

Determinants of fruit and vegetable consumption among Tehranian adolescents: A qualitative research

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Background: For effectively promoting fruit and vegetable consumption among adolescents, it is necessary to identify the determinants of intake. This qualitative research was conducted to explore the determinants of fruit and vegetable consumption among Tehranian adolescents in 2012. **Materials and Methods:** The present qualitative study is aimed at identifying the determinants of fruit and vegetable consumption among Tehranian adolescents in 2012. Male and female students in the middle schools of Tehran, in the age range of 11-14 years, were used as the study population, which was selected by the convenience method. Semi-structured interactional interviews were used for data collection. Data was analyzed using the qualitative content analysis method. **Results:** The availability and accessibility of fruits and vegetables in home, availability of unhealthy options in the environment, socioeconomic status, advertising about unhealthy options, subjective norms, reinforcement, and modeling were explored as environmental factors in this study. Also, individual factors were extracted as the second category that encompassed the subcategories including: preferences, knowledge, skill in preparing fruits and vegetables, outcome expectations, outcome expectancy, perceived susceptibility, and perceived seriousness. **Conclusion:** It is recommended that interventions have family-based designs as well as environmental policy-based (especially schools) ones. Meanwhile, families should be educated to adapt their children's sapour with tastes of fruits and vegetables during their childhood.

Key words: Adolescents, determinant factors, fruit and vegetable consumption

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INTRODUCTION

Urbanization, industrialization, technology development, economic development, and market globalization have led to rapid changes in diet and lifestyle during the past decade. Consequently, it has resulted in increasing the prevalence of diet-related and obesity-based chronic diseases worldwide.^[1,2] In 2008, non-communicable diseases caused an estimated 36 million deaths worldwide; up from 35 million in 2004,^[3] and most of these deaths occurred before the age of 60, that is the most productive period of life. Non-communicable diseases continue to rise, especially in low-and middle-income countries.^[4] Eighty percent of the chronic disease deaths occur in low- and middle-income countries.^[5] Policies for reducing these diseases have typically emphasized on selected risk factors such as smoking, and where diet is concerned, attention has focused on fat consumption. Unfortunately there is less attention to other dietary risk factors, specifically fruit and vegetable consumption.^[6] Approximately 16.0 million

(1.0%) disability adjusted life years (DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability) and 1.7 million (2.8%) deaths worldwide are attributable to low fruit and vegetable consumption.^[7] Consumption of sufficient amounts of fruits and vegetables is recommended as part of a healthy diet. Fruits and vegetables may reduce chronic diseases and more specifically, coronary heart disease (CHD), because of their protective constituents such as potassium, folate, vitamins, fiber, and other phenolic compounds.^[8] Fruits and vegetables are typically lower-calorie, nutrient-dense foods, and are considered to be vital elements of healthy diets. Depending on age and gender, consumption of approximately four to five servings of fruits and vegetables (FV) daily is recommended for children and adolescents.^[9] According to the results of several studies, children's intake of fruit and vegetable tracks into the period of adolescence. Also, these researches have shown that the food preferences and eating habits which established in childhood and adolescence tend to be maintained in adulthood.^[10] On the other hand, the roots of many serious diseases in

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adulthood are formed in adolescence.^[11] Adolescence is a pertinent period to cultivate healthy eating habits, which can contribute to physical and psychological benefits during the adolescent period and reduce the likelihood of nutrition-related chronic diseases in adulthood.^[12] In general, improving fruit and vegetable consumption among children and adolescents is an important public health issue.^[10] To date, nutritional interventions have generally been only moderately successful in improving and maintaining consumption of adequate amounts of fruits and vegetables.^[10] Educational programs and interventions for improving health-related behaviors must be tailored to the most important determinants or mediators of these behaviors.^[13] As adolescents mainly attend and gather in schools, these settings are the places that are most appropriate for nutrition-related interventions and programs among the mentioned group.^[14] This study is expected to provide crucial elements for the development of a school-based fruit and vegetable programs.

