

## Prediction of Adequate Prenatal Care Utilization Based on the Extended Parallel Process Model

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### ABSTRACT

**Background:** Pregnancy complications are one of the major public health concerns. One of the main causes of preventable complications is the absence of or inadequate provision of prenatal care. The present study was conducted to investigate whether Extended Parallel Process Model's constructs can predict the utilization of prenatal care services.

**Methods:** The present longitudinal prospective study was conducted on 192 pregnant women selected through the multi-stage sampling of health facilities in Qeshm, Hormozgan province, from April to June 2015. Participants were followed up from the first half of pregnancy until their childbirth to assess adequate or inadequate/non-utilization of prenatal care services. Data were collected using the structured Risk Behavior Diagnosis Scale. The analysis of the data was carried out in SPSS-22 using one-way ANOVA, linear regression and logistic regression analysis. The level of significance was set at 0.05.

**Results:** Totally, 178 pregnant women with a mean age of 25.31±5.42 completed the study. Perceived self-efficacy (OR=25.23; P<0.001) and perceived susceptibility (OR=0.048; P<0.001) were two predictors of the intention to utilize prenatal care. Husband's occupation in the labor market (OR=0.43; P=0.02), unwanted pregnancy (OR=0.352; P<0.001), and the need to care for the minors or elderly at home (OR=0.35; P=0.045) were associated with lower odds of receiving prenatal care.

**Conclusion:** The model showed that when perceived efficacy of the prenatal care services overcame the perceived threat, the likelihood of prenatal care usage will increase. This study identified some modifiable factors associated with prenatal care usage by women, providing key targets for appropriate clinical interventions.

**KEYWORDS:** Prenatal care, Forecasting, Health promotion

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## INTRODUCTION

Regular prenatal care reduces the pregnancy and childbirth complications by decreasing their risk factors through training, social support, diagnosis, early referral and appropriate treatment.<sup>1-3</sup> Despite their positive outcomes, some mothers do not take advantage of the prenatal care services during pregnancy offered for a variety of reasons so that pregnancy outcomes may lead to unexpected complications including maternal death.<sup>4-6</sup>

There is an inverse correlation between the risk of maternal morbidity and death and the access to trained healthcare personnel during pregnancy and childbirth.<sup>7</sup> The majority of these problems occur during or after a seemingly normal process of childbirth, as it is possible to prevent these events by utilizing preventive pregnancy care.<sup>8</sup> The lack of adequate care sensitivity on the part of the pregnant woman and her family, insufficient knowledge about the high-risk complications of pregnancy, satisfaction with previous childbirth experiences, unwanted pregnancy, trust on self-care, and distrust in care providers are some of the reasons for inadequate care utilization during this period.<sup>5,9</sup>

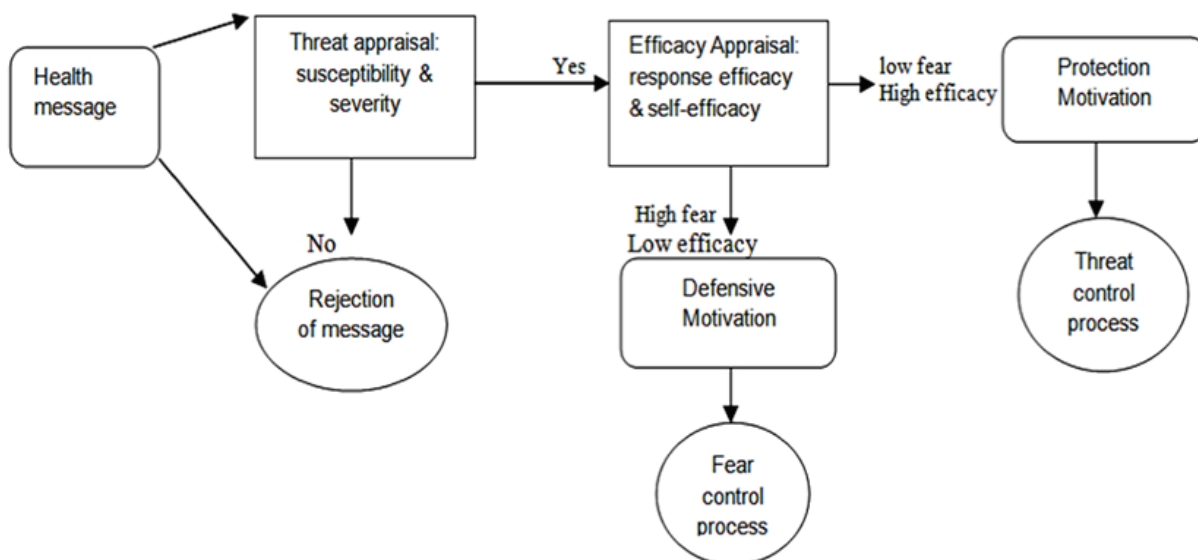
In Iran, like many other countries, the most primary healthcare services for urban and rural populations are health centers and health facilities, respectively. They have been providing free primary health care services for many years including preconception, prenatal and postpartum care, and active follow-up has been conducted by health staffs through home visits whenever necessary.

