



## Research article

### Healthy Eating as Perceived by Thai Adolescents in Public Schools, Bangkok, Thailand

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#### ABSTRACT

Unhealthy food consumption during adolescence increases the risk of non-communicable diseases and can decrease quality of life in adulthood. This study employed a qualitative descriptive design to describe the meaning of healthy eating from the perspectives of adolescents enrolled in secondary public schools in Bangkok and their food choices for healthy eating. Through purposive sampling, 30 participants participated in in-depth interviews. Data were analyzed using content analysis. Four themes emerged that reflect healthy eating as perceived by the Thai adolescents. The first theme was consciously following a healthy eating pattern by consuming more vegetables and fruits, drinking high calcium milk, avoiding foods high in fat, sugar, and sodium, as well as energy drinks and alcoholic beverages. A healthy “plate” included red meat, rice, fat, and vegetables, with no meal skipping. The second theme entailed avoiding foods perceived to be hazardous by consuming safe foods, including organic foods, while avoiding foods contaminated with toxins and chemicals, recycled cooking oils, and burnt foods. Balancing food intake and energy expenditure refers to proper food consumption in accordance with daily activities. The third theme was selecting foods based on nutrition labeling by reading, understanding, and making food choice decisions, including information on serving size, portion size, ingredients, and expiration date. The fourth theme was food as health promoting by obtaining necessary nutrients from healthy foods. Results suggest approaches to develop guidelines for Thai adolescents in urban public schools that include food based dietary patterns, food ingredients, and reading food labels for healthy eating.

**Key words:** Healthy eating, Thailand, Adolescents, Perspective

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## บทความวิจัย

### การบริโภคอาหารเพื่อสุขภาพในทัศนะของวัยรุ่นไทยในโรงเรียนรัฐบาล

#### เขตกรุงเทพมหานคร ประเทศไทย

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โรงเรียนพยาบาลรามาธิบดี คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล

#### บทคัดย่อ

การบริโภคอาหารที่เป็นอันตรายต่อสุขภาพในช่วงวัยรุ่นเพิ่มความเสี่ยงต่อการเกิดโรคไม่ติดต่อเรื้อรัง และสามารถลดคุณภาพชีวิตในวัยผู้ใหญ่ การศึกษานี้ใช้การวิจัยเชิงคุณภาพเพื่ออธิบายความหมายของการบริโภคอาหารเพื่อสุขภาพในทัศนะของวัยรุ่นระดับมัธยมศึกษา ในโรงเรียนภาครัฐ เขตกรุงเทพมหานคร และการเลือกบริโภคอาหารสุขภาพ ใช้การเลือกแบบเจาะจง โดยเลือกวัยรุ่นจำนวน 30 คน ทำการสัมภาษณ์เชิงลึก วิเคราะห์ข้อมูลโดยการวิเคราะห์เชิงเนื้อหา ผลการศึกษาพบว่าความหมายของการบริโภคอาหารสุขภาพในทัศนะของวัยรุ่นไทย ประกอบด้วย 4 ประเด็นหลัก ประเด็นที่ 1) การบริโภคอย่างฉลาดหมายถึงการบริโภคผักและผลไม้เป็นส่วนใหญ่ การดื่มนมที่มีแคลเซียมสูง หลีกเลี่ยงอาหารที่มีไขมันสูง น้ำตาล เกือบสูง รวมทั้งเครื่องดื่มชูกำลังและเครื่องดื่มที่มีส่วนผสมของแอลกอฮอล์ อาหารสุขภาพหนึ่ง “จาน” ประกอบด้วยเนื้อสัตว์ ข้าว ไขมันและผัก ไม่ทอดอาหารมือใดมือหนึ่ง ประเด็นที่ 2) การหลีกเลี่ยงอาหารที่รับรู้ว่าเป็นอันตราย โดยการบริโภคอาหารที่ปลอดภัย ประกอบด้วยอาหารเกษตรอินทรีย์ หลีกเลี่ยงอาหารที่ปนเปื้อนสารพิษ สารเคมี น้ำมันที่ใช้ซ้ำ และอาหารไหม้ ความสมดุลของการบริโภคอาหารและการใช้พลังงานหมายถึงการบริโภคอาหารที่สอดคล้องกับการทำกิจกรรมในแต่ละวัน ประเด็นที่ 3) การเลือกอาหารโดยการอ่านฉลากโภชนาการ ความเข้าใจ และการตัดสินใจเลือกอาหาร รวมถึงการใช้ข้อมูลหน่วยบริโภค ส่วนของอาหาร ส่วนประกอบในอาหาร และวันหมดอายุ ประเด็นที่ 4) อาหารส่งเสริมสุขภาพโดยการได้รับสารอาหารที่จำเป็นจากอาหารเพื่อสุขภาพ ผลจากการศึกษาเสนอแนะเพื่อพัฒนาแนวปฏิบัติสำหรับวัยรุ่นไทยในโรงเรียนภาครัฐ ประกอบด้วยแบบแผนการรับประทานอาหาร ส่วนประกอบของอาหารและการอ่านฉลากโภชนาการเพื่อการบริโภคที่ดีต่อสุขภาพ

**คำสำคัญ:** การบริโภคอาหารสุขภาพ ประเทศไทย วัยรุ่น ทัศนะ

## Introduction

A healthy diet is a crucial factor for enhancing quality of life and preventing chronic disease among adolescents<sup>1</sup>. A balance of adequate nutrition and energy is essential for physical growth and cognitive development in adolescents<sup>2</sup>. Bronfenbrenner (1994) described the reciprocal relationships of family, school, peer groups, the community, and culture on adolescent development in terms of a concentric pattern called “layers of an onion”<sup>3</sup>. Food consumption behaviors among adolescents are influenced by individual, social, physical, and environmental factors<sup>4</sup>, thus making adolescent eating behaviors a complex phenomenon.

