participant stated that eating healthy eating can help her to save money. Response is:

-We do not waste our money to buy supplements. [UF 9]

Urban and rural adolescents' perceptions of factors influencing their eating behaviour

These results will be presented based on the food groups that are associated with CVD, comprising vegetables, fruit, starchy food, fast foods, and sweet and carbonated drinks.

Factor influencing Thai urban and rural adolescents' vegetable intake

Figure 6.3: below shows the thematic map developed from the findings about factors that influenced adolescents' vegetable intake. There are three main themes and eight sub-themes that emerged from the group discussion of urban adolescents, while three main themes and eight sub-themes emerged from the group discussion of rural adolescents.

Figure 6.3 Thematic map of factors influencing Thai adolescents' vegetables intake
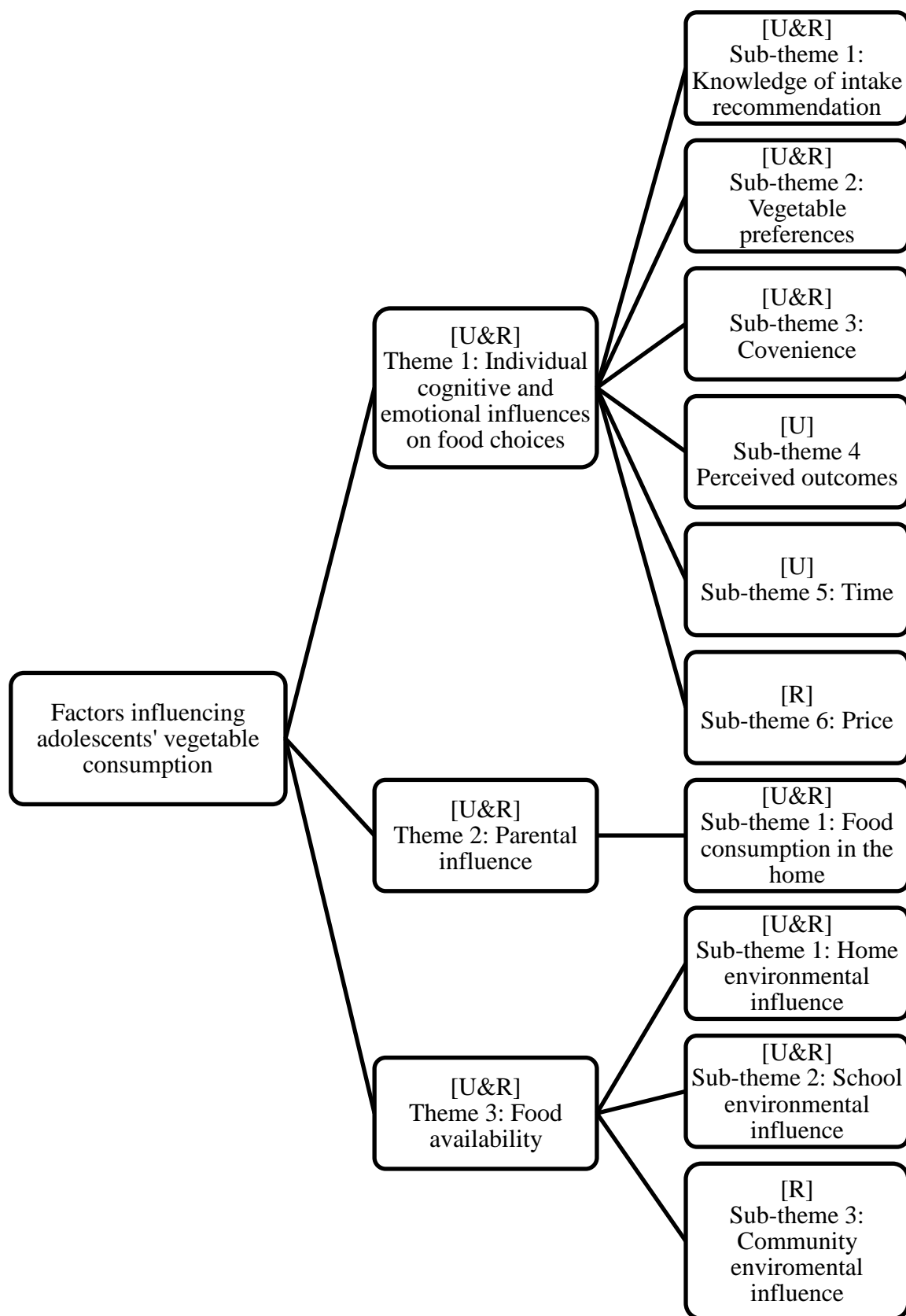
Theme 1: Individual cognitive and emotional influences on food choices

Sub-theme 1: Knowledge of intake recommendation

The majority of the urban Thai adolescents did not know how many serving spoons of vegetables they should eat each day. Related comments were as follows.

-*Vegetables...we should eat one and half serving spoons per day. [UM 8]*

-*I think four serving spoons per day. [UM 5]*

-*Three serving spoons. [UM 6]*

-*I don't know. [UM 4] and [UF 2, 3, 4, 7, 8]*

-*I am not sure. [UF 1, 9, 10]*

Similarly, all of the rural Thai adolescents did not know how many serving spoons of vegetables they should consume per day. Some responses are as follows.

-*Two to three serving spoon per day. [RM 5, 8]*

-*Four to five serving spoons per day. [RM 4]*

-*Two serving spoons. [RF 1]*

-*Three serving spoons. [RF 4]*

-*We don't know. [RF 3, 5]*

Sub-theme 2: Vegetable preference

Most urban participants who consume vegetable amounts of at least 5 serving spoons per day expressed the view that their vegetable intake was influenced by preferences such as taste, appearance, and smell. This view can be identified in the following statements.

-*I buy them (vegetables) nearly every day because they look nice and fresh. [UM 8]*

-*Anyway I like to eat some types of them (vegetables)…some are not tasty such as Chinese kale. It is bitter. [UM 5]*

-Personally, I like to eat vegetables…They are appetizing and yummy. [UF 9]

Taste, smell, texture and appearance also were spontaneously mentioned by most of the urban students who ate less than five serving spoons per day. Responses can be seen in the following statements.

-I do not like them (vegetables)…I do not like their smell and taste. [UM 4]

-They (vegetables) are not tasty, such as Chinese kale [UF 1]

-It (such as Chinese kale) has a grassy smell. [UF 1, 3]....It (such as Chinese kale) is also bitter. [UF 1, 3]

-They (vegetables) are bitter. [UM 4]

-It (such as Chinese kale) is very hard to chew. [UF 1, 3]

-I select just some vegetables I like [UF 3, 4]…there are not many types of them that I like to eat... such as cucumber and Chinese cabbage [UF 3]

-I do not like some vegetables very much...They (vegetable) have a grassy smell... [UF 7]

The taste and smell of vegetables were emphasized as the main barriers to vegetable intake by three urban students who did not eat any vegetables. Related comments were as the following statements.

- They (vegetables) have grassy smell. [UM 9, 10]…I do not like all of them (Vegetables). [UM 10]

- I do not like eating vegetables very much…they are not tasty. [UM 10]

- They (vegetable) are not tasty, and have a bad smell. [UM 7, 9]

Similarly, taste and the appearance of vegetables were mentioned as factors that can influence their vegetable intake by several rural adolescents when they discussed why they eat at least five serving spoons per day. Some examples of comments are as follows.

-They (vegetables) are tasty. [RM 4, 5, 9]

- They (vegetables) are so tasty. [RF 3]

-I like eating vegetables…they look fresh. [RF 3]

-They are appetizing such as mixed vegetable stir fry…It is colourful and appetizing. [RF 3]

Several rural participants who eat vegetables less than five serving spoons each day mentioned taste and appearance as major considerations for eating vegetables. Some students preferred other foods and vegetables were also compared with other foods such as pork and chicken. Some examples of comments are as follows:

-I do not like them (vegetables) I do not like their taste, so I ignore them. [RF 2]

-I like other food more than vegetables such as pork and fried chicken. [RF 6]

-I think that my stomach is small. When I eat other foods a lot, I will eat just a few vegetables. [RF 9]

-Other foods such as meat are more appetizing than vegetables. [RF 6]

Sub-theme 3: Convenience

Some urban students who consume vegetables at least five serving spoons each day said that they can eat lot of vegetables because vegetables are convenient for cooking and eating. Statements in this regard can be seen in the following.

-I cook vegetables if there is nothing to eat...Vegetables are available for eating at my home because my mom always buy them back home....It is cooked easily and we also can eat fresh vegetables. [UM 8]

-They are easy to cook, easy to eat and we can eat even eat raw vegetables. [UM 5]

Similarly, some rural participants who consume vegetables at least five serving spoons per day said that eating and cooking vegetables is convenient.

-It is easy to cook them (vegetables). [RM 8]

-They (vegetables) are easy to cook and eat…We can eat them both cooked and raw such as for dipping into Namprik (shrimp paste mixed with garlic, lime, chilli, sugar). [RM 2]

-They (vegetables) are easy to cook. [RF 7]

-We can eat even if they (vegetables) are raw. [RF 7]

Sub-theme 4: Perceived outcomes of vegetable intake

Some urban and rural participants who consumed vegetables of at least five serving spoons each day mentioned maintaining eyesight as the benefit of vegetable intake, as seen in the statement.

-I think that they (vegetables) can maintain my eyesight [UM 8]

-If we eat a lot of vegetables, we will not gain more weight. I don't like to be fat. [RF 5]

-Tomato makes us have a good skin...I like to eat them [RF 3]

-I like to eat vegetables because they help me to eliminate waste products from body... It is very good for me. [RM 9]

However, there was one urban student who eats at least five serving spoons of vegetables who said that she did not care about the benefits of eating vegetables, as in the comment.

-Anyway I do not think about their (vegetables) benefits…I think only that they can be eaten. [UF 9]

Some students who eats less than five serving spoons of vegetables each day in the urban high school believed that he can ingest pesticide from eating vegetables, as seen in the statement.

- I worry about pesticide contaminating vegetables. [UM 8]

-I don't like Chinese cabbage because it is contaminated with

pesticide...Farmers used pesticide to grow them near my home. [RF 8]

-I don' like vegetables selling in the market...They are contaminated with

pesticide. [RF 7]

Sub-theme 5: Time

Time was mentioned by some urban and rural students who ate less than five serving spoons of vegetables as a factor that can influence his vegetable intake.

- I have to hurry up, so I eat anything...if they are vegetables or not. [UM 8

-Sometimes, I have no time to think...they are vegetable or not...just eat...eat...and eat them [RF 6]

Sub-theme 6: Price

The cheap price of vegetable was only reported by some rural respondents who consumed at least 5 serving spoons of vegetables each day as a reason that influenced their vegetable-purchasing decisions. Some responses are as follows.

-Many kinds of vegetables are sold in my community...I have a lot of choices, and they are also cheap. [RM 4]

-Some vegetables are cheap. [RF 7]

Theme 2: Parental influence

Sub-theme 1: Food consumption in the home

Their parents, particularly mothers, were commonly mentioned by the participants who eat at least five serving spoons of vegetables each day as key people who influenced their vegetable consumption. Mother's cooking and food purchasing were mentioned as factors that affected vegetable consumption behaviour of the urban adolescents, as seen in the following statements.

-Sometimes, nothing to eat...vegetables are available for eating at my home because my mum always buys them back home...I cook vegetables if there is nothing to eat. [UM 8]

-My mum always cooks vegetables. [UM 5]

While one respondent who eat vegetables (five serving spoons) stated that her parents encouraged her to eat vegetables, one participant who consumed less than five serving spoons of vegetable said that his parents did not blame him although they used to force him to eat vegetables. The statements by adolescents were as follows.

-*My parents have encouraged me to eat vegetables since I was young.* [UF 9]

-*They (parents) used to force me to eat vegetables…When they knew what I did not want to eat, they did not blame and force me.* [UM 4]

Vegetable purchasing behaviour of parents was mentioned as a factor that can influence their rural children's vegetable eating behaviour, as seen in the statement.

- *My father and mother always buy vegetables and leave them in the fridge.* [RM 8]

Theme 3: Food availability

Sub-theme 1: Home environmental influence

An urban adolescent who eats at least five serving spoons per day mentioned that vegetable availability at home can make him eat more vegetables. The statement in this regard is:

-*Sometimes, nothing to eat…vegetables are available for eating at my home because my mum always buys them back home…I cook vegetables if there is nothing to eat.* [UM 8]

Similarly, some rural respondent who eats vegetables at least 5 serving spoons per day indicated that vegetable availability at home encouraged them to eat more vegetables. Related comment is:

- *My father and mother always buy vegetables and leave them in the fridge.* [RM 8]

-*I like to eat vegetable...my family always grow them, so I eat it quite often.* [RF 3]

Sub-theme 2: School environmental influence

Urban student who eat less than five serving spoons of vegetables each day stated that food in the school canteen was composed of a few vegetables, and there were few choices. This view is reflected in the following statement:

-Food in the school's canteen is composed of a few vegetables such as rice topped fried meat with basil leaves and noodle soup…normally, I eat just one plate of food at lunch time...I do not want to buy more… I eat just a few; if they (sellers) give me a few vegetables…I have a few choices to eat... We have enough food shops, but most foods they provide are composed of a few vegetables. [UF 10]

-I agree...A dish at school canteen is composed of a few vegetables. [UF 3]

Similarly, foods served in the school canteen with a few vegetables were identified by some rural students who did not eat at least five serving spoons of vegetables as a reason that affects students' vegetable intake. Related comment was:

-When we buy single-plate food, the seller always serves a few vegetables, so we will eat a few vegetables. [RF 1]

Sub-theme 4: Community environmental influence

Some rural respondents who consumed at least five serving spoons of vegetables per day said that the accessibility of buying vegetables in their community was an important factor that affected their vegetable intake.

-They (vegetables) are sold around our house…They (vegetables) are so easy to buy. [RF 4]

-Some vegetables are easy to buy around my home. [RF 7]

The availability of some vegetables grown wild in the community around the home were mentioned by rural participants who eat at least five serving spoons of vegetable as an alternative cause that can make them eat more vegetables. Statements by participants were:

-We can pick some vegetables around our home such as the Ivy gourd. [RM 6]

-Some vegetables I do not need to buy…I can find and get them around my home. [RF 7]

However, this sub-theme did not emerge from the discussion in the group of urban adolescents.

Factors influencing urban and rural adolescents' fruit intake

Figure 6.4 below shows the thematic map developed from the findings on factors influencing urban adolescents' fruit intake, showing three main themes and ten sub-themes, as well as three main themes and nine sub-themes that emerged from the group of rural adolescents.

Figure 6.4 Thematic map of factors influencing adolescents' fruit intake
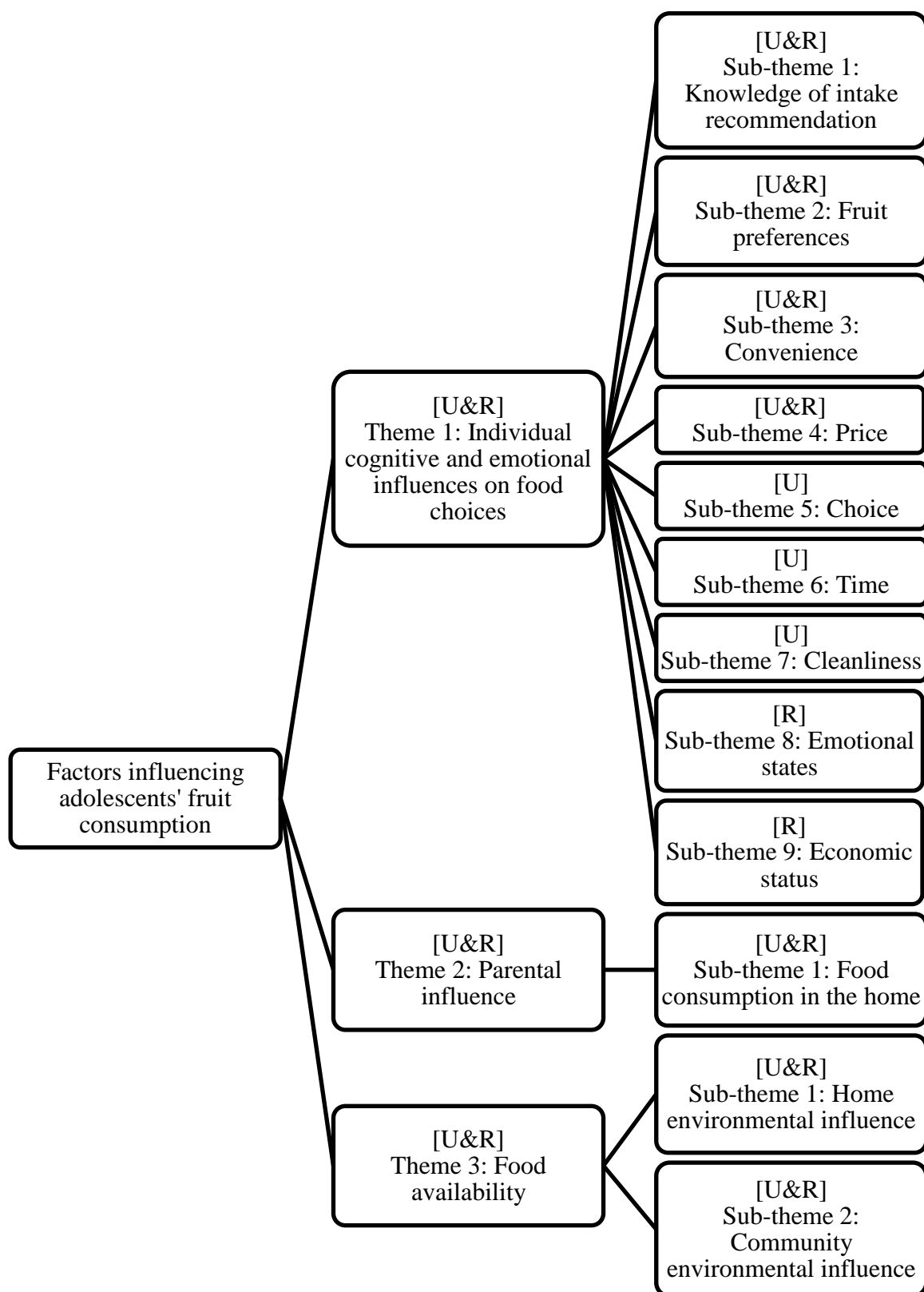
Theme 1: Individual cognitive and emotional influences on food choices

Sub-theme 1: Knowledge of intake recommendation

None of the urban Thai adolescents knew how many serving portions of fruit they needed to eat each day. Related comments were as the following.

-...*four portions [UM 1]...five portions [UM 5]...six portions [UM 4]...seven portions [UM 8]...eight portions [UM 6].... (all student laughed)...I don't know. [UM 1-10]*

-*I am not sure...how many portions of fruit I should eat per day. [UF 2, 7, 9]*
-*For me, I don't know. [UF 1-6, 8, 10]*

Similarly, all of the rural Thai adolescents' did not know how many portions of fruit they should consume per day. Some responses were as follows.

-...*four to five [RM 7]...two portions [RM 8]...four portions [RM 2]...nine portions [RM 4]....we don't know. [RM 1-9]*

-...*two portions [RF 2]...three portions [RF 4]...three to four portions [RF 8]...five portions [RF 6].... I am not sure. [RF 2, 4, 6, 8]*

Sub-theme 2: Fruit preference

Fruit preferences, taste and colour, are considered by some of the urban participants who consumed at least four portions each day as determinants of their fruit intake. Some of them said that fruits are so tasty, while another also mentioned the wide variety of fruits' taste that offered a lot of choice for them. Colour of fruit was expressed as a factor that can make fruit look more appetizing. Statements they made included:

- *They (fruits) are so tasty [UM 4 and 6]*

- *They (fruits) have a wide variety of taste...have a lot of choices [UM 8]*

-*Colour...Fruits are colourful, and their appearance is appetizing...Durain, dragonfruit, and mangosteen, they look fresh and appetizing. [UM 8]*

The appearance of fruit, particularly the taste and smell, was brought up as justification for fruit consumption by urban respondents who ate less than four portions each day. Related comments were:

-I like to eat just some fruits…such as pineapple and watermelon [UM 9]

-I cannot eat Durian and Jack fruit because they have a strong smell. [UM 4]

The taste of fruit which is described as less tasty than snacks was also mentioned by urban adolescents who do not eat at least four portions per day as a barrier to their fruit intake. This view can be seen in the following statements.

-If I have money, I will buy snacks.... I don't want to buy fruit...Snacks are so tasty. [UM 9]

-They (snacks) are so tasty and easy to buy and eat rather than fruit...It is also easy to keep them with myself [UM 10]

Taste also was reported by rural students who consumed at least four portions each day, as a factor that affected their fruit-eating behaviour. A related comment includes:

-I like them (fruits)…they are so tasty. [RF 6]

One rural adolescent who eat fruit less than four portions each day stated that she preferred to eat snacks rather than fruit. Comment is:

- I prefer eating other snacks…they are tastier. [RF 4]

Sub-theme 3: Convenience

Some urban students expressed that they consumed at least four portions each day because it is convenient to by and eat fruit. Statements in this regard were:

-They (fruit) are easy to find and eat. [UM 4]

-Yes, it is easy to buy…I find them (fruit) in the market around my home. [UM 3]

Some urban respondents who consumed less than four portions each day felt that buying and eating snacks was more convenient than eating fruit, as seen in the following statements.

-*They (snacks) are so tasty and easy to buy and eat rather than fruit. [UM 9, 10]*

-*It is not convenient to eat fruit everywhere as snacks...Fruit must be eaten at home...I like mangos, but they need to be peeled and cleaned before eating [UF 7]*

However, only one rural adolescent who eats at least four portions per day stated that buying fruit was convenient. Response is:

-*It is easy to buy them (fruit). [RF 6]*

The convenience of purchasing fruit is considered as a factor that can influence fruit-eating behaviour by rural respondents who consumed less than four portions each day. Fruit was also considered as a kind of ready to eat food. Statements by participants included:

-*I will buy them (fruit) where I can buy them easily. [RM 1]*

-*They are also ready to eat. [RM 1]*

Sub-theme 4: Price

The price of fruit was identified and discussed by urban participants who ea less than four portions of fruit a day. While one of them indicated that the price of fruit influenced her fruit-purchasing behaviour, another one said that the price of fruit did not affect her fruit-eating behaviour when eating fruit at home purchased by her mother. Statements by participants are:

-*Cost can affect me if I buy fruit by myself. [UF 7]...Cost does not affect me if my parents by me fruits. I just order them "What I would like to eat" [UF 7]*

-*My mum buy them (fruit), I have no problem about price at all. [UF 9]*

In contrast, the price of fruit affected fruit-purchasing behaviour of some rural students who did not consume at least four portions per day. Related comment included:

-Eating based on economics status...I look for some fruits that they are readily available in that time....they should be selling at lower prices. [RM 4]

-...Yes, I agree [RM 9]...Eating cheap fruit that I can find (buy) at that time. [RM 9]

Sub-theme 5: Choice

Having a lot of fruit choices was mentioned as a good situation for eating more fruit by urban respondents who consumed at least four portions per day.

- They (fruits) have a wide variety of taste...have a lot of choice [UM 8]

- I like to eat fruit...They are have a variety of taste...Mango have a sharp sour....Grape have a sweet taste...I like them. [UM 4, 6]

However, this sub-theme did not emerge in the group of rural adolescents.

Sub-theme 6: time

Several urban students expressed the view that they cannot eat at least four portions a day because they had no time to eat fruit. In addition, one participant said that she eats just a few fruit on some days because they had some activities to do. Statements by participants are as follows.

-Fruit is what must be eaten at home ....I have no time to eat them [UF 7, 9]...If I buy them (fruit), I will buy just some that I can finish in limited time. [UF 7]

-Yes, I have no time to eat fruit, I eat just main course... If I stay at home, I will have plenty of time to eat fruit. [UF 9]

-I will buy them just some days...when I do some activities; I eat just a few fruits. [UF 11]

-I like to eat fruit....but sometimes, I have some activities to do in lunch break time, so eat just main dish. [UF 8]

However, this sub-theme did not emerge in the group of rural adolescents.

Sub-theme 7: Cleanliness of fruit

One urban student who eats less than four portions each day reported that she worried about cleanliness of eating fruit outside the home. Comment is:

-I am not sure about cleanliness of fruit shops and fresh fruit. So I wait to eat fruit at home. [UF 7]

However, cleanliness of fruit was not mentioned in the group of rural adolescents.

Sub-theme 8: Emotional states

Some rural respondents who ate less than four portions said that their fruit-eating was based on their emotional state. This view is reflected in the following statements.

-I will eat them (fruit) as a result of my emotional state. I will eat them when I want to eat them, and I do want to eat them when I do want to eat, no reason…just feeling. [RM 9]

-I do not eat fruit every day… I would like to eat fruit just sometimes and some days. [RF 7]

-Sometimes, I buy them (fruit). It is just only a bag when I am at school…Yes one bag just two portions. [RM 4]

However, this sub-theme did not emerge in the group of urban adolescents.

Sub-theme 9: Economic status

Some rural adolescents who eat less than four portions a day said that they do not have

money to buy fruit. Statements by respondents are as follows.

-I want to save my money…I have no money to buy fruit. [RF 4]

- Me too, I do not have enough money to buy fruit. [RF 3]

-Eating based on economics status [RM 4]

- Yes, I like to eat fruit, but sometimes, I want to save my money for buying other things. [RM 9]

In contrast, this sub-theme did not emerge in the group of urban adolescents.

Theme 2: Parental influence

Sub-theme 1: Food consumption in the home

Fruit purchasing behaviour of parents and family, particularly mother was mentioned in the group discussion as a supporting factor that assists urban respondents to eat more fruit. Responses included:

-My family, particularly mum always buys fruit back home [UM 4]

-My mom always buys fruit. [UF 7]

Similarly, parents' fruit purchasing behaviour was mentioned by rural adolescents who consumed at least four portions as a factor that influenced his fruit-eating behaviour. Statement in this regard was:

-They (fruits) are available at home…my parents always buy them back home. [RF 3]

Parents' fruit purchasing behaviour was also indicated by several students who consumed less than four portions as a factor that influenced their fruit-eating behaviour, as seen in the following statements.

-I eat as much as somebody buys (fruit) for me. [RM 2, 7, 9] …Who? [Moderator] …My father and mother. [RM 2, 7]

-When my parents go to the market, they always buy fruit back home [RM 9]

-If I stay at home, I will eat them (fruits) as much as my parent buys for me. [RM 2,6, 8]

-Eat as I have them (fruits) at home. [RM 2]

-My parents do not buy fruit for me…They buy only some food for main meals. [RF 4]

Theme 3: Food availability

Sub-theme 1: Home environmental influence

Some urban students who consumed less than four portions reported that the availability of fruit at home affected their fruit intake. This view can be seen in the following statements.

>   *-If they are available for me, I will eat them. If not…, I won' t. [UM 7]*

>   *-I will eat them (fruits), if they are available at home. [UF 9]*

Availability of fruit in home was shown in the group of rural respondents' as a factor that assists respondents who eat at least four portions each day to eat more fruit. This view is reflected by the following statement.

>   *-They (fruit) are available at home…my parent always buy them back home.*
[RF 3]

Some rural students who eat less than four portions each day also mentioned home as a place that gave them fruit. Related comments included:

>   *-I eat fruit some days, not every day. [RM 7, 9] …I eat fruit as much as they*
are available at home for me. [RM 7]

>   *-Yes, if they (fruits) are available at home for me [RM 2, 9]*

>   *-Eat as I have them (fruits) at home sure. [RM 2]*

Sub-theme 2: Community environment influence

One urban participant who eats less than four portions of fruit a day said that fruit that he can eat are sold out in some seasons. Statement by respondent is as follows.

>   *- I can eat just some fruit, but we cannot have them every season such as*
longkong. [UM 10]

One rural student who consumed at least four portions of fruit per day said that some fruits such as mango and longkan were available in the natural environment. Response by participant is:

-It is also easy to get them (fruits) around my home even in the jungle such as mango and longkan. [RF 7]

Availability of fruit in natural environment was expressed by rural adolescents who eat less than four portions per day as a factor that influenced them. Some examples of comments are as follows:

-Based on what season and where I can get them (fruits)...I do not want to buy them...I find them around my home such as mango and longkan. [RM 9]

The long destination between home and market was shown as a barrier to eating fruit by a rural respondent who did not eat fruit of at least four portions each day. Related comment is:

-I rarely go to the market to buy some fruits…My home is far from the market. [RF 4]

Factors influencing urban and rural adolescents' rice and starchy-food intake

Figure 6.5 below shows the thematic map developed from the findings of factors influencing urban adolescents' starchy foods intake, showing one main theme and four sub-themes originating from the group of urban participants and two main themes and five sub-themes that emerged from the group of rural participants.

