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Dietary Pattern in Junior High School Students: Literature Review

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ARTICLE INFO	ABSTRACT
Received: 8 Sep. 2021 Accepted: 5 Oct. 2021	**Background:** Various studies on the students' dietary patterns have been discussed but there is no literature review on the dietary patterns in junior high school students. **Objectives:** Describing the dietary patterns in junior high school students. The search process in this literature review refers to questions compiled using PCC: Population (P), concept (C), and context (C). Eligibility criteria: (1) Articles ranging from 2015-2020, (2) subjects aged 13-15 years, (3) articles that describe students' dietary patterns, (4) full accessed articles, (5) original research articles, (6) cross-sectional studies. **Source of evidence:** Articles in this review literature were searched and obtained from ProQuest, PubMed, and ScienceDirect. **Charting methods:** The article selection stage implemented the PRISMA diagram. **Results:** The junior high school students' dietary patterns mostly do not emphasize the nutritional and calorie content of what food types they consume, what eating frequency is proper for themselves, and how much is the appropriate food amount based on their respective bodies. Instead, they just eat until they are satisfied. Hence, calories and nutrients are out of control. The clinical indicators used to determine whether a dietary pattern is good or bad are the Body Mass Index (BMI), Dietary References Intakes (DRIs), and Overall Competences at School (OCS). Indicators for non-clinical use were COMPASS and Knowledge Attitude and Practice (KAP). **Conclusion:** A good dietary pattern in junior high school students can be determined based on the food type, the eating frequency, and the food amount. The indicators for clinical outcomes are Body Mass Index (BMI), Dietary References Intakes (DRIs), Overall Competences at School (OCS), and Z-Score. Meanwhile, the non-clinical indicators are COMPASS and Knowledge, Attitude, and Practice (KAP) **Keywords:** students, components and dietary patterns, habits, clinical and non-clinical indicators, junior high school

INTRODUCTION

Junior high school students in Indonesia are children aged 13-15 years. Junior high school students are children who are in their adolescence. Adolescence has rapid physical growth, but the characteristics of physical growth are not as drastic as when they are infants [1]. Physical development that is influenced by dietary patterns, physical activity, and sleep patterns is included in the children's daily activities. From a mental and emotional perspective, junior high school students are a group that has the characteristic of continuously wanting to develop self-reliance in daily life activities [2].

Dietary pattern is an attempt to meet the body's needs from the process of hunger to satiety. It can be divided into healthy and unhealthy dietary patterns [3]. A healthy dietary pattern is a dietary habit that emphasizes the nutritional content and calorie intake of the body in order to maintain a healthy, ideal, and optimal body condition. A healthy dietary pattern provides numerous benefits such as preventing malnutrition, non-communicable diseases (NCDs), and obesity. An unhealthy dietary pattern is a dietary habit that has

an adverse effect on the condition of the human body and causes various health risks. An unhealthy dietary pattern will lead to obesity or excess body weight, dehydration, hypertension, diabetes, and nutritional deficiencies, or what is commonly called malnutrition [3,4].

A healthy dietary pattern can be viewed from the eating frequency. The eating frequency refers to how many times you eat in a day. The human eating frequency varies, such as twice, three times, even five to six times a day [5]. A good eating frequency emphasizes the total number of calories and nutrients intake based on what the body needs in a day. Extra calorie intake can lead to excess Body Mass Index (BMI), which can be called obesity, on the other hand, an intake of fewer calories will cause a low BMI that can be called underweight [6].

Food type is a nourishment variety, including dietary pattern components. Food types can be classified into healthy and unhealthy. Healthy food is nourishment that can meet daily nutritional and calorie needs without leaving bad substances in the body [7]. Healthy food type includes food that contains macronutrients, i.e., carbohydrates, proteins, and fats and micronutrients, i.e., vitamins and minerals [8].

The food amount is the portion food number consumed. The food amount consumed by students aged 13-15 years varies depending on their dietary habits [9]. Different food amounts contain different calorie quantities [10]. The food amount can affect whether a person's BMI is ideal or not [11]. Children who have BMIs above the average have a habit of consuming large amounts of food and do not pay attention to calorie intake [12]. An excess amount of food is not good because it can lead to obesity [5].