Currently, some adolescents have diets that exceed the Recommended Dietary Allowance (RDA) for total fat and saturated fat, cholesterol, sodium, and sugar<sup>5,6</sup> due to the influence of unhealthy food marketing<sup>7</sup>. Consequently, the increased prevalence of overweight and obesity among adolescents is associated with increased risk of non-communicable diseases and health care costs, as well as decreases in quality of life in adulthood<sup>8</sup>. In Thailand, the prevalence of overweight and obesity among adolescents has increased both in urban and rural areas<sup>9</sup>. Further, the prevalence of metabolic syndrome in overweight or obese children and adolescents was higher than those with no obesity. Approximately 7.6% of obese or overweight Thai children have metabolic syndrome<sup>10</sup>.

Unhealthy consumption has an impact on health. The high intake of sodium and sugar-sweetened beverages and the low intake of fruit and whole grains are associated with the cause of deaths in 195 countries<sup>11</sup>. Among

adolescents, the high consumption of sugar-sweetened beverages and saturated and unsaturated fats increases the risk of high total cholesterol and obesity. On the other hand, those who consume a diet rich in vegetables, fruit, whole grains, and nuts have a lower prevalence of overweight and obesity, with decreased risk of high blood pressure<sup>12,13</sup>. Eating a breakfast with high fiber and lower insulin resistance is also important<sup>14</sup>. Consequently, adolescents who consume a healthy diet will have decreased risk of atherosclerosis and cardiovascular disease in adulthood<sup>15</sup>. Consequently, a healthy diet during adolescence is a major approach to disease prevention. Thai education programs across schools provide a variety of dietary knowledge in the classroom, including the discussion of the five food groups, the Thai Nutrition Flag, and nutrition labels. However, little is known about how adolescents perceive healthy eating and how they choose their foods in the Thai context. The aim of this study, therefore, was to explore Thai adolescents' perceptions of healthy eating in order to shed light on approaches for designing interventions to promote healthy eating behaviors.

## Method

### Design

This qualitative descriptive study used secondary data from previous study<sup>16</sup>. Using multi-stage sampling, the researchers drew the sampling frame from secondary schools located in Bangkok. These schools were divided into four main jurisdictions: (1) the Office of the Basic Education Commission of Thailand, (2) the Department of Education of the Bangkok

Metropolitan Administration, (3) University Demonstration Secondary Schools, and (4) the Office of the Private Education Commission. This study focused on schools under the Office of the Basic Education Commission of Thailand and the Department of Education of the Bangkok Metropolitan Administration, because these schools cover most of the adolescent population in Bangkok.

The Office of the Basic Education Commission of Thailand covers 119 secondary schools, while the Department of Education of the Bangkok Metropolitan Administration is comprised of 8 schools. These schools were divided into three groups based on student numbers, namely, small-sized schools (less than 500 students), medium-sized schools (500-1,499 students), and large-sized schools (over 1,500 students). The names of all schools (sampling frame) were listed. Finally, two secondary schools from the Department of Education of the Bangkok Metropolitan Administration and three secondary schools from the Office of the Basic Education Commission of Thailand were selected for inclusion in the study. These schools were public secondary schools located in Bangkok (i.e., Jatujak district, Suanluang district, Phra Nakhon district, Rat Burana district, and Bangkok Noi district). Thereafter, purposive sampling was used to recruit 30 participants who were underweight, normal weight, overweight or obese according to the 2014 guidelines on preventing and curing children of obesity. One adolescent from each school grade was selected; thus, six participants per school were selected to participate in in-depth interviews.

## Participants

Researchers coordinated with teachers to provide details of the study procedure to potential student participants. Those students with severe health problems consisting of learning disabilities or diabetes mellitus were excluded based on teachers' reports. Thereafter, the study's principle investigator met with each participant to explain the study and gain their consent to participate in it.

The study's participants were secondary (high school) students, 70% of which were girls by virtue of an all-girls school being included in the study. The mean age was  $15.17 \pm 1.57$  years, ranging from 12-18 years. According to the 2014 clinical practice guidelines on preventing and curing children of obesity based on 2014 criteria, 30% of the participants were obese, 3.3% were overweight, and 10% were underweight. Some of the participants (13.3%) had health problems including asthma (10%) and thalassemia with asthma (3.3%).

