



“I Love
Vegetables”
Initiative
to Increase
Vegetable
Consumption
Among
Children

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Soegijapranata Catholic University - Indonesia

- Background
- Aims
- Current condition
- I Love Vegetables Initiatives
- Expected Outcome
- Conclusion

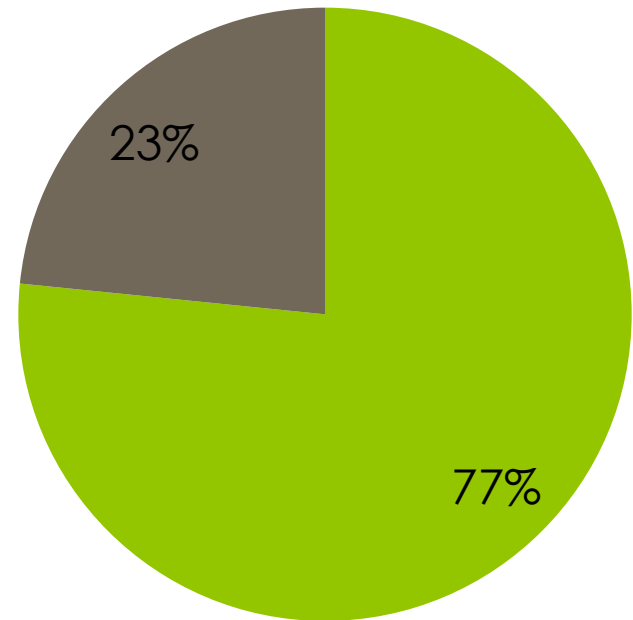
Background



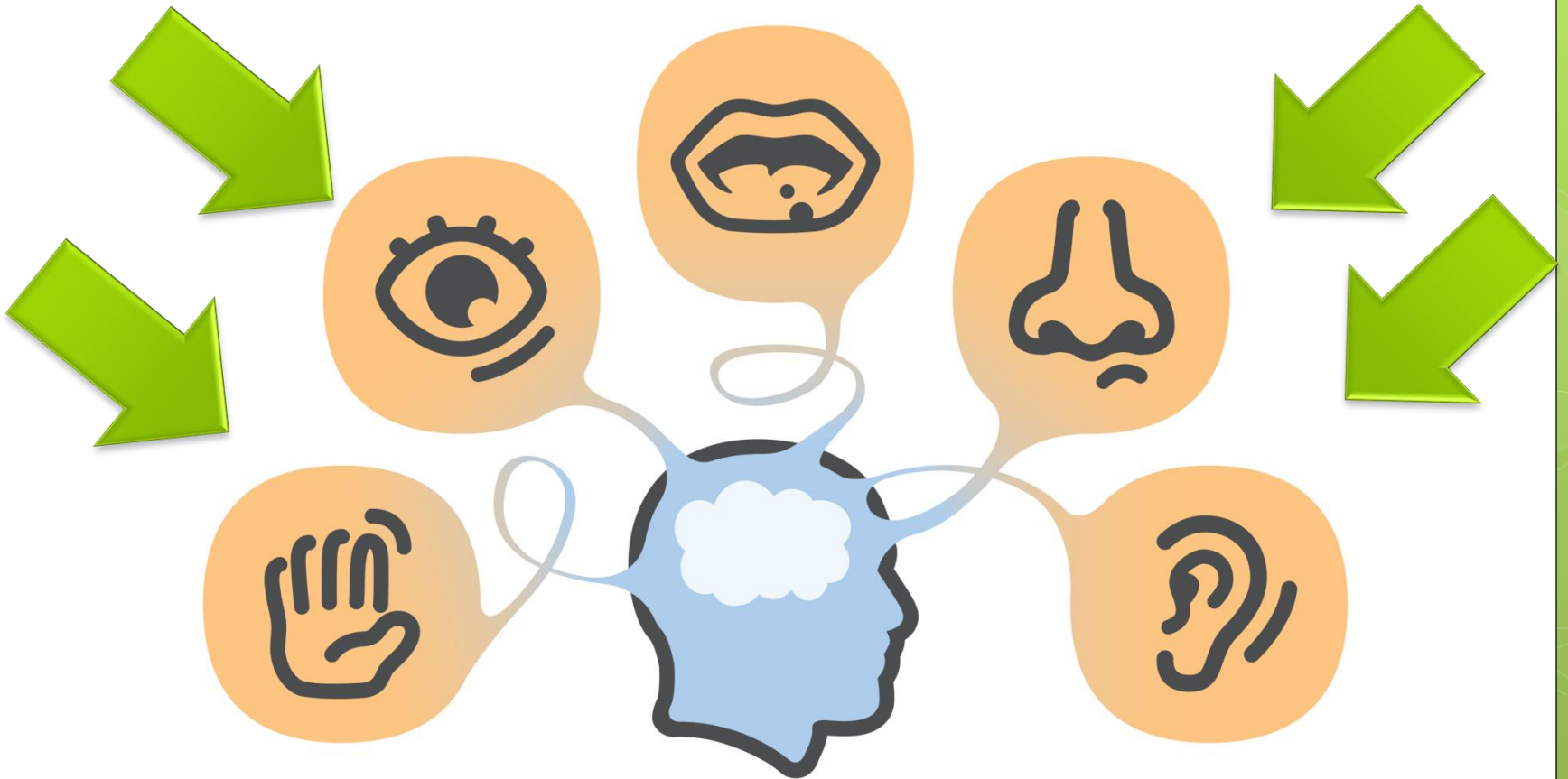
Background



- consume
- do not consume



The cause ??



Social influences

**Social Norm
and
