Geliş Tarihi:
13.08.2024
Kabul Tarihi:
26.11.2024
Yayımlanma Tarihi:
28.12.2024

Kaynakça Gösterimi: Saraç, M. 2024, Complex sample design adjusted analysis of marriage age preference in Türkiye. *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi, 23*(51), 2088-2106, doi: 10.46928/iticusbe.1532653

# COMPLEX SAMPLE DESIGN ADJUSTED ANALYSIS OF MARRIAGE AGE PREFERENCE IN TÜRKİYE

*Araştırma*

Melike Saraç
Sorumlu Yazar (Correspondence)
Hacettepe Üniversitesi
melikesarac@hacettepe.edu.tr

Melike SARAÇ, Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü Sosyal Araştırma Yöntemleri Anabilim Dalı öğretim üyesidir. Sosyal araştırma verisinin istatistiksel analizi ve veri toplama teknikleri alanlarında lisansüstü düzeyde dersler vermektedir. Araştırma yöntemleri, örnekleme tasarımı, veri kalitesi ve demografi alanlarında çalışmaktadır.

# COMPLEX SAMPLE ADJUSTED ANALYSIS OF MARRIAGE AGE PREFERENCE IN TÜRKİYE

Melike Saraç
melikesarac@hacettepe.edu.tr

**Abstract**

The incorporation of properties of complex sample design in statistical analyses is frequently overlooked although multi-staged, stratified, and cluster sample designs are used in surveys. This is important to make design-based inferences based on probability samples. It is possible to estimate the inevitable impact of such designs on statistics by utilizing standard errors, confidence intervals, and design effects. Several programs including Stata, R, and SPSS enable researchers to incorporate the properties of sample designs. The major goal of this study is to identify how the complex sample design adjusted analysis results should be presented with an example of the preferred age at marriage in Türkiye. The study in particular investigates the impact of marriage cohort on women's likelihood of reporting marriage age preference below the median age at marriage in Türkiye while controlling for background characteristics. The 2018 Turkey Demographic and Health Survey, a cross-sectional, face-to-face survey, is the data source for this study. The nationally representative data sets provide information on household composition, fertility, family planning, etc. In addition to proportions of marriage age preference by background characteristics of women in Türkiye, design adjusted estimates of binary logistic regression analysis technique was used to reach objectives. The results indicated that there were some variations in the standard errors of proportions and regression coefficients for study variables. In addition to significant effect of marriage cohort, statistical parameters showed the variance inflation in the complex sample design compared to that of a simple random sample design with the same size. Incorporating properties which are generally overlooked in analyses using complex sample designed survey data consists of the main originality. Moreover, the study is original in terms of presenting representative results focusing on marriage cohorts to the literature which is devoted to marriage age preference in Türkiye.

**Keywords:** Complex sample design, stratification, clustering, weighting, sampling error, design effect, marriage age preference.

**JEL Code:** C18, C83, J12

# TÜRKİYE'DE EVLENME YAŞI TERCİHİNİN KOMPLEKS ÖRNEKLEM TASARIMI ALTINDA ANALİZİ

**Özet**

İstatistiksel analizlerde, çok aşamalı, tabakalı, küme örneklemi tasarımları kullanılsa da kompleks örneklem tasarımının özellikleri sıklıkla göz ardı edilmektedir. Bu durum, olasılıklı örnekleme dayanarak yapılan tasarım tabanlı çıkarsamalar için oldukça önemlidir. Standart hatalar, güven aralıkları ve desen etkilerinin hesaplanmasıyla böyle tasarımların araştırma tahminleri üzerindeki etkisini değerlendirmek mümkün olmaktadır. Stata, R ve SPSS gibi birçok istatistiksel program araştırmacılara analizlerine örneklem tasarımının özelliklerini tanıtma imkânı sunmaktadır. Bu çalışmanın temel amacı, Türkiye'de tercih edilen evlenme yaşı örneği üzerinden kompleks örneklem tasarımının dikkate alındığı analiz sonuçlarının nasıl sunulması gerektiğini göstermektir. Ayrıca bu çalışmada temel özellikler kontrol edilerek evlilik kuşaklarının kadınları tercih ettikleri evlenme yaşının Türkiye'deki ortanca ilk evlenme yaşından daha küçük bir yaş olması üzerine olan etkisi araştırılmaktadır. Çalışmanın veri kaynağını kesitsel, yüz-yüze bir araştırma olan 2018 Türkiye Nüfus ve Sağlık Araştırması oluşturmaktadır. Araştırmanın ülke genelinde temsiliyeti bulunan veri setleri hanehalkı kompozisyonu, doğurganlık ve aile planlaması gibi konularda bilgi sunmaktadır. Çalışmanın amaçlarına ulaşmak için evlenme yaşı tercihine ilişkin oranların Türkiye'deki kadınların temel özelliklerine göre dağılımının yanı sıra tasarımı altında ikili lojistik regresyon analizi yöntemi kullanılmıştır. Analiz sonuçları, ilgili değişkenler için elde edilen yüzdeler ile regresyon katsayılarının standart hatalarında farklılıklar olduğunu göstermektedir. Bu çalışmada, evlilik kuşaklarının istatistiksel olarak anlamlı etkisinin yanı sıra, üretilen parametrelerin kompleks örneklem tasarımının aynı örneklem büyüklüğündeki basit rasgele örneklem tasarımına kıyasla oluşturduğu varyans maliyeti gösterilmiştir. Kompleks örneklem tasarımının kullanıldığı sosyal araştırmaların verileri kullanılarak yapılan istatistiksel analizlerde sıklıkla göz ardı edilen tasarım özelliklerinin dahil edilmesi çalışmanın temel özgünlüğünü oluşturmaktadır. Ayrıca, Türkiye'de evlenme yaşı tercihi üzerine literatüre kadınların evlilik kuşaklarına odaklanarak ülke temsili sonuçlar sunması açısından özgün bir çalışmadır.

