Factors Affecting the Demand for a Third Child among Iranian Women

Arezoo Bagheri (PhD), Mahsa Saadati (PhD)*

Assistant professor, National Population Studies, Comprehensive Management Institute, Tehran, Iran

ARTICLE INFO	ABSTRACT
	Background & aim: Demands for more children have substantial effects on couple's fertility behaviors. The ideal number of children for most Iranian's family is two, so that it is reasonable to study which factors determine women's decision to have a third child. The main aim of this study was to examine factors affecting the demand for a third child (DTC).
	Methods: This cross-sectional study was conducted on 6231 Iranian married women from all provinces during autumn 2014. Participants in the study were selected by multistage stratified sampling method. A structured questionnaire was employed to collect the related data. Finally, the analysis included 2272 DTC questionnaires for women with two children by applying a classification tree model.
	Results: In this study, 50.7% of women with two children had no desire for having the third child, out of whom 71.1% (79) were living in the provinces with total fertility rate (TFR) less than 2 and in urban areas, respectively. Most of them with the educational level of diploma or lower (78.2%) had a negative opinion about having the third child (36.1%). Based on the classification and regression tree algorithm, women who were interested in having their third child in provinces with TFR more than 2 included rural women, urban women with positive opinion toward childbearing, and those with educational level of secondary school. However, women who were keen on having their third child in provinces with TFR less than 2 consisted of urban women aged 30-49 with educational level of high school or lower, those younger than 30 years with positive opinion who married in their 20-29, rural women aged less than 30, and rural women aged 30-49 with positive opinion who married in their 20-39. ***Conclusion:*** Women's place of residence and opinion toward childbearing had important effects on their DTC. However, women's educational level as well as their age and marriage age could affect their DTC in provinces with TFR less than 2 compared to other provinces.

Introduction

Fertility decline has occurred in Iran since the second half of the 1980's, which has changed the perceptions and desires of Iranian families toward childbearing. Accordingly, Iran is now settled among the low-fertility countries (1). In 1986, average fertility rate was six per reproductive woman today. However, average woman has fewer than two children today, which is less than the required replacement level fertility level (2). The fertility transition in Iran shows that although family planning programs have been effective in accelerating the dramatic decline in the fertility rate, fertility behaviors should always be considered in the analysis of fertility trends (3). It is worth mentioning that fertility and childbearing motivations, as the main determinants of the demand for childbearing, play important roles in fertility-related theories (4-11). Childbearing desires (CD) and ideal number of children (INC)

* *Corresponding author:* Mahsa Saadati, Assistant professor, National Population Studies, Comprehensive Management Institute, Tehran, Iran. Tel: +989126332568; Email: mahsa.saadati@psri.ac.ir, mahsa.saadati@gmail.com

are two most important childbearing preference dimensions (6, 10).

The INC has become an interesting issue for many researchers who studied factors influencing the fertility behavior of Iranian families (12-15). The study conducted by Bagheri et al. (2014) indicated that factors, including age, job status, marriage age, and educational level, affect the INC of Iranian women within the age range of 15-49 years (13). Tavousi et al. (2015) investigated the reasons for willingness and unwillingness of childbearing in Tehran (16). Abbasi-Shavazi and khajesalehi (2013) also studied the tendency of childbearing among women living in Sirjan by considering some demographic and social factors (17). Hossaini and Baigi (2014) studied the desire of married women in Hamedan Province to have a second child in terms of some demographic and behavioral factors (18). Hejazi (2014) investigated the factors affecting employed women's desire to have a second child in Isfahan Province (19). A Sociological study conducted by Pilton and Rahmanian (2015) addressed factors influencing the childbearing tendency of married women in the age range of 20-45 years in Jahrom city. The findings showed that gender socialization, parenting problems, social participation, access to food, and religiosity had significant relationships with the desire of childbearing (20).

Several surveys have revealed a gap between childbearing desires and actual births in low-fertility settings; the average number of desired children tends to be higher than the actual number of children in families (21). Since the current low level of fertility is mainly caused by couple's tendency to stop reproduction after their second birth, much of the discrepancy between the desired and actual births can be associated with the absence of third and higher-parity births (21).

