Journal of Education and Human Development
December 2020, Vol. 9, No. 4, pp. 130-139
ISSN: 2334-296X (Print), 2334-2978 (Online)
Copyright © The Author(s). All Rights Reserved.
Published by American Research Institute for Policy Development
DOI: 10.15640/jehd.v9n4a13
URL: https://doi.org/10.15640/jehd.v9n4a13

Preservice Elementary Teachers' Perceptions of Healthy Diets from a Sociocultural Perspective: A Comparative Study of Two Countries

Do-Yong Park, PhD[1], Chanphorn Prommas, PhD[2], Ye Jun Bae, PhD Candidate[3]

Abstract

This study investigated preservice teachers' perceptions and their dietary behaviors and nutrition knowledge regarding healthy diets from a sociocultural perspective. Thirty Thai and twenty U.S. preservice elementary teachers participated in this study representing different culture and society. Using mixed methods, we compared their dietary behaviors and nutrition knowledge so that we could better understand their perceptions of global food. Participants recorded what they ate for one week in each country. Data resources included (a) a food journal, (b) a "nutrients and me" report, (c) a survey, and (d) a focus group interview. The results indicated that preservice teachers (a) perceived global food to be healthy, (b) added renewed interests to their nutrition knowledge and dietary behaviors from a sociocultural perspective, and (c) their future teaching plan using global diets became clearer. The implications are discussed in the paper.

Keywords: diet education; global diets; sociocultural perspective; nutrition knowledge; dietary behaviors; preservice teachers.

1. Introduction

Diets are now interconnected across countries more than ever before due to the increasing international trade of food items, globalized food industries, and advanced agricultural technologies and agribusinesses as the world becomes more closely interrelated through globalization (Cushner, 2007).Investigating people's perceptions of healthy diets from a sociocultural perspective can help obtain a better view of their dietary behaviors and nutrition knowledge.

Among the rapidly growing number of global food choices, people are increasingly interested in a healthy diet because they could use it to "protect against malnutrition in all its forms, as well as noncommunicable diseases (NCDs), including such as diabetes, heart disease, stroke and cancer" (World Health Organization [WHO], 2018a, online). One of the leading risk factors for deaths is related to diets around the world (GBD 2017 Risk Factor Collaborators, 2018). According to Forouhi and Unwin (2019), diet-related deaths can be explained by just three nutritional behaviors: "a high intake of sodium, a low intake of whole grains, and a low intake of fruit" (p. 1917). It is known that whole grains can lower the risk of diabetes because it has fiber and B vitamins and minerals (iron, folate, selenium, potassium, and magnesium) that are critical nutrition for our body (U.S. Department of Health & Human Services, 2015).Unhealthy diets tend to cause various health problems, including obesity, which is viewed as the main culprit of children's poor health. The problem of overweight and obesity is seen around the world. For example, the World Health Organization (2018b) reported that approximately 340 million children and adolescents ranged from 5–19 years old were either overweight or obese in 2016. Specifically, around 17% (12.7 million) of American youth aged 5-19 are obese (Centers for Disease Control and Prevention, 2015).Obesity problems can be better explained through a sociocultural perspective (Kaufman &Karpati, 2007)whichhelps explain how children's behaviors are affected specifically by environmental, social and cultural factors.

Prospective teachers who will teach these children should be aware of these problems and be self-efficacious in teaching nutrition from a global perspective in schools. However, information about healthy diets is lacking in K-12 education as well as in teacher education programs.

[1] College of Education Illinois State University Normal, IL 61790-5330 USA Phone: +1-309-438-5050Fax: +1-309-438 8659dpark@ilstu.edu
[2] Learning Management Department Faculty of Education Burapha University Chonburi, 20130 Thailand Phone: + 66 38 1084 Fax: + 66 38391043chanphorn@buu.ac.th
[3] College of Education The University of Iowa Iowa City, IA 52242 USA +1(319) 621-7051 Fax: +1(309) 438-8659yejun-bae@uiowa.edu

Neither the nutrition curriculum nor teaching resources about healthy diets are readily available in primary and secondary schools. When teaching about diets and nutrition, this global view is often ignored in the classroom not because the problem does not exist, but because teachers are not equipped with enough background knowledge and global perspectives in schools.

2. Literature Review

To date, much has been studied about teachers' knowledge and attitudes of nutrition and diet. Teachers can potentially influence children's eating habits and are responsible for providing nutrition education to students. Recently, Metos et al. (2019) examined 628 K-6 in-service teachers' attitudes, beliefs, self-efficacy aboutnutrition education in the United States. The result showed that the hours of nutrition taught, their personal health practices, and the above three factors were weakly correlated. The study concluded that teachers understood the importance of nutrition education, but nutrition materials and qualified nutrition personnel were lacking in elementary schools. This problem was also found in Gibson's (2007) study that investigated elementary teachers' understanding of nutrition concepts using the content survey and interview. She found that teachers had not taken any formal training on nutrition during their teacher education programs, and some of them only had taken a nutrition class in junior or high school. The study concluded that elementary teachers had positive attitudes about nutrition education but limited nutrition knowledge. While several studies have been conducted on inservice teachers' nutrition knowledge with different topics, the common conclusion can be made that teachers have limited knowledge of nutrition and rarely teach healthy diet education due to, in part, the scarcity of teaching materials available in the K-12 classrooms. Unlike inservice teachers' studies, however, little is known about preservice teachers' perceptions of healthy diets and their own dietary behaviors based on nutrition knowledge from a sociocultural perspective. Preservice teachers are to be equipped with up-to-date knowledge to teach a healthy diet with global perspectives in today's diverse classrooms because, in nutrition education, teachers are the critical component influencing students' healthy eating behaviors and appropriate nutrition knowledge (O'Dea & Abraham, 2001). Hence, this study investigated preservice elementary teachers' perceptions of healthy diets from a sociocultural perspective based on their dietary behaviors and level of nutrition knowledge. Specifically, the following questions guided this study.

