Application of Planned Behaviour Theory to Predict Salt Consumption in the Rural Women of Chabahar

Rabea Agh Atabay[1], Iraj Zareban[2]*, Mahnaz Shahrakipoor[3], Farzane Montazerifar[4]

Abstract

Aim: There is conclusive scientific evidence of the adverse effect of excessive salt consumption on health, particularly on blood pressure, leading to cardiovascular disease (CVD), gastric cancer, osteoporosis, cataracts, kidney stones, diabetes and obesity. We investigated the determinants of salt consumption among the rural women in Chabahar (Iran) by applying the theory of planned behavior.

Methods: Rural native Chabahari women (n =230), aged 12-75 years old, were selected by multistage sampling via native assistants. Data were gathered through a questionnaire with acceptable validity and reliability consisting of TBP constructs (intention, attitude, subjective norms, and perceived behavioral control), as well as demographic characteristics. Bivariate correlations and stepwise regression analyses of TBP model were performed with the SPSS software.

Findings: The results showed a significant direct asociation between attitude, subjective norms, percieved behavioral control and intention, and salt consuming behavior, also between attitude (sig.<0.001), subjective norms (sig.<0.01), perceived behavioral control (sig.<0.01), the intention to reduce salt consumption. Subjective norms, attitude and intention together predicted 10.9% of salt consuming behavior. Attitude and perceived behavioral control together predicted approximately 9% of the intention to reduce salt consumption.

Conclusion: This study indicated that the theory of planned behavior can be used to predict the salt consuming behavior and the intention of Chabahari rural women. Focus on the family- and community-based educational programs to change attitude, subjective norms, and perceived behavioral control is necessary to make women reduce salt consumption.

Keywords: Salt consumption, Theory of planned behavior, Women

1. M.Sc., Department of Education and Health Promotion, School of Health, Zahedan University of Medical Sciences, Zahedan, Iran Email: Rabea.atabay@gmail.com
2. Assistant Professor, Department of Education and Health Promotion, School of Health, Zahedan, University of Medical Sciences, Zahedan, Iran   Email: zareban@gmail.com
3. Associate Professor, Department of Education and Health Promotion, School of Health, Zahedan University of Medical Sciences, Zahedan, Iran   Email: Shahrakipoor@gmail.com
4. Professor, Department of Education and Health Promotion, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran Email: fmontazerifar@gmail.com

Introduction

Salt is by far the biggest source of sodium in the American diet, and has long been known to increase blood pressure. The Dietary Guidelines for Americans (2005) recommend that middle-aged and older adults, as well as African Americans and people with high blood pressure have to limit themselves to 1.5 g/day of sodium (i.e. approximately 3.85g of salt). Other people could consume a bit more; 2.3 g/day of sodium (i.e. approximately 5,90g of salt) [1].

A meta-analysis of trials of modest salt reduction throughout the world has shown that a 6 g/day reduction, i.e. reducing salt intake by approximately half, would lead to an average reduction in systolic pressure in the adult population of 5 mmHg. This in turn would cause a 24% reduction in strokes, and an 18% reduction in coronary heart disease. Worldwide this would end with an approximate reduction of 2.5 million deaths due to strokes and heart attacks each year.

There is conclusive scientific evidence of the adverse effects of excessive salt consumption on health, particularly on blood pressure, leading to cardiovascular disease, gastric cancer, osteoporosis, cataracts, kidney stones, diabetes [1-3] and obesity [3].

There is a significant variation in the levels of salt consumption between different countries, and also significantly different patterns of consumption [1]. So in most of the developed countries, a reduction in salt intake can be achieved by a gradual and sustained reduction in the amount of salt added to food by the food industry; however, in other countries such as Iran where most of the salt consumed comes from the salt added during the cooking or from sauces, a public health campaign is needed to encourage the consumers to use less salt [3].

Family is a prominent element of the social environment where dietary behaviors are enacted and learned [4], and mothers play a crucial role in children's nutrition [5].

