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Review Article

The Determinants of Consanguineous Marriages among the Arab Population: A Systematic Review

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Abstract

Background: Inbreeding continues to account for a significant proportion of marriages among the Arab populations. Consanguinity is recognized in many studies as a significant factor affecting the health of the individual over several generations and poses a real public health problem. This systematic review was conducted to identify the determinants of consanguineous marriage among the Arab population published in the literature.

Methods: This systematic review of the determinants of consanguinity among Arab populations was conducted using databases: PubMed, Medline, Direct Science, Scopus, Web of sciences, Springer, Google scholar between 2000 and 2020. Inclusion and exclusion criteria were set. The selection steps were carried out based on PRISMA guidelines. Disagreements in article selection and data extraction were resolved by discussion or recourse to a third reviewer

Results: Overall, 25 studies were selected. The synthesis of the results concerning the determinants of Arab inbreeding revealed that several economic, socio-cultural and demographic factors seem to be associated with the choice of this type of marriage, such as socioeconomic status, low level of education especially among women, early age at first marriage, place of residence especially in rural areas, and women's status in the labor market.

Conclusion: The relationship between consanguinity and economic, socio-cultural, and demographic factors may be country-specific and highly dependent on the cultural context. Public awareness of genetic risks associated with inbreeding is indispensable.

Keywords: Consanguineous marriage; Determining factors; Matrimonial traditions; Arab populations

Introduction

Choosing a spouse is considered one of the most difficult and complex decisions that individuals will have to make in their lives, and it involves strategies that bring into play both personal and collective interests (1). Consequently, the choice of spouse has a direct influence on the distribution, structure, and heterogeneity of the genetic heritage of the entire population (2).There are different types of endogamy: spatial endogamy, intra community endogamy, intra-religious endogamy, family endogamy (consanguinity) (3), and the latter of received considerable attention

as a causal factor in the prevalence of genetic disorders (4). This type of alliance continues to arouse very significant interest among geneticists, sociologists and social anthropologists (5, 6).

"In clinical genetics a consanguineous marriage is most commonly defined as a union between a couples related as second cousins or closer, equivalent to a coefficient of inbreeding in their progeny of F⩾ 0.0156."(7). Consanguineous marriages have been adopted for centuries (8). Currently, they are practiced by more than one billion of the world's population with rates reaching 20%-50% (9). Particularly in the Muslim countries of North Africa, the Middle East, Central Asia, and most parts of South Asia a transverse belt running from Pakistan and Afghanistan in the east to Morocco in the west (8-10).Among the major populations surveyed, the highest rates of inbreeding marriages have been observed in the Arab world, which stretches from Iraq and the Gulf States in the east to Morocco and Mauritania on the Atlantic coast of North Africa in the west (11). This practice is preferred and respected in most if not all Arab countries (12). Indeed, inbreeding is generally motivated by social and economic reasons; but at the cost of the health of the offspring. Who run the risk of genetic diseases more than other (13).

Congenital malformations are higher in inbred couples above the prime rate (4.5% versus 1%). Inbreeding also increases the incidence of multi factorial disorders such as diabetes, cardiovascular disorders, obesity and certain types of cancer. It can also affect fertility rates, pregnancy outcomes such as increased pregnancy loss and premature labor have been reported with inbreeding (14), despite its harmful effects on health, inbreeding continues to be practiced in Arab communities, based on the results of several empirical studies, different factors have been identified as important determinants of the high prevalence of consanguineous marriages in this context, namely: socioeconomic, socio-cultural, religious, geographic and demographic factors(14).Moreover, public health concerns focused on the role of genetic diseases as causes of serious morbidity and mortality are likely to increase as the prevalence of infectious diseases declines (15).

In order to be able to develop adequate preventive means and strategies, the field of public health must seek to understand the social and cultural foundations in which they develop and reproduce. In this sense, the present study aimed to identify the determinants of consanguineous marriage among the Arab population published in the literature.

