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Determinants of Miscarriage and Induced Abortion Among Married Syrian Refugee Women in Türkiye: A National Population-Based Study

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Original Research

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Abstract

Objective: Syrian refugee women face numerous obstacles that impact their reproductive health. The aim is to assess prevalence and predictors of miscarriage and induced abortion among Syrian refugee women in Türkiye.

Methods: This study is a cross-sectional analysis based on data from 1886 Syrian refugee women aged 15-49 who have a history of marriage, obtained from the 2018 Türkiye Demographic and Health Survey – Syrian Migrant Sample. Univariate Chi-square, independent t-test, and multivariate logistic regression were performed to determine predictors of abortion and miscarriage.

Results: Among ever married Syrian refugee women, 27.3% (n = 514) experienced at least 1 miscarriage, 5% (n = 95) reported having at least 1 abortion. Mean maternal age was predicted with miscarriage and induced abortion (OR = 1.06 [CI: 1.04-1.08; $P < 0.001$] and OR = 1.08 [CI: 1.04-1.12; $P < 0.001$] respectively). Women in the southern/eastern region of Türkiye experienced 4.24 times (95% CI = 1.50-12.02; $P < 0.01$) more abortions than in the western/central region. Women who are related to their spouses had an abortion 1.91 times (95% CI = 1.06-3.43; $P < 0.05$) more frequently than non-related couples.

Conclusions: The rate of miscarriages and induced abortions is high among Syrian refugee women in Türkiye. Regional differences, maternal age, and marriage between relatives have been identified as important variables that need to be taken into consideration. Interventions concentrating on those elements by the bodies concerned may thereby lessen the burden and effects of abortion and miscarriage.

Reproductive health includes having a pleasant and safe sexual life, being able to procreate, and having the choice of when and how often to do so.[1] Maternal health is an essential feature of this paradigm, concentrating on the health of women during pregnancy, childbirth, and the postpartum period. Abortion and miscarriage are major causes of maternal mortality and occurrence worldwide, and they place heavy physical, mental, and social burdens on women who are of reproductive age.[2] These unfavorable pregnancy outcomes continue to be a significant public health problem, especially in low- and middle-income nations where access to competent care is limited and health care systems are frequently underfunded.[3] Especially, migration-related deterioration of living conditions has had a detrimental impact on women's access to health care, particularly family planning and reproductive health services.[4]

Türkiye, Lebanon, Iraq, and Jordan are the immediate host countries for Syrian refugees. Around 5.7 million Syrians were forced to flee their nation after the crisis in 2011, and 6.2 million were displaced. With 3.6 million refugees, Türkiye is currently home to the most Syrian refugees, for whom the Turkish State has established a "temporary protection" status.[5,6] According to demographic studies, this population is considerably younger than that of Türkiye and there are signs of a high fertility rate.[7] According to the 2018 Türkiye Demographic and Health Survey, the total fertility rate of Syrians in Türkiye is 5.3, which is higher than both the Turkish population and Syrian fertility rates prior to the war. The percentage of those related to their spouses was 46% and marriages between children under the age of 18 are common (38%). The average age at first marriage was determined to be between 18 and 20.[8]

Miscarriage and abortion are the terms used to describe the termination of pregnancy at any point during gestation, whether it is intentional (elective or clinically recommended; abortion) or spontaneous (miscarriage). While maternal abortion includes both elective and medically recommended terminations at any gestational age, miscarriage refers primarily to the unplanned

loss of pregnancy before 24 weeks of gestation.[9] Due to the rising number of unsafe abortions and the ensuing rates of morbidity and mortality, the government of Türkiye liberalized abortion laws and increased access to the procedure in the early 1980s. In Türkiye, pregnancy can be legally ended up until the end of the 10th week, beyond which it can be legally ended if medically necessary.[10] Since then, induced abortions have been available at private facilities and at government hospitals for a small cost. Significant improvements have been made to make it easier for Syrian refugees to get medical care. Regulations were first implemented in the 10 provinces that housed temporary shelter centers; eventually, the right to free health care was extended to all provinces. Currently, Syrians living in Türkiye can receive medical care at the Ministry of Health's hospitals and migrant health centers.[11]

Syrian refugee women face numerous obstacles that impact their reproductive health. Morbidity and mortality risks for mothers and infants are greatly increased due to higher risks of mental health conditions such as postpartum depression and restricted access to basic reproductive health services.[12] The difficulties faced by women in such displaced groups are frequently made worse by overlapping vulnerabilities, such as gender inequality and cultural obstacles. They are more susceptible to poor reproductive health due to their limited participation in household decision-making, limited access to and influence over domestic resources (physical and monetary assets), inadequate skills and knowledge, and limited mobility.[13] Research determining unmet needs for family planning among Syrian refugee women living in Türkiye showed that the absence of autonomy among women in decision-making increased the likelihood of unmet needs for family planning by approximately 3 times.[14] Furthermore, the high prevalence of sexual assault and early and forced marriages contribute to the higher rates of unwanted pregnancies among Syrian refugee women and girls.[15] Early marriage, limited contraceptive use, sexual violence, and gender-based violence have all been reported by Syrian refugee women in Türkiye.[16] In addition to these, pregnant women in their host countries face challenges relating to their reproductive health, such as language barriers, unfamiliarity with regional health care systems, and immigrant status.[17]