The Theory of Planned Behaviour (TPB) has been used extensively in the identification of determinants of a wide range of behaviors [6-12] including fruit and vegetable consumption [13-16]. The TPB proposes that the main determinant of any given behaviour is the intention to perform this behavior. This intention, in turn, is determined by attitudes towards the behaviour (instrumental and affective evaluations of the behaviour), subjective norms (perceived social pressure from significant other(s) to perform the behaviour), and perceived behavioural control (PBC) (whether performance of the behaviour is easy or difficult and under one's control or not) [7, 13, 14, 16, 17]. In general, the TPB is considered to be a sufficient model for developing health behavior change

interventions [13].

Lien et al. and O'Neal et al. (2002) investigated how well the TPB predicted the frequency of consumption of fruits and vegetables among seventh graders [15]. O'Neal et al. studied the eating behaviors of older African Americans applying the TPB [18]. Studies in Iran explored predictors of fruit and vegetable intake in students of high school or university using the TPB [19, 20].

Researches in the field of reducing salt intake are rare, and none of them have applied the TPB to investigate the determinants of reducing salt intake. Also none of them have specifically addressed the issue of women's consumption.

Naghibi et al. studied the knowledge and attitude of people referred to health centers of Sari on salt consumption [2]. Forte et al. surveyed the effect of a health education program on salt reduction and blood pressure in two matched rural communities in Portugal [21]. Other studies evaluated eating behavior using the TPB [18, 22-24]. Mazlumi et al. evaluated the effectiveness of reasoned action theory on the determinants of salt consumption in the women referred to the health centers of Yazd city [25]. So because of the absence of theory-based investigation in this field, we investigated the determinants of salt consumption both when cooking food and on the table applying the TPB.

Environment Cognitive and Socio-economical Characteristics of the City of Chabahar

The port city of Chabahar covers an extent of 10.9 square kilometers, and is one of the lowest regions of Sistan and Baluchistan province on the southern coast of the Sea of Oman with a height less than 150 meters. Chabahar is located at the end of a relatively large plain, and is bounded by the sea from the west and the south and along the southeast [26] (Image 1).

Image 1: Position of Chabahar in the map of Iran

Based on the climatology studies, Chabahar's average highest daily temperature in June is 31.5°C and its lowest temperature in January is about 18.9°C.

Residents of Chabahar are mainly Baluch and speak in Baluchi language. Agriculture in

Chabahar has not a suitable situation because of Sistan and Balochistan's climate conditions. Shortage of water sources and poor soil are the reasons for low level of economic efficiency in the agricultural field. Agricultural products, in most cases, are used for the residents' household consumption. Industrial activities in Chabahar pertain to marine industries including the production of fishing vessels, cargo or vessel components [26].

Methods

Sampling

We recruited rural women between the ages of 12 and 70 years. Firstly, we listed the villages of central Chabahar, which had girl's high school and population over 150 households. Then, by simple random sampling, we selected two villages, namely Ramin and Tiss. Then we selected assistant from the high school of every village. In Ramin, the total population of students was 16; then we selected all of them as our assistants. But in Ramin high school, there were 4 classes; then by simple random sampling, we selected one class and inserted all of the students of that class as our assistants. A total of 30 assistants were participated. Each of the assistants was asked to distribute 8-9 questionnaires between the women of neighbors. These women should be home cooks, were more than 12 years old, and had no special illness needed to reduce salt

intake such as high blood pressure. Only those students and women who signed a consent form were included in this research project. Participants who filled the questionnaire incompletely removed from the study. Previously, we enabled assistants with one training session and one group discussion. Group matching was performed through the assistants in terms of age and income as confounding variables.

The sample size was estimated based on a single proportion design. Based on the results of a previous study (20), we assumed that at best, 15% of the women would have less than normal intake. Thus, a study with a sample of 195 women would have 95% power to detect a difference of 5% (10-20%) at the 0.05 significance level. Including loss of samples in the study, the sample size of 260 was considered. Finally, from 260 distributed questionnaires, 230 questionnaires were completed and returned.

