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Are We Facing a Dramatic Increase in Voluntary and Involuntary Childlessness in Iran That Leads to Lower Fertility?

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Abstract

Objectives: In recent decades, fertility has decreased significantly in Iran. In many countries, childlessness is one of the major causes of low fertility. Thus, the present study focused on whether we are facing a dramatic increase in voluntary and involuntary childlessness in Iran that leads to lower fertility.

Materials and Methods: Using secondary data analysis of 2000 and 2011 Iran Demographic and Health Survey (IDHS) and Individual Level Data from the 1996-2016 Census Sample Files, the study aimed to estimate childlessness and to assess the level of voluntary and involuntary childlessness in Iran. The Kaplan-Meier survival function was also used to estimate the percentage of women who fail to have a first birth after marriage.

Results: According to the census data, the proportion of childless women within the age group of 15-39 increased during 1991-2016. In contrast, the rate of lifetime childlessness remained around 4% by 2011 and then raised slightly by 2016 and reached 5%. The survival function of childlessness showed that only 4 and 6.5% of women in 2000 and 2011 remained childless after 10 years of marriage, respectively.

Conclusions: With regard to the low lifetime childlessness rate, advances in the health system, and ideal fertility above two children, it was concluded that the fertility decline in Iran is associated with a decrease in the number of large families and the long birth interval and no rise in childlessness. Although providing support for infertile couples is important, any exaggerated claim about voluntary and involuntary childlessness leads to the adaption of inappropriate and ineffective policies toward increasing fertility.

Keywords: Voluntary childlessness, Involuntary childlessness, Infertility, Low fertility, Iran

Introduction

Fertility has demonstrated a significant decrease in Iran in recent decades. In 1966, the total fertility rate was 7.7 and sharply reduced to 1.8 in 2011. The provincial levels of fertility indicated that the total fertility rate in 22 out of 31 provinces of Iran was below the replacement level in 2011 (1). According to the results of the 2016 census, the total fertility rate increased to 2.01 children (2). From 2010, Iranian policymakers pursued policies aimed at increasing population growth in response to projected changes in the age structure and the possibility of population decline. In many countries, childlessness is considered as one of the major causes of low fertility (3,4). Given the above-mentioned explanations, the present study sought to answer the question of whether Iran is facing a dramatic decline in voluntary and involuntary childlessness that leads to lower fertility.

Any estimation of childlessness has to consider its difference with infertility. The rate of infertility and childlessness strongly depends on the used definition. Childlessness consists of two categories of voluntary (VC) and involuntary (IC) childlessness. In the past, childlessness was mostly unwanted and caused by health problems, as well as congenital and genetic disorders. However, the contemporary childlessness level is expected to be mostly voluntary (5). VC is mainly related to the postponement of childbearing and it occurs in the context of low fertility. Poston and Trent (6) argued that VC and IC vary according to the level of the development of an area. They further suggested that IC and VC predominate among developing and developed countries, respectively.

Infertility is usually used in medical literature and its definition may differ substantially in medical and demographic studies. In medical/clinical definition, it is the inability to conceive after one year of regular and unprotected sexual intercourse. In addition, primary infertility refers to the infertility of women who have never experienced a pregnancy (7).

From a demographic perspective, infertility is defined as the inability to have a live birth for five or more years

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of regular unprotected intercourse (8). Based on the demographic definition, primary infertility refers to the infertility of women who have never had a live birth. Thus, the lifetime childlessness estimator is an approximation of primary infertility (7).

In addition to the definition of infertility, the reported estimates of infertility vary as well. For instance, Mascarenhas et al (9) highlighted that there are no reliable estimates for the infertility global prevalence. Similar to the rest of the world, there is a difference between the estimates of involuntary childlessness and infertility in Iran, with estimates ranging from 2% to 20% (10). In a cross-sectional survey on infertility among married women aged 20-40 years old, Akhondi et al (11) revealed that the prevalence of life time primary infertility was 20.2, 12.8, and 9.2% based on clinical, epidemiological and demographic definitions, respectively. In each of the three estimations, the focus was on the ability to conceive. In another study, Shokoohi et al (12) estimated the prevalence of infertility at the end of the first year of marriage around 15%.