Role Model**



Background

Eating behavior interventions have primarily focused on **increasing individual knowledge** and **awareness** through educational approaches using the mass media in settings such as schools.



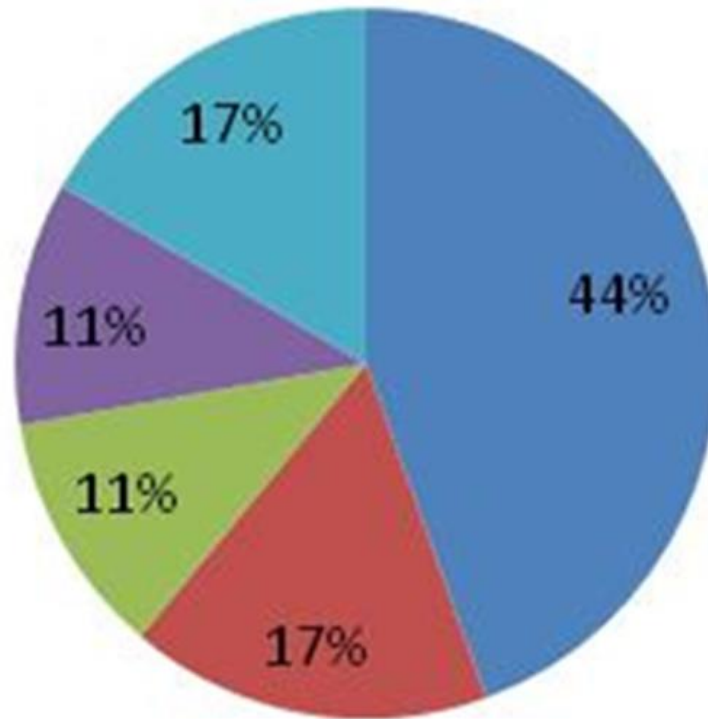
Aims

- to describe knowledge, consumption behavior, and preferences on vegetables among children and
- to introduce an "I Love Vegetable" initiative which may be a possible solution to increase children's vegetable consumption.

