

## Healthy and Tasty: Focus Group Research on Vegetable Consumption among Children Aged 9 to 12

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### ABSTRACT

Focus groups were used to explore attitudes to vegetable consumption among children aged between 9 and 12. Group meetings were used to gather data concerning habitually consumed foods (both in the home and at school), preferred meals, most consumed vegetables, motives for vegetable consumption and non-consumption, the perceptions of vegetable-eating and non-vegetable-eating children, and children's suggested vegetable-based products. Major vegetable consumption drivers and barriers were analysed from the children's perspective. The focus group data showed that certain sensory factors (taste, appearance and texture) are powerful consumption drivers. The identity and the creativity of the person who prepares the meals as well as vegetable consumption habits in the home were also found to have a major impact on attitudes towards consuming vegetable among these children.

### KEYWORDS

Vegetables; Consumption; Children; Focus Group.

### INTRODUCTION

The most recent Global Burden of Disease analysis estimated that 4,9 million deaths per year were attributable to insufficient fruit intake and 1,8 million were attributable to insufficient vegetable intake [1]. A low consumption of fruits and vegetables (FV) has been associated with increased risk of developing certain types of cancer and cardiovascular disease, as well as increased risk of stroke, obesity and diabetes [2-5]. Currently, a minimum daily FV intake of 400 g is recommended and the promotion of FV in the diet has become a priority for several governments in recent years [6, 7].

Low FV intake among children increasingly has become a cause for concern in many countries, like the USA, where children do not consume the five daily servings recommended [8]. In the UK, only 20% of children aged between 5 and 15

consume the recommended amount of FV on a daily basis, the intake of vegetables being particularly low, with an average of one serving per day [9]. In Germany, 70% of children consume fewer than two servings of vegetables per day [10]. There are lots of researches from US and Europe that allow to see the low intake of FV and their reasons but in other places like Uruguay, are limited.

Fruit and vegetable consumption in Uruguayan households amounts to an average of 246 grams per capita per day in urban areas and is dependent on income level [11]. In Montevideo, 28% of preschool children (between 3 and 5 years of age) do not consume vegetables (fresh and/or cooked) and 72% of them only do so once or twice a week [12].

The low consumption of FV in children is directly related to

their family environment, which is believed to influence consumption through a variety of mechanisms, including exposure to more FV, the availability of FV in the home and the FV consumption model provided by parents [13, 14]. Daily exposure to a vegetable provided by parents has been found to significantly improve a child's liking for that vegetable, whereas exposure to a variety of vegetables, as opposed to just one, has been found much more effective at increasing the probability of the child's consuming a new vegetable [15, 16]. Actions performed by parents at meal times have also been found to influence vegetable consumption [17].

In this context, the promotion of vegetable consumption among children is critical, as diet quality tends to persist or even decrease after early childhood [18]. While consumption patterns among adults depend on a number of factors, children eat foods they like [19, 20]. A child's liking for a particular food is a strong predictor of the amount of that food eaten by the child, so it is necessary to increase children's liking for vegetables in order to increase consumption [21]. The promotion of children's liking for vegetables and their incorporation in children's diet is a challenge and the identification of strategies for increasing vegetable acceptance and liking constitutes an initial step toward that end [22, 23].

Qualitative research can be defined as a natural approach to different facts, situations and events in which a set of methods can be used to generate information that is not classified into predetermined categories, but used to provide insight into people's life experiences by capturing the meaning of interactions and the language used. Qualitative research seeks to understand the behavior underlying consumer preferences by exploring the appraisals made by participants from their point of view [24-26].

One of the qualitative research tools most widely used in food science studies is the focus group [27, 28]. Focus groups for the development of marketing strategies have been described as a *"carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment"*, using tools and techniques appropriate to the study theme [29-31].

Working in focus groups also allows the use of projective, unstructured, indirect techniques of data gathering, enabling consumers to project their motivations, beliefs, attitudes or hidden, underlying, often unconscious feelings [32-34]. These projective techniques are based on the psychoanalytic concept that consumers tend to project onto other persons or situations their own unconscious contents and personality traits when prompted by unstructured questions, stimuli and formats. Contents may be projected when they are felt

by the individual to be unacceptable, embarrassing or "unconfessable" [25]. Examples of projective techniques include graphic expression techniques which consist in providing a subject with a verbal prompt to elicit a graphically expressed response, such as a drawing, facilitating the generation, creation and communication of ideas. A drawing can give an account of details and concepts that cannot always be conveyed verbally, and is a rich source of information on the subject of inquiry [35].

