Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

An Analysis of the Second Birth Interval in Tehran, Iran: Trends and Correlates

Hajieh Bibi Razeghi-Nasrabad (PhD)[1*], Meimanat Hosseini-Chavoshi (PhD)[2,3], Mohammad Jalal Abbasi-Shavazi (PhD)[3,4,5]

[1] Associate Professor, Department of Demography, Faculty of Social Sciences, University of Tehran, Tehran, Iran
[2] Senior Research Fellow, University of Melbourne, Melbourne Australia
[3] Honorary Senior Lecturer, The Australian National University, Canberra, Australia
[4] Associate Professor, Department of Demography, Faculty of Social Sciences, University of Tehran, Tehran, Iran
[5] Academy Fellow, Vienna Institute of Demography, Vienna, Australia

ARTICLE INFO

Article type:
Original article

Article History:
Received: 22-May-2023
Accepted: 14-Jan-2024

Key words:
Second Birth
Fertility
Postponement
Population Policy
Iran

ABSTRACT

Background & aim: Postponement of the second birth significantly affects the fertility rate. The main purpose of this paper is to estimate the survival function of the interval between first and second birth and its determinants.

Methods: This study utilized a sub-sample of 363 ever-married women aged 15-49 with at least one child from the 2017 "Iran Fertility Transition Survey" conducted in Tehran and four other provinces, using a structured questionnaire for data collection. The Kaplan-Meier estimator was used to determine the second birth interval, while to analyse its determinants, the gamma-shared frailty distributions with the Weibull model were employed.

Results: The median time from the birth of the first child to the second child was reported 84 months (The time ratio of the second birth interval for women with a diploma or less, compared to university graduate women, was 0.754 and 0.748, respectively. The time ratio of the second birth interval for married women in the 1980s. In comparison to recent marriage cohorts, was 0.651. Increasing the desired number of children resulted in a shorter interval between the first and second birth (TR = 0.786). Experience of abortion (TR = 1.23), prolonged working hours (TR = 1.010), and postponement of the first child (TR = 1.06) were linked to a longer interval between the first and second births.

Conclusion: The second birth interval in Tehran exceeds the national average, influenced by urban residency, university education, and delays in the first childbirth.

► *Please cite this paper as*:
Razeghi-Nasrabad HB, Hosseini-Chavoshi M, Abbasi-Shavazi MJ. An Analysis of the Second Birth Interval in Tehran, Iran: Trends and Correlates. Journal of Midwifery and Reproductive Health. 2025; 13(2): 4703-4713. DOI: 10.22038/JMRH.2024.72530.2125

Introduction

Iran's fertility has sharply declined in recent decades. The period Total Fertility Rate (TFR) fell from 7.7 births per woman in the 1960s to nearly 6.0 by the mid-1970s but increased slightly during the late 1970s and early 1980s. In 1985, fertility started to decline after which it fell sharply during the 1990s and reached below the replacement level in the early 2000s (1). The fertility rate has remained at around 1.8–1.9 births per woman since the mid-2000s before rising to around 2.1 by 2016 and subsequently declining to 1.7 by 2022 (2). In 2021, the TFR in 23 out of the 31 provinces of Iran was below the replacement level (2). This decline has been largely influenced by the postponement of family formation and childbearing. Several studies have shown that childbearing was postponed to a later age in Iran (3-4) and a significant proportion of women have only one child at the end of the reproductive period. In 2006, 5.3% of all married women aged 40-44 were single-child mothers, but the figure

* *Corresponding author*; Hajieh Bibi Razeghi-Nasrabad, Associate Professor, Department of Demography, Faculty of Social Sciences, University of Tehran, Tehran, Iran. Tel: +989127137472; Email: hrazeghi@ut.ac.ir

increased to 8% in 2011 and 12.1% in 2016, respectively (5).

Tempo distortion occurs whenever women are having children at either earlier or later ages than they had previously (6). If the first child was born at the young age of the mother within a short interval after her marriage, the next pregnancies may occur faster. Conversely, a later first birth reduces the likelihood of having a second or third birth. Thus, delayed marriage and postponement of childbearing will lead to a low fertility pattern. Even if the increase in birth delays does not affect overall fertility by compensating for the desired number of children in the coming years, it does cause differences in period fertility rates. However, the total completed fertility rates depend on the degree of fertility 'recuperation' at higher reproductive ages (7-9).

