

Below replacement-level fertility in Iran: Progress and Prospects

**Mohammad Jalal Abbasi-Shavazi
Department of Demography,
Faculty of Social Sciences
University of Tehran
Tehran
IRAN**

Paper prepared for the IUSSP Seminar on: International Perspectives on low fertility: Trends, theories and policies, Tokyo, March 21-23, 2001.

The author is Assistant Professor at the Department of Demography, Faculty of Social Sciences, The University of Tehran, Tehran, Iran; & Associate, Research School of Social Sciences, Australian National University, Canberra, Australia. This paper is based on the finding of a project on '*Demographic Similarity within socio-economic diversity: Fertility Transition in Iran*' awarded by the Wellcome Trust to Peter McDonald and the author. Correspondence to mabbasi@chamran.ut.ac.ir

Below replacement-level fertility in Iran: Progress and Prospects¹

Dr Mohammad Jalal Abbasi-Shavazi

Abstract

In 1996, four provinces of Iran experienced below replacement level fertility. Since the early 1980s, these provinces have recorded lower fertility than the national level. How and under what condition has fertility declined to such a low level in these provinces? It may be of considerable interest to examine whether these provinces can be regarded as the leaders of the fertility transition in Iran. What are the likely the effects of below-replacement fertility on population growth in Iran in the short term? Will Iran, as a whole, experience below replacement fertility in the near future? What would be the reaction of the government if below-replacement level fertility is reached in the near future?

This paper will first, assess and analyse the fertility trends in the provinces of Isfahan, Gilan, Semnan and Tehran as compared with the national level during the period 1972-1996. Using available data, an attempt will also be made to estimate recent fertility levels for these provinces. Second, demographic and socio-economic characteristics, as well as contraceptive use, in these provinces will be reviewed; female singulate mean age at marriage and age-specific proportions married for 1976, 1986 and 1996 will then be examined. Third, the prospects of low fertility in Iran as well as the likely reaction of the government on low fertility will be discussed thereafter.

Introduction

The onset of modest fertility decline in Iran appeared, mainly in urban areas, in the early 1970. Fertility increased during 1976 to 1987, before the renewal of the family planning programme since 1988. These changes coincide rather neatly with three political periods: the later stages of the Shah's regime; the Islamic Revolution and the war against Iraq; and a subsequent period of renewed modernization and pragmatism. There have also been shifts in population policy that took place over the same periods: antinatalism and a government sponsored family planning programme in the later stages of the Shah's regime; denunciation of family planning and encouragement of early marriage in the post-Revolutionary period; and a pragmatic return to antinatalism in the post-1988 period (Abbasi-Shavazi et al. 2000).

Fertility has declined dramatically since the adoption of a new population policy in 1988. This sharp decline has occurred in most provinces and in both rural and urban areas. Total fertility rate has sharply declined from around 6.3 in

¹ I am grateful to Peter McDonald for his encouragement and generous support. Valuable comments received from Amir Mehryar, Mohammad Mirzaie and Chris Wilson on an earlier draft of this paper is gratefully acknowledged. Thanks also to Neamat Nassiri, Director General of the Socio-economic Household Statistics, the Statistical Center of Iran, and Bahram Delavar Director General of the Department of Family Health, Ministry of Health for providing the data necessary for this paper, and to Farzaneh Tajdini and Meimenat Hosseini for their assistance.

1986 to 2.6 in 1996 (Abbasi-Shavazi 2000a,b). This spectacular fertility decline was greeted with incredulity by many overseas observers as well as some demographers inside Iran (see Abbasi-Shavazi et al. 2000). This was mainly based on international stereotypes by which Iran was being portrayed as a traditional society resistant to many aspects of social change. Some also believed that the impact of the renewed family planning programme might not have appeared in such a short time period (Zanjani 1993; Mehryar et al. 2000). Nevertheless, studies have shown that the fertility transition has been underway since the mid-1980s (Ladier-Fouladi 1996, Aghajanian 1995; Aghajanian and Mehryar 1999). The low level of fertility in Iran has been confirmed by the results of the Population Growth Estimation Survey (PGES) conducted by the Statistical Centre of Iran during 1998 (Statistical Centre of Iran 1999), as well as the Iran Demographic and Health Survey (DHS) carried out by the Ministry of Health in 2000 (Ministry of Health and Medical Education 2000).

Some studies have recently addressed the fertility transition and noted the effect of population momentum and the second baby boom, which is expected to be observed in the coming decade (Saraie 1999; Leili-Nahari 1998). However, no research has been undertaken to study the prospects of very low fertility in Iran. This paper is aimed at investigating the possibility of reaching below-replacement fertility in Iran. If below-replacement fertility can be attained with only moderate socio-economic development within an Islamic context, the study of Iran's experience may have some valuable lessons for future demographic changes in Islamic and other Asian countries with similar cultural backgrounds.

Data

The 1986 and 1996 Censuses are the main sources of data used in this study. Fertility levels and trends presented in this paper are based on the application of the own-children method to the 1986 and 1996 census files. The Statistical Centre of Iran (1999) conducted the Population Growth Estimation Survey during 1998-99 (*ARJ 1377-78*). The survey was carried out in two phases. The first phase took place during October 1998 and covered a sample of 566,571 people. The PGES divided the provinces of Iran into five regions with relatively similar measures of fertility and mortality. The first region includes those provinces with very low fertility and mortality while the fifth region consists of those provinces with very high level of fertility and mortality (and low level of socio-economic characteristics).

The first Iranian Demographic and Health Survey was a national survey based on a representative sample of households throughout the country (Ministry of Health and Medical Education 2000). The sample included completed interviews for 1,14,000 households in 28 provinces and the city of Tehran, and, within these households, around 93000 ever-married women were interviewed. The survey covered around 4000 households in each province (2000 households in rural and 2000 households in urban areas). The Ministry of Health and Medical Education conducted the IDHS in collaboration with the Statistical Centre of Iran during November and October 2000.

Other data sources are also used in this paper to analyse the demographic and socio-economic characteristics of the provinces under scrutiny. Such data include published figures from the KAP surveys conducted by the Ministry of Health and Medical Education since 1987 as well as other case studies on the selected provinces.