Figure 6.5 Thematic map of factors influencing adolescents' rice and starchy-food intake.
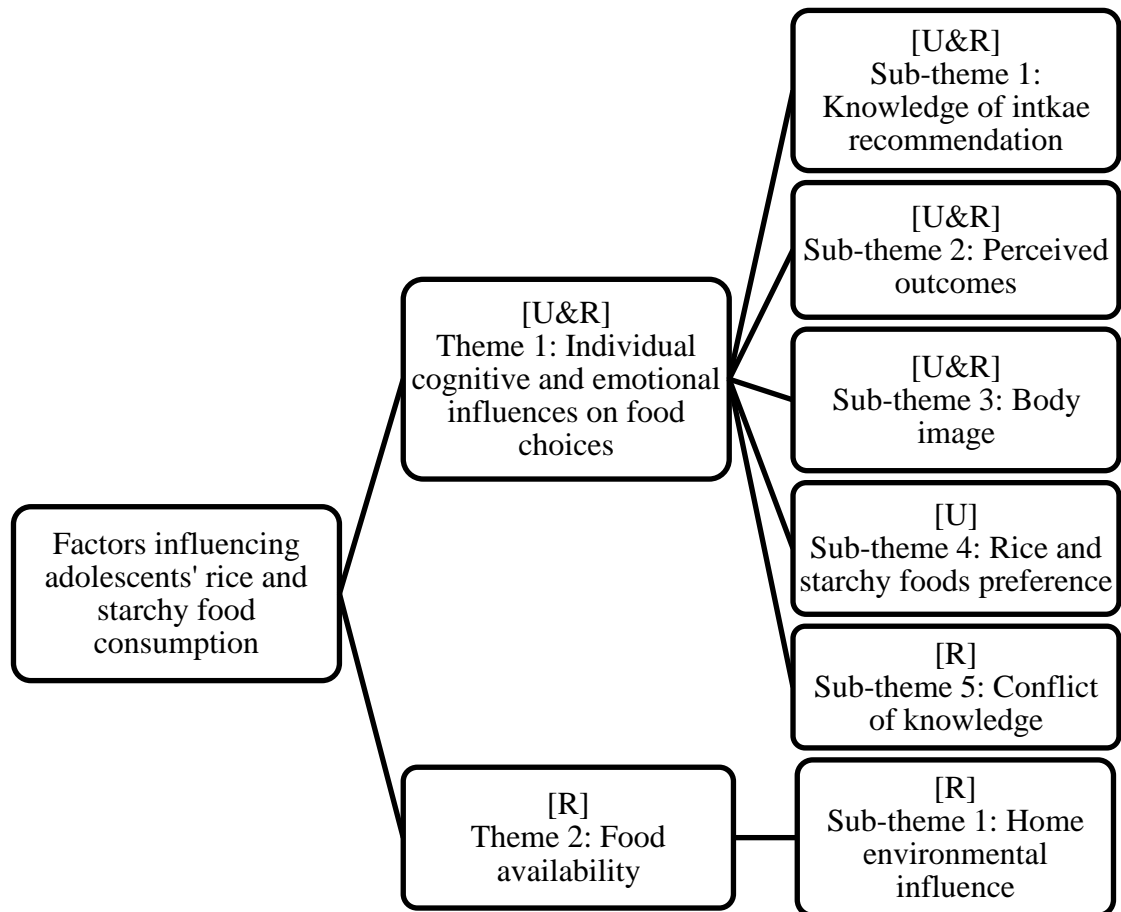
Theme 1: Individual cognitive and emotional influences on food choices

Sub-theme 1: Knowledge of intake recommendation

None of the urban Thai adolescents knew how many serving spoons of rice-starchy foods they should eat each day. Related comments were as follows.

-...two serving spoons [UM 4]...three serving spoons [UM 5]...six serving spoons [UM 6]...four serving spoons [UM 7]...five serving spoons ...I think that all of us guessed [UM 8...(all student laughed)...Yes [1-10]...I don't know. [UM 4]

-I don't know how much I should eat rice and flour per day [UF 4]

-I don't know. [UF 1-10]

Similarly, all of the rural Thai adolescents did not know how many serving spoons rice-starchy foods that they should consume per day. Some responses are as follows.

-...three serving spoons [RM 3]...three to four [RM 5]...two serving spoon spoons [RM 4, 9]...one serving spoon [RM 2]....three for each meals; breakfast, lunch, and dinner [RM 6]... nine serving spoons [RM 9]...we don't know. [RM 1-9]

- I don't know. [RF 1-9]

Sub-theme 2: Perceived outcomes

Some urban students who eat more than 10 serving spoons each day felt that eating rice or starchy foods provided energy, and made them feel full as seen in the following statements.

-They (rice and starchy food) give me energy…I feel full after eating them [UM 2]

-I feel full after eating rice. [UM 7]

Similarly, only one rural student who eats more than 10 serving spoons each day expressed that he liked to eat rice because it made him feel full, and it is not easy to get hungry then. Comment is as follow.

-I like to eat rice…it (eating rice) makes me feel full [RM 6]

-I like to eat rice…It is not easy to get hungry. [RM 9]

-I feel like…not full when I have no rice in each meal. [RM 2]

However, some urban students who eat less than 10 serving spoon each day expressed that eating just a little starchy foods made them feel full. This view can be seen in the following statements.

-I feel full only eat just a little of them (rice and other starchy food). [UM 8]

- I feel full after eating rice. [UM 4]

-I like to eat rice, but I feel full after eating rice just a little. [UM 5]

-Yes, eating rice just a little ...makes me feel full [UM 7]

-I feel full... only eat them just a little (rice and other starchy food). [UM 1]

-Yes, eat them just a little...makes me full [UF 4, 5, 8]

-Eating starchy foods is easy to feel full. [UF 9]

Some rural adolescents who consumed less than 10 serving spoons each day also said that they felt full after they eat a little starchy food. This view is reflected in the following statements.

-I feel full when I eat them (rice and other starchy foods)... just little. [RM 3]

-They (rice and other starchy foods) make me full...just only eating them a little. [RF 1, 7, 9]

-I eat them just a little...when I compared them with other foods...They not tasty, and they also make me feel full...I want to eat other foods rather than rice [RF 5]

Some of them also stated that eating starchy food makes them sleepy and lazy, as seen in the statements.

-Eating them (rice and other starchy foods) too much will make me lazy and sleepy. [RM 4]

-I feel sleepy, if I eat them (rice and other starchy food) too much. [RF 4]

Sub-theme 3: Body image

One of the urban participants who eats less than 10 serving spoons each day was concerned that eating starchy foods made her fat. Statements by participants were:

-They (rich and other starchy foods) make me fat. [UF 10]

-No....eating a lot of rice and starchy food group makes me fat. [UF 4]...Yes...I totally agree with you...It is too much.[UF 5, 8, 9]

Likewise, some rural respondent who consumed starchy foods of less than 10 serving spoons each day stated that eating lots of starchy food will make her fat. The related comment is:

>*-I will get fat, if I eat a lot of them (rice and other starchy foods). [RF 4]…*

>*-I do not want to get fat...it's not nice [RF 3]*

>*-If I eat a lot of them...I will surely get fat. [RF 8]*

Sub-theme 4: Starchy food preference

Some urban students who eat starchy food of less than 10 serving spoon each day explained that other foods are tastier than starchy foods. Response is:

>*-I like to eat other things rather than rice such as meat…They are more delicious than starchy food. [UM 4]*

>*-There are tastier things to eat than rice and starchy food such as meat...I like to eat meat…they are tastier… [UM 8]*

In contrast, this point was not addressed in the group of rural students.

Sub-theme 5: Conflict of knowledge

Some rural respondents who consumed less than 10 serving spoons each day thought that eating starchy foods approximately 10 serving spoon each day was too much. Comment is:

>*-No, 'Eating rice and starchy food ten serving spoons per day' that is too much. [RF 1]...Yes, I agree [RF 8]*

>*-I think that eating rice and starchy food ten serving spoons per day is too much, and I don't want to eat. [RF 3]*

>*-I know that they provide me energy, but it is too much to eat them ten serving spoons per day. [RF 4]*

However, this sub theme was not identified by the group of urban participants.

Theme 2: Food availability

Sub-theme 1: Home environmental influence

Only one rural student who ate more than 10 serving spoons each day said that rice was always available in his home. Response is:

-*There is nothing to eat, and cooked rice is always available at my home.* *[RM 8]*

However the availability of rice and other starchy foods were not discussed in the group of urban adolescents.

Factors influencing urban and rural adolescents' fast food-eating behaviour

Figure 6.6 below shows the thematic map developed from the findings re factors influencing urban adolescents' fast food-eating behaviour, showing four main themes and eight sub-themes originating from the group of urban students. There were four main themes and seven sub-themes that were identified from the group of rural adolescents.

Figure 6.6 Thematic map of factors influencing adolescents' fast food-eating behaviour
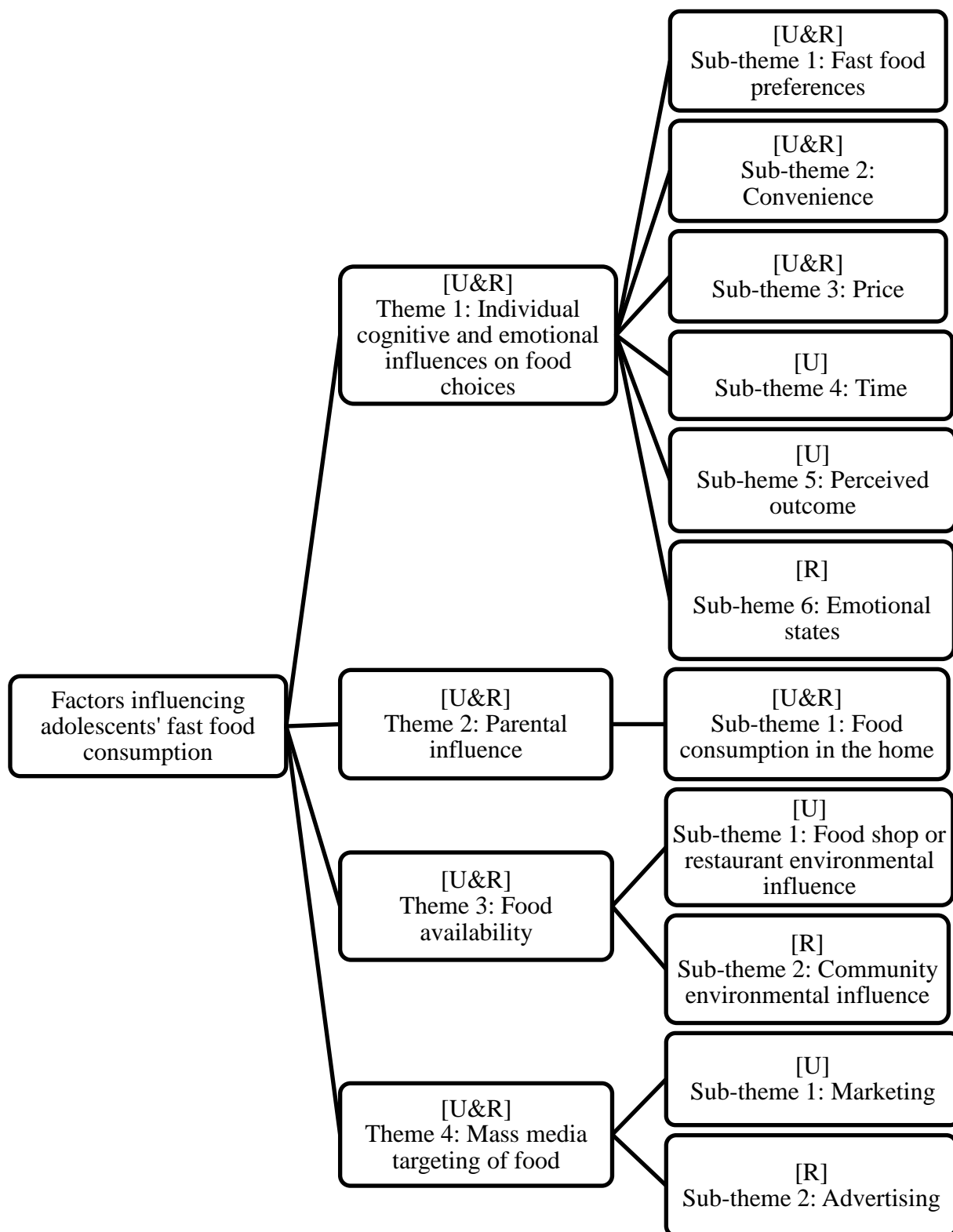
Theme 1: Individual cognitive and emotional influences on food choices

Sub-theme 1: Fast food preference

Many urban adolescents stated that their reason for eating fast food was the taste of fast foods. In addition, some of them indicated that fast food is tastier than fruit and vegetables. Statements are as follows:

-They (fast foods) are so tasty. [UM 6]

-I like to eat them [UM 4, 6, 7, 8, 9, 10]…KFC, Pizza [UM 4], Chester grill, French-fried [UM 9], and MacDonald's [UM 10]…they are so tasty…Yummy [UM 4, 6, 9, 10].

-They are quite expensive [UM 4]…I still want to buy them although they are expensive…cost does not affect me because I want to eat them…I like to eat them…they are so nice and tasty. [UM 8]

-They are delicious. [UF 5, 7, 8, 9]

-They are so tasty (laughed). [UF 1]

-They are very tasty (laughed). [UF 1, 7]

-They are quite salty…I think that most people like salty taste [UF 9]…For example, French-fried is salty. [UF 6]…Most of us like eating salty taste. [UF 9]

-Of course, fast foods are tastier than vegetables and fruit. [UF 1]…Yes… [UF 2, 5, 7, 9, 10]

Other reasons for consuming fast foods were texture and smell, as seen in the following statements:

-They are smooth and soft. [UF 9]

-They have fragrant smell. [UF 11]

Similarly, some rural adolescents said that they liked to eat fast foods because they are so tasty. Some of them also stated that fast food containing high meat is tastier than fruit and vegetables. Related comments are as follows:

-We like to eat meatballs [RM 4, 7, 8]...fried chicken as well [RM 5, 6, 8]...They are so tasty. [RM 2-6, 8, 9]

-They are yummy yummy...I like them very much. [RF 2]

- However, a lot of Thai fast foods are available in our community. ... and their tastes are also very good such as fried chicken. Its taste is like KFC. [RF 2]... I agree, I like to buy and eat them because they are tasty and cheap. [RF 5]

- I like to eat meat more than vegetables and fruit, so I like fast foods. They contain high meat. [RF 4]...Me too [RF 2]

Sub-theme 2: Convenience

Some urban respondents said that eating fast food is convenient. Related comments are as follows:

-They are (fast foods) easy to find and eat. [UM 8]

-It (eating fast food) is so easy and quick. [UM 4]

-It (eating fast food) is so quick. [UF 7]

-It is convenient. [UF 1]

Some rural respondents also identified that eating fast food is convenient. Responses are as the following.

-They are easy to eat. [RM 4, 8, 9]

-I mean it; eating fast food is very convenient. [RM 2, 4, 9]...I can eat them anywhere even if I walk. [RM 4]...Yes [RM 1, 2, 6, 9]

-Anytime and anywhere...I can eat them. [RF 2, 4]

Sub-theme 3: Price

When urban participants were asked why they like to eat fast food, one of them said that fast foods are cheap. In contrast, some of them said that fast foods are very expensive. The cost of fast foods affected their fast food-eating behaviour. This view is reflected in these statements:

>*-They are cheap…Some fast foods are cheap such as grilled burgers and meatballs. [UM 6]*

>*-I don't like them…they are so expensive. [UF 10]*

>*-Some fast foods are too expensive…I will not buy them. [UM 4]*

>*-I rarely eat fast food…they are expensive. [UM 2]*

Price also was mentioned by some rural participants as a factor affecting their fast food-eating behaviour. Related comments are as follows:

>*- Thai fast foods …they are easy to buy because they are available in our community and also not expensive. [RM 4]…Yes, I agree with you [RM 1-9]*

>*-It is quite cheap… You can buy some, if you have just only five or ten Baht. [RF 3]*

>*-However, a lot of Thai fast food is available in our community. They are quite cheap and their taste is also very good such as fried chicken. [RF 2]… I agree, I like to buy and eat them because they are tasty and cheap. [RF 5]*

Sub-theme 4: Time

Time was mentioned by some urban respondents as a reason for eating fast food. Responses include:

>*-We eat fast foods when we are in a rush. [UF 2]*

>*-It (eating fast food) is so easy and quick, when we are in rush. [UM 4]*

However time was not identified in the group of rural adolescents.

Sub-theme 5: Perceived outcomes

While some urban students said that fast food provided energy and made them full, one of them was concerned that fast foods can make her fat. Statements they made included:

>*-Fast foods provide more energy. [UF 4]…Eating fast foods make me feel full. [UF 4]*

> *- I like to eat fast foods...they are so tasty, and they also make me fill full [UF 6]*

> *-Eating them make me fat. [UF 2]*

However these outcomes were not identified in the group of rural adolescents.

Sub-theme 6: Emotional states

Some rural respondents expressed that they ate fast foods based on their emotional states. This view is reflected in the following statements.

> *-Eating them, yummy...yummy, it is not boring like eating other foods. [RF2]*

> *-Sometimes, when I feel bored eating them makes me feel happy. [RF4]*

However, these outcomes were not mentioned in the group of urban adolescents.

Theme2: Parental influence

Sub-theme 1: Food consumption in the home

Parents and family were mentioned by some urban adolescents as key persons that influence their fast food-eating behaviour. Related comments are as follows:

> *-Yes, I agree that they are expensive, but I have not paid for myself...My parents always pay for me. [UF 5]*

> *-I eat fast food with my family when we are all together. [UF 9]...Me too [UF 2]...My family like eating fast food...we want to enjoy and relax together. [UF 2]...Yes [UF 9]*

> *-They are quite expensive...My family will eat fast food for a special occasion such as a birthday party. [UF 10]*

Similarly, some rural adolescents' fast food-eating behaviour was supported by their parents' purchasing behaviours. Statements by participants are as follows:

> *- I like KFC very much...I eat KFC every week... My father goes to the city for his business every week...So he can buy KFC for me. [RF 2]*

-They are cheap or expensive. It does not matter… My parents pay for me.
[RF 2]

Theme 3: Food availability

Sub-theme 1: Restaurant environmental influence

The atmosphere of fast food shops were brought up for discussion by urban
participants when they talked about why they liked to eat fast food. This belief can
be seen in the following statements.

-Fast food shops attract us to sit in more than shops in the market. [UF 1,
9]…They are so cool and they have a good atmosphere. [UF 1]…Yes [UF 2, 5,7,
10]

-I like to eat in sit-down fast food shops...They are clean, and they have a
good atmosphere. [UF 2]...Me too [UF 7]

However this theme did not emerge from the group of rural adolescents.

Sub-theme 2: Community environmental influence

Some rural respondents said that they wanted to eat some western fast foods such as
KFC and Pizza, but they are not available in the rural community. Examples of
comments are as follows:

-Fast food…I want to eat them, but they are unavailable here. [RM
4]…Which fast food do you want to consume? [Moderator]…Such as KFC and Pizza
hut [RM 2, 4, 8, 9]…They look good and appetizing but not available around here.
[RM 1, 4]…Yes [RM 6, 8]…They are unavailable around here. [RM 9]

-Different from Western fast foods such as KFC and Pizza, Thai fast foods
…they are easy to buy because they are available in our community and also not
expensive. [RM 4]…Yes [RM 1, 2]

-We have some fast food such as Grilled pork, Pizza, fried chicken in our
local market. [RM 8]

- It is easy to buy just local fast foods in my community. [RF 4]…such as
meatballs and grilled pork [RF 2, 4]

However this sub-theme did not emerge from the group of urban adolescents.

Theme 4: Mass media targeting of food

Sub-theme 1: Marketing

Marketing techniques, (gift collection, and coupons for discount) were mentioned by some urban respondents as factors that influence their fast food-purchasing behaviour. Statements by participants are as follows:

> *-I sometimes eat to get the gift collections…such as KFC… collect toys. [UF 9]*

> *-I got discount point coupons from Seven Eleven (Name of convenience shop/ open 24 hours) when I bought some fast food such as sausages. [UF 7]*

In contrast, marketing techniques were not brought up in the discussion by rural students.

Sub-theme 2: Advertising

Some rural participants identified advertising of fast foods on television as a factor that motivates them to eat fast foods. Statements they made are as follows:

> *-I saw them on the advertisement on television…They look good and appetizing but are not available around here. [RM 1, 4]…Yes [RM 6, 8]*

> *-I always see them in television such as KFC and Pizza Hut, and I want to eat them...The more I see them, the more I want to eat them, they are yummy.. yummy[RF 4]*

In contrast, this point was not mentioned by the group of urban adolescents.

Factors influencing urban and rural adolescents' soft drinks consumption

Figure 6.7 below shows the thematic map developed from the findings related to factors influencing urban adolescents' soft drink consumption showing one main theme and two sub-themes that originated from the group of urban participants. There were two main themes and five sub-themes that emerged from the group of rural adolescents.

Figure 6.7 Thematic map of factors influencing adolescents' soft drink consumption
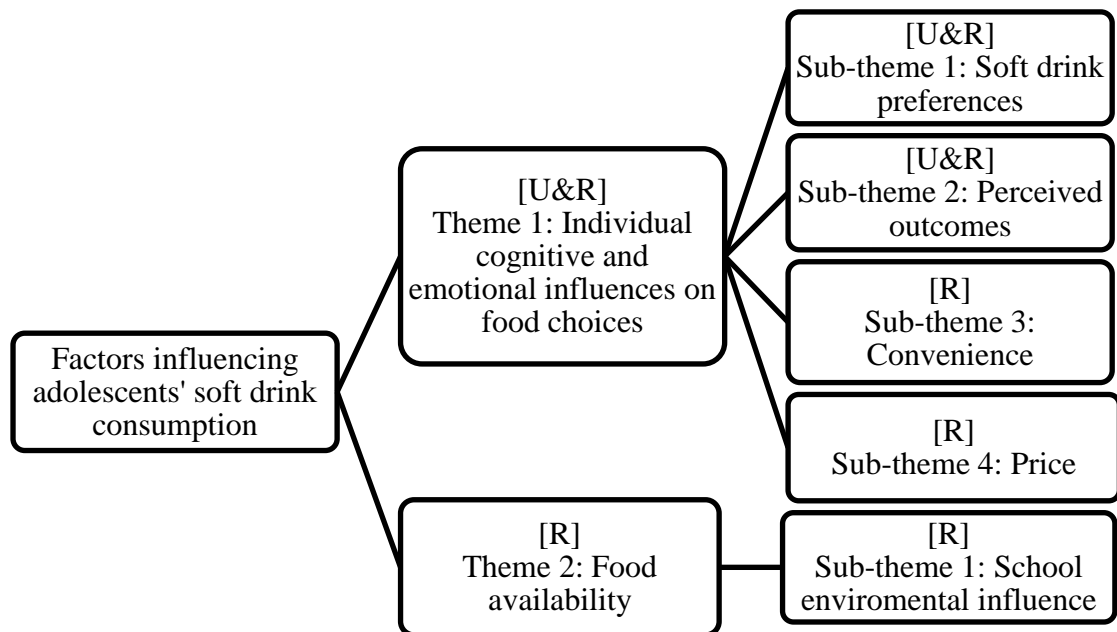
Theme 1: Individual cognitive and emotional influences on food choices

Sub-theme 1: Soft drink preference

When urban students were asked why they drink soft drinks, they said that sweet and carbonated drinks are tasty. Some examples are as follows:

-They (sweet and carbonated drinks) are tasty. [UM 4]

-They are cool. [UF 7] ...They are sweet and delicious. [UF 7, 9]

-They are sweet and tasty. [UF 9]

-I like them. They are tasty. [UF 9]

Some of them also mentioned about soft drink characteristics such as colourful, appetizing, and sparkling influencing their soft drink consumption. Responses include:

-They are colourful and look appetizing. [UM 6]

- They are also so sparkling. [UM 5]

Similarly, several rural participants indicated that soft drinks are sweet and tasty. Related responses are as follows:

-The taste is sweet. [RM 8]

-They are so tasty and sweet. [RF 7, 9]

-They are colourful and appetizing. [RF 2]

Sub-theme 2: Perceived outcomes

Some urban adolescents who did not like to drink carbonated drink were concerned about the disadvantages of drinking carbonated drinks such as stomach ache, feeling burning in the throat. This view can be seen in the following statements:

-I drink sweet drinks but I do not like carbonated drinks…It has no benefit at all. [UM 2]

-I felt sleepy after I drink them (carbonated drink). [UM 4)

-I have stomach ache after drinking them (carbonated drink). [UM 8]

-They irritate my stomach. [UF 4]

-They can cause my stomach ache. [UF 10]

-They can also burn my throat. [UF 4]

On the other hand, some urban participant perceived that they gained some benefit from drinking carbonated drinks such as feeling fresh and full, helping them gain more weight, and making them sleepy. Statements in this regard are as follows:

-I felt fresh after drinking them…They are so sparking. [UM 6]

-I drink them when I feel hot... They make me feel fresh [UM 6]

-When I am tired such as after exercise…They make me feel fresh. [UM 9]

-I like to drink them before going to the bed because they make me feel full and sleepy…It is good. [UM 4]

-After drinking soft drink feel fresher than drinking plain water. [UF 6]

-They make me feel fresh. [UF 4, 9]

-I want to gain more weight. [UF 9]

Some rural adolescents who liked to drink soft drinks identified some advantages of drinking soft drinks in the discussion. Statements by participants are as follows:

-It makes me feel fresh because they are so sparkling.[RM 9]

- I drink them after exercise. They make me feel fresh [RM 1, 2]

- The weather is so hot…so we drink them [RM 1-3, 8, 9]…I feel fresh after drinking them. [RM 2, 8]…Yes [RM 1-5, 7]

-I like carbonated drink; they make me feel fresh after drinking them. [RF 2]

-I like it… I feel fresh after drinking them… They are so sparking… When I come home, I feel tired and hot… So, I drink carbonated drinks. [RF 2]

However, only one rural respondent mentioned negative views about drinking carbonated drinks. For example, carbonated drinks have no benefit at all, they cannot make her full, and she felt addicted after drinking them, as can be seen in the following statements.

-I do not like it, no benefit at all. I like plain water. [RF 4]

-They cannot make me full. [RF 4]

-After drinking them, I want to drink them again and again. It looks like addiction. [RF 4]

Sub-theme 3: Convenience

Some urban and rural residents indicated that it is easy to find soft drinks to drink. Comment is:

-They are easy to find to drink. [RF 3]

-They are available in every shop in my community, so it is easy to buy them to drink. [RF 2]

-They are sold everywhere...they are easy to buy [UF 4, 9]

Sub theme 4: Price

Only one rural participant stated that plain water is cheaper than soft drinks, as can be seen in the following statement:

-Plain water is better and cheaper. [RF 4]

Specifically, price was not discussed in the group of urban adolescents.

Theme 2: Food availability

Sub-theme 1: School environmental influence

Most rural adolescents said that they cannot drink carbonated drinks in school because selling them is not allowed as it's their school policy. Responses by participants are as follows.

-I cannot drink them at school. [RM 9] ...Why? [Moderator] ... Carbonated drink cannot be sold in my school... It is the policy of my school.[RM 9]

-Carbonated drink cannot be sold in our school...Just go outside...They are available in a lot of food shops in front of school. [RM 4]

-Carbonated drink cannot be sold in our school ...Yes, we have to drink them outside. [RM 4, 8]...It is good...I think that this rule can help a bit. [RM 8]

-It does not a matter... We will drink them again when we go outside. [RM 1-9]

However, this theme was not identified by the urban adolescents.

6.4 Conclusion

The overall qualitative findings indicated the same four major factors influenced both urban and rural Thai adolescents' eating behaviour. These factors were individual cognitive and emotional influences on food choices (e.g. knowledge of intake recommendation, food preferences, convenience, and price), parental influence (food consumption in the home), food availability (e.g. home, school, and community environmental influence) and the mass media targeting of food (advertising and

marketing regarding eating behaviour). However, there were minor differences in factors affecting between urban and rural Thai adolescents as summarised in tables 6.2 and 6.3 as follows.

The factors (themes and sub-themes) influencing Thai adolescents' eating behaviour that were mentioned in the focus group discussions were varied. Some factors mentioned in focus group discussion were similar to the factors examined in the survey such as parental influence, and food availability. However, factors such as emotional state were mentioned as affecting rural Thai adolescents' eating behaviour, and this was not part of the quantitative results.