Materials

The authors developed the questionnaire in the light of both nutritional and TPB literatures. The survey included socio-demographic variables as well as statements assessing each component of the TPB, namely fruit and vegetable consumption attitude, subjective norms, perceived behavioral control, salt consumption intention, and consuming behavior.

For content validity test, we sent the questionnaire to 10 specialists of health education and nutrition, and CVI (Content Validity Index) and CVR (Content Validity Ratio) were calculated. All items had CVI greater than 0.79 and CVR greater than 0.62, so they were accepted. Reliability test was performed with measuring the test–retest consistency of the questions. The correlation coefficient of all items was greater than 0.7, and this value was considered optimal [27] and accepted.

According to Ajzen and in line with several studies, we can assess the theoretical constructs with sufficient reliability with only one question [28].

The research variables were attitude, subjective norm, perceived behavioral control, intention and behavior, and questions related to the respondents' demographic characteristics including age, weight, height, BMI, job, current level of education, household population, number of children, having job out of home, and income.

Likert scale was used to measure tpb constructs by selecting one of the three options namely 2 "agree", 1 "neutral", and 0 "disagree".

Intention to use sunscreen/sunbeds was assessed using the question "I intend to reduce salt consumption next month" (agree-disagree). Attitudes towards the reduction of salt consumption were measured using the mean of two questions: "low salt food is insipid or me" and "in my opinion, low salt food is healthier" (agree-disagree).

Subjective norms were measured using the mean of three items 'my family and friends want me to reduce salt consumption' (agree-disagree), 'my family and friends always eat low salt food' (agree-disagree), and 'totally how much do you care about what your family and friends think about reducing salt consumption' (I care so much - I don't care at all).

PBC was measured with one item 'if I want I can reduce salt consumption next month' (agree-disagree).

The research was conducted ethically following the protocols approved by the campus Institutional Review Board. The students were informed about the purpose of the study, and the procedure to complete the scales. They were also explained that the findings of the study would have no effect on their school grades. Furthermore, the students were required not to interfere with completing the questionnaires by the participants, but interpret the questions in local language if it was necessary.

Data analysis

Measured variables included demographic characteristics, and the constructs of TPB included intention, perceived behavioral control, attitude, behavior and knowledge.

Bivariate correlations were conducted to determine associations between all variables of the study. Then multiple linear stepwise regression analysis was conducted to determine the significant determinants of variables on salt consuming behaviors as proposed by the TPB constructs. In this context, a measure of R^2 was reported to represent the proportion of variance in the independent variable that can be explained by the predictor variable. The significance level was set to 0.05. For analysis of qualitative data, Chi-square test was used. Table 1 shows direct, indirect and total effect of independent variables on the participants' salt consuming behavior.

Items were coded so that higher scores indicated more favorable attitudes, stronger subjective norms, higher controllability, self-efficacy, intentions and behavior. The mean of the items measuring each construct was used as total score for that construct. In order to avoid having missing data, in addition to the advising and training the assistants to fill the questionnaires completely, we removed incomplete questionnaires from the study.

Table 1: Direct, indirect and total effect of independent variables on behavior

Independent variable	Direct effect	Indirect effect	Total effect
Knowledge	0.168	0.120	0.288
Subjective norms	0.134	0.101	0.235
Intention	0.0118	0.072	0.190
Attitude	_	0.027	0.027
Perceived behavioral control	_	0.014	0.014

Ethical considerations

All procedures were performed with the approval of Zahedan University of Medical Sciences. Before presenting the questionnaire, we stated the purpose of the study, and the consents were obtained from all participants (by giving a written consent). All subjects were assured of the confidentiality of information in the questionnaire, and were told that they are free to participate in the study.

