

Fruits and vegetables consumption among elderly people: a cross sectional study from Iran

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Abstract

Background: There are substantial evidences that low fruits and vegetables (FV) consumption are major risk factors for many chronic diseases. The aim of this study was to assess FV consumption and its influencing variables among elderly individuals in Iran.

Methods: This was a cross sectional study to investigate on FV intake in a randomly selected sample of elderly individuals who were members of elderly centers in Tehran, Iran. A multidimensional questionnaire was used to collect data regarding demographic characteristics, daily consumption of FV, knowledge, self-efficacy, social support, perceived benefits, and barriers towards FV. Data were analyzed using t-test, one way of analysis, Pearson correlation, and logistic regression analysis.

Results: In total, 400 elderly individuals took part in the study. The mean age of participants was 64.07 (SD = 4.49) years, and most were female (74.5%). The mean served FV per day was 1.76 (SD =1.15). Ninety seven percent of participants (n = 388) did not know recommended intake of at least five servings of FV in each day. Similarly, 88.3% (n=353) did not know the size of a single serving per day. The most frequent perceived benefits and barriers towards FV consumption were availability and being expensive, respectively. Knowledge (OR=0.59, 95% CI = 0.39-0.88), perceived benefits (OR = 0.92, 95% CI = 0.88-0.96) and barriers (OR = 1.08, 95% CI = 1.04-1.14), self-efficacy (OR = 0.89, 95% CI = 0.83-0.95) and family support (OR = 0.91(0.83-0.99) were significantly associated with fruits and vegetables consumption.

Conclusion: The findings from this study indicated that FV intake among elderly individuals in Iran was lower than the recommended minimum of five daily servings and varied greatly by age, marital status, educational attainment, and income level. In

addition the results indicated that low perceived benefits, low self-efficacy, and perceived barriers could lead to lower consumption of FV. It seems that in order to improve FV consumption among elderly individuals in Iran, raising awareness, improving perception benefits and enhancing self-efficacy regarding FV consumption should be receive more attentions. Indeed planning health education programs and nutritional interventions for this group of population are essential.

Background

Coronary heart disease (CHD), cancer and stroke are leading causes of death [1] that are more prevalent among elderly individuals [2] and there is substantial evidence indicating that low fruits and vegetables (FV) intake are major risk factors for such diseases [3]. Several studies showed that adequate consumption of fruit and vegetable have been associated with reduced cancer risk [4,] and CHD [5]. Furthermore, previous studies have shown strong negative relationships between low FV intake and obesity [6], diabetes [7] and hypertension [8]. Despite all these benefits, people do not properly follow the minimum recommended consumption of five servings of FV per day [9]. Data on FV intake derived from food balance sheets in 21 countries (mainly developing countries) showed that only in three countries FV intake meet the minimum World Health Organization (WHO) recommended consumption [10], although it is argued that using data from food balance sheets as a single source of information has its own weaknesses [11].

In general there are many factors that contribute to FV intake. For instance a study showed that several factors including knowledge, attitudes, skills and self-efficacy might influence an individual's likelihood of achieving five a day servings of FV consumption [12]. In addition it has been shown that promoting healthy eating behaviors would be succeeded if influencing factors were considered through appropriate models of health behavior change [13]. One of the most popular models for studying behavioral change in health education/promotion is the Transtheoretical Model (TTM). The model assumes that health behavior change involves progress through six stages of change: pre-

contemplation, contemplation, preparation, action, maintenance, and termination. [14,15]. Studies have demonstrated that the TTM was effective in predicting and promoting fruit and vegetable consumption in different population groups [16,17].

Many studies have shown variables that influence FV consumption among elderly population worldwide [18, 19], but little is known about the frequency, distribution, and determinants of FV consumption among elderly individuals in Iran [20]. The only study that reported on exact amount of FV consumption among elderly in Iran comes from an investigation among a Middle East elderly population including Iranians. This study reported that the average FV intake was 358gr/day in male and 349gr/day in female [21]. In Iran the total mean energy intake exceeded requirements that mainly obtained from carbohydrate like simple sugar. Iranian diet is mainly composed of bread and rice as major energy sources while chronic diseases are main causes of mortality and morbidity in Iran [22] and has been found to have a raising trend in the country [23,24]. In Iran, cardiovascular disease (CVD) accounts for 38% of deaths [25], the second most cause of death is road traffic related injuries [26], and cancer is the third cause of death [27]. Diabetes accounts for 7.7% [28] and 82% of women and 63% of men aged 50 years and above are overweight [29]. The present study was conducted to investigate factors that contribute to FV consumption in elderly individuals in Iran. We particularly were interested to study the effect of the following determinants: age, gender, education, marital status, employment and economic status, chronic disease, body mass index (BMI), stages of change, self efficacy, and support receiving from family and friends, knowledge regarding FV, and perceived benefits and barriers.