Table 6.2 Summary of factors influencing urban Thai adolescents' eating behaviour from focus group discussions

Themes and sub-themes from focus group discussion	Descriptions
Individual cognitive and emotional influences on food choices	
1. Knowledge of intake recommendation	1. Lack of knowledge about how to eat healthily
2. Food preference	2. Taste and food appearance; vegetables are tasty, but some are not tasty/ fast foods look good and tasty.
3. Convenience	3. Convenience of healthy and unhealthy foods; eating fast food is so easy and quick/ vegetables are easy to cook.
4. Perceived outcomes of eating behaviour	4. Perceived advantages and disadvantages of healthy and unhealthy eating; eating vegetables help to maintain eyesight.
5. Price	5. Cost of healthy and unhealthy foods; vegetables are cheap/ fast foods are so expensive.
6. Body image	6. Body image concern; eating starchy foods makes them fat.
7. Time*	7. Lack of time to look for, buy, and eat healthy foods
8. Choices*	8. Lack of healthy choices in school canteen
9. Cleanliness*	9. Worry of cleanliness of fruit bought from food shop
Parental influence	
1. Food consumption in the home	1. Parents' purchasing, and cooking healthy food behaviour; parents always cook vegetables.
Food availability	
1. Home environmental influence	1. Availability of healthy and unhealthy foods at home; parents always buy vegetables, and leave them in the fridge.
2. School environmental influence	2. Availability of healthy and unhealthy foods at school; foods in school canteen comprised of a few vegetables.
3. Community environmental influence	3. Availability of healthy and unhealthy food in community; vegetables are easy to buy around their home.
4. Food shop or restaurant environmental influence*	4. Good atmosphere of fast food shop or restaurant
Mass media targeting of food	
1. Marketing*	1. Junk food marketing; toy collection with meal

* (only found in urban adolescents)

Table 6.3 Summary of factors influencing rural Thai adolescents' eating behaviour
from focus group discussions

Themes and sub-themes from focus group discussion	Description
Individual cognitive and emotional influences on food choices	
1. Knowledge of intake recommendation	1. Lack of knowledge to eat healthily
2. Food preference	2. Taste and appearance of healthy and unhealthy foods; fruit is so tasty/ fast foods are tasty.
3. Convenience	3. Convenience of healthy and unhealthy food; vegetable easy to cook and eat, and even if they are raw/ eating fast food is very convenient.
4. Perceived outcomes of eating behaviour	4. Perceived advantages and disadvantages of healthy and unhealthy eating; drinking soft drinks make them feel fresh.
5. Price	5. Price of healthy and unhealthy foods; fast foods are expensive/ adolescents eat cheap fruit.
6. Body image	6. Body image concern; eating a lot of starchy food makes them fat.
7. Emotional state #	7. When they are bored, eating fast food makes them feel happy
8. Economic status #	8. No money to buy healthy foods
9. Conflict of knowledge #	9. Eating rice following recommendations will make them fat.
Parental influence	
1. Food consumption in the home	1. Parents' purchasing healthy and unhealthy foods, and cooking behaviour; parents always buy vegetables.
Food availability	
1. Home environmental influence	1. Availability of healthy and unhealthy foods at home; adolescents will eat fruits, if they are available at their home.
2. School environmental influence	2. Availability of healthy and unhealthy foods at school; school policy did not allow selling unhealthy food
3. Community environmental influence	3. Availability of healthy and unhealthy food in community; adolescent rarely to go to market to buy some fruits because her home is far from the market.
Mass media targeting of food	
1. Advertising #	1. Unhealthy food advertising on TV; fried chicken

(only found in urban adolescents)

Chapter 7

Discussion

This discussion chapter discusses the findings from the study and interprets them within the existing theoretical frameworks and results from previous research. The results are discussed in three main parts. Firstly, the discussion of the findings related to factors affecting Thai adolescents' eating behaviour obtained from the quantitative and qualitative phases. This is followed by discussion of the Thai adolescents' dietary consumption in relation to CVD. The conclusion is presented in the final part of this chapter.

7.1 Discussion of factors influencing Thai adolescents' eating behaviour

These are discussed and presented in two sections. The first section discusses the characteristics of both groups of participants who participated in the survey and focus group discussion. Then the second section provides discussion related to the factors influencing adolescents' eating behaviour obtained from the quantitative and qualitative parts of this study.

Characteristics of the samples in the phase of survey

184 urban Thai adolescents (67 males and 117 females) and 152 rural Thai adolescents (59 males and 93 females) were recruited for the survey. The percentage of males to females between urban and rural adolescents was similar at 1:2. The mean age of urban and rural adolescents was 16.2 years (SD=0.8) and 16.7 years (SD=0.9), respectively. Rural participants were older on average than the urban participants (16.7 years, SD=0.9 vs. 16.2 years, SD 0.8, z= -4.767, and p=0.000), but despite this were shorter (161.5cm, SD=8.7 vs. 165.1 cm, SD=8.5, t= 3.801, and p=0.000), had a lower weight (53.4kg, SD=12.6 vs. 57.0 kg, SD=13.2, z=-3.689, and p=0.000) had a smaller waist circumference (72.7 cm, SD=9.3 vs. 77.4 cm, SD=9.7), z=-5.306, and p=0.000). The percentage of rural adolescents with normal weight

(80.3%) was higher than that of urban adolescents (69.0%), while fewer rural adolescents were overweight, pre-obese, and obese (approximately 4% vs. 5%, 4% vs. 6%, and 6% vs. 11%, respectively) compared to urban adolescents. In addition, fewer rural adolescents were underweight and pre-underweight (approximately 1% vs. 3%, and 5% vs. 5%, respectively).

Characteristics of the participants in the focus group discussion

Ten male (50.0%) and ten female (50.0%) urban students who had already participated in the survey were recruited to the focus group discussion. The mean age of the urban and rural participants was 15.8 years (SD=1.0), and 16.7 years (SD=1.1), respectively. Just over half of the urban students (55.0%), and the majority of rural students (88.9%) had normal weight status (weight-for-height=SD from -1.5 to + 1.5 SD of the standard population).

This section discusses factors affecting Thai adolescents' eating behaviour obtained from both the survey based on the TPB and the focus group discussion. The TPB model, including its attitude, subjective norm, and PBC are described as independent determinants of behavioural intention, while intention and PBC are described as predictors of the target behaviour (Ajzen, 1991). In this study, it was therefore hypothesized that attitude, subjective norm, and PBC would significantly predict both urban and rural Thai adolescents' eating intention. Eating intention and PBC would predict urban and rural Thai adolescents' eating behaviour as assessed by the FFQ within the TEQ. The results indicated that attitude towards eating behaviour and subjective norm were each significant predictors of urban Thai adolescents' eating intention, and together explained 27.4% of the variance whereas attitude towards eating behaviour predicted 24.1% of variance, and subjective norm regarding eating behaviour added another 3.3%. Therefore, attitude towards eating behaviour was a stronger predictor than the subjective norm regarding eating intention in the model. Urban Thai adolescents' eating behaviour was predicted by the PBC, and explained 5.0% of variance. For rural adolescents, the results showed that eating intention significantly predicted 5.8% of the variance by the subjective norm regarding eating behaviour. Rural Thai adolescents' eating behaviour was predicted by eating intention, explaining 5.5% of the variance. The results of this study generally supported the constructs of the TPB which were found to be predictive of factors

influencing eating intention. The results from the focus group discussion indicated that there were four major factors influencing Thai adolescents' eating behaviour, comprising the personal, social, and physical factors, and the macrosystem. These findings are consistent with the predictive pattern demonstrated in some studies that have used surveys based on the TPB and focus group discussions to identify its effect on dietary consumption in adolescents. They will be discussed together as follows.

Predicting eating intention by attitude

In this investigation of the eating intention of Thai adolescents, attitude was a predictor of urban Thai adolescents' eating intention, while attitude failed to predict rural Thai adolescents' eating intention. This was consistent with the results from numerous dietary studies using the TPB with adolescents. For example, the results of a USA (Californian) study showed adolescents' intention to eat a healthy diet was predicted mostly by attitude, and accounted for 29% of the variance in attitude (Backman et al., 2002). Similarly, a survey of college baseball players in USA showed that attitude was the strongest predictor of intention to eat a healthy diet, and explained 38% of the variance (Pawlak et al., 2009). In addition a study undertaken with ninth-grade students attending public high schools in North Carolina, USA by Pawlak and Malinauskas (2008), found that attitude was the best predictor of intention to eat 2.5 cups of vegetables a day. Also in a study examining fish consumption by Prell and colleagues (2002), fish consumption was influenced predominantly by attitude. In another study examining soft drink choice in female adolescents in North Los Angeles, USA by Kassem and colleagues (2003), they found that the strongest predictor of intention to consume regular soda was attitude. A survey of male adolescents in North Los Angeles showed that attitude was the best predictor of intention to drink regular soda (Kassem & Lee, 2004). This demonstrates that attitude was found to be the strongest predictor of dietary intention in adolescents and in many dietary studies that used the TPB as a conceptual framework.

According to some studies of the TPB's application to dietary behaviour in adolescents, the attitude construct was found to be one of the predictors of intention, but the percentage of prediction was less than the subjective norm, and PBC

(Backman et al., 2002; Pawlak & Malinauskas, 2008; Pawlak et al., 2009). Overall, across studies attitude predicted approximately 25 - 40% of dietary consumption.

Attitude was the strongest predictor (24.1%) of eating intention in urban Thai adolescents, and in this study, attitude towards eating behaviour was described as the Thai adolescents' beliefs or feeling about positive and negative outcomes of their own performance eating behaviour and the evaluation of the importance of these outcomes. Therefore, one possible explanation for the effect of attitude towards eating behaviour on eating intention was that urban adolescents are likely to be concerned about positive outcomes of healthy eating behaviour and negative outcomes of unhealthy eating behaviour or the behavioural beliefs. The important outcomes of eating behaviour assessed by the TEQ were perceived by urban Thai adolescents as maintaining healthy weight, avoiding conditions such as heart disease, diabetes, and high blood pressure, being healthy, and having an effective immune system. Ajzen (1991) argued that individual's perception about positive and negative outcomes of performance behaviour and the evaluation of the importance of these outcomes are influenced by attitude and that affects behavioural intention.

Although many studies of adolescents have shown intention towards specific dietary behaviour was predicted by attitude, there is no association between rural Thai adolescents' attitude and eating intention in this study. However, this is consistent with a study conducted in Thailand by Sangperm and colleagues (2008) who found that the healthy eating intention of urban Thai male adolescents was not associated with their attitude towards healthy eating behaviour. Sangperm and colleagues also found that urban Thai female adolescents' healthy eating intention was predicted by attitude. However, Thai adolescents who participated in Sangperm and colleagues study were younger (10-13 years) than the adolescents in this study (15-18 years).

In this study, the results showed that attitude was a predictor of eating intention of urban adolescents, but there was no association between attitude and eating intention of the rural adolescents. The percentage of females to males in relation to urban and rural Thai adolescents in this study was similar at 2:1.

In comparing urban and rural adolescents in this study, although eating intention among urban adolescents was predicted by their attitude towards eating behaviour, attitude did not predict the eating intention of rural adolescents. This may be because

urban adolescents' eating intention was driven more by their concerns for the health outcomes of their eating behaviour than rural Thai adolescents.

This may be because the weight status of urban and rural adolescents was significantly different with the mean weight of urban Thai adolescents higher than that of rural Thai adolescents. Both urban and rural adolescents mentioned body image in their focus group discussion as a factor that influenced their eating behaviour, particularly the urban adolescents. The adolescents discussed their concern about not wanting to be fat and this was more of a worry for the urban rather than the rural adolescents. Therefore, weight status may be one of the reasons why attitude was the predictor for the urban Thai adolescents eating behaviour only.

Moreover, rural adolescents perceived that they are in good health, and therefore the immediate outcome of eating behaviour (good health) was unimportant to them. This concurs with a qualitative study by Brug and Klepp (2007) where results from focus groups of American adolescents showed that the benefits of foods (good nutrition and health) did not rank as important influences on their eating behaviour. In addition, hunger and taste were the crucial factors to American adolescents' food choices (Neumark-Sztainer et al., 1999). However, it is not surprising that nutrition and health were not the primary influences on food choice in rural Thai adolescents in this study and others that examine adolescents.

Although urban adolescents' eating habits were influenced by attitude or expected outcomes of eating behaviour, the results of the survey did not indicate which behavioural beliefs predicted attitude. This was because of the statistical limitations of the stepwise multiple regression analyses. In rural adolescents, the TPB studies indicated that attitude was not a predictor of eating intention. However the results from the focus group helped the researcher gain more understanding about behavioural beliefs and the outcomes of eating behaviour as follows.

When Thai adolescents were asked to discuss factors influencing their eating behaviour, the relationship between their eating intention and attitude was not mentioned and this was different from the TPB study, where the direct association between urban and rural Thai adolescents' eating intention and attitude towards eating behaviour was examined. However, perceptions about positive and negative outcomes of eating behaviour, and the relationship between attitudes towards eating

behaviour and eating behaviour were mentioned in the focus group discussion with both urban and rural Thai adolescents.

When urban and rural Thai adolescents were asked to discuss their perception about the advantages and disadvantages of healthy eating behaviour, they indicated some expected outcomes that influenced their eating behaviour as mention in section 6.3 in chapter 6.

However, it is also consistent with their knowledge related benefits of eating behaviour which emerged from the focus group discussions. There were three major advantages of healthy eating as perceived by urban adolescents. These were: expected physical benefits such as general health, disease prevention, body image, and cosmetic benefit; psychological benefits, including that they felt good about themselves, and they felt healthy after eating healthy foods; and financial benefit (saving money from buying supplements). In contrast, the benefits of healthy eating were cited by rural adolescents as having only one advantage, expected physical benefits such as general health, disease prevention, and body image. In the focus group discussion, it appears that urban Thai adolescents perceived broader benefits of healthy eating including psychosocial factors. Both urban and rural students perceived the benefits of healthy eating in term of physical health but the urban Thai adolescents may obtain information about healthy eating from many sources (e.g. booklets, internet, and newspapers) and this was more so than rural Thai adolescents.

This is supported by the results from a cross-sectional study related to mass media information sources and associations with fruit and vegetable intake. This Austrian study found that adolescents who reported exposure to nutritional information provided by newspapers, internet articles, and booklets were more likely to consume fruit and vegetables daily (Freisling, Hass, & Elmadfa, 2009). It may be summarised that the urban adolescents seemed to talk more about the advantages and disadvantages of eating some foods than the rural adolescents. This may explain why urban adolescents have more positive attitudes in relation to eating intention than rural adolescents.

Predicting eating intention by subjective norm

Both urban and rural Thai adolescents' eating intention in this study was predicted by their subjective norm, and explained 3.3 % and 5.8 % of the variance respectively. This is similar to the findings from other studies for example, the eating intention of American adolescents was predicted by subjective norm, and accounted for 26% of its variance (Backman et al., 2002). This is consistent with a study by Berg et al. (2000), of Swedish adolescents' that found intention to consume milk and high-fibre was affected by social influences. In addition, Pawlak and colleagues (2009) results from their study of factors influencing intention to eat a healthy diet in college baseball players found that the subjective norm influenced intention to eat a healthy diet, and explained 29% of the variance. Similarly, the result of a study by Pawlak and Malinauskas (2008) that examined factors that predicted intention to eat 2.5 cups of vegetable a day found that subjective norm was the predictor of eating intention.In addition, in the Los Angeles study by Kassem et al. (2003), it showed that subjective norm is one of the predictors of soft drink consumption among female adolescents.

A cross-sectional study by Fila and Smith (2006) identified factors influencing urban Native American boys and girls in Minnesota. The results found that girls' eating behaviour was most predicted by barriers, while boys' eating behaviour was most predicted by subjective norm. According to Fila and Smith (2006), gender influenced the subjective norm of urban Native American adolescents' dietary consumption. In this study, although the percentage of males to females for urban and rural adolescents was similar at 1:2, the results indicated that both urban and rural Thai adolescents' eating intention was predicted by subjective norm and thus there were no gender differences.

The results of this study showed that both urban and rural adolescents' eating intentions were predicted by the subjective norm of social approval. Therefore the area where the adolescents lived was not an influence on their normative beliefs that affected their eating intention. Similarly, the study by Sangperm and colleagues (2008) that examined urban Thai adolescents' healthy eating behaviour found that only subjective norm was a significant predictor of healthy eating intention in urban Thai male and female adolescents.

In contrast, other studies found that there was no association between subjective norm and dietary intention. For example, Wong and Mullan (2009) who used the TPB to identify factors influencing adolescents' breakfast consumption showed that intention to eat breakfast was not predicted by subjective norm. In addition, the study by Blanchard et al., (2009) showed that intention to eat fruit and vegetables in college students was not affected by subjective norm.

The results of the above studies are contradictory and as most of them have a similar cross-sectional design; their results may reflect the differences in the studies populations, including the age of the participants.

However, the studies conducted with younger children and adolescents, compared to older adolescents are more likely to show that subjective norm was a predictor of their dietary consumption. In addition, many studies also indicated that older children or adolescents compared to younger children, are increasingly able to decide their food choices using cognitive motivational factors such as thinking about the advantages of eating healthy foods rather than being affected by social influences (Bissonnette & Contento, 2001; Fila & Smith, 2006). Therefore, subjective norm may not affect older adolescent's choice. For example, Wong and Mullan (2009) used the TPB model to predict the breakfast consumption of Australian university students aged between 17-30 years (mean age=19.46 years). The results showed that subjective norm did not predict their dietary consumption. In addition, the results of the study conducted by Blanchard et al. (2009) indicated that subjective norm was not a predictor of college students' fruit and vegetable consumption.

In this study, the subjective norm was described as the perceived social pressure from important others to perform or not perform eating behaviour and their motivation to comply with them. The results from the survey did not identify which normative beliefs influenced Thai adolescents' eating behaviour because of the statistical limitations in the stepwise multiple regression analyses. However, other specific social influences were discussed by both urban and rural adolescents in their focus group discussions, particularly their mother's behaviour (cooking, food purchasing behaviour, and forceful approach towards them to eat more healthy food).

As a result, the subjective norm was identified as comprised of the people who are important to their eating behaviour including parents, relatives, friends, teachers,

health care professionals, and the mass media. Therefore, it may be explained that both urban and rural Thai adolescents' eating intention was affected by these social influences. Although adolescence is the period of establishing independence, adolescents' perception and intention were influenced by the perception of parents, caregivers, friends, and significant others (Brug & Klepp, 2007; Hewitt & Stephens, 2007). Particularly in the area of food choice, parents and family remain important for adolescents' eating behaviour (Bissonnette & Contento, 2001). In support of this, in traditional Thai culture, although adolescence is a time of growing independence, adolescents are still under the supervision of their parents and older relatives such as grandparents, aunts and uncles. The Thai culture is based on respect for senior adults' advice, particularly their family and teachers (Choowattanakorn, 1999; Sangperm et al., 2008). Therefore, it is reasonable to suggest that the Thai adolescents' eating intention was influenced by significant adults particularly parents, teachers and relatives whom they have close contact with.

 In addition, adolescents have a strong perception of friend's attitudes, and a strong need for social acceptance (Pawlak & Malinauskas, 2008). Friends have been found to be strongly associated with adolescents' dietary behaviour in relation to selecting, sharing and consuming food and beverages (Sangperm et al., 2008; Stanton et al., 2007; Wouters et al., 2010). The study results related to subjective norm may be because the adolescent complies with their peer group, particularly their close friends and their eating behaviour.

In the focus group discussion, having a good body shape or healthy weight was mentioned as a factor influencing both urban and rural adolescents' eating behaviour. Some studies have indicated that the body image and messages about eating healthy and unhealthy foods or being too fat or too thin have affected adolescents' eating behaviour (Anschutz et al., 2008). Thai adolescents had been exposed to the media such as television, radio, internet and magazines, and therefore, it might be explained that both urban and rural Thai adolescents' eating intention was affected by the mass media.

Predicting eating intention by perceived behavioural control

In this study, PBC did not contribute directly to the prediction of eating intention of either urban or rural Thai adolescents. This is inconsistent with the findings of major

studies regarding dietary behaviours, as PBC is considered an important variable that is significantly associated with intention. For example, the study of soft drink consumption among female adolescents in North Los Angeles by Kassem et al. (2003) indicated that intention to drink soft drink was predicted by PBC. In addition, Pawlak and Malinauskas (2008) conducted a study to identify beliefs about eating 2.5 cups of vegetables a day and assessed how well these beliefs predict the intention to eat them. The findings illustrated that PBC was one of the predictors of intention, and explained 15.9% of the variance. Similarly, Pawlak et al. (2009) conducted a study to investigate factors important to college baseball players regarding the intention to eat a healthy diet using the TPB. They found that the PBC was the only predictor of intention to eat a healthy diet, and explained 27% of the variance. Moreover, Wong and Mullan (2009) used the TPB to identify factors influencing adolescents' breakfast consumption and showed that intention to eat breakfast was predicted by the PBC. Furthermore, the study of Blanchard and colleagues (2009) showed that PBC was the strongest predictor of intention to eat fruit and vegetables.

According to the TPB, behavioural intention is influenced by attitude towards behaviour and subjective norm regarding behaviour. In order to account for behaviours not under complete volitional control, the behavioural intention is assumed to be affected by external factors that are perceived to facilitate or impede the performance of behaviour and this factor is named the PBC (Ajzen, 1991).

In contrast, both urban and rural Thai adolescents' eating intention was not influenced by the PBC construct. It seems to be that the eating intention of urban and rural Thai adolescents is independent of the PBC or external control factors. Thai adolescents' perception of eating behaviour may be that it is completely under their own control, and they can eat what they want to eat, and so it was not influenced by environment factors.

However, this finding could not be compared with the results of the Thai study conducted by Sangperm and colleagues (2008). This was because the PBC was not included in their study examining urban Thai adolescents' healthy eating behaviour. Furthermore it could be argued that they used only the TRA to explain urban Thai adolescents' healthy eating behaviour because the TPB was developed from the TRA by adding the PBC (Ajzen, 1991). Therefore, this study of Thai adolescents that used

all the components of the TPB contributes new information about the complete TPB model that requires further examination to replicate this approach.

Moreover, in focus group discussion, the control beliefs were mentioned as a predictor of both urban and rural Thai adolescents' eating behaviour. For example, knowledge about eating healthily, food availability, and their perception about food preferences, and price but they did not discuss the relationship between these control belief factors and eating intention.

In this study, the results based on the TPB indicated that both urban and rural Thai adolescents' eating intention was not predicted by the PBC. This means that Thai adolescents perceived their eating behaviour is under their control and was not affected by facilitators and barriers from external factors.

Predicting eating behaviour by eating intention

In this study, eating intention was a predictor of rural adolescents' eating behaviour, and explained 5.5% of the variance. Similarly, a number of studies have revealed the association between intention and eating behaviour. For example, a longitudinal study by Backman et al. (2002) showed that healthy dietary behaviour was predicted by intention in American adolescents, and it explained 17% of variance in healthy dietary behaviour. In addition, a cross-sectional study by Hewitt and Stephens conducted among Americans adolescents indicated that intention to eat a healthy diet had a positive correlation with healthy eating behaviour, explaining 39% of the variance (Hewitt & Stephens, 2007). Furthermore, a study by Blanchard et al. (2009) showed that the fruit and vegetable intake of college students was predicted by intention (β=0.32, P<0.05) (Blanchard et al., 2009). Moreover, Berg et al. (2009) reported that the consumption of milk and high-fibre bread for breakfast among Swedish children aged 11-15 years was predicted by intention. Prell et al. (2002) indicated that the intention to eat fish was associated with its consumption in Swedish adolescents (r=0.66). The result of the study conducted by Wong and Mullan (2009) showed that breakfast consumption was predicted by intention, explaining 53.1% of variance in breakfast consumption. A study examining soft drink consumption among female adolescents in North Los Angeles by Kassem et al. (2003) found that only the intention to drink soft drinks was found to predict behaviour.

Similarly, a review of the literature on the psychological correlates of various foods, including fruit and vegetable consumption, sugar snacks, sweetened beverage consumption and dietary consumption in children and adolescents indicated that eating behaviours have the most consistent and positive association with dietary intention (McClain et al., 2009). The evidence from a meta-analysis of 185 studies using the TPB as a theoretical framework found that intention accounted for 25% variance in behaviour (Armitage & Conner, 2001).

Although there is strong evidence of a significant relationship between intention and dietary behaviour, it was quite surprising that this relationship was not significant in urban Thai adolescents. However, this finding is consistent with some other studies. For example, in a cross-sectional study by Fila and Smith (2006) the TPB was used to predict healthy eating behaviour in urban Native American adolescents aged 9-18 years and there was no relationship between healthy eating intention and healthy eating behaviour. This is consistent with the study by Sangperm et al. (2008), where the results showed that there was no association between intention and healthy eating behaviour in urban Thai adolescents.

In comparing the different results, the overall evidence indicated that dietary intentions are a good predictor of behaviour in adolescents, whereas a minority of studies found a lack of association between intention and dietary behaviour. It seems reasonable to suggest that some eating behaviours are under complete volitional control and that some behaviours can be influenced by a single internal factor or intention, and that some dietary behaviours are not under volitional control and are influenced by external control factors, and not only personal motivation. This is consistent with the general rule of the TPB that when behaviours pose no problems to volitional control, they can be predicted by intention with considerable accuracy (Ajzen, 1991). Therefore, it might be explained that urban Thai adolescents' eating behaviour could be driven by external factors, and that eating behaviour is not under complete volitional control behaviour in urban Thai adolescents. For rural Thai adolescents, eating behaviour was predicted by eating intention, and therefore the eating behaviour of Thai rural adolescents is under volitional control.

The results from focus group discussion showed that the relationship between eating intention and eating behaviour was not identified by any urban and rural Thai adolescents.

Predicting eating behaviour by the perceived behavioural control

In this study, PBC was not a predictor of rural adolescents' eating behaviour, but rural adolescents' eating behaviour was influenced by their eating intention. This result suggested that rural Thai adolescents' eating behaviour was only affected by personal motivation, not by external factors because they may perceive that eating behaviour was under their volitional (personal) control.

This was also consistent with some study findings that PBC was not a predictor of dietary behaviour. For example, a longitudinal study conducted by Backman et al. (2002), aimed to identify predictors of American adolescents' healthy eating behaviour, and the results indicated that healthy dietary behaviour of American adolescents was not predicted by PBC. The researchers suggested that this result was more influenced by individual motivation than external factors. In addition, Wong and Mullan (2009) who used the TPB to identify factors influencing adolescents' breakfast consumption showed that breakfast consumption was not influenced by the PBC and that it was influenced by personal motivation.

When the control beliefs in the questionnaire were considered, it helped to explain why rural adolescents' eating behaviour was not influenced by control belief or external factors. For example, rural Thai adolescents had low facilitator and high barriers to their eating behaviour. There were local fast foods and other unhealthy eateries around their community. In addition, rural adolescents may prefer unhealthy and fast food to healthy food (e.g. fruit and vegetables) because fast foods are perceived as tastier than healthy foods. This was consistent with the results of some studies indicating that availability and taste of healthy and unhealthy foods were the major predictors of healthy eating behaviour (Backman et al., 2002; Fila & Smith, 2006).

However, the urban Thai adolescents' eating behaviour was predicted by the PBC, and explained 5.0% of the variance, and a similar study among New Zealand adolescents (Hewitt & Stephens, 2007) reported that the PBC was an important

determinant of children's healthy eating. It appears that the urban Thai adolescents' healthy eating behaviour was influenced by external factors such as availability of foods, price, and time pressures and that is supported by a small number of studies using the TPB.

Theoretically, PBC plays a more important role in directly explaining adolescents' dietary behaviour as the TPB model suggests that intention will be the strongest predictor of behaviour when it is perceived to be under the individuals' volitional control, whereas PBC will be the greatest predictor when it is not considered to be under their volitional control (Ajzen, 1991). It is possible that the findings of the previous studies are inconsistent with this because they examined different types of dietary behaviour, population, and environment that may have affected adolescents' decision making in relation to their dietary behaviour.

Focus group discussion provided the evidence about factors that affected both urban and rural Thai adolescents' eating behaviour. There were four factors identified by them that were similar to the PBC, including individual cognitive and emotional influences on food choices, parental influence, food availability, and the mass media targeting of specific foods.

Individual cognitive and emotional influences on food choices that impacted on urban Thai adolescents' eating behaviour were knowledge of intake recommendations, food preference, convenience of food, price, perceived outcomes of eating and body image. Time availability, food choices and the cleanliness of food were mentioned by urban Thai adolescents only, while emotional state, economic status and conflicting knowledge regarding eating some foods were discussed in the group of rural adolescents. The factors discussed by both urban and rural adolescents as being most influential on their eating behaviour was food preference or the appeal of food (taste, smell, texture, and appearance), convenience to buy and cook the food, and the price.

In this study, taste and appeal of food were mentioned many times by both urban and rural adolescents. Consistent with this are the results from the Neumark-Sztainer et al., (1999) study where American adolescents identified the characteristics of food (taste, smell, and appearance) as a main factor influencing their food choice and eating behaviour. Another qualitative research study examining health and nutritional

beliefs, and perception in Australian adolescents (Giskes et al., 2005) indicated that the greatest barrier to their healthy eating was the taste of healthy foods; specifically healthier foods were less tasty. Similarly, O'Dea (2003) stated that satiety, preference for a less healthy diet, and the perception of a healthy diet as less tasty were the main barriers to eating healthy food among American children and adolescents. Taste and food preferences are the first priority for Thai adolescents' eating behaviour and this may be explained by them giving priority to the short term consequences of eating behaviour such as pleasure rather than long-term outcomes (prevention of disease) in making food-choice decisions. This is supported by a study (Neumark-Sztainer et al., 1999) that indicated that a lack of sense of urgency about personal health was perceived as a barrier to eating more fruit and vegetables among American adolescents.

In this study, the convenience of foods was mentioned as a major predictor of Thai adolescents' eating behaviour. Urban Thai adolescents stated that snacks were easier to buy than fruit. Some of the urban and rural adolescents mentioned that fruit is easy to find and buy, and it is ready to eat. Fast foods were mentioned as convenient because they are easy to find and eat even when they were walking somewhere. Similarly, O'Dea (2003) stated that the main barrier to eating healthy food among American children and adolescents was the convenience of less healthy alternatives e.g. availability, easy and quick preparation, and the time involved in preparation of healthy food. In addition, in a study of Australian adolescents, Giskes et al. (2005) reported that one of the major barriers to healthy eating was the convenience of fast food. The Australian adolescents also indicated that eating a healthy diet required more time and energy to buy and prepare it. This may mean that the pleasure from eating convenience food identified by Thai adolescents may be because they had limited time, and so did not want to waste it finding and preparing healthy food. Therefore, the convenience of food was a major priority in decision making in Thai adolescents.