In order to fulfill the third Sustainable Development Goal (SDG), which aims to lower the maternal mortality ratio to fewer than 70 per 100 000 live births, a number of nations have committed themselves to achieving this.[18] Although the sustainable development goals have set targets directly on maternal and infant mortality (SDG 3), it would be misleading to limit maternal health and infant health to a single target. Maternal health is shifting its emphasis from survival to fostering lifelong health and well-being. A comprehensive and integrated approach centered on a good treatment experience is necessary for this enlarged focus.[19] This expanded vision for maternal health is purposefully intended to converge and integrate with the integrative efforts toward the SDGs.[20] Achieving SDG 3 necessitates all-encompassing intervention strategies on reproductive health for all women, including Syrian refugee women. Miscarriage and induced abortion are important markers of reproductive health and may contribute to maternal morbidity and mortality, but little is known about their occurrence and predictors in this population. By addressing these gaps through a national, population-based analysis, policymakers can develop targeted preventative and intervention programs by having a better understanding of predictors of miscarriage and induced abortion among Syrian refugee women. However, there is a lack of quantitative population-based studies that systematically examine the predictors of miscarriage and abortion outcomes among Syrian refugee women, such as sociodemographic factors, marriage patterns, or access to reproductive health services in the literature. There are insufficient statistics on maternal and newborn mortality among Syrian refugees in Türkiye.[16] While there have been some small-scale studies on reproductive health among Syrian refugee women in Jordan,[21] Lebanon,[22] and Türkiye,[23–25] a comprehensive community-based study representing the entire population of Syrian refugee women is currently unavailable. These studies have either been conducted with very small groups or relied on data obtained from medical records. Therefore, this national population-based study will make a valuable contribution to the existing literature by identifying predictors of miscarriage and induced abortion among Syrian refugee women.

This study aims to assess the prevalence and predictors of miscarriage and induced abortion among Syrian refugee women in Türkiye. By determining factors associated with miscarriage and abortion among Syrian refugee women, this study will help achieve SDG targets and provide information for successful intervention initiatives that may improve maternal health outcomes and lower the risk of maternal death in displaced communities.

Methodology

Data

This cross-sectional study analyzed data from the 2018 Türkiye Demographic and Health Survey (2018 TDHS)-Syrian Migrant Sample; the first survey with a representative sample to provide household-level demographic and health information about the Syrian migrant population in Türkiye. The 2018 TDHS-Syrian Migrant Sample survey was specifically developed to provide detailed estimates of key demographic and health metrics for Syrians residing in Türkiye. Its primary goal was to collect household-level data on mother and child health indicators within the Syrian refugee community in Türkiye. The 2018 TDHS-Syrian Migrant Sample was conducted by Hacettepe University Institute of Population Studies, and it is available for researchers based on reasonable request.[8,26]

Sample

Due to a unique sample frame and a lack of data on the Syrian community, the 2018 Turkish Demographic and Health Survey (TDHS) sample design that focused on the Syrian population in Türkiye was different from the national sample design. The 2018 TDHS-Syrian Migrant Sample design included a multi-stage, stratified cluster sampling technique for the Syrian community residing in Türkiye. The target sample size of the 2018 TDHS-Syrian Migrant Sample was set at 2000 households to be interviewed in 100 clusters. This sample size was determined to ensure an acceptable level of precision for core indicators that could be compared with those obtained from the national sample. Fifteen of the clusters were selected from the camps, and 85 were selected outside camps, from quarters. At the time of the listing phase of the survey, 1826 households were occupied and successfully interviewed. The TDHS-Syrian Migrant Sample involved 2216 women aged 15-49 from the 1826 households.

In this further analysis, we chose to have marital history as an inclusion criterion to minimize missing data. Women without marital history were excluded because there were no reported cases of miscarriages or induced abortions in this group. Consequently, 330 women without a marital history were excluded, resulting in a final sample of 1886 women for the analysis in this study.

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Fieldwork

The TDHS-Syrian Migrant Sample data was collected between November 2018 and February 2019 by 3 teams. Each team was comprised of 6 people who were bilingual Turkish and Arabic speakers: 3 female interviewers, a male measurer, a female listing staff member, and a team supervisor. The interviews, conducted on tablets, were initially transferred to the team supervisor using Bluetooth technology. The supervisor then forwarded them to the central data system.

Survey

Within the scope of TDHS-Syrian Migrant Sample, 2 Arabic-language questionnaires, the Household Questionnaire, and the Women's Questionnaire, were tailored from the TDHS Program's Model Questionnaires to address Türkiye-specific population and health concerns. The surveys were translated using both Arabic and Latin alphabets, as some of the field staff members whose native tongue was Arabic were unable to read the Arabic alphabet.

The Household Questionnaire served a dual purpose: firstly to gather demographic details such as age, gender, education, marital status, and relationship to the head of the household for all members of the selected households. This initial section aimed to identify women eligible for further participation in the Individual Survey. The second part of the survey focused on collecting comprehensive data regarding the socioeconomic status of these households.

The Women's Questionnaire is tailored for women aged 15-49 and addresses a wide range of topics. These include personal and household characteristics, migration patterns, reproductive health such as pregnancy and fertility preferences, history of miscarriage and abortion, and contraceptive knowledge and use. It also gathers information on antenatal and postnatal care, breastfeeding practices, child nutrition, immunization, and early childhood development. Additionally, it explores marriage history, women's work and status, and the background of their husbands. Anthropometric data for both women and children are also recorded to provide a comprehensive overview of health and well-being.

Variables

The variables in this study were chosen based on a literature review.[27–35] Predictors anticipated to be correlated with miscarriage and induced abortion among females of childbearing age were selected from the TDHS-Syrian Migrant Sample data set. The 2018 TDHS-Syrian Migrant Sample survey asked women to report any pregnancy loss that had occurred during their lives. Respondents were asked if they had ever had spontaneous abortions (miscarriages) or induced abortions (on-request pregnancy termination). The possible responses to each of the 2 questions were "yes" if the respondent had miscarriage or induced abortion, or "no" if the respondent had not experienced either. Hence, each response variable is a dichotomous variable with possible values 1 (yes) and 0 (no).

