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Evaluating Determinants of Food Hygiene Behavior Based on Health Belief Model in Health Workers of Urmia Health Center

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ABSTRACT

Background: Observance of food hygiene is considered an important principle to prevent humans from contracting diseases and also to protect the environment from contamination. Health workers are on the front line forces of the health system. Therefore, promoting the health of health workers has an important role in promoting community health. The aim of this study is to investigate the determinants of food hygiene based on the Health Belief Model (HBM) in health workers in Urmia. **Methods:** In this descriptive-analytical study, 300 health workers in rural health centers of Urmia city were selected and entered into the study by census method based on inclusion criteria. Data collection tools included 3 parts: demographic characteristics, knowledge questionnaire, attitude and behavior, and health belief model questionnaire. Data were collected and analyzed using interviews. **Results:** The mean age of the workers was 36.76±7.61 year. The attitude and behavior of observing food hygiene had a statistically significant relationship with work experience, knowledge, attitude, gender, marital status, and level of education ($P<0.05$). Based on linear regression test, in all studied constructs, 30% of the variance of food hygiene behavior was explained. The predictive power of perceived efficiency was higher than other constructs ($\beta=0.45$). **Conclusion:** In designing educational interventions, the variables of self-efficacy, perceived benefits, perceived susceptibility, and perceived sensitivity should be emphasized as the most important predictors of food hygiene behaviors in health workers.

Keywords: *Food hygiene; Health belief model; Health worker*

Introduction

Food hygiene means observing all hygienic standards in the production, processing, storage and supply of food, so that finally healthy food with appropriate hygienic quality is available to consumers (Huth *et al.*, 2006). Today, the role and importance of food hygiene in maintaining human health and preventing diseases is clear to everyone. Due to the growing population of the

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world, the provision of healthy and adequate food and their consumption based on the principles of nutrition is one of the principles of a healthy lifestyle. Education as an indicator of community development in three dimensions of knowledge, attitude and skill will change the behavior of learners (Seleem *et al.*, 2010). The World Health Organization (WHO) views foodborne illness as one of the most important health problems today (Zeainali *et al.*, 2013). In less developed countries, large numbers of people are poisoned due to the lack of health awareness as well as food storage under unsanitary conditions. Despite efforts and evaluations in recent decades, the prevalence of foodborne diseases in both developed and developing countries is increasing (Angulo *et al.*, 2009). According to WHO in 2000, 1.2 million people died of diarrheal diseases, a large proportion of these cases were attributed to food contamination and drinking water (Lee *et al.*, 2014). The factors involved in epidemic food-borne diseases include inadequate food storage (temperature, time), contamination of tools, preparing food from unhealthy sources, poor personal hygiene, and insufficient cooking time (Angulo *et al.*, 2009). The most common reason for the spread of these poisonings was consumption of undercooked or raw foods, poor storage conditions, and generally, inappropriate behaviors of people towards the principles of hygiene and food storage. Studies have shown that most people have an acceptable knowledge of health; however, they have insufficient knowledge about the role of microbial contamination (Lee *et al.*, 2014). Consumption of spoiled food, whether in the short term or long term, can have adverse effects on human health (Liu and Grunert, 2020). Corruption and pollution factors cause adverse changes in food ,directly or indirectly, by providing a background for the activity of other factors (Wang *et al.*, 2021). The health belief model (HBM) model is one of the most effective theories for predicting individual health measures by which considers behavior a function of knowledge and attitude of the individual (Raheli *et al.*, 2020. It has been developed on the basis that it causes people to perceive a health threat, leading to a healthy lifestyle. This model has 6 constructs: perceived susceptibility (sense of danger), perceived severity (understanding the depth and seriousness of danger), perceived benefits, perceived barriers, cues to action and perceived self-efficacy; one of the basic applications of this model is primary prevention of a disease or an injury (Medeiros and LeJeune, 2016, Zareipour *et al.*, 2020). According to this model, people will observe food hygiene when they believe that the consequences of not observing food hygiene are serious and dangerous In addition, they will have the incentive by understanding the benefits of performing the task. On the other hand, other people around should also encourage the person in this regard (McCarron and Heaney, 2004). Therefore, considering that health workers are at the forefront of providing health services, they should first control risky behaviors in themselves, and then, take measures to promote prevention over treatment. This group may reduce the positive impact of various trainings and propaganda on the public in the field of spreading health behaviors by not observing the mentioned cases. Therefore, considering the importance of food hygiene in maintaining and promoting health and preventing water and foodborne diseases and the role of health workers as a model, the present study aims to investigate food hygiene determinants based on the HBM among health workers in health center of Urmia city.