**Anahtar Kelimeler:** Kompleks örneklem tasarımı, tabakalama, kümeleme, ağırlıklandırma, örneklem hatası, desen etkisi, evlenme yaşı tercihi.

**JEL Kodu:** C18, C83, J12

## INTRODUCTION AND BACKGROUND

The reporting statistical estimates obtained from multi-staged, stratified, and clustered sample designs employed in social surveys is typically overlooked by researchers. However, there are substantial differences between such sample designs and the simple random sampling approach (Heeringa, West, & Berglund, 2017). Given these considerations, it is crucial to adjust the specific properties of the complex sample designs when making statistical inferences about the target population. Seidenberg, Moser, & West (2023) underlined the importance of reporting information for complex sample survey designs, including confidence intervals/standard errors, weighting, and variance estimation techniques.

In this study, the selected example of the preferred age at marriage is employed to examine the potential effects of stratification, clustering, and weighting on the estimated proportions and regression coefficients. In line with this point, the main aim of the study is to present the results of the complex sample design adjusted analysis of marriage age preference. The effects of women's background characteristics on the likelihood of reporting an age below the median age at marriage are examined, focusing on the marriage cohort.

Social researchers are more likely to focus on actual age at marriage since the issue of child marriages (or early marriages) is among the substantial concerns for many societies across the world. This global problem leads to adverse effects on women's lives due to violation of children's right, reproductive health rights, and rights of women, especially for education and employment areas (UNFPA, 2020). The Plan International UK (2020) ranked the common reasons of child marriages as the poverty and economic conditions; lack of education; gender inequality; cultural norms and traditions; gender-based violence and conflict and crisis settings. In the literature, the term "child marriage" is also used interchangeably with forced marriages and early marriages. Globally, the child marriage indicator is placed in UNICEF's indicators as well as Sustainable Development Goals (SDGs) (UNICEF, 2005; UN, 2015).

On the other hand, preferred age at marriage is typically linked to actual age at marriage when explaining health-related problems. For instance, Carlson (2012) suggested that the mental health of married or never married individuals is affected by the deviation

from the desired age at marriage. Furthermore, it seems that determinants of actual and ideal age at marriage share common actors. Ghorbani and Torabi (2021) found that job status and socio-economic factors have an impact on attitudes towards the age at marriage.

There are various definitions used to measure child marriage among women and men and produce indicators. For example, TURKSTAT (2024) explained the declining trend of child marriage prevalence in Türkiye over the years on the basis of "proportion of 16-17 age group in first civil marriage" for both women and men. Additionally, religious or civil marriages where one of the individuals is under the age of 18 also be defined as child marriage. However, the present study uses the 21.4 years of age restriction on preferred age at marriage. This threshold is based on the median age at marriage in Türkiye for women aged between 25 and 49 years in 2018 (HUIPS, 2019).

Although there is a declining trend in the prevalence of child marriages over the years in Türkiye, there is still a considerable proportion of women who married in their childhood period. When adverse effects of child marriages are considered in conjunction with time period, there is a need to seek the impact of marriage cohort on the preferred age at marriage from more hypothetical view as well as the effect on the actual age at marriage. In some cases, the hypothetical age at marriage may provide certain clues for the actual age at marriage, and marriage practices (e.g., bride price, type of marriage ceremony). Furthermore, not only unveiling marriage cohort[1] impact but at the same time the impacts of socio-demographic and socio-economic factors would be insightful from the political view.

This study attempts to investigate the impact of women's marriage cohorts on the likelihood of reporting a preferred age at marriage below the median age at marriage in Türkiye (21.4 years), for the year 2018. In this sense, the study aims to reveal relative risk factors that might have a potential influence on the likelihood of preference for an ideal age at marriage below this threshold among women. To reach this aim, certain socio-demographic and socio-economic factors will be controlled in addition to the marriage cohort of women.

[1] The marriage cohort represents the specific intervals of years when the marriage event occurs.

The study population is women who are between 15 and 49 years of age in Türkiye that comes from the sample selected for a nationally representative household survey. The women data set of the 2018 Turkey Demographic and Health Survey was utilized to reach study objectives. Age preference for marriage by women's background characteristics was examined through design adjusted proportions and binary logistic regression analysis.