This study tested associations between miscarriage and 14 demographic and socioeconomic aspects of participants' lives. These aspects are age;[27–29] region;[30,31] marital status; participant's education;[32] husband's education; family endogamy; unintended pregnancy; prenatal care with doctor, nurse, and/or midwife;[33] television availability in the household;[34] history of stillbirth;[29] and duration of amenorrhea.[35] The same independent variables were used for induced abortion, except for prenatal care with doctor and midwife, television availability in the household, and duration of amenorrhea.

Some of the independent variables were coded as multichotomous variables in the original dataset. For the purpose of our study, these variables were transferred into dichotomous variables. In the TDHS-Türkiye sample, Türkiye has been divided into 5 parts (Central, North, South, West, and East). However, in the Syrian sample, data was collected only from the Central, Eastern, Western, and Southern regions since the number of Syrian immigrants in the North was very low. We reclassified the districts, merging Central and West into Central/West, and South and East into South/East. While this may have an impact on the outcomes, this was necessary due to low-frequency values in some regions during the analysis. We took regional reproductive health indicators similarities (fertility rate, modern contraceptive prevalence, adolescent pregnancy rate)[22] into account when merging the groups. Similarly, the possible responses to television availability were "yes," "no," and "not a legally recognized resident" and, hence, both "no," and "not a legally recognized resident" were grouped and considered as "no." In addition, the marital status of the respondents widowed, divorced, and no longer living together/separated were categorized into one category, as "unmarried." Likewise, women's and husbands' education were reorganized merging "no education" and "incomplete primary" into "not educated" and "complete primary," "incomplete secondary," "complete secondary," and "higher" into "educated."

Analysis

Data was analyzed using SPSS software, version 24. Skewness and kurtosis values with histogram charts were utilized to assess the normality of the data distribution. Descriptive statistical analyses were performed to explore clinical and sociodemographic characteristics. The Chi-square and independent sample t-test were applied to evaluate the relationship between dependent variables (miscarriage and abortion) and independent variables. Binary logistic regressions (enter method) were run to determine independent predictors of miscarriage and abortion. Variables with a P value below 0.20 in binary analysis were included as independent variables in logistic regression. Despite not meeting the P value threshold, "family endogamy" was also incorporated into the model for miscarriage due to its perceived clinical significance. The Hosmer-Lemeshow test was used to assess the model assumption, and Nagelkerke R-squared values provided insights into the explanatory power of the models. Values of P of less than 0.05 were taken as significant in all analyses.

Ethical Consideration

Hacettepe University Ethics Commission reviewed and approved the TDHS-2018, and informed written consent was obtained from all interviewed women in the original study (35853172-100-E.00000245344). Official permission for secondary analysis of the collected TDHS-Syrian Migrant Sample data was obtained from the Hacettepe University Institute of Population Studies. Ethical approval was not sought for this study, as it involved secondary analysis of publicly available, previously collected data. Additionally, the authors affirm that all procedures complied with the ethical guidelines established by national and institutional committees overseeing research involving human subjects, as well as the principles set forth in the 1975 Declaration of Helsinki and its 2008 revision.

Results

Approximately three-quarters (73.1%, n = 1379) of refugee women lived in the South and East regions, with a mean age of 26.63 years

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(SD = 8.63 years). Regarding education levels, 18.7% (n = 353) of Syrian female refugees and 10.9% (n = 202) of their husbands had no formal education.

Additionally, nearly half of the women (45.9%, n = 865) were related to their spouses. Overall, 13.4% of births/current pregnancies in the 5 years before the survey were unwanted. In Türkiye, the majority of Syrian refugee women (89.7%, n = 1095) received antenatal care from a doctor, while 3.7% (n = 45) were attended by a nurse, and 3.5% (n = 43) by a midwife for their most recent birth within the past 5 years. Among ever married Syrian refugee women, 27.3% (n = 514) had experienced at least 1 miscarriage, 5% (n = 95) reported having at least 1 abortion, and 2.9% (n = 55) mentioned having had a stillbirth (Table 1).

Binary analyses showed that maternal age, region of residence, family endogamy, and husband's education had a significant association with experiencing induced abortion ($P < 0.001$, $P = 0.001$, $P = 0.009$, and 0.037 respectively). Regarding miscarriage, maternal age and history of stillbirth was statistically significant ($P < 0.001$, and 0.031 respectively). Also, region, unintended pregnancy, prenatal care from a doctor, and smoking status were closely linked to miscarriage, with each showing a near significant level of association ($P = 0.059$, $P = 0.076$, $P = 0.09$, and $P = 0.064$ respectively) (Table 2).

The mean maternal age was 28.29 (± 9.029) years. Maternal age was significantly associated with experiencing both miscarriage and induced abortion, and older mothers were found to have a higher probability of experiencing them.

Experiencing miscarriage varied according to the women's smoking status, but this was not statistically significant ($P = 0.064$). Having had a previous stillbirth was significantly associated with experiencing miscarriage ($P = 0.031$).

The result in Table 2 shows that Southern and Eastern parts of the country had the highest percentage (6.0%) of experiencing induced abortion while the Central and Western parts had the lowest percentage (2.4%) of experiencing induced abortion in Türkiye. The husband's educational level was also associated with experiencing induced abortion. Family endogamy was also significantly associated with experiencing induced abortion in the binary analyses.

The results of logistic regression analyses displayed in Table 3 show that only maternal age was found to be significantly associated with experiencing miscarriage, while maternal age, region of residency, and familial relationship with husband were found to be significantly associated with experiencing induced abortion.