Materials and Methods

Study design and participants: This was a descriptive-analytical study conducted in the second half of 2020 in health centers of Urmia city. According to the statistics received from the health center of Urmia city, 196 health centers and 370 health workers were studied by census method. Inclusion criteria were having a welfare organizational position, being employed in a health center and willingness to participate in the study (completion of written consent). The only exclusion criterion was withdrawal from the study. From 370 employed health workers, 300

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individuals were eligible for the study.

Measurements: The data collection tool was a researcher-made questionnaire which included demographic characteristics of the participants, knowledge questionnaire, attitude and behavior of food hygiene, and HBM questionnaire. The items of each of the desired outcomes were selected by reviewing the literature, and for the validity and reliability of these questionnaires, content validity methods and Cronbach's alpha tests were used, respectively. To determine the validity of the questionnaire, it was sent to 10 health education specialists and food health specialists. Based on the opinions of experts, necessary corrections were applied to the questionnaire. The validity of the questionnaire was higher than 80%. To measure reliability, the questionnaire was completed by 35 health workers using Cronbach's alpha test; reliability coefficient of knowledge questions was 0.75, attitude, 0.77, food hygiene behavior, 0.75, perceived susceptibility, 0.73, perceived severity, 88 0., perceived barriers, 0.80, cues to action 0.79, perceived benefits, 0.81, and self-efficacy was 0.79.

Knowledge assessment was prepared in the form of 15 questions in the form of yes, no, and I do not know options. "Yes" received 3 scores, "I do not know", a score of 2, and "No" received a score of 1. Awareness questionnaire scores ranged from 15 to 45. Also, the attitude was measured in the form of 15 questions based on a 5-point Likert scale: strongly agree (5 points), agree (4 points), neither agree nor disagree (3 points), disagree (2 points), and strongly disagree (1 point). The scores ranged from 15 to 75. Three questions containing "always", "sometimes" and "never" were used to assess the food hygiene behavior. "Always" was given 3 points, " sometimes", 2 points, and "never" 1 point. Behavior questions scores ranged from 15 to 45.

The HBM questions consist of 6 constructs of perceived susceptibility, perceived severity, perceived benefits and barriers, cues to action, and self-efficacy based on a 5-point Likert scale: strongly agree (5 points), agree (4 points), neither agree nor disagree (3 points), disagree (2 points) and strongly disagree (1 point), with a score range of 6-30. The questionnaires were completed after explaining the objectives of the research, the consent of the participants, and with the guidance of the questionnaire in form of a self-report.

Ethical considerations: The voluntary nature of the study, the confidentiality of information and obtaining permission from the Research Committee of the Islamic Azad University of Urmia were among the ethical considerations of the research (IR.IAU.URMIA.REC.1398.034).

Data analysis: Data were entered into SPSS20 software and analyzed by descriptive statistics tests of ANOVA and linear regression.

Results

The mean age of the health workers was 36.76±7.61 year. The largest age group was between 30 to 35 (26.3%). Most health workers were female (83.3%) and 42% had less than 10 years of work experience. Marital status indicated that most of the health workers were married (79.7%). Furthermore, most health workers had diploma education (73%) and an average economic status (64.7%, **Table 1**).

The frequency distribution of the constructs of HBM and food hygiene behaviors of health workers showed that they scored lower on the attitude and perceived barriers compared with other constructs in this model. Moreover, Perceived severity and Perceived self-efficacy received the highest scores among the variables of this study. The mean and standard deviation score of food hygiene behavior for all the participants was 29.43±3.12; in other words, health workers received 65.4% of this score (**Table 2**).

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Table 1. Frequency distribution of demographic characteristics of the participants.

Variables	N (%)
Age (year)	
<30	63 (21.0)
30-35	79 (26.3)
35-40	76 (25.3)
<40	82 (27.3)
Sex	50 (16.7)
Male	250(83.3)
Female	
Work experience (year)	
<10	126(42.0)
10-15	52(17.3)
15-20	48(16.0)
>20	74 (24.7)
Marital status	
Married	239(79.7)
Single	48(16.0)
Divorced/ Widowed	13(4.3)
Education	
Diploma	219(73.0)
Associate degree	34 (11.3)
Bachelor and higher	47 (15.7)
Nationality	
Turkish	176 (58.7)
Kurdish	124(41.3)
The economic situation	
Good	28 (9.3)
Average	194 (64.7)
Weak	78(26.0)

The results of ANOVA test demonstrated that with increasing work experience, the score of attitude and behavior of food hygiene increased, and this difference was significant ($P<0.05$). The scores of knowledge and attitude of food hygiene in men was higher than women, but the behavior of food hygiene in women was higher than men, which was statistically significant ($P<0.05$). On the other hand, the scores of knowledge, attitude, and behavior of food hygiene in single health workers (single, divorced/deceased spouse) was lower than married workers ($P<0.05$). On the other hand, the subjects with higher education degrees received higher scores of knowledge and attitude towards food hygiene, and this difference was statistically significant ($P<0.05$).