Methods

Design and data collection

This was a cross sectional study among a randomly selected sample of old people who were members of elderly centers in Tehran, Iran. The study was conducted between September 2007 and April 2008. Tehran has 23 elderly centers in which free educational and social services are offered to members. The membership of these centers is free of charge and all individuals aged 60 and above are eligible to become a member. From all listed members a random sample was selected. The sample size was estimated based on a single proportion design. We assumed that at best 50% of elderly would intake adequate FV. Then, a study with a sample of 385 elderly would have 80% power to detect a difference of 5% (45-55%) at the 0.05 significant level. The sample size actually obtained for this study was 454. Of these, those who did not agree to take part in the study and those who were suffering from serious illness or experienced surgical operation (up to 3 months before the date of data collection) were excluded from the study (n = 422).

Ethics committee of Tehran University of Medical Sciences approved the study. Before conducting the study, the aim, method and confidentiality were explained completely to the potential participants and if they were satisfied to take part in the study, they were asked to read and sign consent form. Furthermore, the headmasters of all 23 elderly centers were approached about their willingness to participate in the study. To collect data, trained interviewers conducted face-to-face interviews. Interviewers had high school diploma. Each interview lasted for approximately 45 minutes.

Instruments

We used several instruments to collect data. The reliability of all instruments was assessed among a sub-sample of 20 participants using Cronbach's alpha coefficient. The instruments and findings are explained as follows:

1. Demographic and anthropometrics questionnaire: The questionnaire consisted of three sections including demographic and anthropometrics data including information on age, sex, education, income, marital status, health status (having a chronic disease or not) and BMI. Chronic disease was indicated by asking each individual to respond to the question: 'Do you have any long-standing diseases'? If they responded positively then they were asked to indicate the name of the disease. Weight was measured using the same digital scales (SECA, calibrated in Iran), while the subjects were minimally clothed and not wearing shoes. Height was measured by a tape measure while the subjects were standing and not wearing shoes and the shoulders were in a normal position. BMI was calculated and expressed in kg/m², Economic status was measured using the asset-based approach developed by Ferguson and colleagues [30] and has been used in previous cross-national studies of economic status and health in developing countries [31]. According to this scale, 0-3 assets were determined as low, 4-6 assets were determined as intermediate and 8 or more assets as high economic situation. The items considered as assets were: television, refrigerator, washing machine, microwave oven, dish-washer, computer, electrical broom, and automobile and phone.

2. Stages of change questionnaire regarding FV consumption behavior: This part of questionnaire was consisted of five statements by which the participants were categorized into different stages of change: pre-contemplation, contemplation, preparation, action and maintenance. This part was included multiple-choice questions adapted from the literature

[32]. Participants were asked to choose the statement that best described their status. Choices for the questions were 1) I am not currently consuming 5 servings of F&V a day and I am not thinking of doing so in the upcoming 6 months, 2) I am not currently consuming 5 servings of F&V a day but I plan to do so within the next 6 months, 3) I am not currently consuming 5 servings of F&V a day but I plan to do so within the next month, 4) I am currently consuming 5 servings of F&V a day but I have only been doing so for less than six months, and 5) I am currently consuming 5 servings of F&V a day and I have been doing that for more than six months. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient and it was found to be 0.79.

3. Self-efficacy rating scale: Self-efficacy was assessed using a five-item questionnaire developed by Ma et al. [32]. Each item is rated on a 5-point scale (from not at all confident to very confident regarding recommended FV consumption) and it gives a score ranging from 5 to 25. A higher score indicates a greater degree of self-efficacy. The scale showed a good validity (as assessed by content validity) and satisfactory internal consistency (as measured using Cronbach's alpha coefficient, 0.85).

4. Support rating scale: In order to assess influences of family and friends on healthy eating, the 6-item family support healthy eating habits scale and the 6-item friend support for healthy eating habits scale were used [33]. Each item is rated on a 5-point scale (from none to very often) and it gives a score ranging from 6 to 30 for each section. The Cronbach's alpha coefficient for the scale was found to be 0.85.