## Data Collection

After signed consent was obtained from parents/guardians, each adolescent participant was interviewed individually in a private room at their school. A semi-structured interview guide was developed based on a literature review, which revealed that adolescent food choices are influenced by multiple factors, including intra-individual factors (the link between food preferences and awareness of healthy eating) and intra-familial factors (the role of the home food environment). Parents influence their children's attitudes and beliefs through setting rules, providing information and guidance, and modeling behaviors. Adolescents affect their

parents' actions through communicating their food preferences. Moreover, extra-familial factors also play a role, such as eating away from the home with peers or others, media exposure, eating at food outlets and schools. Consequently, Bronfenbrenner's Ecological Model (1994) was used to develop the interview guide for understanding the meaning of healthy eating from adolescent perspectives and their healthy food choices.<sup>3</sup> The interview guide directed the process of the in-depth interviews to explore adolescent perceptions of healthy eating, such as "Please tell me about what food you eat?"; "What are your favorite foods?"; "Please tell me about what food you eat at school?"; "How do you choose these foods?"; and "How do you choose food on holidays?" The questions were flexible depending on the responses from different participants. Probing questions were asked in order to clarify points if required. If the participants felt uncomfortable, they could ask to stop or refuse to answer at any time. Each interview session was conducted for approximately 30 to 60 minutes. The interviews were recorded, and field notes were recorded immediately after the interviews, but names and identifying details were not recorded. Data were collected until no new information could be obtained (data saturation).

### Data Analysis

To obtain demographic data, descriptive statistics were used. The qualitative data were analyzed using content analysis<sup>17,18</sup>. The data from each interview were transcribed verbatim in the Thai language. Through open coding, the data were coded line by line to reflect and interpret the meaning of the data deeply.

Thereafter, similar coding was grouped, concepts were created, and then organized into themes.

In order to achieve trustworthiness, the researchers re-read the data. Two rounds of independent coding were used. All of the data were confirmed with the field notes and checked with the participants in order to confirm the findings. During data analysis, these data were examined by the researchers<sup>19</sup>.

### Ethical Considerations

This study was approved by the Human Research Review Committee of the Faculty of Medicine, Ramathibodi Hospital (COA. MURA2020/603), Mahidol University, Thailand. The researcher explained the research project's objectives and participation rights to all participants.

### Findings

The qualitative interviews explored the perceptions of Thai adolescents concerning their healthy eating behaviors and food choices. Four themes emerged as the domains of healthy eating: (1) consciously following a healthy eating pattern; (2) avoiding food perceived to be hazardous; (3) selecting foods based on labeling; and (4) food as health promoting. Moreover, participants with different nutrition statuses (underweight, overweight, and obese) were assessed differently via insights into the barriers and facilitators influencing healthy eating and food choices (see **Table 1**).

**Table 1** Example descriptions associated with the meaning of healthy eating from Thai adolescent perspectives and their healthy food choices based on semi-structured interviews.

Description	Illustrative quote
Carbohydrate	<p>"I like to buy whole wheat bread with a lot of fiber, you know, the ones that aren't white pieces. They have a lot more fiber." (P027L227-228,230)</p> <p>"I think French fries have a lot of starch in them." (P004L140, 142)</p>
Fat	"I think that fried food and coconut milk contain fat." (P004L69,70)
Protein	"I choose fresh milk because it has more calcium. It is good for me and promotes my growth." (P027L209)
Health concern	<p>"I think that fried chicken, fried meat, and fried pork are high in fat. Therefore, if I eat too much or eat large portions, I will become obese." (P025L204-206)</p> <p>"Consuming a lot of sugary food is bad for our health. It risks getting diabetes." (P027L203-205)</p>
Portion size	If the package has a large portion, we should divide it into small portions. If we eat only a part of it (one serving size), we will get a similar nutrient value as labeled on the package, and it might not contain too much sodium, salt, sugar, fat, and other elements." (P028L129-132)

**Theme 1 Consciously following a healthy eating pattern.** This theme covers adolescent perceptions about consuming various foods, eating three healthy meals, and maintaining a daily balance. For participants, a variety of foods means that their meal plates should contain red meat, rice, fat, vegetables, and fruits, and with no meal skipping.

Adolescents gained dietary knowledge based on their perceived health, science education, as well as information from family members, especially mothers, who said that selected foods should be diverse in order to

obtain all of the essential nutrients for each meal. For example,

*"In one plate, all five fingers are to be raised, accounting for many different ingredients. For example, there should be some vegetables as well as some pork. Some vegetables and meat should go together."* (P002L95-96)

*"It's better to eat from all five food groups. We can divide them too. Eat some here and there together at each meal to make sure that all five food groups are eaten from one plate. For certain, we've got bread, boiled eggs, fruits, and some supplementary vitamins. In the morning, I eat two boiled eggs with a plate of rice. The dishes that*

*go with them would be stir-fried vegetables or stir-fried vegetables with a bit of pork, but not too much. When I'm done, I follow with some fruits and milk." (P007L50-63)*

According to the student participants, a hearty breakfast is an essential meal in the morning and provides energy for the brain. Moreover, breakfast energy helps them concentrate on their studies and prevents abdominal pain. A 13-year-old female adolescent stated the following:

*"I see it as important. We need to eat breakfast before we go to school, so we can nourish our brains. Besides, breakfast helps keep stomach ulcers away." (P004L25-28)*

Moreover, the adolescents understood the effects of breakfast on their learning and concentration. A 15-year-old female shared her feelings about a day without breakfast in the following way:

*"When I don't eat breakfast, I already feel hungry by the first or second period. If I eat breakfast, then at least I have something to pad my stomach." (P016L51-52)*

It can be concluded from student perspectives that a balance of food intake and energy expenditure means that proper amounts of food are consumed at each meal, along with considering the activities that the adolescents engage in each day. In terms of the amount of food consumed per meal, more food should be consumed at breakfast than at other meals. At dinner, adolescents should consume fewer carbohydrates.

