


## Food safety knowledge and practice and its relationship with literacy: The case of rural women in Iran

Ahmad Abedi-Sarvestani<sup>1\*</sup> , Amaneh Avarand<sup>1</sup>

<sup>1</sup> Dept. of Agricultural Extension and Education, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran.

**Corresponding author and reprints:** Department of Agricultural Extension and Education, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran. Tel: +98-17-32426845, Fax: +98-17-32426845.

**Email:** [abedi@gau.ac.ir](mailto:abedi@gau.ac.ir)

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### Abstract

**Background:** It is widely understood that most food-borne illness is associated with the inner home environment, and that therefore, the role of women in providing, storage and preparation of healthy food is very important. Given the lack of research on home food safety in Iran, this study focused on the knowledge and behavior towards food safety and its relationship with literacy among rural women.

**Methods:** Data of this cross-sectional survey were collected through questionnaires. The validity of the questionnaire was evaluated by referring to university experts. The questionnaire reliability was evaluated by Cronbach's test ( $\alpha=0.782$ ). The study population consisted of rural women in the areas of Gonbad-e Kavous County in Golestan province, north of Iran. Using random cluster sampling, 385 women from 77 villages were studied. Descriptive statistics and t-test were used for analysis.

**Results:** Knowledge and behavior of the studied rural women towards food safety could be assessed as good and fair respectively. There was no difference between literate and illiterate women in regard to food safety knowledge ( $t=1.72$ ;  $P>0.05$ ), but literate compared with illiterate rural women have in general better food safety behavior ( $t=2.16$ ;  $P<0.05$ ).

**Conclusion:** The findings showed that literacy education can activate mechanisms that lead to food safety behavioral changes. However, there was no difference between literate and illiterate women in regard to food safety knowledge. It suggests that illiterate rural women, despite their inability to read and write, can find appropriate methods to learn about food safety issues.

**Keywords:** Foodborne; Health Literacy; Women.

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### Introduction

Although significant progress has been made in the production and management of food, countries continue to face many problems of food safety (1). Every year,

millions of people around the world suffer from diseases caused by bad food (2), and diseases caused by consumption of contaminated food have become one of the most widespread public health problems in modern society (3). With the increase in

new pathogens, diseases caused by food abuse have increased (4).

According to the World Health Organization, health literacy, whether in rich or poor countries, plays a central role in determining health disparities (5). A recent systematic review showed that low levels of health literacy are a major problem in the United States. This problem was more serious for people with less education (6). Given the above, the promotion of food safety knowledge is essential in order to protect public health and achieve sustainable development. It is also suggested that this is more important for women because women are more responsible for storage and preparation of food at home and they coach and teach their children. So, women can play an important role in enhancing awareness of food safety and of better ways to improve food safety. Although in most countries, men have more access to facilities than women, the various functions of women in their communities cannot be ignored. Therefore, making fundamental changes in the social, economic and cultural aspects of food safety needs to pay attention to women's attitude and knowledge. A recent literature inquiry showed that food literacy can be considered as a particular form of health literacy (7).

Women's literacy and awareness, especially in less developed areas with relatively little access to educational and health facilities, are seen by many as vital (8). It is argued that education plays an important role in the lives of all members of society, but this is more important for women because they have a key role in the family's knowledge, belief and behavior in the field of food safety and nutrition. Women's education can improve their health and nutrition as well as those of their family members. If women are literate, they will often try to update their own information and awareness about health, hygiene and home economics.

Therefore, literate mothers are more likely to have healthier children (9).

In the primary health care sector, it has been proposed that public participation and education services to the community are two of the main principles (10). Community empowerment is seen as one of the most important ways to prevention and care. For this reason, literacy is considered as a factor in enhancing public health because it gives people the power to distinguish and act properly. It is suggested that people with high literacy know the importance of health and hygiene standards. They are also said to collaborate more effectively with health care providers, identify health needs and the convenience they demand, spend a larger part of their income on health care costs and improve their health and their community, try to improve their health knowledge and learning through the media, listen to and execute health commands, know health risk factors and share their health knowledge with others. In contrast, people with low literacy are thought to be less involved in health programs, their health awareness is less, they have poorer physical and mental health, their disease control is weaker, they have less understanding of the information provided and they are less likely act on the instructions. So, the promotion of literacy is seen as an enabling factor for women who usually play an important role in preparing and storing foods for their family (11).