5. Knowledge instrument regarding FV consumption: The knowledge of participants was measured using a six-item questionnaire. The first question was: "Would you say what is recommended servings for FV consumption per day?" The response categories included

'1', '2-3,' or '5 or more' The second item was: Would you say that a single serving of beans is 'more,' 'less,' or 'about as much' as can fit in the palm of your hand? The next four items used an agree/disagree response format. The items were: FV are a good source of fiber; if you take vitamin pills you do not have to eat a lot of FV; boiling and evaporation is best method to cook vegetables; as long as you eat FV, it does not matter what color they are. Correct responses were summed to create a total knowledge score of 0 to 6. This scale was found to be valid (approved by ten nutrition specialists) and a reliable measure (Cronbach's alpha coefficient, 0.72).

6. Perceived benefits and barriers regarding FV consumption: This part was generated from previous studies and focus group discussions with convenience samples of elderly individuals. Participants were asked about their perceptions regarding any amounts of FV intake. The final perceived benefit questionnaire was consisted of 15 items. Each item is rated on a 5-point scale ranging from very important to not at all important. The perceived barrier was consisted of 11 items. Each item is also rated on a 5-point scale ranging from very important to not at all important. The total score for the perceived benefits ranged from 15 to 75 and for perceived barriers from 11 to 55. The Cronbach's alpha coefficient for the benefit scale was 0.73 and for the barrier scale it was 0.69.

7. Daily FV consumption: This section was consisted of 2 parts as follows:

7.1. Food frequency questionnaire: this was consisted of two main questions related to available fruits and vegetables (in all 38 items) in Tehran's markets. Response categories were: never, 1-2 times in week, 3-4 times in week, 5-6 times in week, and every day. Accordingly the respondents were asked to indicate the amount of intake. Then we estimated daily FV intake for each individual derived from above information.

7.2. A 24-hours recall: Participants were asked to estimate their daily servings of FV in breakfast, lunch, dinner, and between meals as snacks or deserts accordance with nutrition guideline card. The nutrition guideline card categorized one serving of vegetables into one of three following groups: (1) one cup of raw green leafy vegetables such as spinach or salad; (2) one-half cup of other vegetables cooked or chopped raw, such as tomatoes, carrots, pumpkin, corn, Chinese cabbage, beans, or onions; and (3) one-half cup of vegetable juice. The nutrition guideline categorized one serving of fruit into one of three groups: (1) one medium size fruit, such as an apple, banana, or orange; (2) one-half cup of cooked, chopped, or canned fruit; and (3) one-half cup fruit juice, not artificially flavored. Then, we calculated daily serving FV consumption for each individual.

Data analysis

Data were analyzed using both descriptive and analytic statistics using one-way analysis of variance (ANOVA), t-test, Pearson correlation, and logistic regression analysis. Pearson correlation was used to assess the correlation between independent variables and FV consumption. Logistic regression analysis was performed to identify the magnitude of association between FV serving eaten per day and independent variables including age, gender, education, marital status, economic status, self-reported chronic disease, and perceived benefits and barriers, self efficacy, knowledge regarding FV consumption, and social support (family and friends). To avoid infinite odds ratios, some categories were merged. For example, marital status was categorized into 'married' and 'widowed and divorced'. For the purpose of logistic regression analysis the sample was divided into

quartiles of FV consumption and comparison was made between the 1st (inadequate) vs. 4th (adequate) quartiles in order to increase statistical power.

Results

Of 454 eligible individuals, 32 individuals did not agree to be interviewed due dislike. Thus 422 individuals who signed consent form entered into the study. A total of 22 questionnaires were excluded from analysis due to incomplete answers. In total, 400 elderly individuals (102 men and 298 women) from 23 elderly centers took part in the study. The mean age of participants was 64.07 (SD = 4.49) years ranging from 60 to 87. The majority of participants were married (55%), unemployed (80%) with BMI between 25 and 29 (48%). The results showed that FV consumption among participants was low. Overall, the mean serving of FV intake eaten per day for the whole sample was 1.76 (SD = 1.15). Table 1 shows the characteristics of the study sample and the mean serving of FV per day for the study subgroups.

The data analysis indicated that 97% of participants (n=388) did not know recommended intake of at least five servings of fruits and vegetables in each day. Similarly 93% (n=372) did not know about the importance of FV color; and 88.3% (n=353) did not know recommended size of one serving. However, 74.3% of participants (n=297) were acknowledged that FV are an important source of fiber, 70.3% (n=281) correctly reported vitamin pills were not as valuable as FV, 76% (n = 304) were aware of boiling and evaporating are healthy methods of cooking vegetables.