The results of the study showed the significant effect of marriage cohort on marriage age preference in Türkiye. Furthermore, region, type of residence, education and wealth are found to be significant factors in the likelihood of reporting marriage age below the median. Finally, the study is expected to contribute to the literature by presenting complex sample design adjusted results for marriage age preference.

## METHODOLOGY

### *Data Source*

The data source of the study comes from the Turkey Demographic and Health Survey (Turkey DHS) that was conducted in the year of 2018 (2018 Turkey Demographic and Health Survey Data, 2019). Since 1993, Turkey DHSs are carried out every five years under the supervision of the International DHS Program. The cross-sectional, face-to-face, household survey provides detailed and country-representative data about women who are in their reproductive age period (between 15 and 49 years of age). All eligible women in the sampled households were interviewed once the household interview was completed. The eligibility criteria for women interviews were being in the reproductive age period and staying that household a night before the interview. The 2018 Turkey DHS collected a wide range of information about fertility, family planning, abortions and stillbirths, reproductive health, marriages, nutritional status of women and their children, women's status, and so on. The 2018 Turkey DHS women data include information of 7,346 women (unweighted number of cases) with 5,265 variables. Particularly, the rich information on women marriages through the marriage history module in the questionnaire allows for detailed analyses of marriages. For this study, the main units of analysis are all women regardless of their marital status in accordance with the study objectives.

The CAPI (Computer Assisted Personal Interviewing) technique, including consistency and reliability checks, was used to collect information through household and women questionnaires. The final data sets were constructed after detailed data editing and data processing steps.

***Sample Design***

The 2018 Turkey DHS adopted a complex sample design approach that refers to a multi-staged, stratified, cluster sample in accordance with the study objectives. The women who are between 15 and 49 years of age consist of the target population of the survey. The created blocks that each of those includes approximately 100 households were used in the sample design. The first stage includes selection of blocks/segments from each stratum as a primary sampling unit (PSU) with PPeS technique. The second stage of selection covers household selection within each selected block. Afterwards, the listing and mapping operation was performed to update household addresses for some of the selected blocks. Final household selections within updated block lists were made based on the systematic sample selection technique. Sampled households were allocated into 754 clusters within 15 strata. The conventional demographic regions (5 regions) and statistical regions (NUTS1) which are closely associated with survey outcomes were used as stratum variables. Each cluster in sampled areas consisted of 21 households. Overall, the sample design of the 2018 Turkey DHS enables production of survey estimates at a country level, 5 conventional demographic regions (West, South, Central, North, East), 12 NUTS1 statistical regions[2] for certain selected indicators (HUIPS, 2019).

Due to unequal selection probabilities and different response behaviors between ever-married and never married women, a final weight variable is included in the women data set to use during statistical analyses. The weight variable covers both design weight and non-response adjustments at a cluster level accounting for the complex sample design. Design weights were calculated based on the inverse of 1st and 2nd stage sample selection probabilities. Non-response adjustments mainly accounted for the cluster level response rates for ever-married and never-married women separately. The

[2] These regions include İstanbul, West Marmara, Aegean, East Marmara, West Anatolia, Mediterranean, Central Anatolia, West Black Sea, East Black Sea, Northeast Anatolia, Central East Anatolia, Southeast Anatolia.

marital status is a known information for each eligible woman owing to the household interview in which detailed information is collected for each household member. There is not any post-stratification adjustment on the final weight variable. The mean of the survey weight (V005) is 1 meaning that weights were normalized to the sample size. Both descriptive and multivariate analyses were performed taking the final weight variable into account to make inferences about the target population.

***Variables***

The variables in both descriptive and multivariate analyses are presented in Table 1. Among the key variables of the study, *preferred age at marriage* was used to identify women who stated a specific age below and above the median age at marriage in Türkiye, and women who reported that they do not want to get married.

The *preferred age at marriage* was used as a binary variable (younger than 21.4=1, 21.4 and older=0) to create an indicator of ideal age at marriage below the median age at marriage. In addition, women who reported that they do not want to get married were included in the sub-group coded as 0. The *marriage cohort* was created based on the marriage duration of women on the basis of survey year 2018. The women who have been married for 0-4 years correspond to the 2015-2018 marriage cohort, women who have been married for 5-9 years correspond to the 2011-2014 marriage cohort, women who have been married for 10-14 years correspond to the 2007-2010 marriage cohort, and so on.

The other predictors are used as control variables that might affect the preference for an ideal marriage age below 21.4 years. The *region* stands for 5 conventional demographic regions in Türkiye (HUIPS, 2019). The East region could be considered the relatively less developed part of the country while the West and Central regions are usually considered as the most developed. The *type of residence* refers to urban and rural settlements. The *ethnicity* variable was measured through the mother tongue of women including Turkish, Kurdish, and Arabic and other. The other category includes remaining ethnic groups of women, which are relatively small compared to Turkish, Kurdish and Arab women. The category for Arab women comes from the national sample of the 2018 Turkey DHS. The *welfare status* comes from the household questionnaire that asks various household assets. The wealth index was created on the

basis of household assets, and it was aggregated into 5 equal welfare levels to be included in the women data set. Lastly, the *educational level* includes five ordinal categories of education, namely no education, primary, secondary, high school, and university and higher (Table 1).

