



## Evaluation of Food Safety Related Behaviors Based on Stage of Change Model among Iranian Women

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### ABSTRACT

**Aims** Food safety is a public health concern due to its great impact on the economy and health of the people in developing countries. Since food preparation is the final line of defense against foodborne diseases; women need to take extra precaution to reduce the chances of home prepared food contamination. This study examined the applicability of the trans-theoretical model of change to assess readiness to increase food safety among housewives' women.

**Instruments & Methods** The present cross-sectional study was carried out among 181 households' women in 2017. Data were collected using a questionnaire consisted of food safety characteristics based on the stage of change. Data were analyzed by SPSS 24 for descriptive analysis, normality test, correlation, and multiple logistic regression analysis.

**Findings** Mean age (SD) of participants was 38.68±8.5 years old. 6.1% of participants were in the pre-contemplation stage, 21.0% in the contemplation stage, 23.2% in the preparation stage, 16.6% in the action stage, and 33.1% in the maintenance stage. Overall stage of change was not significant association with age, educational status and household income.

**Conclusion** Findings of this study may help in planning health intervention programs for housewives' women for their improvement of knowledge, attitude and practice towards foodborne diseases and food safety. We suggested an intervention based on the Trans-theoretical Model for housewives' women to promote food hygiene, at least in home kitchen.

**Keywords** Trans-Theoretical Model; Stage of Change; Household's Women; Food Safety

### CITATION LINKS

[1] Food-borne diseases - the challenges of 20 years ago still persist while new ones continue to ... [2] Food safety and social risk in ... [3] Effectiveness of altered incentives in a food safety inspection ... [4] Consumer attitudes, knowledge and behaviour: A review of food safety ... [5] The knowledge and practice of food safety and hygiene of ... [6] Does mandatory food safety training and certification for ... [7] Consumers' awareness of food safety from shopping to ... [8] Unhealthy landscapes: Policy recommendations on land ... [9] Food safety knowledge and food-handling practices of Greek university ... [10] Food safety and handling knowledge and practices of Lebanese ... [11] Consumer food safety knowledge: Segmentation of Irish home food preparers ... [12] Food safety and foodborne disease in the ... [13] Improving physical activity for hypertensive patients: A transtheoretical ... [14] Stages of physical activity in patients after coronary artery bypass graft surgery ... [15] Predicting physical activity behavior among ICU nurses based on a transtheoretical model ... [16] Predictors of calcium intake in order to identify osteoporosis preventive ... [17] Transtheoretical model of behavior ... [18] The global burden of nontyphoidal Salmonella ... [19] Consumer perceptions of food safety risk, control and ... [20] Consumer food handling in the home: A review ... [21] Health behavior and health education: Theory ... [22] Evaluating barriers to adherence to dietary recommendations in Iranian adults with metabolic syndrome ... [23] Total food chain safety: How good practices can ... [24] Evaluating levels of knowledge on food safety among food handlers from restaurants and various catering businesses in ... [25] 'I don't think I ever had food poisoning', a practice-based approach to ... [26] Consumers' knowledge and safety perceptions of food additives: Evaluation on the effectiveness ... [27] Design and development of food safety knowledge and attitude scales for consumer food safety ... [28] Consumer food safety knowledge ... [29] HACCP: A practical approach. Heidelberg ... [30] Why do consumers deviate from best microbiological ... [31] Consumer food safety education for the domestic ... [32] Position of the American Dietetic Association ... [33] Effect of washing hands with soap on diarrhoea risk ... [34] Hygiene in the home kitchen: Changes in ...

## Introduction

Food-borne diseases are one of the most widespread public health problems involving up to 600 millions of people worldwide, annually [1-3]. It is substantially contributed to outbreaks of foodborne which impose considerable costs to both individuals and governments. Inadequate sanitation in food processing and preservation, in particular issues related to handling and preparation, can result in an environment which is prone to infestation by many pathogenic microorganisms such as *Campylobacter*, *Salmonella*, and other infectious agents [4-7]. Food contamination possesses a substantial burden on the social and economic sectors of the international community with more detritus effect and sources dedicated to public health systems. Foodborne illness is one of the important threats to health and wellbeing of any individual, involving major economic losses and costs related to loss of working days and costs to be paid for disease management. Thus, the increasing incidence of food poisoning outbreaks has led to calls for the adoption of more sufficient and high quality health care system [8, 9].