The mean score of participants' knowledge was 2.07 (SD=0.47), 2.91 (SD=0.84), 3.15 (SD=0.82), 4.33 (SD=0.52), 5.75 (SD=0.46) for pre contemplation, contemplation, preparation, action and maintenance stage, respectively.

The perceived benefits and barriers regarding FV intake are shown in table 2. The most frequent perceived benefits and barriers towards fruits and vegetables consumption were availability (95%) and being expensive (55.5%), respectively. The mean score for perceived benefits was 55.04 (SD=8.89) for pre-contemplation, 55.80 (SD8.19) for contemplation, 58.30 (SD=6.99) for preparation and 62.50 (SD=7.5) for action and 67.5 (SD=10.57) for maintenance. The mean score for perceived barriers was 35.62 (SD=8.17) for pre contemplation, 35.05 (SD=6.57) for contemplation, 32.41 (SD=8.39) for preparation and 27.5 (SD=5.68) for action and 27.88 (SD=15.79) for maintenance. The mean score for self-efficacy was 12.65 (SD=6.24), 12.92 (SD=6.45), 15.67 (SD=5.82), 17.0 (SD=4.14) and 17.41 (SD=3.59) for pre contemplation, contemplation, preparation, action and maintenance, respectively.

When the correlation between TTM variables, knowledge, social support and FV intake was examined all were found to be significantly correlated (Table 3).

Logistic regression analysis was performed to estimate variables that contribute to inadequate FV consumption. The results showed that perceived benefits (OR = 0.92, 95% CI = 0.88-0.96), self-efficacy (OR = 0.89, 95% CI = 0.83-0.95), knowledge (OR = 0.59, 95% CI = 0.39-0.88), support from family (OR = 0.91, 95% CI = 0.83-0.99) were

significant predictors of FV consumption while age, gender, education, marital status, economic status, employment, chronic diseases, and support from friends were not. The results are presented in Table 4.

Discussion

This study revealed that FV consumption among Iranian elderly is much lower than daily recommended consumption by WHO [34]. Furthermore, the prevalence of low FV consumption tended to be increased with age. Similarly studies from high-income countries such as the U.S.A and France showed that the prevalence of low FV consumption increased with age [35,36]. Many developing countries do not have any data on FV consumption patterns in their populations [37], and thus the comparison of our findings with countries with similar conditions seems impossible.

Although previous studies [38,39] showed significant differences between male and female in terms of FV intake, in the present study there were no significant differences between both genders. We speculate this might be due to cultural differences that exist between different nations or simply since most women in this study were housewife, one might argue that they had relatively adequate FV in their daily dietary intake and thus there were no significant differences between male and female.

As expected this study showed that participants who were more educated (people with higher educational level) and wealthier had consumed more FV. These results are similar to what have been reported by other investigators [40,41]. It seems that more research is needed to assess any relationships between educational level of elderly individuals and

their knowledge regarding FV in order to find out whether having higher education leads to consumption of adequate FV or regardless of educational level; knowledge about FV by itself could result in adequate FV intake.

Although this study showed that the majority of participants had good knowledge regarding different health benefits of FV and also believed that vitamin pills are not real substitution for fresh FV, nearly most participants did not know about the amount of daily FV consumption and the correct size of FV in each serving that recommended by WHO. Van Duyn and co workers indicated that being aware about how many FV a person should eat per day has been associated with higher levels of consumption [42].

The current results provided further support for studies that indicated that FV prices were a barrier to consumption for low-income consumers, and thus developing public policies to make FV more affordable for low-income families should be encouraged [43]. A previous study indicated that one percent decrease in the price of FV would lead to a 2% increase in the participations' consumption of FV and 1% increase in family income would increase FV consumption up to 4% [44].

The findings from this study indicated that married participants compared to widowed and divorced consumed more FV. A study showed that only married men consumed more FV compared to single men and there were no differences between women in this regards [45]. This might suggest that there is need for further investigation on this issue or it might be necessary to study the relationship between marital status, family support and

FV consumption in different cultures. However, the findings of this study also indicated that social support could increase FV intake among elderly individuals. Others also reported positive relationship between social support from family and friends and FV intake [46] Thrasuer et al. examined types rather than source of support as determinants of healthy eating among African American adults. They found that informational and instrumental support was associated with healthy eating [47] In Iran, most elderly are living with their family members and are well supported by informational, emotional and instrumental support, and in case of living alone family members are responsible for their needs. Additionally, peer support predominantly gives emotional and informational support to them. This situation could lead to better healthy behaviors (such as FV consumption).