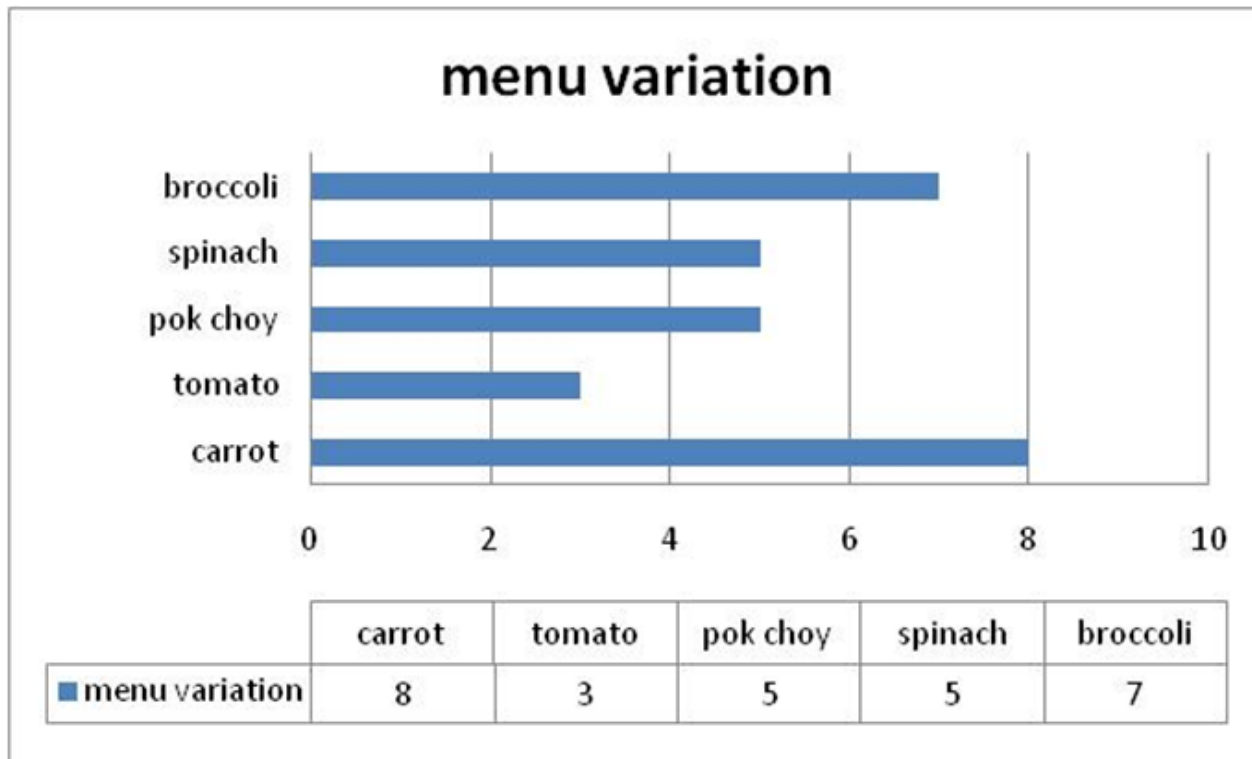
- Knowledge → 25% students could mention the names of 5 vegetables introduced, i.e. carrot, tomato, pak choy, spinach and broccoli.
 - Most student said they like vegetables.
- But
- Dietary recall → 23% student eat vegetables

Current Condition

- Pop food
- fish and seafood
- vegetables
- chicken
- other



Low Menu Variation



- So, the problems are :
 - low children's knowledge about vegetables
 - low variation of vegetables menu presented by the parents.
- Also ...
 - Popular culture's media can easily internalize children's perception and preferences.

Initiative

- Educational campaign → moderately successful
- Intervention should be tailored to the most important determinant, i.e environment and personal.

Environment

Personal

Availability and accessibility

Taste preference

Parental behaviour



Outcome expectation

Peer influence

Self-efficacy and skill

Media



knowledge

Access to school snack bar

- “I Love Vegetables” initiatives was done on a school level.
 - Kartini the Dancer Carrot,
 - Tommy the Actor Tomato
 - Rocco the Rockstar Broccoli
 - Spibam the Super Spinach
 - and Poki the Pak Choy Chef.
- In the ‘I Love Vegetable’ picturebook series, limited words are used and the main character of the book are made appealing and memorable.

Vitamin A dalam wortel sangat bagus untuk matamu, lho!

Vitamin A in carrots is very good for your eyes!



Kekuatan superku dapat mengalahkan penyakit.