According to the model, the log of the odds of a woman experiencing a miscarriage or induced abortion was positively related to maternal age (OR = 1.062 [CI: 1.040-1.084] and OR = 1.078 [CI: 1.035-1.122] respectively). Additionally, induced abortion was significantly associated with geographical regions and family endogamy. The odds of experiencing induced abortion were significantly higher in the southern and eastern regions of Türkiye compared to the central and western parts (OR = 4.239, CI = 1.495-12.019). Additionally, women who had a familial relationship with their spouses were 1.906 times (CI: 1.057-3.434) more likely to have experienced abortion. However, these factors were not significantly associated with miscarriage. Variables such as the husband's education, smoking status, and history of stillbirth did not predict either miscarriage or abortion. Similarly, factors such as television availability, unintended pregnancy, and perinatal care with a doctor, which were analyzed only for miscarriage, were not statistically significant. Prenatal care with a nurse, analyzed only in the abortion model, was also found to have no significant relationship with abortion. Nagelkerke R-squared values were 5.6% and 9.6%, indicating that explanatory variables were useful in predicting experiencing miscarriage and induced abortion respectively.

Table 1. Sociodemographic and clinical characteristics of Syrian refugee women in Türkiye (2018, Türkiye, n = 1886)

Variable	Study group		
	Category	n	%
Sociodemographic characteristics			
Region	Central and West	**507**	**26.9**
	South and East	**1379**	**73.1**
Marital status	Married	**1770**	**93.8**
	Unmarried	**116**	**6.2**
Women education	No education	**353**	**18.7**
	Has education	**1533**	**81.3**
Husband education	No education	**202**	**10.9**
	Has education	**1656**	**89.1**
Family endogamy	Not relative	**1021**	**54.1**
	Relative	**865**	**45.9**
Smoke	Nonsmoker	**1718**	**91.1**
	Smoker	**75**	**8.9**
Television availability	Household has no television	**1595**	**86.0**
	Household has television	**259**	**14.0**
Clinical characteristics			
Unintended Pregnancy*	Wanted pregnancy	**1054**	**86.3**
	Unwanted pregnancy	**167**	**13.7**
Prenatal care with doctor*	Did not attaint care	**126**	**10.3**
	Attainted care	**1095**	**89.7**
Prenatal care with nurse*	Did not attaint care	**1176**	**96.3**
	Attainted care	**45**	**3.7**
Prenatal care with midwife*	Did not attaint care	**1178**	**96.5**
	Attainted care	**43**	**3.5**
History of stillbirth	No history	**1831**	**97.1**
	With history	**55**	**2.9**
History of miscarriage	No history	**1372**	**72.7**
	With history	**514**	**27.3**
History of abortion	No history	**1791**	**95.0**
	With history	**95**	**5.0**
	Mean (SD)		
Women age	**26.63 (8.625)**		
Duration of amenorrhea	**3.98 (4.783)**		
Total Cases		**1886**	**100**

*These variables only include those who have given birth before. Therefore, missing data appears to be high for them.

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Table 2. Binary analyses of factors associated with miscarriage and abortion among Syrian refugee women in Türkiye (2018, Türkiye, n = 1886)

Characteristics	Miscarriage n (%)		*P* value	Abortion, n (%)		*P* value
	Yes	No		Yes	No	
Region			0.059			*P* = 0.001
Central and West	122(24.1%)	385(75.9%)		12(2.4%)	495 (97.6%)	
South and East	392(28.4%)	987(71.6%)		83(6.0%)	1296 (94.0%)	
Marital status			0.321			0.612
Married	487(27.5%)	1283(72.5%)		88(5.0%)	1682(95.0%)	
Unmarried	27(23.3%)	89(76.7%)		7(6.0%)	109(94.0%)	
Women education			0.873			0.453
No education	95(26.9%)	258(73.1%)		15(4.2%)	338(95.8%)	
Has education	419(27.3%)	1114(72.7%)		80(5.2%)	1453(94.8%)	
Husband education			0.169			0.037
No education	47(23.3%)	155(76.7%)		4(2.0%)	198(98.0%)	
Has education	461(27.8%)	1195(72.2%)		89(5.4%)	1567(94.6%)	
Family endogamy			0.623			0.009
Not relative	283(27.7%)	738(72.3%)		39(3.8%)	982(96.2%)	
Relative	231(26.7%)	634(73.3%)		56(6.5%)	809(93.5%)	
Smoke			0.064			0.191
Nonsmoker	458(26.7%)	1260(73.3%)		83(4.8%)	1635(95.2%)	
Smoker	56(33.3%)	112(66.7%)		12(7.1%)	156(92.9%)	
Television availability			0.126			0.757
Household has no television	426(26.7%)	1169(73.3%)		79(5.0)	1516(95.0)	
Household has television	81(33.3%)	178(68.7%)		14(5.4)	245(94.6)	
Unintended pregnancy			0.076			0.234
Wanted pregnancy	266(25.2%)	788(74.8%)		42(4.0%)	1012(96.0%)	
Unwanted pregnancy	53(31.7%)	114(68.3%)		10(6.0%)	157(94.0%)	
Prenatal care with doctor			0.090			0.524
Did not attaint care	25(19.8%)	101(80.2%)		4(3.2%)	122(96.8%)	
Attainted care	294(26.8%)	801(73.2%)		48(4.4%)	1047(95.6%)	
Prenatal care with nurse			0.262			0.117
Did not attaint care	304(25.9%)	872(74.1%)		48(4.1%)	1128(95.9%)	
Attainted care	15(33.3%)	30(66.7%)		4(8.9%)	41(91.1%)	
Prenatal care with midwife			0.787			0.424
Did not attaint care	307(26.1%)	871(73.9%)		49(4.2%)	1129(95.8%)	
Attainted care	12(27.9%)	31(72.1%)		3(7.0%)	40(93.0%)	
History of stillbirth			0.031			0.163
No history	492(26.9%)	1339(73.1%)		90(4.9%)	1741(95.1%)	
With history	22(40.0%)	33(60.0%)		5(9.1%)	50(90.9%)	
Women age (mean [SD])*	31.92(8.48)	28.78(8.53)	0.000	34.49(8.18)	29.37(8.57)	0.000
Duration of amenorrhea [mean (SD)]*	4.18(4.84)	3.90(4.76)	0.277	3.43(4.82)	4.01(4.78)	0.289

*Independent sample t test.