What are the preservice teachers' perceptions of healthy diets from a sociocultural perspective?

How do preservice teachers of Thailand and the United States compare in terms of their dietary behaviors and nutrition knowledge?

3. Methods

This research was designed using a comparative studywith mixedmethods in which we compared by analyzing qualitative and quantitative data from Thailand and the United States.

3.1 Participants

The participants were selected using a convenience sample and comprised 30 Thailand (all Thai females) and 20 U.S. (all Caucasians, 1M & 19F) preservice elementary teachers who were enrolled in a science method course (Patton, 2015). Thai and U.S. preservice elementary teachers were selected to better provide a good contrast of sociocultural aspects including culture and society, and weather/climate. Each Thai participant was paired randomly with each U.S. student, so some U.S. students end up having more than one student as a collaboration partner.

3.2 Intervention Activity

3.2.1.Overview.With an emphasis on two learning opportunities, a sociocultural project called "Global Diets" was implemented in a science method course of two cooperating universities in Thailand and the United States. Participants in each country were aware of the differences in their own social and cultural factors of foods and compared these factors throughout the project. Participants explored and compared their knowledge about nutrition and dietary behaviors so that they could obtain a better view of global diets. This task was made possible by exchanging daily food logs through email and social media called "LINE" (free instant chatting app), which enabled them to exchange information about foods, weather/climate, and culture.

3.2.2. Learning Activity I. Each participant chose one week (7 consecutive days) during the fall semester and communicated with his/her partner about the foods consumed. They then discussed similarities and differences in their dietary behaviors. They also exchanged descriptions of their food log with its pictures.

Each participant was required to keep a journal called "food journal" about what ate everyday including breakfast, lunch, dinner, drinks and snacks, to research nutrients concerning their food choices so that they would better understand their daily dietary behaviors. At the end of the week, students compared their journals with each other and discussed the differences and similarities in terms of sociocultural aspects.

3.2.3. Learning Activity II. To extend the understanding of the sociocultural facet of global diets, participants used Menzel and D'Aluisio's (2007) book titled *Hungry Planet: What the World Eats.*Using this book, they continued to discuss and learn about the global diets of other countries besides Thailand and the United States. This book examined 30 families in 24 countries, and each chapter presented information and photos of a family, weekly-consumed grocery list, and the total cost. The participants chose Chad, Egypt, Greenland, India, Japan, and Poland and discussed each country's nutritional and dietary behaviors. They found some interesting contrasts. For example, the family in Greenland consumed small amounts of dairy and fruits (vitamins and minerals) and spent more on meat and starchy foods (protein and carbohydrates).The family in India spent large amounts on dairy, fruits, vegetables and nothing on meat, fish andeggs (Menzel &D'Aluisio, 2007, p. 167). Also, India has "Street Food," whereas Greenland does not have it.In this instance, the cultural and social environment and history reflect the differences in foods between these two countries. This discussion helped preservice elementary teachers to gain more knowledge about the contextual environment, cultural milieu, and sociocultural perspective of global diets. From a sociocultural perspective, this discussion provided insights about people's nutrition and dietary behaviors and helped the preservice teachers to reflect and discuss how they would teach this aspect in their future classrooms.

3.3. Data Collection

Three data sets were collected: (a) a food journal, (b) a "nutrients and me" report, and (c) focus group interview.

***3.3.1. Food Journal*:** Each participant kept a journal on Excel with details of what they hadfor each meal for seven consecutive days. They answered the following prompts: (a) what type of food did you eat? (b) How much money did you spend? And (c) What nutrients were included in each food you ate? They then added a picture of every food that they ate to this information. This information was recorded into 10 categories including (a) grains and other starchy food; (b) diary; (c) meat, fish & eggs; (d) fruits, vegetables & nuts; (e) condiments; (f) snacks & desserts; (g) prepared food (already made food); (h) fast food; (i) restaurant; and (j) beverage.

***3.3.2. Report of Nutrient and Me*:** They also wrote a report about the relationship between nutrients and their bodies in which they presented information about the foods and nutrients that they ate. This report presents the level of participants' knowledge of nutrition, which includes the indicator of a healthy life. The Level of Knowledge about Nutrition and Diets (see Appendix) was created based on the analysis results of each of the participants' reports (see the Analysis section for more details). The inter-rater reliability of the construct of each level was .81 and that of examples was .79 between two reviewers. As seen in Appendix, the indicators are established by incorporating WHO's recommendations in terms of unhealthy dietary items and healthy life behaviors (2018b).Toward the end of the week, the report was written by answering the following prompts:(a) explain the role of each nutrient (e.g., protein, vitamins, minerals, carbohydrates, fats, and water), (b) define each nutrient that you consumed, (c) name the food that contains each nutrient you ate, (d) explain a healthy life, and (e) name dietary-related diseases. When completed, both the journal and the report were exchanged by Thai and U.S. participants and then used for discussion during class about the differences and similarities of foods and nutrients from a sociocultural perspective. A discussion also followed on what global foods mean in terms of personal nutrition among people around the world.

***3.3.3. Interview*:** Specifically, two researchers spent around three hours of discussion on the interview protocol as to the purpose, content, method of this interview centering around the research questions and intervention activities through calls via LINE instant message app.