Methods

In order to identify all relevant publications on the prevalence and determinants of consanguinity among Arabs, an online search was conducted on PubMed, Medline, Direct Science, Scopus, Web of Sciences, Springer, and Google scholar. Keywords used for our search included: consanguineous marriage, social or demographic, or cultural or economic disposing factors, and (Arab or Kuwait or Oman or Emirates or Bahrain or Qatar or Egypt or Iraq or Syria or Jordan or Sudan or Libya or Tunisia or Algeria or Morocco or Palestine or Lebanon or Yemen), and to combine terms using Boolean operators (and, or, not).

Moreover, the manual search and snowball method was also used to identify other studies from the reference list of selected studies. In order to structure and organize the research corpus, each article was imported into Zotéro (Reference Management Software), and then in Nvivo to ensure an in-depth reading and determine convergences and divergences.

The selection of articles was done by two researchers independently, only articles with titles and abstracts that meet inclusion criteria are retrieve and included. Any disagreements in article selection and data extraction were resolved by discussion or recourse to a third reviewer.

The selection steps were carried out according to the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses (16) (Fig. 1).

The inclusion criteria for this review were: original articles in English and French, published in

peer-reviewed journals, studies focusing on the prevalence and risk factors of intermarriage throughout the country or in a region within the Arab world stretching from Iraq and the Gulf States in the East to Morocco and Mauritania on the Atlantic coast of North Africa in the West. The search area in terms of time was limited to articles published since 2000.

Since a large number of records were identified through designated searches of online databases and other resources, specific steps were taken for screening and eligibility assessments. Articles that did not provide sufficient information were not considered as a source of information, all duplicate references were excluded; articles that did not meet the inclusion criteria were excluded from the study.

