

Food Safety Knowledge and Practices of Male Adolescents in West of Iran

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Abstract

Citation: Mirzaei A, Nourmoradi H, Zavareh MSAZ, Jalilian M, Mansourian M, Mazloomi S, Mokhtari N, Mokhtari F. Food Safety Knowledge and Practices of Male Adolescents in West of Iran. Open Access Maced J Med Sci. 2018 May 20; 6(5):908-912. <https://doi.org/10.3889/oamjms.2018.175>

Keywords: Knowledge; Practices; Food Safety; Food-borne Diseases; Adolescents

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Received: 18-Jan-2018; **Revised:** 10-Feb-2018; **Accepted:** 23-Mar-2018; **Online first:** 12-May-2018

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Funding: This research was supported by IUMS, Ilam, Iran

Competing Interests: The authors have declared that no competing interests exist

BACKGROUND: Every year many people around the world become infected with food-borne infections. Insufficient knowledge and skills related to food safety and hygiene are among the factors affecting the incidence of food-borne diseases, especially in adolescents.

AIM: The purpose of this study was to determine the knowledge and practices associated with food safety and hygiene in Ilam city male adolescents.

MATERIAL AND METHODS: Three hundred and eighty of male adolescents aged 13 to 19 were selected randomly and entered the cross-sectional study. Data were collected using a researcher-made questionnaire From December 2016 to February 2017. Descriptive statistics, Pearson correlation, independent t-test and one-way ANOVA were used to analyse the data in SPSS software (version 19.0).

RESULTS: The findings of the study showed a positive and significant relationship between knowledge and practices related to food safety and hygiene ($r = 0.122$; $p = 0.018$). Also, the findings showed that food safety knowledge and practice of adolescents were significantly affected by the level of their education, parental education level, parental employment status and household economic conditions, ($p < 0.005$). Also, the results showed that the participants generally obtained 57.74% of the knowledge score and 57.63% of practices score. The subjects had the most knowledge about food supply and storage (60%), and the highest practice was related to personal and environmental hygiene, (61.73%).

CONCLUSION: The inadequacy of knowledge and performance of adolescents about food safety and hygiene shows the need for implementation of health education interventions in this area.

Introduction

Food-borne diseases are among the most important public health challenges and one of the major barriers to socioeconomic development worldwide [1]. The results of various studies show that a wide range of infectious diseases spread to humans through unhealthy foods and cause food poisoning, diarrhoea and death [2]. According to the World Health Organization (WHO), in 2010 there were a total of 600 million cases of illness and 420,000 deaths from food-borne diseases worldwide which most of them were related to diarrheal disease agents. Also,

according to the report, 31 risk factors for food-borne diseases have been identified, which are responsible for 32 food-borne diseases [1]. Also, food-borne diseases impose high costs on the health system of countries. WHO has estimated the global burden of foodborne diseases to be around 33 million DALYs in 2010 [1]. Pathogenic agents are transmitted to food from all stages of production to distribution and consumption of food through contaminated equipment, food handlers and also final consumers [3]. Several factors affect the incidence of food-borne diseases; the most important of them are contaminated food supplies, inappropriate food storage, providing food from unhygienic sources, and poor personal hygiene [4]. In addition to the factors