To the best knowledge of the researchers, previous studies on third births have overwhelmingly emphasized the relationship between women's educational attainment and labor force participation with the third birth (22, 23), while other determinants have been given less attention. Moreover, there is no study that consider influential factors on the demand for a third child (DTC) though it could be one of the influential factors for total fertility rate (TFR) increscent in Iranians' families. Most of researchers modeled tendency to have more children by logistic regression (19-20, 24). However, using classification trees is more applicable and also their interpretations are easier than logistic regression (22, 23). Therefore, the main objective of this study is to analyze factors affecting DTC by applying a classification tree approach.

Materials and Methods

This cross-sectional survey was conducted on 6231 married women in 31 provinces of Iran, during autumn 2014 using a structured questionnaire (2). The study population consisted of married women referring to health center for vaccinating their children in all provinces of Iran. Women who disagreed to complete the questionnaire were excluded. The questionnaire, named childbearing attitudes and its social, economic and cultural factors, included 38 questions addressing demographic, socio-economic, and childbearing attitudes. The validity of questionnaire was confirmed by 10 demographers and its reliability was 0.82 for each dimensions based on Cronbach's alpha. Samples size was calculated by Cochran formula to gain 95% of confidence level to analyze data. The samples were selected by multi-stage stratified random sampling method.

In the first stage, 31 provinces were chosen. Later in the second stage, 3 cities in each provinces were selected based on their size and distribution of population through probability proportional to size sampling method (2). In order to conduct this study there was no need for ethics approval since there was no intervention or treatment in this survey, and the aim of the study was explained to the respondents before interviewing them.

This study investigated 2272 women with 2 children who had the desire for more children through classification and regression tree (CART) algorithm. The DTC of these women were assessed by a question asking "considering the two children you already have, do you want to have another child?"

The CART algorithm is a non-parametric statistical methodology developed for analyzing

classification issues. If the dependent variable is categorical, CART algorithm produces a classification tree and when the dependent variable is continuous, it produces a regression tree (25). This algorithm is robust against outliers and collinearities, and can model both categorical and continuous variables, including missing data, detect interactions and can be considered as an exploratory analysis (25).

As different studies highlighted the effective role of the developmental level of different provinces in fertility; the underestimation of the differences among provinces in fertility analysis could prevent the achievement of accurate results (26-28). Accordingly, we divided the regions under study into four provincial classes based on their TFR to obtain a more precise analysis of the data. These classes were constructed according to the study conducted by Abbasi-Shavazi and Asgari-Nadushan (2013), which categorized provinces in Iran during the period of 2009-2011 based on their TFR (26). According to the value of TFR, the provinces of Iran were divided to four categories of TFR≤1.6,

1.7≤TFR≤2, 2.1≤TFR≤2.4, and 2.5≤TFR. Data analysis was performed using the SPSS software (version 22). P-value less than 0.05 was considered statistically significant.

Results

According to the results of descriptive statistics, 50.7% of women with two children had no desire for having a third child, 79% of whom were living in the provinces with TFR less than 2 and 71.1% of them were in urban areas. Almost 92% of these women were 20-39 years and 95.2% of them were married in their 10-29 years. Most of them had negative opinion about having a third child (36.1%) and their educational level was diploma or less (78.2%).

Table 1 presents the results of DTC among women with two children analyzed in terms of the studied variables.

