



## Perceived Barriers to the Consumption of Fruits and Vegetables in Middle Age: Qualitative Ecological Study

Sharareh Bagheri<sup>1</sup>, Khadije Ezzati Rastegar<sup>2\*</sup>, Aysan Setayesh<sup>3</sup>

<sup>1</sup> Ph.D. Student of Health Education & Health Promotion, Vice-Chancellor for Health Affairs, Kurdistan University of Medical Sciences, Sanandaj, Iran.

<sup>2</sup> Ph.D. of Health Education & Health Promotion, Hamadan University of Medical Sciences, Hamedan, Iran.

<sup>3</sup> Nursing Student, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, Sanandaj, Iran.

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### Abstract

**Background:** Consumption of fruits and vegetables is associated with reduced occurrence of mortality stemming from a variety of chronic diseases. This study, employing the environmental model of health behaviors, aimed to investigate the perceived barriers to the consumption of fruits and vegetables in middle-aged individuals.

**Methods:** This is a qualitative study of content analysis, conducted through eight focus group discussions targeting middle-aged individuals, and five individual interviews with the key individuals in 2017. A framework of factors altering the nutritional behaviors of individuals who were classified into four levels was recognized via employing the ecological model.

**Results:** Barriers to consuming fruits and vegetables at the individual level included beliefs, nutritional awareness, and eating habits of the past. At the interpersonal level, family and social support were the major barriers. At the community level, socio-cultural values and norms, environmental components such as accessibility, quality of fruits and vegetables, media, and prices were also among the major barriers. At the public policies level, not monitoring the production and supply of quality products were among the barriers the participants stated.

**Conclusions:** Politicians should weigh upon support programs to reduce the production cost of high-quality fruits and vegetables in low-income communities, and adopt the necessary laws and policies to discuss the production and supply of quality, toxin-free fruits, and vegetables at the macro level.

**Keywords:** Fruits, Vegetables, Ecological model, Qualitative study, Focus group.

\*Corresponding to: K Ezzati Rastegar, Email: kh.rastgar@yahoo.com

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## Introduction

Fruits and vegetables are an essential part of a balanced and healthy diet that has countless positive effects on human wellness and reduces the risk of chronic diseases.<sup>1</sup> Individuals who consume more fruits and vegetables are less likely to gain weight,<sup>2</sup> suffer heart diseases, and certain types of cancer.<sup>3</sup> Yet, in many societies, individuals still receive less than the minimum recommended amount of these food groups.<sup>4</sup> The national survey of risk factors for non-communicable diseases in 2016 showed that the prevalence of fruit and vegetable consumption in the population over 18 years of age in Kurdistan province is 33.3%, which is low compared to an average of the national level; while the prevalence of

overweight and obesity, high cholesterol, and high blood pressure is relatively higher in individuals over 18 residing in the Kurdistan province.<sup>5</sup>

Many factors affect the individual's choices of food groups. Identifying each of these factors can be effective in better understanding eating habits and behaviors, consumption patterns, and in devising nutritional interventions to improve consumption patterns and increase the intake of beneficial food groups such as vegetables and fruits.<sup>6</sup> Studies that have been conducted so far have mostly focused on barriers at the individual level.<sup>7</sup> Studies have been reported the cost of fruits and vegetables, unavailability, lack of awareness, uncertainty concerning the quality of fruits and vegetables, non-access to fruits and vegetables, education, and economic situation such as barriers to low consumption.<sup>8</sup>

Studies reveal the effect of various factors at different levels of individual, interpersonal, and social on the consumption of fruits and vegetables by individuals. A broader perspective is needed to better understand the barriers and provide tailor-made intervention. The socio-environmental Model (SEM) is a health promotion approach that renders this a broader perspective. Acknowledging that most public health challenges are far more elaborate than just examining one level of analysis, SEM incorporates a more comprehensive approach that integrates multiple levels of impact into health behaviors and, ultimately, health outcomes. These levels of influence include internal and interpersonal factors, community, organizational (or institutional) factors, and public policies. The role of social, ecological, environmental factors in influencing nutritional behavior has accelerated in recent years.<sup>9</sup>

Therefore, this study was designed to identify internal and external barriers and propose solutions among different middle-age groups (in terms of gender and occupation) regarding the low consumption of fruits and vegetables. The interventions should be executed according to the felt need of the society, the obstacles perceived by them as well as the participation of the society itself to provide appropriate solutions.