Nevertheless, the non-utilization or inadequate utilization of pregnancy care was responsible for 17% of the cases of cause-specific maternal mortality in 2010 in Iran, especially in underprivileged and less-developed regions of the country. From 2005 to 2011, Hormozgan province in the south of Iran was reported to be one of the highest maternal mortality rates of 39.7 per 100,000 live births;<sup>10</sup> and Qeshm island in this province had the highest rates of maternal

mortality as well (62.22 per 100,000 live births in 2013). One of the main attributable causes of maternal mortality in this town is the irregular or inadequate utilization of prenatal care services by pregnant women and the delayed decision by their families to refer the mothers to obstetrics services even in presence of an underlying disease during pregnancy.<sup>11</sup>

Given the aforementioned health problem in this region of the country, identifying the obstacles and facilitators of prenatal care utilization by pregnant women based on a scientific approach appear to be essential. Furthermore, although every day health messages are being rendered by the health staff to the target group, data show their inadequate effectiveness or failure to change health related behaviors in this domain. The literature suggests that one of the most appropriate models for the assessment of health related behaviors is the Extended Parallel Process Model (EPPM). This is one of the models of cognitive and affective responses to fear. Fear appeals have been shown to be effective in attitude change and self-care behaviors through health messages.<sup>12-16</sup> According to the fear appeal models including EPPM, people tend to evaluate the benefits and harms of the health behavior-related messages first and then react accordingly.<sup>17</sup> They may evaluate the message as either a threat or efficacy, both of which lead to three possible reactions: indifference, rejection of the message, and acceptance of the message<sup>18</sup> (Figure 1).

There are two key elements within the EPPM: threat and efficacy. This approach assumes that the higher the individual's perceived efficacy (a combination of perceived self-efficacy and perceived response-efficacy), the more likely the behavior change and the higher the intention to practice health behaviors; conversely, the higher the perceived threat (a combination of perceived susceptibility and perceived severity), compared to perceived efficacy, the lower the likelihood of behavior change.



**Figure 1:** Simple Description of Witte’s Extended Parallel Process Model for fear appeals (according to Witte, et al., 2001)<sup>18</sup>

This model implies that those individuals who perceive more severe threat are more likely to move into self-protective behaviors and believe that their actions are effective to avert the threat; this can increase the feasibility and ease of the recommended messages. The difference between the scores of perceived threat and perceived efficacy in the model is referred to as the Critical Point, indicating the likelihood of the individual’s performing the intended behavior.<sup>18</sup> Behavior involves the individual’s attitude, beliefs and subjective norms, which affect his/her behavioral control; a greater certainty about a task, thus, leads to a greater intention to perform it.<sup>19</sup> As EPPM suggests, behaviors are determined by the weighting of perceived efficacy against threat;<sup>18</sup> the question remains as to whether or not behavioral intention can always predict a certain health related behavior.

