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# Fish consumption based on transtheoretical model among housewives

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## Abstract:

**BACKGROUND:** Consuming fish plays a key role in human health and prevention of diseases. The aim of this study was using transtheoretical model to analyze the trend of fish consumption among women.

**MATERIALS AND METHODS:** In this descriptive-analytic research, 383 housewives who referred to health centers in Bandar Abbas were selected through a stratified sampling method. Data were collected by a questionnaire to determine fish consumption based on transtheoretical model and analyzed by using SPSS software version 19.0. with the significance level of  $P < 0.05$ .

**RESULTS:** Nearly 11.7% of the patients were found to be at the precontemplation stage; 3.9% were at the contemplation stage; 13.6% were at the preparation stage; 7.3% showed to be at the action stage, and 63.4% were at the maintenance stage. The results showed a significant relation of the constructs of the model with the stages of change of consuming one or two meals of fish a week. Moving through the stages of change from the precontemplation stage to maintenance stage was accompanied by an increase in decisional balance, self-efficacy, and processes of change ( $P < 0.05$ ).

**CONCLUSION:** It is suggested that in designing educational interventions in the light of this model, more emphasis is placed on perceived benefits and self-efficacy. The processes of change are advised to be used more often, and perceived barriers to fish consumption need to be reduced as far as possible.

## Keywords:

Decisional balance, fish, processes of change, self-efficacy, transtheoretical model

## Introduction

Fish is among the healthiest foods that need to be present in one's diet.<sup>[1]</sup> It has a plenty of benefits for the youth as well as the elderly.<sup>[2]</sup> A well-planned consumption of fish lowers the probability of affliction with cardiovascular diseases and mortalities induced by coronary heart disease.<sup>[3,4]</sup> Fish contains omega-3 fatty acid which lowers cholesterol level and the emergence of hypertension, stroke, Alzheimer's, depression, cancer, and type 2 diabetes. For pregnant women and women

at the reproduction age, consuming fish is essential due to its omega-3 content.<sup>[5-8]</sup>

The World Health Organization (WHO) considers fish consumption at least twice a week as one effective factor of preventing cardiovascular diseases as well as brain stroke.<sup>[9]</sup> In their research, Yousefi and Shariati conducted a sociological analysis of fish consumption in Mashhad and found it to be very low among the families (130 g/month). A significant percentage of the households (51.4%) did not consume fish.<sup>[10]</sup> Baghiani Moghaddam and Eivazi investigated why residents of Javanrood did not consume as much fish as recommended

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by the WHO. Only 15.8% of the households followed the twice a week order of consumption. The barriers to fish consumption they mentioned were as follows: high costs, limited access to fish, and undesirable smell and taste.<sup>[9]</sup>

Among health-related issues are nutritional behaviors which are multifaceted and dramatically affect the healthcare. Development of healthy nutritional behaviors is successful only if the influential factors are taken into account in the light of proper models of health behavior change.<sup>[11]</sup> One such model is the transtheoretical model<sup>[1]</sup> that not only opens up a path for understanding behavior change but also offers the criterion for assessing people's preparation for change and offers appropriate interventions.<sup>[12]</sup> It is assumed in this model that people do not make black and white decisions to change their behavior. On the other hand, this change occurs gradually in multiple stages through which one passes.<sup>[13]</sup> There are four sub-constructs in this model: stages of change, decisional balance, self-efficacy, and processes of change.<sup>[14]</sup> The core is the processes of change and is the only sub-construct that has a temporal aspect in this model and is comprised of five consecutive stages: precontemplation stage in which one has no intention of changing one's behavior within the forthcoming 6 months, contemplation stage in which one thinks over changing one's behavior within the upcoming 6 months, preparation stage in which one plans for a change of behavior in near future (e.g., the next 1 month), action stage in which one has made overt behavioral changes in one's lifestyle to achieve the target change, and maintenance stage in which one attempts to maintain the health behavior and not to return to the past wrong habits. Decisional balance has been defined as the pros and cons and costs of behavior change as perceived by individuals.<sup>[15]</sup>

Women nutritional health is of an utmost importance both as members of society and mothers and the effect it has on children's health as well as the other family members. On the other hand, women play a key role in feeding the family. The above-mentioned factors along with the limited knowledge about that motivated the conduction of the present study. Hence, the aim of this study was using the transtheoretical model to analyze the trend of consuming one or two meals of fish a week, among housewives who referred to health centers in Bandar Abbas.