My super power can defeat illness.



- Changes in OUTCOME EXPECTATION
→ The Power of MEDIA : Picturebooks
- Gives KNOWLEDGE → Name of vegetables, Nutrition (vitamin, mineral), name of dishes.
- Give parents some ALTERNATIVE MENU for vegetables such as pok-choy ice cream, carrot jelly candy, tomato pudding, breaded broccoli, and spinach risoles.

Conclusion

- Vegetable consumption among children needs to be improved by doing intervention in their environment.
- “I Love Vegetables” initiative which utilizes picture books as media is proposed to be an alternative solution to increase vegetable consumption.
- The picture books are created to give knowledge to children, change children perception about vegetables consumption outcome expectation and give menu variation to parents.

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Assumption University of Thailand



ICSAF

International Conference on Sustainable Global Agricultural and Food Security 2014

The Emerald Hotel, Bangkok, Thailand, 16 – 18 July 2014





ICSAF 2014 Program

Wednesday, July 16, 2014

Time	Topic
8.30-9.00	Registration
9.00-9.15	Opening remarks Rev. Bro. Dr. Bancha Sanghiran, Rector Magnificus, Assumption University of Thailand
9.15-9.30	Welcome speech Dr. Churdchai Cheowtirakul, Dean, School of Biotechnology, Assumption University of Thailand
9.30-10.10	Keynote speaker 1: Professor Gary M. Smith, University of California at Davis Topic: "Food for sustainable population"
10.10-10.40	Refreshments
10.40-11.20	Keynote speaker 2: Professor Glenn M. Young, University of California at Davis Topic: "Building teams of researchers that facilitate disruptive innovation for sustainable food security"
11.20-12.00	Keynote speaker 3: Professor Bhesh Bhandari, University of Queensland Topic: "Ethylene powder: future alternative to fruit ripening agent"
12.00-13.00	Lunch
13.00-15.00	<p>Oral session1: Food Microbiology and Food Safety (Tabtim/Petairoom)</p> <p>Assoc.Prof. Dr. Bernadeta Soedarini (invited speaker) "Molecular technique for food safety assurance: between global discourse and its application in Indonesia"</p> <p>Bing Huei Chen (invited speaker) "Occurrence and exposure to polycyclic aromatic hydrocarbons in kindling-free-charcoal grilled meat products in Taiwan"</p> <p>Oral Presentation (OF1) "Effect of extraction and shaking time on antibacterial activity of dry <i>Centella asiatica</i> againsts food pathogenic Microorganisms" by Dea Nathania Hendryanti</p> <p>Oral Presentation (OF2) "Adsorption of Cadmium (Cd) by various cereals" by Inneke Hantoro</p> <p>Oral Presentation (OF3) "Effect of solvent extraction on Antioxidant activity and Antibacterial activity against <i>Salmonella enteric</i> Enteritidis (human)" by Supawan Rattanakom</p> <p>Oral Presentation (OF4) "The antimicrobial, antioxidant activities and chemical profile of <i>Centella asiatica</i>" by Patchanee Yasurin</p>



Time	Topic
13.00-15.00	Oral session2: Industrial Biotechnology, Microbial Biotechnology and Molecular (Petchchompoo room)
	<p>Dr. Churdchai Cheowtirakul (invited speaker) “A study of lime beer formulation”</p> <p>Oral Presentation(OB1)“Characteristics of activated carbon derived from bacterial cellulose and its application as a catalyst support” by Lamphun Phanthang</p> <p>Oral Presentation (OB2) “Characterization and purification of cellulase enzyme produced by <i>BacillusMSB12</i>” by Malinee Sriariyanun</p> <p>Oral Presentation (OB3) “Development of bacterial cellulose as alumina catalyst support for ethanol dehydration” by Miftahfarid Ibn Abdulwahab</p> <p>Oral Presentation (OB4) “Site-specific mutagenesis study of the tomato (<i>Lycopersico nesculentum</i>) polyphenol oxidase Cys-His thioether bond” by Atittaya Tandhanskul</p>
13.00-15.00	Oral session 3:Plant Biotechnology
	<p>Oral Presentation (OB5) “Adsorption of congored from aqueous solution by adsorbent derived from bacterial cellulose” by Kantapong Lerdwitee</p> <p>Oral Presentation (OB6) “Detection of Orcinol-O-methyl transferase enzyme encoding gene in East Asian rose <i>Rosa multiflora</i>” by Yen Le</p>
15.00-15.20	Refreshments
15.20-16.00	Poster session I (PF1-18)
18.00-20.00	Welcome dinner (cocktail)