Discussion

This study was intended to model predictors of experiencing miscarriage and induced abortion among women in the childbearing age group of Syrian refugees using the data from 2018 Türkiye Demographic and Health Survey.

The study showed that the percentage experiencing miscarriage and induced abortion within our sample was approximately 27.3%

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Table 3. Logistic regression analysis to determine the predictors of miscarriage and induced abortion among Syrian refugee women in Türkiye (2018, Türkiye, n = 1886)

	Miscarriage, OR (95 % CI)	Abortion, OR (95 % CI)
Women age	***1.062 (1.040–1.084)	***1.078 (1.035–1.122)
Region (Ref: Central/West)	1.035 (0.763–1.405)	**4.239 (1.495–12.019)
Husband education (Ref: no education)	1.376 (0.861–2.200)	2.556 (0.604–10.816)
Family endogamy (Ref: not relative)	0.687 (0.295–1.601)	*1.906 (1.057–3.434)
Smoke (Ref: nonsmoker)	1.315 (0.786–2.200)	1.181 (0.402–3.463)
History of stillbirth (Ref: no history)	0.687 (0.295–1.601)	0.470 (0.059–3.724)
Television availability (Ref: household has television)	0.851 (0.589–1.299)	
Unintended Pregnancy (Ref: wanted pregnancy)	0.998 (0.675–1.474)	-
Prenatal care with doctor (Ref: attainted care)	0.640 (0.397–1.032)	-
Prenatal care with nurse (Ref: attainted care)	-	0.793 (0.231–2.720)
Constant	***0.061	***0.000
Significant: * *P* <0.05, ** *P* < 0.01, * *P* < 0.001.**		

and 5.0% respectively. According to the 2018 TDHS, among Turkish women who had ever been married, around 22% had at least 1 miscarriage and 6% have experienced induced abortion.[26] Within this finding, the miscarriage rate is slightly higher, and the abortion rate is slightly lower than in Turkish society. The overall risk of miscarriage among all recognized pregnancies is roughly 15% (95% confidence interval: 12.5 to 18.7%).[36] Studies have shown that refugee populations experience greater miscarriage and abortion than do host societies.[25,37,38] A study determining health and access to health care for Syrian refugees living in Istanbul found that 23.1% of Syrian refugee women's pregnancies in Istanbul ended in miscarriage.[25] Also, a study from Lebanon aiming to review the maternal health outcomes of pregnant disadvantaged Lebanese women and refugee women showed that abortion cases accounted for 7.9% of pregnancies representing either elective or spontaneous abortion.[38]

The binary analysis revealed that among the covariates in this study, miscarriage was significantly associated with maternal age and history of stillbirth. A history of stillbirth as a kind of pregnancy loss could indicate underlying reproductive health issues that increase the risk of miscarriages in subsequent pregnancies. One explanation for this association may be the presence of maternal health conditions including autoimmune illnesses or hormonal imbalances, which have been related to both stillbirth and miscarriage.[39] Furthermore, psychological stress and emotional distress associated with stillbirth may potentially affect future pregnancy outcomes. Prenatal stress may affect hormone regulation and immune system function, which may lead to problems in subsequent pregnancy by raising the possibility of adverse birth outcomes.[40,41] Further investigation is required to better understand the long-term impacts and find potential strategies to enhance pregnancy outcomes for women with a history of stillbirth. Large-scale longitudinal studies that follow these women through numerous pregnancies may be beneficial.

On the other hand, maternal age was the only factor that was significant in multivariate analyses. The risk of miscarriage differs widely with maternal age, has a clear recurring pattern, and is particularly elevated in the wake of some unfavorable pregnancy outcomes such as a history of pregnancy loss.[28] According to a review of studies conducted at 5 clinical sites in America, the miscarriage rate is raised by 2 times for women between the ages of 35 and 39 and by 3 to 4 times for those beyond the age of 40.[27] In uncomplicated pregnancies, there may be a 50% greater risk related to a maternal age of 35 alone, even though some age-associated risk is attributed to higher incidence of maternal problems.[29] A study determining risk factors for miscarriage in Syrian refugee women living in non-camp settings in Jordan found that the adjusted odds of miscarriage were higher in women of advanced maternal age.[21] Given the association between advanced maternal age and increased miscarriage risk in this study, health care providers should prioritize preconception counseling and early prenatal care for women aged 35 and older. Offering regular monitoring during pregnancy, including more frequent ultrasound scans and early screenings for genetic abnormalities, could help detect and manage potential risks.[42]

The study revealed that maternal age, region of residency, and family endogamy were significantly associated with experiencing induced abortion in both binary analysis and multiple logistic regression analysis. A cross-sectional study of Chinese populations that determined factors associated with spontaneous abortion showed a positive relationship between educational attainment and spontaneous abortion.[32] Studies in other countries also showed this positive relationship between education and induced abortion.[33,43] Women with higher levels of education are generally more financially capable of accessing abortion services and possess greater awareness of abortion laws and service providers.[33] However, in this study, it was found that the husbands' educational attainment was the determining factor for abortion, rather than maternal educational attainment. The consistency of this finding with previous studies indicates that the male member of the home typically makes all key health care decisions in some countries.[44] This is also common in Syria, where the role specified for women was mostly child care and the husbands often have the power of choice over their wives.[45] Women experiencing induced abortion was also positively related to maternal age in this study. Pregnancy-related hypertension, gestational diabetes mellitus, cesarean birth, fetal chromosomal abnormalities, and pregnancy loss are all more common in older women than in younger ones.[46] For this reason, induced abortions may have occurred more in older women.