*"In the morning, I eat quite a lot, but my lunch is more balanced. Meanwhile, my dinner consists of two pieces of whole wheat bread and two boiled*

*eggs; right before my bedtime, I drink some milk." (P007L7-9)*

*"The people at home say I'm getting fat or getting too fat. My older sibling and my mother use the term 'fat'. They want me to cut down on my eating. For example, they want me to eat less dinner. On the other hand, they want me to eat more at breakfast and lunch. They tell me to eat less at dinner and not to eat too much at breakfast and lunch." (P012L11-14)*

The adolescents perceived that they should consume more vegetables and fruits, drink milk that is high in calcium, as well as avoid foods high in fat and foods with high energy density. Vegetables and fruit can help control body weight and prevent some health problems. The adolescents perceived the benefits of vegetables in terms of personal health and having a good bodily figure; so they decided to eat vegetables. For example, a 15-year-old female with normal weight and history of allergies stated the following:

*"Eating vegetables makes me healthier and stronger. Although my friends are fat, I am not fat." (P002L196-197)*

A 13-year-old male with normal weight learned through his own experience that vegetables are easily digested foods and improve bowel movements, as can be seen in the following interview passage:

*"As a person who eats vegetables, when I don't eat them, I get constipated. I don't know why, but I get constipated if I don't eat vegetables. When we eat, when we go out, whenever, it comes out on its own as digested food. When I eat meat without vegetables, I get indigestion. Leafy-green vegetables are the best." (P025L177-187)*



In addition, family members affect adolescent eating styles, as indicated in the following statement:

*"We mostly have vegetables, especially during dinner at my grandmother's home... In particular, it would be hard to stay at my grandmother's place if I didn't know how to eat vegetables. This is because she cooks with lots of vegetables. Some days stir-fried vegetables are on the plate with the little bit of pork: I'd just sit there and stare at all the vegetables."* (P016L167-169)

The adolescents know sources of carbohydrates in their foods, and they know that bread and French fries provide carbohydrates and high energy.

*"I think French fries have a lot of starch in them."* (P004L140, 142)

*"Bread is eaten less than rice while it provides high energy. After you eat bread, you will get sudden energy."* (P020L74-77)

Moreover, some adolescents perceived that complex carbohydrates are better than simple carbohydrates. For example, they eat brown rice or other whole grains, as noted in the following:

*"At first, I didn't like the idea of eating brown rice, but I started to like it after I'd had some. It's good for our health."* (P017L30-31)

*"For bread at home, I like to buy whole wheat bread with a lot of fiber, you know, the ones that aren't white pieces. They have a lot more fiber."* (P027L227-228,230)

The adolescents understood that healthy sources of protein include fish, eggs, and milk. Some adolescents perceived that fish nourishes their brains, while others felt that meat, milk, and eggs help them to achieve proper growth.

*"It will make me clever because fish nourishes my brain."* (P017L253)

*"I think that adolescents should eat meat, milk, eggs, and calcium. My teacher said that adolescence is a growth period. These foods promote growth and development."* (P005L106-108)

Some of the adolescents avoid high fat foods because they believe that fried foods and coconut milk contain fat. For example:

*"If you consume fried fish with a lot of oil, it will be harmful for your health. Consuming rich oily food is a risk for dyslipidemia."* (P026L291-292, 294)

*"I think that fried food and coconut milk contain fat."* (P004L69, 70)

Regarding milk, the adolescents believe that they should consume low fat fresh milk, since it is better than sweetened milk.

*"I choose fresh milk because it has more calcium. It is good for me and promotes my growth."* (P027L209)

**Theme 2 Avoiding foods perceived to be hazardous.** This theme refers to adolescent perceptions of unhealthy diets or chemicals in food, such as in fast food, grilled food, instant noodles, alcohol, soft drinks, and fruit juice, which can be linked to a variety of potential health problems. One of the participants stated that:

*"I think that fried chicken, fried meat, and fried pork are high in fat. Therefore, if I eat too much or eat large portions, I will become obese."* (P025L204-206)

Some participants believed that grilled food can cause cancer, and they thought that they should consume "safe" food, such as fresh vegetables and organic foods while avoiding foods contaminated with toxins, chemicals,





recycled cooking oil, or burnt food. Dark oil and burnt food were perceived to be harmful to health. The adolescents perceived that hot food was safe for their health. They would choose food cooked under sanitary conditions that was of good quality that was good for their health, and was safe to eat.

*"When it comes to bananas, I pick those that are just ripe and invitingly yellow, not so bruised...Not only that, for the most part, I prefer to eat vegetables with some holes in them, because they look like they are free from chemicals. This is because of the toxins, because not all of the leaves have holes, only some of them. I don't like when there are holes in every leaf. When they are sprayed with substances that are not very toxic, like those that they make themselves, insects will eat the vegetables."* (P013L369, 379-383)

*"I like to eat organic vegetables. They are fresh and crispy. For example, when I'm eating salads, I tell my mother that my vegetables have to be organic. I don't want regular vegetables from the market because I prefer organic vegetables over them. Organic vegetables are fresh a lot of the time. That's what I like about them. They're crispy."* (P012L191-194)

Some adolescents remembered what they had heard from their mothers.