The objectives of this literature review are

2. Describing the dietary pattern in junior high school students

LITERATURE REVIEW

Search Strategy

The search process in this literature review referred to questions that have been determined using the PCC (Population, Concept, and Context) [13]. The population in this literature review was junior high school students. The concept was the dietary pattern of students at school published from 2015 to 2020. The context was a cross-sectional study.

Initial searches were conducted between September-November 2020 from three databases: (1) ProQuest, (2) PubMed, and (3) ScienceDirect. The keywords used to source search were *child * AND "dietary habit" OR "habit, diet" AND "junior high school"*. Word combinations were used, including word combinations from Boolean (AND/OR), and MeSH (Medical Subject Heading).

Inclusion Criteria

The inclusion criteria of this literature review were (1) articles from 2015-2020, (2) subjects aged 13-15 years, (3) describing children's dietary pattern, (4) full-access articles, (5) original research articles, and (6) cross-sectional study.

Exclusion Criteria

The exclusion criteria of this literature review were (1) the sample was children with special needs, (2) the sample received a "homeschooling" education, (3) the article was written in a language other than English.

Search Result

The first search revealed 6506 articles, 55 of which were duplicated. Thus, it remains 6451 articles. The next stage was screening based on the title and abstract according to the inclusion and exclusion criteria. It obtained 17 articles that would be assessed for their eligibility using the Joanna Briggs Institute (JBI) checklist for cross-sectional analysis [14]. In the last stage, eight articles were then synthesized qualitatively. The selection stages are described in detail using the PRISMA diagram shown in **Figure 1**.
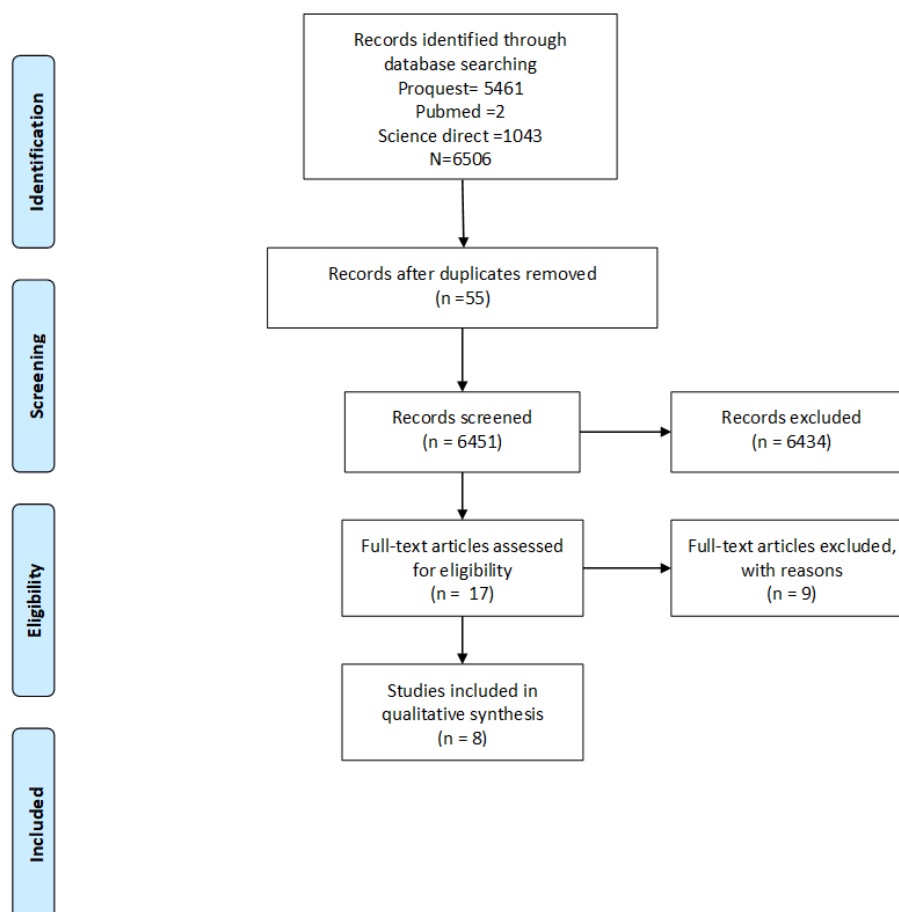