Despite implication of highly developed food safety systems, such as the “farm-to-fork” in Europe and the “farm-to-table” in USA, it is generally noticed that a “weak link” may induce significant morbidity and mortality related to foodborne illness [10]. Kennedy *et al.* reported that more than 95% of food poisoning are sporadic cases which originate from lack of sufficient sanitation measure within the home-based food processing events. This highlights influential effect of domestic food handler on quality of food chain on occurrence on foodborne illness [11].

As food preparation is the final stage where defense against foodborne diseases could be prevented, it is necessary to take special efforts to avoid possibility of contamination of cooked foods. With regard to this, public health education is seen as a key factor to improve food safety measures in the home. It has been suggested that health education in food safety would include a significant reduction in the occurrence of foodborne illness [12].

Many theories have been developed to explain conceptions involved in intentional behavioral change. Among them, the trans-theoretical or stages of change model is increasingly receiving attention by many research groups as a useful exploratory model [13-16]. It assumes that any individual belongs to different points with regard to his/her preparedness to adopt any particular health-related behavior. The theory divided that behavior into 5 distinct stages of change as follows: Pre-contemplation (When an individual has no intention to change), contemplation (When an individual is seriously thinking about changing), preparation or decision (when an individual is actually planning to change), action (When an individual is actively

involved in behavior change), and maintenance (When an individual is sustaining a behavior change) [17].

## Objective

This study aimed to evaluate knowledge and behavior of women about food safety based on trans-theoretical model (TTM).

## Instruments and Methods

**Design:** This cross-sectional study was carried out among 181 households' women, aged 19-64 years old, living in Sardrood town of Tabriz, North-West of Iran. Participants were randomly selected from women were attended to public health care centers of the town. Recruitment was conducted through eligible enrolled women who were consent to participate in the study between November 2016 and April 2017.

**Measurements:** Socio-demographic variables were collected by questionnaire and face-to-face interviews, as well as TTM-based measurement, consisted questionnaire of food safety characteristics based on the stage of change. The reliability of this questionnaire was also determined by a pilot study on 30 housewives' women. The Cronbach's alpha coefficient of the test was 0.74. As a result of the item analysis, several test questions were modified to improve clarity.

**Statistical analysis:** Data were analyzed by SPSS 13.5. Distribution of basic characteristics was calculated and frequencies and percentages were reported. Correlation and logistic regression were used in assessing the statistical association between stage of change and each of the independent variables. Crude odds ratios (ORs), 95% confidence intervals (CI) and p-values were obtained and statistical significance was determined at an alpha level of 0.05.

## Findings

In this study Mean age of participants was 38.6±8.5 years old and mean of family size was 3.6±1.02. The majority of respondents had an elementary school education (51.4%).

Table 1 shows the distribution of participants' behavior based on the stage of change model. 6.1% of participants were in the pre-contemplation stage, 21.0% in the contemplation stage, 23.2% in the preparation stage, 16.6 % in the action stage, and 33.1% in the maintenance stage.

Table 2 contains the distribution of the participants in the different stage of changes and Table 3 contains results from the logistic regression models in this study. Also, stage of change appeared to be significantly associated with family size (p=0.04) and husband's literacy (p=0.02), but no significant relationships were found with age, educational status, and household income.

**Table 1)** Frequency of stage of change (n=181)

Are you take action on food safest during the food preparation or cooking?	N (%)
No, Because I think health care in cooking is not important	11 (6.1)
No, but I often think of the information I have learned about how to cook safe food	38 (21.0)
No, but I have planned to get readiness for food hygiene from the same month.	42 (23.2)
Yes, For example, during the last six months, I have fully followed the principles of food hygiene and sanitation during washing and drying.	30 (16.6)
Yes, I have been successful in food safety and hygiene in the kitchen and I'm trying to keep it.	60 (33.1)

**Table 2)** Participant characteristics by stage of change distribution (n=181)

Variable	Pre-Contemplation	Contemplation	Preparation	Action	Maintenance
<b>Age</b>					
≤29	1	1	7	8	9
30-59	10	36	33	21	51
≥60	0	1	2	1	0
<b>Literacy</b>					
Elementary	8	20	20	13	27
Secondary	3	17	19	15	29
Collage Or Upper	0	1	3	2	4
<b>Family Size</b>					
2	0	5	6	4	4
3-5	11	31	34	24	52
<5	0	2	2	2	4
<b>Economic Status</b>					
Low	2	3	6	5	7
Medium	8	26	31	21	34
High	1	9	5	4	19