Thursday, July 17, 2014

Time	Topic
8.30-9.00	Registration
9.00-9.45	Keynote speaker 4: Prof. Edgar Chambers, Kansas State University Topic:“Food Security, Sustainability, and Consumer”
9.45-10.15	Poster session II (PB 1-11)
10.15-10.30	Refreshments
10.30-12.00	Panel discussion: Working for mutual benefit between university and industry
12.00-13.00	Lunch
13.00-15.00	Oral session 4: Product Development and Sensory Evaluation (Tabtim/Petairoom)
	Oral Presentation (OF5) “Sensory profiles of commercial lotions in Thailand and the effect of product information on consumer’s acceptance scores” by Waruntorn Kaewkeeree



Time	Topic
	<p>Oral Presentation (OF6)“Banana peel powder from two processing methods: physico-chemical properties and application in food product” by Helen Teh</p> <p>Oral Presentation (OF7)“Differentiation of aromatic tea” by Kamolphan Ruengdej</p> <p>Oral Presentation (OF8)“Correlation between children’s snack preference and parent’s income, education, and job in elementary school Sleman Yogyakarta” by Fatma Zuhrotun Nisa</p> <p>Oral Presentation (OF9)“I Love Vegetables ”initiate vein promoting vegetables consumption among children” by Novita Ika Putri</p> <p>Oral Presentation (OF10) “Comparison of acceptance scores as a norm for food and non-food product: case study of orange juice and body lotion” by Paulina Gandhes Dian</p> <p>Oral Presentation (OF11) “Non-alcoholic beer”“Occurrence and exposure to polycyclic aromatic hydrocarbons in kindling-free-charcoal grilled meat products in Taiwan” by Catherine Nabbala Ssepuuya</p>
13.00-15.00	<p>Oral session 5: Bioenergy and Green Technology (Petchchompoo room)</p> <p>Oral Presentation (OB7) “Effect of diluted ionic liquid on pretreatment of rice straw prior to enzymatic saccharification” by Kraiwit Pranneau</p> <p>Oral Presentation (OB8) “The screening of cellulose producing bacteria from Thailand natural source for biofuel production” by Treuktongjai Saenghiruna</p> <p>Oral Presentation (OB9) “Optimization of screw press and alkali soaking pretreatment of wheat straw for application in bio fuel production” by Wawat Rodiahwat</p> <p>Oral Presentation (OB10) “Rapid and accurate determination of alkalinity (NH₃)in para rubber latex by FT-NIR spectroscopy” by Sureeporn Narongwongwattana</p> <p>Oral Presentation (OB11) “Nitrogen footprint analysis of home-based tofu production in West Kalimantan, Indonesia” by Budi Widianarko</p>
15.00-15.20	Refreshments
15.20-16.30	<p>Oral session 6: Food Chemistry (Tabtim/Petai room)</p> <p>Dr. Le Quang Tri(invited speaker) Topic:“Producing slowing digestible rices tarch by maltogenic amylase modification”</p>