Figure 1. Study selection process

Table 1. Characteristic of the study

No.	Author	Years of Publication	Country	Continent
1	Majowicz et al.	2015	Canada	North American
2	Cheng et al.	2017	China	Asia
3	Asakura and Sasaki	2017	Japan	Asia
4	Huang et al.	2018	Taiwan	Asia
5	Abizari and Ali	2019	Ghana	Africa
6	Matsumoto et al.	2020	Japan	Asia
7	Guevara et al.	2020	Spain	Europe
8	Rosi et al.	2020	Italy	Europe

Table 2. Summary of dietary pattern journal review context

No	Author	Sample	Amount of Sample
1	Majowicz et al.	14-15 years	79 students
2	Matsumoto et al.	13-15 years	851 students
3	Guevara et al.	13-15 years	1318 students
4	Rosi et al.	13-14 years	409 students
5	Abizari and Ali	13-15 years	366 students
6	Huang et al.	13-15 years	1371 students
7	Cheng et al.	14 years	4220 students
8	Asakura and Sasaki	13-14 years	281 students

Quality Assessment

Two reviewers read 17 selected full-text articles and conducted a critical assessment using The Joanna Briggs Institute (JBI) checklist for analytic studies [14]. The considerations used were the research sample, research subjects, validity, reliability of measuring instruments, instruments, confounding factors, and statistical analysis used in the study [13].

Data Extraction and Analysis

Data selection was completed on eight articles that had been obtained in the previous stage. Data grouping was conducted based on Peters, et al. (2015) namely: (1) Author, (2) year of publication, (3) source of origin/country of origin, (4) purpose/objective, (5) study population and sample size, (6) how the results are measured, and (7) key studies related to literature review questions [13].

RESULTS

Descriptive Characteristics of Study Articles

The eight selected study articles were published between 2015 and 2020. There were four articles whose research was conducted in Asia [17-20]; two articles on Europe [11,13]; one article on North America [18]; and one other article from Africa [19]; which have been shown in **Table 1**.

The articles synthesized in this literature review have an intervention setting in schools with a study sample of 13-15 years of age [11,19,20,22]; 13-14 years [13,18], 14 years [15]; and 14-15 years [18]. The sample size for these articles ranged from 79 to 4220 children [11,13,17-22]. These data are presented in a journal collection in **Table 2**.

Components and Dietary Pattern

Based on the eight articles that have been synthesized, five articles discussed the food type consume [11,13,17,21,22] with clinical outcome [11,13,22] and non-clinical [17,21]. Three articles discussed eating frequency with clinical outcome

Table 3. Summary of component and diet pattern dimension

No	Component and Diet Pattern	Author		Outcome
1	Food Type	Majowicz et al.	Non-clinical	Knowledge about healthy food and non-healthy food
		Guevara et al.	Clinical	Bodyweight
		Abizari and Ali	Clinical	Effect calories intake to disease
		Cheng et al.	Non-clinical	Knowledge about healthy food and non-healthy food
		Rosi et al.	Clinical	Bodyweight
2	Eating Frequency	Rosi et al.	Clinical	Bodyweight
		Matsumoto et al.	Clinical	Nutrient intake
		Asakura and Sasaki	Clinical	Nutrient intake
3	Food Amount	Asakura and Sasaki	Clinical	Nutrient intake
		Huang et al.	Clinical	Body fat

Table 4. Summary of component and dietary pattern dimension indicator

No.	Author	Outcome	Indicator	
1	Guevara et al.	Clinical	Bodyweight	BMI
	Rosi et al.		Bodyweight	BMI
	Matsumoto et al.		Nutrient intake	DRIs
	Asakura and Sasaki		Nutrient intake	DRIs
	Huang et al		Body fat	OCS
	Abizari and Ali		Effect calories intake to disease intake to disease	
	Abizari and Ali		Effect calories intake to disease	A.-R. Abizari and Z. Ali
2	Majowicz et al.	Non-Clinical	Knowledge about healthy food and non-healthy food	COMPASS (Consent to participate)
	Cheng et al.		Knowledge about healthy food and non-healthy food	KAP

[13,18,20]. Two articles discussed the food amount with clinical outcomes [18,19]. These data are presented in a journal collection in **Table 3**.

Outcome Indicators for Dietary Components and Dimensions

Table 4 shows the outcomes and indicators. Six articles were obtained with clinical outcomes using indicators of Body Mass Index (BMI), Dietary Reference Intake (DRIs), Overall Competence at School (OCS), and Z-Score. [11,13,18-20,22]. Indicators for non-clinical outcomes are Context-Specific Adaptation Activities (COMPASS) and Knowledge, Attitude, and Practice (KAP) [17,21].