**Table 3)** Demographic variables association with stage of change model using logistic Regression Analysis (n=181)

Variable	B (95% CI)	Beta	p-value
<b>Age</b>			
Pre-contemplation	0.01(0.93, 1.09)	1.01	0.20
Contemplation	0.05(0.99, 1.10)	1.05	0.05
Preparation	0.01(0.96, 1.06)	1.01	0.70
Action	-0.02(0.91, 1.02)	0.97	0.32
Maintenance	ref		
<b>Family Size</b>			
Pre-contemplation	-0.03(1.51, 1.80)	0.96	0.04
Contemplation	-0.07(0.62, 1.37)	0.92	0.69
Preparation	-0.09(0.61, 1.33)	0.90	0.62
Action	-0.12(0.56, 1.35)	0.87	0.56
Maintenance	ref		
<b>Literacy</b>			
Pre-contemplation	-1.16(0.08, 1.19)	0.31	0.08
Contemplation	-0.33(0.35, 1.43)	0.71	0.34
Preparation	-0.05(0.48, 1.81)	0.94	0.86
Action	0.04(0.50, 2.15)	1.04	0.90
Maintenance	ref		
<b>Husband Literacy</b>			
Pre-contemplation	-0.79(1.13, 1.54)	1.25	0.02
Contemplation	-0.16(0.41, 1.70)	0.84	0.63
Preparation	-0.38(0.52, 2.01)	1.02	0.94
Action	-0.02(0.46, 2.05)	0.97	0.93
Maintenance	ref		
<b>Economic Status</b>			
Pre-contemplation	-0.45(0.39, 1.01)	0.63	0.05
Contemplation	-0.09(0.70, 1.18)	0.91	0.48
Preparation	-.24(0.60, 1.02)	0.78	0.07
Action	-0.28(0.55, 1.01)	0.75	0.05
Maintenance	ref		

## Discussion

The incidence of foodborne diseases is rising in developing countries, as well as in the developed world [18, 19]. It follows that consumers are one of the

important components in the food safety chain. It is essential to understand consumers' awareness regarding home food safety and home food preparation practices in order to plan proper

education programs [7, 4].

Numerous consumer-based research studies have attempted to evaluate aspects of consumers' food safety practices, with different strategies adopted for data collection, including questionnaire and interview surveys, focus group discussions and observation studies. Measurement of consumer knowledge, attitudes and behavior can provide a basis for planning health promotion programs [20-23].

One of the significant findings of this study was that the most of participants were in the active phase of change (Preparation, action and maintenance stage) for trans-theoretical model. Although study was found to simultaneously address food safety and trans-theoretical model, the results of consumer studies concerning food safety knowledge and practices have revealed that consumers are aware and concerned about food safety issues. There are also many gaps in food safety knowledge and practices that may result in foodborne diseases [24-28]. On the other hand, from another perspective our result can support for the opinion that people of all ages seem to think they know how to handle food safely [29].

Overall, the results obtained from this study provide support for the need for in deep consumer-based nutrition education approaches to enhance consumers' awareness on diverse aspects of food safety analysis. It is evident that any progress in resolving or reducing the risks involved in food safety practice is dependent, in part, on careful identification of change status of the clients. Further, the hygiene errors that consumers make in their own kitchens warrants needs to development of education or information strategies that get the corrective messages and practices to consumers, or to relevant subgroups of consumers [30-34].

#### Strengths and Limitations

The cross-sectional design does not permit to study the cause-effect relationship. Though we controlled for important confounding variables, other unmeasured confounders may exist. In general, this study could enhance our knowledge about food safety-related behaviors on health outcomes.

We strongly suggest that application of the Trans-theoretical Model provided a useful educational platform for interventions focused on housewives to promote home-level food hygiene practices. Future research could include exploring the gap between knowledge and practices of food handlers and designing targeted educational programs based on the research results and assessing the effectiveness.

#### Conclusion

It is concluded that food handlers in households level must undergo to effective and systematic education programs to enable them on taking necessary steps to protect themselves and their families from getting food-borne diseases. More

precisely, educational material about good housekeeping practices should be organized carefully according to real readiness of the trainees. Also, designing any educational program targeted at the enhancement of food handling knowledge and subsequent possible improvements in real practices should be based on understanding the actual change level of food handlers.

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