However, the estimates are much lower in studies focusing on lifetime childlessness at ages 40-44 and current prevalence of infertility. According to Boivin et al (13)., "Current prevalence of infertility are the most relevant estimates on which to base the development of reproductive policies and planning of medical care services for infertility for now and in the future. In this regard, the purpose of this study was to estimate childlessness at national and provincial levels in Iran. Using the 'tree model', the paper also distinguished between voluntary and involuntary childlessness.

Materials and Methods

This study is based on a secondary analysis of the 2000 (14) and 2011 (15) Iran Demographic and Health Survey (IDHS) data sets of women, and individual level data from the 1996-2016 Census sample files, and thus, none of them required ethical approval.

The proportion of childlessness was estimated using data from the individual level data from 1996-2016 Census sample files. Further, the childlessness rates were computed based on 'Zero Parity' among ever-married women as given in the censuses. In this paper, lifetime childlessness included all ever-married women aged 40-44 or 45-49 who have never had a live birth.

In addition, using the 2000 and 2011 IDHS, the survival function derived from Kaplan-Meier estimator was calculated to estimate the percentage of women who fail to have the first birth in their final years of reproductive life.

One of the main limitations of census data is that the VC and IC cannot be calculated accurately. Because the data on contraceptive methods as well as the fertility intentions of women were not collected in the censuses, the identification of VC and IC was not possible. The 2000 and 2011 IDHS collected valuable information that was suitable for more accurate childlessness calculation. Therefore, several indicators such as general, self-reported infertility, voluntary and involuntary, lifetime, and expected childlessness were calculated using the 2000 and 2011 IDHS.

General childlessness shows the percentage of childless ever-married women aged 15-49. These women were childless at the research time, who may have children in the future. Furthermore, VC included childless women who somehow prevented pregnancy and had no intention for giving birth at the research time. Moreover, IC consisted of childless women who did not use contraceptives at the time of the study and were planning to have children.

However, there may be some biases in these estimates. Some women do not want to have any children or use contraception methods to postpone their first births where contraceptive use before the first pregnancy is high. Therefore, they are considered as voluntary childless. However, when these groups of women decide to have children, some of them find that they are unable to have children, and thus, they are considered as involuntary childless (16). In other words, it is possible that using current rather than continuous contraceptive methods leads to a misdiagnosis of involuntary and voluntary childlessness.

Results

Table 1 presents the age-specific childlessness rate (ASCR) using the individual level data from the 1996-2016 Census sample files. ASCR is the percentage of women who have not yet had a live birth by the age group during 1991 and 2016. General childlessness was 10% in 1991 and increased to 17.5% in 2016. A comparison of childlessness rates by age group further demonstrates these changes.

Additionally, 57% of women aged 15-19 had no live births at the census time (1991). This proportion increased to 72.7% in 2016. Similarly, the childlessness rate in age group 25-29 increased from 6.7% to 25.3% during the same period. It should be noted that increasing the proportion of childless women in age group 15-39 is a significant

Table 1. Age-specific Childlessness Rate Among Ever-Married Women Aged 15-49 in Iran During 1996-2016

Age Group	1996	2000	2006	2011	2016
15-19	57.3	65.7	72.6	75.5	73.0
20-24	26.1	29.7	42.4	45.8	44.5
25-29	6.7	10.2	19.8	24.7	26.2
30-34	2.9	4.2	8.7	10.6	13.7
35-39	2.5	2.5	5.4	5.2	7.3
40-44	3.6	2.0	4.3	3.7	5.1
45-49	3.8	2.0	3.8	3.2	4.5
Total	10.1	13.2	18.8	18.5	17.5

Source: Statistical Centre of Iran, Individual Level Data from 1996-2016 Census Sample Files.

issue considering that childbearing is very important in the social and cultural context of Iran, and very low percentage of women are expected to be childless. Many of these people may experience infertility when they plan for having a child. In other words, voluntary childlessness or delayed childbearing can lead to involuntary childlessness.