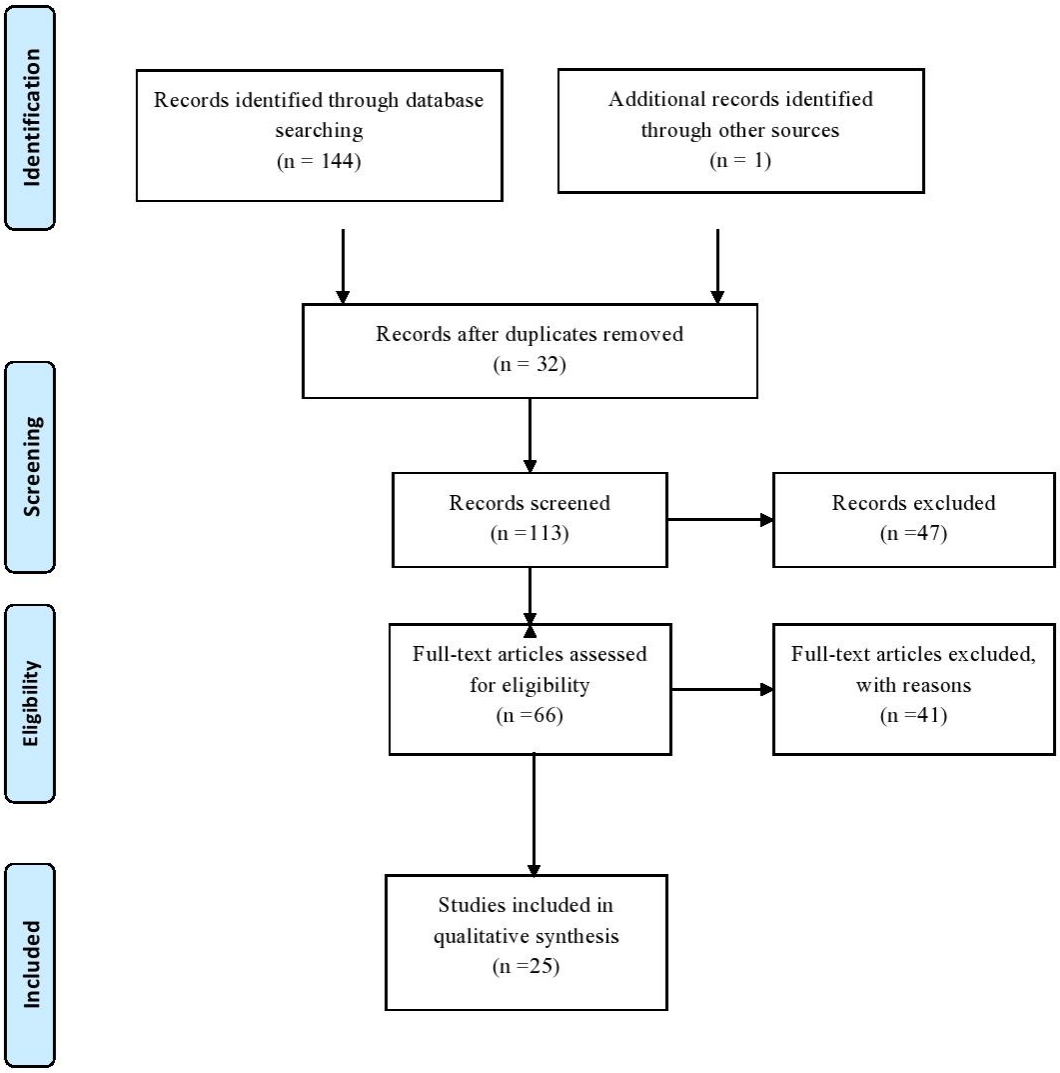

Fig. 1: PRISMA flow diagram of the included and excluded studies

The quality of each included study was assessed using the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) critical appraisal tool for observational studies (17). The STROBE recommendation was adopted in this study to facilitate the critical appraisal of included studies.

The data extraction process consisted of extract-

ing relevant information from the eligible articles that were independently collected by two authors and generating summary data tables presenting the main details and results of the articles. Using NVIVO this data extraction form was developed to categorize the results and extract it appropriately. Items on this form included article specifications (author/year), location of study (country/region), type of study, sample size, time of study conduction and the key finding. We have employed narrative synthesis approaches for analyzing the data

Results

Overall, 145 articles were identified in designated electronic databases published from the year 2000 to the year 2020, of which 32 were duplicates. Overall, 113 items remained for screening. After reviewing titles and abstracts, 47 articles were excluded due to the lack of inclusion criteria. The full text of 66 articles evaluated for eligibility,41 articles were excluded due to lack of quality and irrelevance. Finally, only 25 studies were selected for this review article.

The prevalence of inbreeding

Numerous studies on inbreeding have been conducted in various countries, with the highest frequencies remarkably recorded in Arab countries. Prevalence is estimated to be between 20% and 50% in the Middle East and North Africa; 1%-5% in Southern Europe, South America and Japan; and less than 1% in Western Europe, North America and Oceania (15).The various surveys conducted in Arab countries give a level of inbreeding that varies from 11.6% in El Bahrain (18) and 64.6% in Al-Ramadi (Iraq) (19). As for the types of unions, we have noticed that unions between first cousins are particularly popular and account for nearly a quarter of all marriages in many Arab countries and a percentage of up to 86% of all consanguineous marriages (20).
Consanguinity continues to be practiced in the Arab world, and is generally associated with demographic characteristics such as age and education level, socioeconomic status, place of residence, and employment status (Table 1).

Table 1: summary of studies included in the systematic review populations

N	*Author*	*Country /Region*	*Type of study*	*Sample size*	*Time of study conduction*	*Key Findings*
1	Yahyaa et al. 2019	Al Ramadi (IRAQ)	Cross-sectional	150 married women	2018	• A young age at marriage was associated with consanguinity. • Level of education of women was significantly higher (P=0.000) in the non consanguineous marriages group
2	Mahboub .2019	Riyadh (SaudiArabia)	Transversal	550 married adults	2017-2018	• Consanguinity was 3 times more likely to occur among those who had a family history of inbreeding The level of education and age has no effect on the choice of a consanguineous marriage.
3	ENPSF. 2018	Morocco	Transversal	9969 married women	2017-2018	• The highest proportion of Consanguinity is observed in the 15-19 age groups. • Inbreeding marriages are more common