mentioned above, inadequate monitoring of food production, distribution and supply, and inadequate health education programs are other reasons for the growing incidence of food-borne diseases, especially in developing countries [5] [6] [7]. On the other hand, demand for cheap and ready-to-eat foods that often are produced in unhealthy conditions is being increased [6] [7]. The results of various studies show that if the food health and safety principles are maintained from the production stages to the consumption, many of the water and food-borne diseases are prevented and controlled and food security of consumers is provided [8] [9]. Food safety is defined as the degree of confidence that food will not cause illness or harm to consumers [7]. Consumers are the last link in the chain of food production to consumption, and they are the most important step in combating food-borne diseases through proper selection, purchase, storage and preparation of food products [8] [11]. However, most studies on food hygiene have focused on food handlers but, food consumers have been less targeted by various studies. Previous studies have shown that people especially in less developed countries have poor knowledge and skills in relation to food safety and hygiene [12]. Meanwhile, adolescences need a more educational program in the field of food safety [7] [8] [13]. Adolescences have a significant role in buying, storing and even preparing food, and in the future, their role will be greater [7] [14]. On the other hand, adolescents' exposure to puberty leads to an increase in the spirit of independence and tendency toward peer groups. So, they are more likely to consume fast food/snack away from home rather than at home meal. Due to this reason, adolescents are more at risk to food-borne diseases [14] [15] [16]. Previous studies have reported that knowledge is the most important predictor of safe nutritional behaviors in adolescents [17]. Therefore, assessing the level of adolescents' knowledge and practices in relation to food safety is a fundamental step towards planning future educational interventions. The purpose of this study was to assess food safety-related knowledge and practices of male adolescents in the west of Iran.

Material and Methods

A cross-sectional study was conducted from December 2016 to May 2017 on food safety knowledge and practice of adolescent consumers in the Ilam city (west of Iran). A total of 380 voluntary male adolescents were selected by sampling and included in the study. Research Ethics Committee of Ilam University of Medical Sciences approved the present study.

The data collection was carried out through a 56-items researcher-made questionnaire as self-report. The questionnaire consists of three sections:

1. A demographic section includes 10 items (Age, educational status, parents' educational level, parents' employment status and family economic status).

2. Food safety knowledge scale includes 25 items (For example consumption of food and hot drinks in disposable plastic cups and dishes is dangerous to health). The knowledge section answers scoring was as Yes = 2, I don't know = 1 and No = 0.

3. Food safety practices scale includes 21 items (For instance: how often do you pay attention to the date of production and expiration when you purchase food?). The practice section answers were scored with a five-point Likert scale from never = 1 to always = 5.

Reliability of the questionnaire was estimated using Cronbach's alpha coefficient of internal consistency. The Cronbach's alpha for food safety knowledge and practice was estimated to be 0.81 and 0.86, respectively. Time needed to complete the questionnaire was approximately 25 minutes.

The data analysis was conducted with SPSS software (version 19.0). Descriptive statistics, Pearson correlation, independent t-test and one-way ANOVA were used to analyse the data. *P*-values less than 0.05 were considered as statistically significant.

Results

Three hundred and eighty boys aged 13 to 19 years old in Ilam city, with an average age of 16.38 ± 1.65 years, participated in this study. Most participants are being educated in high school (74.07%) and had a moderate economic status (54.07%).

Table 1: Absolute frequency, relative frequency, mean and standard deviation of knowledge and practice scores regarding demographic variables

Variables	N (%)	Knowledge		Practices	
		M ± SD	p-value	M ± SD	p-value
Educational Status					
Student	284 (74.7)	28.27 ± 7.96		59.91 ± 15.44	
Graduated	96 (25.3)	30.61 ± 7.43	< 0.010	62.34 ± 11.01	< 0.090
Father Educational Status					
Under Diploma	158 (41.6)	27.19 ± 7.14		59.24 ± 13.97	
Diploma	88 (23.2)	28.48 ± 8.23	< 0.001	61.59 ± 14.84	< 0.346
University education	134 (35.3)	31.08 ± 8.02		61.33 ± 14.80	
Mother Educational Status					
Under Diploma	211 (55.5)	28.73 ± 8.23		60.00 ± 14.65	
Diploma	82 (21.6)	27.01 ± 6.33	< 0.005	63.35 ± 12.69	< 0.122
University education	87 (22.9)	30.94 ± 7.94		59.12 ± 15.40	
Father Job Status					
Unemployed	19 (5.0)	24.36 ± 5.76		55.42 ± 15.06	
Employee	166 (43.7)	30.50 ± 8.05	< 0.001	61.10 ± 16.19	< 0.270
Self-employed	195 (51.3)	27.91 ± 7.61		60.53 ± 12.74	
Mother Job Status					
Housekeeper	294 (77.4)	28.81 ± 7.71		61.48 ± 14.22	
Employee	67 (17.6)	30.41 ± 8.58	< 0.010	58.46 ± 14.72	< 0.018
Self-employed	19 (5.0)	24.21 ± 6.30		52.89 ± 15.19	
Family Economic Status					
Weak	64 (16.8)	26.06 ± 7.02		57.45 ± 15.40	
Moderate	208 (54.7)	28.92 ± 7.06	< 0.002	59.75 ± 13.69	< 0.010
Good	108 (28.4)	30.42 ± 8.50		63.82 ± 14.91	

