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### INVESTIGATING THE POSSIBILITY OF PROVIDING A PLANT-BASED MEAL IN SCHOOLS AS A STRATEGY TO INCREASE VEGETABLE CONSUMPTION AND OBESITY PREVENTION IN INDONESIA: AN INSIGHT FROM RESEARCH IN SWEDISH SCHOOL LUNCH PROGRAM

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#### Abstract

**Introduction:** from a survey in 2018, one in five elementary-aged children and one in seven adolescents in Indonesia were overweight or obese. Lacking consumption of vegetables associated with obesity prevalence in school-aged children. Insufficient intake of vegetables in children increases seven times risk of obesity. Accordingly, providing various vegetables in school meals can be an alternative to promote vegetable consumption in children to prevent obesity. This insight comes from a prior study investigating school lunches in Sweden. Vegetarian menus are served in Swedish school lunches as a strategy to increase vegetable consumption and serve nutritious food. Therefore, serving plant-based containing food may also increase vegetable consumption in Indonesian children. **Aim:** to explore the possibility of providing a plant-based meal in Indonesian schools as a strategy to promote vegetable and fruit intake to prevent obesity in children. **Method:** This study is a narrative review that discussed the further implication of the result from a prior study about vegetarian and non-vegetarian meals in Swedish school lunch programs. Seven of 48 articles that met the criteria of the PICO framework were selected to be included in this review. **Result:** Six of seven articles highlighted that introducing snacks containing fruit and vegetable can be done through school-based intervention programs to promote fruit and vegetable intake in schools. **Conclusion:** from the result, serving a plant-based menu in school lunches seems feasible to be implemented in schools with feeding programs and may be beneficial in

preventing obesity and increasing vegetable consumption in Indonesian school-aged children.

**Keywords:** vegetable, fruit, school-meal, obesity, children

## **INTRODUCTION**

A report from Riskesdas (Baseline Health Research) 2013 showed that overweight children aged 5-12 in Indonesia reached 18.8% which classified 10.8% as overweight and 8.8% were obese (Riskesdas, 2013). It was in line with the report from Baseline Health Research 2018 that showed 1 of 5 school-aged children and 1 of 7 adolescents in Indonesia were obese (Riskesdas, 2018). Being overweight and obese is influenced by many factors mainly caused by imbalanced nutrition. One of the risk factors of obesity in children is lacking daily intake of fruit and vegetables (Anggraeni, 2016).

Consuming 4 portions/day of fruit and 3 portions/day of vegetables for children aged 10-12 were recommended by the Ministry of Health as listed in the Guidance of Balance Nutrition (Kemenkes, 2014). It can contribute to the control of excessive high-energy food consumption which has a long-term effect to reduce the risk of obesity (Roe, 2013). However, the majority population in Indonesia only consumes fruit more or less 173 g/day and vegetables 107 g/day which is unable to meet AKG (Recommended Dietary Allowance) for daily consumption of fruit and vegetable as much as 400 g/day or 4-5 portions (BMKG et.al, 2017).

One of the factors that influence children's behavior is their social environment such as school and peers. Therefore, a school-based intervention program is suitable to facilitate promoting fruit and vegetable consumption in school-aged children (de Sa, 2018; CDC, 2013). Introducing various types of fruit and vegetable and plant-based food can be implemented through school meal programs (CDC, 2013). There is a finding from research (Roe, 2013), that providing fruit and vegetable-containing snack can increase the consumption of fruit and vegetable in preschool-aged children.