MATERIALS AND METHODS

The present research is a qualitative study aimed to identify determinants of fruit and vegetable consumption among Tehranian adolescents, in 2012. "The reason for choosing a qualitative method is that in its approach to the phenomena under investigation it is frequently more open, and thereby, 'more involved' than other research strategies that work with large quantities and strictly standardized, and therefore more objective, methods and normative concepts."^[15] Male and female students in the middle schools of Tehran formed the study population that was selected by the convenience method. As region 10 (has central locality in Tehran) could be approximately considered as a representative, samples were chosen from this region. The criteria for selection of samples included voluntarily declaration for participation in study and the ability for transmission of information. Semi-structured interactional interviews were used for data collection. As this kind of interview is flexible and deep, it is appropriate for qualitative researches.^[16] Before initiating the interviews, the aim of the study and the individuals' rights to participate were clearly explained and informed consent was acquired. Given herewith are the key and main questions that were applied as the guidelines for the interview (it must be mentioned that the face and content validity of all questions were confirmed using the expert panel method):

1. How many fruits and vegetables do you eat a day?
2. How do other people in your life impact how many fruits and vegetables you eat?
3. Think about when you are at home; is there anything that prevents you from eating fruits and vegetables?

4. How many fruits and vegetables a day do you think most people eat?
5. Why do we eat more or less fruits compared to vegetables?
6. Why do you think people need to eat fruits and vegetables?
7. What do you believe is the main reason people do not consume fruits and vegetables?

All interviews by the researcher were conducted individually in a comfort space and without the presence of anyone else (in the consultation room of schools). The duration of each interview was between 30-40 minutes. The interviews were continued until data saturation and till no new information was obtained, thus, the total number of participants in the present research reached 31 students. Given the participants' permission, we recorded all the interviews using cell phone facilities. Then, writing word-by-word was accomplished in order to analyze the data. As researchers should be immersed within data in quantitative study,^[16] so we reviewed the contents of the interviews several times. This study was done after formal permissions from the Shahid Beheshti University of Medical Sciences and Tehran's General Office of Education. Ethical considerations of the present research included informed consent, being anonymous, assuring students about the confidentiality, and generalized analysis of the data. The data was analyzed by applying the qualitative content analysis method. This method is applied for subjective interpretation of the content in the textual data. By systematic classification in this method, the codes and themes are identified. The content analysis is more than eliciting objective content from the textual data, but we could detect and clear abstruse themes and patterns in the participants' expressions.^[17] Therefore, data in the present study was analyzed through six phases:

1. Researcher acquaintance with data
2. Introduction of primary codes
3. Review of extracted codes and looking to find themes
4. Reviewing themes and re-comparing them with the data in order to assure their accuracy
5. Defining and nominating themes
6. Preparing the final report.^[18]

RESULTS

From the 31 participants in present study, 52 and 48% of them were boys and girls, respectively, in the age range of 11 to 14 years. After analyzing handwritten notes about adolescents' views related to the factors influencing fruit and vegetable consumption among them, two essential categories were derived that have been explained herewith:

Environmental factors	Personal factors
Category	Constructs
Availability and accessibility of fruits and vegetables at home	Preferences
Availability of unhealthy options in the environment	Knowledge
Socioeconomic status	Skill in preparing fruits and vegetables
Advertising about unhealthy options	Outcome expectation
Subjective norms	Outcome expectancy
Reinforcement	Perceived susceptibility
Modeling	Perceived seriousness

Environmental factors

Availability and accessibility of fruits and vegetables in home, availability of unhealthy options in the environment, socioeconomic status, advertising about unhealthy options, subjective norms, reinforcement, and modeling were obtained as environmental factors in this study. Among the mentioned factors, availability and accessibility of fruits and vegetables in home and availability of unhealthy options in the environment were detected as the main determinants in the home and school settings.

Availability and accessibility of fruits and vegetables in home

Most of students stated that they eat fruits every day in their homes, because their parents always provide fruits at home. But often, as preparing vegetables is difficult and needs more time than fruits, adolescents expressed less availability of vegetables in their homes. Majority of the participants believed that fruit and vegetable consumption will be enhanced if their mothers prepared these nutrients for them (e.g., barking or slicing fruits, exposing them to fruits and vegetables, and serving vegetables with meals).