Understanding the reasons behind delayed childbearing is of particular importance to health planners and policymakers. Although several studies have addressed this issue in other countries (9-11), less attention has been paid to birth spacing in Iran. In this article, we focus mainly on the timing of second births in one of Iran's low fertility contexts. Tehran province has had low fertility for more than two decades, and with a TFR of 1.27, this province is considered one of the lowest fertility settings in Iran (2). We also examine the factors affecting the second birth interval taking into account the relevant theoretical and experimental frameworks. Education has been cited as an important factor influencing the timing of childbearing (12). Theoretically, education has several possible effects on reproductive behaviors and can explain the difference in birth spacing. Educated women have more access to information resources enabling them to have more control over their reproductive life (12-14). Continuing education may lead to the postponement of a second birth as women may consider education as an investment in their human capital formation. The rationale for delaying childbearing by educated women is that their education is considered capital that has been invested during college and needs to be returned through full-time employment (12: 426-423). Studies have pointed out the direct and strong effect of marriage age on the birth interval (16-19) as increasing the marriage age usually leads to shorter first and second birth intervals. In other words, the later the marriage age, the shorter the second birth interval.

Women's employment is an effective factor in the second birth interval. Women delay having children to get a job successfully. On the other hand, women who try to have children at an older age can achieve high levels of human capital including stable, high-paying jobs and high wages (18: 6). Family structure also impacts the timing of childbearing. It has been shown that women who live in or grow up in large families have a faster rate of childbearing (20: 142; 16: 51). Along with the second demographic transition theory, the increasing delay of the second birth can be explained by the decrease in fertility intentions and the desired number of children (16). Couples who want fewer children try to avoid pregnancy by using contraceptives for a longer period.

A few studies (21-25) have focused on the birth interval and its determinants in Iran. This study aimed to estimate the survival function of the interval between the first and second birth and its determinants in the low-fertility context of Tehran, Iran.

Materials and Methods

This study used a sub-sample of data from the 2017 "Iran Fertility Transition Survey" conducted in five provinces of Iran including Tehran (26). In this survey, data were collected using a structured researcher-made questionnaire in the summer of 2017 (August and September). The sampling frame was developed using Iran's 2016 population and housing census, and the households were selected using *a* multi-stage stratified cluster random sampling method. Then sampling was conducted proportional to population size in each district within each province. In each district, a random sample of "clusters" was selected according to the allocated sample size for rural and urban households. The cluster size was set at 10 households. To achieve the aim of the study, a sub-sample were drawn from the surveys, which was limited to 363 ever-married women aged 15-49 with at least one child in Tehran.

In the current study, the second birth was considered as event, and the time between the

first and second birth was survival time. Survival time was calculated using questions about the month and year of birth of the first - and the second child. Women who did not experience another birth after the birth of their first child until the time of the study (August 2017) were censored. Demographic characteristics of women including educational level, employment status, marriage cohort, number of working hours per week, experience of abortion and stillbirth, relationship with spouse, age at marriage, and desired number of children were considered as independent variables affecting the timing of the second birth. The Kaplan-Meier (KM) estimator was used to estimate the survival function and second birth interval. The Kaplan-Meier (KM) estimator is the simplest way of computing the survival over time. It involves computing probabilities of the occurrence of an event at a certain point in time and multiplying these successive probabilities by any earlier computed probabilities to get the final estimate. This can be calculated for two groups of subjects and also their statistical difference in the survivals (27). Because visual comparisons of survival curves are associated with error, statistical tests such as the Logrank test are often used for comparison. The log-rank test is a test to compare the survival distributions of two or more independent groups. In addition parametric survival models were applied for multivariate analysis. Various models such as Exponential, Weibull, Log Logistic, Log Normal, and Gamma were fitted and the best model was selected based on the Akaike Information Criterion (AIK). In this study, frailty was also considered for each person to link the dispersion of risk function from one person to another individual and the correlation of internal personal events to unobserved individual characteristics (21). In frailty models, random components are included in the model by examining the significance of this component, the effect of factors can be determined (28: 83). Thus, frailty is a random component that is entered into the model to calculate the effect of unobserved or unobservable factors (29: 327). Gamma distributions were also used for the frailty variable.

All analyses were performed using Stata software version 15.

Results

According to the results, there were no women in the 15-19 age group who had at least one child. Approximately 19% of women were in the age group of 20-29 years, 21.2% in the age group of 30-34 years, 27.5% in the age group of 35-39 years, 16.5% in the age group of 40-44 and 15.7% were also in the age group of 49-45 years. The mean age of marriage for women is 21.44. Three percent of marriages were under the age of 14, 29.8 % were between the ages of 15-19, 46.8 % were between the ages of 20-24, and 16.8 %were between the ages of 25 and 29. The minimum age for marriage was 13 and the highest age for marriage was 46. In terms of educational level, only 8.5% had primary education and less, 12.9% had secondary education, 43.5% had a diploma or pre-university education, and around 30% had a university education. Only 16.5% of women were employed and 83.5% were unemployed.

Timing of Second Birth

The Kaplan-Meier (KM) survival function curve of the second birth interval is shown in Figure 1. Kaplan-Meier estimator showed that the mean second birth interval was 106 months (confidence interval 95.38-116.85 and standard deviation 5.47). The median second birth interval was 84 months which means that half of the women in the present sample will give birth to their second child after 84 months, ie 7 years from the birth of the first child. Based on cumulative survival ratio values within 120 months (10 years) of the birth of the first child, 70% (with a standard error of 0.03) will have a second child and 30% will remain as a single-child mother.