In this study, many participants mentioned price as a major reason why they eat or do not eat a healthy diet. For example, some rural adolescents said that they ate only some cheap fruit, and some of them said that they ate vegetables because they are cheap. Some urban Thai adolescents said that they rarely eat fast foods because they are very expensive. However, local Thai fast foods are quite cheap and available

nearby. Consistent with the focus group results, there is some evidence that cost was perceived as a factor influencing food choice in American adolescents. Specifically, they thought about how much money they had, and the price of food that they wanted to buy (Neumark-Sztainer et al., 1999). Similarly, Australian adolescents mentioned that healthy foods were more expensive than unhealthy foods (Giskes et al., 2005). It is not surprising that the price of foods affected adolescents including both urban and rural, because they were taking responsibility to find and buy their own food, particularly away from home. Thai adolescents also said that fast foods were more expensive than healthy food such as fruit and vegetables (contrasting view to the Australian adolescents). However, price sometimes was not a problem for eating fast food because their parents purchased it for them. Therefore, it seems to be that one factor (price) was influenced by other factors reinforcing the view that eating behaviour is complex and multifaceted.

Lack of knowledge was found to be an important factor affecting both urban and rural Thai adolescents in that they did not know the exact amount of each type of food group they should eat. Some rural adolescents had some conflicting knowledge in relation to eating rice and starchy food according to the Thai food based dietary guidelines. Lack of knowledge about how to eat healthily was rarely mentioned by adolescents in previous studies but a lack of knowledge related to health and nutrition was mentioned in one study. For example, a qualitative study conducted by Giskes and colleagues (2005), found that a lack of knowledge of diet related diseases and nutritional composition were perceived as barriers to eating a healthy diet in Australian adolescents. In contrast, in this study, the benefits of healthy eating and the disadvantages of unhealthy eating related diseases were well discussed in focus groups by both urban and rural Thai adolescents.

Body image concerns were discussed by both urban and rural adolescents as an influencing factor on their eating behaviour. Consistent with the focus group findings, American adolescents' food choices were influenced by the perception of their body image. They were concerned about being too fat, skinny, or short (Neumark-Sztainer et al., 1999). Some previous studies found that the ideal body image promoted by the mass media may inspire adolescents to copy this by trying to achieve the ideal shape that they see in media images that reflect today's culture (Anschutz et al., 2008). This may explain why some Thai adolescents' eating

behaviour may have been affected by their body image concern so that they did not want to eat too much food.

The perception about positive and negative outcomes of consuming vegetables, starchy foods, fast foods, and soft drinks were mentioned by both urban and rural adolescents. For example, they said vegetables (morning glory) can maintain good eyesight, that they feel full after eating rice, fast food provides more energy, and drinking soft drinks make them feel fresh (possibly a response to the high temperature). However, most outcomes discussed by both urban and rural groups were short-term consequences, and these outcomes seem to be discussed more by urban rather than rural adolescents. This suggests that both urban and rural Thai adolescents had a lack of concern about the long-term consequences of healthy eating for the prevention of chronic diseases. This finding is replicated in a study conducted by Neumark-Sztainer et al., (1999) who found that a lack of sense of urgency about personal health was perceived as an impediment to eating more fruit and vegetables among American adolescents. The results of a focus group study examining the influence of age and gender on food choice in the UK population showed that people aged between 18-30 years old were less concerned about health, and older respondents were more likely to make their food choices based on their health concern (Chambers et al., 2008).

The choice of different fruits was identified by urban adolescents as a facilitator to eating more fruit (e.g. "different fruits have a wide variety of taste, so I have a lot of choice"). This means that having a wider choice of fruit in urban areas provided a good opportunity for eating more fruit for urban Thai adolescents. This is consistent with a study conducted by Neumark-Sztainer and colleagues showed that American adolescents' fruit intake was strongly associated with taste preferences (Neumark-Sztainer, Wall, Perry, & Story, 2003). In addition, Blanchette and Brug (2005) stated that the availability of fruit was most consistently and most positively related to fruit consumption among 6-12 year old children.

In this study, time was mentioned as a factor influencing urban adolescents' eating behaviour. This is consistent with focus group discussion results among American adolescents in the study by Neumark-Sztainer et al. (1999), where they reported that they did not want to wait in a long lunch queue, preferring to eat fast food because it

was served quickly. They also stated that they selected food that can be prepared quickly when they are doing the cooking. Stang et al., (2008) suggested that adolescents tend to feel constrained in terms of time involving academic and extracurricular activities such as workload at school, busy social life, and sporting activities. These activities increase the need for social contact with friends (and their approval) and that may leave a little time to sit down to eat a meal. Therefore, this may explain why urban Thai adolescents' eating behaviour was influenced by time constraints. Time seemed to be more important to urban rather than rural Thai adolescents, and this may be because of the more hurried lifestyle in the city areas.

Cleanliness of fruit was mentioned by only urban Thai adolescents when they discussed factors influencing their eating behaviour. To my knowledge, cleanliness was not mentioned by previous studies in relation to factors influencing adolescents' eating behaviour. This may because locally there were a wide variety of food stalls, shops, and restaurants in the urban areas of Ratchaburi Province, and some of them did not have a certificate to guarantee the quality of their food preparation. Therefore, urban Thai adolescents were concerned about the cleanliness of fruit.

The finding from focus group discussions identified that emotional state affected rural Thai adolescents eating behaviour. For example, rural adolescents liked to eat fast food when they felt bored, and eating fast food made them feel better. This was an important finding that was absent from the survey based on the TPB model. The TPB is a cognitive model that examines the role of thinking and perception and may overlook emotions that have influenced eating behaviour in this study. The results of the study by O'Dea (2003) also indicated that mood enhancement/ reward driven behaviour (e.g. treating oneself to unhealthy alternatives, eating when bored and emotional eating to relieve stress and improve mood, are more fun/exciting) was a barrier to healthy eating. The results from another focus group study conducted by Neumark-Sztainer and colleagues (1999) indicated that emotional state such as feeling bored, stressed and depressed influenced change in American adolescents' eating behaviour.

Economic status was mentioned by rural Thai adolescents as a predictor of their eating behaviour. They stated that they did not have money to buy fruit. This is consistent with the study by Dapi and colleagues (2007) aimed to identify factors

influencing rural and urban adolescents' food perceptions in the Cameroon, Africa. The results showed that "not enough money" was perceived by urban adolescents from an area of poverty as a factor influencing their eating behaviour. It seems to be that eating behaviour of adolescents who live in the areas of poverty, including the rural area of Thailand were influenced by this.

Parental influence on the food consumption in the home (mother's cooking, food purchases, and encouragement and making their children eat more healthy food), was mentioned in the focus group discussion of both urban and rural Thai adolescents as a major social influence on eating behaviour. Similarly in research by Neumark-Sztainer and colleagues (1999), parental influence on eating behaviour such as the diet and cooking behaviour of parents and family meal patterns were discussed as an important factor affecting American adolescents' food choice. This is consistent with a qualitative study by O'Dea (2003), where the findings showed that social reinforcement such as parental control over food, and lack of parental support was discussed as a factor influencing American children and adolescents' eating a healthy diet. The results from an Australian study conducted by Giskes and colleagues (2005) indicated that a parent or family member was mentioned as a barrier to the healthy eating behaviour of Australian adolescents. This means that if the parent or family member did not eat a healthy diet, it may not be purchased and so was not available in the home. Australian parents and family members also reported that they did not have enough time to purchase and prepare healthy food. A study in Thailand conducted by Choowattanakorn (1999) found that in the Thai culture, adolescence is a time of growing independence, but Thai adolescents were still under the supervision of their parents and their older relatives as the Thai culture is based on respect for senior adults' advice. Therefore, it is not surprising that both urban and rural Thai adolescents' eating behaviour was influenced by their parents in this study.

The food availability factor that influenced both urban and rural Thai adolescents were home (e.g. food availability), school (e.g. food availability, and school policy in relation to healthy eating), and community (e.g. food availability). Food shops or restaurants (e.g. good atmosphere) were mentioned by only urban Thai adolescents. Whether home, school, or community, food availability was mentioned as one of the most important factors in urban and rural Thai adolescents' eating behaviour. They indicated that vegetable and fruit availability at home, school, and community could

make them eat more fruit and vegetables. This is consistent with many studies that showed that food availability was an important factor affecting adolescents' food choice. For example, Neumark-Sztainer and colleagues (1999) stated that food availability at school or in the home was perceived as an important factor that influenced their food choice. Australian adolescents reported that the availability of food influenced their healthy eating, and they perceived healthy food was not always in school canteens and food shops (Giskes et al., 2005).

Mass media targeting of food such as fast and junk food marketing and advertising was mentioned as a factor influencing Thai adolescents' eating behaviour. Marketing techniques using free toys, gifts, and discount coupons, particularly in regard to fast food were identified as a factor influencing urban adolescent eating behaviour, with some of the urban Thai adolescents stating that they ate fast food to get the gift collection. Advertising junk food on Thai television was identified as a factor influencing rural adolescents eating behaviour, as advertisements made fast foods look good and appetizing. This is consistent with a study by O'Dea (2003), who found that advertisements for junk food were influencing healthy eating among children and adolescents. Similarly, Giskes et al. (2005) found that advertising on TV, magazines and in cinemas (prior to the movie) in relation to an unhealthy diet was a mentioned as barrier to eating healthy food by Australian adolescents. Advertising may make unhealthy food look good and more appetising, and advertising of unhealthy food contributed to an environment promoting unhealthy eating. The results of many studies indicated that the taste and appeal of food was the priority for making food-choice decisions among adolescents (Giskes et al., 2005; Neumark-Sztainer et al., 1999; O'Dea; 2003). In Thailand, there are many western fast food restaurants in the cities but they are not in the rural areas. While urban Thai adolescents can access fast food restaurants, and can see and buy what they want to eat, rural adolescents used advertisements to help them decide what they want to eat. This may explain why rural adolescents' eating behaviour was more affected by advertisements than urban adolescents, and that junk food marketing affected urban adolescents because they found it easy to participate in a junk food campaign.

The focus group discussion of both urban and rural adolescents indicated a wide variety of factors perceived as influencing their food choices. It seemed that there were relationships between some of the factors. For example, the convenience of

food influenced adolescents who perceived they had limited time. Parental influences such as their purchasing behaviour influenced healthy and unhealthy food availability at home.

While PBC over eating behaviour predicted only 5.0% of variance in urban adolescents, rural Thai adolescents' eating behaviour was not predicted by PBC. There were specific examples of influences on urban and rural Thai adolescents' eating highlighted as PBC in focus group discussions that cannot be captured by the TPB model. These factors can help the understanding about some of the unexplained variance from the stepwise multiple regression analysis results. It means that as only 5% of variance on PBC explained the eating behaviour of urban adolescents, then other factors influencing eating behaviour that were captured in the focus group discussions may contribute to the unexplained variance. These factors included knowledge of intake recommendations, food convenience, time availability, cleanliness of food, the attractiveness and proximity of food shops and restaurants, and food marketing in advertisements. While the PBC in the TPB model could not explain rural adolescents' eating behaviour, the eating behaviour of rural adolescents was influenced by factors including knowledge of intake recommendation, food convenience, emotional state, economic status, and conflicting knowledge about eating behaviour. Therefore, these factors need to be further examined to help the understanding of eating behaviour and thus explain a greater proportion of the variance.

7.2 Discussion of the measurements of Thai adolescents' eating behaviour

This part discusses the results from measuring the portion size of food to identify Thai adolescents' eating behaviour using three different methods, comprising the FFQ used in the TEQ, the 24 hour dietary recall, and digital photographs. Only 20 rural and 20 urban Thai adolescents (sub-group) were recruited to assess their eating behaviour using all three dietary methods as above. Then, only the four main food groups comprising meat and other food in the protein group, rice-starchy foods, fruit, and vegetables were separately measured by the FFQ, 24-hour food recall, and digital photograph method and compared. The results are discussed as follows.

Participant characteristics

The results showed that half of the urban adolescents were male (50%) and their mean age was 15.8 (SD=1.0), while the majority of adolescents were 15 years old (55%), and attended grade 10 (50%). The majority of adolescents had a normal weight (55%), but there were a minority who were overweight (10%), pre-obese (5%), and obese (15%). There were also a minority who were underweight and some were thin (5%) and pre-thin (10%). The mean weight, height, and waist circumference respectively of the adolescents were 59.4 (SD=18.6), 163.7 (SD=8.8), and 80.4 (SD=13.4).

For the adolescents in the rural area, half of the adolescents were males (50%) and the mean age was 16.8 (SD=1.1), while the largest number of adolescents were 17 and 18 years old (30% each), and attended grade 10 (40%). The majority of adolescents had a normal weight (90%), but there were a minority who were obese (10%). The mean weight, height, and waist circumference of adolescents were 57.1 (SD=16.6), 164.3 (SD=10.9), and 74.3 (SD=11.5) respectively.

Thai adolescents' dietary intake

When the results of the dietary intake as measured from the FFQ and the 24-hour dietary recall were compared, the fruit and vegetable intake assessed by the FFQ was reported as greater when compared with the results from the 24-hour dietary recall. Also, the adolescents' protein intake assessed by the TEQ was underestimated when compared with the results assessed by the 24-hour dietary recall. Only the rice and starchy foods intake assessed by the FFQ and the 24-hour dietary recall were similar. These results are discussed as follows.

Both the 24-hour dietary recall and the FFQ were used to assess Thai adolescents' eating behaviour. Thompson and Subar (2008) suggested that the quantification of dietary intake of the FFQ is not as accurate as the 24-hour dietary recall. The dietary intake assessed by the 24-hour dietary recall is answered according to recall or memory of the previous day's intake instead of being derived from a more generalised recall, as in the FFQ (Miller et al., 2008). A single 24-hour dietary recall is not appropriate to assess the individual's usual intake (Lee & Nieman, 2007; Thompson & Subar, 2008). Ma and colleagues (2009) suggested that three days of

24-hour dietary recall were sufficient to measure dietary intake, and they found that, on average, reported dietary consumption was higher at the weekend than during the week. In this study, three days of the 24-hour dietary recall were used to assess the Thai adolescents eating behaviour, while the FFQ (9 lists of food groups) was used to measure Thai adolescents' dietary intake on one occasion only.

Lee and Nieman (2007) suggested that FFQs were known as "screeners" that are particularly useful in situations that do not require quantitative accuracy or measurement of the total diet. The major limitation of the FFQ approach is that it contains some measurement error. Many details of dietary intake are not measured, and the quantification of intake is not as accurate as recall (the 24 hour dietary recall) and records (dietary record). Inaccuracies result from incomplete listing of all the possible food and drink eaten and drunk and from error in the frequency and usual serving size estimate (Thompson & Subar, 2008). The FFQ was designed to measure dietary intake and generally consists of a list of approximately 100 (Thompson & Subar, 2008) or fewer individual foods or food groups that are important contributors to the respondents' dietary intake (Lee & Nieman, 2007). Thompson and Subar (2008) suggest that a longer food frequency list may lead to an overestimate, whereas a shorter list may underestimate because it is an incomplete listing of all the possible foods. The FFQ used in this study was composed of 9 questions or food group list. This may have lead to the underestimation of the dietary intake of Thai adolescents assessed by the FFQ when it was compared with the actual behaviour.

In comparing the 24-hour dietary recall and the FFQ, it appears to be that the dietary intake assessed by the 24 hour dietary recall had greater accuracy than the dietary intake measured from the FFQ as used in the TEQ.

The lack of consistency in the results may be because of social desirability or social expectation about eating behaviour. Social desirability was identified by many researchers as a major problem when self-report questionnaires such as the FFQ were used in their study (Hebert et al., 1995). Generally, adolescents perceived that high amounts of fruit and vegetables are included in a healthy diet, while meat and other foods in the protein group require more limited consumption (Croll et al., 2001). According to the findings, both urban and rural Thai adolescents perceived that healthy eating is consuming a diet rich in fruit and vegetables, and avoiding eating

fast foods that are high in meat and fat. Therefore, it is possible that the respondents may report an overestimation of a healthy diet such as fruit and vegetables, and an underestimation of a less healthy diet (Hebert et al., 1995). This may explain why the Thai adolescents' dietary intake assessed by FFQ was different to the 24 hour recall and so may have been influenced by social expectation and social desirability.

The differences between the 24-hour dietary recall and the FFQ could be because of the research budget and time limitation. Only 20 urban and 20 rural adolescents were recruited to participate in the 24-hour dietary recall in this study. Therefore, using the dietary intake assessed from the 24-hour dietary recall instead of that assessed from the FFQ to also examine the results from the TEQ was not possible because of the statistical limitations. The effective sample sizes based on the TPB study needed to be at least 148 (Rashidian et al., 2006).

In terms of food consumed and social influences, the dietary intake from the digital photography was planned to be used as a triangulation technique to confirm the dietary intake assessed by the FFQ and the 24-hour dietary recall. However, the photographs of meals and beverages could not be used because they did not provide accurate and sufficient detail of the contents or ingredients of the meals. There were two main reasons why the digital photograph of foods and beverages could not be used to quantify the serving portion size and these were the Thai food culture, and the quantification of dietary intake using digital photography technique.

For example some photographs taken by participants were family meals as in picture 5.1. When Thai family members eat a meal together, their food will be set in a central position in front of them in one or more dishes, and then they share all the dishes together. Therefore, taking photographs to examine the portion size of an individual meal is difficult and not appropriate. Thai people also like to share food and so the participants' food and beverages were sometimes shared by their friends after taking the photograph.

Also after taking the photographs of food and beverages, sometimes participants did not finish their meal, and left some food that they did not like to eat such as vegetables. Therefore, the photographs did not show the actual portion size of the participants' food and beverages consumed and how much of the food was left over.

Sometimes, the researcher could not clarify what kind of food was eaten because some photographs presented some food that was difficult to distinguish or only a superficial view such as Figure 5.15. The photographs did not provide all the characteristics of foods as in Figures 5.14 and 5.16.

As a result, the photographs of food and beverages were not used to quantify accurate portion size and usual dietary intake, and they could not be used to confirm the results related to dietary intake assessed between the FFQ used in the TEQ and the 24-hour dietary recall.

In the researcher's view, digital photography is a good technique to quantify everyday dietary intake. Although some photographs did not provide an accurate dietary record, some of them presented very clearly the characteristic of food and portion size. In regard to dietary assessment Hampl and colleagues (2003) found that digital photography provided them with data including accurate portion size and vivid details of their clients' meals. Similarly, a study by Williamson and colleagues regarding the estimation of portion size using digital photography (2003) reported that this tended to yield small inaccuracies (underestimate and overestimate).

The researcher suggests that digital photography techniques could be very useful in regard to collecting pictures of meals and beverages, if used together with other techniques such as dietary record at the same point in time or by noting down the details of food and beverages consumed.

All the fruit, vegetables, and rice and starchy intake assessed by both the FFQ and the 24-hour dietary recall were less than that recommended in the Thai nutrition flag. While the protein intake of Thai adolescents measured by the FFQ was also less than the recommended guidelines, only protein intake assessed by the 24-hour dietary recall was higher than the recommended amount (Working Group on Food-Based Dietary Guidelines for Thai People, 2001).

According to the reported dietary behaviour obtained from the 24-hour dietary recall, adolescents' average reported consumption of fruit, vegetables, and carbohydrates was lower than the food based dietary guidelines for Thai people, and higher than recommended for protein consumption. As a result, these eating patterns of Thai adolescents, particularly the consumption of foods high in animal protein

demonstrated the ingestion of high levels of saturated fat. This coupled with low fruit and vegetable intake may be associated with a higher risk of CVD, and lower protection against CVD.

This evidence is supported by the results from a longitudinal study by Nagura and colleagues (2009) that aimed to examine the association of plant-based food intake with CVD. The results of their study indicated that vegetable intake was inversely associated with total CVD, and plant-based foods, particularly fruit intake were associated with reduced mortality from CVD. This is consistent with the study results by Bazzano and colleagues (2002) that there was a strong inverse association between fruit and vegetable intake and the risk of CVD. The study by Ness and Powel (1997) examined the association between the consumption of fruit and vegetables and CHD and also indicated that fruit and vegetable intake had a strong protective effect from stroke and CHD. The study conducted by Veer and colleagues (2000) suggested that the consumption of a diet containing a high amount of fruit and vegetables was associated with a 16% lower risk of CVD. The study results by Mirmiran and colleagues (2009) found that fruit and vegetable consumption was inversely associated with CVD risk factors, and it also related to lower concentrations of total and low-density lipoprotein cholesterol. Diets containing unsaturated fats (mostly from vegetables, and not from animals) as the predominant form of dietary fat can offer significant protection against CHD (Hu & Willet, 2002).

Additionally, adolescents in urban areas reported a higher number of overweight, pre-obese and obese than the adolescent resident in rural areas. Obesity is a serious health problem because the development of overweight and obesity in adolescence influences health issues in adult life such as increasing high risk of chronic diseases, including CVD (Thomson, Obrazanek, Franko, Barton et al., 2007). Therefore, it may be that urban Thai adolescents may be at a higher risk of CVD than rural Thai adolescents.

Differences in the prevalence of overweight and obesity in children and adolescents are related to many factors such as a family history of obesity, economic background, dietary intake, life style, physical activity, and the food environment. Of these factors, only dietary intake was examined in the quantitative part of the study. This means that the discussion of the possible causes of different weight status in urban

and rural Thai adolescents is limited by this. However, some factors were identified in the focus group discussion, including economic background and the food environment in the urban or rural area of residence. Therefore, there was discussion as to why urban and rural adolescents have significant differences in weight status.

Compared to rural adolescents, the percentage, frequency and quantity of reported fast food, meat, sweets, and carbonated drinks consumption of urban adolescents was significantly higher. Moreover, the urban area studied (Muang Ratchaburi) contained many fast food restaurants, convenience stores, and food stalls serving foods containing high protein and fats compared to the Suanphung District (rural area). Some rural adolescents said that they would like to eat some western fast foods, but they were not available in their community. Furthermore, western fast foods were quite expensive, and they had no money to buy them.Urban Thai adolescents in the city centre of Muang Ratchabuuri had easy access to fast foods restaurants and fast food campaigns and although they were expensive, it did not matter because their parents paid for them.

Therefore, it could be explained that a difference in weight status between urban and rural Thai adolescents in this study was influenced by differences in their dietary intake, food environmental factors, and economic status. To lower the risk of CVD, healthy weight status and factors related to lowering the risk of overweight and obesity in Thai adolescents should be further explored.

7.3 Conclusion

This section provided discussion of the findings from the quantitative and qualitative parts and is summarised as follows in figures 7.1 and 7.2.

Figure 7.1 Factors influencing urban Thai adolescents' eating behaviour obtained from the quantitative and qualitative phases

Quantitative phase   **Qualitative phase**

Thai adolescents' eating behaviour

Eating intention

Attitude towards eating behaviour

Subjective norm regarding eating behaviour

PBC over eating behaviour

Individual cognitive and emotional influences on food choices

Parental influence

Food availability

Mass media targeting of food

No association

Have an association
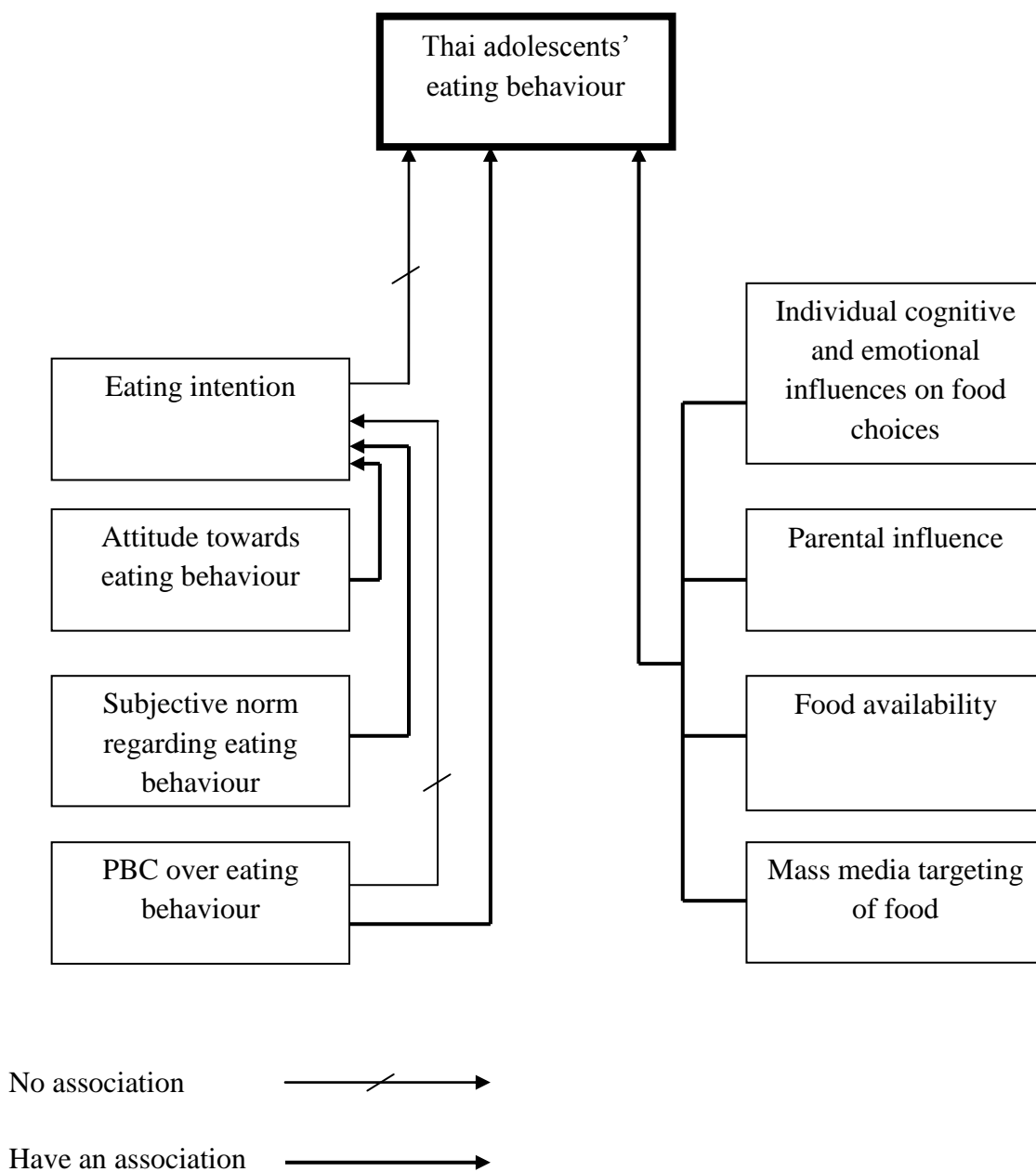
As figure 7.1 demonstrates, urban Thai adolescents' eating behaviour was identified as being influenced by more factors when using the qualitative methods. While the findings from the quantitative analyses showed that urban Thai adolescents' eating behaviour was predicted by only PBC, the results from the qualitative phase found that there were four main factors affecting urban Thai adolescents' eating behaviour, including individual cognitive and emotional influences on food choices (knowledge of intake of recommendation, food preference, convenience of food, perceived outcomes of eating each food, price, body image, time, food choices, and cleanliness), parental influences (food consumption in home such as mother's purchasing and cooking behaviour), food availability (home, school, food shops and restaurants, and community environmental influence), and mass media targeting of food (marketing such as toy collection with a meal). The four factors obtained from the focus group discussions were similar to the PBC in the TPB model.