**Table 1.** Covariates in the descriptive and multivariate analyses

| Variables | Categories | Variables | Categories |
|---|---|---|---|
| Marriage cohort | Never married | Region | West |
| | 2015-2018 | | South |
| | 2011-2014 | | Central |
| | 2007-2010 | | North |
| | 2003-2006 | | East |
| | 1999-2002 | Type of residence | Urban |
| | 1995-1998 | | Rural |
| | Before 1995 | | |
| Preferred age at marriage | Younger than 21.4 years | Ethnicity | Turkish |
| | 21.4 years and older/ones who do not want to get married | | Kurdish |
| | | | Arabic and other |
| Educational level | No education | Welfare status | Lowest |
| | Primary | | Low |
| | Secondary | | Middle |
| | High school | | High |
| | University and higher | | Highest |

***Statistical Analyses***

The descriptive analysis technique, including percentage distributions, and the logistic regression analysis as a multivariable analysis technique were used to obtain information for the study objectives using the women data set of the 2018 Turkey DHS. The impact of marriage cohort on the relative risk of reporting a preferred age at marriage below the median age at marriage was examined with the binary logistic regression analysis technique. The estimation procedure of this technique is based on Pseudo-Maximum Likelihood Estimation. Relationships between the binary variable and a set of predictors, including marriage cohort, will be assessed through estimated odds ratios. The binary dependent variable that denotes preference for an ideal marriage age as follows:

| Values | Subgroups of women |
|---|---|
| 1 | Women who preferred age at marriage below the median age at marriage (21.4 years) |
| 0 | Women who preferred age at marriage older than the median age at marriage and women who do not want to get married |

In the descriptive part of the study, the distribution of preference for an ideal age at marriage below 21.4 years among women in the study population was examined according to background characteristics of women.

Both descriptive and multivariate analyses were conducted using R Studio-Version 2024.04.2 within the appropriate packages (*survey, tidyverse, haven, dplyr, ggplot2*). The complex sample design features of the 2018 Turkey DHS, namely stratum, cluster and weight variables, were incorporated into descriptive (*svyby* function) and multivariate analyses (*svyglm* function). The estimated coefficients were then visualized to better understand the potential effect of covariates on the outcome.

Design effects were estimated for the proportion of women reporting a preferred age at marriage below the median age at marriage among all women by background characteristics (*deff* function). The estimated design effects were interpreted to understand variance inflation through the complex sample design rather than simple random sample (SRS) design with the same sample size. The Taylor series linearization (TSL) technique, the default option in the *survey* package, was adopted as a variance estimation method. Hence, linearized standard errors were presented for both descriptive proportions and regression coefficients of predictors. Moreover, confidence intervals that demonstrate the precision of each proportion were presented (*confint* function).

The final model was employed to evaluate relative risk of reporting a preferred age at marriage below the median age at marriage in Türkiye with a set of covariates in Table 1 (*quasibinomial* family type within *svyglm* function). Before the final logistic model, the significance of each predictor on reporting a preferred age at marriage below 21.4 years was assessed using design adjusted Wald-test technique (*regTermTest* function). Further, these types of relationships were tested with the Rao-Scott F-statistic. The exponential forms of regression coefficients were estimated to make inferences about the likelihood of reporting a preferred age at marriage below 21.4 years (*exp* function).

## RESULTS

### *Descriptive Results*

Table 2 shows the distribution of reporting a preferred age at marriage below 21.4 years among women in the study subpopulation according to certain background characteristics. Overall, approximately 23% of those preferred an age to get married before the 21.4 years of age.

Clearly, the prevalence of reporting a preferred age at marriage below the median age at marriage decreases as the marriage cohorts become younger. The design adjusted proportions indicate that the preference for an age at marriage below 21.4 years are more common among women who married before 1995 (38%) as opposed to never married women (10%), and women who married between 2011 and 2014 (23%). The prevalence of reporting a preferred age to get married below the median age at marriage among women who live in rural areas (31%) is higher than for those who live in urban areas (20%). The proportion of reporting an ideal marriage age below 21.4 years is the highest among women who live in the East region (30%). This proportion is estimated to be 28 percent in the South region.

The percentage of reporting a preferred age to get married below the median age at marriage for the Arabic subpopulation (49%) is more than twice the percentage for the Turkish subpopulation (20%). There is a clear pattern that the proportion of reporting a preferred age to get married below the median age at marriage decreases with the educational level. The prevalence of this statement is around 5% among women who have university and higher degree whereas it increases up to 43% among uneducated women. A similar pattern is also seen for the proportion of reporting a preferred age to get married below 21.4 years by welfare levels (36% for women with the lowest welfare, 10% for women with the highest welfare) (Table 2).