In addition, the childlessness rate in age group 40-44 increased from 3.6% in 1996 to 5.1% in 2016. Therefore, the proportion of childlessness in the first five age groups of women (15-39) has increased during 1991-2016. In contrast, the lifetime childlessness (40-44) remained around 4% by 2011 and rose slightly by 2016. These results suggest that lifetime childlessness is associated with the prevailing base level of primary infertility in any population. According to Bongaarts and Potter (17), primary infertility affects two to three percent of women in the reproductive age in societies that have no control over fertility. Therefore, the level of lifetime childlessness in Iran is close to the normal level of infertility.

Figure 1 shows the provincial level percentage of lifetime childlessness derived from the 2011 and 2016 censuses. At the provincial level, the prevalence of lifetime childlessness ranged from 2.1% in Yazd to 5.8% in Boshehr and 5% in Sistan and Balochestan in 2011.

It seems that these women are unable to have children because of infertility. Given the level of fertility and the socio-cultural context of Iran at that time, one may consider lifetime childlessness as involuntary or primary infertility.

Further, the trends changed in 2016 and the level of childlessness increased slightly in many provinces. In Semnan province, it increased from 3.5% to 6.8% with a high level of development and below-replacement level fertility. On the other hand, after Semnan, Sistan and Balochestan, Boshehr, and Hormozgan provinces, all with a low development level, are in the next rank of lifetime childlessness.

Childlessness in developed provinces with low fertility levels may be voluntary while in less developed provinces, it may be involuntary and affected by health problems, as well as congenital and genetic disorders.

As Rowland argued, childlessness among married women is a misleading indicator of the overall proportions of childless women in provinces with high proportions of never-married cases (18). The sample under investigation in this study was among married women and the results were different if all women of the childbearing age were selected based on the aim of the study.

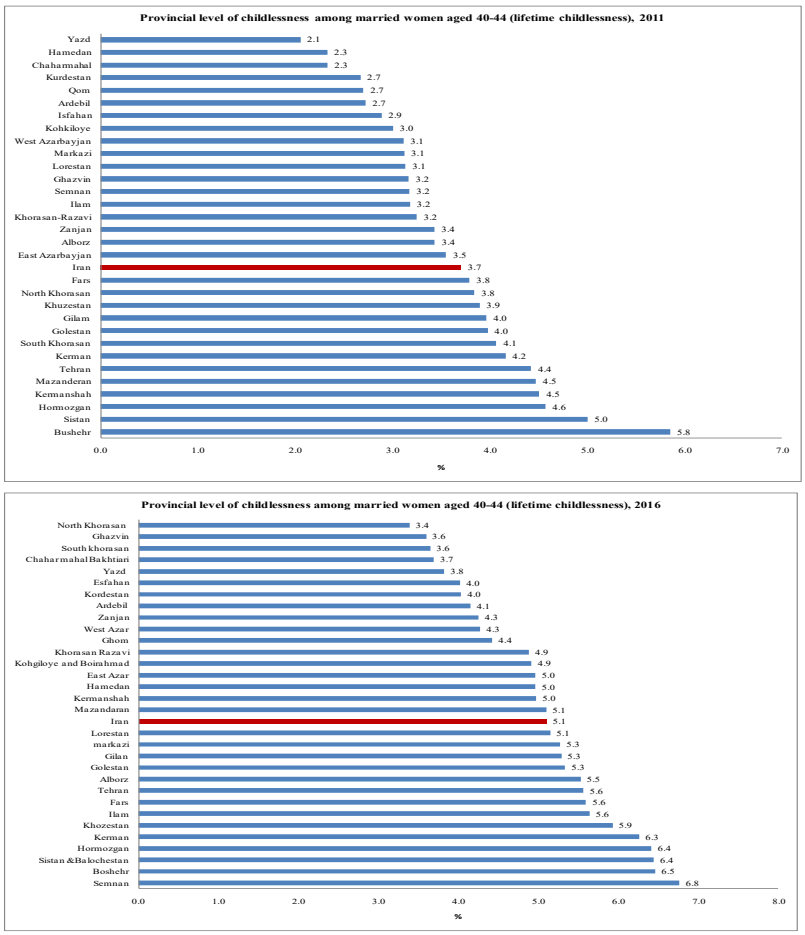

Figure 1. Provincial Level of Lifetime Childlessness Among Married Women Aged 40-44 in Iran During 2011 and 2016. Source. Statistical Centre of Iran, Individual Level Data 2011 and 2016 Census Sample File.