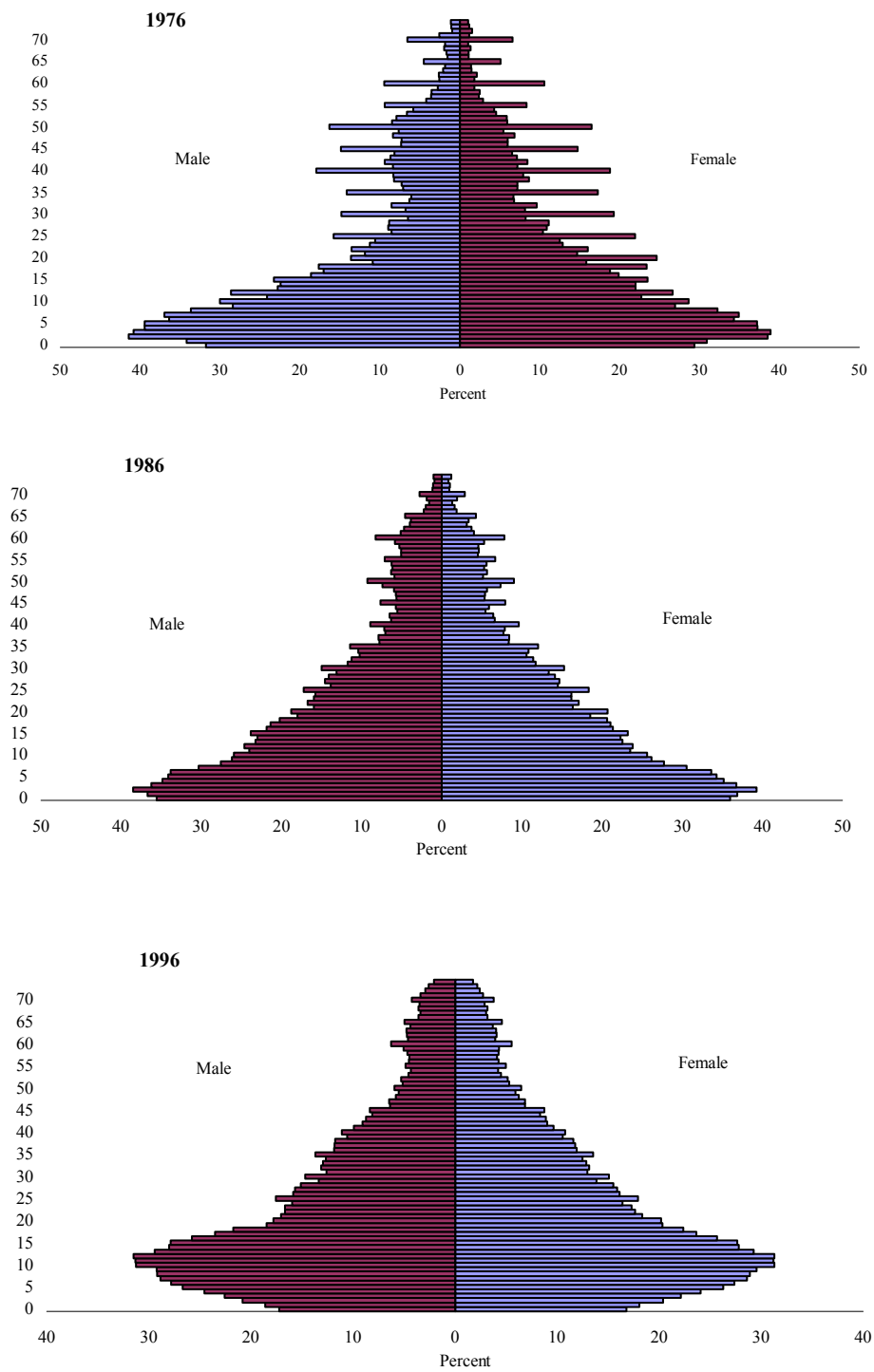
Quality of the data

The own-children method is very sensitive to age reporting and its results may be biased if there are age misreporting in the data. Thus, it is important to assess the quality of age distribution before analyzing the results of the own-children method. Figure 1 shows the age pyramid for Iran in the 1976, 1986 and 1996 censuses. As shown in the figure, there were some signs of age heaping and digit preferences at the 1976 and 1986 censuses, but less so in the 1996 census. In general, age reporting has improved from the 1976 to the 1996 census. Because this study uses the 1986 and 1996 census, the following will only explain the age reporting on the two latter censuses.

In 1986, the proportion of infants (children below one year of age, i.e. age 0) was lower than that of children age 1, 2, or 3. This may occur because of the tendency for under-reporting of children below age 2. One of the indicators for estimating the accuracy of the number of children below age 2 is to compare the survivors of these children who were aged 10 and 11 at the 1996 census. If the number of children below 2 were under-reported in the 1986 census, one would expect that the number of children aged 10 and 11 at the 1996 census to be higher than the numbers of children below 2 in the 1986 census. The survival ratio for children 10 years old at the 1996 census, who were presumably age 0 at the 1986 census, was around 0.93. This suggests that the reporting of children aged two or under in the 1986 census was not underreported.

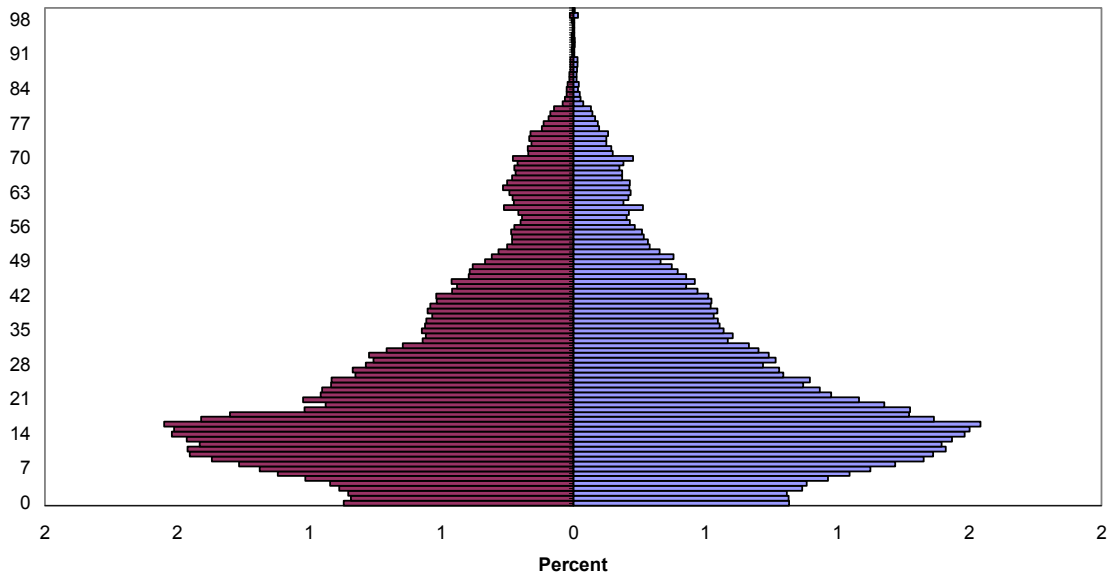
The lower number of children aged two or under may also be due to the fact that fertility began to decline two years before the 1986 census. In the 1996 census, the number of children aged 10 and 11 are lower than those aged 12. This may suggest that the lower number of children aged under 2 had not been the result of under-enumeration, and may have instead been due to the fact that fertility decline began two years before the census. The preliminary result of the IDHS also shows that the proportion of children aged 16 is higher than those aged 15 and 14 (Figure 2). The decline of fertility before 1986 is consistent with the availability of family planning services since 1984. Mehryar et al. (1998) noted that despite the suspension of the official family planning programme, family planning services and supplies were available through public or private health sector. It is interesting to note that the number of family planning clients served began to increase in 1984 and 1985. The other finding of the age distribution in the IDHS is that the proportion of children aged 0 is higher than the proportions of children aged 1 and 2. Given the accuracy of age reporting at the IDHS, this may not be due to over reporting of children, but it rather may be because of the “baby boom” which has already begun.

Figure 1, Population pyramid for the Islamic Republic of Iran, 1976, 1986 and 1996



Source: Statistical Centre of Iran, the 1976, 1986 and 1996 censuses.

Figure 2. Population age distribution of Iran, DHS, 2000



Source: Ministry of Health and Medical Education, 2000.

As indicated earlier, the Ministry of Health and Medical Education conducted the IDHS, in collaboration with the Statistical Centre of Iran. The interviewers were selected among Health Officers (*behvarz*) who have been working in Health Houses (*khanah-e Behdasht*) for several years, and thus, were familiar with the field, and had an accurate knowledge and information about the households and respondents. They were trained by the experts from both the Ministry of Health and the Statistical centre of Iran at different workshops held in each province. Field supervisors from the two organizations were present in the field at the time of data collections to supervise the interviewers teams and to check the accuracy of the data. The author visited two provinces of Kerman and West Azarbayjan at the time of data collection. The quality of data collection was very high and impressive.

The age distribution of females by province resembles the age distribution of males and females on the general features discussed earlier. As can be seen from the figure, there were lower tendencies for age heaping at the 1996 census than in the 1986 for all provinces. The proportion of children aged 0 at the 1986 census was lower than those for children aged one and two in 1986 in all provinces, except Tehran. As mentioned earlier, the proportion of children aged 10 at the 1996 census was lower than those for ages 11 and 12. This also confirms that fertility actually started to decline in 1984 in these provinces. In general, Figures 1 and 2 indicate that age reporting in the 1996 census was considerably more accurate than the 1986 census, at both childhood and adult ages. The improvement in age reporting can be attributed to the rise of the level of education of respondents as well as to the fact that the interviewers registered the age according to respondents' identity cards. This has contributed greatly to the accuracy of age reporting in the 1996 census.

Table 1. Myers' index calculated for Iran and selected provinces, the 1986 and 1996 censuses and DHS 2000

Provinces	Census		DHS
	1986	1996	2000
Iran	6.96	2.73	1.90
Urban	4.57	2.30	
Rural	10.22	3.87	
Isfahan	4.43	1.85	
Gilan	3.97	1.84	
Semnan	7.04	2.30	
Tehran	3.90	2.31	

Note: Figures for Iran and urban and rural areas are for both sexes. Figures for provinces are based on the number of females only.