Results

Descriptive statistics were used to determine the means and standard deviations of all constructs. The descriptive statistics for the demographic variables are presented in Table 2. The results showed that only 20.9% of the participants disagreed that "low salt food is tasteless for them". 50% of the participants agreed that "low salt food is tasteless for them". Most of the participants (54.9%) agreed that "reducing salt consumption is useful for health".

Table 2: Descriptive statistics for demografic variables

Variable	Mean(SD)	Category	n (%)
Age	26.95(9.79)	Teenager (12-20years) Young (20-35years) Aged (35-55 years) Old (>55 years)	72(31.6%) 120(52.6%) 31(13.6%) 5(2.2%)
Current level of education		Elementary Guidance High school Bachelor and more	69(30.1%) 59(25.8%) 66(28.8%) 35(15.3%)
BMI	57.14(370.66)	35< (obesity) 30-35 (overweight stage 2) 25-30 (overweight stage 1) 19-25 (normal) 19> (thin)	11(5.5%) 9(4.5%) 29(14.6%) 86(43.2%) 64(32.2%)
Household population	5.71(2.52)	2-4 (low) 4-7 (medium) 7< (high)	78(35.3%) 89(40.3%) 54(24.4%)
Number of children	2.35 (2.36)	2> (low) 2-4 (medium) 4-6 (high) 6< (very high)	124(60.8%) 43(21.1%) 23(11.3%) 14(6.9%)
Income	722171.05(759632.11)	400000 Toman< (Very low) 400000-800000 Toman (low) 800000-1500000 Toman (medium) 1500000-3000000 Toman (high) 3000000 Toman >(very high)	53(34.9%) 62(40.8%) 27(17.8%) 8(5.3%) 2(1.3%)
Having job out of home		Y N	31(13.5%) 199(86.5%)
Marital status		Single Having husband Divorced Widow	65(28.3%) 156(67.8%) 6(2.6%) 3(1.3%)

Table 3: Mean and standard deviation for the variables of TPB

Variable	Mean (%)	Standard deviation
Knowledge	.43 (43%)	.49681
Intention	1.43 (71%)	.73146
Subjective norms	3.58 (56%)	1.51835
Attitude	2.12 (53%)	1.08300
PBC	1.48 (74%)	.67852
Salt consumption	3.38 (56%)	1.34510

We classified the scores as weak (<33%, total score of the construct), average (33%-66%, total score of the construct) and good (>33%, total score of the construct). According to this classification, the mean scores calculated for attitude, PBC, subjective norms, intention and behavior were around good (Table 3).

Influencing factors of salt consumption

The results of Pearson correlations showed a significant direct association between attitude, subjective norms, percieved behavioral control, intention, and salt consuming behavior (Table 4).

There was a significant asociation between attitude (sig.<0.001), subjective norms (sig.<0.01) and perceived behavioral control

(sig.<0.01), and intention to reduce salt consumption; however, the asociation between perceived behavioral control and salt consuming behavior was not significant. The correlations of mentioned variables are shown in Table 4.

Table 4: Bivariate correlations between the psycosicial variables

Variable		1	2	3	4	5	6	7
1. Subjective norms	R	1						
	Sig							
2.Attitude	R	.309*	1					
	Sig	.000						
3. PBC	R	.386*	.398 *	1				
	Sig	.000	.000					
4. Knowledge	R	.265*	.221*	.098	1			
	Sig	.000	.001	.139				
5. Intention	R	.361*	.179*	.269*	.202*	1		
	Sig	.000	.007	.000	.002			
6. Salt consumption	R	.025	-.047	.034	.342 *	.064	1	
	Sig	.701	.474	.609	.000	.335		

Stepwise regression of healthy catering behavior as the dependent variable and constructs (attitudes, subjective norms, PBC and intention) as independent variables showed that predictive values of subjective norms, attitude and intention in explaining the salt consumption behavior were 6%, 3% and 2%, respectively.