Time	Topic
	<p>Oral Presentation (OF12) “Effect of myrosinase activity on glucosinolates content along the production of <i>Sayur Asin</i>” by Probo Y. Nugrahedi</p> <p>Oral Presentation (OF13) “Selected physicochemical properties of pineapple juice as affected by electro dialysis reduction of nitrate” by Yuwadee Ackarabanpojoue</p> <p>Oral Presentation (OF14) “Evaluation of the effect of drying temperature on the production of instant low glycemic index Garut (<i>Marantha arundinacea</i>) porridge” by Kartika Puspa Dwiana</p>
15.20-16.30	<p>Oral session7: Food Processing and Engineering (Petchchompoo room)</p> <p>Oral Presentation (OF15) “Microencapsulation of freeze dried red beet extract with maltodextrin” by Victoria Kristina Ananingsih</p> <p>Oral Presentation (OF16) “Effect of nitrate on pink color defect in cooked chicken breast” by Chutinun Mooneewan</p> <p>Oral Presentation (OF17) “Effect of ohmic pretreatment at different electrical field strengths on yield and quality of lime oil obtained from hydrodistillation” by Netsai Boonchoo</p> <p>Oral Presentation (OF18) “Effect of tumbling speed and vacuum condition on marinade uptake of skinless boneless chicken breast” by Suvaluk Asavasanti</p>
16.30-17.00	Poster award and closing remarks



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“I Love Vegetables” Initiative to Increase Vegetable Consumption among Children

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Abstract

Vegetables are the main source of micronutrients such as vitamins and minerals. Intake of micronutrients is essential especially for children. Unfortunately, children's consumption of vegetables is low. This paper aims to (1) describe knowledge, consumption behavior, and preferences on vegetables among children, (2) to introduce an "I love vegetable" initiative for children by using picture books. The possible motives on vegetable consumption will also be discussed. A small survey was done to a population of 4-8 years old children, which shows that most children stated they like consuming vegetables. However, the result of dietary recall shows that only 8 out of 35 children did eat vegetables. The lack of vegetables consumption may lead to micronutrient deficiency which may cause growth disorder and health problems in children. Sensory preferences are believed to be the most determinant factor of vegetable consumption in children. However, sensory preferences, especially in children, are not determined solely by senses. Children sensory preferences are strongly affected by their knowledge and perception about the food and environmental factors such as social norm and role model. Some studies show that children preferences can be altered through some social context. Popular culture is one of the media which may be able to alter the sensory preferences in children by educating the children to internalize the value or to change perception. One of the initiatives to internalize value and change children perception is reading bilingual "I Love Vegetables" picture books series.

Keywords: Vegetable Consumption, Children, picture books

Introduction

Low vegetable consumption among children in South East Asia is becoming a concern to most communities. Low vegetable consumption may lead to nutrition, especially micronutrition, deficiency. Even worse, micronutrition deficiency in children may lead to some serious problems. Micronutrients deficiency in South East Asia, as reported by WHO and other institution reflects a low vegetable consumption since the major source of micronutrients is fruits and vegetables. South East Asia suffers from Vitamin A and C deficiency (WHO, 2009; Khan & Iqbal,

2006). WHO also estimates that one out of two preschool children in developing countries are iron deficient. The greatest number of population with anemia caused by iron deficiency is in South East Asia with a 315 million population (WHO, 2008).

Higher intake of vegetables can contribute improvement to nutrients deficiency. However, previous survey-based study shows that children do not like to eat vegetables. A study done in Semarang, where "I Love Vegetable" initiative started, shows that 76,6% children were not consuming vegetables everyday. Meanwhile, WHO recommends



consumption of vegetable and fruits at least 400 gram per day (Nurhayati, 2003).

Low vegetables consumption in children can be caused by many factors. Children's consumptions of vegetables can be associated with the child's liking for vegetables or in other words, sensory preferences of the children. However, sensory preferences in children may not be the result of sensing the food only, but may also be caused by children's environment.

Many studies explain a strong environmental influence on food choices. Environmental influences include food availability, price, promotion, and social influences such as social norms and role models. Therefore, eating behavior interventions have primarily focused on increasing individual knowledge and awareness through educational approaches using the mass media in settings such as schools. (French & Stables, 2003).

A review by Blanchette & Brug (2005) shows that television viewing/advertisement also influenced children's food choices. Television viewing was inversely associated with fruit and vegetable intakes. These may be the result of the replacement of fruit and vegetables by foods advertised on television, such as snack food. This shows the power of media to influence children's diet preferences. Therefore, to do an intervention in order to increase children's vegetable consumption, a popular culture media is believed to be an effective way.