Source: The 1986 and 1996 censuses, and IDHS 2000

Table 1 shows the result of Myers' index calculated for the 1986 and 1996 censuses for Iran and selected provinces. The index calculated from the IDHS for Iran has also been provided. As can be seen, age reporting has improved over the last two decades. The Myers' index for the age range 10 to 69 declined from 6.96 in 1986 to 2.73 in 1996, and to 1.90 in 2000. There was a slight tendency to report digits ending with 0 and 5 at the 1986 census. However, this tendency was very low at the 1996 census.

The trend of sex ratio is another indicator of data quality. The sex ratio at birth is expected to be around 1.05 provided that the number of girls are not under-reported or omitted. If there is a tendency for son preference in the society, the sex ratio at birth is expected to be higher than 1.05. The sex ratio at birth (for the age 0) at the 1986 and 1996 censuses was 1.03 and 1.06, respectively. The ratio for urban areas at the two censuses was 1.02 and 1.05 while those for rural areas were 1.05 and 1.06, respectively. This finding suggests that few births were omitted at the two censuses. The improvements in the census coverage and age reporting of the censuses have been documented by other studies (Leete et al. 1997; Mirzaie et al. 1996). Mirzaie et al. (1996) examined age reporting in the 1986 census and 1990 National Sample Survey and concluded that age reporting in the 1986 census was much better than in the 1976 and 1966 censuses. Keshtkar (2000) calculated the Wipple's and Meyer's indices for the 1996 census, and concluded that age heaping in the two sets of data was very low. Mirzaie et al. (1996) and Abbasi-Shavazi (forthcoming) found signs of age misreporting in the census of such remote provinces as Sistan-Baluchistan, Kohgiluyeh Boor Ahmad and Char Mahal Bakhtiari. But because this study focuses only on provinces with high level of socio-economic characteristics and particularly with the high level of education, the possibility of age misreporting in these provinces is low, and thus, the effects of age-misreporting on the own-children fertility estimates is negligible.

This paper does not claim that the age reporting in the 1986 and 1996 censuses is free from errors. But even with generous allowances for error, the application

of the own-children method to the censuses seems to be well justified. Nonetheless, own-children estimates of fertility based on the 1996 census may be more reliable than those from the 1986 census.

Methodology

The own-children method is used to estimate fertility trends and levels for Iran and the selected provinces. The own-children method is one of the indirect techniques which uses the reverse-survival procedure to estimate fertility measures for the years previous to a census or household survey. Based on the information on a household record, the number of children under 15 are first identified and matched to women aged 15-64, assuming that these children are the births of the enumerated mothers. The matched children and mothers are then reverse survived to the 15 years preceding the census or survey, to obtain the number of births and mothers for the years prior to the census. Age-specific fertility rates and total fertility rates are calculated by dividing the number of reverse-survived births by the number of reverse-survived women. The own-children fertility estimates are usually calculated for 15 years back to the census. The reason for limiting the procedure to children under 15 is that younger children (under 15) are more likely to stay with their natural mothers than older children. Age-specific fertility rates are initially calculated for single years of age and time. Estimates for grouped ages or calendar years are then obtained by dividing the aggregated numerators (births) by the aggregated denominators (women). Such aggregation is useful in minimizing the distorting effects of age misreporting on the fertility estimates (Cho et al. 1986; Retherford and Thapa 1999).

The own-children method was applied to the 1986 and 1996 censuses to estimate fertility. Abbasi-Shavazi (2000a) has given several reasons to justify the use of the own-children method in Iran. The reasons include the incompleteness of vital registration data and the improvement of the census data, particularly age reporting. Moreover, more than 95 per cent of children under 15 live with their natural mothers. Given the sharp fertility decline in Iran in recent years, unlike other indirect methods of fertility estimation, the own-children method allows estimation of current fertility for years previous to a census and therefore, the fluctuation in fertility could be studied.

The own-children estimates may suffer from some problems including age misreporting, under-reporting, migration, and mortality factors. Despite the modest age misreporting by single years, given that this study will estimate age-specific fertility rates in five-year age groups, the effects of age reporting on the result will be minimal. Life tables are required for reverse-survival of children and mothers. Since appropriate life tables were not available for Iran and the selected provinces, this study used the West Model Life Tables according to the life expectancy for each province at the time of the census. To examine the effect of mortality level on the results, three different life expectancies for the years 1986, 1991 and 1996 were used with around 9 years difference. The result showed that using life expectancy of 59.0 for 1986 and 68.3 for 1996,

produced the TFR with only less than 2 per cent difference (Abbasi Shavazi Forthcoming). Furthermore, considering the effects of age reporting, mortality, migration and matching of children to their mothers on the own-children fertility estimates, Abbasi-Shavazi concluded that the method produced satisfactorily reliable results.

Fertility trends and levels

a) Fertility trends and levels at the national level

Abbasi-Shavazi (2000a) analysed the single-year fluctuation of fertility trends over the period 1972-96. He found that fertility transition in Iran has passed through different periods. From 1972-1979, the fertility rate rose from 5.8 to 6.5. There was little evidence in the period of any impact on fertility of the family planning programme implemented by the Shah's regime. Following the Revolution, TFR was very high and constant during the period from 1980 to 1984. In this period, government policies of the Islamic Republic of Iran emphasised early marriage for young adults. The revolutionary slogans were also supportive of the poor, and people had a rather positive attitude towards the new government subsidies on family expenditure. Consequently, Iranian couples had every reason to marry early and have more children while married.

In the period from 1985 to 1989, the high fertility regime created by the Revolution flattered and fertility started to decline. TFR declined its peak in 1984 to 6.2 in 1986 and further to around 5.3 in 1989. The decline was, however, slow until 1989 before it accelerated during the 1990s. Finally, in the period from 1990 onwards, the transition accelerated. TFR fell sharply after 1989 dropping from 5.32 in 1990 and further to 2.69 in 1996; a 50 per cent decline in six years. The Spectacular decline also occurred in both rural and urban areas. In rural areas of Iran, TFR dropped from 7.7 in 1986 to 2.9 in 1996. TFRs for urban areas declined from 5.4 to 2.03 in that period. The drop in fertility in urban areas, though sharp, was not as sharp as the decline in rural areas (Abbasi-Shavazi 2000a).

b) Below-replacement level fertility provinces

The own-children estimates of fertility showed that six provinces (East Azarbaijan, Isfahan, Gilan, Semnan, Mazandaran and Tehran) reached below replacement fertility in 1996. Total fertility fell below replacement level in urban areas of these provinces, although some rural areas still had a level of fertility above the replacement level. Question may arise whether these fertility estimates are accurate. In other words, is the low level of fertility in these provinces true, or is it because of underreporting of young children (i.e. age 0 or 1). As discussed earlier, studies have shown that the possibility of underreporting of children at the 1986 and 1996 census is minimal, and some have argued that due to the advantages of rationing system, children 0-4 may have been over-reported at the 1986 (Zanjani 1991). Thus, it is reasonable to believe that the estimates are correct, and that the own-children estimate has drawn a real picture of fertility level in the provinces under scrutiny. The other reason for the accuracy of the result is that these provinces have had high level of socio-

economic characteristics and the level of education has been high, which all may have led to the accuracy of age reporting at the censuses.

Nevertheless, it has been suggested that to use fertility estimates for several years or a period (two, three or five year periods) instead of single-year estimates, to reduce the effects of misreporting or under-reporting of children (Cho, et al. 1986). The fertility estimates for the period 1994-96 would cancel out the effect of under-reporting on the result, if any. For this reason, it was decided to examine the average of the TFRs for the period 1994-1996, and select the provinces with the replacement-level fertility or lower over the three-year period. Only four provinces of Isfahan, Gilan, Semnan and Tehran qualified (Table 2), and thus, this paper only focuses on these four provinces.