						among the poorest women and women In rural areas
4	Hajjaj et al. 2018	Tetouan/ M'diq-fnideq (Morocco)	Retrospective	201 female students	2016- 2017	A strong association between the prevalence of consanguineous marriage and age 19 yr or younger.
5	Benkou .2018	Traras Mountains (Algeria)	Prospective	316 couples	2012-2014	The association between consanguinity and occupation and young age at marriage was very significant respectively (P<0.05 and P<0.01).
6	Al kandari & Al- kandari.2018	Ḥawallī and Al - Farwāniyya (Kuwait)	Cross- sectional	3497 Married women	_	• The Bedouin culture of Al Farwāniyya is more likely to have consanguineous marriage. The greater the economic and educational status of respondents, the higher the choice of marriage away from the family clan.
7	Islam. 2018	Jordan	Cross- sectional (the Jordan Population and Family Health Surveys)	11352 married women	2012	• Marriage at a younger age is a factor in favour of consanguinity. • Women in rural were 1.18 times more likely to have a consanguineous marriage than those in urban. • Women with no education are more likely to be in a consanguineous marriage. • Women who were not in the labour force were 1.1 times more likely to have a consanguineous union. Poverty, is a factor favoring consanguineous marriage
8	Abbad. 2016	Tiflet (Morocco)	Prospective survey	1000 couples	2012	• Age at marriage is a determining factor in consanguineous marriage (P=0,000). Rural residence before marriage and a low level of education have an important effect on the choice of marriage.
9	Bachir. 2017	Beni Abbas Algeria	Prospective	315 individuals	_	• The younger couples marry, the more likely they are to accept the union with a relative Inbreeding increases significantly, when the wife's level of education decreases.

10	Ahmed. 2017	Egypt	Cross- sectional	10916 young people	2013-2014	• The mean age at marriage was significantly lower among those with an inbred marriage. • The consanguinity was significantly higher in rural than in urban (P<0.001). As education levels and the wealth quintile increases, the prevalence of consanguinity is reduced.
11	Kerkeni et al. 2016	Tunisia	Transversal	1016 students	2003-2004	The association between consanguinity and education and employment status was highly significant for women (P<0.001).
12	Khalil. 2015	Almadina (SaudiArabia)	Transversal	1318 Saudis	2014	• Consanguineous marriage is the preferred choice in rural (67.86%) over urban. A person's level of education is a very strong variable in response to marriage to non-relatives.
13	Sirdah .2014	Ghaza	Transversal	156,635 people	2000-2013	• The average age of those with first-cousin marriages is lower than those of the second-cousin marriages and the non-consanguineous, P< 0.001. The consanguinity is significantly higher in semi-urban areas (41.6%) than in urbanareas.
14	Sidi-Yakhlef .2013	Oulhaça (Algeria)	Prospective	260 households	2009-2010	• Association between consanguinity and the age group less and equal to 18 yr, • A woman with a low level of education has a high chance of being in a consanguineous union Decrease in the number of consanguineous marriage when the husband's employment status increases.
15	Islam. 2012	Oman	Cross- sectional	2037 married women	2000	• Early marriage is more prevalent among women in consanguineous union • Urban/rural residence shows no significant differential effect on inbreeding. • Women's education levels show no association with inbreeding. Women who do not work for pay are almost twice as likely to have a consanguineous marriage.