For instance, one of students said;

"My father always buys fruits for home, fruits are available in our home most of times, but if I have a good mood I take from freezer and eat. As washing fruits is hard in my mind, if my mother carry out that I'll certainly eat." (A second grade girl)

Another student stated;

"There are constantly fruit and vegetable in our home, I often forget to intake. Of course, I consume fruit and vegetable whenever my mom brought me fruits or if there be vegetable beside food cloth." (A first grade boy)

Availability of unhealthy options in the environment

Most of participants expressed the existence of unhealthy materials (e.g., confiture and junk food, such as, puffs, chips, fast foods, beverages, candies, and chocolates) in the school and home as one of the barriers to consume fruits and

vegetables. These adolescents mentioned that their school's superette mostly sold unhealthy cates. That is, accessibility to students of unhealthy options compared to fruits and vegetables is more in the school setting. Similarly, a large number of individuals state this to be barrier in the home setting also.

In addition, adolescents believe that most of their peers' tendency to consume such unhealthy cates is mainly due to a change of their taste in childhood. Also, these materials are delicious and attract the adolescents. The reason for this is that more than two-thirds of participants preferred confiture and candies (compared to fruits and vegetables) because of their deliciousness and lusciousness.

For example, one of adolescents declared;

"The new cates and confiture (such as puffs, chips, etc.) have caused we eat less amount of fruit and vegetable. Children are seriously adherent of these. If one of such cates was available at home, I'll be motivated to eat that not fruit/vegetable." (A first grade girl)

Socioeconomic status

A number of adolescents in the present study knew that economic factors were a barrier for the intake of fruits and vegetables. Moreover, few of the students stated that the engagement of parents outside the home causes them not to have enough time to buy and prepare vegetables at home.

Advertising about unhealthy options

Here, the participants mentioned media propaganda about puffs, chips, and the like.

Subjective norms

Subjective norms encompass the influence of family, relatives, health professionals, media, as well as a motivation to comply. A majority of the students agree that individuals such as parents, sisters, brothers, grandfathers, grandmothers, and close relatives play an important role in their consumption of fruits and vegetables.

As a case, an adolescent remarked that;

"My grandmother is the main reason for me to consume fruit and vegetable. My mom is a teacher. Thus when I was a child, my grandmother has cared me most of the time. On that years till now, She always tell me: eat fruit and vegetable more, this is very good and beneficial for you." (A third grade boy)

In analyzing data, family and relatives were detected as strong determinants at home.

"My father often uses puffs and chips. His habits has caused I eat confiture and junk foods instead of fruit. However, abundantly there are fruits in our home, but I don't eat" (A third grade boy)

"Physicians' recommendations and experts' dialogs in mass media (TV and radio) are effective in fruit and vegetable consumption," said some of adolescents.

Another construct related to subjective norms is the motivation to comply. Many students quoted that they consume fruits and vegetables because they obey parents'/ elders' orders as well as the existent rules at home.

For example, one said;

"My grandfather says; the more eating fruit and vegetable, the stronger body and the better school achievement. I always imitate his remarks. For this, he buys me a reward when I acquire the average score above 19." (A second grade boy)

In addition, supervision of mothers in home and also fruit and vegetable consumption of peers were determinant factors that individuals had mentioned in interviews. Based on their statements, they attend and obey their mothers' words and orders due to interest.

Conversely in some instances, motivation to comply has a negative impact on the intake of fruits and vegetables. That is, for some adolescents this factor was considered to be a barrier.

An adolescent narrated;

"I always like to eat confiture, my parents and all of family members and relatives (especially my grandfather) intend to these things. For example, when I'm at my grandfather's home, he constantly brought these for me and if I abstain eating he will be peeved. Whenever you go to his home, you surely could find confiture, beverage, and ice-cream." (A third grade boy)

Reinforcement

This is defined as a response to one's behavior in order to increase/decline the likelihood of behavior repetition. It could be positive or negative. According to the expressions of many students, verbal encouragement from parents, family members, and relatives was an important motivational factor. Also, encouragement from friends was reported in some cases. As a negative reinforcement, parents being peeved — in situations where their children refuse eat fruits and vegetables — has had an improving influence.