## Materials and Methods

Participants were selected as a result of their special characteristics (inclusion criteria), and their capability to talk and participate in group discussions. Exclusion criteria included age less than 18, mental disorders, and diagnosis of

chronic diseases such as types of cancers. The variety in sample selection was due to the need for a deep understanding of the barriers to fruit and vegetable consumption based on the cultural, economic, and social context of the participants. A total of 48 people participated through individual interviews and focus group discussions in the study. Most of them had an academic level of education (35.5%). You can see demographics characteristics in table 1.

The present qualitative study was conducted by the content analysis method 10 in 2020 in Sanandaj city. Eight focus group discussions were conducted (including 2 groups of housekeepers, 2 groups of worker women, 2 groups of employee men, and 2 groups of worker men). Five individual interviews were conducted through semi-interviews with experts in organizations and institutions related to community nutrition after the end of each FGD and code extraction. The interviewees included the representatives of the agricultural organization, Kurdistan university of medical sciences, the fruit and vegetable sellers' union, the nutrition expert, and the deputy of food and medicine. Two members of the research team were in charge of group discussions. One person, as the discussion moderator, directed the discussions and at the beginning of the sessions, gave brief explanations about the aims and significance of the study, emphasizing the impartiality of the study researchers and the scientific nature of the research along with obtaining the permission (written consent) of the interviewees, and ensuring that their information was to be maintained confidentially by recording all discussions presented at each meeting. The note-taking method was also employed during the interviews.

Before conducting the study, the draft questions were edited by health education professionals. Group discussion sessions were conducted using an interview guide shown in table 2. Group discussion continued until the participants were saturated with the answers and fully understood the new codes (meaning saturation), and the researchers were assured that there was no new topic or idea by the participants (code saturation).<sup>11</sup> Each group session lasted an average of one hour. The duration of the data acquisition process (group discussion

sessions and individual interviews, collectively) lasted for two months.

The process of analyzing the qualitative data was executed manually based on the steps proposed by Granheim and Landman.<sup>10</sup> The content of the focused group discussions was recorded with the consent of the participants and transcript word for word. The data were simultaneously recited by the researchers (two experts who conducted the interviews) to gain a general understanding. The rewritten texts were analyzed immediately after each group discussion and interview, and original and unforeseen cases were followed up in the interview and subsequent discussions. The data were categorized into semantic units, categories, subcategories, and themes. The semantic unit was defined using the participants' own words. The semantic units were summarized to reduce the text content while preserving the original structure, and further, the semantic units were classified. Finally, the themes that linked the basic themes and meanings in the categories were identified and then analyzed.

The analysis was performed based on the ecological health model. The coding results were presented to the participants to confirm the accuracy of the coding and validate the results and the research process was reviewed by professors and experts in qualitative research to ensure the accuracy and reliability of the study.

**Table 1. Demographic characteristics of participants in group discussions**

Parameter	Class	Mean (SD)
Age	30-40	16 (33.3)
	40-50	16 (33.3)
	50-60	16 (33.3)
Gender	Male	23 (52)
	Female	25 (48)
Employment status	Housekeeper (female)	13 (27)
	worker (female)	12 (25)
	Employee (men)	12 (25)
	Employee (men)	11 (23)
	Illiterate	4 (8)
Education	Intermediate	12 (25)
	Diploma	15 (31.5)
	Academic	17 (35.5)

**Table 2. Questions Guide in group discussion and individual interviews**

Individual interview	Group discussion sessions
1-Introducing the research aim, the indicators of low fruits and vegetable consumption in the surveyed population, and its consequences	1-Introducing the research aim, introducing the participants (demographic characteristics, and some eating habits such as consuming fruits and vegetables daily)
2-What is your opinion on the low consumption of fruits and vegetables in middle-aged?	2-Do you think, how much fruits and vegetables are enough for daily eating?
3-What are the laws and policies monitoring the production and supply of quality fruits and vegetables free of toxins?	3-What are the benefits of eating fruits and vegetables?
4-How perform the rules?	4-what are the reasons for not eating enough fruits and vegetables?
5-How we can educate society about the importance of consuming fruits and vegetables, the amount of consumption, and refining the vegetables?	5-What is the effect of people in your family interact about consuming fruits and vegetables?
	6-What are the effect of society and the government on the consumption of fruits and vegetables?
	7-Where do you gain information, especially the consumption of fruits and vegetables, their properties and the balance of consumption?