Figure 2 shows the survival function of second birth timing by characteristics of women. The median and mean second birth interval as well as the results of the Log-Rank test of the relationship between the variables and the time variable are also reported in Table 1. The survival function by educational level showed that the second birth interval increased by women's educational level, and the highest interval belongs to women with a university education (by the median of 118 months). The

mean and median of the second birth interval in women with a diploma and less were 80 and 66 months, respectively. The log-rank test indicated a significant difference in the second birth timing by educational level (P < 0.001).

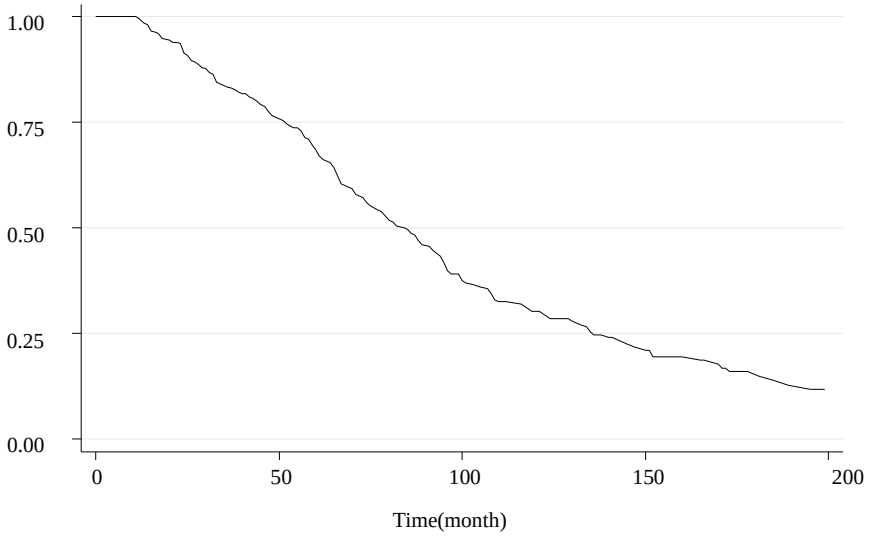

Figure 1. Kaplan-Meier Survival Curve for the timing of second birth in Tehran, Iran

The differences were also significant based on the employment status, and as expected, the median second birth interval was higher among employed than unemployed women. The results of the Kaplan-Meyer estimator showed that the median second birth interval for employed and non-employed women is 89 months and 82 months, respectively. Around 20% of unemployed women had their second birth up to three years after their first birth, while only 6% of employed women gave birth to their second birth in this interval. Also, within 10 years of the first birth, 58% of employed women had given birth to their second birth, compared to 72% of unemployed women.

The survival function by place of residence up to the age of 14 also showed that women who lived in urban areas until the age of 14 reached a second birth at a higher interval. The median second birth interval was 88 months among women who have lived in urban and 59 months among women who lived in rural areas.

Kaplan Meyer's diagram also showed that only 7% of urban women are likely to have a second birth within 24 months of their first birth as compared with 27% for women of rural origin. Within ten years of the first birth, 32% of women with urban backgrounds have one child, compared with 14% of women with rural backgrounds. The results of Kaplan Meyer's estimate showed that women in recent marriage cohorts experience more delay in second birth than other cohorts. The median second birth interval for marriage cohorts of the 1980s, 1990s, and 2000s was 52, 78, and 92 months, respectively. Accordingly, women in the marriage cohort of the 2000s gave birth to their second child three years and six months later than women in the marriage cohort of the 1980s. The results of the Logrank test also showed a significant difference between the first birth and the second birth in terms of marriage cohort. It is estimated that 17% of women in the 1980s and 13% of women in the 1990s marriage cohort had a second birth two years after the birth of their first birth. As marriage cohorts progressed, the percentage of women

who reached their second birth within two years of their first birth decreased.