This paper aims to describe knowledge, consumption behavior, and preferences on vegetables among children and to introduce an "I Love Vegetable" initiative for children by using picture books which may be a possible solution to increase children's vegetable consumption.

Methodology

An interview was done as a pretest to understand the knowledge and behavior of children regarding vegetable consumption. The

respondents were both the children and parents. The interview was performed by using a simple questionnaire. The questionnaire contains questions about children knowledge on vegetables, children preferences on vegetables, and children behaviour. To elaborate the data obtained from the interview, literature review was done. Based on the obtained result, an initiative called "I Love Vegetables" in the form of a series of picture books were created. Prior to these creation, an interview was performed to children age 4-7 years old to acquire their preference on the types and characters of the picture books. These picture books were then published and socialized to the children sample. A post-test, in the form of interview, will be done to see the result and effectiveness of the picture books as media to internalize values and increase vegetables consumption of children.

Result and Discussion

The result from a survey on 35 students at the age of 4-8 years old shows children's knowledge about vegetables, where only 25% of the student can mention the names of 5 vegetables introduced, i.e. carrot, tomato, pak choy, spinach and broccoli. Most of the students were able to guess carrot and broccoli because they have distinctive features, however most of them have difficulty in guessing which vegetable is pak choy and spinach. Some of the children do not even know the names of the last two vegetables.

There were no indication that the children have knowledge regarding the name of the vegetables with the consumption of those vegetables. Even though they know the name of vegetables, their favorite food is still the popular food such as fried chicken (in fast food chain restaurant), pizza or Japanese food found from a fast food chain restaurant. Figure 1 shows the proportion of the students which favor popular culture food types rather than home made or restaurant food, which mainly contain vegetables.

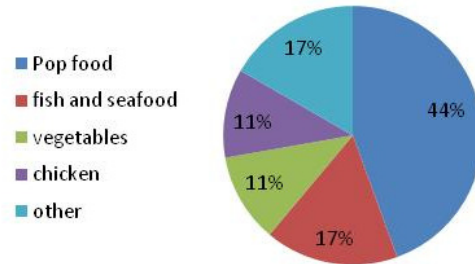


Figure 1. Favorite Food of Children

However, when asked in the interview, most of the children answered that they do like vegetables. But when a dietary recall was done, only 23% student ate vegetables. This might indicate that the children actually know that they are expected to like vegetables. They understand that they need to eat vegetables but children still prefer not to consume vegetables. This may be a result of environmental factors which may affect their sensory preferences.

A review by Blanchette & Brug (2005) stated that education campaign is only moderately successful in promoting vegetables consumption among children. Interventions aiming to improve behaviours should be tailored to the most important determinants or mediators of these behaviours in order to be successful. Blanchette and Brug mentioned two determinants, i.e environment and personal. The possible environmental determinants most frequently observed were availability and accessibility of fruits and vegetables, parental behaviour (parental consumption/modelling and child-feeding practices), peer influences, media (television viewing/advertisement) and access to school snack bars. For personal determinants, taste preference, outcome expectations, self-efficacy and skills, and knowledge were examined. The creation of "I Love Vegetables" picture books as initiatives is trying to do intervention in the aspect of media, outcome expectations and knowledge.

Children sensory preferences may also be affected by the low variation of vegetables menu provided by the parents. From the result of survey to the parents shown by Figure 2, menu variation provided by parents in the house is not many. Carrot is the vegetables that parents usually cook in several forms, including soup, stir-fried, or cap-cay (a Chinese

food). Other vegetables like tomato even has as low as 3 in the menu variation.

From the pre-test survey results above, it can be concluded that there are problems such as low children's knowledge about vegetables, low variation of vegetables menu presented by the parents. It also can be concluded that popular culture's media can easily internalize children's perception and preferences. Based on these facts, an initiative were created to solve the problem which caused low vegetables consumption in children.

"I Love Vegetables" initiatives was done on a school level. It was done by creating a series of picturebooks featuring five vegetables as the main character, i.e. Kartini the Dancer Carrot, Tommy the Actor Tomato, Rocco the Rockstar Broccoli, Spibam the Super Spinach, and Poki the Pak Choy Chef. Perry et al. (1998) reported that multicomponent school-based programs, including intervention program, conducted in 20 elementary schools, can increase fruit and vegetable consumption among children.