## Materials and Methods

The target population of this study was housewives who referred to Bandar Abbas health care centers. Based on Henry *et al.*'s research and with at least 0.5 for the mean difference between two stage groups at significance level of 0.05 and power of 0.8 and the sample size was

estimated 383 participants.<sup>[16]</sup> They were selected through a multiple stratified method. Initially, among eleven health centers, seven were randomly chosen. Then, according to the population covered in every center, the required sample size was determined. From among those visiting the health centers every visitor who met the inclusion criteria entered the study until the required sample size was complete. The inclusion criteria were as follows: being married, literate, and willing to take part in the research. The exclusion criteria were being illiterate and unwilling to take part in the research.

Data were collected by a questionnaire that consisted of demographic variables (age and education), stages of change of fish consumption, pros and cons self-efficacy, and processes of change toward fish consumption. The decisional balance was estimated as the subtraction of pros and cons. To design the questionnaires, a review of the related literature was used along with interviews with a number of research subjects. To determine the face and content validity of the items, a panel of experts was used, and Cronbach's alpha was employed to establish the reliability.

To determine the stages of change for consuming fish one or more meals a week, a questionnaire was used which was comprised of 4 yes/no items. These items explored the state or intention of consuming one or more meals of fish a week within the forthcoming one and 6 months. According to the responses one made, the result would belong to any of the precontemplation, contemplation, preparation, action, or maintenance stages.

The perceived benefits and perceived barriers questionnaires for consuming fish, each contained 8 items in a Likert scale, with five choices ranging from totally agree to totally disagree. The scores of all items were added up and then divided by 8. The result would be the perceived benefits and barriers scores of fish consumption which ranged between 1 and 5. Cronbach's alpha for perceived benefits and perceived barriers questionnaires were 0.73 and 0.77, respectively, which points to a high internal consistency.

The self-efficacy questionnaire for consuming fish contained 5 items arranged in a Likert scale. Each item consisted of 5 choices ranging from too easy to too hard. The Cronbach's alpha was estimated to be 0.75.

The cognitive processes questionnaires for consuming fish contained 10 items in a Likert scale, each with 5 choices ranging from totally agree to totally disagree. The scores of all items were added up and then divided by 10, and hence, it ranged between 1 and 5. Cronbach's alpha was estimated 0.70 which points to an acceptable internal consistency.

Furthermore, the behavioral processes questionnaires for consuming fish contained 10 items in a Likert scale, each with five choices ranging from totally agree to totally disagree. The scores of all items were added up and then divided by 10, and hence, it ranged between 1 and 5. Cronbach’s alpha was estimated 0.83 which points to an acceptable internal consistency.

In advance to the data collection, the purpose of the study, confidentiality of the data and how to complete the questionnaire were explained to subjects.

Data were analyzed by using SPSS software version 19.0 (IBM Company, Armonk, NY, USA) One-way ANOVA was used to test how the processes involved in changing the fish consumption behavior relates to such factors as decisional balance, self-efficacy, and processes of change. To look into the trend of change in decisional balance, self-efficacy, and processes of change for fish consumption, linear trend analysis was used. The significance level was set at below 0.05.

### Results

The mean age of the participants was 29.5 years (standard deviation = 7.3), ranging from 16 to 58. The education level of 5.7% was an elementary school, 15.9% was secondary school, 48.3% was high school, and 30% had a university degree. The majority of participants (63.4%) were at the maintenance stage and the minority (3.9%) were at the contemplation stage [Table 1].