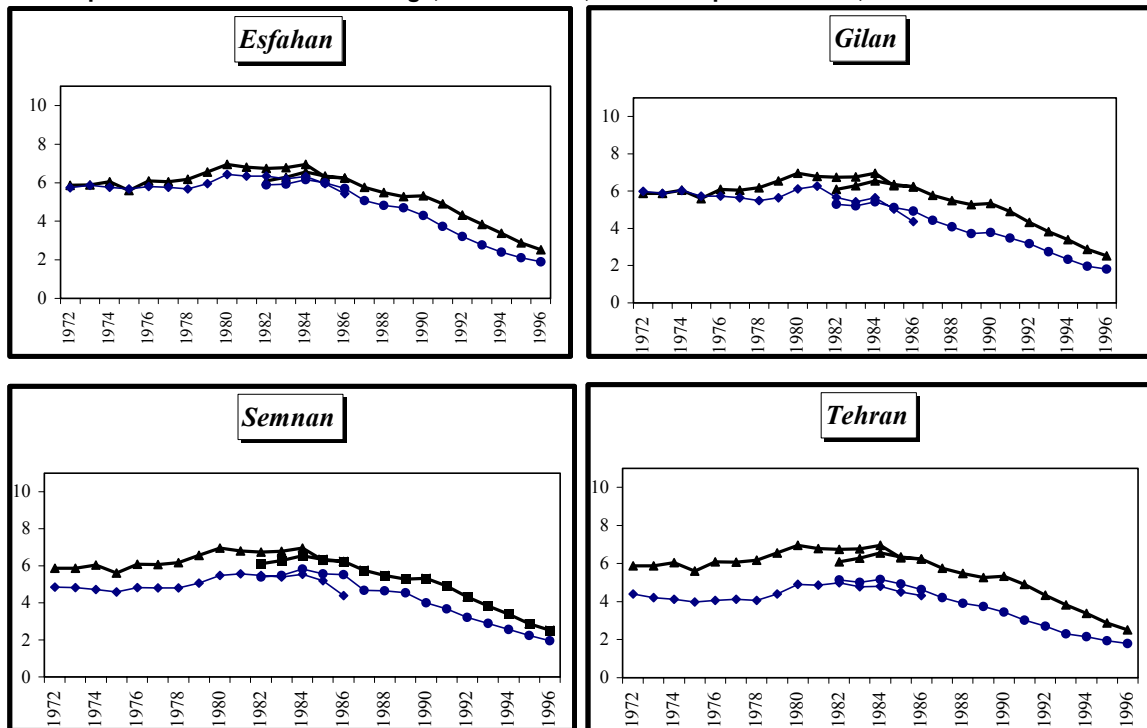
Figure 3 compares the trends of TFRs for Iran and the selected provinces during 1972 and 1996. As shown, the provinces followed similar trends as compared to the national level: a moderate decline in the early 1970s, a rise during 1979-84, a moderate decline during 1985-88 followed by a sharp decline after 1989.

Fertility in all of the selected provinces has been lower than the total country since the early 1970s. Tehran province displayed the lowest fertility among all other provinces, followed by Gilan, Semnan and Isfahan. During 1972 and 1976, Isfahan and Gilan had more or less similar fertility with the national level, but they revealed lower fertility than the national level thereafter.

Tehran was the leader of fertility transition, as below-replacement level fertility was reached in Tehran in 1994 (2.16). One year later, total fertility in Tehran was 1.95, and the other three provinces also joined Tehran and experienced below-replacement level fertility: Gilan had a TFR of 1.96, while Isfahan and Semnan revealed TFRs of 2.11 and 2.24, respectively. By 1996, fertility in these provinces reached the lowest level as compared with other provinces as well as the national level: Tehran (1.79), Gilan (1.81), Isfahan (1.90) and Semnan (1.95).

Considering the three-year period of 1994-96, total fertility rate in Tehran was the lowest (1.97) followed by Gilan (2.03), Isfahan (2.14), and Semnan (2.25). TFR for Iran was 2.92 over the same period (Table 2).

Figure 3. Own-children estimates of total fertility rates for women in provinces with very low fertility as compared with the national average, 1972 to 1996, Islamic Republic of Iran, 1986 and 1996 censuses



Source: Own-children estimates of TFRs from the 1986 and 1996 censuses, Statistical Centre of Iran

Table 2, Trends of TFRs for Iran and the selected provinces, 1982-96

Year	Iran	Gilan	Isfahan	Semnan	Tehran
1982	6.0985	5.3047	5.8766	5.3960	5.1449
1983	6.2855	5.2027	5.9217	5.4703	5.0151
1984	6.5502	5.4306	6.1608	5.8294	5.1653
1985	6.3526	5.1253	5.9872	5.5614	4.9260
1986	6.2323	4.9323	5.6989	5.5181	4.6395
1987	5.7602	4.4286	5.0760	4.6651	4.2038
1988	5.4876	4.0738	4.8173	4.6552	3.9217
1989	5.2724	3.7152	4.6865	4.5401	3.7544
1990	5.3273	3.7861	4.2907	4.0070	3.4539
1991	4.9070	3.4765	3.7415	3.6821	3.0341
1992	4.3304	3.1664	3.2236	3.2220	2.6975
1993	3.8313	2.7408	2.7773	2.8864	2.3030
1994	3.3873	2.3276	2.4094	2.5739	2.1652
1995	2.8746	1.9666	2.1119	2.2417	1.9531
1996	2.5216	1.8186	1.9088	1.9536	1.7972
1994-96	2.9278	2.0376	2.1433	2.2564	1.9718

Source: Statistical Centre of Iran, Own-children data from the 1986 and 1996 censuses.

Table 3 shows total fertility rates for Iran as a whole, and the five regions included in the Population Growth Estimation Survey (PGES) in 1998 (see

footnote on Table 3 for the provinces included in each region). As can be seen, below replacement-level fertility in Iran was reached by 1998. TFR for Iran was 2.06, and that of urban areas was well below replacement level (1.88). However, fertility for rural areas (2.39) was still above the replacement level.

Comparing different regions, regions 1 and 2 had experienced below-replacement fertility in both rural and urban areas. Region 3 also had below-replacement level fertility. Although TFR in rural areas of this region was 2.42, below-replacement level was reached in urban areas of this region (1.97). Regions 4 and 5 were the two regions that still had above replacement level fertility. Nevertheless, total fertility rate in these two regions was below or close to 3.

Table 3, TFRs for different regions in the Islamic Republic of Iran, 1998

Region ¹	Total	Urban	Rural
<i>Iran</i>	2.06	1.88	2.39
Region 1	1.68	1.61	1.97
Region 2	1.88	1.81	2.02
Region 3	2.16	1.97	2.42
Region 4	2.41	2.14	2.80
Region 5	2.91	2.68	3.14

Note: 1) Region 1 includes the provinces of Tehran and Gilan. Region 2 includes the province of East Azarbaijan, Ghom, Isfahan, Mazandaran, Yazd, Markazi, Semnan and Golestan. Provinces included in Region 3 were Kermanshah, West Azarbaijan, Fars, Kerman, Khorasan, Zanzan, Ardabil, Hamadan and Ghazvin. Region 4 consists of Ilam, Chaharmahal Bakhtiari, Khozestan, Hormozgan, Lorestan and Booshehr provinces. Region 5 comprises of the provinces of Kordestan, Kohgiluyeh and Sistan and Baluchistan.

Source: Statistical Centre of Iran, 1999.

c) Fertility by urban and rural areas

As indicated earlier, below-replacement level fertility was reached in urban areas of Iran by 1996. TFR in urban areas was 2.03 in 1996. Although Tehran had the lowest level of fertility in Iran in 1996, the level of fertility in rural areas of Tehran (2.4) in 1996 was still higher than the replacement level. The reason for the low fertility of Tehran as a whole is the low fertility in urban areas (1.7). The second reason is that around 80 per cent of the population were living in urban areas. Fertility in rural areas of Semnan province was just around replacement level (2.2). However, TFRs for Isfahan and Gilan provinces in both rural and urban areas reached below-replacement level by 1996. It should be noted that below-replacement level fertility was also reached in urban areas of such provinces as East and West Azarbaijans, Mazandaran, Zanzan, Markazi and Hamadan provinces by 1996.

Table 3 indicates that by 1998, TFR in urban areas of Iran was just below 1.9 while rural areas recorded a TFR of around 2.4. Of the five regions included in the PGES, regions one to four experienced TFRs of below 2.2 in urban areas,

whereas only rural areas of regions one and two experienced below-replacement fertility in 1998.

d) Partial TFR for ages below and over 30

Although, total fertility rate is useful to examine the level and trend of fertility over a period, it will not show the extent to which women have changed their fertility behaviour from one period to another. Thus, it would be interesting to analyse partial TFR for the ages below and over 30. This will show the level of recuperation (making up) of fertility if women postponed their fertility during the periods.