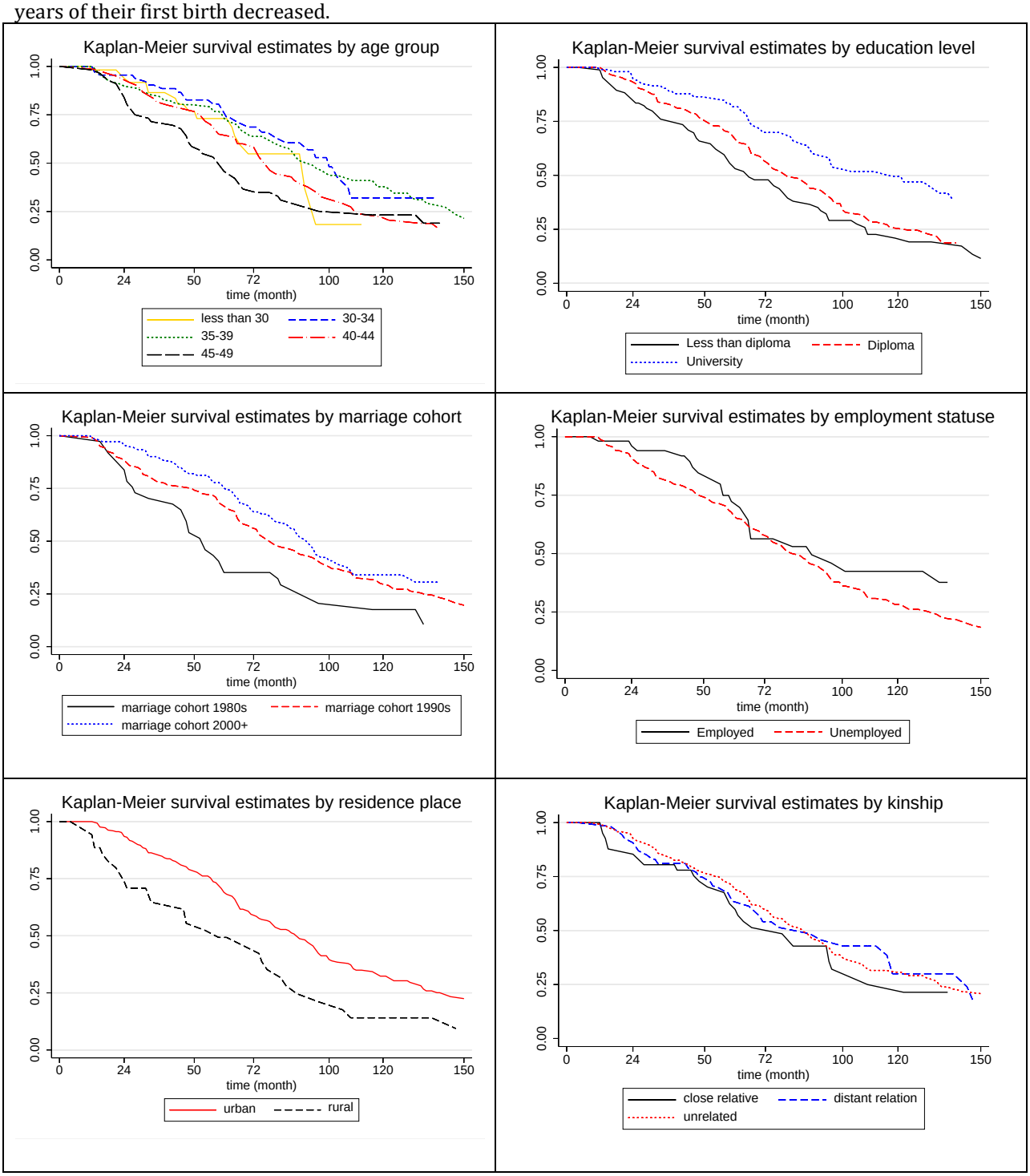

Figure 2. Survival function of second birth timing by characteristics of women, Tehran, Iran

Among the marriage cohort of the 2000s, only 5% of women had a second child in the second year after the birth of their first child. In other words, in this distance, 95% of women in this cohort had one child. In comparison, among the 1980s cohort, 46% of women gave birth to their second child after 3 years of the birth of their first child, while in the 2000s cohort, only 18% of women had given their second child, and 82% remained one child. Within 10 years of the first birth, 83% of women in the cohort of the 1980s were likely to have a second birth. This figure was 70% and 67% for the 1990s and 2000s onwards cohorts, respectively.

Overall, according to the results of the Kaplan-Meyer estimator and the Logrank test, women with a university education, women who married after 2000, employed women, and women of urban origin hada second birth at a later interval as compared to their counterparts.

To examine the factors associated with second birth timing in a multivariate model, such parametric survival analysis methods as Weibull, Log logistic, Lognormal, and Gamma were used, and finally, the best model was selected and analyzed. The lowest value of the Akaike index was related to the Weibull model. Hence, the Weibull model was recognized as the most efficient model.

In the parametric model, taking into account the frailty of Weibull survival, the test of zero variance showed a significant amount of frailty, thus the amount of frailty shows the dispersion between and within individuals. The significance of frailty means that the correlation between the timing of the first birth and the second birth of each individual is a main factor in modeling. Therefore, the results of fitting the frailty model are presented in the model and the value of the frailty coefficient was 0.649

In parametric models, the relative change in survival time [event time ratio (ETR)] is the regression coefficient. So covariate effects are directly expressed in terms of time ratio (TR) .In this study, TR> 1 and TR<1 mean that the interval between the first birth and the second birth is longer and shorter, respectively. In other words, women with TR> 1 get pregnant later than women with TR<1 (21).

According to the results presented in Table 1, women's education was an influential variable in the timing of second birth. The second birth interval was shorter for women with a diploma (TR = 0.754) and less for diploma (TR = 0.748) than for women with a university degree (reference group). In other words, women with university education experienced second birth with more delay than women with less education.