There are few descriptions in the literature of the use of focus groups with children. Stafstrom worked with children with epilepsy aged 7-18 years and hypothesized that art therapy focus groups would enhance the self-image of children and adolescents with epilepsy [36]. With respect to foods, Cullen conducted a study with children aged 9-12 years into the influence of social context and availability and ease of access to FV on children's diets [37].

The aim of this study was to use the focus group technique to explore motivations and barriers for vegetable consumption among children aged 9-12 in Uruguay.

## MATERIALS AND METHODS

Group meetings were held in the second and third weeks of November 2015.

### Recruitment

The study was carried out in Montevideo, capital of Uruguay, where are living more than 50% of Uruguayan people. The authorities of two private schools in Urban Montevideo were contacted and they asked parents with children in the school to give permission for their children to participate. Demographics family backgrounds are similar in the two participating schools. Parents were told that a meeting would be held with children within school premises in order to gather information about foods, without specifying which food type would be discussed. Focus groups were held with the children receiving parental permission. Fourteen children (4 girls and 10 boys) recruited in the first school were divided into 2 groups of 7 children. In the second school, 21 children (11 girls and 10 boys) were divided into 3 groups of 7.

### Design and Testing of the Meeting Development Plan

The moderator was provided with general guidelines for conducting the group meetings. The guidelines drafted by the authors provided a stepwise scheme that included questions to be asked by the moderator. The draft guidelines were adjusted based on a pilot trial with a group of students in the same age range as those participating in the study. The pilot trial included the use of drawing as a projective technique.

**Focus group meetings**

School rooms used as venues for the group meetings were suited to group activities: they were spacious, free from distractors and soundproof. Each focus group meeting lasted approximately 40 minutes. All the focus groups were conducted by a moderator-researcher and were also attended by two research assistants acting as observers.

The focus group meeting development plan of the focus groups is shown in (Table 1). In Stage 1, in order to introduce children to the subject of foods and to make them feel at ease, they were given paper, pencils and coloured pens, and they were instructed to “make a drawing of what they usually eat at home for lunch and dinner and what they like eating”, since, according to Krolner, children report FV in terms of “what they like” and “what they don’t like” [38]. Later, in Stage 2, they were provided with a colour printed list of 20 vegetables accompanied by photographs. The list comprised those vegetables available on the local market (Table 2). The children were asked to mark on the list whether they knew each vegetable and whether they habitually consumed it.

In Stage 3, the meeting proper began with general questions about foods habitually eaten by the children and a discussion of the drawings from Stage 1, leading towards the topic of consumption of vegetables. The children were asked to explain why they did or did not eat vegetables. They were also asked to describe children who consume vegetables and children who do not.

Finally, the children were again given paper and coloured pens and were asked to make another drawing, in this case of an “innovative” product that they would like to eat and that contained mainly vegetables.

**Table1:** Focus group meeting development.

<b>Stage1</b>	Materials: paper, pencils and coloured pens Task: “Make a drawing of what you usually eat for lunch and dinner at home and what you like eating.”
<b>Stage2</b>	Self-report: “Are you familiar with this vegetable? Do you usually eat this vegetable?”
<b>Stage3</b>	Meeting development: Themes: What children habitually consume in their homes and at school. Children’s preferred foods. Vegetable consumption. Motives for vegetable consumption. Motives for non-consumption of vegetables
<b>Stage4</b>	Materials: paper, pencils and coloured pens Task: “If someone told you that they could make a new product using vegetables, what would you recommend them to make for it to be tasty? Please make a drawing of the product that you would like.”

**Interpretation of Results**

Meetings were recorded and then transcribed for use as the basis for the analysis. The group moderator and the research assistants reviewed each transcription, and compared their notes taken during the focus groups for accuracy. All the verbatim comments were also transcribed.