In general, two main views of literacy can be distinguished. In one view, literacy is attributed to a combination of skills needed to understand and produce written forms of a language (12). This 'skills' view is widely accepted in developing countries. However, today the concept of literacy is not considered solely as the ability of reading, writing and counting but as *functional literacy*. It is claimed that functional literacy facilitates access to knowledge and boosts the process of

empowerment and self-esteem from which all human beings benefit without literacy, a person remains ignorant and unable to learn (13). Literacy learning needs to be accompanied by learning about areas such as lifestyle, biodiversity, cultural heritage, poverty reduction, disaster risk reduction and safety as well as civic engagement to be fully functional.

The alternative view sees literacy, not as an ability (to read and write, or to read and write functionally, or to read and write and learn) which a person possesses or does not possess and which can be learned in a classroom, but as a set of practices that take place in the course of everyday life (14,15,16). Sometimes called the New Literacy Studies (17) but more generally called 'literacy as social practice' (18), this approach points out that there are multiple literacies such as religious literacies, occupational literacies, academic literacies etc. It draws on the work of Professor Brian Street whose work in Iran was the basis for his major study of *Literacy in Theory and Practice* (19). Associated with this view of literacy practices is *critical literacy* seen as a means to help people to be aware of their position and be ready to accept and make positive changes (20), associated with the work of Paulo Freire.

However, some points should be noted. First, illiteracy is a gender issue. For example, in 2009 the number of illiterate adults was estimated as 781 million people worldwide, Two-thirds of them were women (21). According to UNICEF, nearly a billion people entered the 21st century unable to read a book or sign their names and two thirds of them are women (22). Second, research and detailed calculations suggest that women's education is not only useful for themselves but also for their families and the communities in which they live. In this regard, some believe that the most productive investment in the developing world is an investment in girls' education including literacy (23).

Since the role of women in the family and in food consumption is generally recognized, it is essential that the women's knowledge, attitudes and behavior in regard to food safety be examined. It is estimated that between 50 to 87 percent of foodborne disease outbreaks can be traced to foods that are prepared in the home (24). Furthermore, the kitchen environment is known as a place that may be heavily contaminated with different bacteria (25). Because of the situation of rural women, the need for studying food safety among rural women is critical. And since many women in rural areas are regarded as 'illiterate', it is important to explore the relationships between literacy, women and food safety in rural areas. Research is needed to test all these generalized conclusions. Based on the above, the research goals of this study were: a) Investigating the level of rural women's food safety *knowledge*, b) Exploring the rural women's food safety *practices* at home, and c) Examining difference between literate and illiterate women towards food safety knowledge and practice.

### Methods

This study was a cross-sectional survey. The study population consisted of rural women who lived in Gonbad-e Kavous County (5071 km<sup>2</sup>) of Golestan province, North of Iran in 2014 (Fig. 1 and 2). They were reported as living in 32,438 households in 157 villages. Almost all villages (99.9%) in Golestan province have access to a reliable electricity supply (26). This makes it possible for the majority of rural households to have at home a refrigerator with small freezer. The rural household was considered as the unit of study. Based on a pilot study that was performed on 30 rural women outside the study area and using Cochran's formula, the sample size was estimated as 380 households. These 380 were chosen based on random cluster sampling method. Gonbad-e Kavous County consisted of two

divisions, one with two rural districts and the other with four rural districts. Then, the number of samples in each rural district was divided by five to find the number of villages to be chosen randomly. In this way, 77 villages were selected randomly based on the list of village names in each rural districts and table of random numbers. Then in each of these selected villages, five women were chosen randomly as the samples (one woman from each of the selected 5 households), a total of 385 respondents.



Figure 1. Golestan Province in North of Iran



Figure 2. Gonbad-e Kavous County in Golestan Province

Data was collected by structured questionnaire which included questions related to the socio-economic and demographic characteristics of the participants, and also to the knowledge and behavior of participants towards food safety. Food safety knowledge was measured with 28 items in the form of a scale that was presented firstly by Stenger

and improved for this study (27). Food safety behavior was assessed with 65 items. To do this, first, the most consumed foods in the study area were identified in the form of a food pyramid. Then, by using the technique of Hazard Analysis and Critical Control Points (HACCP) the critical points in the production, preparation and storage of foods were determined (28). This stage took 30 times to review and reform critical points according to the food pyramid and local culture. Then, a question was raised for each critical point. This procedure resulted in 78 questions for food safety behavior. Then, two to five answers were indicated for each question in which only one answer was seen as an appropriate answer. The score of food safety behavior scale was considered as the sum of the correct answers given to each questions (1 score for each correct answer). The validity of the questionnaire was evaluated by referring to university experts in the field of food industry and health, and some items were adjusted according to local circumstances.