Regarding the region of residence, the percentage of women who had an induced abortion was highest in the South and East (6.0%),

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while the percentage in the Central and Western regions was lowest (2.4%). The Southern and Eastern regions are often linked to higher levels of poverty and they may have higher rates of abortion because of restricted access to contraception and a lack of knowledge about reproductive health. However, the richer regions, such as the Central and Western regions, may have easier access to contraceptive methods, lowering the frequency of unintended pregnancies and reducing the need for induced abortions. It is critical to identify the underlying causes of regional differences in abortion rates in order to develop regionally specific policies and to guarantee that women have equitable access to reproductive health services and assistance. In this regard, it is imperative to step in and prioritize the country's eastern and southern regions. However, experiencing miscarriage among Syrian refugee women in Türkiye did not differ significantly according to region of residency. This may be because miscarriage is primarily a spontaneous process that may be influenced by other biological and psychological factors.[47]

This study's finding of a correlation between marriage to relatives and abortion is in line with previous literature.[48–50] A community-based survey on Syrian refugee women's health and its predictors in Sanliurfa, Türkiye showed that 56% of Syrian women were married to relatives[24] Marriage to relatives can increase the risk of genetic deficiencies which may cause pregnancy problems, especially when close family members are involved.[48] Medical decisions such as induced abortions may result from these issues. Public education of the genetic hazards of consanguinity can assist people in making well-informed choices regarding family planning and marriage.

We have also tested the effect of prenatal care with a doctor, with a nurse, and with a midwife on miscarriages and induced abortions. However, these variables did not present significant association with miscarriages and induced abortions. This result is striking for this study. A research finding revealed that lack of prenatal care had positive association with pregnancy loss.[32] Also, a study conducted at 20 primary health care centers in Lebanon, including Ministry of Public Health and United Nations Relief and Works Agency for Palestine refugees facilities, found that women with a history of abortion were more likely to have fewer antenatal care visits, and completing less than the recommended number of ANC visits was associated with higher rates of abortion.[25] These studies reveal a relationship contrary to our findings. Therefore, larger studies are needed to interpret this in greater detail.

In this study, we chose television availability in the household as an indicator of social status. No significant associations with miscarriages and abortions were found in this study. It is commonly known that a person's socioeconomic status (SES), which is determined by their degree of wealth, education, and their occupation, affects their health. Such socioeconomic considerations have an impact on pregnancy outcomes as well as the health and life expectancies of the pregnant woman. Low SES individuals are more prone to engage in dangerous behavior patterns and have less access to medical treatments,[51] given the fact that other indicators may be more representative, such as wage, none of which are present in the data set.

Limitations of the Study

The study does have some limitations, although it makes valuable contributions to the literature. Firstly, it relies on data from the 2018 TDHS-Syrian Migrant Sample for its secondary analysis. The variables used in the study are confined to those available within this dataset. It is likely that other variables, not included in this dataset, also influence miscarriages and abortions. Secondly, women's histories were self-reported, so there is a risk of information and recall bias. Furthermore, these results are not applicable for other refugees worldwide and only apply for the study population.

A constraint of this research is the comparatively low Nagelkerke R-squared values, which were 9.6% for induced abortion and 5.6% for miscarriage. These numbers imply that the models only account for a minor portion of the variation in these outcomes, suggesting that the results could be influenced by additional unmeasured or unaccounted-for factors. The Syrian refugee sample was included in the TDHS 2018 research for the first time in Türkiye. This data is very valuable in terms of determining the current situation and predictors of abortion and miscarriage regarding the reproductive health of Syrian refugee women in Türkiye. Furthermore, the study's nationally representative framework and outstanding sampling strategy provide a very trustworthy representation for Türkiye of induced abortions and miscarriages among Syrian refugee women presently.

Conclusion

The rate of miscarriages and induced abortions is high among Syrian refugee women in Türkiye. Geographical location, family endogamy, and maternal age are all linked to induced abortion. Miscarriage is linked to maternal age. Interventions concentrating on those elements by the concerned bodies may thereby lessen the burden and effects of abortion and miscarriage. These variables should be decisive in the reproductive health services and training to be provided and should be included in the programs. Further studies are needed including immigrants' and refugees' abortion and miscarriage experiences and risk factors.

Data availability statement. Data is available partially at https://hips.hacettepe.edu.tr/en/menu/demographic_and_health_survey_serie-101. This study used the 2018 Türkiye Demographic and Health Survey (2018 TDHS)-Syrian Migrant Sample. The 2018 TDHS was conducted by Hacettepe University Institute of Population Studies. Data collection and entry took place from October 2018 to February 2019 with a nationally representative sample of 2216 Syrian-refugee women in the 15-49 age group.

Author contribution. EIO, MG, EK, AÖ, and RCD contributed to study design. EIO and MG crafted the manuscript and EK executed data analyses. EIO, MG, EK, AÖ, and RCD supervised the study process and amended the manuscript. EIO, MG, EK, AÖ, and RCD critically revised and approved the final version of the manuscript.

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References

1. **World Health Organization (WHO)**. Sexual health and its linkages to reproductive health: an operational approach. 2017. Accessed March 25, 2024. https://iris.who.int/bitstream/handle/10665/258738/9789241512886-eng.pdf?sequence=1
2. **Alkema L**, **Chou D**, **Hogan D**, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *Lancet*. 2016;**387**(10017): 462–474.