DISCUSSION

Dietary pattern is the main factor determining the good or bad health condition of a person [20]. It is divided into two, namely healthy and unhealthy dietary pattern. A healthy dietary pattern will have a good effect on the health of the body and protect the body from disease. An unhealthy dietary pattern will have a bad effect on health and can lead to disease [3]. There are 44.1% of the world's population who have a healthy dietary pattern in terms of the food type consume, namely fruits and vegetables. Research conducted by S.

Khatibzadeh et al. (2016) showed that 55.9% of the world's population does not adopt a healthy dietary pattern [21].

Dietary patterns for children cannot be separated from the influence of the family's dietary habits. As reported by The Global Survey, 35% of the world's family population has an erratic family dietary habit and is free from healthy conditions so that the family's diet is not healthy. Meanwhile, there are 33% of the world's family population that do not add excess sugar to their dietary pattern, which they consider already sufficient to make a healthy dietary habit for their families. Then, there are 32% of the world's family population who only eat natural foods that they think are adequate to make a healthy dietary pattern according to the food type they consume [22].

A healthy dietary pattern is determined based on the food type, the eating frequency, and the food amount [5,6,9,11,15,17-19]. Determining a healthy dietary pattern that people can do can be conducted by concerning the food types selected based on nutrient and calorie content, the eating frequency that is suitable and proper for the body based on their respective activity schedules, and the food amount with portions calculated based on nutrition, calories, and total Daily Energy Expenditure (TDEE) needed by the body in each. Total Daily Energy Expenditure (TDEE) is of course different for each person depending on height, weight, body fat percentage, and daily activities. This Total Daily Energy Expenditure (TDEE) also applies to children [18,25].

One of the healthy dietary pattern determinants is the food type. It is required to select healthy food types and leave the unhealth to maintain the health. Healthy food is nourishment that can meet daily nutritional and calorie intake without leaving bad substances in the body so that the body will receive the benefits of these foods [7]. Healthy food contains macronutrients, i.e., carbohydrates, proteins, and fats, and micronutrients, i.e., vitamins and minerals [8]. Nutritional levels in food are highly essential to emphasize because nutritional levels are a major value of various food types that have an effect on the body.

The nutrients from food are categorized into macronutrients and micronutrients. Macronutrients consist of carbohydrates, fats, and proteins while micronutrients consist of vitamins and minerals [8]. Macro carbohydrates contained in staple foods such as rice, corn, sweet potatoes, and wheat that act as a source of energy. Lack of these nutrients can cause the body to feel weak, nauseous, constipated, and headaches. Meanwhile, the excess of these nutrients can cause the body to accumulate excess sugar and if it can not be broken down, it will become a fat pile [28]. The next macronutrient content is protein. It acts as a builder of body cells that have been damaged. Protein exists in foods such as meat, fish, eggs, and nuts. Lack of these nutrients can cause the body to lose muscle mass, edema, prone to bone fractures, and kwashiorkor. Meanwhile, the excess of these nutrients can cause the body to experience kidney problems and osteoporosis because the body wastes more calcium [29]. The next macronutrient is fat. Fat acts as long-term energy or the body's food supply. Fat is found in foods such as meat, fish, vegetable and animal oils, and eggs. Lack of these nutrients can cause the body to become hungry easily, the immune system to decline, slow wound healing, easily feel cold, and slow absorption of other nutrients. Excess of these nutrients can cause the body to be overweight and can also lead to coronary heart disease due to blockages in blood vessels by excess fat deposits [30].

The nutrients contained in the next food are micronutrients. Micronutrients consist of vitamins and minerals. Vitamins function as regulators of metabolism in the body. Vitamins are revealed in various food types and are mostly discovered in fruits and vegetables. Overall micronutrient deficiencies in vitamins can lead to dry skin, premature aging, brittle hair, brittle nails, and leukemia. Meanwhile, excess vitamins can cause nausea, rashes, vomiting, and kidney stones [31]. Minerals are nutrients that function to support the body in producing hormones and enzymes. Minerals exist in mineral water, fruit, and vegetables. Overall mineral deficiency can lead to bone and muscle weakness, heart attack, angina, goiter, and syncope whereas excess mineral micronutrients can cause constipation and headaches [32].