Absolute and relative frequencies, mean and standard deviation of knowledge and practice scores regarding demographic variables are shown in Table 1.

The results showed that adolescents graduated from high school ($p < 0.01$), adolescents with more educated parents ($p < 0.005$), adolescents with employed parents ($p < 0.01$), as well as adolescents with a good economic situation ($p < 0.02$) had a higher level of knowledge about food hygiene. However, the results of food safety related to practice showed that the higher levels were only found in the adolescents with householder mothers ($p < 0.01$) and in the adolescents with a good family economic status ($p < 0.05$). Also, Pearson correlation test showed a positive and significant relationship between knowledge and practices related to food safety and hygiene ($r = 0.122$; $p = 0.018$).

Table 2: Mean and standard deviation of the total knowledge and practices scores related to food hygiene and three sub-scales

Variables	Mean	SD	Obtainable Scores Range
Total Food Hygiene Knowledge	28.87	7.88	0 – 50
Personal and Environmental Food Hygiene	7.18	2.72	0 – 12
Food Preparation and Preservation	13.20	3.85	0 – 22
Food Consumption	8.46	3.04	0 – 16
Total Food Hygiene Practices	60.52	14.47	21 – 105
Personal and Environmental Food Hygiene	18.52	5.42	6 – 30
Preparation and Preservation of Food	20.46	5.74	7 – 35
Food Consumption	21.53	5.42	8 – 40

Table 2 shows the mean and standard deviation of the total knowledge and practices scores related to food hygiene and three sub-scales including personal and environmental hygiene, food supply and storage, and food consumption. As seen, the participants obtained 57.74% of the knowledge score and 57.63% of practices score. The highest and lowest obtained scores of knowledge were related to the food supply and storage (60%) and food consumption (52.87%), respectively. Also, the highest and lowest obtained scores of practices were related to personal and environmental hygiene (61.73%) and food consumption (53.82%), respectively. Moreover, 33.4% of the adolescents reported that they had not received any education regarding food hygiene. Figure 1 illustrates the contribution of different educational resources to increase the adolescents' information regarding food hygiene and safety. As it can be seen, the Internet had the highest roll with 22.3%, and health staff (8.4%) had the lowest role in adolescent food safety education.

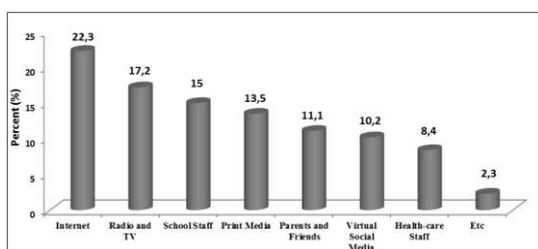


Figure 1: Sources of information of study subjects on food safety and hygiene (%)