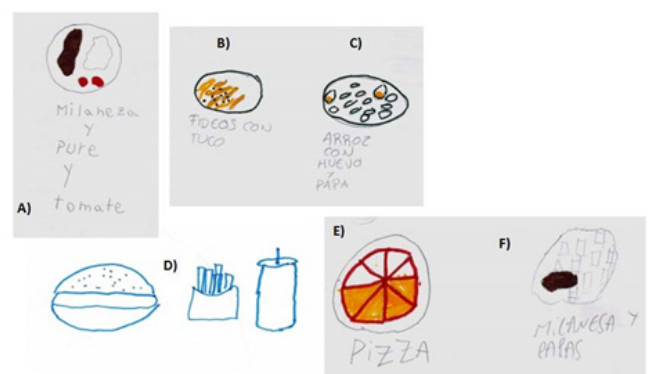
In order to obtain reliable results, the transcribed data were coded independently by the three researcher of this study, and consensus was reached afterwards. Each code was categorized according to the children’s topics of interest. Analysis was facilitated by QSR International’s NVIVO- Free trial version software (QSR International, Pty. Ltd.).

For each of the vegetables on the list, frequency of mention of familiarity and consumption was measured and results analyzed. The categorization of data obtained from the drawings provided a preliminary insight into aspects of innovative vegetable-based products that the children would find appealing. The remarks and accounts made by each child were interpreted for underlying meaning.

**RESULTS**

The drawings made in Stage 1 (Figure 1) reflected the scarce presence of vegetables in dishes habitually consumed and liked for lunch and dinner: noodles with tomato sauce, pasta with mushroom sauce, fried breaded steak with rice, hamburgers, pizza, oven-baked potatoes and sweet potatoes, beef or chicken steak with mashed potato, chicken nuggets, French fries, steak sandwiches, soups and stews.

**Figure 1:** Children’s drawings showing what they like eating. A) Fried breaded steak with mashed potato and tomato, B) Noodles with tomato sauce, C) Rice with egg and potato, D) Hamburger, French fries and soft drink, E) Pizza and F) Fried breaded steak with potatoes.



All the children reported habitually eating at least one vegetable from the list. The number of habitually eaten vegetables varied between 3 and 20, averaging 10. Tomato, lettuce, corn, peas and carrots, followed by sweet red peppers, onions and pumpkin, were the most habitually consumed vegetables

among all the children (Table 2).

**Table 2:** List of vegetables habitually consumed by the responding children.

Vegetable	Consumed by (% of children)
Tomato	94.3
Corn	88.6
Lettuce	88.6
Carrot	82.9
Peas	82.9
Sweet red pepper	77.1
Onion	71.4
Pumpkin	68.6
Spinach	54.3
Squash	54.3
Chard	45.7
Beetroot	42.9
String beans	34.3
Cabbage	31.4
Broccoli	28.6
Cucumber	22.9
Aubergine	14.3
Horseradish	14.3
Cauliflower	5.7
Brussels sprouts	2.9

Vegetable consumption motives emerged from the analysis of group sessions. Motives were categorized in the following clusters: sensory attributes, age-related factors, enjoyable meals that contain vegetables, consumption habits in the home and emotionally close persons associated with vegetable consumption, all of which promote intake of vegetables.

**Sensory attributes**

The children mentioned the vegetables that they liked best in terms of taste, which were beetroot, lettuce, tomato and carrots, and those they liked least, which were broccoli, spinach, chard and cabbage, on account of what was perceived as their bitter or unpleasant taste. Soft textures were perceived as disagreeable and colour was an attractive attribute that incited consumption.

*“I like the taste of carrots”*

*“I like tomato, lettuce and carrot; they are not bland”*

*“I like salad with vinegar dressing”*

*“I like beetroots because of their colour”*

*“I don’t like aubergines because they are very bitter”*

*“I don’t like the taste of cabbage because it’s horrible; nor do I like the taste of spinach and chard, because they are bland and taste bad”*

*“Cabbage tastes really bad”*

*“Broccoli is soft when you chew it; yuck!”*

*“When you look at them you realize you won’t like them”*

Some children reported using flavourings to mask the taste of vegetables, as shown by the examples *“I add mayonnaise, or sometimes soy sauce”, “cabbage with apple is very tasty”*.

Olive oil and ketchup were also mentioned as dressings.

**Age-related factors**

The children in this study (aged between 9 and 12) perceived themselves as *“older”* children, a fact that has implications in their vegetable consumption habits. *“I started to eat some vegetables in general when I was about 9.”*

*“As you grow up you realize what you really like eating.”*

*“As a little girl, you get used to eating only one thing, because that is what you are fed as a baby and later you are given a variety of meals; and it is only then that you start to eat vegetables.”*

*“As a little girl, I left peppers aside from my meals; I used to say that I didn’t like it and I never tried it. I started to eat it only recently and I really like it.”*

In contrast with the above, one girl reported *“I used to eat a lot of vegetables when I was small, until I tried hamburgers and fries.”*

**Preferred meals and vegetables**

Among dishes containing vegetables, salad was reported by these children to be the one that promotes vegetable consumption and was among the vegetable meals preferred by these children.