3. **World Health Organization (WHO)**. Maternal mortality. 2019. https://www.who.int/news-room/fact-sheets/detail/maternal-mortality
4. **Ak EY**, **Tandoğan Ö**, **Aslan E.** The views of Syrian immigrant women on family planning and unplanned pregnancy: a qualitative study. 2025; *Int J Pub Health.* **70**:1607967.
5. **Ozturk L**, **Serin ZV**, **Altınoz H.** Challenges and obstacles for Syrian refugee women in the Turkish labor market. *Societies.* 2019 Jun 26;**9**(3):49.
6. **Adali T**, **Türkyılmaz AS**. Demographic data on Syrians in Turkey: what do we know? *Int Migr.* 2020 Jun;**58**(3):196–219.
7. **Akar S**, **Erdoğdu MM**. Syrian refugees in Turkey and integration problem ahead. *J Int Migr Integr.* 2019 Aug;**20**(3):925–940.
8. **Hacettepe University Institute of Population Studies**. 2018 Turkey Demographic and Health Survey Syrian Migrant Sample. Ankara, Turkey; 2018. Accessed March 25, 2024. https://fs.hacettepe.edu.tr/hips/dosyalar/Araştırmalar%20-%20raporlar/2018%20TNSA/2018_TDHS_SR.pdf
9. **Wang Q**, **Ma J**, **Lan Y.** Long-term trends in the global burden of maternal abortion and miscarriage from 1990 to 2021: joinpoint regression and age-period-cohort analysis. *BMC Pub Health.* **25**, 1554(2025). https://doi.org/10.1186/s12889-025-22716-1
10. **Population Planning Law, No. 2827**. *Official Gazette*, 27 May 1983, No. 18059. Accessed May 27, 2024. https://www.mevzuat.gov.tr/MevzuatMetin/1.5.2827.pdf
11. **Çöl M**, **Bilgili Aykut N**, et al. Sexual and reproductive health of Syrian refugee women in Turkey: a scoping review within the framework of the MISP objectives. *Reprod Health*. 2020 Jun 22;**17**(1):99. doi: 10.1186/s12978-020-00948-1. PMID: 32571350; PMCID: PMC7310196.
12. **World Health Organization (WHO)**. Common health needs of refugees and migrants: literature review. 2021. Accessed March 15, 2025. https://www.who.int/publications/i/item/9789240033108
13. **Tumwine G**, **Östergren PO**, **Gummesson C**, et al. Assessing the effectiveness of a sexual and reproductive health and rights training programme in changing healthcare practitioners' attitudes and practices in low-income countries. *Global Health Action.* 2023;**16**(1): 2230814.
14. **Cifci S**, **Icke S**, **Hakimi S.** Unmet need for family planning among Syrian migrant women living in Turkey and its determinants. *Contracept Reprod Med*. 2024 Jun 20;**9**(1):30. doi: 10.1186/s40834-024-00277-9. PMID: 38898539; PMCID: PMC11188515.
15. **Clark CJ**, **Spencer RA**, **Khalaf IA**, et al. The influence of family violence and child marriage on unmet need for family planning in Jordan. *J Fam Plan Reprod Heal Care.* 2016;**43**(2):105–112. doi: 10.1136/jfprhc-2014-101122
16. **Cöl M**, **Aykut NB**, **Mut AU**, et al. Sexual and reproductive health of Syrian refugee women in Turkey: a scoping review within the framework of the MISP objectives. *Reprod Health.* 2020;**17**(1):1–12. doi: 10.1186/s12978-020-00948-1
17. **Heslehurst N**, **Brown H**, **Pemu A**, et al. Perinatal health outcomes and care among asylum seekers and refugees: a systematic review of systematic reviews. *BMC Med.* 2018;**16**:89
18. **Callister LC**, **Edwards JE**. Sustainable development goals and the ongoing process of reducing maternal mortality. *J Obstet, Gynecol Neonatal Nurs.* 2017 May 1;**46**(3):e56–e64.
19. **World Health Organization (WHO)**. WHO recommendations on antenatal care for a positive pregnancy experience. 2016. Accessed March 15, 2025. https://www.who.int/publications/i/item/9789241549912
20. **Souza JP**, **Day LT**, Rezende-Gomes AC, et al A global analysis of the determinants of maternal health and transitions in maternal mortality. *Lancet Glob Health.* 2024;**12**(2):e306–e316.
21. **Khadra MM**, **Suradi HH**, **Amarin JZ**, et al. Risk factors for miscarriage in Syrian refugee women living in non-camp settings in Jordan: results from the Women ASPIRE cross-sectional study. *Conflict and Health* **16**.1(2022):32g.
22. **AlArab N**, **Nabulsi D**, **El Arnaout N.** et al. Reproductive health of Syrian refugee women in Lebanon: a descriptive analysis of the Sijilli electronic health records database. *BMC Womens Health*. **23**, 81(2023). https://doi.org/10.1186/s12905-023-02231-4
23. **Sayili U**, **Ozgur C**, **Bulut Gazanfer O**, et al. Comparison of clinical characteristics and pregnancy and neonatal outcomes between Turkish citizens and Syrian refugees with high-risk pregnancies. *J Immigr Minor Health.* 2022 Oct;**24**(5):1177–1185. doi: 10.1007/s10903-021-01288-3. Epub 2021 Oct 11. PMID: 34635997; PMCID: PMC8504429.
24. **Şimşek Z**, **Yentur Doni N**, **Hilali NG**, et al. Community-based survey on Syrian refugee women's health and its predictors in Şanliurfa. *Turkey Women Health.* 2018;**58**:617–631. https://doi.org/10.1080/03630242.2017.1321609
25. **Torun P**, **Mücaz Karaaslan M**, **Sandıklı B**, et al. Health and health care access for Syrian refugees living in İstanbul. *Int J Public Health.* 2018;**63**(5):601–608.
26. **Hacettepe University Institute of Population Studies**. Demographic and Health Survey Series. Accessed March 12, 2025. https://hips.hacettepe.edu.tr/en/menu/demographic_and_health_survey_serie-101
27. **Silver RM**, **Varner MW**, **Reddy U**, et al. Work-up of stillbirth: a review of the evidence. *American journal of obstetrics and gynecology.* 2007 May 1;**196**(5):433–444.
28. **Balayla J**, **Azoulay L**, **Assayag J**, et al. Effect of maternal age on the risk of stillbirth: a population-based cohort study on 37 million births in the United States. *American Journal of* Obstetrics & Gynecology. 2011 Jan 1;**204**(1):S227.
29. **Magnus MC**, **Wilcox AJ**, **Morken NH**, et al. Role of maternal age and pregnancy history in risk of miscarriage: prospective register-based study. *BMJ*. 2019 Mar 20;364.
30. **Bose S**, **Trent K.** Socio-demographic determinants of abortion in India: a north–south comparison. *J Biosoc Sci.* 2006 Mar;**38**(2):261–282.
31. **Sundaram A**, **Juarez F**, **Bankole A**, et al. Factors associated with abortion-seeking and obtaining a safe abortion in Ghana. *Stud Fam Plan.* 2012 Dec;**43**(4):273–286.
32. **Zheng D**, **Li C**, **Wu T**, et al. Factors associated with spontaneous abortion: a cross-sectional study of Chinese populations. *Reprod Health.* 2017 Dec;**14**(1):1–9.
33. **Harville EW**, **Xiong X**, **Buekens P.** Disasters and perinatal health: a systematic review. *Obstet Gynecol Surv.* 2010 Nov;**65**(11):713.
34. **Sesay FR**, **Anaba EA**, **Manu A**, et al. Determinants of induced abortion among women of reproductive age: evidence from the 2013 and 2019 Sierra Leone Demographic and Health Survey. *BMC Womens Health*, 2023;**23**(1):44.
35. **Small CM**, **Manatunga AK**, **Klein M**, et al. Menstrual cycle characteristics: associations with fertility and spontaneous abortion. *Epidemiology.* 2006;**17**(1):52–60. DOI: 10.1097/01.ede.0000190540.95748.e6
36. **Pokale YS**. Recurrent miscarriage. *Int Res J Med Sci.* 2015;**3**(9):13–19.
37. **Harakow HI**, **Hvidman L**, **Wejse C**, et al. Pregnancy complications among refugee women: a systematic review. *Acta Obstet Gynecol Scand*. 2020. https://doi.org/10.1111/aogs.14070
38. **Dimassi H**, **Alameddine M**, **Sabra N**, et al. Maternal health outcomes in the context of fragility: a retrospective study from Lebanon. *Confl Health.* 2023;**17**(1):59.
39. **Singh M**, **Wambua S**, **Lee SI**, et al. MuM-PreDiCT. Autoimmune diseases and adverse pregnancy outcomes: an umbrella review. *BMC Med*. 2024 Mar 5;**22**(1):94. doi: 10.1186/s12916-024-03309-y. PMID: 38438886; PMCID: PMC10913233.
40. **Entringer S.** Impact of stress and stress physiology during pregnancy on child metabolic function and obesity risk. *Curr Opin Clin Nutr Metab Care.* 2013 May;**16**(3):320–327. doi: 10.1097/MCO.0b013e32835e8d80. PMID: 23400210; PMCID: PMC3740218.
41. **Coussons-Read ME**. Effects of prenatal stress on pregnancy and human development: mechanisms and pathways. *Obstet Med.* 2013 Jun;**6**(2):52–57. doi: 10.1177/1753495X12473751. Epub 2013 May 3. PMID: 27757157; PMCID: PMC5052760.
42. **American College of Obstetricians and Gynecologists, Committee on Gynecologic Practice**. Prepregnancy counseling: committee opinion No. 762. .*Fertil Steril* 2019;**111**(1):32–42.
43. **Gelaye AA**, **Taye KN**, **Mekonen T.** Magnitude and risk factors of abortion among regular female students in Wolaita Sodo University, Ethiopia. *BMC Womens Health.* 2014;**14**(1):1–9.
44. **Bloom SS**, **Wypij D**, **Das Gupta M.** Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city. *Demography.* 2001 Feb;**38**(1):67– 78.
45. **Syam H**, **Venables E**, **Sousse B**, et al. "With every passing day I feel like a candle, melting little by little." experiences of long-term displacement amongst Syrian refugees in Shatila, Lebanon. *Confl Health.* 2019 Dec;**13**(1):1–2.