According to the results, the investigated variables had significant effects on DTC, except for marriage age (P-value<0.01). As can be seen in Table 1, most of women in the provinces with TFR more than 2 (above 60%) were in rural

Table 1. Results of demand for a third child among women in terms of the studied variables

Variables		Demand for a third child (Response Variable) (%)			Test statistic	P-value
Name	Value	Yes	No	Total		
Province	TFR≤1.6	45.7	54.3	100	47.17*	<0.001
	1.7≤TFR≤2	45.5	54.5	100		
	2.1≤TFR≤2.4	61.6	38.4	100		
	2.5≤TFR	68.8	31.2	100		
Place of Residence	Urban	45.8	54.2	100	26.80*	<0.001
	Rural	57.8	42.2	100		
Age	10-19	57.1	42.9	100	17.12**	<0.001
	20-29	54.0	46.0	100		
	30-39	47.3	52.7	100		
	40-49	39.1	60.9	100		
Opinion	Negative	43.4	56.6	100	24.96*	<0.001
	Neutral	49.0	51.0	100		
	Positive	56.0	44.0	100		
Marriage Age	10-19	49.1	50.9	100	0.071**	0.790
	20-29	49.8	50.2	100		
	30-39	43.6	56.4	100		
	40-49	100.0	0.0	100		
Educational Level	Secondary school and lower	53.5	46.5	100	7.11**	0.008
	High School/Diploma	46.2	53.8	100		
	University	47.1	52.9	100		

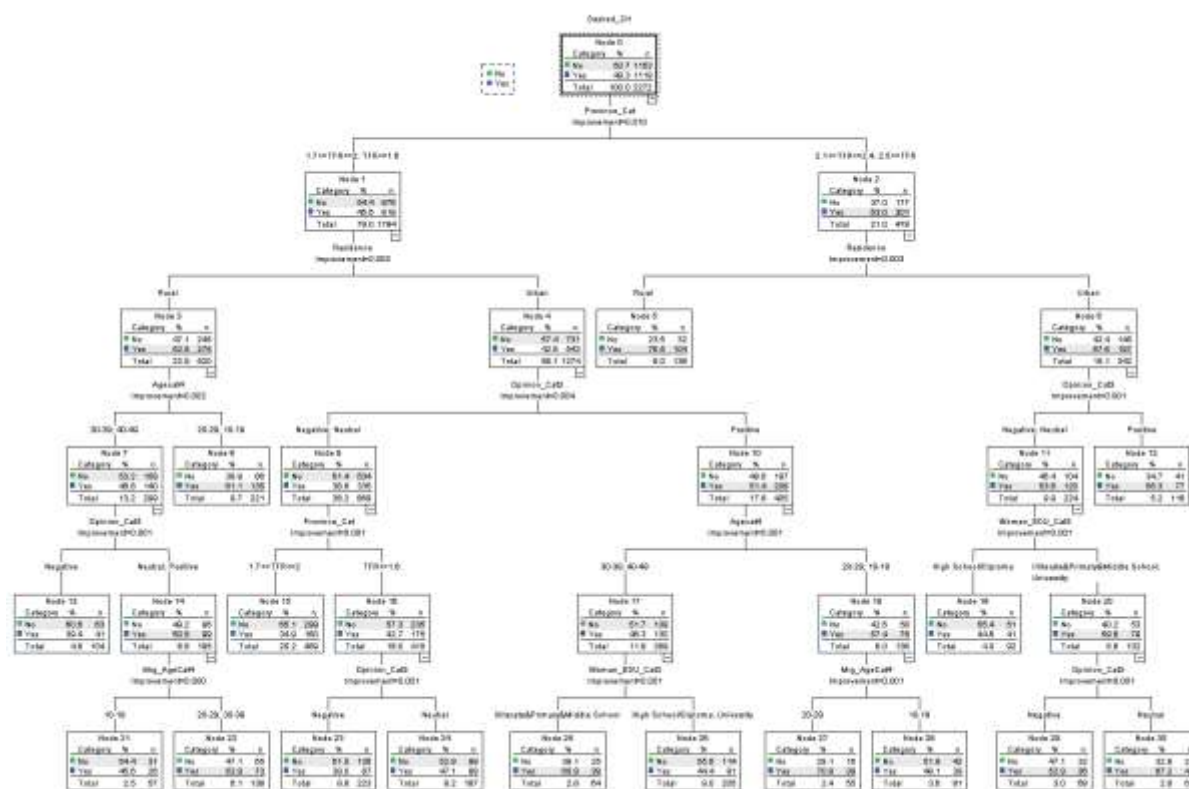*Pearson Chi-Square **Linear-by-Linear Association

Figure 1. Classification tree of demand for a third child

areas (57.8%) with the age range of 10-29 years (above 50%), positive opinion about birth giving (56.0%), and the educational level of secondary school or lower (53.5%) had the desire for a third child. Most of women in the provinces with TFR less than 2 (above 50%) were in urban area (54.2%), with the age range of 30-49 years (above 50%), negative and neutral opinions about birth giving (above 50%), and the educational level of high school or higher (above 50%) had no desire for a third child.