*"When I eat Cha-bu, I like to take it out of the broth early because it's not quite cooked yet, but my mom says to cook it thoroughly first to avoid parasites. Because of that, I started eating it after it is well-cooked."* (P002L83-84)

*"Is the food clean or not? When it comes to the pork found in the market, when I see flies on it, I get a little worried."* (P014L193-194)

*"Look at the oil. It shouldn't be black. If it's black, then it means they have fried a lot and that it's bad. Sometimes it smells, too. When you eat it with the smell of that bad oil, it's bad for your health."* (P022L297-303)

In addition, some adolescents acknowledged that caffeinated beverages are suitable for workers and people that need to stay awake, but adolescents do not need to drink them. A 15-year-old female adolescent stated:

*"Caffeine and coffee are not good. Because we're not using as much energy as adults, because we're not working, because we're not staying up late, we don't need to drink them."* (P002L98-99)

*"Similarly, hard workers need energy drinks. Adolescents don't need to drink it because we're not using as much energy."* (P020L363, 365)

Moreover, some adolescents who have diabetes in their family avoid consuming sugar because they perceive that eating too much sugar increases the risk of contracting diabetes.

*"My mother who has diabetes warned me about consuming sugary food because she fears that I will be the same as her."* (P017L49)

*"Consuming a lot of sugary food is bad for our health. It increases the risk of getting diabetes."* (P027L203-205)

Adolescents perceived that sausages with a bright red color are not good for their health. They will choose ripe sausage with a natural color. An 18-year-old female adolescent stated:

*"For sausages, I will choose ripe sausages, newly fried, and with a good color. It is good for one's health because it is clean and hot."* (P013L88, 91-93)

Some of the adolescents were concerned about the raw materials that are used

in cooking food. They felt that the materials should not be past their expiration dates, as indicated in the following:

*"Look at the raw material, sugar or somethings that can expire. If it is very old, you should not buy it."* (P025, L262-263)

The participants also felt that a person should avoid torn or broken packages, and that food safety is important for their health. In terms of food safety practices, they did not choose food that was expired or damaged.

*"Regarding packaging, if there is a tear or if the package is incomplete, it should not be bought. Look at the products that have just come because some products are kept for a long time. They may have expired, such as bread."* (P013L171-174)

**Theme 3 Selecting foods based on labeling.** This theme refers to adolescents' perceptions and experiences in reading, understanding, and using the nutrition information on food labels, such as information about calories, serving size, portion size, ingredients, and expiration dates, when making decisions about the food.

*"For example, if the package has a large portion, we should divide it into smaller portions; if we eat only a part of it (one serving size), we will get a similar nutrient value as labeled on the package and it might not contain too much sodium, salt, sugar, fat, and other elements."* (P028L129-132)

In terms of healthy milk, the adolescents want to consume milk with a high calcium content. Consequently, they compare the percentages of calcium on the labels. The adolescents thought that they should drink milk that is low in sugar, as indicated in the following:

*"Sometimes, when I have free time, I stand and read a book. It says how many calories are in*

*what food, what percentage of milk a certain food contains, how much of the milk real milk, things are like that, and how much calcium content is in the food."* (P027L215-217, 219)

Some of the adolescents understand that glucose is a form of sugar that provides calories:

*"Sometimes according to the food label, it doesn't have sugar. However, I found that for the nutrition information "glucose" is written and that means sugar."* (P005L127-128)

Moreover, sodium, saturated fats, and calories were of concern for most of the adolescents, as seen in the following excerpts:

*"Nutrition labels state that this bottle has glucose. I will look for calorie information."* (P029L267)

*"Look at the food label, read the ingredients of the food, such as the percentage of sugar, saturated fats, and sodium."* (P027L215-217,219)

Sometimes the nutrition information on the food label is difficult to understand. Some of the adolescents cannot choose healthy foods because they are confused about some of the words, such as sodium, salt, and glucose.

*"Read the nutrition facts; they state that sodium converts to sugar, and salt. It is composed of sugar. Oh, I don't understand."* (P007L191-193).

However, time and hunger are also barriers to using nutrition information.

*"Don't look at anything. I will pick up the food that I want to eat. It will take too much time to choose one."* (P012L146-148)

*"I'm so hungry. I don't choose anything. Only eat."* (P004L147-149)

**Theme 4 Food as health promoting.** This theme refers to adolescent perceptions about getting all of the nutrients from healthy foods. Consequently, supplementary foods are



not necessary for everyone if they can get all of the necessary nutrients from the five food groups. However, if food consumption is below what a body needs, then supplementary foods should be added. For example, if a student studies hard and does not get enough sleep, he or she can add protein and some vitamins to help the immune system.

*"Someone said that most people consume protein lower than their body requirement. Therefore, they eat whey protein."* (P027L336-337,339)

While perceived as unnecessary for everyone, some of the adolescents thought that vitamin B complex helps the brain to be effective. *"My friend suggests that chicken soup contains vitamin B complex that helps you wake up."* (P015L297-298)

Some adolescents had health problems so they take vitamin C to strengthen their immune system.

*"I take vitamin C because I always have a common cold."* (P017L266)

Adolescent social networks, including networks of friends and family, and social media affect the adolescent decision-making concerning supplementary food. Some of the adolescents take supplementary food because the family provides them with it. For example: *"My mother buys salmon capsules for me because I do not sleep enough and have panda eyes."* (P002L175-176)

On the other hand, some of the adolescents are interested in the food business for beauty. They choose supplementary foods, such as glutathione and vita berry, to help them look good.