Participants who had stood in more advanced stage of change of FV consumption behavior were more likely to consume these foods. These are consistent with findings by other researchers [48]. These results implies that stage of readiness to change eating habits should be considered as influencing factors while planning interventions for increasing FV. For example, motivational strategies for encouraging FV consumption may be more effective for elderly individuals who are in the pre contemplation or contemplation stages, while supportive strategies to maintain a level of FV consumption may be more appropriate for who are in maintenance stage. In addition, there are relationships between TTM variables (benefit, barriers and self-efficacy) and stages of change regarding fruit and vegetable consumption. The findings from our study showed that those who were in later stages had higher perceived benefits and self-efficacy and

lower perceived barriers. Similarly Di Noia et al. reported that the individuals who had higher pros and self-efficacy were stood in preparation, action, and maintenance stages compared with individuals in precontemplation and contemplation stages [48]. As this study showed, variables such as barriers and self-efficacy could significantly predict FV consumption. It has been shown that self-efficacy, and perceived barriers are important predicting factors for diet behaviors and many health behaviors [49,50]. Therefore, one can suggest improving individuals' abilities through continued education and training may lead to enhanced intake of FV. It seems that it is important that policy makers and all who are responsible for peoples' health should be aware of these influencing variables.

Consistent with other previous findings [51], our study showed that elderly individuals who were in normal range of BMI consumed more FV. This relationship might be explained by the lower energy density and higher volume of fiber and water content in FV [52] that leads to more ideal weight.

Given that all our respondents were members of elderly centers, the findings of this study might not be generalized to all elderly who live in Tehran. These elderly might be differed from others in terms of socioeconomic status, family cohesiveness, social support, and availability and access to FV. Further studies are needed to examine the mediating factors affecting FV consumption in a larger and more diverse group of elderly in Iran. In addition one should note that our findings on FV intake were based on self-reported information and thus might be associated with measurement errors. Similarly seasonal aspects were not investigated in this study. Since season might influence

availability of FV, it is recommended to consider this in the future studies.

Conclusion

The findings demonstrated that FV consumption among Iranian elderly individuals was low and varied greatly across age, education and income level. In addition the results indicated that low perceived benefits, low self-efficacy, and perceived barriers could lead to lower consumption of FV. Therefore, it seems that in order to improve FV consumption among Iranian elderly individuals, raising awareness, improving perception benefits and enhancing self-efficacy regarding FV consumption should be receive more attentions. Indeed planning health education programs and nutritional interventions for this group of population are essential.

List of abbreviations: FV: Fruit and vegetable, CHD: Coronary heart disease, CVD: Cardiovascular disease, BMI: Body Mass Index, TTM: Transtheoretical Model, OR: odds ration.

Competing interest

The authors declare that they have no competing interests.

Authors' contributions

LS was the main investigator, analyzed the data and involved in drafting the Manuscript. **HE** has supervised the study; contributed to the study design and gave final Approval for the study to be published. **KM** contributed to the study design, performed the statistical

analysis, and supervised the study. **SST** involved in drafting, and revising it critically for important intellectual content. **AJ** helped in writing process. **AM** contributed to the analysis, edited the paper and provided the final version. All authors read and approved the final manuscript.

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Table 1: The characteristics of study sample (n=400)

	No (%)	FV serving /day Mean (SD)	P*
Age			0.003
60-64	255 (63.8)	1.83 (1.18)	
65-69	87 (21.7)	1.73 (1.10)	
70-74	47 (11.75)	1.52 (1.04)	
75-79	8 (2)	1.53 (0.88)	
80-84	2 (0.5)	0.57 (0.61)	
>85	1 (0.25)	0.29 (0.29)	
Gender			0.81
Male	102 (25.5)	1.74 (1.16)	
Female	298 (74.5)	1.77 (1.50)	
Education			< 0.001
Illiterate	165 (41.2)	1.63 (0.96)	
Primary	143 (35.8)	1.74 (1.15)	
Junior secondary	64 (17)	1.57 (0.98)	
Senior secondary	22 (5.5)	3.15 (1.73)	
College	6.0 (1.5)	2.98 (1.54)	
Marital status			< 0.001
Married	230(55)	1.95(1.16)	
Widowed/divorced	170 (45)	1.51(1.08)	
Economic Status			< 0.001
Low (0-3 assets)	306 (76.5)	1.68 (1.03)	
Intermediate (4-6 assets)	65 (16.3)	1.57 (0.99)	
High (8 or more assets)	29 (7.3)	3.34 (1.52)	
Employment status			0.58
Employed	54 (13.5)	1.91 (1.04)	
Housewife	283 (70.8)	1.73 (1.11)	
Retired	63 (15.7)	1.79 (1.41)	
BMI			< 0.001
<25	106 (26.5)	2.78 (1.15)	
25-29	192 (48)	1.66 (0.74)	
≥ 30	103 (25.5)	0.92 (1.01)	
Stage of Change (n = 386)			< 0.001
Pre contemplation	283(73.4)	1.63 (0.98)	
Contemplation	76 (19.6)	1.47 (0.94)	
Preparation	27 (7.00)	2.28 (0.68)	
Action	6.0 (1.50)	5.0 (0.00)	
Maintenance	8.0 (2)	5.25 (0.70)	
Chronic disease			< 0.001
Yes	197 (49.25)	2.03 (1.29)	
No	203 (50.75)	1.49 (0.92)	