The CART algorithm was employed to classify DTC. Figure 1 presents the most accurate classification tree of DTC based on the investigated variables of province, residence, age, opinion, marriage age, and educational level.

Table 2 presents the misclassification matrix indicating the accuracy of classification model. The grey cells in Table 2 signify the correct classification or accuracy of the classification tree of Figure 1.

Table 2. Misclassification Matrix for Classification

Observed Category		predicted Category		Total
		Yes	No	
Yes	Numbers	546	573	1119
	Total Percentage	24.03	25.22	49.25
No	Numbers	318	835	1153
	Total Percentage	14.00	36.75	50.75
Total		864	1408	2272
Total Percentage		38.03	61.97	100

The accuracy of the classification tree for this model can be calculated by *Equation 1*.

$$Accuracy = \frac{546 + 635}{2272} = 0.61 \qquad (1)$$

Classification accuracy equals to 0.61 means that DTC of 61% of women was classified correctly. In other words, the misclassifications of this model was equal to 39% (23).

To fit CART algorithm to data sets, data were divided into two different groups of training and learning data. in fact, the training data was used for fitting the model and learning data for confirming the validity of the model. the validity of the fitted model is confirmed when the risks of these two data groups are close to each other (29). The risk is a measure of the predictive accuracy of the tree. For categorical dependent variables, the risk estimate is the proportion of cases classified incorrectly after adjustment for prior probabilities and misclassification costs.

Table 3 tabulated the risks and standard errors of classification tree which are calculated based on training and learning data.

As can be seen in Table 3, these values are almost equal indicating the validity of classification models proposed by classification tree in Figure 1. According to Figure 1, the CART algorithm entered all of the investigated variables in the classification tree as nodes. Province has been placed in the root of the classification tree as the most influential variable on classifying DTC. The following 9 rules were extracted from Figure 1.

1. Women in provinces with TFR less than 2, living in rural area aged younger than 30, had demand for a third child.
2. Women in provinces with TFR<2, living in rural area with age range of 30-49 years with negative opinion, had no demand for a third child.

Table 3. Risks and Standard Errors of Classification Trees

Learning set *k*-fold cross-validity of training set	risk	Standard error
	0.392	0.010
	0.428	0.010

3. Women in provinces with TFR<2, living in rural area with age range of 30-49 years with positive or neutral opinions, marriage age of less than 20 years, had no demand for a third child.
4. Women in provinces with TFR<2, living in urban area with negative and neutral opinions, had no demand for a third child.
5. Women in provinces with TFR<2, living in urban area with the age range of 30-49 years, positive opinion, educational level of high school or higher above, had no demand for a third child in contrast with less educated ones.
6. Women in provinces with TFR<2, living in urban area aged younger than 30 with positive opinion and marital age of less than 20 years had no demand for a third child in contrast with married women in age the age range of 20-29.
7. All the rural women in provinces with TFR>2 had demand for a third child.
8. Women in provinces with TFR>2, living in urban area with positive opinion, had demand for a third child.

Women in provinces with TFR>2, living in urban area with high school degree or higher, as well as negative and neutral opinions had no demand for a third child in contrast with women who had a low level of literacy (e.g. illiterate, primary and secondary school educational levels).

Discussion

In this study, 'demand' has been used to measure the individual's desire for having another child. Various terms, such as tendency, desire, or willingness have been used in different studies to examine this variable. Fertility could result in having this demand (17-20). Some studies addressed the unwillingness to have more children (17, 19).