Figure 7.2 Factors influencing rural Thai adolescents' eating behaviour obtained
from quantitative and qualitative phases

Quantitative phase   **Qualitative phase**

No association

Have an association
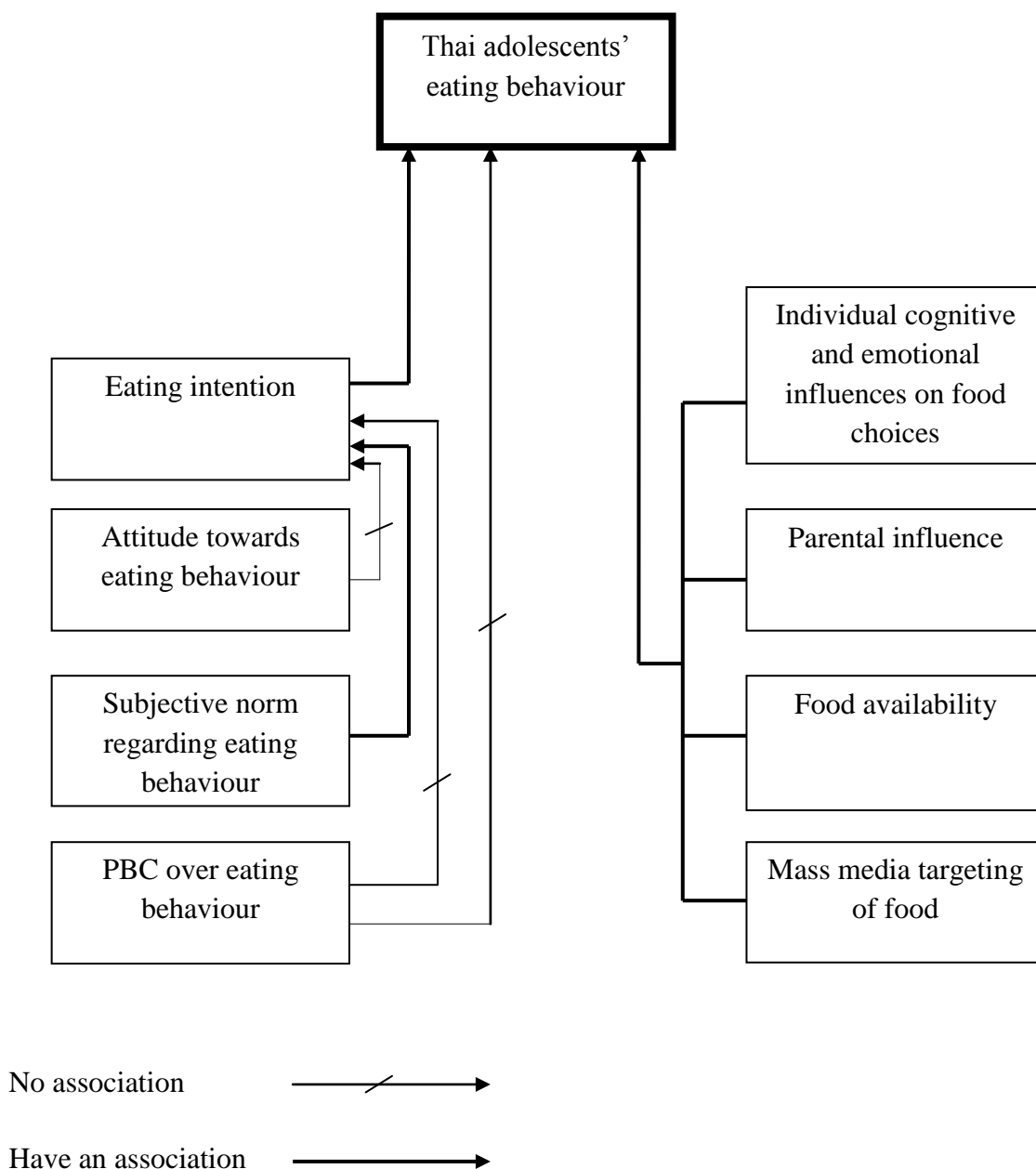
As a figure 7.2 demonstrated, the findings from the quantitative phase showed that rural Thai adolescents' eating behaviour was predicted by only eating intention, and in turn this was predicted by the subjective norm. The results from the qualitative phase found that there were four main factors that affected urban Thai adolescents' eating behaviour. However, some minor factors were different. They included individual cognitive and emotional influences on food choices (knowledge of intake of recommendation, food preference, convenience of food, perceived outcomes of eating each food, price, body image, emotion, economic status, and conflict of knowledge), parental influence (food consumption in home such as mother's purchasing and cooking behaviour), food availability (home, school, and community environmental influences), and mass media targeting of food (advertising). As a result, it appears that rural Thai adolescents' eating behaviour was influenced by more factors when qualitative methods were utilised. The findings from the quantitative phase indicated that rural Thai adolescents' eating behaviour was perceived as under their own control. Conversely, the results from the qualitative indicated that rural Thai adolescents' eating behaviour was perceived to be influenced by external or environmental factors.

In this study, while both the quantitative survey and focus group discussions had strengths and limitations, together they offered a fuller explanation of the results of this study. This was planned by the researcher initially because eating behaviour is complex and influenced by many factors. However it was not anticipated that these approaches would work together so well to complement each other and reveal very interesting results.

For example the results of the survey highlighted what factors affected urban and rural Thai adolescents' eating intention and behaviour, the specific common beliefs in each question could not be identified. This included the overall, subjective norm or social pressure (including parents, teachers, friends, health care professional, and mass media) which was a predictor of both urban and rural Thai adolescents' eating intention in survey. However, the results from the focus group discussions showed that their mothers were always mentioned by participants as an important person who influenced their eating intention. Therefore, the mixed methods provided both the breadth and depth for the analyses of the study results and so helped this study to contribute new information.

In the survey, while PBC was predictor of urban adolescents' eating behaviour, and explained only 5.0 % of the variance, more influences including included knowledge of intake recommendation, food convenience, time availability, cleanliness of food, food shop and restaurant environmental influence, and marketing were mentioned in focus group discussions as factors influencing urban adolescents' eating behaviour. In addition, rural adolescents' eating behaviour was predicted by eating intention, and account for only 5.5% of the variance, while the PBC could not explain rural Thai adolescents' eating behaviour. The results from the focus group showed that the eating behaviour of rural Thai adolescents was influenced more by some factors, including knowledge of intake recommendation, food convenience, emotional state, economic status, and conflict of knowledge about eating behaviour that could not be identified by the survey. This suggests that the use of focus groups not only gives more detail and complements the survey results but also adds other specific information that has not been included in the survey such as the importance of emotional state in relation to healthy eating.

Another issue was the assessment of food consumption by both the questionnaire and 24-hour dietary recall. There were 20 urban and 20 rural adolescents who completed the FFQ used in the TEQ and the 24-hour recall and this provided different results. The 24-hour dietary recall seemed to provide more accurate actual behaviour than the FFQ because 3 days for dietary recall were used but the FFQ was once only. The FFQ may have been influenced by social expectation such as reporting the consuming of high levels of fruit and vegetables, and eating low protein when in practice this does not occur. However, the 24-hour dietary recall provided a record or a more accurate dietary intake than using the FFQ because completing the 24 hour-dietary recall form was based on specific memories rather than generic recall assessed by the FFQ. Different assessment methods were selected for the study because eating behaviour is difficult to measure accurately and it was thought that using more than one assessment would help to clarify the situation. Therefore, future studies may benefit from using the 24-hour dietary recall for all participants instead of the FFQ to avoid potential inaccuracies.

 Digital photographs of food intake were also planned to help with the accuracy in assessing actual eating behaviour. Photographs can record the vivid details of food and beverages and the cooking method, together with the date and time of meals.

However, this technique had some limitations, particularly in Thai eating culture where they like to eat food together (family meals and sharing food with family members and friends). For example, photographs may provide only superficial detail of food, and cannot identify who has eaten what or what food was left at the ends of the meal. It also requires the participant to specify what was eaten. Therefore, digital photography needs to be used concurrently with other measures such as a dietary record so that the written record can be compared to the visual photographs of the food. In addition, perhaps asking participants to take photographs of their food before and after eating would also help record food intake accurately.

For the literature search in this study, the researcher used an electronic search as explained in chapter 2 (page 48-51) to search articles in relation to this study. The results found that only 3 articles (Hewitt & Stephens, 2007; Horst et al., 2008; Kassem et al., 2003) from 5 databases (CINAHL, EMBASE, MEDLINE, PsycINFO, and the Cochrane Library) were identified, while 9 articles (Backman et al., 2002; Berg, Jonsson, & Conner, 2000; Blanchard, et al., 2009; Fila & Smith, 2006; Kassem & Lee, 2004; Pawlak& Malinauskas, 2008; Pawlak, Malinauskas & Rivera, 2009; Prell et al., 2002; Sangperm et al., 2008) were gained by further searching from relevant sources. However, when the researcher revisited MEDLINE, 6 (Backman et al., 2002; Berg, Jonsson, & Conner 2000; Blanchard et al. 2009; Kassem & Lee, 2004; Pawlak & Malinauskas, 2008; Pawlak, Malinauskas, & Rivera, 2009) of the 9 articles were available. This is probably because the search strategy was limited by only "items with links to free full text". This is a limitation of the electronic search used in this study. It was used to find as many possible studies which addressed the review's research question. The researcher set inclusion and exclusion criteria, and a method for searching which limited the search to only items with links to free full text. This decreased the number of possible articles which could have been identified in the data bases. However, the researcher has gained the basic skills of undertaking an electronic search and has added greatly to her understanding of the vital importance of a literature search.

In the next chapter, the conclusion, strengths, limitations, and recommendations of this study will be presented.

Chapter 8

Conclusion, strengths, limitations, and recommendations

This final chapter includes four sections. The first section presents the conclusion of this study. Then this is followed by the strengths and limitations of this study. The last section is recommendations for health care providers and further research.

8.1 Conclusion of this study

This mixed methods study aimed to identify the factors influencing Thai adolescents' eating behaviour.

The study had this primary research question:

What factors influence adolescents' eating behaviour in urban and rural areas of Thailand?

To examine this in detail there were six secondary questions.

1. Do the components of the TPB help to predict urban and rural Thai adolescents' eating behaviour?

2. What are the differences between urban and rural Thai adolescents' predictors of eating behaviour when based on the TPB?

3. Are there differences in eating behaviour when assessed by different methods?

4. What are the perspectives on eating behaviour of urban and rural adolescents?

5. What are the similarities and differences between urban and rural Thai adolescents' perspectives regarding eating behaviour?

6. What are the similarities and differences in factors influencing Thai adolescents' eating behaviour between the studies conducted based on the TPB and adolescents' perspectives?

This study was designed:

1. To identify factors influencing Thai adolescents' eating behaviour in urban and rural areas of Thailand.

2. To compare factors influencing urban and rural Thai adolescents' eating behaviour.

Mixed methods were identified to be used in this study. The study was designed as follows.

The quantitative part of this study:

The TPB was used as the theoretical framework to identify factors influencing Thai adolescents' eating behaviour and their eating behaviour itself, 184 urban and 152 rural adolescents completed the TEQ questionnaire that was developed based on the TPB. Then, multiple dietary assessments including the 24-hour dietary recall and digital photography of food and beverages were used as triangulation techniques to further explore the eating behaviour of 10 males and 10 females from the urban and rural areas of the study.

The qualitative part of this study:

To further examine factors influencing Thai adolescents' eating behaviour, four focus group discussions of single-sex groups of boys and girls were undertaken to facilitate further discussion. The 38 volunteers were recruited from the participants in the quantitative part. There were 10 males and 10 females from an urban high school and 9 males and 9 females from a rural high school.

Stepwise multiple regression analyses were used to examine the prediction of eating intention as the dependent variable using three constructs of the TPB; attitude towards eating behaviour, subjective norm regarding eating behaviour, and PBC over eating behaviour. Adolescents' eating behaviour was examined as the dependent variable by two components of the TPB; PBC and eating intention. The Wilcoxon

signed-rank test was used to compare Thai adolescents' eating behaviour (portion size) assessed from the FFQ used in the TEQ and the 24-hour dietary recall form. In addition, digital photographs were analysed to identify dietary intake and used to confirm portion size of food intake assessed by the 24-hour dietary recall and the FFQ. Thematic analysis was used to analyse the data from the focus group discussion.

The results from the TPB indicated that attitude and subjective norm were significant predictors of urban Thai adolescents' eating intention, while urban Thai adolescents' eating behaviour was predicted by the PBC. Subjective norm was a significant predictor of rural Thai adolescents' eating intention, which in turn was a significant predictor of eating behaviour in rural Thai adolescents. Thus, it may imply that rural Thai adolescents' eating behaviour was predicted by the subjective norm.

Thai adolescents' eating behaviour assessed by the 24-hour dietary recall and the FFQ used in the TEQ provided different results. This meant that fruit and vegetable intake assessed by the FFQ appeared to be overestimated, and adolescents' intake of the protein group measured by the FFQ was likely be underestimated when compared with the results assessed by the 24-hour dietary recall. Only rice and starchy food consumption assessed from the FFQ and the 24-hour dietary recall were similar. Photographs of meals could not be used to estimate the portion size in this study because they did not provide accurate portion sizes. Therefore, the photographs of food and beverages could not be used to confirm the results from the survey and 24-hour dietary recall.

The results can be summarised as Table 8.1.

Table 8.1 The summary of hypothesis testing

Hypotheses	Accept	Reject
Hypothesis I: Urban adolescents' attitude towards eating behaviour will significantly predict eating intention.	√	
Hypothesis II: Rural adolescents' attitude towards eating behaviour will significantly predict eating intention.		√
Hypothesis III: Urban adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.	√	
Hypothesis IV: Rural adolescents' subjective norm regarding eating behaviour will significantly predict eating intention.	√	
Hypothesis V: Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.		√
Hypothesis VI: Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating intention.		√
Hypothesis VII: Urban adolescents' eating intention will significantly predict eating behaviour.		√
Hypothesis VIII: Rural adolescents' eating intention will significantly predict eating behaviour.	√	
Hypothesis IX: Urban adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.	√	
Hypothesis X: Rural adolescents' perceived behavioural control over eating behaviour will significantly predict eating behaviour.		√
Hypothesis XI: Explore eating behaviour using quantitative methods (FFQ, the 24-hour dietary recall, and digital photography) to examine similarities and differences	√	

From the focus group discussion, thematic analyses identified four major factors influencing both urban and rural Thai adolescents' eating behaviour. These factors were: (i) individual cognitive and emotional influences on food choices (e.g. knowledge of intake recommendation, food preferences, perceived outcome associated with specific foods, convenience, price, body image), (ii) parental influence (food consumption in the home), (iii) food availability (home, school, food shops and restaurants and community influences) and (iv) mass media targeting of food (advertising and marketing).

The results from the survey indicated that urban Thai adolescents did not have volitional control of their eating behaviour as the factors influencing urban and Thai adolescents' eating behaviour identified from the FFQ was the PBC or the control belief. Moreover, the factors influencing urban Thai adolescents' eating behaviour identified from the focus group analysis were external factors similar to the PBC. Therefore, it can be proposed that from both the survey and focus group results, the factors that influenced urban adolescents' eating behaviour were external to them.

In contrast, the findings from the survey showed that eating intention was a predictor of rural adolescents' eating behaviour. It seemed that rural Thai adolescents' eating behaviour was under their own control. However, the results from the focus group discussion also showed that external factors affected their eating behaviour. Therefore, both internal (eating intention), and external factors were considered when factors affecting rural adolescents' eating behaviour were identified.

8.2 Strengths of this study

This study has a number of strengths as following;

1. The TEQ was based on the common beliefs (behavioural, normative, and control beliefs) gained from the pilot study. Using this approach meant that the cognitions that were being examined were chosen by the Thai adolescents (from the pilot study) rather than the researcher. Therefore, it could be argued that important factors that were central to understanding Thai adolescents' eating behaviour were identified.

2. The sample size in the study was sufficient for the regression analysis of the TPB.

3. The use of multiple dietary assessments to measure Thai adolescents' eating behaviour in this study including the FFQ used in the TEQ and the 24-hour dietary recall minimised potential bias that may have resulted in over/under estimating the reporting of dietary intake.

4. Dietary intake is found to vary for most people at the weekend compared to weekdays. Therefore, the 24 hour dietary recall form was used to assess adolescents' dietary behaviour at least 3 times, two times during the week and one time at the weekend.

5. Using mixed methods strengthened this study as follows.

The quantitative study based on the TPB model identified Thai adolescents' eating behaviour. The TPB is a very useful model, but only examines the role of thinking and perception by self report and does not include emotions and specific aspects of social pressure and context that may have influenced eating behaviour in this study. Therefore, using qualitative methods helped the researcher identify factors influencing adolescents' eating behaviour that were absent from the quantitative study such as the role of mother in cooking food, and the emotional state of the adolescent. This may partly explain the differences in the results of the hypothesis testing between the urban and rural adolescents.

Although the results of the quantitative study indicated which component of the TPB influenced Thai adolescents' eating intention and behaviour, each common belief (each question in the questionnaire) was not identified in the data analysis. However, focus group discussion helped the researcher to identify specific detail about the beliefs. For example, the results from the survey indicated that both urban and rural adolescents' eating behaviour was predicted by subjective norm, but this did not identify which normative belief (important people) influenced urban and rural Thai adolescents' eating behaviour. However, the results from the focus group indicated that their mother was an important person in this.

8.3 Limitations of this study

Several limitations need to be considered as follows;

1. This study was limited by its cross-sectional design because the TPB model in the form of the TEQ questionnaire was used to predict behavioural intention and behaviour. As the data was collected at the same time the sequencing of the variables is unclear. Future research would be strengthened by using a prospective design such as a longitudinal study which would follow a cohort of adolescents using multiple measures over time using the TPB as a theoretical framework to establish temporal associations between the predictors and adolescents' eating intention and behaviour. A prospective design would therefore test the model's efficiency in predicting factors influencing adolescents' eating behaviour. A cross-sectional design can be justified as a pragmatic option for this study because of the time limitation on this study.

2. This study only examined a sample of urban and rural Thai adolescents from one province, namely Ratchaburi, Thailand. The results were based on a convenience sample of students that may not be representative of all grade 10-12 students in each school. Although the two schools represented a wide range of economic backgrounds and different ethnic groups, the schools were not randomly selected and therefore the findings may not be generalisable to all urban and rural dwelling Thai adolescents.

3. Although the questionnaire for this study was developed carefully following a recognised procedure, it has some weaknesses for assessing the eating behaviour of the participants. Adolescents self-report of dietary intake were used in this study, which may be prone to a social desirability bias.

4. Some questions in the TEQ were not specific. For example, it is as follows.

Part V: Subjective norm regarding eating behaviour

A. Beliefs about your important people's thinking

1. My parent/s or guardian/s think/s that

I should not: ___1___:___2___:___3____:___4___:___5___:____6____:____7___: I
should

eat more fruit and vegetables in the future

Part VI: Perceived behavioural control over eating behaviour

A. Control belief factors

13. My parent/s or guardian/s always buy/s fruit and vegetables for me.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

---

Each question includes father, mother, and guardians together in the same question. If they were separated, they may have given more specific information about who has more influence on their children's eating behaviour. However the results from the focus group demonstrated that the participants mentioned that their mother was the most important person influencing their eating behaviour.

5. Because of time and cost limitation, only 20 urban and 20 rural adolescents were assessed in relation to their actual eating behaviour with the 24-hour dietary recall. This small sample size limited the use of regression analyses which could have been performed when actual eating behaviour was examined using the components of the TPB.

6. The urban high school was closed many times in the period of data collection due to the flu epidemic in 2009 (H1N1) (Ministry of Public Health, Thailand, 2009). This meant that the students had a very busy schedule. In addition,

the participants said that they had too many activities to do after completing the questionnaire and so it was difficult for them to continue to participate. Therefore, there were only a few students who wanted to participate further in the next part (completing the 24-hour dietary recall, taking photographs of their meals and beverages, and the focus group discussion). The weight status of the students who participated in the focus groups did not include the range of weights as planned because of the low participant numbers.

7. Focus group discussion in this study did not provide as rich descriptions as anticipated. The Thai adolescents did not engage in detailed discussion because there were many points identified in the focus group, and there was limited time. Also the participants lost concentration in the discussion when the group was nearly finished.

8.4 Recommendations

Knowledge gained from this study provided an understanding of factors influencing urban and rural Thai adolescents' eating behaviour. The researcher also gained experience in regard to the process of this research. Therefore, the recommendations for a programme related to promoting healthy eating behaviour and further research have been based on the results from the survey, focus group discussion, and the research findings as follows.

Recommendations to health care providers and public health professionals

The recommendations need to be put into the context of current and future policy and Thailand and could be used to promote healthy eating behaviour for Thai adolescents specifically in the areas in which they dwell. This would mean that the Thai health policy would be grounded in the context in which people live and this may help understanding and be in line with the current recommendations.
The health policy in Thailand (Bureau of Policy and Strategy, 2009b) has evolved from the 1st National Health Development Plan (1961-1966) to the present 10th National Health Development Plan (2002-2006). The 10th National Health Development Plan, covering the period 2007-2011 has followed the vision and philosophy of the 9th Plan. The 9th Plan provided a clear vision of "a people-centred approach" and the philosophy of a "sufficiency economy". Its aims were to: (a)

promote health and prevent and control disease; (b) establish health security; (c) build capacity in health promotion and health system management; and establish measures in generating knowledge through research.

The Thai government believed that health promotion be considered as a key strategy for the sustainable health development of individual, families, communities and society. Therefore, "Healthy Thailand", the vision of the Medium-term Strategic Plan, was adopted as a national agenda to be used as guidance to reducing behavioural risks and to solve major health problems. Under the umbrella of "Healthy Thailand", nine programme approaches were initiated by the Ministry of Public Health. They are as follows.

1. Child Development
2. School Children in Health Promoting Schools
3. Healthy Families for a Healthy Thailand
4. Healthy Cities
5. Physical Activity and Diet for Health
6. Reproductive Health
7. Food Safety
8. Healthy Public Toilets
9. Healthy Elderly

According to "Healthy Thailand", "Diet for Health" is one of the main strategies and has been promoted to reduce behavioural risks and to solve the major health problems of Thai people such as chronic diseases, including CVD. Nutrition and healthy eating were also included in each programme approach to "Healthy Thailand"(the exception being "Healthy Public Toilet Strategy"). For example, healthy eating has been promoted as one of the important activities in "School Children in Health Promoting Schools" (Wirotpong, 2007), and "Healthy Families for a Healthy Thailand" (Working Group on Food-Based Dietary Guidelines for Thai People, 2001). This strategy has been used across the board from the individual, family, and school, to the community, and societal level.

It may help health care providers develop programmes for promoting healthy eating in adolescents in order to promote good health and the prevention of CVD in middle age and later life.

The major findings of this study were that:

      1. Urban Thai adolescents' eating behaviour was predicted by the PBC or external factors.

      2. Urban Thai adolescents' eating intention was predicted by their attitude and subjective norm.

      3. Rural Thai adolescents' eating behaviour was predicted by eating intention.

      4. Rural Thai adolescents' eating intention was predicted by subjective norm.

The findings from the focus group discussion were a smaller part of this study but Thomas and colleagues (2004) state that qualitative studies improve understanding of the views of the participants of an intervention. Therefore, the findings are relevant when designing a programme to implement the promotion of healthy eating. The focus group findings indicated that:

      1. There were four factors which were identified as important when promoting healthy eating in urban and rural Thai adolescents.

      1.1 Individual cognitive and emotional influences on food choices such as knowledge about eating behaviour, food preferences, and perceived outcomes of eating

      1.2 Parental influence such as food consumption in the home (mother's purchasing, and mother's cooking behaviour)

      1.3 Food availability such as availability of healthy diet in the home, school canteen, and the atmosphere of fast food restaurants

      1.4 Mass media targeting of food such as the advertising of unhealthy food, and marketing.

      2. Both urban and rural Thai adolescents failed to comply with the food-based dietary guidelines for Thai people. The Thai guidelines recommend that healthy eating includes a variety of food including high levels of fruit, vegetables, dietary fibre and wholegrain cereals, and low amounts of saturated fats, salt, and sugar because they are recognised as the overall CVD protective dietary components.

3. Both urban and rural Thai adolescents were less knowledgeable about how to eat healthily, and specifically they did not know how much they had to eat from each of the five food groups.

Therefore, the findings suggested health care providers and public health professionals need to promote healthy eating and prevent CVD as follows.

For urban adolescents

The findings based on the TPB for urban Thai adolescents' were that their eating behaviour was predicted by perceived control, so they would benefit more from programmes designed that emphasise increasing the facilitators and decreasing the barriers to healthy eating behaviour, and also increasing their self-efficacy or their confidence in their ability to eat a healthy diet by using these activities as follows.

1. Increasing more healthy food at home, by controlling unhealthy foods bought by parents

2. Making changes to the availability of healthy foods in the school canteen and controlling the selling of unhealthy food such as carbonated drinks as a school policy

3. Making healthy food taste and look attractive at home and in the school canteen

4. Making healthy food a more convenient choice in the home and school canteen. For example, providing milk contained in a small box instead of milk in a big bottle so that adolescents could take it on the bus or keep it in their backpack Putting fruit in convenient packaging such as a plastic bag or box so that adolescents can take it with them and it is ready to eat

5. Reducing or controlling the cost of healthy foods and snacks in school

6. Providing enough time in the lunch break for adolescents to select, buy, and, eat their healthy meals

7. Creating lessons or activities to promote healthy eating behaviour in the classroom such as small group discussion on healthy choices and food preparation to provide information on healthy diet

8. Making it fashionable to eat a healthy diet and publicising it on boards and posters in schools and in the community in order to motivate adolescents to eat healthily, and increasing advertising of healthy food to make it more appealing

9. Motivating and encouraging adolescents to eat healthily during mealtimes by parents at home, and using announcements in school canteens

10. Helping adolescents develop skills to cope with difficult situations with their healthy eating behaviour in the classroom with their friends or to be given personal advice by a health care professional about healthy eating behaviour

For rural adolescents

According to the findings based on the TPB study, rural Thai adolescents were influenced by their eating intention which affected their eating behaviour, and eating intention was affected by subjective norm. They would benefit from programmes designed to increase individual motivation for healthy eating behaviour, and similar healthy eating activities involving parents, family members, peers, teachers, and significant others to increase the effect of social approval on their healthy eating behaviour. The activities are as follows.

1. Encouraging and motivating adolescents to eat healthily by parents, peer group and significant others

2. Asking adolescents to share their plans and goals in relation to eating behaviour with their parents, friends, and significant others

3. Promoting self-motivation and personal commitment to eat healthily for adolescents by parents, teachers, health care providers, and public health professionals

4. Promoting parents, family members, peers, teachers, and others as important people who influence adolescent's healthy eating behaviour by using posters in schools and in the community

Moreover, the results from the focus group discussion of rural and urban adolescents were similar. Therefore, the activities suggested for urban adolescents (number 1 to

10 as above) should be included in a healthy eating programme for rural adolescents.

Recommendation for future research

The findings of this study identified issues that should be discussed when using the TPB as a theoretical framework, together with a mixed methods design. The recommendations are as follows.

1. This study is the first study in Thailand that applies all the components of the TPB to factors influencing Thai adolescents' eating behaviour. The TPB results demonstrated that attitude and subjective norm were significant predictors of urban Thai adolescents' eating intention, while urban Thai adolescents' eating behaviour was predicted by PBC. In addition, subjective norm was a significant predictor of rural Thai adolescents' eating intention, which in turn is a significant predictor of eating behaviour in rural Thai adolescents. Therefore, overall, the study found support for the TPB as a framework to assist in the understanding of Thai adolescents' eating behaviour. For further studies, the TPB (TEQ) could to be used with adolescent eating behaviour in other areas of Thailand including major city areas such as Bangkok and Chang Mai and rural areas in the North-eastern region of Thailand to see whether the results can be replicated.

In addition, the results in this study indicate that subjective norm is one of the important factors influencing Thai adolescents' eating intention, including parents and peers. However, having different meal time settings for breakfast (home), lunch (at school), and dinner (family or peer group) means they are influenced by different social groups. For example, usually Thai adolescents have breakfast and dinner at home, so their eating behaviour may be influenced by parents and family members. In contrast, having lunch at school may be influenced by peer pressure. Therefore, the application of the TPB to the study of adolescents' eating behaviour could include a comparison between breakfast, lunch, and dinner to further examine the role of the social environment.

2. The TPB not only provided a framework for understanding Thai adolescents' eating behaviour but also could be used to design interventions for promoting healthy eating behaviour. The results of this study suggest that PBC was a

predictor of urban adolescents' eating behaviours, and intention was a predictor of rural adolescents' eating behaviour. In turn, eating intention of rural adolescent was predicted by subjective norm, while eating intention of urban adolescents was predicted by attitude and subjective norm. Therefore, urban adolescents who were affected by PBC or control belief towards eating behaviour, would benefit more from programmes designed to increase the availability and accessibility of healthy food and that promote self-efficacy about undertaking healthy eating behaviour. Rural adolescents who were affected by eating intention that influenced their eating behaviour, and their eating intention was predicted by subjective norm, would benefit more from programmes designed to increase individual motivation. This would also include healthy eating activities involving family and peers to help increase the healthy eating behaviour in adolescents.

3. However only one urban public high school in the city and one rural public high school were selected by purposive sampling. The sample was also a convenience sample and included more females than males (approximately twice as many in both urban and rural high schools). This may have affected the results of this study as the study by Fila and Smith that examined the predictors of urban American adolescents' healthy eating (2006) showed that different genders were influenced by different predictors of their healthy eating behaviour. Specifically female urban adolescents' healthy eating behaviour was mostly predicted by barriers, while male urban American adolescents' eating behaviour was mostly predicted by subjective norm. Therefore, future research could use a more systematic sampling procedure to control both the gender, SES and other demographics such as weight which may influence dietary intake.

4. Using both the FFQ and 24-hour dietary recall elicited some very interesting results so demonstrating that future studies may benefit from using the 24-hour dietary recall for all the participants instead of the FFQ to avoid potential inaccuracies. Assessing adolescents' eating behaviour by the FFQ alone may be prone to a social desirability bias including reporting the consumption of high levels of fruit and vegetables, and eating low protein when in practice this does not occur. Measuring adolescents' dietary intake with the 24-hour dietary recall can provide a more accurate assessment of dietary intake.

5. Digital photographs of food intake can help the accuracy in assessing actual eating behaviour. However digital photography needs to be used alongside other measures such as dietary record so that the written record can be compared to the visual photographs of the food. The researcher needs to provide participants with instructions about how to take photographs for estimating the portion size of food and beverages they consume.