* Derived from t-test and one was analysis of variance (ANOVA).

Table 2: Frequency of responses to survey questions regarding the benefits and barriers of FV consumption

Perceived benefits		No.	%
	I can find any kind of FV in my local stores	381	95.25
	FV contain more vitamins and minerals	379	94.75
	FV decrease the risk of chronic disease	330	82.50
	FV make our diet diverse	327	81.75
	Eating FV is a good way for treating chronic disease	330	82.50
	Eating FV would help me to be less aggressive	317	79.25
	Eating FV treats constipation	315	78.75
	Eating FV would help me maintain my weight	311	77.75
	Eating more FV advised by physicians	285	71.25
	Eating FV cheering my family members	274	61.75
	Eating FV is common in my culture	264	66.00
	Eating FV would keep me from getting sick	145	36.25
	Eating FV would help me to live longer	130	32.50
	I feel I am caring my body health if I eat more FV	119	29.75
	By eating FV I feel better	59	14.75
Perceived barriers			
	Eating FV is expensive	222	55.50
	Habit of eating FV has been established since childhood	153	38.25
	Eating FV leads to overeating	147	36.75
	Media advertisements are not about eating FV	127	31.75
	I do not have time to prepare FV	107	26.75
	Eating more FV is not recommended in my culture	95	23.75
	My family members do not like consumption of FV	82	20.50
	Eating more FV is difficult for me	82	20.50
	I have health problems (like flatus) with eat FV	80	20.00
	I have limitation ways to provide FV in my meal	80	20.00
	I do not like taste of FV	38	9.50

Table 3: Correlation between TTM, knowledge, social support and FV consumption

	FV intake	Knowledge	Benefits	Barriers	Self efficacy	Social support (family)	Social support (friends)
FV intake	1						
Knowledge	0.39**	1					
Benefits	0.23**	0.13**	1				
Barriers	-0.29	-0.20	-0.03	1			
Self efficacy	0.33**	0.16**	0.09	-0.17**	1		
Social support (family)	0.28**	0.13**	0.09	-0.22**	0.35**	1	
Social support (friends)	0.31**	0.11*	0.11*	-0.20*	0.34**	0.63**	1

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.

Table 4: Odds ratios and 95% CI obtained from logistic regression analysis for inadequate FV consumption per day

	OR (95% CI)	P
Age	1.06 (0.98-1.15)	0.14
Sex		
Male	1.0 (ref.)	
Female	0.91 (0.21-3.94)	0.89
Education		
Literate	1.0 (ref.)	
Illiterate	1.58 (0.74-3.38)	0.23
Marital Status		
Married	1.0 (ref.)	
Widowed/divorced	1.01 (0.49-2.06)	0.96
Economic Status		
High	1.0 (ref.)	
Intermediate	1.17 (0.44-3.10)	0.75
Low	1.38 (0.62-3.07)	0.42
Employment Status		
Employed	1.0 (ref.)	
Housewife	1.25 (0.275-.76)	0.76
Retired	0.72 (0.18-2.78)	0.63
Chronic Disease		
No	1.0 (ref.)	
Yes	1.46 (0.71-3.01)	0.29
Knowledge	0.59 (0.39-0.88)	0.01
Perceived benefits	0.92 (0.88-0.96)	< 0.001
Perceived barriers	1.08 (1.04-1.14)	< 0.001
Self efficacy	0.89 (0.83-0.95)	0.001
Social support from family	0.91 (0.83-0.99)	0.03
Social support from friend	0.97 (0.88-1.06)	0.50