*“I like salads with cabbage, tomato, carrot, onion and beetroot; I even like the onion in it.”*

In all the group meetings, lettuce and tomato salad was reported to be the most frequently eaten. Other preferred vegetables included in salads were the following:

*“What I most like is onion; mi mother says that as a little girl I would always ask for more of it.”*

*“I really like tomato; I sometimes eat it as if it was an apple.”*

*“Lettuce with salt is absolutely delicious.”*

*“Cabbage with apple and carrot is really tasty.”*

*“Beetroot with onion.”*

*“Salad with potato, peas, carrots and mayonnaise.”*

Tomato is usually present in sandwiches and hamburgers, as is lettuce in the latter case. Vegetables are often consumed together with other types of preparations like meat in general and specifically grilled beef, fried breaded steak and hamburgers, which are also served with mashed potato, pasta and salads. To a lesser extent tomato is consumed in pizzas.

The children expressed preferences for more substantial

meals in which vegetables are not prominent, such as meat pies (e.g., shepherd’s pie) or grilled beef with tomato and lettuce salad.

*“I usually eat ham and cheese fried in bread crumbs with chopped spinach.”*

*“Shepherd’s pie with spinach and tomato.”*

*“Stuffed squashes.”*

*“I like few vegetables and I always have them mixed with something else.”*

**Consumption habits in the household**

The children reported that throughout their lives they have been motivated and able to choose to eat vegetables, since a variety of vegetables has been available in their homes.

*“Maybe children who don’t eat vegetables tried only one of them and thought that they were all the same.”*

The children said that some children do not consume vegetables because they have not been pressured to do so at home and did not eat them at an early age:

*“Their parents didn’t force them to eat vegetables.”*

*“Some children have gotten so used to the taste of junk food that they haven’t liked other foods that they tasted later.”*

*“Because they were not familiarized with vegetables when they were little.”*

*“Because they never eat vegetables in their homes.”*

One child who was not exposed to the habit of consuming vegetables in his home perceived those who consumed them as “weird”, highlighting the importance of generating healthy practices in the family environment.

**Emotionally-bonded models**

The responding children reported that their parents, followed by their grandparents, aunts and uncles, as well as other persons with whom they have emotional ties, encouraged their intake of vegetables.

*“My father makes the most delicious beef empanadas; because he puts more care and love into it, they are tastier than others.”*

*“On Sundays, my mother makes a delicious pie.”*

*“I very much enjoy eating hamburgers with my family on weekends; they are made with lettuce, tomato, even fried eggs and mozzarella cheese; a full hamburger.”*

*“My brother’s girlfriend makes a cake with vegetables; she makes it with love and I like it very much.”*

One boy said that in addition to the care with which his parents prepare meals, “you know what your parents put in your meals and the care with which they prepare them”, and “you can be more confident of eating what’s in them”.

Descriptions of those children who enjoyed eating vegetables

and those who did not are shown in (Table 3).

To conclude the session, each of the children was asked to make a drawing of a mainly vegetable-based product that would taste good. When the drawings were analysed, the products were divided into categories according to their described characteristics, as shown in Table 4. Examples of drawings are shown in (Figure 2).

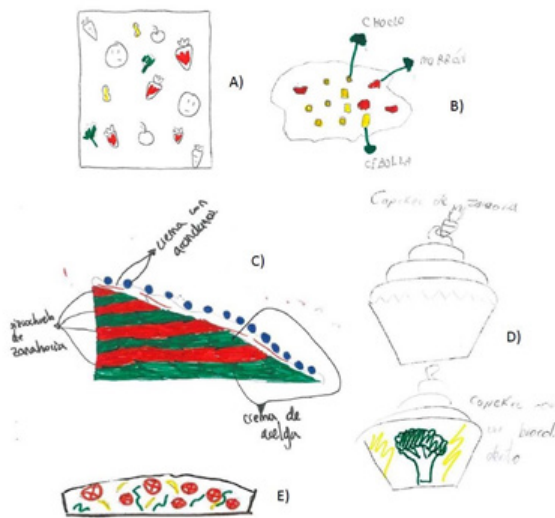
**Table 3:** Perception of children who consume vegetables and those who do not.