Using the same interview protocol, a focus group interview was separately conducted by a researcher in each country to explore the in-depth understanding of participants of what they eat, what they have learned, any pattern of their dietary behaviors and any cultural influences, similarity and differences of the participants' diets in both countries, obesity problems from a sociocultural perspective, and how they are going to apply into their teaching in the future.

Finally, participants were asked to discuss how this project helped to improve their nutrition knowledge and dietary behaviors. After translating Thai interview scripts into English confirmed by an English professor at the Thai university, all the scripts were exchanged for analysis.

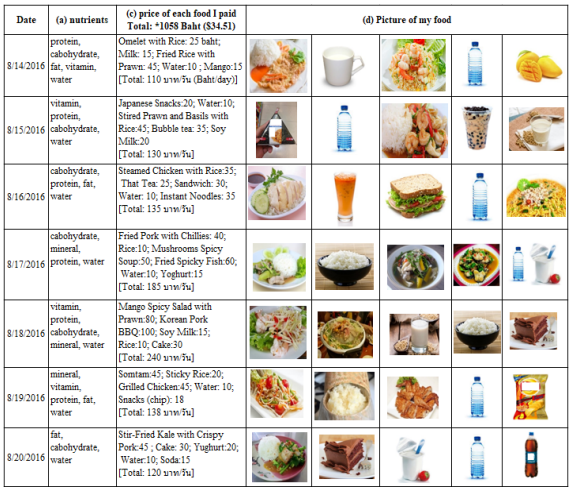
3.4. Data Analysis

The food journal and report were analyzed with descriptive statistics as it feasibly delivers the information when considering the nature of datasets. Unlike a Bayesian interpretation of statistics, the current study used descriptive statistics to rule out the possibility of incorporating prior beliefs and evidence about preservice teachers' dietary behaviors and nutrition knowledge to produce new information. When analyzing to find a pattern for food behaviors, a constant comparative method using open coding was utilized by two student members (Strauss & Corbin, 1998) to find common experience, patterns, or themes. (Maxwell, 1996).After one week, U.S. participants analyzed their counterparts' data in class. Two authors separately read each of the journals and reports a couple of times and sketched the key ideas that showed a pattern in terms of price, type of food, culture-related food, and type of nutrients. They constantly compared all journals and reports to make sure if the found pattern was reasonably established. The inter-rater reliability value was.81 (Krippendorff, 2018), which is reliable when considering the variance of sample food in individuals and the cultural aspects of the two countries. Despite the variation among individual data distinguished within the group, a clear pattern was found and confirmed by member checking in which two students in each country were invited to serve. Interviews were also analyzed using the same method, and these focused on whether they confirmed the patterns found from journals and reports or created new viewpoints toward global diets and health. Using data source triangulation (Patton, 1999), these three data sets were collected during and after the intervention activity and triangulated to obtain a more accurate picture of preservice teachers' understanding of diets across the countries.

4. Findings

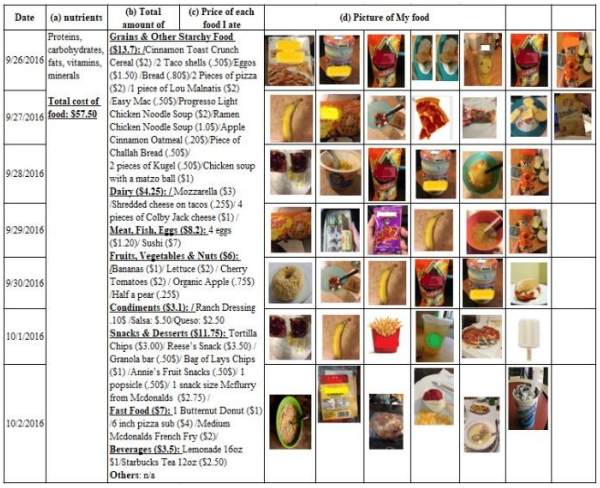
Results are presented below in the order of Food Journal, Report, and Interview.

4.1. Food Journal: Figure 1 shows one example of Thailand students' dietary behaviors recorded in the food journal over seven consecutive days in fall, 2016.



Date	(a) nutrients	(c) price of each food I paid Total: *1058 Baht ($34.51)	(d) Picture of my food
8/14/2016	protein, cabohydrate, fat, vitamin, water	Omelet with Rice: 25 baht; Milk: 15; Fried Rice with Prawn: 45; Water:10 ; Mango:15 [Total: 110 บาท/วัน (Baht/day)]	
8/15/2016	vitamin, protein, cabohydrate, water	Japanese Snacks:20; Water:10; Stired Prawn and Basils with Rice:45; Bubble tea: 35; Soy Milk:20 [Total: 130 บาท/วัน]	
8/16/2016	cabohydrate, protein, fat, water	Steamed Chicken with Rice:35; Thai Tea: 25; Sandwich: 30; Water: 10; Instant Noodles: 35 [Total: 135 บาท/วัน]	
8/17/2016	cabohydrate, mineral, protein, water	Fried Pork with Chillies: 40; Rice:10; Mushrooms Spicy Soup:50; Fried Spicky Fish:60; Water:10; Yoghurt:15 [Total: 185 บาท/วัน]	
8/18/2016	vitamin, protein, cabohydrate, mineral, water	Mango Spicy Salad with Prawn:80; Korean Pork BBQ:100; Soy Milk:15; Rice:10; Cake:30 [Total: 240 บาท/วัน]	
8/19/2016	mineral, vitamin, protein, fat, water	Somtam:45; Sticky Rice:20; Grilled Chicken:45; Water: 10; Snacks (chip): 18 [Total: 138 บาท/วัน]	
8/20/2016	fat, cabohydrate, water	Stir-Fried Kale with Crispy Pork:45 ; Cake: 30; Yughurt:20; Water:10; Soda:15 [Total: 120 บาท/วัน]	

Fig. 1. An Example of Thailand Preservice Teacher's Diets for a Week.