The present study aimed to predict prenatal care utilization as a healthy behavior in the rural areas of Qeshm using the EPPM. The research questions were whether the constructs of the EPPM are able to predict pregnant women’s intention to utilize prenatal care services, and if so, whether the intention to utilize prenatal care can predict the adequate utilization of these services by pregnant women.

## MATERIALS AND METHODS

In this longitudinal prospective study, 192 pregnant women living in rural areas of Qeshm, were enrolled in the study. The participants were a group of pregnant women covered by the health facilities of Qeshm in 2015 selected according to the study’s inclusion criteria, namely having an Iranian nationality, permanent residence in rural areas of Qeshm and being in the first trimester of pregnancy based on the last menstrual period or ultrasound. The exclusion criteria in this study consisted of unwillingness to continue participation in the study and abortion due to any reason. However, in cases of preterm birth due to medical or midwifery reasons, the adequacy and inadequacy of the participant’s prenatal care utilization was assessed according to the mother’s first pregnancy visit and the number of prenatal care visits completed on the basis of her gestational age.

The participants were selected through multi-stage sampling. First, a list was prepared of all the rural health facilities covered by the urban and rural health centers in the area. The total number of women with health records in each health facility was then obtained. At least one health facility covering the largest population of women was then selected non-randomly and based on geographical

distribution and the distance from each health facility to the satellite villages covered by that facility. Then, a quota was accordingly assigned to each health facility and a convenience sampling was performed in each quota. In the health facilities that covered only a small number of pregnant women, however, all the women were included in the study through the census method.

A total of 1100 pregnant women had health records in the surveyed health facilities. The initial study sample size was determined as 160, using correlation sample size formula<sup>20</sup> (with an effect size of 0.22, first-type error of 0.05, and a study power of 0.8). However, the total sample size was increased to 192 to take account of a potential sample loss of 20%.

Sampling was carried out from 19 health facilities for two months, except during the weekends and holidays, from early April to late June 2015.

The study setting comprised all the 45 villages of Qeshm and the study population consisted of the pregnant women covered by the health facilities of the Qeshm health network affiliated to Hormozagan University of Medical Sciences.

According to the National Guideline for Midwifery and Childbirth Services in Iran, receiving at least five out of eight visits of prenatal care is regarded as the adequate utilization of care. For low-risk pregnancies, the criterion is to get a minimum of two visits in the first half of pregnancy and six visits in the second half.<sup>21</sup> In the present study, a minimum of six visits of prenatal care (one in the first half of pregnancy and five in the second half) was considered to be adequate because, first, few to no women presented for preconception counseling, and the diagnosis and treatment of their underlying disorders was, therefore, delayed, and second, due to the likelihood of the women's failure to pay regular and timely visits to the health facilities given the pregnancy records in this region and the citizens' tendency not to seek care in the private sector unless in cases of emergency, which is unlike in urban areas;

therefore, women who had received less than six visits of prenatal care or had not received any visit at all were considered as the cases of inadequate utilization and non-utilization of prenatal care. The adequacy of care was determined at the end of the follow-up period, i.e. at 38-40 weeks of gestation, based on the gestational age and the ideal number of visits for the given age.

The researchers followed-up the participants until the end of pregnancy and delivery and the number of prenatal visits were recorded for each person.

Data were collected using the structured Risk Behavior Diagnosis Scale (RBDS) based on the EPPM.<sup>17</sup> The original scale is a 12-item survey theoretically grounded in the EPPM. RBDS has two main constructs, namely perceived threat (consisting of the perceived severity and perceived susceptibility) and perceived efficacy (consisting of the perceived self-efficacy and perceived response-efficacy). The researcher then developed his/her targeted health message on the basis of these subscales.<sup>18</sup> The study's questionnaire included 24 items on the basis of the research objectives and health messages were developed for each construct in the model accordingly to predict the outcome measures. All the questionnaire's statements were scored based on a 5-point Likert scale from 1 (totally disagree) to 5 (totally agree).