Modeling

The leading part of human learning is through observation and imitation of others' behaviors. In this aspect, a majority

of the participants mentioned that there are some persuasive factors, such as; observing the intake of fruits and vegetables of parents, family members, relatives, and friends, as well as experiencing the positive outcome of fruit and vegetable consumption among the entourage. Some individuals quoted that eating confiture and junk foods by their father/other family members and friends is the reason for less intake of fruits and vegetables among them.

A student stated,

"As my grandmother always eats fruit and vegetable and she has a good physical status in spite of high age, I have understood that for being healthy like her, I must consume enough fruit and vegetable." (A first grade boy)

And another adolescent stated,

"When I was a child, I often try to imitate things. I frequently was seeing that my parents and family were eating fruit most of times, thus I was interested too." (A first grade girl)

Personal factors

As the second extracted category, individual factors encompassing the sub-categories include; preferences, knowledge, skill in preparing fruits and vegetables, outcome expectation, outcome expectancy, perceived susceptibility, and perceived seriousness.

Preferences

Preferences (mostly taste) were the most expressed factor among the personal ones. A majority of the students declared that the sweet taste of fruits enhanced the consumption of fruit and conversely being tansy of vegetables is an obstacle for using them. In general, some reasons that adolescents mentioned for their preferences were; diversity, deliciousness, color, smell, shape, and better taste of fruits compared to vegetables, as well as good/bad experiences after eating fruits and vegetables.

For instance, one of the adolescents stated,

"Some of people don't eat vegetable, because vegetables are tansy and make smelly mouth, but fruits aren't. Fruits have better taste and are diverse, but vegetables haven't variety and just comprise peppergrass, spearmint, and like these. Children like fruits due to diversity and they could use fruits considering their desires and concerns." (A third grade girl)

Knowledge

Generally, participants in the present study had a good awareness of the benefits of consuming fruits and vegetables and they believed that intake of fruits and vegetables could prevent heart diseases, cancers, anemia, vitamin

deficiency, osteoporosis, chillness, and so on. Also, based on the students' quotations it could result in increasing their IQ (intelligence quotient), help in better learning, being energetic, and exhilaration.

As an example, one stated;

"Most of fruits reroute cancers and diseases, and vegetables — due to their vitamins — strengthen our bodies. Thus, when we have cold, physician recommends us to eat chino and sweet lemon more — that have plenty of Vitamin C." (A third grade girl)

In a question about the number of meals that was recommended by the World Health Organization (WHO), a majority of adolescents regretfully were not aware and expressed that eating one-to-two meals is enough for an individual's health. This unawareness has influenced their daily intake pattern, as most of them reported eating one-to-two meals of fruits and vegetables.

Skill in preparing fruits and vegetables

Ability and skill in preparing fruits and vegetables (e.g., cleaning, washing correctly, barking, and slicing) was the barrier for consumption that adolescents cited.

Here is the quotation of an adolescent;

"Some fruits must be washed and be barked with especial accuracy. As I couldn't, I don't choose them. Of course, I eat when my mom do this and brought me." (A first grade boy)

Outcome expectation

This was the fourth subcategory among the individual factors, which included the gracious taste of fruit, the tangy and ungraceful taste of vegetables, and personal perceptions on the benefits and advantages of fruit and vegetable consumption. Most of adolescents stated that eating fruits made them feel good due to their gracious taste. There were different views about consuming vegetables. Some believed that eating vegetables along with meals was very delightful and made the food tasty, but some others had inverse views.

An adolescent mentioned;

"Every morning and afternoon, my mom brings fruits and all family conjointly consumes them. Also, she always provides vegetable with dinner, but I don't eat, because it changes taste of foods." (A second grade girl)

Participants had several perceptions about the benefits of fruit and vegetable consumption. A majority of them knew this behavior was useful for health, and some students expressed other benefits, such as; acquiring energy and exhilaration by eating fruits, better learning,

enhancing body resistance, better vision, and preventing early aging.