Date	(a) nutrients	(b) Total amount of	(c) Price of each food I ate	(d) Picture of My food
9/26/2016	Proteins, carbohydrates, fats, vitamins, minerals	**Grains & Other Starchy Food ($13.7):** /Cinnamon Toast Crunch Cereal ($2) /2 Taco shells (.50$)/Eggos ($1.50) /Bread (.80$)/2 Pieces of pizza ($2) /1 piece of Lou Malnatis ($2) /Easy Mac (.50$)/Progresso Light Chicken Noodle Soup ($2)/Ramen Chicken Noodle Soup (1.0$)/Apple Cinnamon Oatmeal (.20$)/Piece of Challah Bread (.50$)/ 2 pieces of Kugel (.50$)/Chicken soup with a matzo ball ($1) **Dairy ($4.25):** /Mozzarella ($3) /Shredded cheese on tacos (.25$)/ 4 pieces of Colby Jack cheese ($1) / **Meat, Fish, Eggs ($8.2):** 4 eggs ($1.20)/ Sushi ($7) **Fruits, Vegetables & Nuts ($6):** /Bananas ($1)/ Lettuce ($2) / Cherry Tomatoes ($2) / Organic Apple (.75$) /Half a pear (.25$) **Condiments ($3.1):** / Ranch Dressing .10$ /Salsa: $.50/Queso: $2.50 **Snacks & Desserts ($11.75):** Tortilla Chips ($3.00)/ Reese's Snack ($3.50) / Granola bar (.50$)/ Bag of Lays Chips ($1) /Annie's Fruit Snacks (.50$)/ 1 popsicle (.50$)/ 1 snack size Mefflurry from Mcdonalds ($2.75) / **Fast Food ($7):** 1 Butternut Donut ($1) /6 inch pizza sub ($4) /Medium Mcdonalds French Fry ($2)/ **Beverages ($3.5):** Lemonade 16oz $1/Starbucks Tea 12oz ($2.50) **Others**: n/a	
9/27/2016	**Total cost of food: $57.50**			
9/28/2016				
9/29/2016				
9/30/2016				
10/1/2016				
10/2/2016				

Fig. 2. An Example of U.S. Preservice Teacher's Diets for a Week.

Notes: The brand name of each product was deleted by whiting it out.
*Thailand currency is converted into USD. One Baht was around 0.033 USD, with fluctuation of 0.005 during the period of this study. The numbers of the price in column (c)are presented in Thailand currency.

Figure 1 shows the diet that one Thai student participant consumed for one week according to her *food journal*. This particular student's diets demonstrated that it is not difficult to access international foods including Lay's chip, Pepsi, Bubble tea, Japanese snacks, and even Korean Pork BBQ, which the K-POP culture in southeast Asia has influenced. However, the diet of the Thai student presented in Figure1 may not be the best representation of the diet of the entire Thailand preservice teachers who participated in this study. Indeed, many Thai student diets were filled only with Thailand foods, e.g., Pad-Thai and Tom Yum Kung.

Thailand preservice teachers spent$27.32 (849.17 Baht) on average (min: $15.11 (460 Baht); max: $38.60 (1175 Baht)on foods for a week(equal to $263.14 when converting to the level of U.S. GDP per capita).

On the other hand, the diets of American preservice teachers diets were mostly Westernized, and a good amount of food consumed everyday was fast food according to their *food journals*. Figure 2, which presents the diet of one American student, shows that this diet ranged from snacks to fast food, including pizza, French fries,

doughnuts, noodle soup, and taco. American preservice teachers spent $115.09 on average (min: $57.50;max: $194)on food for a week.

As seen in Figure 2, although this particular student's diet may not be the best representation of the entire U.S. preservice teachers' typical diets, it still shows some degree of what, how, and when most students eat certain food. As seen in Figure 2, this student consumes a great deal of fast food and processed food (e.g., Tortilla chips, Reese's snack, Granola bars, Mozzarella, etc.).

Table 1 shows the comparison results of the money that all participants spent on food for one week in each country. Due to currency differences, the data are presented in percentage. The *food journal* data shows expenditure patterns. Thai participants spent more money in the following order: Meat, Fish & Eggs (1st); Grains & Other Starchy Food (2nd); Beverage (3rd); Fruits, Vegetables & Nuts (4th); Dairy (5th); and Fast food (6th). On the other hand, American preservice teachers' dietary behaviors show a different pattern: Fast food (1th), Beverage (2nd), Grains & Other Starchy Food (3rd), Fruits, Vegetables & Nuts (4th) followed by Prepared Food (5th), and Meat, Fish & Eggs (6th).A big difference was that Thailand preservice teachers spend more money on meat, fish and eggs, whereas the U.S. group on fast food (see Table 1).