*"I always take glutathione, which is sold in 7-11 stores. Someone told me that it will help my skin."* (P030L177, 181)

## Discussion

This study explored the concept of healthy eating as perceived by adolescents. It provides valuable insights into improving adolescent nutrition in order to promote good health practices among adolescents.

One important study finding was that adolescents perceive breakfast as the essential meal of the day, which provides energy for the brain and helps them concentrate during their studies. Similarly, Silva et al. in 2015 reported that Brazilian adolescents perceived that the foods served at breakfast should be varied, containing both calorie-rich and vitamin-rich foods<sup>20</sup>.

Adolescents also know that they should consume a variety of foods, eat three meals per day, and achieve a balanced diet. Their five food groups consisted of rice, red meat, fat, vegetables, fruit, and with no meal skipping. Eating a balanced and varied diet is the best strategy to get both macro and micronutrients<sup>21</sup>. Currently, adolescents are at risk of nutritional deficiencies that occur when they skip a meal or consume energy-dense and poor-nutrient foods. Skipping meals is related to the low consumption of fruit and vegetables, and the over-consumption of saturated fat and sodium<sup>22,23</sup>.

Several studies make clear that fruits and vegetables are sources of micronutrients and dietary fibers that play an important role in preventing chronic illnesses<sup>24,25,26</sup>. Three key factors influence vegetable and fruit consumption by adolescents: (a) individual

factors (e.g., age, gender, knowledge, taste preference); (b) social factors (e.g., parental intake and modeling, parental and family support, family meals, and peer influence); and (c) environmental factors (e.g., income, parental occupational status, parental education, household availability)<sup>27</sup>. The present study's findings are consistent with those of Kakinami et al., who reported that adolescents that perceive themselves to be overweight or obese eat fruit and vegetables or exercise to lose weight<sup>28</sup>. However, parental modeling and adolescents' co-decision-making have a positive correlation with adolescent vegetable and fruit consumption<sup>29</sup>.

During the adolescent period, consumption of junk meals can increase the risk of health problems in the future due to excessive calories, bad cholesterol, and absence of dietary fibers<sup>30</sup>. Interestingly, the adolescents in this study perceived that overconsumption of fast and processed foods leads to overweight and obesity. For example, cookies, cakes, and wafers contain trans-fatty acids that increase the risk of cardiovascular problems<sup>31</sup>.

The adolescents in this study know that an accumulation of chemicals in foods will harm their health in the long-term. Sources of food contaminants are either through environmental contamination (water, air or soil) or food processing (packing, transportation, cleaning, cooking, and storage)<sup>32</sup>. For example, nitrates are added to preserve meats, and to limit fungal growth and spoilage, which is toxic to the respiratory, cardio, and neurological systems, and possibly cause cancer<sup>33</sup>. Fried potato chips and French fries are not safe to eat due to their negative effects on the nervous system, the

reproductive system, and gene mutation due to acrylamide<sup>34</sup>. Findings from this study lead to the conclusion that adolescents know about food hazards. They try to choose foods that are fresh, natural, or do not have an expired date. Some of the adolescents learned about food safety from their mothers, who can be valuable role models and food safety communicators who should be equipped with suitable knowledge.

The nutrition information on food packages is a challenge for some adolescents, especially those who are just beginning to use it. Some of the adolescents read and interpret the nutrition information on the food labels to guide them in choosing healthier products. A previous study reported that adolescents that use nutrition labels were more likely to consume healthier food<sup>35</sup>. The majority of the adolescents paid more attention to information about "best before date," "saturated fat," "sodium," and "sugar." However, some of the nutrition vocabulary made them confused (such as glucose vs. calories, salt vs. sodium), especially when the nutritional information is complex and requires both nutrition knowledge and numeracy skills to interpret and use the information<sup>36</sup>. Unclear food labels may lead to incorrect food choices, despite adolescents having nutrition knowledge. In our study, time and hunger factors were also barriers to using information. Consequently, nutrition labeling should be modified to be more easily understood and quickly compared, which will help adolescent consumers make healthier food choices.

In terms of food as health promoting, adolescents feel they should consume three healthy meals, a variety of foods, and have a balanced diet so they do not necessarily need



supplementary foods. Furthermore, adolescents who studied hard felt that they may not be consuming enough nutrients, such as protein, vitamin B, and vitamin C. In addition, sometimes their parents or guardians provided them with supplementary foods in order to prevent health problems. Jun et al. (2018)<sup>37</sup>, for example, found that 32% of the children and adolescents in the U.S. use dietary supplements and 24% use multivitamin-minerals to improve and maintain their health<sup>37</sup>. In addition, some of the adolescents bought food supplements available at convenience stores in order to improve their body image. This is an example of the media's influence and its potential to harm their health<sup>20</sup>. Healthcare providers, therefore, should provide greater supplementary dietary information through various communication channels to adolescents and their parents/guardians.