6. A mixed methods approach is recommended in order to enhance the quality of findings in future studies.

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Appendices

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Appendix A

Search strategies for databases

Database: CINAHL

Search	Search Terms	Search Option	Action
S4	(Healthy eating or healthy diet* or eating behavio* or food consumption or food intake or nutrition* or diet*) and (S1 and S2 and S3)	**Search mode**-Boolean/ Phrase	View results (10) Revise Search View Details
S3	Healthy eating or healthy diet* or eating behavio* or food consumption or food intake or nutrition* or diet*	Limiters- Full Text; Publication Year from: 1991-2009; English Language **Search mode**-Boolean/ Phrase	View results (26643) Revise Search View Details
S2	Adolescen* or teen* or youth or young	Limiters- Full Text; Publication Year from: 1991-2009; English Language **Search mode**-Boolean/ Phrase	View results (66686) Revise Search View Details
S1	Theory of planned behavio*	Limiters- Full Text; Publication Year from: 1991-2009; English Language **Search mode**-Boolean/ Phrase	View results (272) Revise Search View Details

Database: EMBASE

#	Searches	Results	Search Type	Action
1	(Adolescent, teen, teenager, young, young people, youth).af.	52,645	Advanced	Display more>>
2	(healthy eating or eating behaviour or eating behavior or food consumption or food intake).af.	32904	Advanced	Display more>>
3	(theory of planned behaviour or theory of planned behavior).af.	743	Advanced	Display more>>
4	1 and 2	3063	Advanced	Display more>>
5	1 and 2 and 3	6	Advanced	Display more>>

Database: Cochrane Library

ID	Search	Hits
#1	(adolescent) or (teen) or (teenager) or (youth) or (young people), from 1991-2009	60,587
#2	(healthy eating) or (eating behaviour) or (eating behaviour) or (food consumption) or (food intake) or (nutrition) or (diet), from 1988 to 2009	7,030
#3	(theory of planned behaviour) or (theory of planned behavior), from 1991 to 2009	285
#4	(#1 and #2), from 1991 to 2009	1,269
#5	(#1 and #2 and #3), from 1991 to 2009	23

Database: Medline (PubMed)

Search	Most Recent Queries	Results
#4	Search ((#1) and #2) and #3) Limits: only items with links to free full text, Humans, English, Dietary Supplements, MEDLINE, Nursing journals, Adolescents: 13-18 years, Publication Date from 1991 to 2009	21
#3	Search (Theory of planned behaviour) OR theory of planned behaviour) Limits: only items with links to free full text, Humans, English, Dietary Supplements, MEDLINE, Nursing journals, Adolescents: 13-18 years, Publication Date from 1991 to 2009	39
#2	Search ((((((Healthy eating) OR eating behaviour) OR eating behaviour) OR food consumption) OR food intake) OR nutrition) OR diet) Limits: only items with links to free full text, Humans, English, Dietary Supplements, MEDLINE, Nursing journals, Adolescents: 13-18 years, Publication Date from 1991 to 2009	7039
#1	Search ((((((adolescent) OR teen) OR teenager) OR youth) OR young) OR young people Limits: only items with links to free full text, Humans, English, Dietary Supplements, MEDLINE, Nursing journals, Adolescents: 13-18 years, Publication Date from 1991 to 2009	128,534

Database: PsycINFO (COLC)

#	Searches	Results	Search Type
1	(adolescent or teen or teenager or youth or young or young people).af.	514419	Advanced
2	Limit 1 to (full text and peer reviewed journal and all journals and human and English language and abstracts and yr="1991-2009"	16322	Advanced
3	(healthy eating or eating behaviour or eating behaviour or food consumption or food intake or nutrition or diet).af.	69904	Advanced
4	Limit 2 to (full text and peer reviewed journal and all journals and human and English language and abstracts and yr="1991-2009"	2484	Advanced
5	(theory of planned behaviour or theory of planned behaviour).af.	7792	Advanced
6	Limit 3 to (full text and peer reviewed journal and all journals and human and English language and abstracts and yr="1991-2009"	176	Advanced
7	2 and 4 and 6	34	Advanced

Appendix B

Protocol for ethical approval by Faculty of Health Research Ethics Committee

Research Proposal

Factors influencing Thai adolescents' healthy eating behaviour

Introduction

As in developed and other developing countries, chronic diseases are the major cause of adult illness and death in Thailand. Overweight and obesity rates also have increased continuously in all age groups, particularly in urban areas (Wibulpolprasert, 2005). The prevalence of overweight and obese children and adolescents has dramatically increased from 5% during 1986-1995 to 17.9% during 1996-1999 (Likitmaskul et al., 2003).

The primary cause of obesity and such chronic diseases may be increased consumption of unhealthy foods and insufficient physical activity. Healthy eating is an important part of a healthy lifestyle that can prevent many medical problems, including becoming overweight, obesity and chronic diseases (Darnton-Hill et al., 2004). The food intake patterns of the Thai population have changed according to changing lifestyles, during the period of accelerated globalisation and urbanization (Kosulwat, 2002). There is evidence to show that changes in diet and lifestyle in Thailand have been linked to the prevalence of obesity and chronic diseases (Kosulwat, 2002). For example, eating patterns have shifted from a Thai traditional food which contains high fibre to a more westernized 'fast food' diet which tends to be high in fat and carbohydrates (Kosulwat, 2002), particularly in Thai adolescents (Wibulpolprasert, 2005). This may be related to urban dwelling adolescence because of the easy access to fast food.

Adolescence is a crucial transition period between childhood and adulthood, and developing healthy behaviour in adolescence is likely to influence long term behaviours. Diet and nutrition have been known for many years to play important factors in the promotion and maintenance of good health throughout the entire life course (Darnton-Hill et al., 2004). Therefore, healthy eating is increasing importance

and has been examined among adolescents in several countries, in relation to factors that influence healthy eating behaviour (e.g. Lake et al., 2007; Fila & Smith, 2006; Backman et al., 2002). However, Thai adolescents' approach to healthy eating may differ from that of adolescents in other countries. While understanding factors influencing healthy eating behaviour is very important to promote healthy eating behaviour among Thai adolescents, there is very little research showing about factors influencing Thai adolescents' healthy eating behaviour.

There are models from health psychology such as the Theory of Planned Behaviour (TPB) that attempt to predict health-related behaviours (Ajzen, 1996). The TPB will be used to examine healthy eating behaviour in this study.

The purpose of this study will be to identify factors influencing Thai adolescents' healthy eating behaviour in urban and rural areas using the Theory of Planned Behaviour. The results of this study may be important and useful for the further development of intervention strategies or programmes that promote healthy eating, as well as providing useful data for development of further research in adolescents both urban and rural areas in Thailand.

Literature review

Healthy Eating

Healthy eating is difficult to conceptualise because it is an important part of a healthy lifestyle that is influenced by diverse beliefs, cultures, and patterns of lifestyle across societies (Sangperm et al., 2008). However, many countries such as United States, United Kingdom, Australia, China and Thailand have food-based dietary guideline for their populations to practice healthy eating and provide more details about how to eat healthily. This study will be based on food base dietary guideline for the Thai population or Thailand Nutrition Flag.

(See http://www.fao.org/ag/AGN/nutrition/education_guidelines_tha_en.stm)

Adolescent and healthy eating

For adolescents, healthy eating is fundamental for healthy growth, and cognitive and psychological developments (Baker-Hennningham et al., 2007). In addition, adopting healthy eating patterns early in life are considered fundamental to efforts that aim to

promote health and prevent chronic diseases later in life (Lytle, 2003). Developing behaviours in adolescence may influence long term behaviours to adulthood. Thus shaping healthy eating behaviour in this period is very important to promote a healthy dietary pattern.

Factors influence adolescents' eating behaviour

According to Story and colleagues (2002), adolescents' eating behaviour is impacted by various influences including individual (intrapersonal), social environment (interpersonal), physical environment (in this case the community setting), and macrosystem (societal). Individual factors that influence adolescents' eating behaviour include knowledge, attitudes, beliefs, self-efficacy (confidence in own ability), taste, food preferences, and lifestyle. Interpersonal processes and relationships between adolescents and family, friends, and peer network can impact on adolescents' eating behaviour. The community setting influences accessibility and availability of foods. Macrosystem factors including mass media and advertising, social and culture norms, food production and distribution influence food policy, food availability, food price which affect adolescents' healthy eating (Story et al., 2002).

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) is an extension of Ajzen and Fishbein's the Theory of Reasoned Plan. The TPB has been extensively used to examine predictors of behavioural intentions, which are then linked to behaviour (Ogden, 2007). According to the TPB (Ajzen, 2006), behaviour is guided by three major constructs. They include attitude toward the behaviour, subjective norm, and perceived behavioural control. Attitudes are determined by beliefs about the likely outcomes of the behaviour and the positive or negative evaluation of these outcomes (behavioural beliefs). Subjective norms are determined by the social pressure perceived by individual to perform or not perform behaviour and individual's motivation to comply (normative beliefs). The perceived behavioural control is determined by control beliefs that can facilitate or impede performance of behaviour such as internal control factors (e.g. skills, abilities, information) and external control factors (e.g. obstacles, opportunities) (Ogden, 2007). While attitude, subjective norm, and perceived behavioural control can have direct influence on behavioural intention,

both behavioural intention and perceived behavioural control have directly influence on behaviour as described by Figure I.

Figure I: Schematic representation of the Theory of Planned Behaviour (Ajzen, 2006)
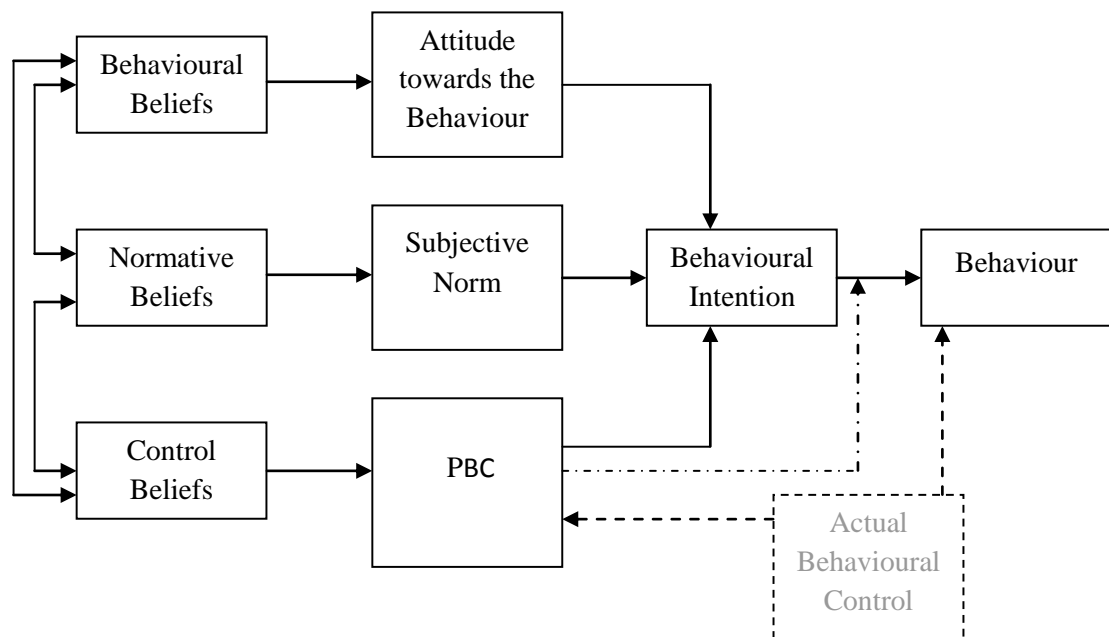
The TPB has been applied to the study of a variety of dietary behaviours. According to Fila and Smith (2006), the urban Native American youths' healthy eating was influenced by barriers, attitudes toward healthy eating, perceived behavioural control, and subjective norms (n= 139). Healthy eating did not have an association with healthy eating intention. While male adolescents' eating behaviour was most influenced by perceived social pressure, female adolescents' eating behaviour was most influenced by barriers indicating gender differences in the reasons for healthy eating behaviour.

Techniques in measuring diet

Measurement of dietary intake can be assessed using different methods such as a food record, 24-hour food recall, food frequency questionnaire, and photographic record (Lee and Nieman, 2007). The 24-hour food recall and photographic record will also be used in this study to measure dietary intake to aid comparison of results.

Research question

What are factors influencing adolescents' healthy eating behaviour in urban and rural areas of Thailand?

Aim of research

The aim of this study will be to identify the factors influencing adolescents' healthy eating behaviour in urban and rural communities in Thailand.

Objectives of study

1. To identify attitudes, subjective norms, and perceived behavioural control (the components of the TPB) that may predict healthy eating behaviour in Thai adolescent in both urban and rural areas.

2. To further explore other factors influencing Thai adolescents' healthy eating behaviour in both urban and rural areas.

Hypotheses

There will be: (1-4 only)

1. Differences in attitudes, subjective norms, and perceived behavioural control in relation to healthy eating will predict adolescents' healthy eating behaviour.

2. Differences in attitudes, subjective norms, and perceived behavioural control in relation to healthy eating will predict adolescents' healthy eating intention.

3. Differences between male and female adolescents in relation to TPB and healthy eating behaviour.

4. Differences between urban and rural adolescents in relation to TPB and healthy eating behaviour.

5. Healthy eating intention will predict adolescents' healthy eating behaviour.

6. Will further explore TPB and other factor that may influence adolescents' healthy eating behaviour using qualitative technique.

Design and methodology

Design

The study consists of two phases. The first phase will be quantitative and the second phase will include quantitative and qualitative methods. A cross-sectional survey will be carried out in the first phase using the components of the TPB to predict healthy eating behaviour. A predominantly qualitative approach will be employed in the second phase.

Setting

The study will be conducted in Ratchaburi province, in the central part of Thailand because this province contains both urban and rural areas. It is located 80 kilometres west of Bankok, the capital of Thailand, and borders on Myanmar (Burma). I also work as a lecturer in Ratchburi province and have developed good contacts in public health and schools. The cost and operationalisation of this research will be expedited by examining the area in which I work and live. Two public high schools are under the Ratchaburi Educational Service Area Office I, Ministry of Education, and they will be approached to take part in this study. The first is called Benjamarachutit School and it will be selected from other urban public high schools because it is the largest high school (1,670 pupils in grade 10 to 12) and located in the central city of Muang Ratchaburi. Therefore, it will provide a variety of participants from a wide social background. The second school is Suanphung Wittaya School, and it will be selected from other rural public high schools because it is located in Suan Phung district that is furthest from the central city of Muang Ratchaburi and also near the border line between Thailand and Myanmar (Burma) and therefore is rural.

Participants

The participants will be recruited from the male and female students attending in grades 10 to 12.

The TPB will be employed as a conceptual framework in first phase. According to Rashidian (2006), effective simple size for regression analyses of theory of planned behaviour studies is 148. That is calculated by the variance inflation factor method (α=.05; power=80%). However, samples will include at least 15 (10% of sample) to

account for the chance of incomplete data and withdrawal. Therefore, the participants from each urban and rural public high school should be at least 163, and the total number of participants in this phase will be 326.

Gender-specific focus groups with semi-structured questions, a 24-hour recall dietary record, and a photographic record will be used in the second phase to further explore factors influencing Thai adolescents' healthy eating behaviour. The first 10 male and 10 female participants who are willing to attend at the specified time will be included from each school. The total number of participants in this phase will be 40.

The inclusion criteria are adolescents of 15-19 years who can read and write. The participants from Bejamaruchutit School (urban) also need to live within Muang Ratchaburi (town boundaries), and the participants from Suanphung Wittaya School (rural) need to live within Suan Phung district.

Exclusion criteria include severe mental illness and learning disability.

Tools and materials

Phase I:

Anthropometric measurements

1. The digital weight measuring instrument: this instrument will be used to measure the weight all of participants.

2. The portable height measuring instrument: this instrument will be used to measure the height all of participants.

3. The portable length measuring instrument: this instrument will be used to measure the waist circumference all of participants.

Questionnaire based on TPB

4. The TPB was found to be a useful predictor of intentions and behaviour in the meta-analysis of its efficacy (Armitage and Conner, 2001). At the present time, there are no validated tools available in the Thai language that examines healthy eating behaviour using the TPB. Therefore, the Thai Healthy Eating Questionnaire (TEQ) was developed by the researcher based on the recommendation for Constructing a

TpB Questionnaire: Conceptual and Methodological Considerations (Ajzen, 2006), Food-based Dietary Guideline for Thai Population (Working Group on Food-Based Dietary Guideline for Thai People, 2001), and previous studies (e.g. Fila and Smith, 2006; Sangperm, 2008; Shepherd et al, 2006). It is composed of six parts.

Part I: Personal Information (24 questions)

Part II: Attitude toward Healthy Eating Behaviour Scale (28 items, 7-point rating scale)

Part III: Subjective Norm regarding Healthy Eating Behaviour Scale (12 items, 7-point rating scale)

Part IV: Perceive Behavioural Control regarding Healthy Eating Behaviour Scale (35 items, 7-point rating scale)

Part V: Healthy Eating Intention Scale (3 items, 7-point rating scale)

Part VI: Healthy Eating Behaviour Scale (11 items, 6-point rating scale)

5. Focus groups with semi-structured questions exploring what factors influence healthy eating behaviour

6. The 24-hour food recall form: this form will be used to collect dietary data about what participants eat in the last 24 hours (Gibson, 2005; Lee & Nieman, 2007).

7. Digital cameras: the participants will use digital cameras to take photos of their meal time foods and beverages. The photos will be used to examine portion size and characteristics of foods and beverages (Gibson, 2005) as well as the social situation in which meal and consumed.

TEQ part VI: healthy eating behaviour scale, focus groups, the 24-hour food recall form, and taking photographs of participants' food and beverages will be used to critically examine the factors involved in healthy eating behaviour.

Data collection

Firstly, the high school head teachers will be asked for their co-operation with the study using the letter from NAM, UEA. Then the teachers will be given introductory information about the research with the letter from the research. They will be then

asked to inform the students in their class about the study. Then, the information sheet and consent form will be distributed by the researcher in the school canteen to explain the study. If the students would like to take part in this study, the students will be asked to return the consent forms with their signatures and their parent signatures (age of consent is 20 year in Thailand). If either is missing then the student will not be included in the study.

In the first phase, each student will have an identification number and will be given the questionnaires to complete at lunchtime for around 20-25 minutes. Their weights, heights, and waist circumferences will be measured by the researcher.

In the second phase, the participants will complete the healthy eating behaviour scale for the second time, and then participate in focus groups. The participants will be requested to keep confidentiality within the groups and to sign the confidentiality from.

The 45 to 60- minute focus group will be administered in a quiet private room in school time (personal study time). The first part of the focus group will begin by asking participants about their own concept of healthy eating. After that, the participants will be asked about factors influencing their healthy eating behaviour. Focus groups will be carried out by the researcher as the facilitator. The focus group discussion will be audio-recorded and a note taker will be record the group discussion. The researcher also will write the key issue on the flip chart. At the end of discussion, the researcher will summarise main issues raised by the group. They will be shown the group member, and will be checked by participants to confirm data accuracy (Grbich, 1999). The participant will be reminded at the end of group that have agreed to maintain confidentiality.

Participants from focus group will complete the 24-hour food recall form three times with at least one day from the week end, and two days from the days of the week. This will reflect way that eating behaviour may change at the weekend and during the school week (Gibson, 2005) At the end of focus group discussion, the participants will complete the 24-hour food recall form, and the researcher will make two further appointments with the participants to complete the 24-hour food recall form on 2 further occasions over the next week.

After that, the researcher will give students digital cameras to take photos of their foods and beverages in the next three days. Three digitals cameras will be distributed in each group in each group in each school (3 digitals/ 10 participants or 1 digital camera/ 3-4 participants).

The camera with image of foods from each participant will be return to researcher, and image will be downloaded to researchers' note book (need password to access). Then, the images in digital camera will be deleted from memory card before sending the digital camera to other participant.

Ethical issues

This study will seek approval from the Ethics Committee from the Faculty of Health, University of East Anglia. Information related to this study will be initially announced in the participants' school by their teachers followed by distribution of information sheet by the researcher.

The School of Nursing, University of East Anglia will send letters to the directors of the two schools and the director of Ratchaburi Educational Service Area Office I, Ratchaburi Province, Ministry of Education to give information which will assist co-operation to do the study in their schools.

The group discussion may possibly induce distress. The participant in distress will be asked if they wish to leave the group if so the note taker will company them and give them time to talk about their feeling.

If they stay in the group, they will be taken aside at the end of group and given time to talk about their distress.

They can be referred or self refer to the counsellor in the school. While eating disorder or other conditions are recognized or actively disclosed, the participants concerned will be taken aside and advised to seek help from the health professional in the school, health care centre or hospital that they can access.

The participants will be reminded at the end of group that they have agreed to maintain confidentiality. If there are any disclosures of a potentially confidential nature, the person who may have disclosed information will be quietly taken to

private area and asked if they are ok and if they wish to do anything about the disclosed information.

Rigour

The rigor of quantitative research method will be ensured by validity, reliability and objectivity, and the rigor of qualitative research method will be ensured by trustworthiness in terms of credibility, transferability, dependability, and confirmability (Lincoln and Guba, 1985).

Validity, reliability, and objectivity

Therefore the TEQ will be assessed for content validity by two experts in the field of health psychology and nutrition from Faculty of health, UEA (Dr Janet Ramjeet and Dr Lee Hooper). Then, it will be translated in Thai by the researcher. After that, they will be back translated and checked by Associate Professor Dr. Surintorn Kalampakorn (Ph.D. from University of Michigan, USA), Public Health Nursing Department, Faculty of Public Health, Mahidol University, Thailand. The questionnaire (TEQ) will be piloted in Ratchaborikanukhro School, Ratchaburi province, Thailand. (This school is nearby to the schools that will be approached for the study.) First of all, the head teacher of the school will be asked for his co-operation using the letter from School of Nursing and Midwifery, University of East Anglia. If he says yes, then he will ask the students at morning assembly if they wish to volunteer (grade 10-12 only).They will be asked to meet with the researcher at lunchtime. Then, the TEQ will be piloted with the first 30 volunteer students during the lunchtime break. The questionnaire will be further developed based on feedback, and Cronbach' s alpha coefficient of rating scales which will be at least .60. The statistical support and advice for this was given by Dr. Malu Drachler (AHP).

Qualitative method will demonstrate:

Credibility

Focus groups with semi-structured questions, dietary methods, and photographic record will be used to collect data. The researcher will spend the lunchtime with the participants in each public high school to collect data and to build trust at least 3 to 4 weeks before starting the focus group with them.

At the end of discussion, the researcher will summarise main issues in relate to questions. They will be shown the group member, and will be then checked by participants to confirm data accuracy (Grbich, 1999). After the focus group, the researcher will transcribe the audio recorder discussion. The action of participants and nonverbal behaviour observed by note takers will be also be considered. The translation will be read several times, line by line and word by word, and the researcher will revisit the key of research question and purpose (Braun & Clarke, 2006). This means that the researcher will be actively examining the data in relation to the research question. Therefore the emerging data will be examined in relation to the research question. After that, the data will be coded and cathegorised that matches a text segment. Then the coded data and categories will be generated to develop themes (Mile and Huberman, 1994; Braun and Clarke, 2006).

Transferability

The research will provide a clearly description of design, sampling, data collection, analysis, and finding in order to enable the readers interpret correctly and apply the finding to own area.

Dependability and confirmability

This study will use different methods of data collection to help determine the dependability of response from participants and confirm or challenge explanations for behaviour (triangulation).

Data analysis

In the first phase, data will be analysed by The Statistical Package for Social Science (SPSS version 15.0 SPSS Inc., Chicago, IL, USA). Descriptive statistics will be used to examine personal data and study variables. To identify the association between the scales for the 3 independent variables (IVs) including attitude, subjective norm, and perceived behavioural control proposed in the TPB, intention to eat healthily and healthy eating behaviour (dependent variables), multiple regressions will be undertaken.

In the second phase, the themes will be derived from the group discussion on healthy eating. The discussion from the focus groups will be transcribed in Thai and then be

translated into English by the researcher. After that, they will be checked by Associate Professor Dr. Surintorn Kalampakorn. Then, the translation will be read and reread line by line, word by word, and the data will be coded and/ or categorised that match a text segment.

After that, the coded data and categories will be generated to develop themes (Mile & Huberman, 1994; Braun & Clark, 2006).

Qualitative analysis will be used to analyse the association of healthy eating behaviour between score of healthy eating behaviour scale, data from the 24-hour food recall form, and participants' foods and beverages photos.

Dissemination

The research findings will be disseminated through:

-Local presentation at community meeting.

-International presentation at conferences, conventions, and meetings.

-National and international publishing in peer-review journals

Timeframe

Stage	Timeframe	Activity
Stage 1	October 2007-October 2008	The first stage of this research will include: -Developing of the problem statement, research question, and method of study. - Gaining ethics approval from Faculty of Health Research Ethics Committee, University of East Anglia - Negotiating access to the setting and participants for the study.
Stage 2	November 2008-February 2009	Data collection: in Thailand: -Phase I: collecting data by using questionnaire -Phase II: collecting data by using focus group, dietary methods, and photographic record.
Stage 3	March 2009-September 2009	Data analysis: -Phase I: Numerical data will be entered into SPSS version 15. Data will be described and analyzed by using descriptive and inferential statistics. - Phase II: The conversation from focus group will be transcribed in Thai, and translated into English. Finally, data will be coded and analysed by using thematic analysis.
Stage 4	October 2009-July 2010	Writing up and Submission

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Appendix C

Ethical approval letter

UEA
NORWICH

University of East Anglia
Norwich NR4 7TJ England

Telephone
01603 456161

Miss Kamonporn Patcheep
1 Cunningham Road
Norwich
NR5 8HG

Dear Kamonporn,

Factors influencing Thai adolescents' healthy eating behaviour – 2008036

The resubmission of your above proposal has now been considered by the Chair of the FOH Ethics Committee and we can now confirm that your proposal has now been approved.

Please could you ensure that you have the relevant approvals for the project in Thailand.

Please could you ensure that any amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the committee. Please could you also arrange to send us a report once your project is completed.

The committee would like to wish you good luck with your project.

Yours sincerely,

Yvonne Kirkham
Faculty of Health
Tel: 01603 591721
Email: Y.Kirkham@uea.ac.uk

Appendix D

University of East Anglia

THE THAI EATING QUESTIONNAIRE (TEQ)

FOR CHILDREN

OF RATCHABURI PROVINCE HIGH SCHOOL

The TEQ is divided into 6 parts (112 items)

Part I   **Personal information (9 items)**

Part II   **Eating behaviour (9 items)**

Part III   **Eating intention (9 items)**

Part IV   **Attitude towards eating (25 items)**

Part V   **Subjective norm regarding eating behaviour (18 items)**

Part VI   **Perceived behavioural control over eating behaviour (42 items)**

Please read the instructions carefully and answer all questions honestly. This is not a test or quiz, thus there is no right or wrong answer. The questions are just about obtaining information about what you think and do.

PART I: PERSONAL INFORMATION

Instruction: Please read each question carefully and mark your answer by putting (√) in the space between brackets, or by writing answer on the line provided.

1. Student ID number………………… Room number……………………

2. I am now in Grade:

    (   ) 10   (   ) 11   (   ) 12

3. The name of my school is:

    (   ) Benjamarachutit School

    (   ) Suanphung Wittaya School

4. My home is located at in:

    (   ) Muang Ratchaburi

    (   ) Suanphung District

5. I am now ……………… years old ……………months

6. Sex: (   ) Male   (   ) Female

7. Weight………………Kg. (will be measured by researcher)

8. Height…………………Cm. (will be measured by researcher)

9. Waist…………………Cm. (will be measured by researcher)

PART II: EATING BEHAVIOR

Instruction: Please read each question carefully and circle the appropriate number that best reflects your opinion.

1. How many rice-serving spoons of vegetables do you eat each day?

rice-serving spoons											
0	1	2	3	4	5	6	7	8	9	10	> 10

2. How many portions of fruits do you eat each day?

1 banana (small)   1 orange   1 piece = 1 portion   6 little pieces = 1 portion   6 little pieces = 1
portion = 1 portion = 1 portion

portions											
0	1	2	3	4	5	6	7	8	9	10	> 10

3. How many table spoons of meat or protein do you eat each day?

1 egg = 2 spoons   1 mackerel = 2spoons   1 chicken drumstick = 2 spoons   1 tofu = 4 spoons

spoons											
0	1	2	3	4	5	6	7	8	9	10	> 10

4. How many rice-serving spoons of rice-starchy foods do you eat each day?

| 1 plate of rice | 1 bowl of noodles | 1 piece of fermented noodle | 1 slice of bread | 1 ear of corn |

= 3 rice-serving spoons   = 3 rice-serving spoons   = 1 rice-serving spoon   = 1 rice-serving spoon   = 1 rice-serving spoon

rice-serving spoons											
0	1	2	3	4	5	6	7	8	9	10	> 10

5. How many glasses of milk and cups of yogurt do you eat each day?

milk 1 glass   1box = 1 glass   yogurt = 1 cup

glasses/cups											
0	1	2	3	4	5	6	7	8	9	10	> 10

6. How many days over the last week did you eat fast foods such as burgers, sausages, pizzas, fried chickens, and meat balls?
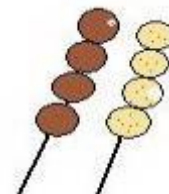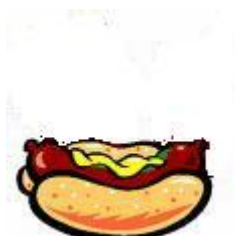
days							
0	1	2	3	4	5	6	7

7. How many days over the last week did you eat sweet snacks?
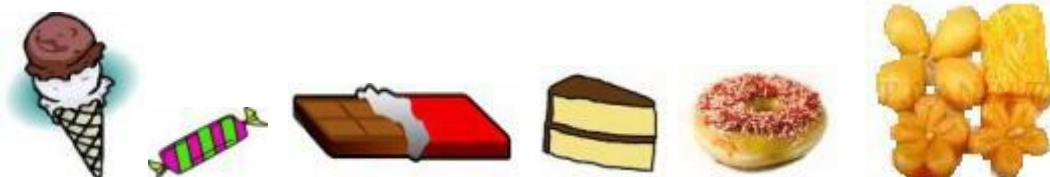
days							
0	1	2	3	4	5	6	7

8. How many days over the last week did you eat savoury snacks?
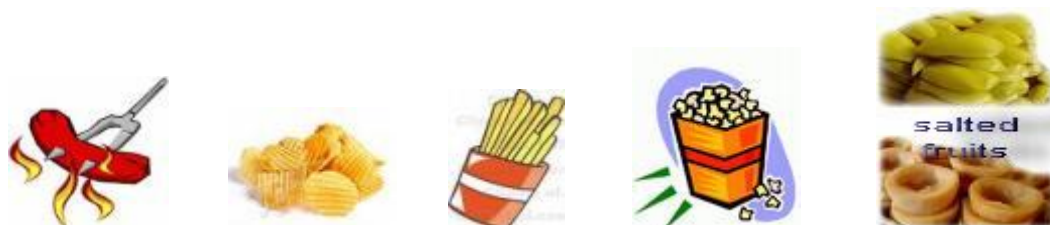
days							
0	1	2	3	4	5	6	7

9. How many days over the last week did you drink sweet drinks?

days							
0	1	2	3	4	5	6	7

PART II: EATING INTENTION

Instruction: Please read each question carefully and circle the appropriate number that best reflects your opinion.