The linearized standard errors of the estimated proportions range between approximately 0.01 and 0.05. This refers to gaining quite high precision for estimated proportions. Looking at the design effects (*deff*) for each proportion, the complex sample design of the survey increased the variance of the reporting a preferred age to get marriage below the median age at marriage proportion 2.2 times compared to SRS design with the same sample size. Moreover, the complex sample design of the 2018 Turkey DHS decreased efficiency by 1.15 (highest welfare status) and 2.66 (East region) times for the preference for an age to get married below the median age at marriage proportion by background characteristics (Table 2).

**Table 2.** Complex sample design adjusted estimates of 'reporting a preferred age to get married below the median age at marriage' proportions among women by certain characteristics, Türkiye 2018

| **Preference for an age to get married below the median age at marriage** | | | | | |
|---|---|---|---|---|---|
| | **Reporting a preferred age to get married below 21.4 years** | **Reporting a preferred age to get married older than 21.4 years or unwilling to get married*** | **Linearized standard error** | **Confidence Interval 95%** | **Design effect** |
| **Total population** | 0.23 | 0.77 | 0.01 | (0.21; 0.24) | 2.20 |
| **Marriage cohort** | | | | | |
| Never married | 0.10 | 0.90 | 0.01 | (0.08; 0.12) | 2.03 |
| 2015-2018 | 0.25 | 0.75 | 0.02 | (0.21; 0.29) | 1.50 |
| 2011-2014 | 0.23 | 0.77 | 0.02 | (0.19; 0.26) | 1.32 |
| 2007-2010 | 0.25 | 0.75 | 0.02 | (0.22; 0.28) | 1.46 |
| 2003-2006 | 0.30 | 0.70 | 0.02 | (0.27; 0.34) | 1.48 |
| 1999-2002 | 0.30 | 0.70 | 0.02 | (0.26; 0.34) | 1.64 |
| 1995-1998 | 0.35 | 0.65 | 0.02 | (0.30; 0.39) | 1.44 |
| Before 1995 | 0.38 | 0.62 | 0.04 | (0.31; 0.46) | 1.37 |
| **Region** | | | | | |
| West | 0.19 | 0.81 | 0.01 | (0.17; 0.21) | 2.06 |
| South | 0.28 | 0.72 | 0.02 | (0.25; 0.32) | 1.27 |
| Central | 0.23 | 0.77 | 0.01 | (0.20; 0.26) | 1.79 |
| North | 0.14 | 0.86 | 0.01 | (0.12; 0.17) | 1.23 |
| East | 0.30 | 0.70 | 0.02 | (0.27; 0.34) | 2.66 |
| **Type of residence** | | | | | |
| Urban | 0.20 | 0.80 | 0.01 | (0.19; 0.22) | 2.13 |
| Rural | 0.31 | 0.69 | 0.01 | (0.28; 0.34) | 2.17 |
| **Ethnicity** | | | | | |
| Turkish | 0.20 | 0.80 | 0.01 | (0.18; 0.21) | 2.07 |
| Kurdish | 0.31 | 0.69 | 0.02 | (0.28; 0.35) | 1.69 |
| Arabic | 0.49 | 0.51 | 0.05 | (0.39; 0.60) | 1.81 |
| Other | 0.28 | 0.72 | 0.04 | (0.19; 0.37) | 1.73 |
| **Educational level** | | | | | |
| No education | 0.43 | 0.57 | 0.03 | (0.38; 0.48) | 1.80 |
| Primary | 0.35 | 0.65 | 0.01 | (0.33; 0.38) | 1.51 |
| Secondary | 0.32 | 0.68 | 0.02 | (0.29; 0.35) | 1.39 |
| High school | 0.14 | 0.86 | 0.01 | (0.12; 0.16) | 1.42 |
| University and higher | 0.05 | 0.95 | 0.01 | (0.04; 0.07) | 1.32 |
| **Welfare status** | | | | | |
| Lowest | 0.36 | 0.64 | 0.02 | (0.32; 0.39) | 1.78 |
| Lower | 0.30 | 0.70 | 0.01 | (0.27; 0.33) | 1.53 |
| Middle | 0.24 | 0.76 | 0.01 | (0.21; 0.26) | 1.22 |
| Higher | 0.19 | 0.81 | 0.01 | (0.16; 0.22) | 1.81 |
| Highest | 0.10 | 0.90 | 0.01 | (0.08; 0.12) | 1.15 |

*Women who reported that they do not want to get married were included in this group since they did not report a particular age to get married below the median age at marriage. This group of women accounts for only 8% of the total.

***Multivariate Results***

Table 3 shows the design adjusted logistic regression analysis results of reporting a preferred age to get married below the median age at marriage for women in the study subpopulation. The design adjusted Wald tests were performed to identify influential predictors of the incidence of child marriage. The selected predictors, namely *marriage cohort, region, type of residence, ethnicity, educational level* and *welfare status* are significantly associated with the preference for an age to get married below the median age at marriage indicator. In line with these results, all predictors were included in the final logistic model although the main focus of the study is on the marriage cohorts.