Data collection was conducted using interviews with participants or self-expression to complete questionnaires. We defined literate and illiterate women in terms of the self-declared ability of reading and writing. Thus, if one participant (rural woman) said she could not read and write, we considered her as illiterate and used interview to complete the questionnaire. It should be noted that this research project draws upon the skills approach and the social practices approach to literacy and the special position of women in this field. For it is concerned with literacy practices in relation to health, one of many different forms of literacy, and it seeks to explore the differences in behavior in relation to food safety of rural women who are literate or illiterate. While the definition of 'illiteracy' is contested, there are people who are regarded by society in general and who also regard

themselves as ‘illiterate’, unable to engage directly themselves without the help of mediators in the various social practices of literacy which they need for their daily living (29). We have taken here those people who call themselves ‘illiterate’ as

our distinguishing criteria. Since the majority of the studied rural women were Turkmen people, the Turkmen language was used to communicate with Turkmen women.

Table 1. General characteristics of the study participants

Variable	Groups	Frequency	Percent
Age (year)	19-32	55	14.47
	33-43	136	35.78
	44-54	126	33.15
	55-75	63	16.57
Main Occupation	Unemployed	316	83.15
	Tailoring	15	3.94
	Husbandry	26	6.84
	Carpet weaving	20	5.26
	Government employee	3	0.78
Education	Illiterate	131	34.47
	Elementary school	137	36.05
	Secondary school	69	18.15
	High school	34	8.94
	University (associate degree and bachelor)	9	2.36
Type of housing	Owned	374	98.42
	Leased	6	1.58
Distance to town (km)	2-15	66	17.36
	16-50	161	42.36
	51-90	92	24.21
	91-150	61	16.05
Source of information about food safety	Children	182	47.89
	Television	175	46.05
	Friends	8	2.10
	Magazine	8	2.10
	Radio	7	1.84
	Newspaper	0	0.0

It should be noted that one of the researchers who did the data collection was a female Turkmen. Like other survey researches, we accepted the answers the respondents gave to the questioner after ensuring the validity of the questionnaire and after ensuring their proper understanding of the questions. After collecting data, SPSS statistical software was used to analysis data. Statistics like frequency, mean, standard deviation, percentage and t-test were used.

## Results

Results showed that the mean age of participants was 43 years with the standard deviation of 11.21. The average of family size of the participants was 6 persons.

Most of the respondents were illiterate (n=131) or low-educated at the elementary levels (n=137). Children and television were stated by half of the respondents to be the main source for obtaining food safety information. Table 1 shows summary information about the demographic and socio-economic condition of the participants.

### *Food safety knowledge*

Twenty-eight items were used to measure the general knowledge of food safety. The items related to six areas of food safety public knowledge: 1) cleaning food, 2) separating food, 3) cooking food, 4) freezing food, 5) increasing food risk and 6) groups at most risk of disease. The

participants were asked to read/listen to the possible answers for each question and mark/indicate the correct answer. To calculate the total score of the food safety knowledge index, the score of 1 was considered for correct answer and zero for a wrong answer. Thus, respondents' score of general food safety knowledge can vary between zero and 28. The distribution of correct responses and the percentage of correct answers given to each question shows in Supplements file. The average score of food safety knowledge was calculated as 17.73 with standard deviation of 5.69 that shows the food safety knowledge of rural women can be assessed as good. Table 2 shows the distribution of respondents' knowledge of general food safety at the levels of poor, fair, good and excellent. The mentioned levels were calculated based on the IDSM<sup>1</sup> formula in which the levels (or groups) were defined as follows:

- Poor (A): if  $A \leq \text{Mean} - \text{SD}$
- Fair (B): if  $\text{Mean} - \text{SD} < B \leq \text{Mean}$
- Good (C): if  $\text{Mean} < C \leq \text{Mean} + \text{SD}$
- Excellent (D): if  $\text{Mean} + \text{SD} < D$

Table 2. The levels of food safety knowledge

Knowledge level	Score range	No.	Percent
Poor	5-14.5	56	14.7
Fair	14.6-17.5	99	26.1
Good	17.6-21.5	189	49.7
Excellent	21.6-28	36	9.5

**Food safety behavior**

As stated above, the questionnaire contains 65 questions for measuring rural women's food safety behavior. The questions and the answers given to these questions shows in Supplements file. Average score of food safety behavior was calculated as 37.21 with standard deviation of 4.91 that shows the food safety behavior of rural women can be assessed as fair. Table 3 shows the distribution of respondents' food safety behavior at the levels of poor, fair, good

and excellent. The mentioned levels are calculated based on the IDSM formula.