Perceived severity and perceived susceptibility evaluated the perceptions of the risk and effects of not visiting on time for receiving prenatal care and women's exposure to the undiagnosed complications of pregnancy and childbirth in the case of failure to visit for prenatal care or receiving irregular care, respectively. Perceived response-efficacy and perceived self-efficacy evaluated the women's subjective perceptions of the efficacy/benefits of prenatal care, and their perceptions of their own ability to get regular and timely visits in health facilities for receiving prenatal care, respectively. Finally, behavioral intention assessed the women's intention to pay regular and timely visits to



health facilities for receiving prenatal care in their current pregnancy.

Since the subjective barriers to performing a behavior are often affected by several factors, the non-personal barriers that were likely to prevent the desirable utilization of prenatal care such as the great distance to the health center, lack of access to transportation, need to care for a minor or an elderly, etc. were also asked with one semi-structured question.

The adequacy or inadequacy of prenatal care utilization was determined by calculating the number of visits in accordance with the woman's gestational age in each trimester, and standard statistical tests were then used to examine the relationship between each of the EPPM constructs and the variable of behavioral intention and the adequacy of prenatal care.

The validity of the study tool was confirmed by assessing its face and content validity.<sup>22</sup> At first, to assess the face validity, the questionnaire was distributed among 10 experts in reproductive health and health education and health promotion. Second, to determine the Content Validity Index (CVI) of the tool using Walts and Bussel's criteria and the Content Validity Ratio (CVR) based on the minimum acceptable value according to Lawshe's chart,<sup>23</sup> the questionnaire was distributed among 12 experts familiar with the study's subject and methods. The CVI and CVR of the entire scale were 0.94 and 0.87, respectively. The internal consistency of the tool was confirmed using Cronbach's alpha coefficient of 0.93, as calculated by the responses given by 20 eligible women, and with an acceptable level of 0.7.<sup>24</sup> The stability of the instrument over time was assessed using the test-retest method with a minimum of two-week interval and the correlation between the test and retest scores was calculated as 0.87, indicating the good stability of the instrument.<sup>24</sup>

After obtaining written consents, we collected the data through self-completion questionnaires that were completed by the

researcher after a full explanation of the statements, followed by an interview, in case the respondent was illiterate. All the participants received prenatal care by the health facility staff and were followed up by the researcher until weeks 38-40 of gestation. The number of prenatal care visits completed was then calculated. As attrition is an inevitable problem in almost every longitudinal epidemiological study, to prevent the loss of study's power and potential bias, the researchers obtained at least two contact phone numbers and postal address from the eligible women presenting to the health facilities. In addition, if a pregnant woman who delayed her visits and avoided visiting to receive care even after a reminder phone call made by the facility staff, she was visited at home by both health staff and researcher, and in the case of refusal to get care, this event was reported to the health network by a phone call, and written official reports were sent for further interventions by family health experts; the results of these services were then recorded on special care forms.

The raw data obtained were analyzed in SPSS, version 22. The normal distribution of the data was confirmed through the Kolmogorov-Smirnov test. Descriptive statistics were used to determine the central and distribution indices and inferential statistics to find the Pearson correlation coefficient between the model's constructs and behavioral intention. The difference between the mean scores of the model's constructs and the demographic variables was calculated using the one-way ANOVA, the independent samples t-test, and the Chi-squared test ( $X^2$ ). The linear regression analysis was used to determine the association between the model's constructs and behavioral intention, and the logistic regression analysis determined the association with the adequacy of prenatal care. The level of significance was set at 0.05. The control over the effect of the confounding variables on behavioral intention and the adequacy of prenatal care was also examined. The critical point was

calculated by subtracting the total score of the perceived threat from the total score of the perceived efficacy and their association with the outcome variables was also determined.