Table 1. A Comparison of Money Spent in Each of 10 Food Categories (%)

Food Category	Thailand preservice teachers (%)	US preservice teachers (%)
Grains & Other Starchy Food	12.33	11.60
Dairy	6.48	6.62
Meat, Fish & Eggs	37.33	8.18
Fruits, Vegetables & Nuts	9.50	10.07
Condiments	0.62	4.08
Snacks & Dessert	15.21	7.60
Prepared food	1.20	9.92
Fast Food	3.02	17.92
Restaurant	1.10	11.16
Beverage	13.21	12.86
Total	100	100

However, the price comparison (see Table 1) may not present the dietary behaviors in detail because of the different food prices, which could skew the real nutritional information of each participant's intake. To help improve this weakness, this study analyzed both group participants' food journals again in terms of (a) the kinds of food and nutrition consumed and (b) the frequency of a certain food item each participant ate. Analyzing 30Thailand food journals, the study found that Thailand preservice teachers had more weekly intake of proteins and carbohydrates than vitamins and minerals. Specifically, Thailand preservice teachers atemore rice and meats and fish (proteins and fats) than fruits (vitamins) and dairy products (minerals). On the other hand, American preservice teachers had more intake of carbohydrates and vitamins and less intake of minerals and proteins and fats. Specifically, they had more rice and fruits and vegetables (carbohydrates and vitamins) than dairy products (minerals) and meats (proteins and fats). Surprisingly, American preservice teachers included little meats in their diet. But both groups had less intake of dairy products.

4.2. Report of 'Nutrition and Me': The purpose of this report is to demonstrate the preservice teachers' level of nutritional knowledge about all the foods that they consume. All participants' reports were analyzed by two raters using the criteria (see Appendix), which are established based on what WHO recommends for diet-related diseases and how to start a healthy life(WHO, 2018b).Table 2shows the result of preservice teachers' nutrition knowledge. The inter-rater agreement was 81%. As seen in Table 2, the chi-square independence test for any association between the two parties was not statistically significant at $p<0.05$ ($X^2=0.97$, $df=2$, $P=0.64$), meaning that no statistically significant difference of their knowledge between the two groups.

Although they are not associated, the result shows a similar pattern in which the majority of preservice teachers in each country possessed an intermediate level of knowledge on nutrients followed by the beginning level. And both groups had little knowledge at the advanced level.

Table 2. Preservice Teachers' Nutrition Knowledge Recommended by WHO

Knowledge level	Thailand	U.S.
Confident	2	3
Intermediate	19	11
Beginning	9	6
Total	30	20

***4.3. Interview*:** A focus group interview was conducted to follow up on the food journal and explore preservice teachers' in-depth understanding of global diets and health in terms of dietary behaviors and nutrition knowledge.

Topic 1: Learning about dietary behaviors and nutrition knowledge from the global diet project (Note: TS means Thailand Student; AS stands for American Student).

Two key features were found about the dietary behaviors of participants. One was analysis, and the other was change. Preservice teachers analyzed their food behaviors and came to critically think about the nutrition of the food that they eat. As seen below, Thai preservice teachers learned that they had a chance to analyze what they eat weekly and came to consider what is better good for them (TS1; TS3). They realized that they do not apply their nutrition knowledge that much into their dietary behaviors or eating habits(TS1; TS2; TS4). Instead, they just eat according to their familiarity with food (TS2; TS3).American preservice teachers analyzed their weekly dietary behavior in detail in terms of nutrition balance, food products, and money spent. As seen in AS 1, 2, and 3 interviews about dietary behaviors, all three have in common that they eat out too much. AS1 noticed from her food journal that she spent too much money on eating out rather than cooking at home, which skewed her nutrition balance. Also, AS3 learned that her diets were skewed to fast food so that she ends up eating too much starch and fats. AS2 also ate out often because her college life was always on the move, and it was convenient. She consumed excessively processed foods rather than cooking at home. Regarding the definition of the term "global diets", participants of both countries never heard of it or studied it during their teaching training. It was foreign to almost all of them though they had their own rough ideas.

Topic 2: Patternsof participants' dietary behaviors; Influence of the culture and society of a country.

Thai preservice teachers shared their perceptions about their American counterparts' dietary behaviors after they exchanged food log information through a chatting app. They perceived that U.S. preservice teachers eat more carbohydrates and proteins because they are in cold weather. Two Thai preservice teachers opinionated with respect that "American food reflects the American value of society and culture, which means they eat fast food, carbohydrates, and a huge amount of food with family and friends as seen in movies" (TS2; TS3). Thai preservice teachers conceived that the global diets reflect the geography, culture, and value of the society. On the other hand, one U.S. preservice teacher with a couple of the same voices from others recognized the cultural influence on diets by critically thinking, "Compared to Thai peers, I feel as though our culture revolves around "comfort foods," or meals that taste good but aren't necessarily good for our bodies or health" (AS 4). The American participants perceived their dietary behaviors as fast food were because culture and society demand a fast lifestyle in America. The responses that reflected this aspect are "America is a very fast-paced, I want it and need it now type of culture which I think influences the diet patterns of citizens. Fast foods give people the quick, easy, cheap meal they need right when they need it. It always feels like I'm on the go, so I don't have much of a choice at times when it comes to food" (AS1).

American preservice teachers acknowledged that eating patterns can be different due to cultures and socioeconomic status (SES). They realized that eating habit is influenced by the culture and society rather than their nutritional knowledge.

They perceived that Thailand students ate healthier food like fruits and cooked food rather than fast food and soda. One U.S. partner mentioned, "I basically have a positive attitude toward diets and I think I should show respect to it because the food in other locations has its own tradition and people have their own eating habits and patterns. So I think diet patterns can be different in different cultures and societies. Those who come from different countries will obviously consume different foods due to what is available in that location and the culture.

Socioeconomic status may also play a role by what types of foods people can afford in different places around the world" (AS2) followed by another one's comment, "Communicating with Thai students through LINE, I had a chance to look at what I ate everyday and think about a healthy diet seriously" (AS5). AS1, AS2 and AS5 perceived that their dietary behaviors are influenced more by the culture and society and SES rather than by their nutritional knowledge.

Topic 3: Differences and similarities between the diets of participants; Relation to weather/climate; Discussion of obesity problems from a sociocultural perspective.