The eating frequency is how many times you eat in a day. Several studies have shown that the eating frequency of children aged 13 to 15 years is mostly twice a day and three times a day depending on the schedule of daily activities at school. Twice means that the children eat during the day and at night while three times a day means that the children eat breakfast, lunch, and dinner [5]. Many children aged 13-15 years have the habit of not having breakfast before starting their daily activities [6].

The next determining factor for the dietary pattern is the food amount. Food amount is defined as the number of portions of food consumed. The food amount consumed by children aged 13-15 years varies depending on the children's dietary pattern [9]. Different food amounts contain different quantities of calories [10]. The food amount can affect children's Body Mass Index (BMI). Excess food amount is not good if you do not consider the nutrients contained and the calories intake because it can cause obesity [5].

The results of the review indicated that research on dietary habits can be used to measure clinical and non-clinical outcomes. Clinical outcomes that can be measured are body weight, nutritional intake, and calorie intake. Non-clinical outcomes that can be measured are an insight into good dietary patterns and nutrition. It is as shown in **Table 3**.

Indicators for measuring clinical and non-clinical effects are shown in **Table 4**. Clinical indicators for measuring clinical effects are Body Mass Index (BMI), Dietary References Intakes (DRIs), Overall Competences at School (OCS), and Z-Score. Meanwhile, non-clinical indicators are COMPASS and Knowledge, Attitude, and Practice (KAP) [5,6,9,11,15,17-19].

BMI is used to determine the clinical outcome, namely body weight in a person. The ideal BMI is a range of 18.5-24.9 calculated from height and weight [23]. DRIs are used to determine the clinical effect of nutritional adequacy in dietary patterns. DRIs have an ideal range of 97-98% based on age, gender, and nutritional intake [24]. OCS is used to determine the clinical effect on someone who has a different dietary pattern with the level of concentration in learning at school. Z-Score is an indicator to determine the clinical effect of the relationship between calorie intake and disease. The Z-Score is calculated by subtracting the observed value from the population mean, then dividing it by the standard deviation [25].

The results of this review revealed two non-clinical indicators, namely COMPASS and Knowledge, Attitude, and Practice (KAP). Several studies had shown the use of the COMPASS and KAP instruments as a way to explore the depth

of insight into a good dietary pattern in junior high school students [15,18].

CONCLUSIONS AND SUGGESTIONS

This study concludes that:

1. A good dietary pattern in junior high school students can be determined based on the food type, the eating frequency, and the food amount.
2. Assessment of dietary pattern is measured by indicators for clinical outcomes, namely Body Mass Index (BMI), Dietary References Intakes (DRIs), Overall Competences at School (OCS), and Z-Score while non-clinical indicators are COMPASS and Knowledge, Attitude, and Practice (KAP).

LIMITATION

This review is limited to the literature with children aged 13-15 years. Further research can be conducted with a wider age range.