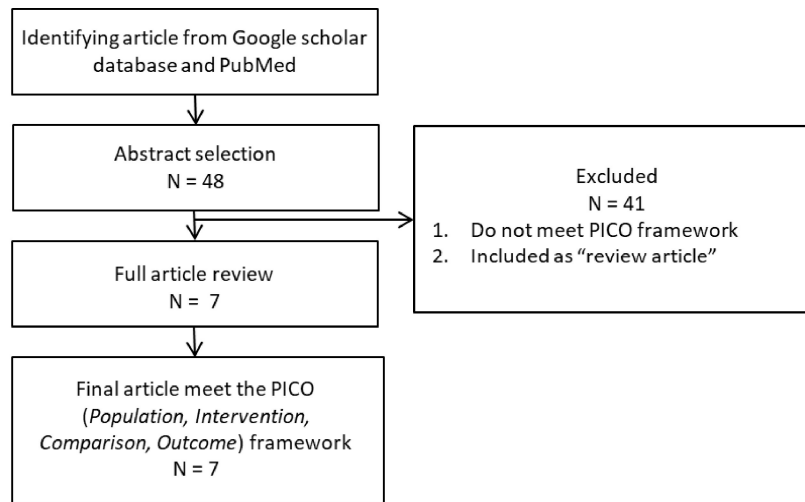
A study in the Sweden schools setting to investigate the food waste of vegetarian dishes also resulted that food waste on the vegetarian menu was not significantly different from the non-vegetarian menu which means that some vegetable-containing food was also liked by the children (Hardiyanti, et.al., 2022). The result from the same study also suggested that providing plant-based dishes in school needs to be continued to nurture students' habit of consuming vegetables (Hardiyanti, et.al., 2022). Based on these findings, the author has aimed to explore the possibility of serving plant-based food in school to increase fruit and

vegetable consumption in school-aged children which further may prevent obesity in school-aged children.

## METHODS

This writing is using the narrative review as the study design which aimed to describe and assess articles regarding a topic (Demiris, 2019). It can be used to explore a new idea or evaluate previous studies and is presented as an overview or summary of a topic without a set of rigid protocols (Demiris, 2019). This study design is suitable for the author’s aim to explore and describe the insight of providing a plant-based meal in Indonesian schools to promote fruit and vegetable consumption that is inspired by the prior study in Sweden setting.

The process of collecting, identifying, and analyzing data is displayed in picture 1. The author decided on the articles to be included based on PICO (Population, Intervention, Comparison, and Outcome) framework that is shown in table 1, and inclusion and exclusion criteria in table 2.



Picture 1. Data collection process

Table 1. PICO framework

P	I	C	O
School-aged children (5-18 years old) and/or kitchen staff	Providing plant-based dishes (vegetable and/or fruits) in school	Education about vegetable and fruit consumption with or without media	Increasing vegetable and fruit consumption to prevent childhood obesity

Table 2. Inclusion and exclusion criteria

Criteria	
Inclusion	Exclusion
<ol style="list-style-type: none"> <li>1. Articles were published in full text</li> <li>2. Articles were research paper published in Indonesia or international</li> <li>3. Articles were published in Bahasa Indonesia or English</li> <li>4. The study were in human population</li> <li>5. Articles were published between 2017 and 2022</li> <li>6. Articles were covered topic in obesity, school meal program, vegetable and fruit consumption in children and adolescents population in Indonesia</li> </ol>	<ol style="list-style-type: none"> <li>1. Articles were included as review article</li> <li>2. Articles from popular media such as television and social media</li> </ol>

## RESULTS

The result of this narrative review was gathered from seven full-review articles that meet the criteria of the PICO framework. Seven articles showed that school-based intervention programs may influence children's behavior in consuming fruit and vegetable. Most of the school-based intervention programs were using education methods with and without media. Some studies also involve teachers and kitchen staff in the education about fruit and vegetable in schools (Wayuningrum, 2021; Hadi, S.N., 2022).

Six of seven articles showed that providing a snack or food containing fruit and vegetable can increase students' knowledge about the variety of fruit and vegetable which further influence their habit of consuming more fruit and vegetable in their daily life. A study tried to modify the intervention by serving fruit and vegetable in different colors to attract children and assess their preferences (Rizkyana, O. et.al., 2017). The result of the study showed that combining two or three colors and texture in serving fruit and vegetable in children may increase their interest and appetite to take more fruit and vegetables (Rizkyana, O. et.al., 2017).