According to the results of this study, educational level had a significant influence on DTC, which was in line with the obtained results of previous studies (18, 20, 25). Nowadays, the increase in the women's educational level and their tendency to benefit this education enhances their willingness to participate in social activities, such as working outside home. Therefore, they prefer to work outside their

home due to economic reasons or social situations. Accordingly, this situation makes having children for most of women a deterrent factor, which can result in lower possibility of giving birth to more children. Factors, such as entering the university, changing individual beliefs through heightening educational level, and shaping modern attitudes, directly increase the marriage age, which indirectly lead to delay in childbearing age and fertility rates (18). Moreover, the marriage age is one of the factors affecting fertility according to the results of this study. Increase in the average age of marriage is always reported as one of the major reasons of low fertility (3).

Due to the increase in the fertility age of women in Iran, it is necessary to develop childbearing culture at the right time for couples. The reason for this is that women and couples are worried about childbearing at old ages. In the current study, women's marriage age also influenced DTC. In a study conducted by Kazemipour in 2014 (2), there was a negative relationships between the age and tendency to have a child, meaning among married women within the age range of 15-49 years. This means that by increasing the marriage age of youth in threshold of marriage, their desired number of children decreased. Saadati et al. (2017) also concluded that by preparing the condition for on-time marriage, the desired number of children could be reachable (22). This result is similar to the obtained results of the study conducted by Abbasi-Shavazi and Asgari-Nadushan (2005) (26). They mentioned that women who married in the higher ages had fewer INC compared to the others.

Likewise, Abbasi-Shavazi and Khajesalehi (2013), Hossaini and Baigi (2014), and Hejazi (2013) reported women's age as an influential factor on DTC (17-19). The increase in women's age decreases their desire of having more children. Saadati et al. (2017) indicated that if the socio-economic condition for younger women changes according to their needs, they will have at least 2 children (22). The unwillingness for older women could be caused due to the decrease in their ability to give birth and bring up their child.

On the basis of this study, opinion under the influence of cultural, economic, and social variables could also affect the decrease in the women's desires. Women who had negative attitude toward childbearing were less likely to have another child in contrast with those with positive opinion, which was in the same vein with the findings of the studies conducted by Hossaini and Beigi, as well as Beigi (18, 28). Negative opinions of women included their fear of being blamed by others for having more children, less happy moments with the presence of a child, high cost of childbearing, which could decrease their willingness to have more children. Moreover, some women considered children as barriers to their occupational and educational status.

The place of residence could also have a significant impact on DTC, which was confirmed by previous studies (14, 25). Women living in rural areas compared to those in urban areas had the desire to bear more children. A study conducted by Saadati and Bagheri (2016 a, b) concluded that dividing provinces according to TFR could result in different results in different divisions (23, 25). The findings of the current study was also indicative of the fact that women in provinces with lower level of TFR were not as interested as those in provinces with TFR>2 to have a third child.

This study aimed to analyze the influencing factors on DTC, an indicator of behavior fertility in all provinces, through CART method. To the best knowledge of researchers, few studies investigated DTC and the effects of different variables on that. It is worth mentioning that can be applied in future studies since the results of the current study were obtained based on a large representative sample and the data were analyzed by the most applicable classification method, named CART. Although this study provided useful findings, nonetheless the limitations must be considered. The data from DTC did not compare men and women, and was focused only on women. In order to provide more generalizable results, the researcher intends to draw from both men and women. The outcomes of the study can pave the way for policymakers to design and adopt fertility planning programs.

Conclusion

Based on the obtained results of this study,

women's place of residence and opinion play a significant role on their DTC. However, in provinces with TFR lower than two, women's educational level, age, and marriage age affected their DTC in comparison with women in other areas.

Fertility decline is not desirable for the population growth of any society. Therefore, it is important to adopt programs, which encourage fertility and increase the fertility rate to the replacement level. In doing so, there is a desperate need to analyze and examine the factors which affect fertility behaviors. Without considering these influential factors, fertility planning programs cannot be as successful as expected.

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Conflicts of interest

The authors declare no conflicts of interest.

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