Table 4, Partial TFR for ages below and over 30 for Iran and selected provinces with low fertility, 1982-84, 1988-90 and 1994-96

Province	Rural			Urban		
	1982-84 Sub-TFR	1988-90 Sub-TFR	1994-96 Sub-TFR	1982-84 Sub-TFR	1988-90 Sub-TFR	1994-96 Sub-TFR
Iran						
Below 30	4.07	3.5	1.97	3.41	2.56	1.49
Over 30	3.24	3.23	1.5	2.33	1.88	0.78
TFR	7.31	6.73	3.48	5.74	4.45	2.28
Isfahan						
Below 30	4.18	3.23	1.64	3.54	2.52	1.42
Over 30	2.95	2.66	0.9	2.1	1.68	0.59
TFR	7.13	5.89	2.54	5.64	4.2	2.01
Gilan						
Below 30	3.33	2.35	1.34	2.88	1.98	1.26
Over 30	2.5	2.02	0.84	1.87	1.35	0.61
TFR	5.83	4.37	2.18	4.75	3.33	1.87
Semnan						
Below 30	3.43	2.85	1.58	3.16	2.4	1.4
Over 30	2.74	2.52	1.11	2.11	1.69	0.67
TFR	6.17	5.37	2.69	5.27	4.09	2.07
Tehran						
Below 30	3.77	3.11	1.82	2.96	2.07	1.27
Over 30	2.66	2.36	0.95	1.78	1.3	0.55
TFR	6.43	5.47	2.77	4.74	3.37	1.82

Note: Because the data files for each province was different from the file for urban and rural areas, figures presented in this paper are slightly different from the figures in Table 2.

Source: The 1986 and 1996 censuses

Table 4 shows partial TFR for ages below and above 30 in rural and urban areas for the periods of 1982-84, 1988-90 and 1994-96. It should be mentioned, however, that the figures provided in this paper are cross-sectional, and thus, do not show the experience of real cohorts of women. As shown,

more than 50 per cent of fertility of women in both rural and urban areas occurred at ages below 30 during the three periods. For example, around 56 per cent of fertility for Iranian women in rural areas occurred at ages below 30 during the period 1982-84, while only 44 per cent occurred at ages above 30. The corresponding figures for women in urban areas at the same period were around 60 and 40. During 1988-90, the percentage of fertility occurring at ages below 30 for women in rural areas declined to 52, indicating that fertility was mainly controlled or postponed at these ages. The percentage of partial TFR for ages above 30 increased to around 48 over the same period. Partial TFR for women at both ages below and above 30 declined further during the period 1994-96. However, the percentages of fertility occurred at ages below 30 at both rural and urban areas increased by 1994-96. This decline may have occurred because older women controlled their fertility after age 30. This is consistent with family planning programme implemented after the 1988 by which couples were encouraged to limit their childbearing between their 20s and 30s. Given that most Iranian women would like to have at least two children, it is expected that not all women control their fertility before age 30, but they are more likely to limit their childbearing after age 30. The pattern of sub-TFR for the selected provinces resembles the pattern of the national level.

The low fertility that has been observed may be temporary. It is clear in Iran that fertility has fallen simultaneously at all ages. At the older ages (i.e. 30+), women have already had high fertility in the past, so their present low fertility can be seen as a response to past high fertility. However, women at younger ages are starting out on a new fertility regime with much lower fertility in their 20s. It is possible that those now experiencing low fertility in their 20s will, in their thirties, have higher fertility than women who are now in their thirties. If this happens, there would be tendency for the TFR to rise over time. A cohort analysis is needed to deal with this issue.

e) Average age of women at childbearing

Table 5 also shows average age of childbearing for Iranian women and the selected provinces for 1976, 1986 and 1996. The result of this table is consistent with the findings of Table 3.

Table 5, Average age of women at childbearing for Iran and selected provinces, 1976, 1986 and 1996

Province	1976	1986	1996
Iran	28.9	29.5	28.5
Isfahan	28.2	28.7	27.2
Gilan	29.2	29.9	28.1
Semnan	28.8	29.4	27.7
Tehran	27.9	28.4	27.3

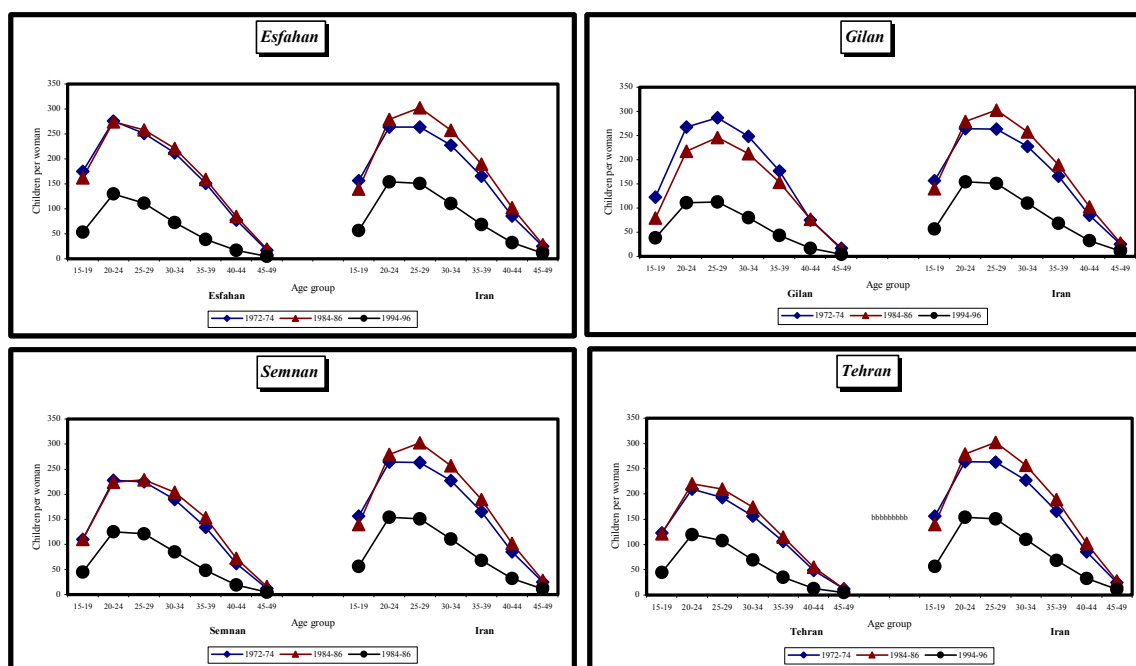
Source: The 1986 and 1996 censuses

Average age of women at childbearing for Iranian women increased from 28.9 in 1976 to 29.5 in 1986, but declined to 28.5 in 1996. The pattern for women in the selected provinces is again similar to that of the national level. As mentioned earlier, the reason for the increase and subsequent decrease in average age of childbearing is that after the revolution due to the relaxation of family planning programme and the implementation of pronatalist policies, fertility increased and also the period of childbearing continued until older ages. This contributed to the rise of average age of women at childbearing. However, due to the re-introduction of family planning programme and the encouragement of the programme to bear children between ages 20s and 30s, women controlled their fertility after age 30, and thus, the mean age at childbearing declined in 1996. Results of KAP surveys conducted by the Ministry of Health and Medical Education show that women who used family planning services, particularly tubectomy, in recent years, were mainly those aged 35 and above with more than three children.

f) ASFRs for selected provinces

Further light can be shed on the nature of fertility in these provinces through examination of changes in age specific fertility rates. Figure 4 shows ASFRs for Iran for the three periods 1972-74, 1984-86 and 1994-96.

Figure 4. ASFRs for women in the selected provinces as compared with the national level, 1972-74, 1984-86 and 1994-96



Source: Statistics Centre of Iran, Own-children Data from the 1986 and 1996 censuses.

Between 1972-74 and the peak of fertility in 1984-86, fertility rates rose by roughly equal proportions in every age group (except 15-19). Then between 1984-86 and 1994-96, the rates fell substantially in every age group. All

provinces experienced more-or-less similar pattern of fertility to the national level. The very substantial falls in fertility in the middle, peak ages of childbearing provide the explanation of why the fall in fertility in Iran from 1984 to 1996 was faster than any other recorded case. The steep fertility decline in all age groups suggests that starting, spacing and stopping of childbearing all occurred at the same time. That is, young couples started their childbearing later, married women were spacing their births and older women stopped their childbearing simultaneously. This cross-sectional effect may have been a compensation for the very high fertility at all ages before 1986 (Abbasi-Shavazi et al. 2000).