In the making of "I Love Vegetables" picturebooks, an interview with purposive sampling of 35 children 3-6 year-old was performed to gain insight about childrens preferences in book reading. In the interview, which also showed samples of book types and features, it was found that the children love to read books that have more visuals rather than verbal texts in capturing information. This result is the same with an experiment done by McNeal & Ji (2003). Henceforth, in the 'I Love Vegetable' picturebook series, limited words are used and the main character of the book are made appealing and memorable. A page sample of the carrot and spinach series is shown in Figure 3 below.

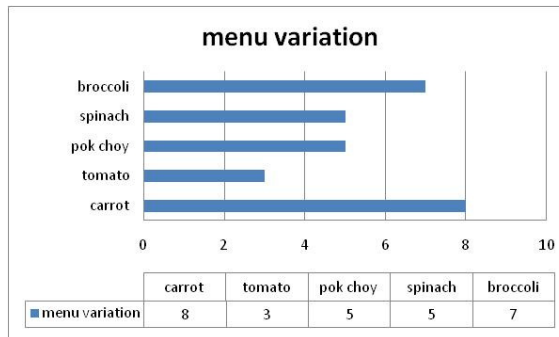


Figure 2. Menu Variation for Vegetables



Figure 3. Part of the Pages in “I Love Vegetables” Picturebooks Series

The picturebooks series are intended to change perception, inform children and parents about vegetable nutritional value and how to give more variation to vegetable menu. As reviewed by Blanchette and Brug (2005), media can have a big influence in children's behaviour. Television and advertisements viewing snack foods can significantly reduce fruit and vegetables consumption and replaced them with the snack food, which often omit or if any vegetables are used are usually in very low usage. This, however, gives the understanding that an intervention done through correct media may also change the behaviour of not wanting to consume vegetables daily. The media used in “I Love Vegetables” initiatives is picture books which is believed to be popular among children in the age of 4-8 years old.

“I Love Vegetables” picture books series are expected to adjust children's outcome expectation of vegetables. Outcome

expectation is the perceived positive and negative consequences of fruit and vegetable intake, which usually include health, physical and social outcome expectancies. Most children have a negative perception for eating vegetables. This may result from the habit and environmental drives. For example, vegetables are rarely being used as a reward. Instead, snack and sweets are often used more as a reward which will eventually increase the liking of this type of food. On the other hand, when children are given reward if they consume vegetables can result in further decreased liking for the vegetable which a reward is offered.

With “I Love Vegetables” picture books, children's perception for vegetables will hopefully turn into a positive outcome expectation. The desired outcome expectation is that vegetable consumption can lead to healthy and strong body like pictured by the characters in the picture books. Through the



picture books, the media also give knowledge to children about names of vegetables and their nutrition contents, such as vitamin A, vitamin C, magnesium, iron, etc. This knowledge is given also to promote vegetable consumption since knowledge is one of determinant of children consumption (Blanchette & Brug, 2005).

The low consumption of vegetables among children may also be caused by low menu variation provided by the parents. Therefore, a recipe is included at the back of each picture books to give parents alternatives for the kinds of vegetable menu to serve to children. The menu provided is not just a dish, but creative menu which most children will most likely prefer such as pok-choy ice cream, carrot jelly candy, tomato pudding, breaded broccoli, and spinach risoles.

In order to see how effective the “I Love Vegetables” series books are in increasing children’s vegetable consumption, a post-test will be conducted to study the behaviour change towards vegetable consumption in children and their parents. The post-test study will be used to analyze how picturebooks affect children’s perception about vegetables and how the recipe provided can give more menu variation for parents to eventually affect children’s vegetables consumption.

Conclusion

Vegetable consumption among children needs to be improved by doing intervention in their environment. “I Love Vegetables” initiative which utilizes picture books as media is proposed to be an alternative solution to increase vegetable consumption. The picture books are created to give knowledge to children, change children perception about vegetables consumption outcome expectation and give menu variation to parents.

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