Adolescents attempt to apply their nutrition knowledge when they make food choices. However, some adolescents experience difficulty in putting their healthy eating knowledge into practice. The food environment affects their food choices, decision-making, and eating behaviors<sup>38</sup>. Families, schools, the healthcare profession, and public health policies in nutrition are key drivers to maximize the promotion of healthy eating behaviors among the adolescent population. Healthy food should be inexpensive and supported by the government. The nutrition information on food labels should be clear and easy to understand. Moreover, unhealthy food industry practices should be controlled via increasing taxes, restricting promotion, and controlling front-of-pack labeling, among other strategies. Finally, the government and schools

should more actively promote healthy foods for a healthier school environment.

#### **Limitations and Recommendations for Future Research**

This study was conducted among adolescents in urban settings where the food and social environment may differ from other areas. Consequently, generalizability is limited only to adolescents aged 12-18 years in urban contexts. In addition, this study focused on the views of adolescents. Perspectives of their parents should be explored in a future study.

#### **Conclusion and Implications for Practice**

Unhealthy eating is a significant problem among adolescents that can lead to many chronic diseases in adulthood. The findings reflect Thai adolescents' perceptions related to healthy eating behaviors and their decision-making in order to make healthy approaches to food choices. Healthy eating from the perspectives of Thai adolescents covers four themes: consciously following a healthy eating pattern; avoiding foods perceived to be hazardous; selecting foods based on labeling; and food as health promoting. Results suggest a need to develop guidelines for adolescents that include increasing knowledge of food based dietary patterns, food ingredients, and comprehension of food labels for healthy eating among Thai adolescents in urban public schools. In particular, knowledge, perceptions, and the environment are seen to influence eating patterns and should be strengthened to effectively support, promote, and preserve healthy eating behaviors among adolescents.

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## References

1. Wu XY, Zhuang LH, Li W, Guo HW, Zhang JH, Zhao YK, Hu JW, Gao QQ, Luo S, Ohinmaa A, Veugelers PJ. The influence of diet quality and dietary behavior on health-related quality of life in the general population of children and adolescents: a systematic review and meta-analysis. *Qual Life Res.* 2019; 28(8):1989-2015.
2. Micali N, Ploubidis G, De Stavola B, Simonoff E, Treasure J. Frequency and patterns of eating disorder symptoms in early adolescence. *J Adolesc Health.* 2014; 54(5):574-81.
3. Bronfenbrenner U. Ecological models of human development. *International Encyclopedia of Education.* 1994; 3:1643-47.
4. Banna JC, Buchthal OV, Delormier T, Creed-Kanashiro HM, Penny ME. Influences on eating: a qualitative study of adolescents in a periurban area in Lima, Peru. *BMC Public Health.* 2016; 15:16:40.
5. Araújo J, Teixeira J, Gaio AR, Lopes C, Ramos E. Dietary patterns among 13-y-old Portuguese adolescents. *Nutrition.* 2015; 31(1):148-54.
6. Ochola S, Masibo PK. Dietary intake of schoolchildren and adolescents in developing countries. *Ann Nutr Metab.* 2014; 64 Suppl 2:24-40.
7. Harris JL, Heard A, Schwartz MB. Older but still vulnerable: All children need protection from unhealthy food marketing: Yale Rudd Center for food policy and Obesity; 2014 Available from: [www. YaleRuddCenter.org](http://www.YaleRuddCenter.org).
8. World Health Organization. Obesity and overweight fact sheet. Geneva (Switzerland): World Health Organization, 2016.
9. Nonboonyawat T, Pusanasuwanasri W, Chanrat N, Wongthanavimok N, Tubngern D, Panutrakul P, et al. Prevalence and associates of obesity and overweight among school-age children in a rural community of Thailand. *Korean J Pediatr.* 2019; 62(5):179-86.
10. Rerksuppaphol L, Rerksuppaphol S. Prevalence of metabolic syndrome in Thai children: A cross-sectional Study. *J Clin Diagn Res.* 2014; 8(4):PC04-7.
11. GBD 2017 Diet Collaborators. Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the global burden of disease study 2017. *Lancet.* 2019; 393(10184):1958-1972.
12. O'Neil CE, Keast DR, Nicklas TA, Fulgoni VL 3rd. Out-of-hand nut consumption is associated with improved nutrient intake and health risk markers in US children and adults: National Health and Nutrition Examination Survey 1999-2004. *Nutr Res.* 2012; 32(3):185-94.
13. Mellendick K, Shanahan L, Wideman L, Calkins S, Keane S, Lovelady C. Diets rich in fruits and vegetables are associated with lower cardiovascular disease risk in adolescents. *Nutrients.* 2018; 10(2):136.
14. Donin AS, Nightingale CM, Owen CG, Rudnicka AR, Perkin MR, Jebb SA, Stephen