To comply with ethical considerations, the research project was approved by the deputy of research under the Ethical Code sbmu2.rec.2015.22. Written informed consent to enter the study was obtained from the participants and they were ensured about the confidentiality of their data and their right to withdraw from the study at any time; they were also ensured that their withdrawal would not affect their right to receive the routine care.

## RESULTS

Initially, all the 192 questionnaires were self-completed by the study participants or by the researcher through interviews. Except for 14 women who had to terminate their pregnancy before the 37<sup>th</sup> weeks of pregnancy for medical or obstetric reasons, the remaining participants (178) were followed-up until weeks 39-40 of gestation. Seven out of all the remained participants refused to attend the health facilities, so with obtaining their agreements, they were visited regularly by the researcher at their own homes until the childbirth.

The mean age of the participants was 25.31±5.42, the mean gestational age at the time of entering the study was 10 weeks, and one third of them were first time mothers. Table 1 presents some of participants' characteristics.

The most common medical disorders in the women's current pregnancy included iron deficiency anemia and digestive disorders. Four of the women had to have C-sections before their 37<sup>th</sup> week of gestation due to pregnancy-induced hypertension, gestational diabetes mellitus, and asthma. All the other infants were born at full term and none had to be admitted to neonatal intensive care unit (NICU).

Overall, 26.6% of the participants had received inadequate prenatal care, 8.9% only 1-2 visits, 17.7% a maximum of 3-4 visits during their entire pregnancy and 6.8% had

**Table 1:** The participants' demographic and reproductive information

Variable	N (%)
<b>Education</b>	
Illiterate	13 (6.78)
Lower secondary school	59 (30.72)
Upper secondary school	109 (78)
Post-secondary education	11 (5.72)
<b>Employment status</b>	
Housewife	176 (91.65)
Corporate employee	3 (1.55)
Self-employed	10 (5.20)
Semi-manual skilled (laborer)	3 (1.60)
<b>Spouse's education</b>	
Illiterate	13 (6.78)
Lower secondary school	59 (30.72)
Upper secondary school	109 (56.78)
Post-secondary education	11 (5.72)
<b>Spouse's employment status</b>	
Corporate employee	15 (7.81)
Self-employed	113 (58.85)
Unemployed	13 (6.77)
Semi-manual skilled (laborer)	51 (26.57)
<b>Household size</b>	
2-3 persons	63 (32.81)
4-6 persons	88 (45.84)
7 and above	41 (21.35)
<b>Self-assessed economic status</b>	
Low	134 (69.79)
Intermediate	58 (30.21)
High	0 (0)
<b>Pregnancy intention</b>	
Intended pregnancy	170 (88.55)
Unintended pregnancy	22 (11.45)
<b>Past diagnoses or medical history*</b>	
Yes	33 (17.18)
No	159 (82.82)

\*Including gestational diabetes, pregnancy-induced hypertension, heart disease and asthma

received no care at all. The most common reasons mentioned by the participants who did not receive prenatal care in health facilities included the great distance from their home to the health facility (20.3%), lack of access to transportation (9.3%) and the necessity to care for a minor or an elderly at home (8.9%); however, nearly half of them (44.3%) gave no reason for their inadequate utilization of prenatal care.

The comparison of the scores obtained for the RBDS items assessing the EPPM constructs and the critical point revealed significant

differences between the utilizer and non-utilizer participants (Table 2). This finding suggests that all (100%) of the women who had negative critical point at the beginning of the study, based on the questionnaires results, did not receive adequate or any prenatal care during pregnancy. In contrast, most (88.8%) of the women who received positive critical points ended up receiving adequate prenatal care ( $P<0.001$ ).

As to the first research question, a significant and positive correlation was obtained between all the model constructs and the women’s behavioral intention for receiving prenatal care. The highest correlation was observed between perceived self-efficacy and the intention to receive prenatal care ( $r=0.75$ ,  $P<0.001$ ). Similarly, significant and positive correlations were observed among intentional behavior and perceived response-efficacy ( $r=0.59$ ,  $P<0.001$ ), perceived susceptibility ( $r=0.54$ ,  $P<0.001$ ), and perceived severity ( $r=0.48$ ,  $P<0.001$ ).