Table 1. Mean and median of the second birth interval by socio-demographic determinants in Tehran, Iran, 2017

Variable	Mean			Median			Logrank test (chi-Square)	P-value	Number
	Mean	SD	CI (95%)	Median	SD	CI (95%)			
Total	106.12	5.47	95.38- 116.85	84	4.86	74.46-93.53			363
Age group									
<30	76.38	5.62	65-36-87.407	91	17.10	57.47-124.52			57
30-34	116.48	11.95	93.043-139.92	100	6.77	86.72-113.27			77
35--39	109.14	8.68	92.12-126.16	94	6.06	82.11-105.88	7.87	0.096	100
40-44	95.87	9.24	77.76-113.99	77	3.78	69.58-84.41			60
45-49	90.86	11.86	114.11-67.61	59	5.56	48.101-69.58			57
Education level									
Less than diploma	89.11	8.95	71.57-106.66	66	8.49	49.34-82.65			86
Diploma	92.62	5.25	82.31-102.92	80	5.82	68.58-91.41	15.47	< 0.001	157
University	144.77	13.69	117.92-171.62	118	18.30	82.12-153.87			120
Employment status									
Employed	123.11	12.88	97.857-148.36	89	20.30	49.19-128.80			60
Unemployed	99.89	5.34	89.41-110.37	82	5.12	71.95-92.043	3.92	0.048	303

Resident place up to the age of 14

Urban	110.099	5.97	98.38-121.81	88	4.57	79.037-96.96	6.561	0.010	326
Rural	72.70	10.71	51.70-93.69	59	17.76	24.19-93.80			37
Kinship									
Close	102.66	14.93	73.39-131.92	78	11.39	55.67-100.32			44
Distant	114.61	15.98	83.28-145.94	88	16.56	55.53-120.46	0.362	0.835	56
Unrelated	103.73	6.08	91.80-115.65	86	5.18	75.83-96.16			263
Marriage cohort									
1980	70.54	9.26	52.37-88.70	52	4.31	43.54-60.45			38
1990	103.72	7.56	88.90-118.55	78	6.28	65.68-90.31	13.63	< 0.001	121
2000+	100.90	5.18	90.73-111.07	92	3.75	84.64-99.35			204

The desired number of children had an impact on the second birth timing, so that women who considered more children as ideal, gave birth to their second birth at a shorter distance (TR = 0.786). Married women in the 1980s gave birth to their second child in a shorter distance (TR = 0.651) than cohort women from 2000 onwards. Also, women who experienced abortions gave birth to their second birth at a longer distance than other women (TR = 1.23).

The number of working hours per week had a positive impact on the second birth timing, so women with longer working hours gave birth to their second child at a longer interval (TR = 1.010).

Table 2. Akaike index values of parametric models determining the distance between the first and second birth in Tehran, Iran, 2017

Exponential model	Weibull	Log logistics	Log normal	Gampertz	Gama
719.050	655.2120	656.99	678.8039	676.95	657.7692

Table 3. Results of fitting a common Weibull survival model

Variable	Coefficient	Time ratio	Std. Err.	[95% Conf. Interval]	
Birthplace					
Urban	0.159	0.158	1.172	0.859	1 .599
Rural (ref)	-	1	-		
Education level					
Less than diploma	-0.290	0.748*	0.151	0.556	1.00
diploma	-.281	0.754*	0.131	0.583	0975
University (ref)	-	1	-		
Marriage cohort					
1980	-0.427	0.651**	.153	0.482	0 .881
1990	0.1403	0.869	.108	0.702	1 .075
2000+ (ref)	-	1	-		
Abortion					
Yes	.207	1.230	0.156	0.905	1 .672
No		1			
Marriage to first birth interval	0.0675	1.069**	0.023	1.0120	1 .021
Desired fertility	-.2403	0.786**	0.067	0.688	0.897
Work hour	0.0095	1.010*	0.004	1.001	1.018
Frailty	0.629		0.231	0.323	1.303

LR Chi2 (10) = 59.90, Prob>Chi2= <00.1, Log Likelihood= -314.606, AIC=680.3739,
LR test of theta=0: chibar2(01) =15.93, Prob >= Chibar2 < 0.001

Discussion

This study aimed to investigate the second birth timing and its determinants in the context of low fertility in Tehran. The results of the Kaplan-Meyer estimator indicated that the median second birth interval was 84 months, which means that half of the women had a second birth 7 years after the birth of the first child. Based on the values of the cumulative survival ratio, probably in 120 months (10 years) from the birth of the first child, 70% of women reach a second birth. In other words,

30% of women will still have only one child. Therefore, there is a significant delay in the second birth in Tehran city which can affect overall fertility rates. A comparison of these findings with Razeghi Nasrabad et al (5) indicates that the second birth interval in Tehran with the lowest period of TFR, is longer than in Iran as a whole. Using 2011 IDHS data, they estimated the second birth interval in Iran to be about 4.5 years. They also showed that the probability of having a second birth in the 1990s was very high and more than 95% reached the second child. Since the late 1990s, the probability of a second birth slightly decreased, however, in the last years of the 2000s, nearly 80% of women had a second birth.