## Results

The number of participants in each FGD was between 6-9 individuals. The demographic characteristics of the participants in the group discussion are listed in table 2. Based on the results of data analysis and using the ecological model, the factors affecting the nutritional behaviors of individuals were explained in four levels (figure1).

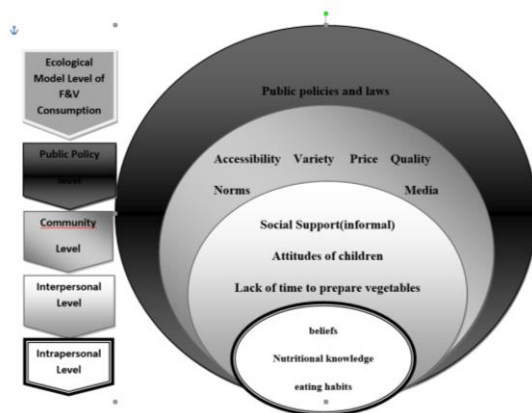


Figure 1. Ecological model of barriers to fruit and vegetable consumption in middle age

Personal level: Individual beliefs (16 codes) can be considered as one of the factors affecting the consumption of fruits and vegetables since many of these beliefs are internalized. The main concern for women was the refining of vegetables. This means that they considered this process time-consuming and unreliable. They believed that they did not have an appropriate and reliable means to wash and refine vegetables because using dishwashing liquid, one of the key steps in conventional vegetable refining, is carcinogenic.

“We’d rather have a vitamin deficiency than getting cancer.” (FGD1, worker woman)

However, in individual interviews, it was asserted with certainty that there is no new guideline on vegetable hygiene that replaces dishwashing liquid, and there is no scientific evidence to refute the vegetable hygienic guideline.

Participants' nutritional knowledge included the importance of fruit and vegetable consumption, its role in preventing diseases, and the amount needed daily per individual. Almost the majority of participants in group discussion sessions did not have enough understanding of the conventional time to eat fruits and vegetables during the day. “We do not know at what intervals of the day fruits and vegetables should be eaten. Before or after a meal, or whether it is correct to eat several fruits and vegetables at the same time” (FGD2, housekeeper).

The above sentence was an example of participants' concerns that was repeated many times.

Many participants believed that sources of nutrition information in urban areas were cyberspace (telegram), television, and health workers.

Adults' eating habits are the result of eating habits in childhood and adolescence. In all group meetings, the most of participants stated that they are used to the habit of eating fruits and vegetables. “Because I have not eaten vegetables since I was a child, my tongue is foreign to eating vegetables.” (FGD3, employee man).

“The main reason people have inadequate eating habits is their family, because they have not been accustomed to a healthy and balanced diet since childhood, and they have overlooked the importance of having all the major food groups in the family diet, although the case may be for various other reasons, including the economic situation, etc.” (FGD1, employee woman).

Interpersonal level: Lack of support from friends and family (code 35) was also a barrier to consuming fruits and vegetables. Most of the men (employees and workers) believed that none of their friends and colleagues ate fruits and vegetables.

“It is not possible to sit alone and eat fruits and vegetables when our friends are not interested in eating fruits and vegetables, and the most common suggestion we usually get from our friends outside the home or, toffice environment is to go out for hot breakfast or grab a tea together.” [With a laugh, she continued], “I do not think any man eats fruit at work. Regarding home, they are at home for a few hours. How are they supposed to eat as much fruit and vegetables as recommended in this short time” (FGD2housekeeper)?

Women considered time-consuming preparation and the lack of interest in children and other family members as barriers to preparing foods containing vegetables.

“Every time I cook dishes made with vegetables, I have to prepare another alternative without vegetables because my husband and children won’t eat it, so why should I even bother?” (FGD2, housekeeper).

“I am fond of raw and cooked vegetables and I enjoy dishes made with vegetables, but since only I eat these dishes, you may not believe it, but I can only eat these foods in my mother's house.” (FGD1, housekeeper).