Outcome expectancy

Adolescents quoted several factors in this subgroup. These were, (a) value and importance of fruits and vegetables' taste, (b) importance of health, being energetic and exhilaration, having healthy eyes, better learning, and so on — in few cases — not having fruit and vegetable consumption in life priorities due to high employment, and disregarding of parents to their children's nutrition and health.

As an example, a student said;

"I mostly like to eat carrot, because I think it is very helpful for my seeing. As I study lots, I wish to have healthy and good eyes." (A second grade boy)

Perceived susceptibility and severity

Disease history and related fear were recognized as the determinants of fruit and vegetable consumption among adolescents. In some instances, complications like dwarfishness were recognized as a threat that impelled adolescents toward consumption of fruits and vegetables — in order to avoid length lowness.

An adolescent stated in this matter;

"I formerly had some problems. For example, there was a tumor on my neck that had made me afraid much. After that, I eat fruit and vegetable more than ever." (A third grade boy)

DISCUSSION

Qualitative research claims to describe life worlds 'from the inside out', from the point of view of the people who participated. By so doing, it sought to contribute to a better understanding of social realities and to draw attention to processes, meaning patterns, and structural features.^[15] Thus, a qualitative approach has been applied in the present study for identifying the determinants of fruit and vegetable consumption among adolescents. The applicable goal of this research is provision of information about opportunities and threats, in order to design appropriate interventions for improving fruit and vegetable intake among adolescents.

The first elicited category in the present study was environmental factors. Environment refers to the physical and social conditions around the person.^[19] As, the participants of this study stated, availability and accessibility of fruits and vegetables in their homes, availability of unhealthy options in the environment, socioeconomic status, advertising about unhealthy options, subjective norms, reinforcement, and modeling

were environmental determinants. Among the mentioned factors, availability and accessibility of fruits and vegetables in home and availability of unhealthy options in the environment were detected as the main determinants in the home and school settings. One environmental factor that could influence fruit and vegetable intake is the availability and accessibility of fruits and vegetables in the home. Many studies have sought to determine the relationship between home availability and accessibility and intake of fruits and vegetables.^[20] A literature review assessing fruit and vegetable availability related to fruit and vegetable intake has concluded that home availability is associated with fruit and vegetable consumption for children, adolescents, and adults.^[21] This review included articles from 1993 to 2005, and represented a variety of qualitative, cross-sectional, and experimental studies related to fruit and vegetable intake. Of the qualitative studies reviewed, all indicated that increased fruit and vegetable availability positively influenced the intake and a lack of availability hindered fruit and vegetable intake.^[21] Also, Rasmussen *et al.*, in their review of the literature — for potential determinants of fruit and vegetable intake in children and adolescents — have reported that three out of three papers identified a positive association between child-reported home availability of fruit and vegetable (fruit and vegetable being present in the home) and children's intake of fruit and vegetables.^[10] Of all the determinants in a study conducted by Blanchette and Brug, the availability and accessibility of fruits and vegetables was most consistently and most positively related to consumption.^[22] Availability of fruits and vegetables at home depends on some factors (e.g., financial status, time, and importance of adolescents' health, from the parents' point of view). Based on the adolescents' quotations in the present research, despite fruit being available at homes at most times, vegetables were less available. This was due to the time taken and difficulty of preparing vegetables. Also culturally, mothers usually undertake the provision and preparing of vegetables. Accessibility includes several items, such as; cleaning, washing, and preparing fruits and vegetables for serving (barking, slicing, etc.), exposing them, as well as serving vegetables along with meals. The study findings show that accessibility is a more important factor than availability, because preparing fruits and vegetables for use (washing, barking, slicing, etc.) is the main barrier that has been mentioned by adolescents. In general, in spite of the availability, adolescents may refrain from consuming fruits and vegetables due to lack of skills. Also, students addressed the availability of unhealthy options in the environment (home and school) as a barrier. Results of Nago *et al.*'s research among urban adolescents of Benin is similar in this matter. Adolescents in Benin expressed that, compared to fruits and vegetables, confiture and chocolates were easily available in their school. Thus, students had