Table 3. The levels of food safety behavior

Food safety behavior level	Score range	No.	Percent
Poor	16-32.5	54	14.2
Fair	33-37.5	110	29
Good	38-42.5	180	47.3
Excellent	43-48	36	9.5

**Literate and illiterate rural women regard to food safety**

Literate and illiterate rural women in terms of food safety knowledge and behavior were compared using t-test statistical analysis. The results showed that there was no significant difference between these two groups in terms of food safety knowledge. But the two groups showed significant difference in terms of food safety behavior, so that the literate rural women in this sample were seen to have better food safety behavior than the illiterate women (Table 4).

Table 4. Comparison of food safety knowledge and behavior among literate and illiterate rural women

Variable <sup>1</sup>	Women groups		t	Sig*.
	Literate (n=249)	Illiterate (n=131)		
-Food safety knowledge	17.95	17.29	1.72	0.09
-Food safety behavior	36.63	36.43	2.16	0.03

<sup>1</sup> mean of variables are compared  
\* two-tailed

**Discussion**

The findings of this study showed that the food safety behavior of the studied women could be assessed as fair. Furthermore, literate compared with illiterate rural women have in general better food safety behavior. This means that people who have more education are also more likely to have a higher level of food safety behavior. In this regard, studies conducted by some researchers such as Karabudak *et al* (30), Van Fleet and Van Fleet (31), Ko (32), Stenger (27) and Stenger *et al* (33) have shown that the level of education has a positive relationship with the level of

<sup>1</sup> Interval of standard deviation from the mean

food safety behavior of people. It is important to record that the survey accepted the answers given by the respondents; it was not possible with such a large cohort to make observations of the practices in reality. We are conscious that some bias may appear in these results but since they reflect closely the findings in the other two sections of the research, we feel the findings may be accepted as generally valid.

One finding of this present study is that there was no difference between literate and illiterate women in regard to food safety knowledge. One reason could be that children and television programs are given as the main sources of food safety information for these participant women. In other words, it is likely that illiterate women have used their children and also television programs to gain information about food safety. If that happened, the definition of literacy shows itself best here, that literacy is not just the ability to read and write, but that the literate persons are those who practice reading and writing and thus learn and become aware of their position (14). Our results also suggest that illiterate rural women, despite their inability to read and write, can find appropriate methods to learn. At the same time, it should be noted that the literate women in this sample have better food safety behavior. This shows that literacy education can activate mechanisms that ultimately spread knowledge and attitude and lead to behavioral changes.

As knowing food safety behavior and its relationship to education can help health promotion planning, knowing the level of behavior of food safety among women in the preparation and storage of food and its relationship to education is an important factor in public health. Women have the most important role in the preparation of food at the home environment. Therefore, the promotion of knowledge and attitudes of women towards appropriate food safety behavior can improve the nutritional status

and health of rural people and reduces many health problems and illness that come from foods. According to our research findings, the following are recommended:

- Since a large number of rural women are illiterate or low literate, proper training methods such as home education or demonstration methods should be used.
- Given that the most important sources of information for rural women appear to be children and television programs, it is recommended using children as an extension between rural women and health centers. It is also recommended including food safety education materials in the school curricula. It can also be suggested that appropriate television programs be used to promote food safety in rural areas.
- It will be very helpful that the ways and methods of food safety information and knowledge acquisition among illiterate rural women be further investigated.
- For better understanding, it is suggested that this study be repeated to cover rural men.
- This study was conducted in a county that is relatively homogeneous in regard to ethnicity. The Gonbad-e Kavous County consists mostly of Turkmen residents in which the impact of literacy could have been influenced by the local dominant culture as a moderator variable. Therefore, it is suggested to repeat this study to cover different ethnicities.

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#### ***Author contributions***

Ahmad Abedi-Sarvestani: Research design, questionnaire design, data analysis, information inference, manuscript preparing and writing.



Amaneh Avarand: Questionnaire design, data collection, data analysis.

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