The estimated odds ratios were slightly higher for women in the older marriage cohorts relevant to women in the younger marriage cohorts. The odds of reporting a preferred age at marriage below 21.4 years were considerably higher for women in the 1995-1998 marriage cohort (OR=2.48, $p<0.0001$) and before 1995 marriage cohort (OR=2.46, $p<0.0001$) compared with the never married women. The women in the 2003-2006 and 2015-2018 marriage cohorts are also more likely to report a preferred age at marriage younger than 21.4 years (OR=2.25 and 2.47, $p<0.0001$) relative to the never married women (Table 3).

Compared to the West region, the odds of preferring an age to get married below the median age at marriage for the Central and East regions in Türkiye were significantly increased (OR=1.27 and 1.22, $p<0.001$ and $p<0.01$, respectively). In other words, residing in the Central and East regions raise the odds of reporting an ideal age to get married below 21.4 years approximately 27% and 22%, when the other predictors are held constant. The odds of reporting a preferred age to get married below the median age at marriage for Arabic women were significantly increased compared with Turkish women (OR=2.41, $p<0.0001$) (Table 3).

The odds of reporting a preferred age to get married above 21.4 years were more than 1.84 times higher for women who have university or higher degree of education compared with uneducated women ($p<0.0001$). Compared to women with the lowest welfare level, the odds of preferring an age to get married below 21.4 years were

significantly decreased for women with the higher welfare levels. For instance, the odds of reporting a preferred age to marry below the median age at marriage were 1.51 times lower for women in the highest welfare level relative to women with the lowest welfare level ($p<0.0001$).

Looking at the complex sample design effects on regression coefficients, linearized standard errors ranged between 0.08 (Central region and rural residence) to 0.19 (other ethnicity) for the estimates.

**Table 3.** Complex sample design adjusted estimates of logistic regression analysis on the risk of 'reporting a preferred age to get married below the median age at marriage' – Odds ratios, linearized standard errors, *p* values, and design adjusted Wald F-test statistics for each predictor

| Predictor | Category | $e^{\beta}$ | se($\beta$) | p(t>\|t\|) | Wald F-test statistics |
|---|---|---|---|---|---|
| **Intercept** | | 0.32 | 0.17 | p<0.0001 | |
| **Marriage cohort** | | | | | |
| | Never married (.ref) | - | - | | |
| | 2015-2018 | 2.47 | 0.12 | p<0.0001 | F(1,728)=187.15 p=<2.22e-16 |
| | 2011-2014 | 1.75 | 0.12 | p<0.0001 | |
| | 2007-2010 | 1.81 | 0.11 | p<0.0001 | |
| | 2003-2006 | 2.25 | 0.12 | p<0.0001 | |
| | 1999-2002 | 2.14 | 0.12 | p<0.0001 | |
| | 1995-1998 | 2.48 | 0.13 | p<0.0001 | |
| | Before 1995 | 2.46 | 0.18 | p<0.0001 | |
| **Region** | | | | | |
| | West (.ref) | - | - | - | |
| | South | 1.19 | 0.10 | p<0.05 | F(1,728)=15.34 p=1.6408e-05 |
| | Central | 1.27 | 0.08 | p<0.001 | |
| | North | 0.60 | 0.16 | p<0.001 | |
| | East | 1.22 | 0.09 | p<0.01 | |
| **Type of residence** | | | | | F(1,728)=45.03 p=3.897e-11 |
| | Urban (.ref) | - | - | - | |
| | Rural | 1.13 | 0.08 | 0.11 | |
| **Ethnicity** | | | | | |
| | Turkish (.ref) | - | - | - | F(1,728)=36.45 p=2.4931e-09 |
| | Kurdish | 1.02 | 0.09 | 0.859 | |
| | Arabic | 2.41 | 0.16 | p<0.0001 | |
| | Other | 1.16 | 0.19 | 0.432 | |
| **Educational level** | | | | | |
| | No education (.ref) | - | - | - | |
| | Primary | 0.85 | 0.11 | 0.131 | F(1,728)=449.32 p=<2.22e-16 |
| | Secondary | 0.86 | 0.13 | 0.234 | |
| | High school | 0.42 | 0.14 | p<0.0001 | |
| | University and higher | 0.16 | 0.17 | p<0.0001 | |

| | | | | | |
|---|---|---|---|---|---|
| **Welfare status** | Lowest (.ref) | - | - | - | |
| | Low | 0.94 | 0.09 | 0.512 | F(1,728)=202.90 |
| | Middle | 0.81 | 0.10 | p<0.01 | p=<2.22e-16 |
| | High | 0.75 | 0.12 | p<0.01 | |
| | Highest | 0.49 | 0.14 | p<0.0001 | |

Figure 1 clearly shows the magnitude and direction of the complex sample design adjusted odds ratios for each predictor included in the model. In addition, the marginal effects for being never married for each category of the marriage cohort variable on the preference for a marriage age below 21.4 years show the significant differences between cohorts (Figure 2).