The result of the stepwise linear regression analysis confirmed this finding. The perceived self-efficacy was associated with an increase, and the perceived susceptibility was associated with a decrease on the intention to receive care. With each unit of increase in the score of perceived self-efficacy, receiving care increased by 0.96 (95% CI=0.76 -1.13,  $P<0.001$ ).

Conversely, with each unit of increase in the score of perceived susceptibility, receiving care decreased by -0.28 (95% CI=-0.27 to -0.13,  $P<0.001$ ). The demographic variables that were associated with a reduction in the

likelihood of behavioral intention included:

Being a housewife (adjusted Beta=-0.17;  $P=0.012$ ; CI=-0.48 to -0.11), the husband’s occupation in the labor market (adjusted Beta=-0.20;  $P=0.005$ ; CI=-0.46-0.03), an increased household size (adjusted Beta=-0.24;  $P<0.001$ ; CI=-0.36 to -0.10), an increased number of daughters (adjusted Beta=-0.29;  $P<0.001$ ; CI=-0.37 to -0.11), unwanted pregnancy (adjusted Beta=-0.38;  $P<0.001$ ; CI=-0.47 to -0.20), and the need to care for minors and elderly at home (adjusted Beta=-0.15;  $P=0.035$ ; CI=0.40 to -0.13). However, we did not observe a significant association for other demographic variables. Overall, according to the stepwise linear regression, the model components explained 56% of the distribution of the factors pertaining to behavioral intention (adjusted  $R^2=0.55$ ).

To answer the second research question, the effect of the EPPM constructs and behavioral intention on the adequacy of prenatal care was assessed using the conditional backward technique in Logistic Regression (alpha-to-remove=0.1). The results showed that with unit of increase in the scores both of perceived susceptibility and perceived severity, the odds of receiving care reduced to 0.04(Odds ratio=0.04;  $P<0.001$ ). In contrast, with each unit of increase in the scores of perceived self-efficacy and perceived response-efficacy, the odds of receiving care increased by more than 25 and 16, respectively. Moreover, with each unit of increase in the scores of behavioral intention and critical point, the odds of receiving care increased by 1.88 and 9.34, respectively (Table 3).

**Table 2:** Comparison of the scores of the Risk Behavior Diagnosis Scale items in the pregnant women receiving adequate and inadequate/no prenatal care

Subscale/items	Adequate utilization	Non-utilization	P value* (95% CI)
	utilization/Inadequate		
	Mean±SD	Mean±SD	
Perceived severity (6)	25.26±3.89	22.46±4.37	<0.001 (1.46-4.14)
Perceived susceptibility (6)	23.24±5.06	19.41±5.48	<0.001 (2.10-5.54)
Perceived Response-efficacy (6)	27.29±3.73	22.26±4.21	<0.001 (3.74-6.31)
Perceived self-efficacy (6)	25.28±4.60	17.59±4.02	<0.001 (6.20-9.18)
Behavioral intention (4)	18.61±1.66	12.59±1.00	<0.001 (5.51-6.53)
Critical point	4.10±3.81	-2.02±2.54	<0.001 (4.93-7.30)

\*Two independent-samples t-tests

**Table 3:** The results of the logistic regression analysis for assessing the predictive power of the model variables for determining the adequacy of prenatal care utilization

Variable	Coefficient	Odds Ratio	P value (95% CI)
Perceived Self-Efficacy	3.22	25.23	0.001(5.02-124.86)
Perceived Response-efficacy	2.81	16.75	0.001 (3.82-72.24)
Perceived Susceptibility	-3.03	0.04	0.001 (0.01-0.21)
Perceived Severity	-3.09	0.04	0.001(0.0005-4.12)
Behavioral Intention	0.63	1.88	0.004 (1.06-3.31)
Critical Point	2.23	9.34	0.028(1.25-68.66)
Husband's occupation in the labor market	-0.84	0.43	0.02( 0.11-0.83)
Need to care for minors /elderly	-1.03	0.35	0.04 ( 0.05-0.70)
Unwanted pregnancy	-1.04	0.35	0.001( 0.06-0.98)