A non-significant relationship was found between perceived behavioral control and salt consuming behavior, indicating that this construct does not make a significant direct contribution to salt consuming behavior.

Whereas for intention, attitude ($R^2 = 0.064$) predicted approximately 6 % of the variance, and perceived behavioral control ($R^2 = 0.089$) predicted approximately 3% of the variance.

A non-significant relationship was found between intention and subjective norms, indicating that this construct does not make a significant direct contribution to intention to consume salt.

Discussion

Predictors of intention

The results of the present research showed that perceived behavioral control and attitude are direct and significant predictors of intention to reduce salt consumption, and subjective norms did not predict intention directly. Also in the study of Kim et al. in Minnesota, perceived behavioral control and attitude could predict intention while subjective norms could not predict intention changes [29]. However, two studies in Iran showed that in addition to the mentioned constructs, subjective norms

predicted intention directly [16, 20]. This difference may be because of differences between the subjects of studies. Both of those two studies evaluated fruit and vegetable consumption determinants whereas our study evaluated determinants of salt consumption.

Also the results of this research showed that attitude is a better predictor of intention; this finding is also corroborated with other studies [30].

Predictors of behavior

The research results showed that subjective norms, attitude and intention are direct determinants of reducing salt consumption in the rural Baluch women of Chabahar. Some other studies also revealed that subjective norms is a prominent predictor of behavior [30] and intention is a direct predictor of behavior, [20, 30]. Differences between the study populations may result this. But some other researchers concluded that perceived behavioral control also predicted health behavior significantly [16, 28, 31]; it was even the strongest predictor of behavior [16, 31].

Also the present research showed that subjective norms, attitude and intention are direct and significant predictors of salt consumption. In line with the present study, the findings of Mazlumi et al., who evaluated the effectiveness of reasoned action theory on the determinants of salt consumption in

women, showed a significant correlation between adding salt into food when cooking and intention, avoiding to add salt to food when eating with intention and attitude and avoiding to eat salty foods and attitude [25]. In contrast, in the present study, "subjective norms" was a strong predictor of salt consumption in the participants. This finding can be due to cultural and social context of the study population. Residents of Chabahar are mainly Baluch [26]. In line with the present study, two other studies in Iran showed that subjective norms predicted behavior and intention significantly. But unlike the present study, in the above researches, two other constructs (attitudes and perceived behavioral control) together with subjective norms predicted both intention and behavior [16, 20]. Obeying social norms in the study population seems to be stronger than other studied societies, so that it dominated behavior. Unlikely, in the study of Lien et al. in America, subjective norms and attitude did not effect on behavior [15]; so obeying social norms in the American society seems to be weaker than in the studied Iranian societies.

Conclusion

The results of this study indicated that the theory of planned behavior (TPB) is useful to explain salt consumption behavior and intention of the rural women of Chabahar as it

explained approximately 11% of salt consumption behavior and 9% of intention to reduce salt consumption.

Considering the findings of present study, for having rural women of Chabahar reduce salt consumption focus on the community and family-based educational programs, which includes all members of society is necessary. In other words, the control of prominent role of subjective norms should not be ignored. Focusing on the determinants of intention including perceived behavioral control and attitude is crucial to make people intend to salt reduction.

Selecting rural women of different ages and all levels, choosing rural women of different ages, levels and socioeconomic groups and theory-based investigation are among the strengths of this study. Self-administered questionnaire and measuring salt consumption as the past behavior of participants are the limitations of the study, because food intake should be measured continuously using a standard questionnaire [32]. Yet previous studies have used this method to measuring eating behavior [16, 20]. Also despite education and recommendations made by the researcher, using various assistants to complete the questionnaire may influence the results of questionnaires.

We suggest that future studies should investigate the predicting power of constructs of the TPB for salt consumption by including the indirect constructs of TPB too. Also researches investigating the pathways between other influencing factors and TPB constructs are needed.

Conflict of interest: The authors had no conflicts of interests

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