- AM, Sattar N, Cook DG, Whincup PH. Regular breakfast consumption and type 2 diabetes risk markers in 9- to 10-year-old children in the child heart and health study in England (CHASE): a cross-sectional analysis. *PLoS Med.* 2014; 11(9):e1001703.
15. Funtikova AN, Navarro E, Bawaked RA, Fito M, Schröder H. Impact of diet on cardiometabolic health in children and adolescents. *Nutr J.* 2015; 14:118.
  16. Deesamer S, Piaseu N, Maneesriwongul W, Orathai P, Schepp KG. Development and psychometric testing of the Thai-nutrition literacy assessment tool for adolescents. *Pacific Rim Int J Nurs Res.* 2020; 24(1):5-19.
  17. Miles MB, Huberman AM, Saldana J. *Qualitative Data Analysis: A Methods Sourcebook.* 3 ed. California: SAGE; 2014.
  18. Zhang Y, Wildemuth BM. Qualitative analysis of content. 2017. In: *Applications of social research methods to questions in information and library science* [Internet]. California: Libraries. 2nd. [318-29]. Available from: [https://books.google.co.th/books?hl=th&lr=&id=uv98DQAAQBAJ&oi=fnd&pg=PA318&dq=related:5Ro4lZNraQImUM:scholar.google.com/&ots=VUNNF8N5hn&sig=imx5AUdRGvJnN6Jo0V\\_DKYMROwE&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.th/books?hl=th&lr=&id=uv98DQAAQBAJ&oi=fnd&pg=PA318&dq=related:5Ro4lZNraQImUM:scholar.google.com/&ots=VUNNF8N5hn&sig=imx5AUdRGvJnN6Jo0V_DKYMROwE&redir_esc=y#v=onepage&q&f=false).
  19. Elo S, Kaariainen M, Kanste O, Polkki T, Utriainen K, Kyngas H. Qualitative content analysis: A focus on trustworthiness. *SAGE journals.* 2104; 1-10.
  20. Silva DC, Frazão Ida S, Osório MM, Vasconcelos MG. Perception of adolescents on healthy eating. *Cien Saude Colet.* 2015; 20(11):3299-308.
  21. Ward E. Addressing nutritional gaps with multivitamin and mineral supplements. *Nutr J.* 2014; 13(1):72.
  22. Pedersen TP, Meilstrup C, Holstein BE, Rasmussen M. Fruit and vegetable intake is associated with frequency of breakfast, lunch and evening meal: cross-sectional study of 11-, 13-, and 15-year-olds. *Int J Behav Nutr Phys Act.* 2012; 9:9.
  23. Rodrigues PRM, Luiz RR, Monteiro LS, Ferreira MG, Gonçalves-Silva RMV, Pereira RA. Adolescents' unhealthy eating habits are associated with meal skipping. *Nutrition.* 2017; 42:114-120.e1.
  24. Boeing H, Bechthold A, Bub A, Ellinger S, Haller D, Kroke A, et al. Critical review: vegetables and fruit in the prevention of chronic diseases. *Eur. J. Nutr.* 2012; 51(6):637-63.
  25. Amao I. Health benefits of fruits and vegetables: Review from Sub-Saharan Africa. 2018. Available from: <http://dx.doi.org/10.5772/intechopen.74472>.
  26. Conner TS, Brookie KL, Carr AC, Mainvil LA, Vissers MC. Let them eat fruit! The effect of fruit and vegetable consumption on psychological well-being in young adults: A randomized controlled trial. *PloS one.* 2017; 12(2):e0171206.
  27. Al-Otaibi H. Factors influencing fruit and vegetable intake in adolescents. In: Ostojic SM, editor. *Human health and nutrition: New research.* New York: Nova Science 2015. p.183-200.
  28. Kakinami L, Houle-Johnson SA, Demissie Z, Santosa S, Fulton JE. Meeting fruit and



- vegetable consumption and physical activity recommendations among adolescents intending to lose weight. *Prev Med Rep.* 2018; 13:11-5.
29. Ma Z, Hample D. Modeling Parental Influence on Teenagers' food consumption: an analysis using the Family Life, Activity, Sun, Health, and Eating (FLASHE) Survey. *J Nutr Educ Behav.* 2018; 50(10):1005-1014.
30. Yadav B, Kaur M. Knowledge regarding health hazards of junk food and its prevention among adolescents. *J Nurs Res.* 2019; 1(2):57-64.
31. Iqbal MP. Trans fatty acids - A risk factor for cardiovascular disease. *Pak J Med Sci.* 2014; 30(1):194-7.
32. Rather IA, Koh WY, Paek WK, Lim J. The sources of chemical contaminants in food and their health implications. *Front Pharmacol.* 2017; 8:830.
33. Butler A. Nitrites and nitrates in the human diet: Carcinogens or beneficial hypotensive agents? *J Ethnopharmacol.* 2015; 167:105-7.
34. Ouhtit A, Al-Sharbati M, Gupta I, Al-Farsi Y. Potato chips and childhood: what does the science say? An unrecognized threat? *Nutrition.* 2014; 30(10):1110-2.
35. Haidar A, Carey FR, Ranjit N, Archer N, Hoelscher D. Self-reported use of nutrition labels to make food choices is associated with healthier dietary behaviours in adolescents. *Public Health Nutr.* 2017; 20(13):2329-2339.
36. Miller LM, Cassady DL. The effects of nutrition knowledge on food label use. A review of the literature. *Appetite.* 2015; 92:207-16.
37. Jun S, Cowan AE, Tooze JA, Gahche JJ, Dwyer JT, Eicher-Miller HA, Bhadra A, Guenther PM, Potischman N, Dodd KW, Bailey RL. Dietary supplement use among u.s. children by family income, food security level, and nutrition assistance program participation status in 2011-2014. *Nutrients.* 2018; 10(9):1212.
38. Vandevijvere S, Barquera S, Caceres G, Corvalán C, Karupaiah T, Kroker-Lobos M, et al. An 11-country study to benchmark the implementation of recommended nutrition policies by national governments using the Healthy Food Environment Policy Index, 2015-2018. *Obes Rev.* 2019; 20(Suppl 2): 57-66.