## DISCUSSION

The present study applied, for the first time, the EPPM for prediction of intention to receive prenatal care in pregnant women in rural areas. In line with the classic theory of the model, the present study examined the participants' perceptions of the threat of not receiving prenatal care and predicted their likelihood of developing maternal and neonatal complications. It was found that a large portion of the women accepted the message and, therefore, they were placed in the perceived threat stage. In addition, the predictive value of the EPPM constructs was confirmed by comparing the critical points between the groups of women receiving adequate and inadequate/no care. Therefore, the significant difference between the two groups in terms of the mean critical point (positive, zero and negative) demonstrates the power of this variable in predicting the adequacy of prenatal care utilization.

A number of similar studies have also confirmed the predictive value of this variable in determining the people's behavioral intention and desired behavior.<sup>15,25,26</sup> Nevertheless, not all the women within a positive critical point necessarily received adequate care, as 11.2% of them did not utilize adequate prenatal care services. This finding demonstrates the importance of more careful follow-up with participants who have had a critical point of zero.

According to the EPPM theory, having similar scores for perceived efficacy and perceived threat suggests equal perceptions of

threat and fear; however, at this stage, people are likely to more intensely perceive the fear and regard the available recommended strategies as ineffective rather than adopting strategies to control the threat and pursue self-care measures; therefore, they may shift from the stage of threat control to fear control. This finding is often attributed to the participants' lack of access to effective risk control strategies or their perception of the strategies as ineffective.<sup>17,18</sup> In the present study, this finding may be attributed to how nearly two-thirds of the participants reported their monthly income as insufficient, especially after the 6.1 Richter earthquake occurring in the island of Qeshm in 2008, upon which people had to spend a large portion of their income on house repairs and reconstruction; also, the residents' meager income, which is often earned through manual labor and fishery, suffices only for the bare necessities such as drinking water and food and cannot be spent on healthcare.

The other factors involved in the participants' poor perceptions about the efficacy of these services included the costs and difficulty of access to diagnostic and medical tools and strategies; false assumptions about the ineffectiveness of the preventive, diagnostic or medical measures and strategies offered as part of prenatal care; and mostly the incorrect traditional beliefs favoring self-treatment instead of utilizing midwifery services, especially among illiterate and low-literate women from highly populated and extended families in whose health behaviors



the role of *important others* is especially highlighted. Previous studies have shown that women's own knowledge and literacy is the main predictor of their own and their family's utilization of healthcare services,<sup>27</sup> while inadequate literacy is associated with poorer health behaviors, poorer self-care and less concern about health behaviors.<sup>28</sup>

It has been suggested that one of the reasons for the delayed utilization of prenatal care services was the great distance from home to the health center, which was proposed as an important barrier to receiving care.<sup>29</sup> Similarly, findings of a systematic review suggest that difficult access to a health center or clinic, long waiting period to receive prenatal care and poor family's economic situation were proposed as a fundamental barrier to receiving care services in the view of women.<sup>30</sup>

Answering the first question of the study showed that all the EPPM constructs were independently associated with the intention to receive prenatal care, but the strongest predictor of behavioral intention remained perceived self-efficacy and perceived susceptibility. The results of a meta-analysis of 22 experimental studies on the role of risk assessment theories in people's change of practices revealed the highest mean score obtained in the construct of perceived threat pertains to perceived severity rather than perceived susceptibility and to perceived response-efficacy rather than perceived self-efficacy in the construct of perceived efficacy.<sup>31</sup> This finding shows when perceived efficacy outweighs perceived threat, people are motivated to deal with the threat which also increased their behavioral intention and performance of healthy behaviors. Nevertheless, the likelihood of rational decision-making, behavioral intention and proper health practices increase when participants assess the risks and perceive their severity only if they simultaneously perceive response-efficacy of the health messages, demonstrate appropriate self-efficacy, reduce perceived barriers such as costs, and know how to replace more appropriate and