Discussion

This study aimed to determine the status of knowledge and practices of adolescent boys about food safety and hygiene. The subjects reported moderate levels of food safety knowledge and practice. These findings indicated inadequate knowledge and practice of the subjects about food safety and health. In this study, the knowledge and practice of the adolescents were studied both in total and regarding three areas include 1) Personal and Environmental Food Hygiene (PEH), 2) Food Preparation and Preservation (FPP), and 3) Food Consumption (FC). Accordingly, the results of the study showed that the level of adolescents' knowledge in two areas of FPP and PEH was better than of FC. The food consumption practice was also weaker in two other areas. Findings of other studies indicated that food consumers had poor knowledge and practice in relation to food safety [2] [7] [18]. Socioeconomic factors seem to play a crucial role in the knowledge and practices of male adolescents in the field of food safety and hygiene. The results of present study showed that adolescents' knowledge regarding food safety was significantly affected by their educational status (Studying or have graduated), parents' educational level, parents' job status and household economic conditions. So that, the results indicated the higher knowledge of adolescents with higher educated parents and graduated adolescents. Additionally, adolescents with employed parents and also adolescents with good household economic status significantly had more knowledge about food safety and hygiene. However, the role of socioeconomic factors was more limited in adolescents practice in relation to food safety and hygiene. So that, only the mother's job status and family economic status had a significant effect on the practice. Accordingly, the well-being of the family and stay-at-home mothers had a positive and significant influence on the practice of the adolescents in relation to food safety and hygiene. Therefore, in several studies, the effect of socioeconomic factors on the knowledge and practice of adolescents in relation to food safety has been reported [8] [18] [19] [20] [21]. Generally, it can be said that the higher education level of adolescents and their parents has a positive effect on food safety-related knowledge [19] [20] [21], although it does not guarantee a proper practice [22]. However, the job status of the parents and the household's economic situation have a positive impact on the knowledge as well as improving the practice of adolescents in relation to food safety [20].

In the present study, adolescents with employed mothers were more knowledgeable about food safety and hygiene, while the children of the housewife's mothers reported better practice. These findings can be explained by the fact that employed mothers have more access to knowledge sources related to food safety due to higher levels of literacy

and more presence in the society. Therefore, much of their knowledge can be passed to their children. Of course, resources that generate knowledge in adolescents do not necessarily enhance their behaviour, and vice versa, resources that affect behaviour may not be a good source of knowledge. Hence, housewife mothers can be good role models for learning skills related to the prevention of food-borne diseases in adolescents [23] [24]. Adolescents, especially adolescent boys, tend to model from out-of-home patterns including peers and friends, and for this reason, they spend more time outdoors than their childhood [14] [25] [26]. As a result, they eat more out-of-home foods that often include ready-to-eat meals, junk foods and street foods that increase the risk of food-borne diseases [25] [26]. Health education seems to be the most important need for adolescents to prevent food-borne diseases [7] [13]. With the passing of the childhood, the social responsibility of adolescents is increased. So, they play a more active role in the selection, purchase, preparation and preservation of foods [8]. Accordingly, teenage is a great opportunity to implement health education interventions and develop knowledge and skills related to food safety and hygiene [14]. The fact is that as long as the adolescents are not adequately aware of the potential dangers of food-borne contamination, they will not have enough motivation to adopt the preventive behaviours [8] [27]. According to the results of present study, about one-third of the participants reported that so far they have not received any education about food safety and hygiene. Of the adolescents who were educated, only 15% and 4.3% of them were educated by school staff and healthcare system, respectively. These findings indicated that only small proportion of food safety and hygiene education of the adolescents provided by healthcare staff or school health care providers. On the other hand, the role of mass media in educating adolescents about food safety more reported [8] [28]. In this study, the Internet and virtual communication social networks were provided 32.5% of the food safety education to the adolescents. Also, radio and television (17.2%) and printed media (13.2%) had a significant contribution to the education of food safety to the adolescents. Similar studies in other developing countries also indicated that there were not adequate educating programs in the field of food safety and hygiene, especially for adolescents [29].

In today's world, Web-based educational resources play an important role in promoting health-related knowledge and practices of adolescents [30, 31]. However, the educational content provided by the Internet may not have sufficient scientific credibility and always cannot be trusted. Therefore, due to the high interest of adolescents to Web-based educational resources, it is suggested that these methods be used in further educational interventions in the field of food safety and hygiene. In this way, the interest and selection of adolescents are respected and can also

be acted as a credible scientific resource for educating health topics in the Internet environment.

In summary, the results of this study indicated the inadequate knowledge and practices of male adolescents in relation to food safety and hygiene. Since adolescents are vulnerable and at risk for food-borne diseases. Consequently, they should be more targeted at food safety educational interventions.

Acknowledgements

Researchers are grateful for all of the study participants. This Project is supported by IUMS, Ilam, Iran.