https://doi.org/10.1017/dmp.2025.10162 Published online by Cambridge University Press

46. **Kimberly L**, **Case A**, **Cheung AP**, et al. Advanced reproductive age and fertility: no. 269, November 2011. *Int J Gynaecol Obstet*. 2012 Apr;**117**(1): 95–102. doi: 10.1016/j.ijgo.2011.11.002. PMID: 22506284.
47. **La X**, **Wang W**, **Zhang M**, et al. Definition and multiple factors of recurrent spontaneous abortion. In: *Environment and Female Reproductive Health*. Singapore: Springer; 2021:231–257.
48. **Bachir S**, **Aouar A.** Study of the impact of consanguinity on abortion and mortality in the population of Beni Abbes (southwestern Algeria). *Egypt J Med Hum Genet.* 2019;**20**(1). https://doi.org/10.1186/s43042-019-0004-7
49. **Hamamy H**, **Al-Bayati N**, **Al-Kubaisy W.** Consanguineous marriages in Iraqi urban population and the effect on pregnancy outcome and infant mortality. *Iraqi Med J.* 1986;**34**:76–80.
50. **Basaran N**, **Hassa H**, **Basaran A**, et al. The effect of consanguinity on the reproductive wastage in the Turkish population. *Clin Genet*. 1989;**36**: 168–173.
51. **Jones RK**, **Darroch JE**, **Henshaw SK**. Patterns in the socioeconomic characteristics of women obtaining abortions in 2000-2001. *Perspect Sex Reprod Health*. 2002;Sep **1**:226–235.

https://doi.org/10.1017/dmp.2025.10162 Published online by Cambridge University Press