A significant relation was found between the stages of change and decisional balance, self-efficacy, and processes of change ( $P < 0.05$ ). Meanwhile, one move from the precontemplation to maintenance stage, there

**Table 1: Stages of change of consuming one or two meals of fish a week**

Stages of change	n (%)
Precontemplation	45 (11.7)
Contemplation	15 (3.9)
Preparation	52 (13.6)
Action	28 (7.3)
Maintenance	243 (63.4)
Total	383 (100)

**Table 2: Relation between transtheoretical model constructs and stages of change of consuming one or two meals of fish a week**

TTM constructs	Stages of change, mean (SD)					F	P*
	Precontemplation	Contemplation	Preparation	Action	Maintenance		
Decisional balance	1.28 (1.01)	1.25 (0.82)	1.64 (0.86)	1.52 (1.09)	1.83 (0.79)	5.44	<0.001
Self-efficacy	2.59 (0.83)	2.49 (0.46)	2.61 (0.62)	2.87 (0.68)	2.94 (0.70)	5.02	<0.001
Cognitive processes	3.68 (0.56)	3.88 (0.51)	3.88 (0.42)	3.91 (0.45)	4.05 (0.43)	7.01	<0.001
Behavioral processes	3.21 (0.68)	3.52 (0.70)	3.60 (0.70)	3.45 (0.59)	3.63 (0.65)	3.90	<0.004

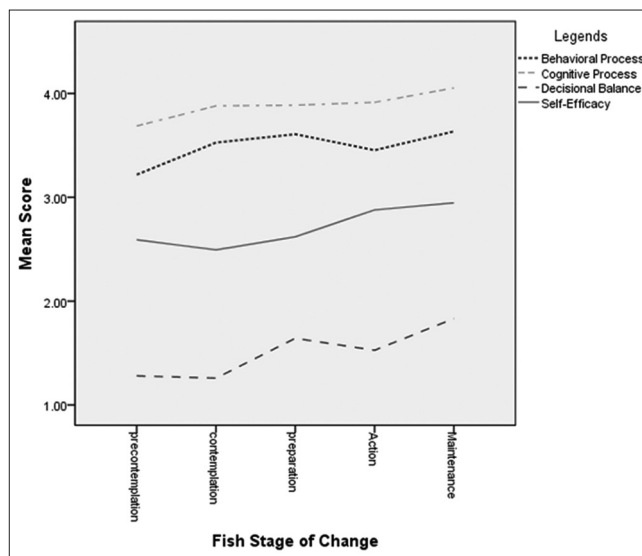
\*One-way ANOVA. TTM=Transtheoretical model, SD=Standard deviation

is an increase in decisional balance, self-efficacy, and processes of change [Table 2].

Once the ANOVA test result showed to be significant, linear trend test was run. Accordingly, the decisional balance, self-efficacy, cognitive processes, and behavioral processes showed to have a statistically significant linear trend ( $P < 0.001$ ). Decisional balance, self-efficacy, cognitive processes, and behavioral processes had an overall increasing trend along the stages of change. In other words, meanwhile, the participants were moving from precontemplation toward maintenance, their decisional balance, self-efficacy, cognitive processes, and behavioral processes were increased in a linear fashion [Figure 1].