16	Shawky et al. 2011	Egypt	Transversal	10,000 couples	_	• Inbreeding was significantly increased in the 15 to 25 year age group. • Consanguinity is more prevalent in rural populations. • Inbreeding rates are significantly higher among mothers (66.2%) and fathers (59.9 %) who are not in school. • Consanguinity among non-active mothers was significantly higher. Inbreeding is significantly higher among non-working fathers $P<0.001$
17	Lafta. 2010	Baghdad	Transversal	302 families	2009	• Age at marriage has a direct effect on increasing the consanguinity A significant association was found between consanguinity and a lower level of education.
18	Hami .2009	Rabat-Salé-Zemmour-Zaer Morocco	prospective	270 families	2005	• women who marry before the age of 20 are significantly more likely to accept consanguinity • the probability of entering into a consanguineous union among women is significantly higher for those who spent their childhood in the countryside The education has no effect on inbreeding.
19	Barbour & Salameh. 2009	Lebanon	Transversal	1556 married women	_	• women working at home, and lower education of both men and women are correlated with a higher frequency of inbreeding Housing in the suburbs had the highest inbreeding rates.
20	Assaf & khawaja. 2009	Palestine	Cross- sectional .	16,197 women in 1995 / 4,971 women in 2004.	1995 and 2004	• Increased chances of consanguinity with decreasing age at marriage. • Women's level of education was not considered significant. The highest inbreeding rates were found among poor, non-working, and women living in rural.
21	Kanaan et al. 2008	the Bekaa Lebanon	Transversal	552 households	_	• Consanguinity did not depend on the age of the couple at marriage. Elementary school-educated fathers and mothers had the highest proportion of inbreeding.
22	El Mouzan etal,2007	Saudi Arabia	Cross-sectional	11554 house-	2004-2005	• Overall prevalence was significantly more common in rural

				holds		(59.5%) than in urban.
23	Al Ali .2005	Qatar	cross-sectional	1800 women	2004	Statistically significant differences between consanguineous and non-consanguineous marriages regarding • the mother's age (P=0.043), • education level (P<0.001), occupational level(P<0.001)
24	Gunaid et al. 2004	Sana'a, Yemen	cross-sectional	1050 individuals	2000	• The young age of the wives, was an important feature of the marriages. • The frequency of inbreeding was considerably higher among urbanizing individuals than urban individual
25	Jurdi & Saxena. 2003	Yemen	cross-sectional	9750 married women	1997	• In the very youngest age group at marriage, unions among cousins are more frequent than in the oldest marriage cohort. • Inbreeding is higher in rural. • Women with only elementary school education are more likely to be in a consanguineous union. • Couples with average to high economic status were less likely to marry inbreeding

Age at first marriage

Almost all of the included studies reported that consanguineous marriage occurs in younger ages in comparison with non-consanguineous marriage. The results obtained in Morocco from 9969 women aged 15-49 yr showed that the highest proportion of consanguineous marriage is observed in the 15-19 age group (27.0%) (21).This observed correlation is consistent with that reported in other regions in Morocco (22-24). Other results obtained for populations in the Algerian regions also revealed that the younger the spouses are, the more they are subjected to this tradition (25-28).

Among 2037 Omani women, early marriage is more common among women inbred(P<0.001). A similar finding was reported in Sana'a, Qatar, Kuwait, Arramadi, and Baghdad (19, 29-32).In the latest Jordanian Demographic Survey, data indicated that a one-year increase in age at marriage reduced the likelihood of consanguineous marriage by 9% (odds ratio (OR) = 0.91; 95% confidence interval (CI): 0.89–0.93) (33).Similarly, in the Gaza, age is an important determinant factor for consanguinity in new marriages, which decreases significantly as age increases (34). In Palestine, among16197 women in 1995 and 4971 women in 2004, more than 70% of women who married after the age of 25 entered into a non-consanguineous marriage (35). As in Egypt, among 10,000 couples, consanguinity was significantly increased in the 15 to 25 year age group for both males and females compared to the older age groups (P<0.05 and <0.001) (20). These results contradict those obtained in Riyadh and Lebanon (36, 37).

Spouses Educational Levels

Education level is an important factor influencing the choice of both spouses. In the governorates of Ḥawallī and Al –Farwāniyya (Kuwait), among 3497 married women, the greater the education

level of respondents, the greater the preference for marriage outside of the family (Pearson correlation r = 0.056);*P*<0.01)(31).Similar results were obtained in Iraq in the city of Aramadi and the capital Baghdad(19, 32). Similarly, among 10,000 Egyptian couples, inbreeding showed significantly higher levels among out-of-school mothers (66.2%) and fathers (59.9%) (20). Again, among 1000 couples in northwestern Morocco Tiflet, the chi-square statistic test indicates that the level of education of the illiterate category has a significant effect on the choice of consanguineous marriage among the couples studied ($\chi2$=279,177; *P*=0.000 (22). A similar finding was reported to Oulhaça and Beni Abbés in Algeria (25, 28).