Perception of children who eat vegetables	Perception of children who do not eat vegetables
Positive comments: “Energetic”, “Healthy”, “Vegetarian”  Negative comments: “Weird, like her” (pointing to a classmate).	Unfamiliarity: “They don’t like them because they never tried them”, “They are afraid to try” Peer influence: “There’s this child who is going to try broccoli, but because she said that she didn’t like it it’s as if she warned him that he will not like it.” Age: “They are small children”, “They are one year old”, “They are two to five years old”, “They are overweight”, “They are not good at sports”, “They are capricious”, “They prefer tastier foods”

**Table 4:** Innovative products containing vegetables that would be liked by the responding children.

Category	Specific description
<b>Drinks</b>	“Tomato and carrot juice”, “Vegetable and fruit mix: carrot, potato, orange, apple, strawberries”, “Carrots with orange juice”, “Yogurt with vegetables”, “Sweet vegetable shake”
<b>Crumb-fried foods</b>	“Made with lettuce”
<b>Noodles</b>	“Noodles with vegetables”, “Noodles made with pumpkin”
<b>Hamburger</b>	“Alternatives to hamburger: pie made up of layers of chard and pastry made with carrot, topped with blueberry sauce” “Hamburgers with sweet pepper, mayonnaise, ketchup, chard and spinach”
<b>Bars</b>	“Cereal bars enriched with vegetables”
<b>Salads</b>	Colourful salads: “violet salads”, “rainbow salads”, “salads that include green pieces” “Salad with carrots, lettuce, beetroot and corn”
<b>Pies</b>	“Green-and-yellow ones”
<b>Cakes with vegetables</b>	“Star-shaped ones”
<b>Texture</b>	Proposals for “new textures” those are not mushy or squidgy when associated with vegetables, except for desserts, which can be soft in texture.
<b>Sweetness</b>	The idea is that of “a vegetable inside a dessert, for example inside a cupcake made with apple and broccoli”.
<b>Packaging</b>	“Fun”, with an “appealing drawing”, “with a prize inside”

**Figure 2:** Drawings made by children of an innovative food product containing mainly vegetables and that would be appealing to/liked by the children. A) Fruit and vegetable yoghurt; B) fried breaded vegetable steak; C) vegetable cake; D) vegetable cupcakes; and E) crustless vegetable pie.



## DISCUSSION

The results of Stage 1 of the task “make a drawing of what you usually eat at home for lunch and dinner and what you like eating” show the absence of vegetables in the drawings. The meals portrayed were prepared mainly from meat and starches (rice, potatoes). Other dishes were reported when the children were asked specifically about the consumption of vegetables, but these were not spontaneously included among customary dishes or preferred foods.

The children’s comments in the group sessions were consistent with several authors’ reports of a direct relationship between the sensory attributes of vegetables - unappealing appearance and bitter taste- and their low consumption among children [39-42]. Couthard [18] reported that babies are born with a preference for sweet foods and that children’s rejection of vegetables is associated with the bitter taste of many vegetables despite their high vitamin content.

Zeinstra found that texture is among the motives for vegetable rejection, and texture attributes depend on the cooking method [42]. The results of this study are consistent with those reported by other authors, according to whom children prefer crunchy and crisp textures and light and sweet tastes, rejecting strong and bitter tastes [41, 43, 44].

Children in this study mentioned their perceptions of age-related changes in their own vegetable consumption habits

-the ages at which they started to like or reject vegetables. We found no previous reports in the literature of such age-related perceptions.

According to what these children reported, Uruguayan mothers often resort to the use of sauces with flavours liked by their children to encourage the consumption of vegetables, as do mothers in the UK [45]. Research carried out in the USA showed that children added butter, sauces, vinegar and cheese to vegetables [46]. The children in this study reported that the same strategy is used in Uruguay to increase children’s consumption of vegetable dishes: adding mayonnaise, ketchup, soy sauce, among others.

The importance of children participating in the preparation of meals or food purchasing for increasing vegetable consumption, reported recently by Baker, was not reflected in our study [47].

In contrast to other published findings [42, 48-50] in this study no observations can be inferred about cooking methods.

With regard to the influence of food habits in the home, the results of this study reinforce reports by other authors to the effect that experience with foods plays a major role in the development of food preferences. Repeated exposure to unfamiliar foods, or to those with a disagreeable taste - as is the case with some vegetables-appears to increase both liking and consumption of vegetables in children [51, 52].