Both Thailand and U.S. preservice teachers mentioned that although people need food containing contain protein, fats, carbohydrates, vitamins and minerals, differences exist in the specific food choices along with how much of these nutrients are consumed. They also said that differences might be due to location, the weather/growing season, and the regular eating habits of each individual. One Thai participant commented "My daily diet is filled with many kinds of locally available foods.

But I think that American friends eat many carbohydrates to warm their body due to cold weather" (TS3) seconded by TS2. In addition, both groups shared the opinion that, if the weather were warm and wet, then this would provide a good environment for food to be produced. In terms of obesity, American preservice teachers said that obesity was due to a lack of nutrient-rich food or overeating. One U.S. student said, "I learned in one of my psychology classes that fresh foods are more expensive because they go bad first. Those of low income cannot afford to keep buying food every time it spoils, so eating out or already prepared food is the easiest/cheapest. However, the available food has trans-fats, are high in sugar, and lack important vitamins and minerals. Foods that have high amounts of 'bad' fats will cause those who eat them to gain weight. As a result, many people who are obese come from low-income households" (AS 4).Thus, the conclusion can be made that the participants had become aware of the differences and similarities of the food consumed by each party and that this knowledge was related highly to different locations (culture) and weather/climate. At the same time, both participant groups acknowledged that the cause ofobesity was due to unhealthy foods, including trans-fats, high sugar, and a lack of vitamins and minerals.

Topic 4: Applying into the future teaching of global diets.

The preservice teachers of both countries felt that they lacked background knowledge about the nutrition of global foods. They had never before analyzed the food that they consumed in terms of a sociocultural perspective and nutrients, i.e., protein, vitamins, minerals, carbohydrates, fats, and water. Both participant groups realized that a global perspective could help children to understand better about the food that they consumed day to day. They indicated that they planned to teach this perspective in their future classroom so that the children would make better decisions about their diets. One Thai preservice teacher mentioned that she planned to incorporate a comparison and reflection of diverse foods and cultural backgrounds into her teaching because "learning about the food pyramid, various nutrients, and healthy lifestyle choices is a vital part of children's development" (TS 2). Also, another U.S. student commented, "I would turn this data into a very beneficial lesson on personal health. For older grades (4^{th}-8^{th}), I could incorporate the food log activity for a shorter period of time (4-5 days) and have students present and discuss their findings as a class. If possible, just like what we did, connecting my future class to pen pals in other countries could be a great way to talk about differences in diet amongst various cultures" (AS1).

In summary, the preservice teachers of both countries analyzed and changed their perceptions on daily and global diets. Through the course of this project. they felt that they had little knowledge of their dietary behaviors and nutrition knowledge. Both participant groups indicated that they should be on alert about what they eat to share their stories in future classrooms. Most participants are in favor of global diets and planned to teach the global perspective by comparing and reflecting on different foods and cultural backgrounds because they realized that learning about various nutrients, diverse food, and healthy lifestyle choices was a vital part of children's growth and development.

5. Discussion

This study examined preservice teachers' perceptions of diets from a sociocultural perspective with two foci: dietary behaviors and nutrition knowledge. Three sets of data helped answer the two research questions. The first question concerned the perceptions of preservice teachers in Thailand and the U.S. about global diets in terms of a sociocultural perspective. Thailand preservice teachers perceived that their daily food included many kinds of locally available foods and that their American counterparts consumed many carbs to warm their body due to cold weather.

They also reasoned that American students eat different foods due to different locations and cultural backgrounds. On the other hand, the U.S. preservice teachers perceived that Thai preservice teachers ate more fish and tropical fruits because of the location and warm weather. However, the preservice teachers of both countries were unfamiliar with the term "global diets." It may be because none of the U.S. preservice teachers received formal training on nutrition and diets, especially diets from across the globe during their teacher education program. Diets across the world are related to and influenced not only by the location and weather/climate but also by culture and society. Each country has its own set of traditions and different standards of food. Preservice teachers in Thailand and the U.S. perceived that nutrients could be balanced through different

foods in different cultures even if they have different set of traditions and standards. This type of positive perception is a critical component in educating students about diets as the food of different countries becomes globally available and closely interconnected through increasing international trade of food items and globalized food industries (Cushner, 2007; Menzel & D'Aluiso, 2007). In nutrition and dietary behaviors education, such attitude and respect for the value of food in each culture should be included in the diet curriculum of K-12 education.

The second research question is regarding the comparison of preservice teachers' dietary behaviors and nutrition knowledge between Thailand and the U.S. Thailand teachers spend more money on foods as a diverse mixture of global food and Thailand food whereas American preservice teachers spend on a great deal of fast food and processed food. This distinctive pattern can be reasonably explained by the sociocultural perspective. Thailand has been influenced socially and culturally by adjacent countries, e.g., Vietnam, Malaysia, Korea, and Japan. Preservice teachers in both countries realize that many of their proportions are skewed and at least unbalanced so that they have changed their attitude to stay away from unhealthy diet behaviors.