The findings revealed that the median second birth interval in married women in 1981, 1991, and 2001 onwards was 52, 78, and 92 months, respectively, and women in recent marriage cohorts tend to have their second child later than in earlier marriage cohorts. The results of parametric models also confirmed the difference in second birth timing in the marriage cohort of 1980 and 2000, but not with the marriage cohort of 1990. These findings are consistent with the results of other studies (30, 21, 23). Women who marry in recent cohorts experience a longer delay in first and second births than older cohorts.

The median second birth interval among employed and non-employed women was 89 and 82 months, respectively. The results showed that while 20 percent of unemployed women give birth to their second birth after three years of first birth, only 6 percent of employed women give birth to their second child in that interval. Also, within 10 years of the first birth, 58% of employed women progressed to the second birth, while in this period, this figure was 72% for unemployed women. However, the results of fitting the parametric models do not confirm these differences. In many studies, the type of occupation, the job sector (public or private), and the number of working hours were identified as more important factors in influencing the birth interval (22, 23, 25) than employment status.

In this study, the positive effect of working hours during the week on the second birth interval was confirmed and with increasing women's working hours per week, the second birth interval increased. A study of women with one child in Shahriar, Iran (31) found that the factor that incompatibility of work and childbearing is one of the main reasons for more delay at second birth. In this study, employed women were worried about not having time to take care of their children or doing houseworks. Due to the existing costs and economic conditions, they considered it necessary to continue participating in the labor market. Therefore, they either had no intention of having a second child or sought to balance the individual, family, and social spheres with a long delay. Similar results were obtained in another study that examined the simultaneous experience of family work among working mothers with young children in Tehran (32), and women working in shops, restaurants, and hospitals who worked longer hours, experienced a greater birth interval. These findings confirm the work-family conflict and its impact on reproductive decisions and behaviors.

The results revealed that having an experience of abortion or stillbirth prolongs the second birth interval. The same results were also obtained by Trassel et al. (33) in the Philippines, Malaysia, and Indonesia, Sonson and Tang (34) in Vietnam. In these studies, women who experienced miscarriage or stillbirth were more likely to have a second birth. In a study by Islam (35), women who did not have their first child alive for any reason gave birth to their second child two years later than other women. It is inferred that this interval may be to rehabilitate the mother in preparation for pregnancy and subsequent birth, so the interval between the first and second births increases when women experience abortion or stillbirth.

The findings of this study confirmed the influential effect of women's educational levels on the timing of second birth. According to the results, the highest interval belongs to women with a university education. The median interval between the first birth and the second birth of women with a university education, diploma, and less than a diploma was 118, 80, and 66 months, respectively. The results of fitting parametric models also showed that in women who have less than a diploma and diploma education, the second birth interval is shorter

than in women with a university education. This finding is consistent with many studies conducted in the context of low fertility and confirms the determining effect of education on childbearing postponement and fertility decline (12-15, 36, 37). However, the findings are inconsistent with the results of the study of Ahammed et al (38) and Islam (35). In the study by Islam, the mother's education along with the place of residence, survival status of the first birth and the mother's age at marriage showed a favorable effect on the distance between the first and second birth. However, in this study, educated women living in the city reached their second birth in a shorter time.

The findings showed that the desired number of children is one of the important covariates that has a significant effect on second-birth timing. The effect of the desired number of children at the time of marriage is increasing, and as the desired number of children at the time of marriage increases, the survival time in one child status decreases. Similarly, Fallahzadeh et al. (39) found that the mean second birth interval is 51.77 months, compared with 47.52 months for those who preferr more than two children. The effect of the desired number of children in the study by Swenson and Thang (34) showed that people who wanted more children gave birth to the next child in a shorter time.

This study also found a significant effect of the first birth timing on the second birth interval. As the first birth interval increases, so does the distance from first birth to the second birth. These results were in line with the results of the study of Singh et al. (40). Other studies revealed that as the age of marriage increases, women try to compensate for the delay effect by childbearing at shorter intervals. However, in this study, the results of parametric survival analysis indicated that with increasing the distance between marriage and first birth, the second birth interval increases. This finding may be due to reduced fecundity and fear of pregnancy at older ages. The effect of delay in marriage and first birth on reducing the probability of pregnancies and subsequent births and total fertility rate has been confirmed in various studies (6-7).