Survival of the Childlessness

The Kaplan-Meier estimator was used to estimate the survival function of childlessness, and in other words, the percentage of women who fail to have a first birth.

The survival curve from the 2000 IDHS revealed that more than 90% of married women had a live birth after five years of marriage. The median survival time was 2.7 year and only 0.04% of females failed to give birth after 10 years of marriage time. As previously mentioned, these women were probably unable to have children because of infertility. This percentage can also indicate lifetime childlessness (Figure 2).

The survival curve derived from the 2011 IDHS showed that more than 80% of women had a live birth after five years of marriage. On the other hand, the median survival time was 3.5 year and only 0.06% of females in the sample were unable to have the first birth after ten years of marriage. McDonald et al also analyzed the birth interval in Iran. In their study, the synthetic parity progression ratios for a lifetime of ten years demonstrated that around 16.7% of women in the reproductive age had no live birth. Of these statistics, 10.2% were never married and 6.5% had no live birth after ten years of marriage (19).

Voluntary and Involuntary Childlessness

Figures 3 and 4 demonstrate the segmentation of women according to multiple childlessness indicators in 2000 and 2011. This segmentation shows various pathways for identifying VC and IC.

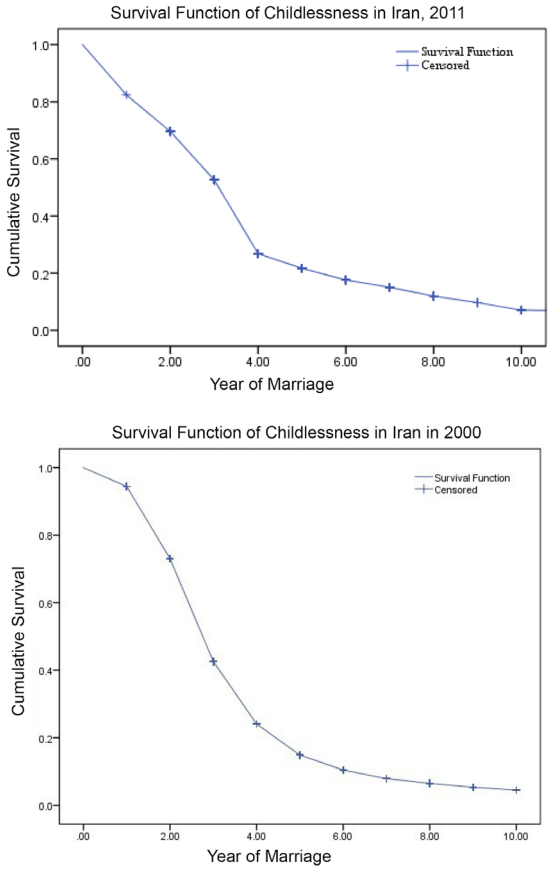

Figure 2. Survival Function of Childlessness Among Married Women Aged 15-49 in Iran. Source. Iran Demographic and Health Survey Between 2000 and 2011.

In the 2000 IDHS, about 87% of women had live birth while nearly 13% of them had no live birth. According to women's responses to the question about the reasons for not using contraceptives, 2.2% were pregnant at the research time. IC was estimated to be 4.5% including 2% self-reported infertility, hysterectomy, and illness, along with 2.5% who were not using any contraceptive method while intending to have children. Based on the results, 6% of women were voluntary childless. More precisely, around 2.2% of them were using contraceptive methods while the remaining 3.8% used no such methods. The main reasons for nonuse were the lack of intercourse with the husband, the separation of the husband, a fear of the side effects, and the opposition of the husband or family members on the contraceptive method.