REFERENCES

1. Taylor RW, et al. Effect of a baby-led approach to complementary feeding on infant growth and overweight: A randomized clinical trial. JAMA Pediatrics, 2017; 171(9):838-46. https://doi.org/10.1001/jamapediatrics.2017.1284 PMid:28692728 PMCid:PMC5710413
2. Ji M-G, Lee M-R. The convergence relationship on stress, sugar intake behaviors, and oral health status in high school students. J. Converg. Inf. Technol., 2019;9(4):118-29. https://doi.org/10.22156/CS4SMB.2019.9.4.118
3. Giontella A, et al. Relation between dietary habits, physical activity, and anthropometric and vascular parameters in children attending the primary school in the Verona South District. Nutrients, 2019;11(5):1070. https://doi.org/10.3390/nu11051070 PMid:31091731 PMCid:PMC6566536
4. Kibayashi E, Nakade M, Morooka A. P29 association of a healthy dietary habit with dietary practices for lifestyle disease prevention and with health awareness. J. Nutr. Educ. Behav., 2020;52(7):S29. https://doi.org/10.1016/j.jneb.2020.04.074
5. Asakura K, Sasaki S. School lunches in Japan: Their contribution to healthier nutrient intake among elementary-school and junior high-school children. Public Health Nutr., 2017;20(9):1523-33. https://doi.org/10.1017/S1368980017000374 PMid:28294086
6. Matsumoto M, Hatamoto Y, Masumoto A, Sakamoto A, Ikemoto S. Mothers' nutrition knowledge is unlikely to be related to adolescents' habitual nutrient intake inadequacy in Japan: A cross-sectional study of Japanese junior high school students. Nutrients, 2020;12(9):1-12. https://doi.org/10.3390/nu12092801 PMid:32933110 PMCid:PMC7551575
7. Spielvogel I, Matthes J, Naderer B, Karsay K. A treat for the eyes. An eye-tracking study on children's attention to unhealthy and healthy food cues in media content. Appetite, 2018;125:63-71. https://doi.org/10.1016/j.appet.2018.01.033 PMid:29410047
8. Ladeira C, Carolino E, Gomes MC, Brito M. Role of macronutrients and micronutrients in DNA damage: Results from a food frequency questionnaire. Nutr. Metab. Insights, 2017;10:117863881668466. https://doi.org/10.1177/1178638816684666 PMid:28469462 PMCid: PMC5395264
9. Huang L-Y, Wahlqvist ML, Lee M-S, Chiang P-H. Dietary quality linkage to overall competence at school and emotional disturbance in representative Taiwanese young adolescents: dependence on gender, parental characteristics and personal behaviors. Nutr. J., 2018;17(1):29. https://doi.org/10.1186/s12937-018-0333-2 PMid:29471835 PMCid:PMC5822521
10. Kahleova H, Lloren JI, Mashchak A, Hill M, Fraser GE. Meal frequency and timing are associated with changes in body mass index in Adventist Health Study 2. J. Nutr., 2017;147(9):1722-8. https://doi.org/10.3945/jn.116.244749 PMid:28701389 PMCid:PMC5572489
11. Rosi A, et al. Weight status, adherence to the mediterranean diet, physical activity level, and sleep behavior of Italian junior high school adolescents. Nutrients, 2020;12(2):478. https://doi.org/10.3390/nu12020478 PMid:32069883 PMCid:PMC7071404
12. Mekonnen T, Tariku A, Abebe SM. Overweight/obesity among school aged children in Bahir Dar City: cross sectional study. Ital. J. Pediatr., 2018;44(1):17. https://doi.org/10.1186/s13052-018-0452-6 PMid:29361952 PMCid:PMC5781282
13. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. Int. J. Evid. Based. Healthc., 2015;13(3):141-6. https://doi.org/10.1097/XEB.0000000000000050 PMid:26134548
14. Moola S, et al. Checklist for analytical cross sectional studies. Joanna Briggs Inst. Rev. Man., 2017:1-7.
15. Cheng Y, Zhang Y, Ma J, Zhan S. Food safety knowledge, attitude and self-reported practice of secondary school students in Beijing, China: A cross-sectional study. PLoS One, 2017;12(11): e0187208. https://doi.org/10.1371/journal.pone.0187208 PMid:29095878 PMCid:PMC5667794
16. Huang L-Y, Wahlqvist ML, Lee M-S, Chiang P-H. Dietary quality linkage to overall competence at school and emotional disturbance in representative Taiwanese young adolescents: dependence on gender, parental characteristics and personal behaviors. Nutr. J., 2018;17(1):29. https://doi.org/10.1186/s12937-018-0333-2 PMid:29471835 PMCid:PMC5822521
17. Guevara RM, Urchaga JD, Cabaco AS, Moral-García JE. The quality of breakfast and healthy diet in schoolaged adolescents and their association with BMI, weight loss diets and the practice of physical activity. Nutrients, 2020;12(8):1-15. https://doi.org/10.3390/nu12082294 PMid:32751733 PMCid:PMC7469001
18. Majowicz SE, et al. Food safety knowledge, attitudes and self-reported practices among Ontario high school students. Can. J. Public Heal., 2015;106(8):e520-e526. https://doi.org/10.17269/CJPH.106.5213 PMid:26986914 PMCid:PMC6972454

19. Abizari A-R, Ali Z. Dietary patterns and associated factors of schooling Ghanaian adolescents. J. Health. Pop. Nutr. 2019;38:5. https://doi.org/10.1186/s41043-019-0162-8 PMid:30728067 PMCid: PMC6364425

20. Alakaam AA, Castellanos DC, Bodzio J, Harrison L. The factors that influence dietary habits among international students in the United States. J. Int. Students, 2015;5(2):104-20. https://doi.org/10.32674/jis.v5i2.428