Conclusion

According to the studies conducted in various societies, low fertility is associated with increasing marriage age as well as the distance between births and delaying childbearing. In these countries, where the fertility rate is below replacement level, it is largely affected by the timing of childbearing (8). Even some people who decide to delay their first or second birth may eventually experience unwanted childlessness or end up with only one child (38). As a woman gets older, her fertility decreases, and with increasing age, this decrease becomes more rapid (40-43). The desired fertility in Iran and even in the city of Tehran (as a pioneer of low fertility), is more than two children (30). Despite this, however, the results of this study showed that women in the low fertility context of Tehran, delayed their second birth, and this behavior has a negative impact on women's completed fertility.

Overall, the findings of the current study showed that living in urban areas, university education, and increasing the distance between marriage and first birth increase the second birth interval. Thus, providing reproductive health services to reduce voluntary or involuntary abortions, providing child care services, and facilitating childbearing at appropriate ages, in addition to facilitating family formation and reducing the interval between births, can lead to the realization of fertility ideals. Due to the high rate of urbanization and lack of access to child care services, which are usually provided in extended families, providing child care services can reduce the birth interval. This plan can be especially useful for employed women who also have longer working hours. In line with pronatalist policies, considering the ideal fertility in society, to prevent further fertility decline, it is suggested that policymakers and health planners should focus their attention on reducing birth intervals. Planners and counselors in the field of family and fertility should also provide the necessary advice on the appropriate age for fertility, the appropriate interval between births, and the effect of aging on infertility enabling couples to have children with proper planning.

Declarations

Acknowledgements

The authors would like to appreciate The National Institute for Population Research, Tehran, Iran for approving this project to be conducted.

Conflicts of interest

Authors declared no conflicts of interest.

Ethical Considerations

The data for the manuscript was extracted from a survey on "Gender role division and transition to second birth" with ethical code of 11/65477 issued by The National Institute for Population Research, Tehran, Iran.

Code of Ethics

11/65477.

Funding

None.

Authors' contributions

All authors contributed to the design, data collection and analysis as well as reviewing the manuscript. Also, all authors approved the final manuscript and agreed to be accountable for all aspects of the work in terms of accuracy and integrity.

References

1. Abbasi-Shavazi M. J, McDonald P, M. Hosseini-Chavoshi M. The fertility transition in Iran: Revolution and Reproduction, Springer; 2009.
2. Statistical Center of Iran. Population-and-housing-censuses. 2019. Available from: https://www.amar.org.ir. 2019.
3. McDonald P, Hosseini-Chavoshi M, Abbasi-Shavazi MJ. Assessment of Iranian fertility trends using parity progression ratios, Demographic Research. 2015; 32(58): 1581–1602.
4. Soltani Z, Eini H, Eslami M, Motlagh M. Multivariate analysis of Iran's period fertility changes in the 1370s & 1380s. Journal of Population Association of Iran, 2018; 12(24): 171-205.
5. Razeghi Nasrabad H, Abbasi-Shavazi M. J, Moeinifar M . Are we facing a dramatic increase in voluntary and involuntary childlessness that led to lower fertility. Crescent Journal of Medical and Biological Sciences. 2020; 7(2): 212-219.
6. Feeney G, Bongaarts J. The Quantum and Tempo of Life-Cycle Events. Vienna Yearbook of Population Research. 2006; 4: 115-151.
7. Trussell J, Menkrn J. Early childbearing and subsequent fertility. Family Planning Perspectives. 1978; 10(4): 209–218.
8. Sobotka T. Is lowest-low fertility explained by the postponement of childbearing? Population and Development Review. 2004; 30(2): 195-220.
9. Sobotka T. Post-transitional fertility: The role of childbearing postponement in fuelling the shift to low and unstable fertility levels. Journal of Biosocial Science. 2017; 49(S1), S20-S45.
10. Fukuda S. Gender role division and transition to the second birth in Japan. IPSS Working Paper Series (E). 2017; 28): 1-39.
11. Tomkinson J. Age at first birth and subsequent fertility. Demographic Research. 2019; 40: 761-798.
12. Edwards ME. Education and occupations: reexamining the conventional wisdom about later first births among American mothers. InSociological Forum. 2002; 17: 423-443.
13. Berrington A, Stone J. Beaujouan E. Educational differences in timing and quantum of childbearing in Britain: A study of cohorts born 1940–1969. Demographic research. 2015; 33(26): 733–764.
14. Tropf FC, Mandemakers JJ. Is the association between education and fertility postponement causal? The role of family background factors. Demography. 2017; 54: 71-91.
15. Hoem JM, Neyer G, Andersson G. Education and childlessness: The relationship between educational field, educational level, and childlessness among Swedish women born in 1955-59. Demographic Research. 2006; 14(15): 331-380.
16. Nomaguchi K. Determinants of having a first and a second child among Japanese married women in recent cohorts. University of Maryland, College Park; 2003.
17. Stanow G, Bracher M. Deferment of the first birth and fluctuating fertility in Sweden. European Journal of Population. 2001; 17: 343-363.
18. Stier H, Sela-Dotan A. Timing of Childbirth and Employment Consequences: The Israeli Case. InPrepared for presentation at the Brno Meeting of ISA-RC28 on Social Stratification. 2007; 27.
19. Mensch B. S, Ibrahim B. L, Lee S. M, El-Gibaly O. Gender-role attitudes among Egyptian