As seen in the result, the participants of both countries noticed that their dietary behaviors and nutrition knowledge were far from that which WHO recommended (WHO, 2018b). One reason may be that they have a fast daily lifestyle that modern society and culture demand. Another reason may also be due to a lack of nutrition knowledge. The majority of preservice teachers in each country possessed an intermediate level of knowledge on nutrients followed, and some had a beginning level of knowledge about the diet-related global diseases by WHO. However, the data in this study also show that both groups had little knowledge at an advanced level. This finding may be further explained by Majors (2015) who found that college students have barriers relative to healthy food choices due to intrapersonal (e.g., temptation and lack of discipline) reasons; interpersonal (e.g., friends and social groups) reasons and environmental barriers (e.g., time constraints and easy access to unhealthy food).These barriers suggest that preservice teachers do not apply the nutritional knowledge that they have into their meal selection because of their busy college schedule or because they have little knowledge or both. This study also found that changes in attitudes toward dietary behaviors and nutrition knowledge occurred in both groups. From a sociocultural perspective, the global-diet focused intervention (e.g., "Hungry Planet: What the world eats") should be implemented in conjunction with individual-level interventions (e.g., food journal and report of nutrition and me) to facilitate behavior analysis and change, which Greaney, Less, White, Dayton, Riebe, Blissmer, Shoff, Walsh, and Greene (2009) supported.

This current study also investigated the understanding of preservice teachers of the obesity problem.Both participant groups acknowledged that a fundamental cause for obesityrests in unhealthy foods,including trans-fats, high sugar, and lack of vitamins and minerals. As Kaufman and Karpati (2007) argued, obesity problems can be better explained through a sociocultural perspective that is used to explain how children's behaviors are affected not only by their socioeconomic status but also by their environmental, social, and cultural factors. As AS2 noted in the interview, she recognized that children's social-economic status affects their food habits which aligns with what the literature has asserted (Temple et al., 2006; WHO, 2018b; Wang et al., 2012). This current study also explored how future teachers framed their teaching plan of diets when incorporating a sociocultural perspective.

Although the preservice teachers lacked specific knowledge about diets across the globe, they did perceive that these could include fresh and healthy food. With this perspective in mind, the preservice teachers in both countries plan to teach about the relationship between nutrition and healthy lifestyle choices in the future. They indicated that they would like to keep watching what they eat to share their stories learned from the global diets project when they teach in the future. Teachers can play a key role in teaching dietary behaviors and nutrition knowledge about the healthy lifestyle choices of their students (O'Dea & Abraham, 2001). Although almost all participants had received no formal training on nutrition and diets, they said that they planned to teach about foods available globally from a sociocultural perspective so that children could make informed decisions concerning healthy lifestyle choices as they grow and develop. Recently, Metos et al. (2019) reported that inservice teachers need "additional support and resources to teach nutrition in the classroom" (p. 75).

Therefore, one recommendation is to provide teaching resources of nutrition and dietary behaviors to inservice teachers and should also be offered in the teacher preparation programs.

6. Conclusion

Preservice teachers, both Thailand and the United States, perceived that diets across the globe could be healthy and increased their awareness of diets with renewed interest in their nutritional knowledge and dietary behaviors from a sociocultural perspective. This awareness is related to increasing the likelihood of meeting the dietary guidelines that WHO has recommended. An increased awareness could help preservice teachers to change their attitudes about balanced dietary behaviors. In addition, the future teaching plans of the participants from a

more global perspective became more explicit as they realized that learning about balanced intake of nutrients, diverse international foods, and healthy lifestyle choices would help children make better decisions when they select their foods in the globally interconnected societies. This study concluded that the increased knowledge of preservice teacher about dietary behaviors and WHO's guidelines appear to be related positively to a renewed interest into developing healthy diet patterns and creating a more informed teaching mindset concerning dietary education.

7. Implications for School Health

One of the key findings in this research is that the increased knowledge of preservice teachers about dietary behaviors and WHO's guidelines appear to be related positively to a renewed interest into developing healthy diet patterns and creating a more informed teaching mindset concerning dietary health education in schools. However, both preservice and inservice teachers are lacking nutrition knowledgewithlittle teaching experience of health education. Therefore, implications for school health are as follows.

• When teaching nutrition education in school, using a sociocultural view can help the learners analyze and change their nutritional knowledge and dietary behaviors through constant comparisons.
• School can provide inservice and preservice teachers with teaching materials to increase the awareness of nutrition and dietary behaviors through a sociocultural viewpoint, e.g., a book of *Hungry Planet: What the World Eats* (Menzel and D'Aluisio, 2007).
•School teacherscan provide students with an opportunity to keep a food journal so that they increase the awareness of diets with renewed interest in their nutritional knowledge and dietary behaviors.
• School can assign preservice teachers to experienced veteran teachers recognized in nutrition education to get the clinical supervision of nutrition and health education.
• School can invite professional parent externs and collaborators of local food agency, college, and university to provide in-service training to both inservice and preservice teachers during their clinical teaching experience.

Acknowledgement

This research was made possible through the grant "Go Global" of the Scholarship of Teaching and Learning (SoTL) at Illinois State University. We appreciate the SoTL's grant support for our research.

References

Centers for Disease Control and Prevention. (2015). *Prevalence of childhood obesity in the Unites States, 2011-2012*. Retrieved Oct. 14, 2015, from http://www.cdc.gov/obesity/data/childhood.html

Chen, Y.H., Yeh, C.Y., Lai, Y.M., Shyu, M.L., Huang, K.C., &Chiou, H.Y. (2010). Significant effects of implementation of health-promoting schools on schoolteachers' nutrition knowledge and dietary intake in Taiwan. *Public Health Nutr., 13*(4), 579-88.

Cushner, K. (2007). The role of experience in the making of internationally-minded teachers. *Teacher Education Quarterly, 34*(1), 27-39.

Forouhi, N.G., & Unwin, N. (2019). Global diet and health: old questions, fresh evidence, and new horizons. *The Lancet, 393*(10184), p. 1916-1918.

GBD 2017 Risk Factor Collaborators. (2018). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet, 392*, p. 1923-1994.