In addition, "expected childlessness" can be estimated using DHS data. It is the sum of involuntary childlessness and intended childlessness, or what Tanturri and Mencarini introduced as 'permanent postponement' (20). In 2000, most women intended to have children in the future but only 0.1% of them did not want any children, thus, the expected childlessness was very low (4.6%).

As shown in Figure 4, 83% of women had a live birth during reproductive life while 17% had no live birth in 2011. Voluntary and involuntary childlessness also changed to 10.1% and 3.6%, respectively. Among women who were considered involuntary childless, 1.4% reported infertility, hysterectomy, and illness and 2.2% of them wanted children and did not use contraception. However, the results showed that the majority of Iranian women experienced childbearing and only 0.3% of them do not have the intention to have children in the future. Thus, the expected childlessness that was estimated using IDHS 2011 was 3.9%.

It should be noted that the exposure time (the duration of the marriage and contraceptive use) was not controlled in these estimates. If one considers a period of five years or even one or two year(s), the estimates will certainly be lower than current estimates.

Discussion

Our results clearly showed that the proportion of childlessness in the first 5-year age-groups has increased during the last decades in Iran. In contrast, variations in the proportion of women aged 40-49 who had no live birth were few. In addition, the proportion of lifetime childlessness remained around 4% by 2011 and rose slightly by 2016.

The percentage of childlessness is high in most European countries with a low total fertility rate. High lifetime childlessness (around 20%) in Europe has become increasingly linked to the postponement of the first birth. Therefore, it can be concluded that there is a

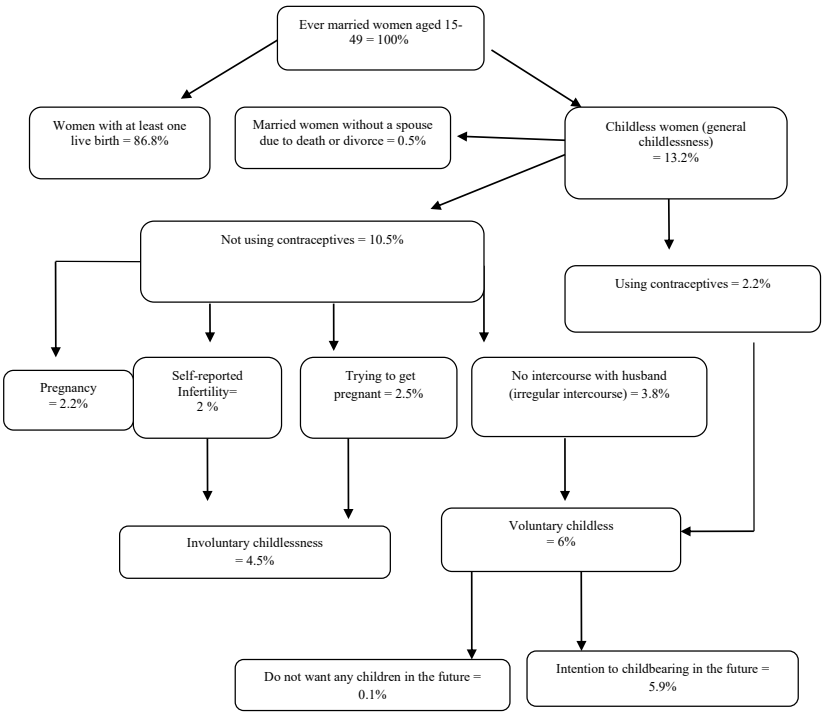

Figure 3. Percentage Distribution of Childless Women Aged 15-49 by Different Indicators of Childlessness (the 2000 IDHS).

negative relationship between high levels of voluntary childlessness and completed cohort fertility (4). However, in spite of a gradual and slow increase in childless rates in recent decades, the proportion of lifetime childlessness is very low in Iran compared to many European countries. Thus, low fertility cannot be easily linked to lifetime childlessness.