According to the linear regression test, the most important predictive construct was self-efficacy ($\beta=0.45$), following that were perceived benefit ($\beta=0.33$), perceived susceptibility ($\beta=0.18$), and perceived severity ($\beta=0.16$); these constructs were statistically significant in predicting food hygiene behavior of health workers ($P<0/05$). In general, based on linear regression model, the constructs demonstrated 30% of the predictive power of food hygiene behavior among the health workers.

Table 2. Mean (±SD) of score and standard deviation of the constructs of health belief model and food hygiene behavior in participants.

Variables	Mean±SD	Range	Percentage of the maximum score
knowledge	28.64±3.51	15-45	63.6
Attitude	38.41±3.15	15-75	51.2
Perceived susceptibility	20.27±3.87	6-30	67.7
Perceived severity	21.24±2.77	6-30	70.8
Perceived benefits	20.39±2.90	6-30	67.9
Perceived barriers	18.22±2.87	6-30	60.7
Cues to action	19.12±3.01	6-30	63.7
Perceived self-efficacy	21.58±2.98	6-30	71.9
Food hygiene behavior	29.43±3.12	15-45	65.4

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Table 3. Relationship between demographic variables and knowledge, attitude, and behavior of food hygiene.

Variables	Awareness score	P-value[b]	Attitude score	P-value	Behavior score	P-value
Age (year)		0.6		0.1		0.2
<30	27.71±3.52[a]		36.2(11.31)		30.14(6.7)	
30-35	29.01±3.75		34.37 (7.87)		29.2 (6.63)	
35-40	28.52±3.76		35.55 (7.38)		28.3 (4.69)	
>40	29.32±3.51		39.719.22)		29.6 (7.35)	
Sex		0. 02		0.03		0.04
Male	30.04±3.91		39.14 (8.93)		28.84 (6.17)	
Female	27.63±3.62		35.99(9.11)		31.28(8.23)	
Work experience (year)		0.5		0.001		0.006
<10	28.10±3.57		35.80±9.68		29.26±7.06	
10-15	28.80±4.21		35.05±8.81		28.09±4.72	
15-20	29.22±3.43		35.77±6.88		28.33±6.18	
>20	29.31±3.49		39.25±9.33		39.27±6.69	
Marital status		0.02		0.01		0.01
Married	30.22±3.82		43.23±10.43		38.69±10.01	
Single	27.78±3.64		36.02±8.78		28.65±6.03	
Divorced/ Widowed	27.92±3.83		37.18±9.97		29.66±6.42	
Education		0.05		0.04		0.08
Diploma	26.22±3.83		37.18±9.97		29.08±7.01	
Associate degree	27.78±3.64		36.02±8.78		30.14±6.58	
Bachelor and higher	31.92±3.83		43.23±10.43		29.36±4.44	
Nationality		0.1		0.7		0.1
Turkish	28.45±3.41		36.11±8.39		29.80±6.90	
Kurdish	29.05±3.99		37.08±10.13		28.46±6.12	
Economic situation		0.7		0.5		0.06
Good	27.96±3.53		37.96±9.83		30.92±8.33	
Moderate	28.71±3.62		36.01±9.03		29.10±6.48	
Weak	28.93±3.85		37.26±9.18		29.00±6.23	

[a]: Mean±SD; [b]: ANOVA test

Table 4. Findings of linear regression model in predicting food hygiene behavior of the health workers.

Variables	r (correlation coefficient)	SE	Beta	t	P-value
knowledge	0.064	0.091	0.036	.74	0.4
Attitude	0.19	0.157	0.09	1.22	0.22
Perceived susceptibility	0.27	0.087	0.18	2.6	0.02
Perceived severity	0.24	0.077	0.16	3.20	0.002
Perceived benefits	0.39	0.090	0.33	3.971	0.001
Perceived barriers	- 0.22	0.15	- 0.11	1.48	0.13
Cues to action	0.12	0.086	0.07	1.45	0.14
Perceived self-efficacy	0.58	0.098	0.45	4.20	0.0001

Discussion

Food hygiene is the standard that must be observed in food consumption to reduce physical, chemical, and biological pollution. Given that healthcare providers are of the main source of healthcare services, they must first take control of their risky behaviors and promote prevention over treatment. Therefore, their observance of food hygiene becomes significant. In the present study, with increasing work experience, the score of attitude and behavior in observing food hygiene increased as well. In Balali's study, health workers