An article from a study case in West Java resulted that local food can be used to introduce a variety of fruit and vegetable and can improve nutritional status and intake in fourth-grade students (Sekiyama, 2017). Additionally, there is a finding in an article that developing school activities such as gardening in schools by planting vegetables and healthy cooking classes encourage students to consume more vegetables and fruit and increase physical activity in school-aged children (Dampang, 2018).

## DISCUSSION

Implementing a school-based intervention program might be effective to be strategy to increase the consumption of fruit and vegetable in school-aged children. It is because the school environment is a social environment where the children mostly spend their time. School is also the place where children develop and interact with their peers which also influence their habit. Therefore, nurturing healthy eating in children by introducing them to consume plant-based dishes is relevant to be implemented in schools. It is supported by the study (Power, et.al., 2008) showed that schools have an influence in shaping children's behavior so that introducing healthy food such as fruit and vegetable can be conducted in the school environment. However, children's behavior in consuming fruit and vegetables can be influenced by multifactor for instance family habits, availability of fruit and vegetable serving in the house, and media exposure (Blanchette, 2005).

Education is an important aspect of behavioral change so education about the essential role of fruit and vegetable intake in daily life is also needed in the implementation program for increasing fruit and vegetable consumption in children. The result from a study by Kusumarani et.al (Kusumarani, 2018) and Utami (Utami, 2017) showed that education about fruit and vegetable intake using media poster and comic or without media contribute to increasing knowledge and awareness in children about consuming fruit and vegetable. Increasing knowledge further contributes to better behavioral change. Educating and raising awareness to eat better is important to be started since childhood because it may influence behavior in adulthood.

From the study (Rizyana, O. et.al., 2017), it was proved that the consumption of fruit and vegetables in children may influence by the variety of the color and textures. Children are usually attracted to colorful things so introducing colorful fruit and vegetable can grab their interest and enhance their appetite to consume them. The green and orange colors are usually associated with an increase in appetite (Febriana, R., 2014; Fibrihirzani, H., 2012).

In the articles, there is a finding that involving interesting activities such as gardening and cooking classes may be effective in increasing fruit and vegetable intake in children and also physical activity which is a good way to prevent overweight in children (Dampang, 2018). This finding is in line with the previous study by Herman et al. which showed that gardening activities can increase 44% the daily consumption of fruit and vegetable (Hermann et.al, 2006). The other study by Wells et.al. also resulted that gardening in schools contributes to reducing sedentary activities in the school (Wells, et.al., 2014).

Cooking class in school can be effective to encourage students to consume fruit and vegetable because in this activity there will be an interaction between students which influence their habit. Cooking class is usually ended with eating together and this activity encourages the student to eat what is served. Also, their appetite will increase because they eat together with their peers.

## **CONCLUSION**

In summary, this narrative review concluded that serving a plant-based menu as a snack or full meal in school seems feasible to be implemented even though the implementation may be possible in school with catering service. However, for a school without a feeding program, providing a variety of fruit and vegetables such as in the canteen may still be possible. Furthermore, even though the effect of increasing the intake of fruit and vegetable is not directly reduced obesity in children, it is still beneficial to improve nutritional status and prevent obesity and other non-communicable diseases in adulthood.

## **RECOMMENDATION**

As the recommendation based on the result of this narrative review, providing snacks or dishes containing fruit and vegetable in school is recommended to create an encouraging environment for children to improve their behavior in particular regarding fruit and vegetable consumption. The type of dishes can be adjusted by the available local food and available ingredients in the area. Additionally, involving activities such as healthy cooking classes and planting vegetables in the learning process can be done as a strategy to introduce a variety of fruit and vegetable in school-aged children. Furthermore, investigating the effect of providing fruit and vegetable in school meal programs on the increasing daily fruit and vegetable intake in children can be conducted in other study designs.

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