Accordingly, further consideration should be given in interpreting this relationship at the provincial level. According to the 2016 census, the level of lifetime childlessness slightly increased in many provinces. For example, in Semnan province, it increased from 3.5% to 6.8% with a high level of development and below-replacement level fertility. Our results from recent patterns of childlessness in Semnan province confirmed a negative relationship between prevalence of voluntary childlessness and the current level of fertility, while Sistan and Balochestan, Boshehr, and Hormozgan provinces, all with low development level and above replacement-level fertility had higher lifetime childlessness.

Based on the provincial level of childlessness, it seems that both developed and less developed provinces are experiencing a growing level of childlessness. However, in developed provinces, childlessness may be voluntary while less developed provinces may experience involuntary childlessness or infertility. Thus, the findings of this study support Poston and Trent's argument (6) which indicated that a U-shaped pattern of the proportion of childless occurs based on the level of development and a decrease is observed in involuntary childlessness in less developed countries and an increase in voluntary childlessness in developed countries over time.

In addition, Kaplan-Meier estimator showed that only 4% and 6.5% of women remained childless within ten years of marriage in 2000 and 2011, respectively. Hosseini-Chavoshi et al (21) reported that the age-specific rate of first birth age has changed to older ages in the last decades, but its level represents no decrease. They further concluded that childlessness may not increase in the future given the constant trend of parity progression from marriage to the first birth.

In addition, VC and IC were identified using data on contraceptive methods and fertility intention. The results demonstrated that among married women aged 15-49, voluntary childlessness increased from 5.6% in 2000 to 10.1% in 2011, but involuntary childlessness reduced from 4.5% in 2000 to around 3.6% in 2011. However, the use of current rather than continuous contraceptive methods may lead to a misdiagnosis of involuntary and voluntary childlessness. Therefore, more detailed questions about the length of using contraceptive methods are necessary.

In line with Poston and Trent, in the present study, it was argued that an increase in VC can be attributed to a delay in childbearing caused by structural and ideational factors. Our previous analysis regarding delayed childbearing and first birth timing revealed that many young couples tend to have a short delay for their first birth until they have established themselves professionally or become socially and economically ready for independent living (22-25). On the other hand, the recent decline in involuntary childlessness may have been due to reductions in disease and malnutrition.

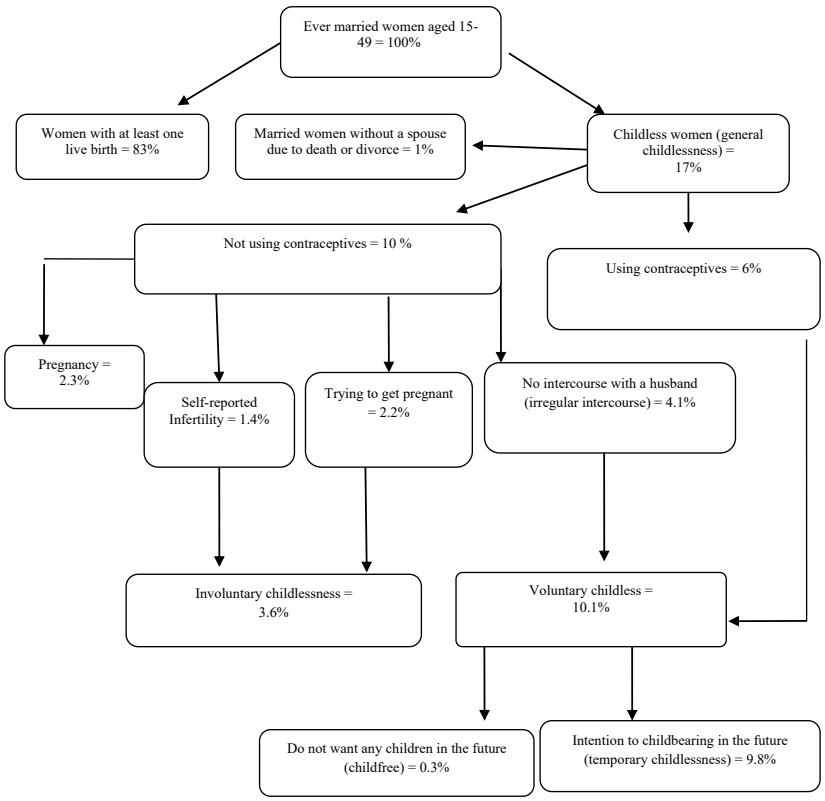

Figure 4. Percentage Distribution of Childless Women Aged 15-49 by Different Indicators of Childlessness (the 2011 DHS).