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with less work experience received high scores of knowledge and attitude (Balali Meybodi *et al.*, 2011). In contrast, in the study of Taghizadeh on Tabriz's school health workers, it was found that with increasing work experience, the score of attitude and awareness increases (Taghizadeh Ganji *et al.*, 2009); this which can be due to differences in work experience and type and quality of in-service training. In this study, knowledge and attitude scores increased with increasing education level. In Balali's (Balali Meybodi *et al.*, 2011) and Ajami's (Ajami *et al.*, 2008) research, knowledge and attitude of health workers regarding oral health increased with increasing education level. However, no significant relationship was observed between knowledge and attitude and school health workers degrees in Taghizadeh's study. (Taghizadeh Ganji *et al.*, 2009); the reason can be different classifications of education in different groups. In the present study, men's score of knowledge and attitude was higher than women's. In the study by Balali (Balali Meybodi *et al.*, 2011), Taghavi (Taghavi *et al.*, 2004), and Tahani (Tahani *et al.*, 2017), the score of knowledge and attitude was higher in women. Regarding prevention of oral diseases in health workers of Isfahan, Khademi found no significant difference between knowledge score and attitude between men and women (Khadem, 2018); the differences in studies may be due to different methods of data collection which require further investigation into larger sample sizes.

Perceived self-efficacy, as the most important predictor of food hygiene behavior, was consistent with the results of the study by Zareipour *et al.*, who reported that self-efficacy was the best predictive factor of self-medication behavior in women (Zareipour *et al.*, 2018). A significant relationship was observed in Ziaee's study regarding self-efficacy in nutritional behavior of pregnant women (Ziaee *et al.*, 2017), in Roozbahani's study on self-efficacy and dairy consumption behavior of healthcare providers (Roozbahani *et al.*, 2021), and in Hosseini's research on self-efficacy and dairy consumption of students (Hosseini *et al.*, 2017). Various studies using HBM on topics such as diabetes, blood pressure, and breast self-examination have emphasized the role of self-efficacy in predicting health behavior (Mazloomi Mahmoodabad *et al.*, 2011, Mohammad Hussein Moghaddam and Mirzaei, 2013) In the present study, in order to predict the behavior of food hygiene in health workers, the second most important construct was perceived benefits, which affected the desired behavior; this was in line with the results of Avci's research on breast self-examination (Avci, 2008). It should be noted that perceived benefits play a role in preventing diseases caused by the consumption of contaminated food, such as poisoning, parasitic diseases such as worms and cysts, etc. As perceived susceptibility and severity increases, food hygiene behaviors become more prevalent. These findings were consistent with Daniel's research (Daniel and Messer, 2002). The results showed that with the increase in perceived susceptibility and predicted severity, food hygiene behavior increases. These findings are consistent with the results of studies by Daniel (Daniel and Messer, 2002) and Zareipour (Zareipour *et al.*, 2018). The perceived severity of complications includes food poisoning due to the contamination of food with bacteria, viruses and other pathogenic agents (due to non-compliance with hygiene principles). By understanding these things, a person will have good food hygiene. Food contamination can also lead to a variety of chemicals, fungal toxins, pesticides, heavy metals and insecticides, the symptoms of which become apparent in the long run; if a person uses such foods for a long time, his/her risk of diseases such as nerve damage, congenital defects, and types of cancers will increase. It is obvious that paying close attention to the consequences of not observing food hygiene will be effective in an intervention program. In Karimy's study, there was a barrier to understanding the most important predictor of nutritional behavioral variables (Karimy *et al.*, 2016); Kloeblen (Kloeblen and Batish, 1999) and the Sun (Sun *et al.*, 2006) reported perceived barriers as the most important predictors of nutritional function of mothers,

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which was not consistent with the present study. Finally, health belief constructs predicted a 30% variance of food hygiene consumption behavior among health workers. Roozbahani et al. (Roozbahani *et al.*, 2021) and Morowatisharifabad were able to predict 20% of the variance of dairy consumption and nutritional behaviors (Morowatisharifabad *et al.*, 2018), while in the study by Ayatollahi (Ayatollahi H *et al.*, 2021) and Wang et al. (Wang *et al.*, 2021), this rate was 60% based on HBM, which is different from the present study, maybe because of the study group and their behaviors.

The strength of this study is to investigate the behavior of food hygiene in health workers, who are the first providers of health services. Limitations of the study are cross-sectional and low sample size. Therefore, the researchers suggest that a study with a larger sample size and an intervention study should be conducted in this group.

Conclusion

The variables of self-efficacy, perceived benefits, perceived susceptibility, and perceived sensitivity should be emphasized as the most important predictors of food hygiene behaviors in health workers. Moreover, by examining the capacities of HBM in explaining the performance of food hygiene and the difference in the prediction of constructs, appropriate interventions should be planned to increase this predictor.

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Authors' contributions

Zamaniahari S and Zareipour Z were involved in conception and design; Mohammad Rezaei Zh and Jadgal MS, in analysis and interpretation of data; Rostampor F, in drafting of the manuscript; Gasem Soltani R, in critical revision of the manuscript for intellectual content; and Zareipour Z conducted the statistical analysis.

Conflict of interest

The authors declared no conflict of interest.

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