Community level: Although the meaning of accessibility was the presence of fruits and vegetables in the residence of individuals, there were different interpretations regarding accessibility (54 codes). Some considered the high price of fruit as the cause of non-availability as not having access to quality fruits and vegetables. One person defined that the concept of access was to provide fruit as a subsidy. The distance aspect was another theme that belonged to the accessibility category. However, there were several opposing views on the preparation of fruits and vegetables.

“There are greengrocery shops or produce sections in all streets and markets. Even standing in most of the streets, there are selling fruit, so we cannot suppose that we have a problem in terms of distance. Our problem is due to the financial capacity and poor quality of products” (FGD4, male worker).

Most of the participants stated that there is a variety of fruits and vegetables in our city, especially in spring and summer, and in general, the lack of variety of fruits and vegetables cannot be considered as a major barrier, but in any case, there is no variety of fruits in winter and the available variety is limited to a few. In some group meetings, the lack of fruit variety, especially in winter, was weighed upon as a barrier to low fruit consumption.

“I am used to eating at least one piece of fruit in the office every day, but to be honest, I'm weary of the look and smell of apple and oranges during winter because I only have two options every day, this year we were even deprived of eating oranges.” (FGD1, employee woman)

The majority of participants in all the meetings held considered financial difficulties as one of the main barriers to consuming fruits and vegetables.

“Low-income and underprivileged individuals prioritize food, and eating fruits and vegetables is their last priority because they have to worry about satisfying their hunger. For example, my income is so limited per month that sometimes I'm desperate for providing my bread and butter, let alone fruits and vegetables.” (FGD4, low-income worker)

The quality of the fruit is defined by having a wholesome and fresh appearance, without placidity, worms, mold, etc. Most of the participants reported the fruits and vegetables in their city often lacked these qualities. Participants believed farmers add a lot of fertilizers and toxins to their crops for more profit, which both damages the taste and are harmful to the consumers' health.

“When I give my children fruits and vegetables, I am plagued with feelings of guilt because I feel like I'm just poisoning them.” (FGD1, worker woman)

“Most people are afraid of eating fruits and vegetables because of the contamination and cancer; the main concern for people is the fear of consuming harmful fruits and vegetables because production and distribution monitoring is inadequate,” responded one male employee (FGD3).

“Many fruits and vegetables are irrigated with sewage water during the planting phase.” (FGD2, Housekeeper)

In all group discussions, participants believed that changes in socio-cultural, and norms played a negative role in a healthy diet. Changes in food environments and the increase in the supply of fast foods and unhealthy foods can be considered as one of the major barriers.

Social changes in the role of women in the family, the employment of women, and the lack of opportunities to prepare a variety of salads and dishes containing vegetables are also barriers to the consumption of fruits and vegetables.

“We have to be in harmony with society. We cannot exercise our personal opinion at home. Previously, the parents were not so willing to go the extra mile to please their children and the child was obliged to eat whatever was provided to him or her at home, but now the situation is completely different in

families and the whole family dynamic has changed. There is this desire to spoil the children and do as they please, and parents have virtually no role in choosing the type of food on their table, and fast food has become the main dish of most families.” (FGD1, worker woman)

The housekeeper (FGD2) complained: “In our culture, the priority is to provide and serve meat and rice, and men pay less to buy fruits and vegetables. Some families are accustomed to preparing fruit only for guests, and it is a means of entertainment for when families are having guests over.”

Most participants considered the role of media and advertising in the consumption of fruits and vegetables to be negative. They maintained that television and its advertisements played a major role in the consumption of unhealthy foods. Driver (FGD4) believed that “media never advertises for fruits and vegetables. Instead, always advertises for soft drinks, chips, and snacks, and my children always ask for these.”

Social media channels also challenge people's beliefs by broadcasting contradictory messages that have no scientific source. “I read in the telegram that tomatoes should not be chopped because they lose their nutrients or how harmful basil is and so on (FGD2, housekeeper).

Public policy level: Most participants maintained that farmers were not monitored for the production, storage, and supply of fruits and vegetables.

In one of the interviews, it was asserted: “Despite the results of fruit and vegetable samplings, which unfortunately indicate contamination of products, there is no law regarding dealing with individuals who supply low-quality fruits and vegetables with high toxins.”