acceptable options for behavior change.<sup>32</sup>

It is assumed that behaviors change according to a set of assumptions and beliefs that require the passage of time and are often due to the merging of cognitive, psychological and social functions, and the individual's intention to change or modify the intended action is formed to answer whether the proposed methods can satisfy his/her needs and how much the recommended health strategies are able to meet his/her demands. In other words, they may believe that they are able to do a specific health behavior, but they may not do it, because they would like to be assured about consequences of that certain behavior.<sup>19</sup> Our research hypothesis was whether the behavioral intention always leads to the intended action change. In response to this question and as a confirmation of the second question of the study, findings indicated the predictive role of this variable for the intended action, as it had double predictive power in women with adequate prenatal care compared with inadequate care or non-utilizers. The predictive role of behavioral intention for the intended action has been shown in several studies.<sup>33,34</sup>

Each of the model's constructs not only was independently associated with the increased likelihood of the intention to receive prenatal care, but also demonstrated itself as a strong predictor of the adequacy of care utilization. An important finding of this study was the independent role of the individuals' perception of self-efficacy, which showed a strong association with the intention to utilize prenatal care and its adequacy. Self-efficacy or the perceived ability to successfully carry out a task is a major principle that links knowledge to action. As self-efficacy is a vital part of medical plans and aims to obviate negative emotions and strengthen coping behaviors, he believes that the most important prerequisite for behavior change is to have an adequate perception of self-efficacy.<sup>35</sup> This finding acknowledges the importance of people's perceived self-efficacy in the realization of the expected

behaviors and improving self-efficacy through effective interventions which can increase the likelihood of performing the intended healthy behavior.<sup>36,37</sup> Nevertheless, the results of a meta-analysis of 16 clinical trials showed that the behavioral intention increases when perceived self-efficacy overcomes perceived threat; however, this change does not always lead to the adoption of desirable healthy behaviors.<sup>38</sup>

Assessing the differences between the role of demographic and underlying variables in the participants' intention shows that although some barriers such as the woman being a housewife, household size and the increased number of daughters were associated with a reduced intention to utilize prenatal care services, they were unable to maintain their role in determining the adequacy of care. These findings suggest that these factors were unable to affect the mothers' visits for receiving prenatal care and their adequate utilization of the services, and more important factors were, therefore, found to be at play in the utilization of prenatal care services. However, a few barriers were identified in some studies to reduce the likelihood of women's utilization of midwifery care services, including medical conditions during pregnancy,<sup>39</sup> increased number of children,<sup>40</sup> mother's young or old age,<sup>30</sup> the unavailability of a trustworthy person for babysitting, and needing the husband's permission for receiving prenatal care.<sup>41</sup> In contrast, having the encouragement of a family member for receiving care<sup>9</sup> and having an independent source of income and being employed<sup>41</sup> were among the factors that facilitated the early initiation and adequate utilization of prenatal care for pregnant women.

The findings of this study using this model suggest important insights into the process through which high perceived efficacy increases the prenatal care usage and how high perceived threat might compromise its effectiveness. However, our study's samples only consisted of the women with family health records in rural health facilities and

the researchers had no access to all the women in this region, such as those who had never visited these facilities; this limitation makes the interpretation of the results difficult and challenges their generalizability to the entire population of pregnant women in the region, even though attempts were made to include a large part of the target group in the sampling.

## CONCLUSION

This study showed that a variety of psychological, attitudinal and structural factors could contribute to limited prenatal care utilization in the rural regions of Iran. Thus, health care providers like midwives and other staff who are responsible for maternal health care system should be warned about the impeding factors that affect utilizing prenatal care services. Because of the limited number of studies in Iran in this domain, especially in deprived regions, future research like a qualitative study is recommended on the women who are hard to reach and have never visited the health staff and explore the predisposing causes to further increase our current knowledge in this domain.

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