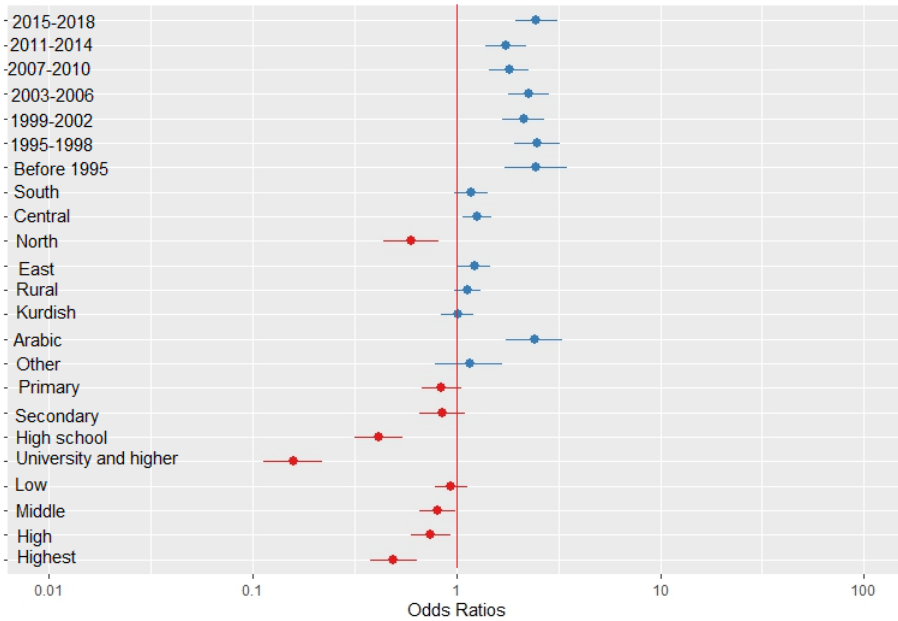


**Figure 1.** Complex sample design adjusted estimates of logistic regression analysis on the risk of 'reporting a preferred age to get married below the median age at marriage' – Odds ratios, for each predictor

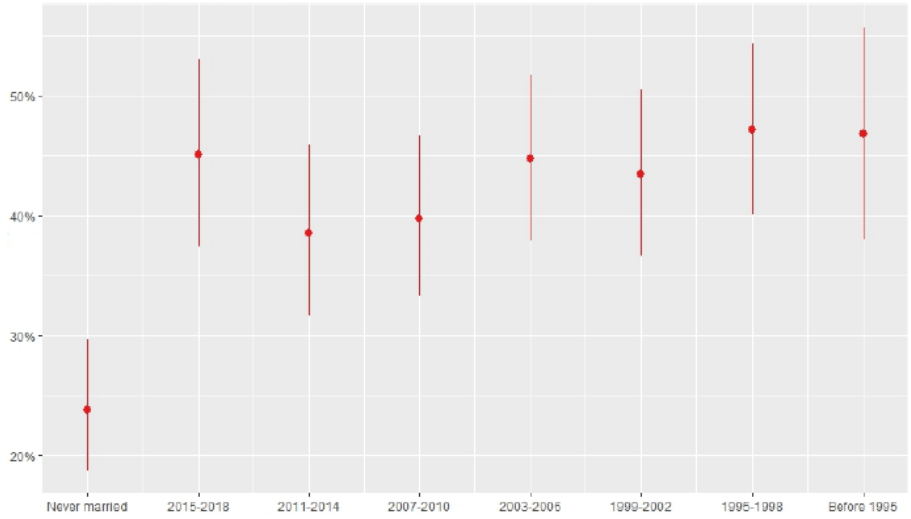


**Figure 2.** Complex sample design adjusted marginal effects of being never married for each category of the marriage cohort variable on the reporting a preferred age to get married below the median age at marriage

## CONCLUSION AND DISCUSSION

This paper presents statistical evidence about the impact of marriage cohorts on the risk of preferring an age to get married below 21.4 years for the subpopulation of women 15-49 years old. The present study also evaluates various factors that might affect the relative risk of this preference in Türkiye for the year 2018. Therefore, the findings may be utilized for understanding the increasing trend of age at marriage over the years and planning to eliminate or reduce adverse effects of child marriages among women. Both descriptive and multivariate analyses were carried out taking complex design features into account as well as weighting. The main motivation behind that was making accurate interpretations about the target population on the basis of design adjusted proportions and regression coefficients. The design effects that were estimated for key statistics (proportions) show the variance inflation on the estimated proportions because of the complex sample design. The standard errors of the proportions and model parameters (regression coefficients) could be interpreted as the errors due to selecting a sample from the whole population.