In sum, there are significant differences in the estimates of involuntary and lifetime childlessness in this study with primary infertility estimates based on clinical, epidemiological and demographic definitions in other studies. It can be assumed that these differences are due to the use of a particular sampling method, focus on lifetime infertility (experience of infertility at any time of the couple's joint life) not current infertility, and considering pregnancy as an endpoint and definition of primary infertility.

Indeed, many families in Iran wish to have more than two children (25). The results of a meta-analysis study showed that only 0.8% of Iranian women consider childlessness as an ideal fertility dimension (26). In Iranian society, strong norms persist against childlessness. For many women, childbearing is one of the goals and stages of life, and thus, they want a child because of emotional needs, as well as religious and cultural values (27,28).

With regard to the low prevalence of childlessness and ideal fertility toward above two children in Iran, it is concluded that a fertility decline in Iran is associated with a decrease in the number of large families and the long birth interval but not due to a rise in involuntary childlessness and infertility.

Some evidence in sub-Saharan Africa demonstrated that high infertility had a high effect on overall fertility, and a reduction in infertility to "normal" levels increased fertility in that region by 15% (15). In Cameroon, a country with an unusually high level of infertility, Larsen and Menken estimated that the current total fertility rate of 5.5% of children would rise to 7.3% in the absence of sterility (29). However, Inhorn and Patrizio found that an important demographic reality is that despite the difference in the global estimates of infertility, it does not appear to have increased in the last two decades. Even in African countries, there is evidence of a decrease in infertility because of reductions in unsafe abortions and sexually transmitted infections (30).

Additionally, Bongaarts highlighted that the role of sterility variations has become small enough to be ignored since the 1990s. This is based on the lack of variation in the proportion of childlessness reported by women aged 40-49 in recent DHS surveys. Nearly 3% of women in a union are childless at the end of the childbearing years in the absence of pathological sterility. In 67 countries with DHS surveys performed since 2000, the average proportion of childless was 2.2%, demonstrating no significant variation in pathological sterility in recent surveys. Bongaarts even concluded that there is no need for providing a *sterility* index regarding explaining the change in fertility in contemporary populations (31).

Conclusions

Today low fertility is considered as an important challenge in Iran. To prevent a further decline in fertility and increase it to the replacement level, seeking practical and

evidence-based policies seems an appropriate alternative for the fertility policy of Iran. Any exaggerated claim about the childlessness rate leads to the adaption of inappropriate and ineffective policies toward increasing fertility. The focus of medical/clinical definition is on the ability to conceive but not on live birth. The "total fertility rate" is the average number of live births per woman during the fertility period. Thus, in the use of infertility in demographic discussions, its definition in the demographic perspective should be the criterion. Infertility is an issue and a distressing condition for many men and women in Iran (32-36), and thus, it is important to provide support for the infertile couples. In line with the findings of Tellier and Obel, both the medical/clinical and demographic concerns are important (37), but should not confuse them with each other in reviewing the trends and policies (37).

Accordingly, an accurate provincial and national estimate of infertility based on clinical, epidemiological and demographic definitions in Iran is needed to demonstrate the situation and provide guidelines and action plans.

It is believed that an increase in childlessness in the first five-year age-groups in Iran is contemporary and may be due to tempo effects that are related to a delay in childbearing. In addition, age-related changes in fecundity can have a significant impact on the likelihood of involuntary childlessness, especially in relation to delays in marriage and childbearing (37,38). Therefore, it is suggested that health policymakers and planners provide sufficient information about the appropriate age of fertility and reproductive outcomes in older ages.

Conflict of Interests

None to be declared.

Ethical Issues

Not applicable.

Acknowledgments

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