Demographic and socio-economic characteristics of the selected provinces

The sharp fertility decline and the attainment of below replacement fertility in the selected provinces of Iran have already been described. The main question on how such low level of fertility was reached in these provinces remained unanswered. Due to lack of sufficient data, it is not possible to explain the pathway by which fertility declined to such a low level in Iran and particularly in the selected provinces. The explanation of below-replacement level fertility is beyond the scope of this paper. However, some selected socio-economic of the provinces under scrutiny are presented in this section. Nuptiality and marriage pattern of the population for Iran and the selected provinces will be discussed first; women status and their educational and economic characteristics will be presented thereafter. The reason for the presentation of these figures is the importance of marriage pattern as well as the status of women on the low level of fertility in advanced countries with below-replacement level fertility (United Nations Population Division 2000; McDonald 2000).

Nuptiality change

Studies have shown that fertility transition in advanced countries with low fertility has mainly occurred because of the change in nuptiality pattern; a reduction of the proportion of married people at ages 15-19 and 20-24, and consequently an increase in age at marriage (Yushiro 1998; Ueno 1998). Table 6 describes female singulate age at marriage and age-specific proportion ever married for Iran and the selected provinces for the years 1976, 1986 and 1996.

The government of the Islamic Republic of Iran has encouraged early marriages since the 1979 Revolution. Young couples received many incentives for early marriages. Minimum legal age at marriage has also decreased from sixteen to nine after the revolution. Despite these changes, female singulate age at marriage did not change very much during 1976-1986, but increased considerably during 1986-1996. As shown, female singulate age at marriage increased from 19.52 in 1976 to 19.73, and then increased by around 2 years. Proportion ever married at ages 15-19 has also declined from 34 per cent in 1986 to 18 per cent in 1996. Despite the decline of the proportion ever married

at ages 15-24, universality remains one of the main characteristics of the Iranian marriage pattern (Abbasi-Shavazi 2000b).

Table 6, Female singulate mean age at marriage (SMAM) and age-specific proportion married, 1976 to 1996, Iran by province

Age/Year	Province				
	Iran	Isfahan	Gilan	Semnan	Tehran
1976					
SMAM	19.52	18.86	21.21	20.45	18.70
15-19	0.343	0.435	0.197	0.254	0.384
20-24	0.786	0.840	0.675	0.728	0.748
25-29	0.932	0.952	0.906	0.928	0.900
1986					
SMAM	19.73	19.23	21.48	20.37	20.55
15-19	0.335	0.425	0.296	0.327	0.344
20-24	0.796	0.799	0.594	0.722	0.724
25-29	0.906	0.931	0.861	0.724	0.837
1996					
SMAM	22.09	21.32	23.41	22.21	22.13
15-19	0.140	0.212	0.140	0.176	0.169
20-24	0.607	0.672	0.512	0.603	0.613
25-29	0.852	0.895	0.781	0.855	0.851

Sources: Abbasi-Shavazi (2000b).

Family planning

Caldwell, Caldwell and McDonald (2000) argued that after 1965, fertility fell widely in the Third World at least partly because there were new and better methods of fertility control available, and because the 'population explosion' debate had increasingly legitimised birth control. The decline of fertility in Iran has partly been due to the implementation of family planning programmes after 1988. The rise of education, and the high level of prosperity had all created a demand for family planning services, and by the means of the legitimacy and availability of family planning services, contraceptive prevalence rate has risen, and thus, fertility declined considerably.

As mentioned earlier, the first national family planning programme in Iran started in 1967. After a decade, contraceptive prevalence rate increased to 37 per cent. The programme was mainly urban oriented, and by 1976, only 20 per cent of rural women were using contraceptives. Contraceptive prevalence rate for urban areas in 1976 was 54 per cent. The family planning programme was suspended after the revolution, and pronatalist policies were implemented. Young couples were encouraged to marry earlier, and married couples were given incentives to bring more children while married (Mehryar et. al. 2000). Due to the relaxation of family planning programmes, and the implementation of pronatalist policies, the population of Iran increased by 3.9 per cent during 1976 and 1986. After a decade, the government of the Islamic Republic of Iran reversed its population policies and took an active role in implementing antinatalist policies. As shown in Table 7, contraceptive prevalence rate

increased from 49 per cent in 1989 to 65 per cent in 1992, and further to 73 per cent in 1997. The gap between rural and urban areas narrowed over this period.

An indication of the success of family planning programme after the revolution is the high percentage of modern contraceptive use in rural areas. In 1997, the percentage of rural women aged 15-49, who were using modern methods of contraception, was higher than that for women in urban areas (Table 6). For example, around 57 per cent of women in rural areas of Iran were using modern methods as compared with only 46 per cent of women in urban areas. The figures for the provinces in both urban and areas, except for urban areas in Semnan province, were higher than those for the national level.

Table 7. Percentage of women aged 15-49 years using different methods of contraception, by province, 1997

Province	Rural			Urban		
	Modern	Traditional	Total	Modern	Traditional	Total
IRAN	56.6	8.5	65.9	45.8	22.1	77.4
Gilan	59.2	14.4	74.0	57.7	23.7	81.4
Isfahan	59.8	17.7	77.5	53.8	27.8	81.7
Semnan	56.8	17.2	74.0	46.6	25.9	72.5
Tehran	59.4	20.6	80.2	50.8	29.7	80.8

Source: MOHME, 1998 (annual Conference on Population and Family Planning, Tehran.

Relative effects of marriage and family planning on fertility decline

As mentioned earlier, studies have shown (Chesnais 1998; Ueno 1998; Yushiro 1998) that below replacement fertility was reached in many advanced countries due to nuptiality change and the rise of the proportion of women never married. Yushiro (1998) stated that the continuous dip in the birth rate over the last two decades has been a result of the tendency among young people not to marry, which has been a major reason for fewer births in Japan. However, this is not the case for Iran as most women marry before age 30. Abbasi-Shavazi (2000b) has decomposed the changes in total fertility rate from 1976 to 1996 into the components of changes in nuptiality and marital fertility for Iran by province (Table 8). He found that most of the fall during 1986 and 1996 was due to the decline in marital fertility. Around 86 per cent of the fertility decline was due to the change in marital fertility and only 24 per cent to nuptiality change. The decomposition of the change in TFR for provinces was identical to that of the total population.

Abbasi-Shavazi concluded that family planning might have had a major role in the reduction of fertility in recent years. Nevertheless, it is not clear how and under what condition fertility has been controlled within marriage.

Table 8. Changes in adjusted TFR and the effects of components changes for the periods, 1976-86 and 1986-96, Iran by province

Province	1976-86			1986-96		
	Change in:	Attributable to:		Change in:	Attributable to:	
	TFR	Marriage	Marital fertility	TFR	Marriage	Marital fertility
Iran	0.15	-0.20	0.35	-3.70	-0.52	-3.20
Gilan	-0.79	-0.04	-0.75	-2.84	-0.50	-2.34
Isfahan	-0.10	-0.15	0.05	-3.68	-0.55	-3.13
Semnan	0.58	0.07	0.51	-3.06	-0.50	-2.56
Tehran	0.58	-0.19	0.78	-2.71	-0.38	-2.33

Sources: see Table 4.

Status of women in Iran and the selected provinces

A: Literacy rate and education

Table 9 shows literacy rate for population 6 years and above for Iran and selected provinces by sex in 1986 and 1996. There was a noticeable gap between male and female literacy rate in 1986 in Iran and the selected provinces, except in Tehran where female literacy was slightly higher than that of males. By 1996, the literacy rate for both males and females increased and the gap between the literacy of male and females has narrowed.

Table 9. Literacy rate for population 6 years and above for Iran and selected provinces with low fertility, 1986 and 1996 (%)

Province	1986		1996	
	Male	Female	Male	Female
Iran	71.0	52.1	84.7	74.2
Isfahan	78.5	62.7	88.3	80.9
Gilan	73.9	58.0	83.9	74.6
Semnan	77.5	63.2	88.0	80.8
Tehran	77.7	78.4	91.0	85.0

Source: Beladi-Musavi, 1997.

For example, literacy rate for males increased from 71 in 1986 to around 85 in 1996, while those for females increased from 52 to 74, respectively. Literacy rate for males in the provinces were lower than 80 per cent, but the figures increased to level above 80 per cent in the three provinces of Isfahan (88 per cent), Gilan (84 per cent) and Semnan (88 per cent). Literacy rate for Tehran was 91 per cent, the highest level among other provinces, in 1996. The increase in the literacy rate for females during 1986 and 1996 was much higher than that for males. Female literacy rate for the provinces, except for Gilan, was considerably higher than that of the total country.