In Yemen, among 9750 married women, women with only primary education are more likely to be in consanguineous relationships than women with more advanced education, 45.5% vs. 38.5% (38). Moreover, studies in Egypt, Jordan, and Lebanon have shown that as the level of education increases the prevalence of consanguineous marriage is decreased (33, 37, 39, 40). In Palestine about 42% of women with at least secondary education women with at least secondary education contracted consanguineous marriages compared to 49% of women with less than elementary education (35).In Baghdad, a significant association ($\chi2$=6.274,*P*=0.043) was found between consanguinity and lower education levels. Overall, 36% of women involved in consanguineous marriages reported being illiterate and poorly educated, compared with 27.8% of non-consanguineous women. On the other hand, the results show no significant association ($\chi2$=1.095, *P*=0.5) between the level of education of the husband and consanguineous marriage (32). The same result was obtained in Tunisia (41).

However, these results are not analogous to those obtained by other research in the Arab world. Among 2037 women interviewed in Oman, women's education levels showed no significant association with inbreeding when the effects of other factors are adjusted (42). Similarly, in Sana'a and Riyadh education and inbreeding showed no correlation (29, 36).

Place of residence

Place of residence is of fundamental importance in the study of consanguinity since it not only constitutes the natural framework in which individuals evolve, but also prefigures their future universe in matters of marriage and procreation. Most of the studies carried out in this field have shown that consanguinity is more widespread in rural. The Sirdah study of 156,635 people observed that in Gaza, the frequency of consanguineous marriages is significantly higher in semi-urban areas (41.6%) than in urban (39.1%) (*P*<0.001) (34). In Palestine, data from the 1995 and 2004 surveys of 21168 married women showed that the lowest rates of consanguinity were recorded in urban (35). In addition, in Jordan, time-series data from the Jordan Population and Family Health Surveys indicate that women living in rural were 1.18 times more likely to be married inbred than those living in urban (OR=1.18; 95% CI: 1.04-1.34) (33).In the latest demographic survey in Morocco of 9969 women. Consanguineous marriage is more common among rural resident women (21).Similarly, in the Rabat region (Morocco), the probability of entering into consanguineous unions among women is significantly higher for those who spent their childhood in the countryside; they are almost eighteen times more likely than their urban counterparts (OR=17.61;*P*<0.001) (24). Moreover, in northwestern Morocco, the residence in the rural before marriage has a highly significant effect on the choice of consanguineous marriage ($\chi2$ = 229267) (22).Secondary analysis of data from a youth survey in Egypt, 2014 revealed that the prevalence of consanguineous marriage was significantly higher in rural (29.3%) than in urban areas (23.9%) (*P*<0.001) (39), the same result has also been reported by previous studies in Egypt (20).Among 11554 Saudi households Overall prevalence of inbreeding was significantly more common in rural (59.5%) than in urban areas (54.7%) (43).

The same finding in Almandine almunawwarah, consanguineous marriage was the preferred choice in rural (67.86%) over urban areas

(29.08%) (P<0.0283) (44). Unlike previous results, a secondary analysis of health survey data from 2037 women in Oman shows that approximately 73% of respondents currently live in urban and 27% in rural areas. Urban/rural residence shows no significant differential effect on inbreeding in Oman (42). This was also reported in a study in Sana'a (29).

Employment Status

Inactive women are likely to marry a relative. In Oman, women's labor market status is a very important determinant of consanguinity; women who do not work for money are almost twice as likely to have a consanguineous marriage (42). Moreover, in Jordan women ,who were not in the labor force were 1.1 times more likely to have a consanguineous marriage than those employed (33).Moreover, in a representative study in Palestine, women in the labor force had significantly lower rates of consanguinity than other women in 1995. With women outside the labor force 1 to 3 times more likely to be consanguineous than those in the labor force. However, women's occupation lost its importance (P=0.485) (35). Among 9750 Yemeni women, the association of current employment status with inbreeding is also direct and significant, with all categories of working women lower likely to be married to cousins than women who are not participating in the labour force (38). In addition, in Egypt the prevalence of inbreeding among non-working woman was significantly higher than among working woman (P<0.05) (20). This is consistent with other studies shown that women working only at home had the highest rates of inbreeding (22, 26, 41).