more accessibility to these. Withal, these things were more attractive due to the good packaging preparation, and shape.^[1] The same finding was obtained among Tehranian students who participated in the present survey. In both the home and school settings, they had access to unhealthy options more than fruits and vegetables. Other factors (e.g., deliciousness, attractiveness, and easiness of preparing, and consuming) besides accessibility, induce a greater consumption of them and lower intake of fruit and vegetable.

Subjective norm was another construct in the environmental category. A person's subjective norm was determined by his or her normative beliefs, that is, whether important referent individuals approved or disapproved of performing the behavior, weighted by his or her motivation to comply with those referents.^[23] In the present study, subjective norms included the influence of family, relatives, health professionals, media, as well as the motivation to comply. Family and relatives were recognized as strong determinants for fruit and vegetable consumption in the home. Pearson *et al.*'s research that was conducted among children, adolescents, and families, revealed that there was a positive correlate between some factors like;

- a. Family role,
- b. Family encouragements, and
- c. Parents' intake of fruits and vegetables, and fruit and vegetable consumption among children and adolescents.^[24]

Similarly, parents influence was an important home-related determinant in Nago *et al.*'s study.^[11] Mette Rasmussen *et al.*, reported in their review research that a positive association between parental intake of fruit and/or vegetables and children's fruit and/or vegetable consumption was observed in eight out of nine articles.^[10] Some children learned how to eat fruits and vegetables from a family member and found it easier to eat healthy if the entire family did so, or if they experienced positive social support and motivation from adults to eat healthy.^[25] In general, parents play a principal role in the availability and accessibility of fruits and vegetables and they also influence their children's intake, by consuming fruits and vegetables themselves, giving encouragement, supervising adolescents' nutritional behaviors, establishing rules about household nutrition, and giving informational support. Unfortunately, sometimes they have negative effects on the adolescents' behavior. This may be due to insufficient knowledge, undesirable attitudes about fruits and vegetables, disregarding children's nutrition and health, and consumption of unhealthy competitive food. In this regard, some studies have mentioned parents as being social influences for eating unhealthy foods, for example,

by having unhealthy eating habits themselves. In a study from Ireland, children said that their parents offer mixed messages to them. On the one hand parents try to restrict children's intake of candies, chocolates, soft drinks, and potato crisps, and on the other hand they consume the very same unhealthy food.^[25]

The second category that was elicited in the present study was personal factors. The commonly mentioned items in this category were preferences and taste — more than others. Preference is the individual factor that has been studied most extensively. In a review, 11 papers analyzed it and in all 11 papers a positive association between preferences and children's and adolescents' intake of fruit and vegetables was observed.^[9] Also, in the Neumark-Sztainer study, one of the two strongest correlates of fruit and vegetable intake was taste preference (28% of variance).^[26] According to the conclusion of many studies, taste is the main reason for disliking fruits and vegetables especially vegetables.^[27-29] Unfortunately, foods rich in fat and sugars are typically preferred, while low calorie, nutrient-rich fruits and vegetables are poorly liked.

CONCLUSION

Doing qualitative pilot studies before conducting larger quantitative ones is common, but those findings are not usually published in scientific journals. However, the present research demonstrated that the information gained from such qualitative studies is very valuable and interesting. As fruit and vegetable intake among adolescents is closely correlated with the availability and accessibility of fruits and vegetables in the home and availability of unhealthy options in the environment, the results of the present study confirm that interventional efforts need to be family-based as well as environmental policy-based (especially in schools). In addition, due to the results of the determinant power of taste, educational programs must focus on parents. Families must adapt their children's sapour with tastes of fruits and vegetables during the childhood period. This can be carried out in school settings by means of several activities (e.g., taste-testing games, etc.). Finally, authors recommend that any intervention related to fruits and vegetables among adolescents must consider the findings of the present and similar researches.

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