### Discussion

As the results of the present study showed 11.7% of women were at the precontemplation stage of consuming fish. This is to say that they did not intend to consume one or two meal of fish a week in the forthcoming 6 months. About 3.9% of these participants showed to be at the contemplation stage. That is, they were considering one or two meal of fish a week within 6 months’ time. Nearly



**Figure 1:** The mean scores of decisional balance, self-efficacy, cognitive processes, and behavioral processes regarding fish consumption based on the stages of change

13.6% were found to be at the preparation stage. In other words, they were planning for consuming one or two meal of fish a week within the next month. Moreover, 7.3% of the participants were found to be at the action stage which implies that they consumed one or two meal of fish a week, but they had not done so within the past 6 months. 63.4% showed to be at the maintenance stage which is the minimum percentage. In the study of De Vet *et al.* implemented the transtheoretical model on adults' fish, fruit, and vegetable consumption in the Netherlands, 40.3% of the participants showed to be at the precontemplation stage; 12.8% were at the contemplation stage; nearly 6.2% were at the preparation stage; 7.9% were at the action stage and 32.8% were at the maintenance stage.<sup>[17]</sup> In the aforementioned study, the majority of subjects showed to be at the precontemplation stage which is divergent from the findings of the present research. This difference can be due to the different research populations, their socio-economic status and demographic features in the two investigations.

Concerning the relation between the stages of change and decisional balance, a positive relation was found. In other words, a development throughout the stages of fish consumption was accompanied by an increased decisional balance. The mean score of decisional balance at the maintenance stage was found to be significantly higher than the precontemplation and contemplation stages. A higher decisional balance in a particular behavior implies more tendency toward changing the behavior. If one's perception of the benefits of changing a certain behavior is more precise and more benefits are highlighted than barriers, there is a more chance of changing that behavior.<sup>[18]</sup>

Findings of the present research revealed that through the development from precontemplation to maintenance stage, one's perceived benefits of consuming fish is increased while the perceived barriers are decreased. These findings are consistent with a body of related literature.<sup>[11,19-21]</sup> These results are also consistent with the underlying principles of the transtheoretical model since perceiving more benefits and fewer barriers of consuming fish lead one towards the maintenance stage and help the behavior last longer.

Self-efficacy is comprised of belief in one's own capability of showing a certain behavior and achieving certain goals. As the most powerful predictor of health-related behaviors, self-efficacy has a key role in changing behaviors.<sup>[22,23]</sup> A significant relation was found in the present research between self-efficacy and the five stages of behavior change. According to the findings, along development from the precontemplation to maintenance stage, one's self-efficacy is also developed. The results reported by Tassell indicated a significant increase in

self-efficacy in maintaining a healthy diet that entails consuming fruit and vegetable and less fat.<sup>[24]</sup> This finding was consistent with the results of the present research. In their research, Strecher *et al.*<sup>[25]</sup> investigated the role of self-efficacy in achieving a certain behavioral change. Their investigation of multiple health-related behaviors concluded that there was a significant correlation between self-efficacy and change in health-related behaviors. There can be several reasons for the probable similarity between the present research and the one just mentioned. At higher stages of development (action or maintenance), people might have gradually attempted more to overcome barriers to fish consumption. At the same time, their perceived benefits of the behavior must have increased. These two key factors could have played a role in subjects' well-organized and regular behavior of fish consumption. Employing strategies to simplify a complicated behavior, encouraging and motivating activities, lowering stress associated with the adoption of new role all in all can help to increase belief in one's capabilities of continuing a certain behavior.<sup>[22]</sup> These strategies can be used to increase women's self-efficacy and help them to move from the beginning stages to more advanced ones.

Processes of change include activities, strategies or processes that help to make progress in the developmental stages. These processes are comprised of two main categories as follows: cognitive processes and behavioral processes. Moreover, these processes are considered as the primary guidelines for healthy interventions.<sup>[14,26]</sup>

In the present research, the mean scores of cognitive and behavioral processes were divergent in the different developmental stages. The mean score of cognitive and behavioral processes was the highest in subjects at the maintenance stage. The same score was the lowest at the precontemplation stage. This finding is consistent with the expected trend of the transtheoretical model since along with one's progress in developmental stages, they are expected to use the processes of change more. In Hildebrand and Betts and Van Duyn *et al.*'s investigations of fruit and vegetable consumption, the mean scores of cognitive and behavioral processes were higher in preparation, action, and maintenance stages than precontemplation and contemplation stages.<sup>[27,28]</sup> The mean score of cognitive and behavioral processes was higher in the higher stages of development as compared to the initial stages in other studies.<sup>[16,19,29-32]</sup> This is also consistent with the finding of the present research. This finding can be due to several reasons such as the fact that in precontemplation and contemplation stages subjects had probably no certain motivation and plan for changing the behavior. However, once one enters the practical stages, he/she replaces the unhealthy behavior with a healthy one and attempts to maintain

the new behavior and not to return to the unhealthy behavior.