Gibson, F. (2007*). Nutrition Education and the Elementary Classroom Teacher*. Unpublished Doctoral Dissertation, The University of Arizona, AZ.

Greaney, M.L., Less, F.D., White, A.A., Dayton, S.F., Riebe, D., Blissmer, B., Shoff, S., Walsh, J.R., & Greene, G.W. (2009). College Students' Barriers and Enablers for Healthful Weight Management: A Qualitative Study.*J Nutr Educ Behavior, 41*(4), 281-286.

Jones, A.M., &Zidenberg-Cherr, S. (2015). Exploring nutrition education resources and barriers, and nutrition knowledge in teachers in California. *J Nutr Educ Behavior, 47*(2), 162-169. doi: 10.1016/j.jneb.2014.06.011.

Kaufman, L., &Karpati, A. (2007). Understanding the sociocultural roots of childhood obesity: food practices among Latino families of Bushwick, Brooklyn. *Soc Sci Med., 64*(11): 2177-88.

Krippendorff, K. (2018). Content analysis: An introduction to its methodology (4th ed.). Thousand Oaks, CA: SAGE Publications.

Majors, M.R. (2015). *Dietary habit and knowledge of college age students*. Theses and Dissertations-Dietetics and Human Nutrition. The University of Kentucky, Lexington, KY.

Menzel, P. &D'Aluisio, F. (2007). *Hungry plant: What the world eats?* (1st ed.) Material World.

Metos, J.M., Sarnoff, K., & Jordan, K.C. (2019).Teachers' perceived and desired roles in nutrition education. *J Sch Health, 89*(1), 68-76.

O'Dea, J.A., & Abraham, S. (2001) Knowledge, beliefs, attitudes, and behaviors related to weight control, eating disorders, and body image in Australian trainee home economics and physical education teachers. *J Nutr Educ, 33*(6), 332–340.

Patton, M.Q. (2015). *Qualitative evaluation and research methods (4th ed.)*. Los Angeles, CA: SAGE.

Pierre, R., & Eddy, J.M. (1979). Nutrition and the Pre-professional Student. *Health Education, 10*(2), 6-7.

Shannon, B., Marbach, E.S., Graces, K. Sims, L.S. (1981). Nutrition knowledge, attitudes, and teaching effectiveness of K-6 teachers. *J Nutr Educ, 13*(4), 145-149.

Temple, N.J., Steyn, N.P., Myburgh, N.G., & Nel, J.H. (2006). Food items consumed by students attending schools in different socioeconomic areas in Cape Town, South Africa. *Nutrition, 22*(3):252-8.

U.S. Department of Health and Human Services and U.S. Department of Agriculture (2015). *2015–2020 Dietary Guidelines for Americans.* (8th ed.) Retrieved on May 10, 2019 from http://health.gov/dietaryguidelines/2015/guidelines/

Wang, Y.,&Lim, H. (2012). The global childhood obesity epidemic and the association between socio-economic status and childhood obesity, *J Intl Review of Psychiatry, 24*(3), 176-188. doi: 10.3109/09540261.2012.688195

Werkhoven, T., Cotton, W., &Russell, K. (2014). Pre-service health and physical education teachers' obesity-related nutrition knowledge and food habits. *Journal of the HEIA,21*(3), 2-11.

World Health Organization ([WHO], 2018a). *Healthy diet*. Accessed on June 27, 2019. https://www.who.int/news-room/fact-sheets/detail/healthy-diet

World Health Organization ([WHO], 2018b). *Obesity and overweight*. Retrieved on July 1, 2019 from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Appendix

Level of knowledge about nutrients and diets

Level of Knowledge	Indicator	Example of Responses in the Report of Nutrition and Me
Advanced Level	• Define each nutrient • Explain the role of each nutrient • Name foods that have each nutrient • Explain unhealthy items to avoid, i.e., "(a) high intake of sodium, (b) low intake of whole grains, and (c) low intake of fruit." • Explain how to start a healthy dietary life • Identify diets-related disease	• I know that minerals are an essential nutrient that come from inorganic elements. They must be naturally growing, solid, inorganic; be in an orderedstructure having definite chemical composition. • I learned that minerals are essential nutrients to build and keep upteeth, bones, hair, blood,nerve function, muscles, and metabolic processes that transform the food we consume into energy. • I ate bananas, apples, sushi, whole wheat bread, & cheese that have minerals. • To keep myself healthy, I avoid sugary drinks, too much sodium and eat lots of fruits. • Based on what I learned in class, I practice balancing between calorie intake and expenditure, having little intake of sugars, and keeping salt intake (e.g., 5g per day), which helps keep ourselves from hypertension, heart disease, obesity, and stroke.
Intermediate Level	• Define each nutrient in a short manner. • Explain the role of each nutrient but not sufficiently. • Name foods that have each nutrient • Explain roughly unhealthy items to avoid. • Explain little about how to start a healthy dietary life. • Identify few diets-related diseases.	• Minerals are vital for maintaining healthy bones, teeth, and immune systems. • I ate activa light yogurt, light string cheese, provolone cheese slices, shredded cheese, & cream cheese that include minerals. • To keep myself healthy, I avoid sugary drinks, too much sodium and eat fruits. • I should keep myself from eating unhealthy food so that I can keep my BMI under control.
Beginning Level	• Define each nutrient briefly or unclearly. • Explain the role of each nutrient roughly. • Name foods that have each nutrient • Explain little about unhealthy items. • Explain little about how to start a healthy dietary life. • Identify no diets-related diseases.	• Minerals are used for growth and health; macro-minerals are minerals body needs to large amounts. • Cheese • Not too much sugar and soda. I know I thought should not consume but I do not care much.