1. I intend to eat more vegetables in the future.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

 2. I intend to eat more fruits in the future.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

3. I intend to eat adequate amount of meat/protein (9 spoons per day) in the future.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

4. I intend to eat adequate amount of rice-starchy (10 rice-serving spoons per day) in the future.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

5. I intend to drink a glass of milk or eat a cup of yogurt per day in the future.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

6. I intend to avoid fast foods.
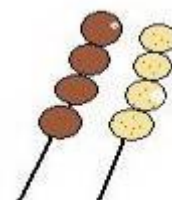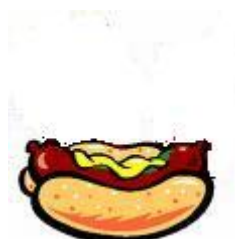
_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

strongly agree   strongly disagree

7. I intend to avoid sweet snacks in the future.
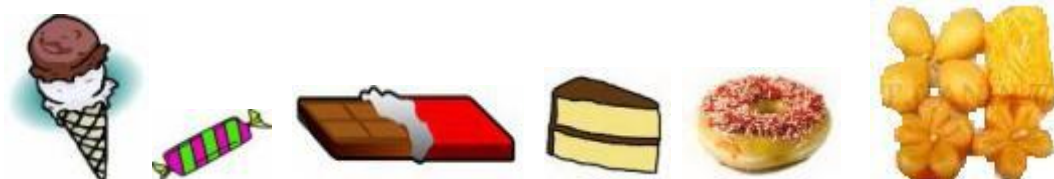
____1____:____2____:____3____:____4____:____5____:____6____:____7_____

 strongly agree   strongly disagree

8. I intend to avoid savoury snacks in the future.

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

 strongly agree   strongly disagree

 9. I intend to avoid sweet drinks in the future.

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

 strongly agree   strongly disagree

IV: ATTITUDE TOWARDS EATING

Instruction: Please read each question carefully and circle the appropriate number that best reflects your opinion.

A. Belief about outcomes regarding eating

1. Eating more fruit and vegetables will make me

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

   healthier   the same   less healthy

2. Eating more fast foods and sweet snacks will make me have

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

heavier weight   the same weight   lighter weight

3. Eating more savoury snacks and sweet drinks will give me

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

  a better   the same   a worse
immune system   immune system   immune system

4. Eating more fruits and vegetables will make me feel

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

  fresher   the same   less fresh

5. Eating more fruits and vegetables will give me have

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

a healthier skin   the same skin   a worse skin

6. Eating more fruits and vegetables will make me feel

____1____:____2____:____3____:____4____:____5____:____6____:____7_____

  full   the same   not full

7. Eating more fruits and vegetable will prevent constipation.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

    agree   neutral   disagree

8. Eating more fast foods, sweet and savoury snacks, and sweet drinks will make me at higher risk of some diseases such as heart disease, diabetes, high blood pressure.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

    agree   neutral   disagree

9. Drinking milk or eating yogurt will increase my risk of osteoporosis.

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

    agree   neutral   disagree

10. Eating more fruits and vegetable will make me get

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

 a better shape   the same shape   a worse shape

11. Eating more fruits and vegetable will make my food

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  enjoyable   the same   boring

12. Eating fast foods, savoury and sweet snacks, and sweet drinks will make my food

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  enjoyable   the same   boring

13. Eating fast foods, sweet snacks, and sweet drinks will make me look

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

 more trendy   the same   less trendy

B. Importance of the outcomes regarding eating

1. To me, being healthy is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

2. To me, being the proper weight is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

3. To me, having an effective immune system is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

4. To me, feeling fresh after eating food is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

5. To me, having a healthy skin is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

6. To me, feeling full after a meal is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely
unimportant   important

7. To me, having no constipation is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

  extremely   neutral   extremely

unimportant   important

8. To me, avoiding diseases such as heart disease, diabetes, high blood pressure is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

extremely ... neutral ... extremely
unimportant ... important

9. To me, avoiding osteoporosis in later life is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

extremely ... neutral ... extremely
unimportant ... important

10. To me, having a good body shape is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

extremely ... neutral ... extremely
unimportant ... important

11. To me, the enjoyment of food is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

extremely ... neutral ... extremely
unimportant ... important

12. To me, eating trendy foods is:

_____1_____:_____2_____:_____3_____:_____4_____:_____5_____:_____6_____:_____7_____

extremely ... neutral ... extremely
unimportant ... important

PART V: SUBJECTIVE NORM REGARDING EATING BEHAIOUR

Instruction: Please read each question carefully and circle the appropriate number that best reflect your opinion about others.

A. Beliefs about your important people's thinking

1. My parent/s or guardian/s think/s that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruits and vegetables in the future

2. My parent/s or guardian/s think/s that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat savoury snacks and sweet drinks in the future

3. My relatives think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruits and vegetables in the future

4. My relatives think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat fast foods and sweet snacks in the future

5. My teachers think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruits and vegetables in the future

6. My teachers think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat savoury snacks and sweet drinks in the future

7. My friends think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruits and vegetables in the future

8. My friends think that

I should not:___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat sweet snacks and sweet drink in the future

9. Health care professionals I am contact with think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruits and vegetables in the future

10. Health care professionals I am contact with think that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat sweet drink and savoury snacks in the future

11. Mass media such as TV, radio, internet, magazines, and newspapers state that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat more fruit and vegetables in the future

12. Mass media such as TV, radio, internet, magazines, and newspapers state that

I should not: ___1___:___2___:____3____:___4___:____5___:____6____:____7___: I should

eat fast foods and sweet drinks in the future

B. Influence of people who are important to you

1. With regard to eating, I want to do what my parent/s or my guardians think I should do

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

2. With regard to eating, I want to do what my relatives think I should do

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

3. With regard to eating, I want to do what my teachers think I should do

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

4. With regard to eating, I want to do what my friends think I should do

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

5. With regard to eating, I want to do what health care professionals think I should do

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

6. With regard to eating, I want to do what the mass media say I should do

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

PART VI: PERCEIVED BEHAVIOURAL CONTROL OVER EATING BEHAVIOUR

Instruction: Please read each question carefully and circle the appropriate number that best reflect your opinion.

A. Control belief factors

1. Fruits and vegetables are available.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

2. Fast foods, savoury and sweet snacks, and sweet drinks are available.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

3. Fruits and vegetable are cheap.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

4. Fast foods, savoury and sweet snacks, and sweet drinks are cheap.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

5. Fruits and vegetables are tasty.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

6. Fast foods, savoury and sweet snacks, and sweet drinks are tasty.

　　　Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

7. Fruits and vegetables look appealing and appetizing.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

8. Fast foods, savoury and sweet snacks, and sweet drinks look appealing and appetizing.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

9. Eating foods contained high fruits and vegetables takes time (e.g. thinking, and choosing, and preparing them).

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

10. Selling savoury and sweet snacks, and sweet drinks is against school policy.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

11. It is difficult to understand about how to eat healthily.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

12. Mass media such as TV, magazines and radio advertise a lot of fast foods, savoury and sweet drinks, and sweet drinks.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

13. My parent/s or guardian/s always buy/s fruits and vegetables for me.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

14. My parent/s or guardian/s always buy/s fast foods, savoury and sweet snacks, and sweet drinks for me.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

15. Nobody supports or encourages me to eat more fruits and vegetables.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

16. My friends always persuade to eat more fruits and vegetables.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

17. My friends always persuade me to eat fast foods, savoury and sweet snacks, and sweet drinks.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

18. As I am in a hurry at meal times, I do not want to think about which foods are healthy or unhealthy foods. I just eat anything.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

19. Eating fast foods and savoury and sweet snacks and drinking sweet drinks are convenient (e.g. they are easy to buy, ready to eat, and I can eat anywhere at any time).

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

20. Some fruits and vegetables may be contaminated with pesticide.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

21. Drinking sweet drinks such as carbonated drinks, concentrated drink reduce thirsty in hot weather.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

B. Control belief perceived power

1. It is easy to eat more fruits and vegetables because they are available.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

2. It is hard to eat more fruits and vegetables because fast foods, savoury and sweet snacks, and sweet drinks are available.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

3. It is easy to eat more fruits and vegetables because they are cheap.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

4. It is hard to eat more fruits and vegetables because fast foods, savoury and sweet snacks, and sweet drinks are cheaper.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

5. It is easy to eat more fruits and vegetables because they are tasty.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

6. It is hard to eat more fruits and vegetables because fast foods, savoury and sweet snacks, and sweet drinks are tastier.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

7. It is easy to eat more fruits and vegetables because they look appealing and appetizing.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

8. It is hard to eat more fruits and vegetables because fast foods, savoury and sweet snacks, and sweet drinks look more appealing and appetizing.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

9. It is hard to eat more foods contained fruits and vegetables because eating them take time (e.g. thinking, choosing, and preparing them).

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

10. It is easy to eat more fruits and vegetables because selling fast foods, savoury and sweet snacks, and sweet drinks are against school policy.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

11. It is hard to eat healthily because it is difficult to understand about healthy eating.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

12. It is hard to eat more fruits and vegetables because the advertising encourages me to buy fast foods, savoury and sweet snacks, and sweet drinks.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

13. It is easy to eat more fruits and vegetables because parent/s or guardian/s always buy/s them for me.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

14. It is hard to eat more fruits and vegetables because parent/s or guardian/s always buy/s fast foods, savoury and sweet snacks, and sweet drinks for me.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

15. It is hard to eat more fruits and vegetables because nobody supports or encourages me to eat them.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

16. It is easy to eat more fruits and vegetables because my friends always persuade to eat more fruits and vegetables.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

17. It is hard to eat more fruits and vegetables because my friends always persuade me to eat fast foods, savoury and sweet snacks, and sweet drinks.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

18. It is hard to more fruits and vegetables because I feel in a hurry at meal times, and I do not want to think about which foods are healthy or unhealthy food. I just eat anything.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

19. It is hard to eat more fruits and vegetables because eating fast foods, savoury and sweet snacks, and sweet drink are more convenient.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

20. It is hard to eat more fruits and vegetables because I worry about pesticide contaminated them.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

21. It is hard to drink fresh water or milk, because sweet drinks such as carbonated drinks, concentrated drinks reduce thirsty in hot weather.

Strongly disagree: __1__:__2__:__3__:__4__:__5__:__6__:__7__: Strongly agree

Thank you very much for your cooperation!

Appendix E

The 24- hour Dietary Recall Form

Instruction: Please mark your answer by putting an (√) in the space between brackets and writing answer on the provided.

1. Please fill the date that you are recording the data ……../……./…….

2. Which day of the week does this record?

( ) Sun ( ) Mon ( ) Tues ( ) Wend ( ) Thurs ( ) Fri ( ) Sat

Time	Order	Names of food and beverage	If you buy them, please indicate the cost	Details of food and beverage		Where did you eat?	Who did you eat with?
				Kind of food and Beverage	Amount		
Example							
7.00 am	1	chocolate milk	10 Baht	- chocolate milk	1 box, 250 cc	home	mother
	2	fried rice		- rice	2 serving spoons	home	mother
				- egg	1 egg		
				- cabbage	1 serving spoon		
				- tomato	½ tomato		
				- pork	2 table spoon		
7.30 am	3	banana		- cultivated banana	1 small banana	bus	friends

Time	Order	Names of food and beverage	If you buy them, please indicate the cost	Details of food and beverage		Where did you eat?	Who did you eat with?
				Kind of food and Beverage	Amount		

Appendix F

Information sheet

Study title   Factors influencing Thai adolescents' healthy eating behaviour

Researcher   Miss Kamonporn   Patcheep

Ph.D. student at School of Nursing and Midwifery, Faculty of health, University of East Anglia (UEA), United Kingdom

This is a student research study conducted under the supervision of Dr. Janet Ramjeet, Dr. Lee Hooper, and Dr. Jill Robinson from the University of East Anglia, United Kingdom. This project has been approved by the Faculty of Health Ethics Committee, University of East Anglia. The study will help the student learn more about the topic area and develop skills in research design, collection and analyses, and writing a research paper.

Why are we doing this research?

Healthy eating is fundamental to promoting good health and is a key element in healthy human growth and development, from the early childhood years to later life stages. Healthy eating is particularly important in reducing the risk of many chronic diseases and obesity. Adolescence is an important period between childhood to adulthood, and developing behaviour in adolescents is likely to influence long term behaviour. Thus, it is of interest to know about adolescents' eating behaviour, and factors influencing healthy eating behaviour for the promotion of healthy eating pattern in Thai adolescents.

Why have I been invited to take part?

You have been invited to join our study because you are a student in grade 10 -12 (age15-19 years) in Benjamarachutit School or Suanphaung Wittaya School.

Do I have to take part?

It is important for you to know that you can choose not to take part in the study. Choosing not in participate in this study will in no way affect your standing in your

school and with your teacher. This study consists of two phases. You can select to take part in either phase I only or in both phases. However, you cannot in phase II without talking part in phase I. If you volunteer to be a participant in this study, you may freely withdraw at any time without it's affecting your progress at school.

What will happen to me I take part?

Students who study in grade 10 to 12 in Benjamarachutit School and Suanphaung Wittaya School will be needed to the participants. At least 163 male and female students from each school will be needed to take part in phase I. The first 20 male and female participants who take part in phase I and are willing to attend small group at the specified time will be need to take part in phase II. Students who would like to take part in this study will be asked to return the consent form with their signature and their parent's signature to the researcher.

If you volunteer to participate in this study for phase I only, we will ask you to do the following things:

You would need to complete the Thai Eating Questionnaire (TEQ). This is a 112-item questionnaire about your eating behaviour. This would be completed in school at lunchtime and take approximately 20-25 minutes.

If you volunteer to participate in both phase I and phase II, we will ask you to do the following things:

You would need to complete the TEQ. Following this, you will be asked your views on your healthy eating and factor affecting your eating behaviour. The discussion will be recorded with and audio recorder. You would need to complete the 24-hour food recall. The researcher will be then make two further appointments in the following week with the participants in the school to complete the 24-hour dietary recall form on further occasions. Following that, the researcher will give you digital cameras to take photos of your foods and beverages in three days over the next week.

What are the possible risk and discomforts and might I have some if I take part in the research?

In phase I**,** you will be asked to interrupt your lunch break time for around 20-25 minutes in your school canteen to answer the questionnaire, and measure your weight, height, and waist circumference in the private room provided by your school. This will be completed with the minimum discomfort to you.

In phase II, you and the other students will be with the researcher for around 45-60 minutes for a small group interview. The room will be provided for us by your school. There is a small risk that group members may disclose personal information in the group. Therefore at the end of the group you will be reminded about the importance of keeping everything you hear or see confidential and not disclose it to anyone. If an eating disorder or other conditions is recognized or activity disclosed, the participant will be advised to seek help from the health professional/ counsellor in the school, or their general practitioner in the health centre. Group discussion may possibly cause distress in a group member. The student with distress will be taken aside during or after the group and given time to talk about their feeling in the private area. If they wish to leave during the group, the note taker will accompany them, giving time to talk about their feelings, and listen to them in private area. If appropriate, they will be advised to seek help from the counsellor in their school.

You will also need to complete the 24-dietary recall form 3 times and to take photos of your meals and beverage for 3 days, comprising two days from the days of the week and one day from the weekend.

Is there anything else to be worried about if I take part?

When the results of this study are published, your name will not be used and no information that discloses your identity will be released or published

The transcription and the tapes will be examined by members of the research team only, and they will be destroyed after the study is completed after 5 years.

What are the possible benefits of taking part?

There will be no direct benefit to you by taking part in this study. However, your participation will help the researcher and the health care professional identify factors

influencing adolescents' healthy eating behaviour, and this study then may be useful for promote healthy eating behaviour in Thai adolescents.

Contact details

If you have any question about this research now or later, please contact:

Miss Kamonporn Patcheep (Researcher)	-Mobile phone in Thailand: 0066-(0)81723XXXX
	-Mobile phone in United Kingdom: 0044-(0)778736XXXX
	-E-mail address: kamon_dao@hotmail.com
Dr. Montatip Chaiyasak (Director of Boromarajonani College of Nursing ' Ratchaburi)	-Mobile phone in Thailand: 081-9869XXXX
	-E-mail address: montatipus@hotmail.com

Appendix G

Consent form

Research Project   Factors influencing Thai adolescents' healthy eating behaviour

Researcher   Miss Kamonporn   Patcheep

Ph.D. Student at School of Nursing and Midwifery, Faculty of Health, University of East Anglia, United Kingdom

Please initial box

1. I confirm that I have read and understand the information sheet for this study. I have had the opportunity to consider the information, ask questions and have had them answered satisfactorily. ☐

2. I understand that my participant is voluntary and that I am free to withdraw at any time without giving any reason and any effect. ☐

3. I am aware of the procedures involved in this study, including any inconvenience. ☐

4. I agree to take part in the this study

☐ To complete questionnaire

☐ To participate in a small group with other students

……………………   …………………   ……………………….
Name of student   Date   Signature

……………………   …………………   ……………………….
Name of parent   Date   Signature (or
thumbprint)

or guardian

Appendix H

Fisher Skewness Coefficient and Fisher Kurtosis Coefficient of Normality Testing

Table 1 Fisher Skewness Coefficient of Normality Testing

Variable	Skewness	Standard error of Skewness	Fisher Skewness Coefficient
Urban Thai adolescent (n=184)			
Eating behaviour	-0.217	0.179	-1.212
Eating intention	-0.270	0.179	-1.508
Attitude towards eating behaviour	-0.221	0.179	-1.235
Subjective norm regarding eating behaviour	-0.237	0.179	-1.324
PBC over eating behaviour	0.238	0.179	1.330
Rural Thai adolescents (n=152)			
Eating behaviour	0.237	0.197	1.203
Eating intention	-0.048	0.197	-0.244
Attitude towards eating behaviour	-0.312	0.197	-1.584
Subjective norm regarding eating behaviour	-0.301	0.197	-1.528
PBC over eating behaviour	0.366	0.197	1.858

Table 2 Fisher Kurtosis Coefficient of Normality Testing

Variable	Kurtosis	Standard error of Kurtosis	Fisher Kurtosis Coefficient
Urban Thai adolescent (n=184)			
Eating behaviour	-0.510	0.356	-1.433
Eating intention	-0.631	0.356	-1.772
Attitude towards eating behaviour	-0.588	0.356	-1.652
Subjective norm regarding eating behaviour	-0.693	0.356	-1.947
PBC over eating behaviour	-0.336	0.356	-0.944
Rural Thai adolescents (n=152)			
Eating behaviour	-0.174	0.391	-0.445
Eating intention	-0.670	0.391	-1.552
Attitude towards eating behaviour	0.033	0.391	0.084
Subjective norm regarding eating behaviour	-0.617	0.391	-1.578
PBC over eating behaviour	-0.287	0.391	-0.734

Appendix I

Histograms-Normality testing of all variables in the quantitative phase

Urban Thai adolescents

Histogram

Urban adolescents

Mean =5.67
Std. Dev. =0.43
N =184

Histogram

Urban adolescents

Mean =5.86
Std. Dev. =0.67
N =184

—— Normal

Histogram

Urban adolescents

Mean =4.25
Std. Dev. =0.638
N =184

PBC over eating behaviour

Rural Thai adolescents

—— Normal

Histogram

Rural adolescents

Mean =3.75
Std. Dev. =0.86
N =152

Eating behaviour

Histogram
Rural adolescents

Eating intention

Mean =5.35
Std. Dev. =0.886
N =152

Histogram

Rural adolescents

Attitude towards eating behaviour

Mean =5.61
Std. Dev. =0.623
N =152

—— Normal

Histogram

Rural adolescents

Mean =5.63
Std. Dev. =0.756
N =152

Subjective norm regarding eating behaviour

—— Normal

Histogram

Rural adolescents

Mean =4.30
Std. Dev. =0.66
N =152

PBC over eating behaviour

Appendix J

Normal P-P Plot of Regression Standardized Residual

Urban Thai adolescents

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: EatingBehaviour

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Intention

Rural Thai adolescents

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: EatingBehaviour

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Intention

Appendix K

Table of Multicollinearity Testing

Table 1: Pearson Correlation matrix between each the TPB variables

	HEB	HEI	AT	SN	PBC
Urban adolescents (n=184)					
1. Eating behaviour (HEB)	-				
2.Eating intention (HEI)	.151*	-			
3. Attitude toward eating behaviour (AT)	.126	.491**	-		
4.Subjective norm regarding eating behaviour (SN)	.080	.368**	.411**	-	
5.PBC over eating behaviour	.224**	.271**	.321**	.198**	-
Rural adolescents (n=152)					
1. Eating behaviour (HEB)	-				
2.Eating intention (HEI)	.234**	-			
3. Attitude toward eating behaviour (AT)	.089	.144	-		
4.Subjective norm regarding eating behaviour (SN)	.133	.241**	.453**	-	
5.PBC over eating behaviour	.115	-.019	.354**	.401**	-

**p<.01

Appendix L

Scatter Plot of Regression Standardized Residual

Urban Thai adolescents

Scatterplot

Dependent Variable: Intention

Scatterplot

Dependent Variable: EatingBehaviour

Rural Thai adolescents

Scatterplot

Dependent Variable: EatingBehaviour

Scatterplot

Dependent Variable: Intention
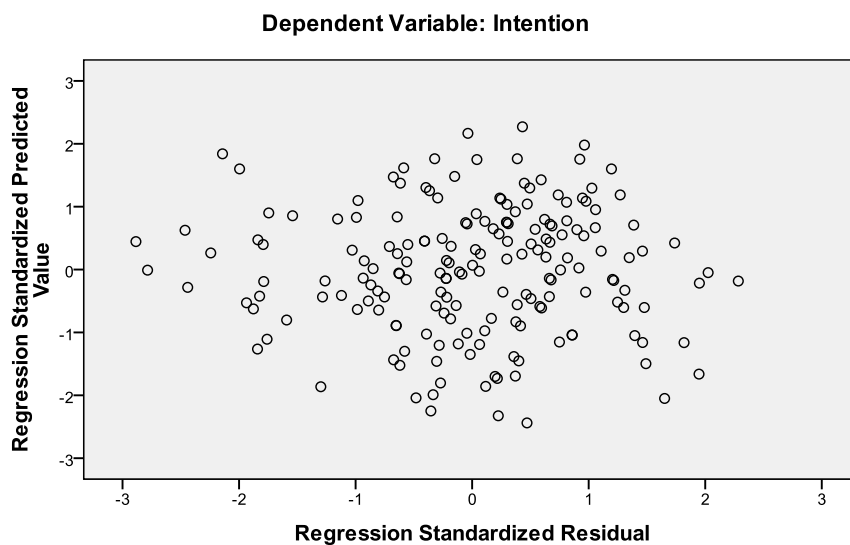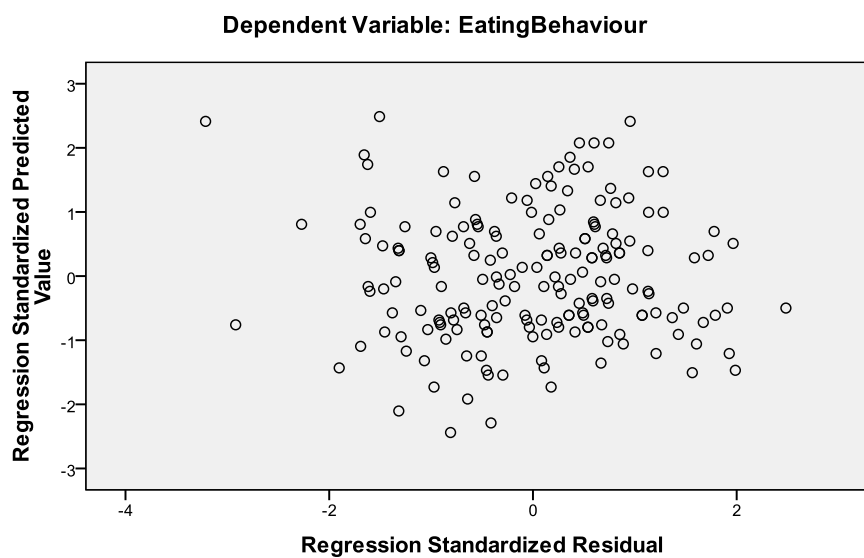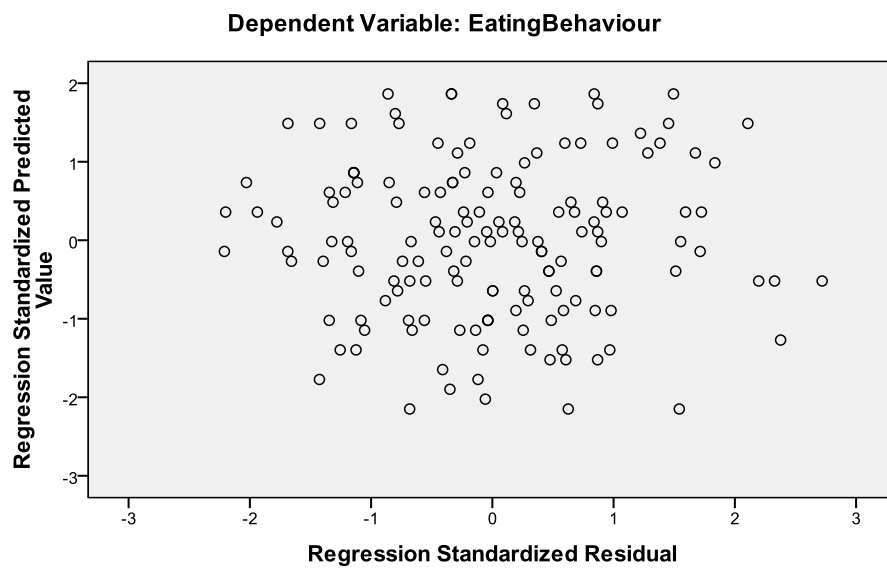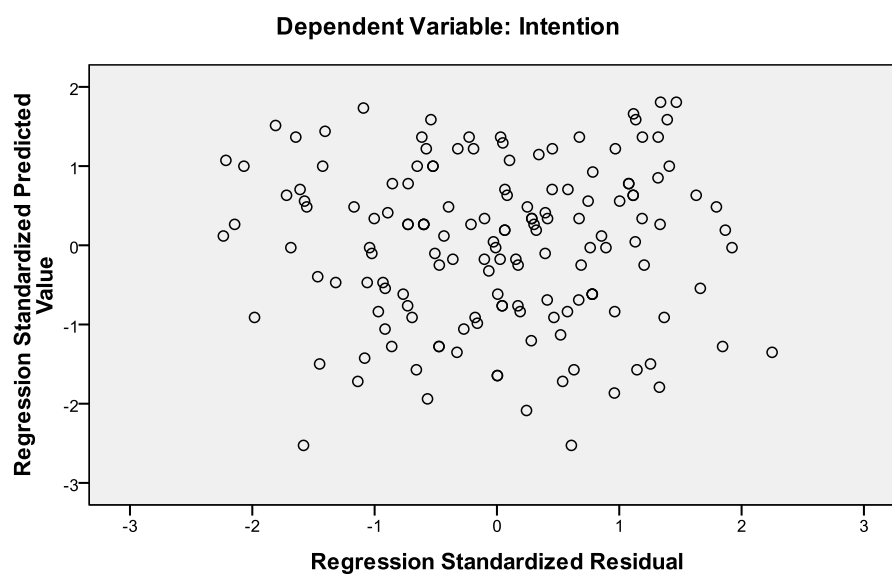
Appendix M