Attainment of female students at high school and higher education also increased during the same period. In 1986, around 10 per cent of Iranian female students were attending high school and only 1.2 per cent attended higher education (Table 10). By 1996, the figures increased to 19.3 and 4.3 per cent, respectively. The attainment of female student in the selected provinces doubled or tripled over the same period. For example, in 1986, only 1.2 per cent of female students were attending higher education as compared with 4.3 per cent in 1996. The percentage of female students attending higher education in Gilan (0.5 per cent), in 1996, was around eight times higher than that of those in 1986 (4.1). The equivalent figures for the provinces of Semnan, Isfahan and Tehran were six times, five times and around three times, respectively, higher than those of 1986.

Table 10. Attainment of female students at the high school and higher education for Iran and selected provinces, 1986 and 1996 (%)

Province	1986		1996	
	High school	Higher education	High school	Higher education
Iran	9.9	1.2	19.3	4.3
Isfahan	9.3	1.2	20.6	6.1
Gilan	12.9	0.5	23.1	4.1
Semnan	11.2	1.2	21.9	7.1
Tehran	14.4	2.7	23.4	7.7

Source: As Table 7.

The increase in the level of education for female and their participation in higher education may all have had direct and indirect effect on fertility decline over the period 1986 and 1996. Given that the level of female education in all of these provinces has been higher than that of the national level, it is not surprising that they all have reached below-replacement fertility.

B: Labour force participation rate

Yushiro (1998:132-133) noted that the increasing number of Japanese women who marry later in life was closely associated with the rise in the rate of employment and the improvement of their economic status. Moreover, the rate of women advancing to four-year universities has increased, and the gap between male and female students has narrowed. Yushiro concluded that 'if the present trend continues, a "lower fertility cycle" would emerge; less children – permitting girls to advance to higher education – higher women's employment rates – later marriages – low fertility rates'. Although, the level of education in Iran has increased in recent years, female economic activities and their labour force participation rate have not changed considerably.

Crude activity rate for females peaked in 1976 (12.93), increasing from 9.2 in 1956 to 12.93 in 1976. This was due to development policies implemented by previous regime during the 1960 and early 1970s. The figure declined to its lowest level in 1986 (7.15), and then slightly moved upward to 8.5 in 1991 and

to 9.1 in 1996. Nevertheless, the level of activity rate for females was still lower than the figure in 1956.

There appeared different patterns of activity rate for females in the selected provinces. In 1986, female crude activity rate in Gilan was considerably higher than that of Iran as a whole and other provinces. Isfahan and Tehran also had higher activity rate than the national level. In 1996, the provinces of Tehran and Gilan experienced a decline in activity rate as compared with the 1986, but there was an increase in the activity rate for Isfahan and Semnan.

Yashiro (1998:129) found that a major cause of the continuous decline in fertility in Japan was the increasing participation of women in the labour force. This, in turn, has increased the opportunity costs of having children for a family. This is a common phenomenon in industrialized countries. Caldwell, Caldwell and McDonald (2000) believed that most explanations for very low fertility centre on the mass employment of married women with children, an explanation that must be tempered by noting that mothers were flooding into the job market in most Western countries well back into the baby boom years of the 1950s and 1960s. They noted that 'some explanations emphasize that full-time employment, based on preceding lengthy education, gives women an alternative role to that of mother and even wife'.

As discussed earlier, female labour force participation rate in Iran is not high and thus, unlike Japan and other advanced countries, opportunity costs for having children for married couples is not high. Thus, it is reasonable to argue that the rise education and increasing level of expectations have been the major causes of fertility decline, but not female activity rate. McDonald (2000a,b) argued that if females are provided with high level of gender equity in the family, they could contribute to family decision-making, and thus, fertility will decrease to low level. Given the rise of the level of female education, although women are enjoying higher status within family, and this may partially have contributed to fertility decline in Iran.

Discussion

This paper aimed at examining the fertility level in the selected provinces that experienced below-replacement fertility by the mid 1990s. The validity of fertility measures was assessed through the evaluation of age reporting at the 1986 and 1996 censuses. Age reporting has improved from the 1986 to the 1996. This has justified the application of the own-children method to the two censuses. Total fertility rate and age-specific fertility rate for Iran and the selected provinces were presented for the period of 1972 and 1996. The results showed that the provinces of Gilan, Isfahan, Semnan and Tehran have had lower fertility than the national level since the 1970s, and reached below-replacement level fertility over the period 1994-96. The estimates were confirmed by the findings of the 1998 Population Growth Estimation Survey. In 1998, TFR for Iran as a whole was 2.06, while that of urban areas was 1.88.

Of five regions included in the survey, three had reached a TFR of below 2, while the other two had fertility rate close to below replacement level.

How and under what conditions such low level of fertility was attained in these provinces. As shown, all the provinces under scrutiny have enjoyed higher socio-economic characteristics than the national level and other provinces. Literacy rate for has improved during the same period. The attainments of females at high school as well as higher education in the provinces were higher than those for Iran as a whole. Female singulate mean age at marriage in these provinces was higher than that of the national level during 1986 and 1996. Contraceptive prevalence rate also increased in these provinces. Given their higher level of development, it is not surprising these provinces have been the leaders of fertility transition in reaching below-replacement fertility before all other provinces.

Will Iran, as a whole, experience below-replacement fertility in the near future? Given the sharp decline in fertility of other provinces since the late 1980s, it is expected that other provinces attain below-replacement fertility as their socio-economic status progress. Abbasi-Shavazi (2000a) has found that all provinces and rural and urban areas of Iran have experienced sharp fertility decline over the last decade. Therefore, it can be argued that other provinces may reach below-replacement fertility even if their socio-economic characteristics do not become similar to the national level. This is in line with the argument made by Wilson (2001), which 'demographic convergence' has (or soon will be) occurred independent of 'economic convergence'. Hirschman, et al. (199?) observed that in Thailand 'the diffusion of low fertility behaviour had raced ahead of the structural determinants of fertility behaviour'. This has already been confirmed by the results of the PGES in Iran.

Will Iran or the selected provinces experience an increase in their fertility in the future? As Caldwell, Caldwell and McDonald (2000) noted, 'some people believe that lower fertility is simply a reaction to bad times after the end of the high-employment, rapid growth period stretching through the 1950s and 1960s'. This is also true for Iran, as some believe that economic hardship will be over within a certain number of years and then people will compensate their low fertility.

As mentioned earlier, the low fertility that has been observed may be temporary. Fertility has fallen simultaneously at all ages. The low fertility of the older women may have been a response to past high fertility. However, it is possible that those now experiencing low fertility in their 20s will, in their thirties, have higher fertility than women who are now in their thirties. If this happens, there would be tendency for the TFR to rise over time. Given the high level of education and the change of values for young generation, it is unlikely that couples change their fertility behaviour in the future. The result of the KAP survey conducted by the Ministry of Health and Medical Education has shown that around 25 per cent of pregnancies were unwanted. The result of unwanted pregnancies by parity also showed that the majority of those with four children

or more had reported that their pregnancies were unwanted. The number of ideal family size has also declined very much.

The main question here is the extent to which this low fertility affects the population growth rate in the coming decade. Saraie (2000) and Leili Nahari (1999) examined the effect of the young structure of population on population growth rate. They projected the size of the population for the next twenty years if the country will immediately reach below replacement fertility and remain stable until by 2021. The result has shown that the population would increase by around 25,000,000 before it starts to decline. Thus, due to the effects of "echo" of the earlier baby boom, the results of low fertility will not come to the effect within the coming decade, and the population of the country would continue to increase for some time. Nevertheless, it should be noted that the population of the low-fertility provinces comprise around one third of the total population of Iran. Thus, even some remote provinces may not join the leaders of fertility transition in reaching below-replacement fertility in the near future, because of the smaller proportion of their populations; their contribution to the total population would not be as large as the low fertility provinces. In other words, the effect of low fertility provinces on fertility at the national level will be substantial, and further fertility decline in these provinces will lead to lower fertility in Iran.