Discussion

Following the results of previous studies, consanguineous marriage is customary in most Arab communities, with a great variation between countries, as well as within the same country. The probability of practicing consanguineous marriage in the Arab world is far from being random; this practice depends on various factors. Regarding age at first marriage, the chances of entering into consanguineous unions in Arab countries are higher for spouses who marry at a younger age than for their counterparts who marry late. This means that marriage is not an individual decision, but has been prepared and negotiated by both families since the future spouses' adolescence, as well as the control that parents exercise over their children. Due to a marital agreement between the partners' families and not between the couples themselves (31). There are many reasons for this association, including the fact that marriage arrangements for cousins are easier and cheaper for families (45). Another reason suggested for women's early age of marriage in consanguineous unions is the economic driver. The marriage of a young woman generates a secondary gain for her primary family if it alleviates the low household economy of a member who cannot generate money. When an educated woman can participate to the family's income, there is no financial advantage to the family for the woman to marry younger (45).

Therefore, the woman's education plays a crucial role in the choice of marriage model; a woman with a low level of education is more likely to be in a consanguineous union. This reflects the still common practice among Arab parents of dropping their daughters out of school when the groom becomes available (38). Women's high level of education is one of the main factors that may play a role in lowering consanguinity rates in some Arab countries including Jordan, Lebanon, Egypt, Kuwait, Qatar, Tunisia, and Morocco (20, 21, 30, 33, 40, 41). Educated people make informed decisions based on their knowledge of the adverse health effects resulting from marriage between parents. Contrary to expectations, other findings show that consanguineous marriage was practiced in the population regardless of education level. This may be related to root deeply social and cultural beliefs in the country (29). It may also be related to a personal preference for inbreeding (36).

Furthermore, our results show that the highest prevalence of consanguineous marriages ob-

served among families with unfavorable socioeconomic conditions. The reasons for this association can be attributed to the economic benefits of consanguineous union, namely: lower cost and greater simplicity or ease of premarital negotiation and marital arrangements, lower parental and partner expectations, and financial benefits of dowry (46). Moreover, the poor more often choose a close relative to preserve their economic wealth, positively correlated with family size (47). The search for a safe social framework in a context of socio-economic precariousness emerges as a strategy and reinforces the thesis according to which the support and the family network are fundamental reasons for choosing consanguineous marriage (48).

In addition, the selection of spouses is influenced by geographical proximity, particularly in rural areas. This is expected because rural areas are characterized by close-knit communities with stronger family and tribal relationships, low levels of education and an early age of marriage (20). In addition, the relative frequency of consanguineous marriages among Bedouins rather than in urban areas can be attributed to the abundance of relatives of a given degree, the availability of inbred persons in an adequate geographical or social space, the availability of related people belonging to an age group, social norms favoring a certain type of consanguineous unions, and factors dependent on social structure (49).

As for the profession, the women's employment is closely related to the socio-economic situation, women's status in terms of education, economic status and women's independence (33). Women's involvement in the labor market could be a factor in reducing the rate of consanguinity (45). Most women who work for money have greater levels of education and, therefore, are more susceptible to independence and decision-making power (33). In addition, women in the job market are more socially visible and generally in close proximity to eligible unrelated men (45).

Conclusion

The relationship between consanguinity and economic, socio-cultural, and demographic factors may be country-specific and highly dependent on the cultural context. In general, it is more expressed among women in most contexts. Awareness programs are needed to inform individuals of the disadvantages of inbreeding mating in order to reduce the prevalence of inbreeding in a population where a strong preference is given to family traditions and values.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interests

The authors declare that there is no conflict of interest.

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