The diet of caregiver is often a good predictor of family diet. Vegetable intake in children has been found related with their caregiver’s consumption, information and motivation of vegetables [53, 54]. FV consumption in children has also been found to be positively associated with the availability of such foods in the household and parents’ modelling of food consumption [55-57]. The children in the present study were clearly aware of the relationship between vegetable consumption habits in their homes and their own vegetable consumption habits. They expressed it mainly as a demotivating element (“they were not brought up to like them”, “they never ate vegetables at home”). Both vegetable availability in the home as reported by the children, as well as family food habits, appear to have an impact on children’s FV consumption. Out-of-home contexts may be a possible starting point for the promotion of FV consumption, in accordance with Van der Horst [58].

Some statements by participants in this study reinforce other authors’ findings about children’s food neophobia, that is, their reluctance to try new foods for fear of a negative sensory experience (“children who do not eat vegetables are afraid to try them”) [59].

Children view meals prepared by parents or persons emotionally close to them as “*very tasty*”, indicating their inclination to perceive home-cooked meals as better tasting. This is reinforced by the confidence children have when an emotionally close person prepares their meals. The emotional bond to persons in the children’s immediate social circle becomes a powerful driver for vegetable consumption. This is exemplified in the sentence “*I don’t like meals prepared by someone I don’t know*”. Bova reported that children imitated the consumption behaviour of their role models [60]. The behaviour reported by these children was in line with the above, as well as with that reported by Rasmussen, according to whom parents ‘modelling of fruit and vegetable consumption is a key determinant of children’s intake [61]. Baranowki also pointed out that the oldest family members may play the most influential role in the forming of children’s food habits [46].

This study did not give rise to information about children’s involvement in the purchase of foods and the preparation of meals, in contrast to Van der Horst [58].

### Drawing of a Vegetable-Based Product that the Children of this Study Would Like

Developing and marketing nutrient-rich vegetable-based foods for children remains a challenge. Such a product should be appealing to parents to encourage its initial purchase, and its appearance and taste attributes should be liked by children, so that parents repeat the purchase [62].

The children in this study often emphasized that the product must be “*fun*”. A FV mix was an interesting option depicted in the children’s drawings as a dish liked by them. The children also suggested presentation in different shapes, consistent with Olsen who reported children’s preference for amusing shapes in their vegetables [63].

A new product must definitely be “*liked*” in order for it to be consumed by this population. One child described it as “*something that we like a lot with vegetables*”. Children in all the groups reported liking and consuming fried breaded steak and hamburgers with fries, followed by hot dogs, and these foods were strong reference points for a new product wanted by the children.

According to Elliot, a food targeted specifically to a child audience should use an entertaining name, the package should bear images of characters appealing to children (e.g. animals, popular cartoon personalities), and the food itself should have artificially enhanced colours and be provided in child-friendly shapes (e.g., animal crackers, fruit-shaped gummies and dinosaur-shaped chicken nuggets) [64].

Interestingly, one girl drew a line across the page to divide it into two sides, one for “*healthy*” foods and the other for “*tasty*” foods. Apples, lettuce and pears were perceived as healthy, while hamburgers and hot dogs were perceived as tasty. Hypothetically, her view may be that healthy foods are good for you but do not necessarily taste good, raising the challenge of developing food products that are not only healthy but tasty.

### CONCLUSION

This study identified vegetable consumption drivers and barriers in 9- to 12-year-old children from the participants’ perspective. Sensory factors (taste, appearance and texture) were major vegetable consumption drivers. The identity of the person preparing the meals, as well as their creativity in doing so, was also important. One way of increasing vegetable consumption in children is to serve vegetables alongside the foods the children most like.

The importance of vegetable consumption habits in the home was highlighted by the children. One way of increasing vegetable consumption might be to develop the habit of consuming vegetables outside the home, for instance in school canteens, take-outs and restaurants.

In the view of these children, a tasty product made with vegetables, in addition to being healthy, should also come in different shapes and colours, with packaging perceived as amusing. Interestingly, sweet foods containing vegetable ingredients were proposed by several of the responding children.

A possible direction for future work to improve consumer knowledge, attitudes and practices in order to evoke voluntary changes in food habits that affect nutritional status is to increase the participation of the children in the preparation of meal or food purchasing.

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