What would be the reaction of the government on below-replacement fertility in Iran? Caldwell, Caldwell and McDonald (2000) noted that low level of fertility in some developing countries has caused surprisingly little reaction outside academic circles. They stated that one reason for the slow government reactions is "population momentum; the fact that age structures are still adjusting to the relatively new low fertility levels and in most cases will not fully adjust for decades". Given that the government of the Islamic Republic of Iran is faced with the prospects of "post-revolutionary baby boom", no official policies is expected to be implemented with regard to low fertility in Iran. All the efforts are concentrated on the improvement of health, the expansion of reproductive health services, as well as the reduction of fertility in rural areas and the provinces with high fertility (UNFPA 1999, 2000). This will undoubtedly lead to low fertility in all provinces of Iran in the future.

The other reason why low fertility may not attract due attention in the near future is the fact that not all provinces have experienced below-replacement fertility. Some provinces, particularly in rural areas, still have higher fertility than the national level. Besides, some government officials and experts believe that this low level of fertility is mainly due to recent economic hardship, and thus fertility may rise again after this economic hardship is over. The importance of low fertility and its negative impacts on population growth rate not only has not attracted policy makers in developing countries, but also some planners in advanced countries, where below-replacement fertility had been reached since the 1980s, are not convinced about the effects of such low fertility yet (United Nations Population Division 2000). Furthermore, funding agencies such as the UNFPA and the World Bank also support the programmes to reduce fertility.

Therefore, due to the age structure of the population, unlike some other Asian countries as observed by Freedman (Freedman 1995: 23), the issue of rising fertility in Iran may not be an important population issue in Iran at least within the next decade. Indeed, given that Iran is about to get a new "echo" baby boom, further reductions in fertility would be needed to keep the number of births at the present level. In fact, trying to achieve a stable annual number of births is probably a more useful policy target than replacement-level TFR. Clearly, it is the number of babies, school children, students, labour force, and women of reproductive ages that matters for planning purposes.

References

- Abbasi-Shavazi, M.J. (Forthcoming). 'Assessment of the own-children method of estimating fertility using the 1986 and 1996 censuses in Iran' [Persian]. Journal of Social Sciences.
- Abbasi-Shavazi, M.J. (2000a), National trends and social inclusion: fertility trends and differentials in the Islamic Republic of Iran, 1972-1996, Paper presented at the IUSSP Conference on Family Planning in the 21st Century, 16-21 January, Dhaka.
- Abbasi-Shavazi, M.J. (2000b), Effects of marital fertility and nuptiality on fertility transition in the Islamic Republic of Iran, Working Papers in Demography, No. 84, Canberra: Australian National University.
- Abbasi-Shavazi, M.J, Mehryar, A. Jones, G. and McDonald, P. (2000), Revolution, war and modernization: Population policy and fertility change in Iran, Demography Programme, Australian National University, Canberra.
- Aghajanian, A. (1995) 'A new direction in population policy and family planning in the Islamic Republic of Iran'. Asia-Pacific Population Journal, 10,3-20.
- Aghajanian, A. and Mehryar, A. (1999) 'Fertility transition in the Islamic Republic of Iran: 1976-1996'. Asia-Pacific Population Journal, 14,21-42.
- Beladi-Mousavi, S. (1997). Females Socio-economic Indicators in the Islamic Republic of Iran [in Persian]. Tehran: Office for Women's Affairs in the Presidential Office.
- Caldwell, J. Caldwell and McDonald, P. (2000), 'Consequences of low fertility and policy responses: a global perspective', in Korea Institute for Social Affairs and United Nations Population Fund, Low Fertility and Policy Responses to Issues of Ageing and Welfare, Seoul: KIHASA.
- Chesnais, J.C. (1998), 'Below-replacement fertility in the European Union (EU-15): Facts and policies, 1960-1997'. Review of Population and Social Policy, 7: 83-101.
- Cho, L. J., Retherford, R. D. and Choe, M. K. (1986), The Own-Children Method of Fertility Estimation. University of Hawaii Press, Honolulu.
- Dangol, D.B., Retherford, R. D. and Thapa, S. (1997), 'Declining fertility in Nepal'. Asia-Pacific Population Journal, 12(1): 33-54.
- Freedman, R. (1995), Asia's recent fertility decline and prospects for future demographic change, Asia-Pacific Population Research Reports No. 1.: East-West Center: Honolulu.
- Hirschman, C., Tan, J., Chamrathirong, A. and Guest, P. (199?), The path to below replacement-level fertility in Thailand. Paper presented at the Annual Meeting of the Population Association of America.
- Keshtkar, M. (2000), 'Age heaping in the 1996 census' [Persian], *Population*, 31-32(1): 101-118.
- Leili Nahari, B. (1998), 'Momentum of population growth in Iran' [Persian]. Journal of Social Science, 13.
- Leete, R., Alam, I. and Jones, G. (1997). *Population, Socio-Economic and Health Statistics of the Islamic Republic of Iran*. New York: United Nations Population Fund.

- McDonald, P. (2000a), 'Gender equity, social institutions and the future of fertility'. Journal of Population Research 17(1): 1-16.
- McDonald, P. (2000b). The 'toolbox' of public policies to impact on fertility—a global view. Paper presented at Annual Seminar 2000 of the European Observatory on Family Matters, Low Fertility, Families and Public Policies, Seville, 15-16 September.
- Mehryar, A.H. Roudi, N. Aghajanian, A. and Tajdini, F. (1998) 'Evaluation and attainments of the family planning programme in the Islamic Republic of Iran'. Working paper, Tehran: Institute for Research on Planning and development.
- Mehryar, A., Roudi, F., Aghajanian, A. and Tajdini, F. (2000), Repression and revival of the family planning programme and its impact on the fertility levels and demographic transition in the Islamic Republic of Iran, paper presented at the 7th Annual Conference of the Economic Research Forum, Amman Jordan, 26-29 October.
- Ministry of Health and Medical Education (2000), Preliminary results of the Demographic and Health Survey. Unpublished report [*Persian*]
- Mirzaie, M., Koosheshi, M. and Naseri, M. B. (1996). 'Estimation and analysis of vital-demographic indicators of Iran, 1986 and 1991.' Tehran: Institute of Research and Social Studies, Faculty of Social Sciences, the University of Tehran [*Persian*].
- Retherford, R. D. and Thapa, S. (1999), 'The trend of fertility in Nepal'. Genus, LV(3-4): 61-97.
- Retherford, R.D., and Ogawa, N. (1978). 'Decomposition of the change in the Total Fertility Rate in the Republic of Korea, 1966-70'. Social Biology 25(2):115-127.
- Retherford, R. D., Pejaranonda, C., Cho, L. J., Chamrathirong, A. and Arnold, F. (1979), *Own-children Estimates of Fertility for Thailand Based on the 1970 Census* 63. East-West Center, Honolulu.
- Retherford, R. D., Pejaranonda, C., Cho, L. J., Chamrathirong, A. and Arnold, F. (1979). *Own-children Estimates of Fertility for Thailand Based on the 1970 Census*. Honolulu: East-West Center.
- Saraie, H. (1995) 'On the appropriateness of Whipple's index for evaluation of quality of population statistics in the Iranian population censuses' [*Persian*]. Population, 13-14,25-38.
- Saraie, H. (2000), 'Age composition, the momentum of population growth, and the future population of Iran' [*Persian*]. Journal of Social Sciences, 15(1): 47-66.
- Statistical Center of Iran (1999), Results of the Population Growth Estimation Survey, First Phase 1998-99, Tehran.
- Ueno, C. (1998), 'The declining birthrate: Whose problem?'. Review of Population and Social Policy, 7: 103-128.
- United Nations Population Division (2000), Below Replacement Fertility, Population Bulletin of the United Nations Special Issue 40/41. New York.
- United Nations Population Funds (2000), UNFPA Activities in the Islamic Republic of Iran: Annual report 1999, UNFPA, Tehran.
- United Nations Population Funds (1999), Country Population Assessment Report: Islamic Republic of Iran, UNFPA, Tehran.

- Wilson, C. (2001), Implications of global demographic convergence for fertility theory, Paper prepared for the IUSSP conference on: International Perspectives on low fertility: Trends, theories and policies, Tokyo, March 21-23.
- Yushiro, N. (1998), 'The Economic factors for the declining birthrate'. Review of Population and Social Policy, 7: 129-144.
- Zanjani, H. (1991) Population and Urbanization in Iran: Population. Centre for Urban Studies and Research, Ministry of Housing and Urban Planning, Tehran [*Persian*].
- Zanjani, H. (1993) A Study of Fertility in Iran, Centre for Urban Studies and Research, Ministry of Housing and Urban Planning, Tehran [*Persian*].