adolescents. Study Family Planning. 2003; 34(1): 8-18.
20. Gillespie R. Contextualizing voluntary childlessness within a postmodern model of reproduction: Implications for health and social needs. Critical Social Policy. 2001; 21(2): 139-159.
21. Saadati M, Bagheri A, Factors affecting first and second birth intervals among 15-49 year-old women in Tehran, Iranian Journal of Epidemiology Spring. 2019; 15 (1): 68-76.
22. Razeghi Nasrabad H, Abbasi-Shavazi M, Hosseini Chvoshi M. Phenomenology of first birth among women in Tehran City. Women Strategic Studies. 2014; 63: 57-95.
23. Abbasi-Shavazi M.J, Razeghi-Nasrabad H. Patterns and factors affecting marriage to first birth in Iran, Journal of Population Association of Iran. 2011; 5(9): 75-107.
24. Erfani A, Nojomi M, Hosseini H. Prolonged birth intervals in Hamedan, Iran: Variations and determinants. Journal of Biosocial Science. 2018; 50: 457-471.
25. Razeghi Nasrabad, H, Hosseini Chavoshi M. Abbasi-Shavazi M. Determinants of first birth-interval in Tehran using event history models. Population Studies Journal. 2019; 5 (2): 127-156.
26. Abbasi-Shavazi M. J, Razeghi Nasrabad H, Hosseini Chavoshi M. Fertility transition survey, 2017, Research report, National Population Studies and Comprehensive Management Institute. Tehran, Iran, 2019.
27. Goel M. K, Khanna P, Kishore J. Understanding survival analysis: Kaplan-Meier estimate. International Journal of Ayurveda Research. 2010; 1(4), 274–278.
28. Hosmer D. W, Lemeshow S. Applied survival analysis, John Wiley, New York. 1999
29. Kleibaum David G, Klein M. Survival analysis: a self-learning text. 3rd ed. New York: Springer; 2012.
30. Razeghi Nasrabad H, Abbasi-Shavazi, MJ. Ideal fertility in Iran: A systematic review and meta-analysis, International Journal of Women's Health and Reproduction Sciences. 2020; 8(1): 10-18.
31. Razeghi Nasrabad H, Hosseini, Z, Sheikhi M. Women's lived experience of one- child with emphasis on the reasons and consequences in the City of Shahryar. Journal of Population Association of Iran. 2016; 11(22): 43-82.
32. Razeghi Nasrabad, H, Hosseini Z. The experience of the combination of work and family in employed mothers with younger children. Journal of Applied Sociology. 2019; 30(3): 109-134.
33. Trussell J, Martin L, Fledman R, Palmore J, Concepcion M, Bakar DA. Determinants of birth interval length in the Philippines, Malaysia, and Indonesia: a hazard model analysis. Demography. 1985; 22: 145–168.
34. Swenson I, Thang NM. Determinants of birth intervals in Vietnam: a hazard model analysis. Journal of Tropical Pediatrics. 1993; 39: 163–167.
35. Islam H. An Analysis of birth intervals in Bangladesh using frailty models. Journal of the Asiatic Society of Bangladesh, Science. 2016; 42(2): 243-249.
36. James KS, Skirbekk V, Van Bavel J. Education and the global fertility transition-Foreword. Vienna Yearbook of Population Research. 2012; 10: 1-8.
37. Razeghi Nasrabad H. Effect of education on age at first birth in Semnan, Hormozgan, Kohkiloye, and Booir Ahmad Provinces, Iran. Hormozgan Medical Journal. 2018; 22(2): 103-112.
38. Ahammed B, Kabir R, Abedin M, Ali M, Islam A, Determinants of different birth intervals of ever-married women: Evidence from Bangladesh. Clinical Epidemiology and Global Health. 2019; 450–456.
39. Fallahzadeh, H, Farajpour Z, Emam, Z. Duration and determinants of birth interval in Yazd, Iran: a population study. Iranian Journal of Reproductive Medicine. 2013; 11(5): 379–384.
40. Singh, R, Tripath V, Kalaivani M, Singh K, Dwivedi S.N, Determinants of birth intervals in Tamil Nadu in India: Developing Cox hazard models with validations and predictions, Revista Colombiana de Estadistica. 2012; 35 (2): 289-307.
41. Best J, editor. Images of issues: Typifying contemporary social problems. Routledge; 2017 Sep 29.
42. Morgan S. P. Late nineteenth and early twentieth-century childlessness. American Journal of Sociology, 1991; 97 (3): 779-807.
43. Morgan SP, Hagewen K. Is very low fertility inevitable in America? Insights and forecasts from an integrative model of fertility. InThe new population problem 2005 May 6 (pp. 15-40). Psychology Press.