Study findings indicate that a considerably high proportion of women in Türkiye preferred an age to get married before the 21.4 years of age (23%). Moreover, older marriage cohorts are more likely to report an ideal age at marriage below the median

age at marriage compared with younger marriage cohorts. In a general manner, this result refers to changing marriage practices and increasing trend of age at marriage over the years in Türkiye (19.0 in 1993, 20.8 in 2008; 21.4 in 2018). These results also show us a relationship between the ideal age at marriage and the actual age at marriage in the country. The increase in the actual age at marriage for women in Türkiye, which is about 2.4 years over the period studied, could mainly be attributable to the increase in years of education over time. Moreover, starting from earlier times, researchers are building bridges between late marriages or low marriage rates and the modernisation theory for countries (Evans, 1980; Malhotra & Tsui, 1996; Zang & Kwan, 2006). In this regard, the policies should be shaped according to marriage practices, family planning and reproductive health behaviors, age at first marriage, and age at first birth among women over time.

When we evaluate the controlling factors, the likelihood of reporting a preferred age at marriage below 21.4 years is significantly affected by regional, ethnical, educational and welfare level differences among women. Compared to the West region, the Central and East regions had significantly higher odds of reporting lower ages to get married. In a similar way, Arabic women are more likely to prefer an ideal age at marriage below the median age at marriage compared to Turkish women. This could be attributable to different cultural norms among ethnic groups in the East and Central regions compared to the West region. Furthermore, women with less education and lower welfare levels appear to have higher tendency to prefer an age to get married below 21.4 years. In particular, the likelihood of reporting a preferred age to get married above 21.4 years were more than 1.8 times higher for women who have university or higher degree of education compared with uneducated women.

These significant results could be associated with the lower socio-economic status among these women. In light of these findings, planning policies intended for women who live in less developed regions, women with less education and lower socio-economic level would be important.

This study is expected to provide an example for the analyses and results to be presented using data collected from a sample selected using a complex design. This is essential for making accurate interpretations based on empirical results for sub-populations within the overall population.

The study calls for future studies that examine socio-economic indicators in terms of reporting a preferred age at marriage younger than the median age at marriage. This leads to a better understanding of the preference for an age to get married before the median age at marriage and making evidence-based policies. Furthermore, the qualitative studies that use focus group or in-depth interview methods would be insightful to understand traditional and societal norms behind the marriages in Türkiye.

**REFERENCES**


2018 Turkey Demographic and Health Survey Data. (2019). The DHS Program. https://tnsaveri_tdhsdata.hacettepe.edu.tr/request.php

Carlson, D. L. (2012). Deviations from desired age at marriage: Mental health differences across marital status. *Journal of Marriage and Family*, *74*(4), 743-758. https://doi.org/10.1111/j.1741-3737.2012.00995.x

Evans, R. J. (1980). Modernization theory and women's history. *Archiv für Sozialgeschichte, 20*, 492-514.

Ghorbani, Z., & Torabi, F. (2021). Changes in the ideal age at marriage in Iran and its determinants between 2004 and 2015. *Journal of Population Association of Iran*, *16*(31), 33-59. https://doi.org/10.22034/JPAI.2022.136091.1161

Heeringa, S. G., West, B. T., & Berglund, P. A. (2017). *Applied Survey Data Analysis*. Chapman and hall/CRC.

HUIPS. (2019). *2018 Turkey Demographic and Health Survey*. Hacettepe University Institute of Population Studies, T.R. Presidency of Turkey Directorate of Strategy and Budget and TUBITAK. Ankara.

Malhotra, A., & Tsui, A. O. (1996). Marriage timing in Sri Lanka: The role of modern norms and ideas. *Journal of Marriage and the Family*, *58*(2), 476-490. https://doi.org/10.2307/353511

Plan International UK. (2020). *Ending Child Marriage*. https://plan-uk.org/about/our-work/child-marriage. Access date: 09.05.2024

Seidenberg, A. B., Moser, R. P., & West, B. T. (2023). Preferred reporting items for complex sample survey analysis (PRICSSA). *Journal of Survey Statistics and Methodology*, *11*(4), 743-757. https://doi.org/10.1093/jssam/smac040

TURKSTAT. (2024). *İstatistiklerle Çocuk 2023*. https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Cocuk-2023-53679

UNFPA. (2020). *Child, Early and Forced Marriage in Turkey. Data Analysis of Turkey Demographic and Health Surveys 1993-2018*. Sweden Sverige and Hacettepe University Institute of Population Studies. Ankara.

UNICEF. (2005). *Early Marriage A Harmful Traditional Practice: A Statistical Exploration*, https://books.google.com/books?id=FOn-h6oSVQwC&pgis=1

United Nations (UN). (2015). *Sustainable Development Goals*. https://sustainabledevelopment.un.org/?menu=1300

Zang, X., & Kwan, A. (2006). Modernization and ethnic variation in the effect of status attainment on marriage timing in urban Malaysia. *International Journal of Sociology of the Family*, *32*(1), 1-17.

**Ethics Committee Approval**

This study does not require the approval of an Ethics Committee. The study uses the women data from the 2018 Turkey Demographic and Health Survey, conducted by the Hacettepe University Institute of Population Studies.

The data sets are open for researchers to use. The data can be requested using the following link: https://tnsaveri_tdhsdata.hacettepe.edu.tr/request.php