One limitation of the present research was that it only involved literate women and therefore, the results cannot be easily generalized to all women visitors of the health centers.

## Conclusion

The study findings revealed a significant relation between decisional balance, self-efficacy, and processes of change on the one hand and consuming one or two meals of fish a week on the other. Perceived benefits, self-efficacy, and processes of change were found to be positively related to higher stages of change. It is suggested that in designing educational interventions in the light of this model, more emphasis is placed on perceived benefits and self-efficacy. The processes of change are advised to be used more often, and perceived barriers to fish consumption need to be reduced as far as possible.

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## Conflicts of interest

There are no conflicts of interest.

## References

- Matlabi M, Sharifirad G, Mostavafi F, Mohebi S, Azadbakht L. Factors affecting fish consumption based on structures of health education. *J Health Syst Res* 2012;8:523-36.
- Grieger JA, Miller M, Cobiac L. Knowledge and barriers relating to fish consumption in older Australians. *Appetite* 2012;59:456-63.
- Verbeke W, Vackier I. Individual determinants of fish consumption: Application of the theory of planned behaviour. *Appetite* 2005;44:67-82.
- He K, Song Y, Daviglius ML, Liu K, Van Horn L, Dyer AR, et al. Accumulated evidence on fish consumption and coronary heart disease mortality: A meta-analysis of cohort studies. *Circulation* 2004;109:2705-11.
- Burger J, Gochfeld M, Batang Z, Alikunhi N, Al-Jahdali R, Al-Jebreen D, et al. Fish consumption behavior and rates in native and non-native people in Saudi Arabia. *Environ Res* 2014;133:141-8.
- Morris MC, Evans DA, Bienias JL, Tangney CC, Bennett DA, Wilson RS, et al. Consumption of fish and n-3 fatty acids and risk of incident Alzheimer disease. *Arch Neurol* 2003;60:940-6.
- Fernandes AC, Medeiros CO, Bernardo GL, Ebone MV, Di Pietro PF, Assis MA, et al. Benefits and risks of fish consumption for the human health. *Rev Nutrição* 2012;25:283-95.
- Connelly NA, Lauber TB, Niederdeppe J, Knuth BA. How can more women of childbearing age be encouraged to follow fish consumption recommendations? *Environ Res* 2014;135:88-94.
- Baghyani MM, Eivazi S. Investigation of Factors Related to Lack of Using Fish at the Recommended Amount by WHO in Families of Javanrood (Western Iran) According to Model Goal-Directed Behavior (MGB) in 2006; 2011.
- Kohansal MR, Firoozzare A. Applying multinomial logit model for determining socio-economic factors affecting major choice of consumers in food purchasing: The case of Mashhad. *J Agric Sci Technol* 2013;15:1307-17.
- Tehrani H, Majlessi F, Shojaeizadeh D, Sadeghi R, Hasani Kabootarkhani M. Applying socioecological model to improve women's physical activity: A Randomized control trial. *Iran Red Crescent Med J* 2016;18:e21072.
- Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot* 1997;12:38-48.
- Charkazi A, Fazli L, Alizadeh F, Fazelnia A, Bakhsha F. Regular physical activity based on transtheoretical model among health and paramedic schools of Golestan University of medical sciences. *Iran J Health Educ Health Promot* 2014;1:57-68.
- Velicer W, Prochaska J, Fava J, Norman G, Redding C. Detailed Overview of the Transtheoretical Model. *Hentet fra*; 1998.
- Glanz K, Rimer BK, Viswanath K. *Health Behavior and Health Education: Theory, Research, and Practice*. San Francisco United States: John Wiley & Sons; 2008.
- Henry H, Reimer K, Smith C, Reicks M. Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers. *J Am Diet Assoc* 2006;106:841-9.
- De Vet E, de Nooijer J, de Vries NK, Brug J. The transtheoretical model for fruit, vegetable and fish consumption: Associations between intakes, stages of change and stage transition determinants. *Int J Behav Nutr Phys Act* 2006;3:13.
- Pirasteh A, Davati A, Jouhari Z, Mohamadi L. Predicting physical activity behavior among Iranian medical college students using the transtheoretical model. *Daneshvar Medicine journal* 2012;19:1-11.
- Di Noia J, Schinke SP, Prochaska JO, Contento IR. Application of the transtheoretical model to fruit and vegetable consumption among economically disadvantaged African-American adolescents: Preliminary findings. *Am J Health Promot* 2006;20:342-8.
- Abdi J, Eftekhari H, Mahmoodi M, Shojaeizade D, Sadeghi R. Lifestyle of the employees working in hamadan public sectors: Application of the trans-theoretical model. *Iran Red Crescent Med J* 2015;17:e25269.
- Rossi SR, Greene GW, Rossi JS, Plummer BA, Benisovich SV, Keller S, et al. Validation of decisional balance and situational temptations measures for dietary fat reduction in a large school-based population of adolescents. *Eat Behav* 2001;2:1-8.
- Saffari M, Shojaeizadeh D, Ghofranipour F, Heydarnia A, Pakpour A. *Health Education & Promotion-Theories, Models & Methods*. Tehran: Sobhan Publication; 2009. p. 1-234.
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev* 1977;84:191-215.
- Tassell N, Flett R. Stages of change for fruit and vegetable intake and dietary fat modification in Maori women: Some relationships with body attitudes and eating behaviours. *New Zealand Journal of Psychology* 2005;34:28-34.
- Strecher VJ, DeVellis BM, Becker MH, Rosenstock IM. The role of self-efficacy in achieving health behavior change. *Health Educ Q* 1986;13:73-92.
- Tehrani H, Taghdisi MH. Community action: A strategy for health promotion. *Iran J Health Educ Health Promot* 2015;2:255-9.
- Hildebrand DA, Betts NM. Assessment of stage of change, decisional balance, self-efficacy, and use of processes of change