## Discussion

The aim of this qualitative study was recognized to perceive barriers to the consumption of fruits and vegetables in middle- age. The results of the study were gathered by employing the ecological health model, which was a combination of Bandura's social cognitive theory and the smooth biology model.<sup>9</sup> According to findings, barriers at the individual level included beliefs, nutritional awareness, and eating habits. In other studies, that examined the consumption of fruits and vegetables from a social and ecological perspective, individual factors affecting the consumption of fruits and vegetables included taste preferences, lack of awareness, habits, and self-efficacy.<sup>12,13</sup> Usually, participants maintained that difficult to break a habit.<sup>14</sup>

The results indicate the importance of education's role in raising public awareness and improving the consumption of fruits and vegetables.<sup>15</sup> Some people have the motivation to adopt positive lifestyle habits and should, therefore, be targeted for nutrition education programs.<sup>16</sup> Interpersonal barriers in the present study included friends and family's support, children's attitudes, and lack of time to prepare vegetables-containing meals. Studies reported that children's and men's attitudes were a barrier to trying to eat more fruits and vegetables.<sup>16,17</sup> Social roles such as family and job roles operate at the interpersonal

level, creating contexts and meanings for food choices;<sup>18</sup> which is consistent with the findings of this study and the role of mothers. The role of women influences interpersonal processes in dietary behaviors.<sup>16,19</sup>

Public education increases women's self-efficacy and skills and plays an important role in promoting better fruit and vegetable consumption. Women are desirable targets for nutrition programs because they are primarily responsible for purchasing and procurement of meals, they are a valid source of health and nutrition information, and are usually more engaged in the promotion of their health habits compared to men.<sup>20</sup> The time-consuming preparation of fruits and vegetables<sup>21,22</sup> and social changes, women's role in the family,<sup>23</sup> increase the supply of healthy and packaged fruits and vegetables.

In this study, barriers at the community level included access, quality, price, values, and norms of the target society, media, and advertising, along with diversity which was similar to the results of a qualitative study conducted in the United States.<sup>24</sup> Based on these findings, the main barriers to consuming fruits and vegetables in low-income and poor individuals are cost, transportation, quality, variety, food environment changes, along with the changes that concern social norms about food. Also, lack of access and proximity of markets, distribution of fruits and vegetables, lack of reliance on the wholesomeness of fruits and vegetables were among the perceived barriers in the consumption of fruits and vegetables. The main barrier to fruit and vegetable consumption is the cost.<sup>25</sup> Price is one of the factors influencing the consumption of fruits and vegetables, interventions to increase the consumption of fruits and vegetables among low-income backgrounds, or individuals living in low-income communities, require considerations and incentive delivery plans, and motivational counseling.<sup>26,27</sup>

About access to fresh fruits and vegetables, the results of a study confirmed that with the addition of greengrocery shops, the consumption of fruits and vegetables increased community.<sup>27</sup> For resolving the access barriers, establishing fruit and vegetable stalls in stores may improve the consumption of fruits and vegetables. Consistent with the present study, various studies have discussed the low quality and contamination of fruits and vegetables by various herbicides. Herbicides are carcinogenic and the use of chemical fertilizers is a barrier to the consumption of fruits and vegetables.<sup>28,29</sup>

The use of toxins and contamination of fruits and vegetables requires monitoring of the production and supply chain for fruits and vegetables. So, education to farmers about the use of chemical fertilizers and coding of fruits and vegetables will be helpful, and necessary interventions to improve the quality of fruits and vegetables. The limitation in access and lack of variety in winter exist in this study and others.<sup>27</sup> Therefore, peoples' education on how to store fruits for the winter may increase the consumption of fruits and vegetables. Finally, the media play an important role in shaping correct and incorrect eating habits and behaviors. They need to be addressed in policies and interventions.<sup>30</sup>

Similar to other qualitative studies and methodology, the integration of middle-aged individuals in their different settings was one of the limitations of the study. However, the findings of the present study, due to the diversity of samples in both genders, can provide a deep understanding of the barriers to fruit and vegetable consumption in the middle-aged target group, which cannot be attained in few studies. Also, due to the qualitative nature of research, its generalizability to other societies is the next limitation of the present study.

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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