21. Khatibzadeh S, et al. A global database of food and nutrient consumption. Bull. World Health Organ., 2016;94(12). https://doi.org/10.2471/BLT.15.156323 PMid:27994286 PMCid:PMC5153920

22. Zhou W, Xu X, Li G, Sharma M, Qie Y-L, Zhao Y. Effectiveness of a school-based nutrition and food safety education program among primary and junior high school students in Chongqing, China. Glob. Health Promot., 2016;23(1):37-49. https://doi.org/10.1177/1757975914552914 PMid:25280547

23. Borga M, et al. Advanced body composition assessment: From body mass index to body composition profiling. J. Invest. Med., 2018;66(5):887-95. https://doi.org/10.1136/jim-2018-000722 PMid:29581385 PMCid:PMC5992366

24. Matsumoto M, Hatamoto Y, Sakamoto A, Masumoto A, Ikemoto S. Breakfast skipping is related to inadequacy of vitamin and mineral intakes among Japanese female junior high school students: a cross-sectional study. J. Nutr. Sci., 2020;9:E9. https://doi.org/10.1017/jns.2019.44 PMid: 32166024 PMCid:PMC7054306

25. Mears R, Salway R, Sharp D, Shield JPH, Jago R. A longitudinal study investigating change in BMI z-score in primary school-aged children and the association of child BMI z-score with parent BMI. BMC Public Health 2020:1902. https://doi.org/10.1186/s12889-020-10001-2 PMid:33302899 PMCid:PMC7731748

26. Shoup ME. FOOD FOR KIDS: Euromonitor finds 15% of parents are happy with their child's eating habits. FOOD navigator-usa. 2019. Available at: https://www.food navigator-usa.com/Article/2019/10/02/FOOD-FOR-KIDS-Euromonitor-finds-15-of-parents-are-happy-with-their-child-s-eating-habits

27. TDEE calculator: Learn your total daily energy expenditure. https://tdeecalculator.net/

28. Newell ML, Wallis GA, Hunter AM, Tipton KD, Galloway SDR. Metabolic responses to carbohydrate ingestion during exercise: Associations between carbohydrate dose and endurance performance. MDPI J., 2018;10(1):37. https://doi.org/10.3390/nu10010037 PMid:29301367 PMCid:PMC5793265

29. de Gavelle E, et al. The willingness to modify portion sizes or eat new protein foods largely depends on the dietary pattern of protein intake. Nutrients, 2019;11(7):1556. https://doi.org/10.3390/nu11071556 PMid:31295831 PMCid:PMC6682883

30. Kratz M, Baars T, Guyenet S. The relationship between high-fat dairy consumption and obesity, cardiovascular, and metabolic disease. Eur. J. Nutr., 2015;52(1):1-24. https://doi.org/10.1007/s00394-012-0418-1 PMid:22810464

31. Newman JC, McBurney MI, Hunt KJ, Malek AM, Marriott BP. Modeling possible outcomes of updated daily values on nutrient intakes of the United States adult population. Nutrients, 2020;12(1):210. https://doi.org/10.3390/nu12010210 PMid:31941154 PMCid:PMC7019904

32. Heydenreich J, Melzer K, Flury C, Kayser B. Low energy turnover of physically inactive participants as a determinant of insufficient mineral and vitamin intake in NHANES. MDPI J., 2017;9(7):754. https://doi.org/10.3390/nu9070754 PMid:28708118 PMCid:PMC5537868

33. Yaguchi-Tanaka Y, Tabuchi T. Skipping breakfast and subsequent overweight/obesity in children: A nationwide prospective study of 2.5 to 13- year olds in Japan. J. Epidemiol., 2020:31(7):417-25. https://doi.org/10.2188/jea.JE20200266 PMid:32655088 PMCid:PMC8187609

34. Yeşilfidan D, Adana F. The impact of health behaviours development training on healthy lifestyle behaviours amongst adolescents with obesity risk: A school example in a city in western Turkey. J Pak Med Assoc. 2017;67(11):1698-703. PMid:29171563

35. Karami A, Dahl AA, Turner-McGrievy G, Kharrazi H, Shaw G. Characterizing diabetes, diet, exercise, and obesity comments on Twitter. Int. J. Inf. Manage., 2018;38(1):1-6. https://doi.org/10.1016/j.ijinfomgt.2017.08.002