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- of low-income parents for increasing servings of fruits and vegetables to preschool-aged children. *J Nutr Educ Behav* 2009;41:110-9.
28. Van Duyn MA, Kristal AR, Dodd K, Campbell MK, Subar AF, Stables G, *et al.* Association of awareness, intrapersonal and interpersonal factors, and stage of dietary change with fruit and vegetable consumption: A national survey. *Am J Health Promot* 2001;16:69-78.
  29. Aghamolaei T, Sadat Tavafian S, Madani A. Fish consumption in a sample of people in bandar abbas, Iran: Application of the theory of planned behavior. *Arch Iran Med* 2012;15:545-8.
  30. Greene GW, Fey-Yensan N, Padula C, Rossi S, Rossi JS, Clark PG, *et al.* Differences in psychosocial variables by stage of change for fruits and vegetables in older adults. *J Am Diet Assoc* 2004;104:1236-43.
  31. Cook AS, O'leary F, Allman-Farinelli M. Behavioural and cognitive processes adults use to change their fruit and vegetable consumption. *Nutr Diet* 2015;72:327-32.
  32. Oliveira Mdo C, Anderson J, Auld G, Kendall P. Validation of a tool to measure processes of change for fruit and vegetable consumption among male college students. *J Nutr Educ Behav* 2005;37:2-11.