References

1. World Health Organization (WHO), (2010). WHO Estimates of the Global Burden of Food-borne Diseases, 2010. Available from: http://apps.who.int/iris/bitstream/10665/200046/1/WHO_FOS_15.0_2_eng.pdf?ua=1
2. Redmond EC, Griffith CJ. Consumer food handling in the home: A review of food safety studies. *Journal of Food Protection*. 2003; 66(1):130-161. <https://doi.org/10.4315/0362-028X-66.1.130>
3. Hedberg CW, MacDonald KL, Osterholm MT. Changing epidemiology of food borne disease: A Minnesota perspective. *Clinical Infectious Disease*. 1994; 18:671-682. <https://doi.org/10.1093/clinids/18.5.671>
4. Lynch M, Painte J, Woodruff R, Braden C. Surveillance for foodborne-disease outbreaks United States 1998-2002. *MMWR Surveill Summ*. 2006; 55:1-42. PMID:17093388
5. Soner A, Özgen I. International hygiene standards for food-beverage businesses. Health and nutrition in the tourism sector; problems and solutions symposium. Baskent Üniversitesi, Alanya, Türkiye, 2002.
6. Medeiros LC, Hillers VN, Chen G, Bergmann V, Kendall P, Schoreder M. Design and development of food safety knowledge and attitude scales for consumer food education. *Journal of the American Dietetic Association*. 2004; 104(11):1671-1677. <https://doi.org/10.1016/j.jada.2004.08.030> PMID:15499353
7. Sanlier N. The knowledge and practice of food safety by young and adult consumers. *Food control*. 2009; 20(6):538-42. <https://doi.org/10.1016/j.foodcont.2008.08.006>
8. Unusan N. Consumer food safety knowledge and practices in the home in Turkey. *Food control*. 2007; 18(1):45-51. <https://doi.org/10.1016/j.foodcont.2005.08.006>
9. Medeiros L, Hillers V, Kendall P, Mason A. Evaluation of food safety education for consumers. *Journal of Nutrition Education and Behavior*. 2001; 33(S1):S27-S34. [https://doi.org/10.1016/S1499-4046\(06\)60067-5](https://doi.org/10.1016/S1499-4046(06)60067-5)
10. FAO/WHO (2003). *Codex Alimentarius, Basic Text on Food Hygiene*. 3rd ed, Italy, 2003.
11. Kagan LJ, Aiello A, Larson E. The role of the home environment in the transmission of infectious disease. *Journal of Community Health*. 2002; 27:247-267. <https://doi.org/10.1023/A:1016378226861> PMID:12190054
12. Eves A. Kipps M. *Food hygiene and HACCP*. Oxford:

- Butterworth-Heinemann, 1995: 202-245.
13. Byrd-Bredbenner C, Wheatley V, Schaffner D, Bruhn C, Blalock L, Maurer J. Development of food safety psychosocial questionnaires for young adults. *Journal of Food Science Education*. 2007; 6:30–37. <https://doi.org/10.1111/j.1541-4329.2007.00021.x>
 14. Mullan BA, Wong C, Kothe EJ. Predicting adolescents' safe food handling using an extended theory of planned behavior. *Food Control*. 2013; 31(2):454-60. <https://doi.org/10.1016/j.foodcont.2012.10.027>
 15. Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *J Am Coll Nutr*. 2005; 24(2): 83-92. <https://doi.org/10.1080/07315724.2005.10719448> PMID:15798074
 16. Byrd-Bredbenner C, Abbot JM, Quick V. Food safety knowledge and beliefs of middle school children: implications for food safety educators. *Journal of Food Science Education*. 2010; 9(1): 19e30.
 17. Abbot JM, Byrd-Bredbenner C, Schaffner D, Bruhn CM, Blalock L. Comparison of food safety cognitions and self-reported food-handling behaviors with observed food safety behaviors of young adults. *European Journal of Clinical Nutrition*. 2009; 63:572e579.
 18. Tomaszewska M, Trafialek J, Suebpongsang P, Kolanowski W. Food hygiene knowledge and practice of consumers in Poland and in Thailand-A survey. *Food Control*. 2018; 85:76-84. <https://doi.org/10.1016/j.foodcont.2017.09.022>
 19. Jianu C, Chiş C. Study on the hygiene knowledge of food handlers working in small and medium-sized companies in western Romania. *Food Control*. 2012; 26 (1):151-6. <https://doi.org/10.1016/j.foodcont.2012.01.023>
 20. Avarand A, Abedi-Sarvestani A. Analysis of knowledge and attitude towards food safety among university students in Gorgan city. *Journal of Food Hygiene*. 2015; 17(5):53-66.
 21. Sharifirad GH, Hidarnia A. Effect of health education in the decrease of intestinal parasitic infection in Ilam using Perry model. *Journal of Shaeed Sdoughi University of Medical Sciences Yazd*. 2001; 9(4):75-80.
 22. Ansari-Lari M, Soodbakhsh S, Lakzadeh L. Knowledge, attitudes and practices of workers on food hygienic practices in meat processing plants in Fars, Iran. *Food control*. 2010; 21(3):260-3. <https://doi.org/10.1016/j.foodcont.2009.06.003>
 23. Mirzaei A, Ghofranipour F, Ghazanfari Z. Social cognitive predictors of breakfast consumption in primary school's male students. *Global journal of health science*. 2016; 8(1):124. <https://doi.org/10.5539/gjhs.v8n1p124> PMID:26234965 PMCid:PMC4804056
 24. Tibbs T, Haire-Joshu D, Schechtman KB, Brownson RC, Nanney MS, Houston C, Auslander W. The relationship between parental modeling, eating patterns, and dietary intake among African-American parents. *Journal of the American Dietetic Association*. 2001; 101(5):535-41. [https://doi.org/10.1016/S0002-8223\(01\)00134-1](https://doi.org/10.1016/S0002-8223(01)00134-1)
 25. Altekruze SF, Street DA, Fein SB, Levy AS. Consumer knowledge of food-borne microbial hazards and food-handling practices. *Journal of food protection*. 1996; 59(3):287-94. <https://doi.org/10.4315/0362-028X-59.3.287> PMID:10463448
 26. Gavaravarapu SR, Vemula SR, Rao P, Mendu VV, Polasa K. Focus group studies on food safety knowledge, perceptions, and practices of school-going adolescent girls in South India. *Journal of nutrition education and behavior*. 2009; 41(5):340-6. <https://doi.org/10.1016/j.jneb.2008.12.003> PMID:19717117
 27. Schafer RB, Schafer E, Bultena GL Hoiberg EO. Food safety: an application of the health belief model. *Journal of Nutrition Education*. 1993; 25: 17–23. [https://doi.org/10.1016/S0022-3182\(12\)80183-X](https://doi.org/10.1016/S0022-3182(12)80183-X)
 28. Rimal A, Fletcher SM, McWatters KH, Misra SK, Deodhar S. Perception of food safety and changes in food consumption habits: a consumer analysis. *International Journal of Consumer Studies*. 2001; 25(1):43–52. <https://doi.org/10.1111/j.1470-6431.2001.00162.x>
 29. Gavaravarapu SR, Vemula SR, Rao P, Mendu VV, Polasa K. Focus group studies on food safety knowledge, perceptions, and practices of school-going adolescent girls in South India. *Journal of nutrition education and behavior*. 2009; 41(5):340-6. <https://doi.org/10.1016/j.jneb.2008.12.003> PMID:19717117
 30. Hamel LM, Robbins LB. Computer-and web-based interventions to promote healthy eating among children and adolescents: a systematic review. *Journal of advanced nursing*. 2013; 69(1):16-30. <https://doi.org/10.1111/j.1365-2648.2012.06086.x> PMID:22757605
 31. Long JD, Stevens KR. Using Technology to Promote Self-Efficacy for Healthy Eating in Adolescents. *Journal of Nursing Scholarship*. 2004; 36 (2):134-9. <https://doi.org/10.1111/j.1547-5069.2004.04026.x>