The Weight-for-height Growth Charts

The Weight-for-height Growth Chart for Thai boy (5-18 years old)
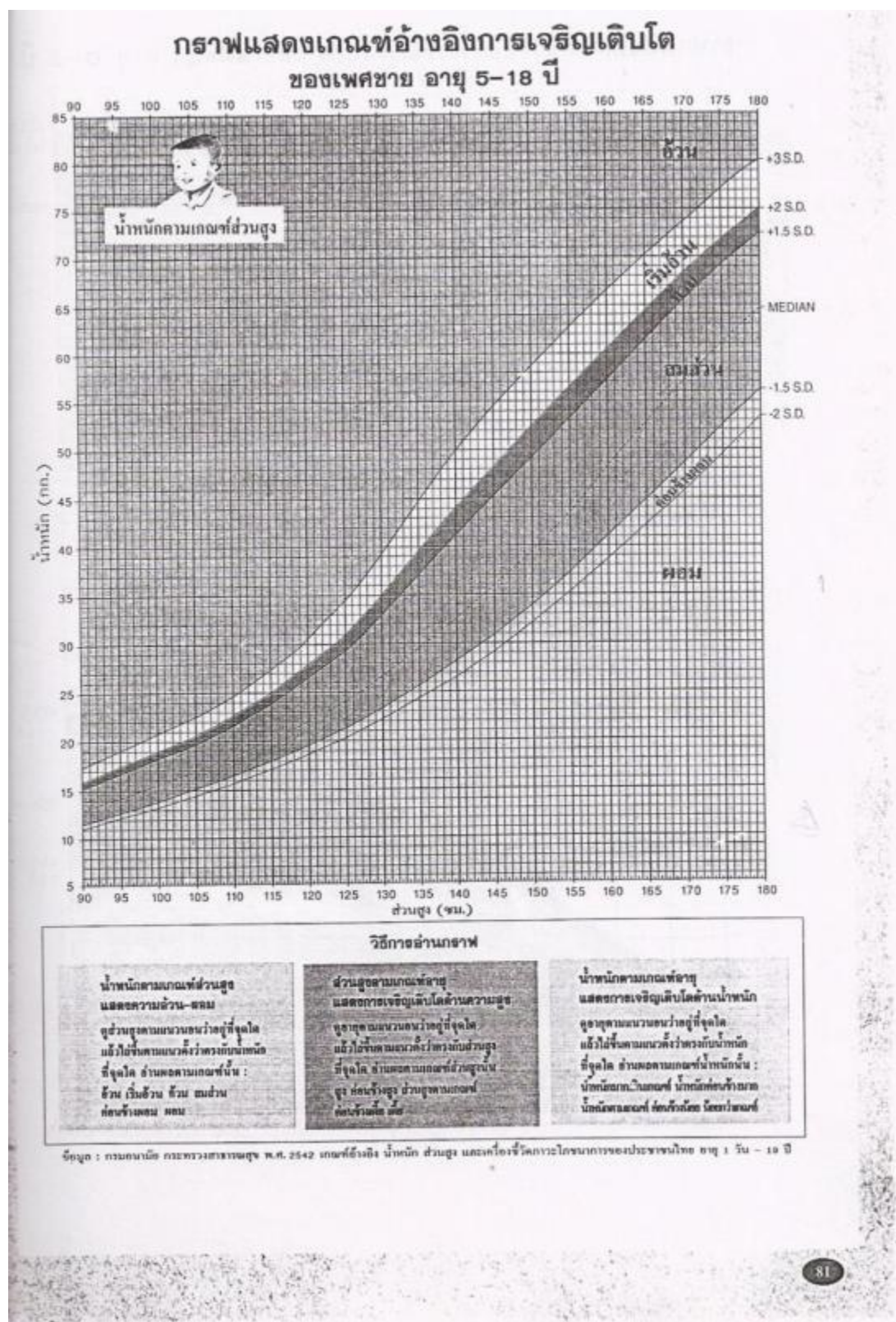
The Weight-for-height Growth Chart for Thai girl (5-18 years old)
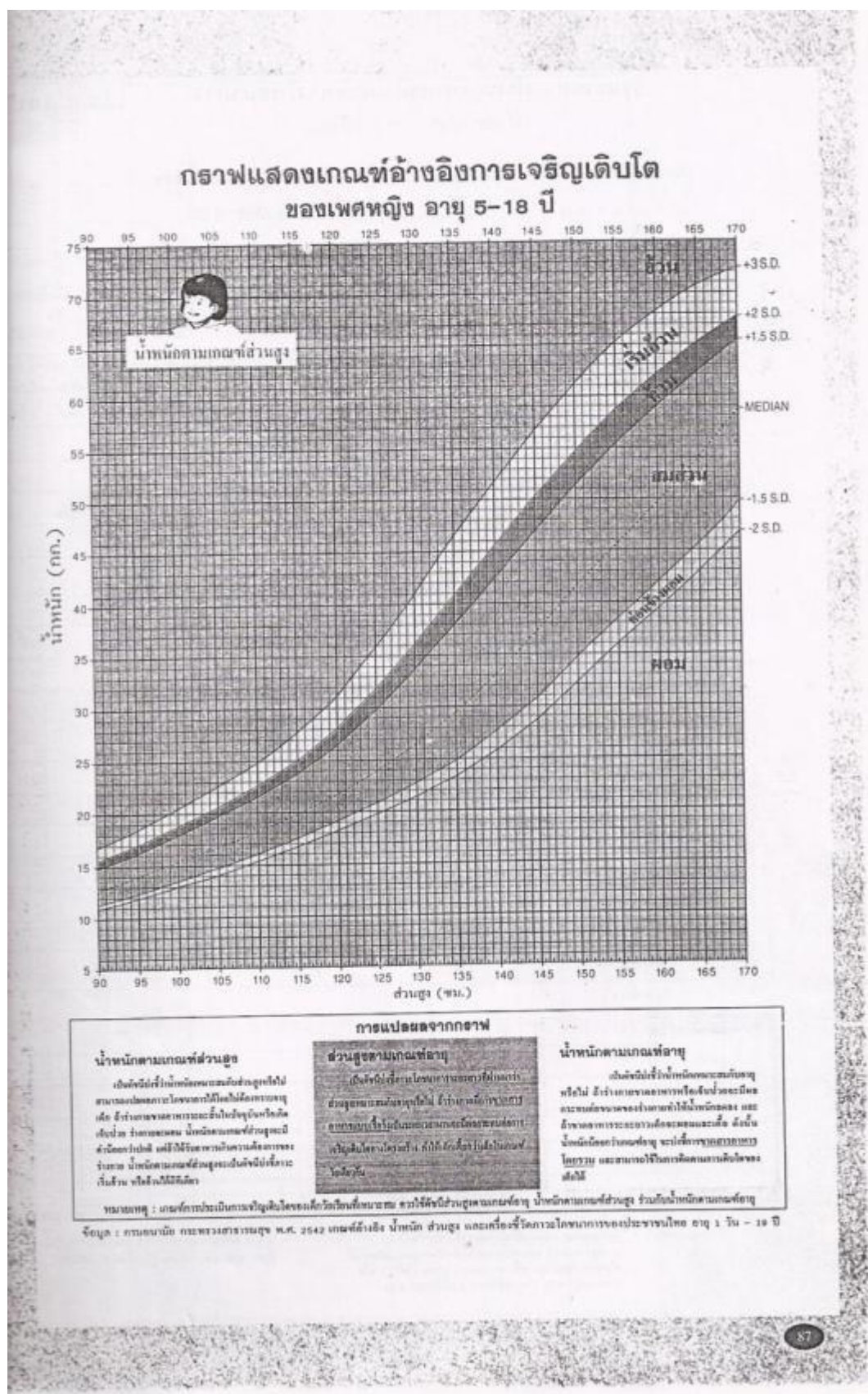
Appendix N

Reliability of the Thai Eating Questionnaire (TEQ)

Part II of the TEQ: Eating Behaviour

Item of question	Cronbach's Alpha if item Delete
Item 1	0.82
Item 2	0.81
Item 3	0.80
Item 4	0.79
Item 5	0.82
Item 6	0.81
Item 7	0.81
Item 8	0.82
Item 9	0.81
	Cronbach' s Alpha = 0.83

Part III of the TEQ: Eating Intention

Item of question	Cronbach's Alpha if item Delete
Item 1	0.84
Item 2	0.84
Item 3	0.85
Item 4	0.88
Item 5	0.86
Item 6	0.84
Item 7	0.82
Item 8	0.83
Item 9	0.83
	Cronbach' s Alpha = 0.86

Part IV: Attitude towards Eating

Item of question	Cronbach's Alpha if item Delete
A. Belief of outcomes regarding eating	
Item 1	0.79
Item 2	0.80
Item 3	0.84
Item 4	0.77
Item 5	0.77
Item 6	0.78
Item 7	0.79
Item 8	0.78
Item 9	0.85
Item 10	0.78
Item 11	0.77
Item 12	0.79
Item 13	0.81
B. Importance of the outcomes regarding eating	
Item 1	0.79
Item 2	0.79
Item 3	0.79
Item 4	0.77
Item 5	0.80
Item 6	0.77
Item 7	0.78
Item 8	0.79
Item 9	0.79
Item 10	0.79
Item 11	0.78
Item 12	0.81
	Cronbach' s Alpha = 0.80

Part V of the TEQ: Subjective Norm regarding Eating Behaviour

Item of question	Cronbach's Alpha if item Delete
A. Beliefs about your important people's thinking	
Item 1	0.78
Item 2	0.79
Item 3	0.79
Item 4	0.79
Item 5	0.78
Item 6	0.79
Item 7	0.78
Item 8	0.81
Item 9	0.78
Item 10	0.81
Item 11	0.77
Item 12	0.81
B. Influence of people who are important to you	
Item 1	0.78
Item 2	0.79
Item 3	0.78
Item 4	0.77
Item 5	0.78
Item 6	0.77
	Cronbach' s Alpha = 0.80

Part VI of the TEQ: PBC over Healthy Eating Behaviour

Item of question	Cronbach's Alpha if item Delete
A. Control belief factors	
Item 1	**0.88**
Item 2	**0.86**
Item 3	**0.87**
Item 4	**0.86**
Item 5	**0.87**
Item 6	**0.86**
Item 7	**0.86**
Item 8	**0.85**
Item 9	**0.86**
Item 10	**0.86**
Item 11	**0.86**
Item 12	**0.86**
Item 13	**0.86**
Item 14	**0.85**
Item 15	**0.87**
Item 16	**0.87**
Item 17	**0.86**
Item 18	**0.86**
Item 19	**0.86**
Item 20	**0.86**
Item 21	**0.86**
B. Control belief perceived power	
Item 1	**0.86**
Item 2	**0.86**
Item 3	**0.86**
Item 4	**0.86**
Item 5	**0.86**
Item 6	**0.85**

Item of question	Cronbach's Alpha if item Delete
Item 7	**0.86**
Item 8	**0.85**
Item 9	**0.86**
Item 10	**0.86**
Item 11	**0.86**
Item 12	**0.85**
Item 13	**0.86**
Item 14	**0.85**
Item 15	**0.86**
Item 16	**0.87**
Item 17	**0.86**
Item 18	**0.86**
Item 19	**0.86**
Item 20	**0.86**
Item 21	**0.86**
	Cronbach' s Alpha = 0.86

Appendix O

Semi-structured questions for focus groups

Research Title: Factors influencing Thai adolescents' healthy eating behaviour

Stage	Topic	Question	Prompt
1	Knowledge of healthy eating	1. What is healthy eating behaviour in your opinion? 2. How to practice healthy eating? 3. What are the advantages and disadvantage of healthy eating for you? 4. Do you know about food based dietary guidelines for Thai people?	Adequate knowledge of healthy eating
2	Eating behaviour	5. What kind of food do you eat each day?, and how much do you eat?	Dietary intake
3	Factors influencing adolescents' eating behaviour	6. Why do you eat those foods? 7. What makes it hard and easier to eat vegetable (fruit, starchy foods, fast foods, and sweet drinks)? and how?	Factors that facilitate and impede eating behaviour

Appendix P

Consent form for focus group confidentiality

Research Project   Factors influencing Thai adolescents' healthy eating behaviour

Researcher   Miss Kamonporn   Patcheep

Ph.D. Student at School of Nursing and Midwifery, Faculty of Health, University of East Anglia, United Kingdom

Please initial box

1. I understand that the information discussed by the focus group member is confidential.   ☐

2. I agree to keep it confidential and not discuss it with anyone else.   ☐

………………………   …………………   ……………………….

Name of student   Date   Signature

Kamonporn Patcheep   …………………   ……………………….

Name of researcher   Date   Signature

Appendix Q

Focus Group Note-Taker Form
Date:……………………..
Site:……………………………………
Start time:……………….   **Facilitator:** Kamonporn Patcheep
End time:………………..   **Note-taker:**………………………………
Seating chart: Make a seating chart indicating the participants and their number or identifier. Use this chart to identify speakers as you take notes.

Focus Group Note-Taker Form		
Question	**Responses**	**Observations**

Appendix R

The results of quantitative phase

Table 1 Weight status of urban (184) and rural (n=152) Thai adolescents

Weight status	Urban adolescents (n=184)		Rural adolescents (n=152)	
	n	%	n	%
Underweight	6	3.3	2	1.3
Pre-underweight	9	4.9	7	4.6
Normal	127	69.0	122	80.3
Overweight	10	5.4	6	3.9
Pre-obesity	12	6.5	6	3.9
Obesity	20	10.9	9	5.9

Thai adolescents' eating behaviour measured by the TEQ

Table 2 Vegetable consumption

Vegetable consumption (serving spoon per day)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	Percentage (%)	n	Percentage (%)
No consumption	5	2.7	3	2.0
	(5)	**(2.7)**	**(3)**	**(2.0)**
Less consumption				
One	27	14.7	18	11.8
Two	38	20.7	34	22.4
Three	43	23.4	37	24.3
Four	28	15.2	12	7.9
	(136)	**(73.9)**	**(101)**	**(66.4)**
Recommended consumption				
Five	20	10.9	23	15.1
Six	10	5.4	13	8.6
Seven	7	3.8	6	3.9
Eight	3	1.6	2	1.3
Nine	1	0.5	2	1.3
Ten	1	0.5	-	-
More than Ten	1	0.5	2	1.3
	(43)	**(23.4)**	**(48)**	**(31.6)**
(serving spoon/head/day)	Mean= 3.3	SD=2.0	Mean= 3.5	SD=2.1
Mann-Whitney U Test	Z=-0.879	Sig. (2-tailed) = 0.380		

Table 3 Fruit consumption

Fruit consumption	Urban adolescent (n=184)		Rural adolescent (n=152)	
(portion per day)	n	Percentage (%)	n	Percentage (%)
No consumption	1	0.5	4	2.6
	(1)	**(0.5)**	**(4)**	**(2.6)**
Less consumption				
One	27	14.7	10	6.6
Two	37	20.1	43	28.3
Three	44	23.9	32	21.1
	(108)	**(58.7)**	**(85)**	**(56.0)**
Recommended consumption				
Four	33	17.9	26	17.1
Five	13	7.1	21	13.8
Six	10	5.4	4	2.6
Seven	7	3.8	3	2.0
Eight	5	2.7	5	3.3
Nine	3	1.6	1	0.7
Ten	1	0.5	1	0.7
More than ten	3	1.6	2	1.31
	(75)	**(40.8)**	**(63)**	**(41.4)**
(portion/head/day)	Mean= 3.5	SD=2.2	Mean=3.5	SD=2.0
Mann-Whitney U Test	Z=-0.080	Sig.(2-tailed) =0.936		

Table 4 Protein consumption

Foods in protein group consumption (table spoon per day)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	Percentage (%)	n	Percentage (%)
Less consumption				
One	3	1.6	4	2.6
Two	5	2.7	21	13.8
Three	6	3.3	26	17.1
Four	13	7.1	31	20.4
Five	22	12.0	18	11.8
Six	35	19.0	16	10.5
Seven	15	8.2	9	5.9
Eight	32	17.4	10	6.6
	(131)	**(71.2)**	**(135)**	**(88.8)**
Recommended consumption				
Nine	10	5.4	4	2.6
	(10)	**(5.4)**	**(4)**	**(2.6)**
Over consumption				
Ten	11	6.0	3	2.0
More than ten	32	17.4	10	6.6
	(43)	**(23.4)**	**13**	**(8.6)**
(table spoon/head/day)	Mean= 7.2	SD=2.6	Mean= 5.0	SD=2.6
Mann-Whitney U Test	Z=-7.447	Sig. 2-tailed =0.000		

Table 5 Rice-starchy food consumption

Rice-starchy food consumption	Urban adolescent(n=184)		Rural adolescent(n=152)	
(serving spoon per day)	n	Percentage (%)	n	Percentage (%)
Less consumption				
One	-	-	11	7.2
Two	7	3.8	14	9.2
Three	12	6.5	37	24.3
Four	12	6.5	11	7.2
Five	13	7.1	9	5.9
Six	28	15.2	21	13.8
Seven	12	6.5	9	5.9
Eight	19	10.3	7	4.6
Nine	48	26.1	21	13.8
	(151)	**(82.1)**	**(140)**	**(92.1)**
Recommended consumption				
Ten	16	8.7	7	4.6
	(16)	**(8.7)**	**(7)**	**(4.6)**
Over consumption				
More than ten	17	9.2	5	3.3
	(17)	**(9.2)**	**(5)**	**(3.3)**
(serving spoon/day/head)	Mean= 7.3	SD=2.5	Mean=5.2	SD=2.9
Mann-Whitney U Test	Z=-6.384	Sig. 2-tailed =0.000		

Table 6 Milk and milk product consumption

Milk and milk products consumption (glass per day)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	Percentage (%)	n	Percentage (%)
No consumption	3	1.6	12	7.9
	(3)	(1.6)	(12)	(7.9)
Standard consumption				
One	54	29.3	72	47.4
Two	65	35.3	35	23.0
Three	31	16.8	19	12.5
Four	16	8.7	10	6.6
Five	8	4.3	3	2.0
Six	3	1.6	-	-
Seven	2	1.1	-	-
Eight	2	1.1	1	0.7
	(181)	(98.4)	(140)	(92.1)
(glass or glasses/day/head)	Mean= 2.3	SD=1.5	Mean= 1.7	SD=1.2
Mann-Whitney U Test	Z=-4.417	Sig. (2-tailed)=0.000		

Table 7 Fast food consumption

Fast food consumption (day per week)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	**Percentage (%)**	**n**	**Percentage (%)**
No consumption	11	6.0	12	7.9
	(11)	**(6.0)**	**(12)**	**(7.9)**
Consumption				
One	34	18.5	31	20.4
Two	46	25.0	42	27.6
Three	55	29.9	38	25.0
Four	12	6.5	15	9.9
Five	16	8.7	8	5.3
Six	3	1.6	4	2.6
Seven	7	3.8	2	1.3
	(173)	**(94.0)**	**(140)**	**(92.1)**
(day/week)	Mean= 2.6	SD=1.6	Mean= 2.4	SD=1.5
Mann-Whitney U Test	Z=-1.179	Sig. (2-tailed)=0.238		

Table 8 Sweet and sweet snack consumption

Sweets and sweet snack consumption (day per week)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	**Percentage (%)**	**n**	**Percentage (%)**
No consumption	7	3.8	1	(0.7)
	(7)	**(3.8)**	**(1)**	**(0.7)**
Consumption				
One	22	12.0	24	15.8
Two	24	13.0	32	21.0
Three	34	18.5	27	17.8
Four	24	13.0	17	11.2
Five	25	13.6	15	9.8
Six	10	5.4	5	3.3
Seven	38	20.7	31	20.4
	(177)	**(96.2)**	**(151)**	**(99.3)**
(day/week)	Mean= 3.9	SD=2.2	Mean=3.7	SD=2.1
Mann-Whitney U Test	Z=-1.133	Sig. (2-tailed)=0.257		

Table 9 Savoury snack consumption

Savoury snack consumption (day per week)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	**Percentage (%)**	**n**	**Percentage (%)**
No consumption	30	16.3	14	9.2
	(30)	**(16.3)**	**(14)**	**(9.2)**
Consumption				
One	41	22.3	28	18.4
Two	40	21.7	36	23.7
Three	36	19.6	25	16.4
Four	19	10.3	28	18.4
Five	7	3.8	8	5.3
Six	4	2.2	-	-
Seven	7	3.8	13	8.6
	(154)	**(83.7)**	**(138)**	**(91.8)**
(day/week)	Mean= 2.2	SD=1.8	Mean= 2.8	SD=1.9
Mann-Whitney Test	Z=-2.552	Sig. (2-tailed)=0.011		

Table 10 Sweet drink consumption

Sweet drinks consumption (day per week)	Urban adolescent (n=184)		Rural adolescent (n=152)	
	n	Percentage (%)	n	Percentage (%)
No consumption	11	6.0	3	2.0
	(11)	**(6.0)**	**(3)**	**(2.0)**
Consumption				
One	17	9.2	14	9.2
Two	22	12.0	28	18.4
Three	30	16.3	26	17.1
Four	24	13.0	17	11.2
Five	23	12.5	32	21.1
Six	20	10.9	4	2.6
Seven	37	20.1	28	18.4
	(173)	**94.0**	**(149)**	**(98.0)**
(day/week)	Mean= 4.0	SD=2.2	Mean= 3.9	SD=2.0
Mann-Whitney U Test	Z=-0.537	Sig. (2-tailed)=0.591		

Table 11 Stepwise multiple regression analyses of the TPB variables on eating intention, and eating behaviour

Predictors	B	Beta	Estimate	R square	P value	95% CI
<u>Urban adolescents</u>						
Dependent variable:						
Eating intention						
Independent variables:						
Attitude toward eating behaviour	0.025	0.408	0.300	0.241	0.000	(0.222, 0.378)
Subjective norm regarding eating behaviour	0.109	0.200	0.109	0.274	0.005	(0.034, 0.184)
Constant = 3.826						
Dependent variable:						
Eating behaviour						
Independent variables:						
PBC over eating behaviour	0.059	0.224	0.059	0.050	0.002	(0.022, 0.097)
Constant = 32.907						
<u>Rural adolescent</u>						
Dependent variable:						
Healthy eating intention						
Independent variables:						
Subjective norm regarding eating behaviour	0.141	0.241	0.141	0.058	0.003	(0.050, 0.233)
Constant = 33.805						
Dependent variable:						
Eating behaviour						
Independent variables:						
Eating intention	0.230	0.234	0.230	0.055	0.004	(0.076, 0.384)
Constant = 29.078						

The multiple regression equation is written as

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \ldots + b_kx_k$$

And the standardized regression equation is

$$ZY = b_1x_1 + b_2x_2 + b_3x_3 + \ldots + b_kx_k$$

Where

Y	=	Dependent variables (eating intention, eating behaviour)
Z variable	=	Variable in standard score
a	=	Constant
$b_1, b_2, b_3, \ldots,$ and b_k	=	the coefficient of $x_1, x_2, x_3, \ldots,$ and x_k
x_1	=	the value of attitude towards eating behaviour
x_2	=	the value of subjective norm regarding eating behaviour
x_3	=	the value of PBC over eating behaviour

The regression equation of eating intention in urban adolescents is written as:

The regression equation   HEI   = (3.826) + 0.250 (AHEB) + 0.109 (SHEB)

The standardized regression equation   Z HEI   = 0.408 (Z AHEB) + 0.200 (Z SHEB)

The regression equation of eating behaviour in urban adolescents is written as:

The regression equation	HEB	$= (32.907) + 0.059 \, (PBC)$

The standardized regression equation	Z HEB	$= 0.224 \, (Z \, PBC)$

The regression equation of eating intention in rural adolescents is written as:

The regression equation	HEI	$= (33.805) + 0.141 \, (SHEB)$

The standardized regression equation	Z HEI	$= 0.241 \, (Z \, SHEB)$

The regression equation of eating behaviour in rural adolescents is written as:

The regression equation	HEB	$= (29.078) + 0.230 \, (HEI)$

The standardized regression equation	Z HEB	$= 0.234 \, (Z \, HEI)$

Thai adolescents' eating behaviour assessed by 24-hour dietary recall

Table 12 Food consumption of Thai adolescents assessed by 24-hour dietary recall (Sub-group, n=40)

Food consumption	Urban adolescents (n=20)		Rural adolescents (n=20)	
	n	**%**	**n**	**%**
Vegetable consumption				
Less than 5 serving spoons/ day	19	95.0	19	95.0
At least 5 serving spoons/ day	1	5.0	1	5.0
Fruit consumption				
Less than 4 portions/ day	20	100.0	14	70.0
At least 4 portion/ day	-	-	6	30.0
Foods in protein group consumption				
Less than 9 table spoon/ day	1	5.0	3	15.0
9 table spoon/ day	3	15.0	3	15.0
More than 9 table spoons/ day	16	80.0	14	60.0
Rice and starchy food consumption				
Less than 10 serving spoons/ day	19	95.0	15	75.0
10 serving spoons/ day	1	5.0	2	10.0
More than 10 serving spoon/ day	-	-	3	15.0

Table 13 Food consumption of Thai adolescents assessed by 24-hour dietary recall (Sub-group, n=40)

Food consumptions	Urban adolescents (n=20)		Rural adolescents (n=20)		Urban and rural adolescents (n=40)	
	Mean	SD	Mean	SD	Mean	SD
Vegetable consumption (Serving spoon per day)	2.2	1.5	2.6	1.2	2.4	1.3
Fruit consumption (Portion per day)	0.8	0.9	2.9	1.9	1.8	1.8
Foods in protein group consumption (Table spoon per day)	13.3	4.2	13.3	4.3	13.3	4.2
Rice and starchy food consumption (Serving spoon per day)	5.9	1.9	7.6	2.3	6.8	2.3

Thai adolescents' eating behaviour assessed by the FFQ

Table 14 Vegetable consumption assessed by the FFQ (Sub-group, n=40)

Vegetable consumption (serving spoon per day)	Urban adolescent (n=20)		Rural adolescent (n=20)	
	n	**percentage**	**n**	**percentage**
No consumption	3	15.0	0	0.0
	(3)	**(15.0)**	**(0)**	**(0.0)**
Less consumption				
One	2	10.0	1	5.0
Two	7	35.0	5	25.0
Three	2	10.0	4	20.0
Four	2	10.0	4	20.0
	(13)	**(65.0)**	**(14)**	**(70.0)**
Recommended consumption				
Five	2	10.0	3	15.0
Six	1	5.0	1	5.0
Seven	1	5.0	1	5.0
Eight	**-**	**-**	**-**	**-**
Nine	**-**	**-**	**-**	**-**
Ten	**-**	**-**	**-**	**-**
More than ten	**-**	**-**	1	5.0
	(4)	**(20.0)**	**(6)**	**(30.0)**
	Mean=2.7		Mean=3.9	
	SD=2.0		SD=2.3	

Table 15 Fruit consumption assessed by the FFQ (Sub-group, n=40)

Fruit consumption (portion per day)	Urban adolescent (n=20)		Rural adolescent (n=20)	
	n	**percentage**	**n**	**percentage**
No consumption	-	-	-	-
	(-)	(-)	(-)	(-)
Less consumption				
One	5	25.0	-	-
Two	3	15.0	3	15.0
Three	6	30.0	4	20.0
	(14)	**(70.0)**	**(7)**	**(35.0)**
Recommended consumption				
Four	3	15.0	5	25.0
Five	1	5.0	5	25.0
Six	1	5.0	1	5.0
Seven	1	5.0	-	-
Eight	-	-	-	-
Nine	-	-	1	5.0
Ten	-	-	-	-
More than ten	-	-	1	5.0
	(6)	**(30.0)**	**(13)**	**(65.0)**
	Mean=3.0		Mean=4.5	
	SD=1.7		SD=2.2	

Table 16 Protein consumption assessed by the FFQ (Sub-group, n=40)

Protein consumption (table spoon per day)	Urban adolescent (n=20)		Rural adolescent (n=20)	
	n	percentage	n	percentage
Less consumption				
One	-	-	-	-
Two	-	-	-	-
Three	-	-	4	20.0
Four	-	-	5	25.0
Five	6	30.0	5	25.0
Six	-	-	-	-
Seven	3	15.0	1	5.0
Eight	3	15.0	2	10.0
	(12)	**(60.0)**	**(17)**	**(85.0)**
Recommended consumption				
Nine	-	-	-	-
	(-)	**(-)**	**(-)**	**(-)**
Over consumption				
Ten	1	5.0	1	5.0
More than ten	7	35.0	2	10.0
	(8)	**(40.0)**	**3**	**(15.0)**
	Mean=8.1		Mean=5.6	
	SD=2.6		SD=2.6	

Table 17 Rice and starchy food consumption assessed by the FFQ (Sub-group, n=40)

Rice and starchy food consumption (serving spoon per day)	Urban adolescent (n=20)		Rural adolescent (n=20)	
	n	percentage	n	percentage
Less consumption				
One	-	-	-	-
Two	1	5.0	2	10.0
Three	2	10.0	7	35.0
Four	2	10.0	3	15.0
Five	3	15.0	-	-
Six	1	5.0	3	15.0
Seven	2	10.0	2	10.0
Eight	3	15.0	1	5.0
Nine	2	10.0	1	5.0
	(16)	**(80.0)**	**(19)**	**(95.0)**
Recommended consumption				
Ten	3	15.0	1	5.0
	(3)	**(15.0)**	**(1)**	**(5.0)**
Over consumption				
More than ten	1	5.0	-	-
	(1)	**(5.0)**	**(-)**	**(-)**
	Mean=6.7		Mean=4.8	
	SD=2.7		SD=2.4	

Appendix S

Biography

Name	Miss Kamonporn Patcheep
Date of Birth	August 5, 1973
Place of Birth	Kanchaburi, Thailand
Institutions Attend	Diploma in Nursing Science
	Boromarajonani College of Nursing' Ratchaburi
	Ratchaburi, Thailand
	Master of Science (Public Health Nursing)
	Mahidol University
	Bangkok, Thailand
	Doctor of Philosophy
	University of East Anglia
	Norwich, United Kingdom
Scholarship	Royal Thai Government
Position and Office	Instructor
	Boromarajonani College of Nursing' Ratchaburi
	84/21 Kathatorn Road, Tumbol Na-Muang
	Muang, Ratchaburi 70000 Thailand
E-mail address	kamon_dao@hotmail.com