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

*Khaddouj El Goundali, Milouda Chebabe, Fatima Zahra Laamiri, Abderraouf Hilali

Hassan First University of Settat, Higher Institute of Health Sciences, Laboratory of Health Sciences and Technologies, 26000 Settat, Morocco

*Corresponding Author: Email: k.elgoundali@uhp.ac.ma

(Received 11 Jan 2021; accepted 09 Mar 2021)

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 $F \geq 0.0156$. (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 Science, 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 Zotero (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).

| 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                                        |

Available at:  http://ijph.tums.ac.ir
| Study | Authors | Location | Study Type | Sample | Year | Findings |
|-------|---------|----------|------------|--------|------|----------|
| 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 | Hawalli 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. - 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. - 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. |
| 8 | Abbad. 2016 | Tiflet (Morocco) | Prospective survey | 1000 couples | 2012 | |
| 9 | Bachir. 2017 | Beni Abbas Algeria | Prospective | 315 individuals | | |
El Goundali et al.: The Determinants of Consanguineous Marriages among …

| No. | Author(s)          | Location  | Study Design | Sample Size  | Year(s)  | Findings |
|-----|--------------------|-----------|--------------|--------------|----------|----------|
| 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 (Saudi Arabia) | 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.  
- 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 urban areas. |
| 13  | Sirdah. 2014       | Ghaza     | Transversal   | 156,635 people | 2000-2013 |  
- 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. |
| 14  | Sidi-Yakhlef. 2013  | Oulhaça (Algeria) | Prospective | 260 households | 2009-2010 |  
- 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. |

Available at: [http://ijph.tums.ac.ir](http://ijph.tums.ac.ir)
| Study ID | Authors                    | Country        | Study Type       | Sample Size | Year   | Key Findings                                                                                                                                 |
|---------|---------------------------|----------------|------------------|-------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                |
|         |                           |                |                  |              |        | • 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.                                                                                               |
| 18      | Hami .2009                | Rabat-Salé-Zemmour-Zaer Morocco | Prospective | 270 families  | 2005   | • 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.|
|         |                           |                |                  |              |        | • Consanguinity did not depend on the age of the couple at marriage. Elementary school-educated fathers and mothers had the highest proportion of inbreeding.|
| 20      | Assaf & khawaja. 2009     | Palestine      | Cross-sectional  | 16,197 women in 1995 / 4,971 women in 2004. | 1995 and 2004 | • Overall prevalence was significantly more common 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 households | 2004-2005 | • Overall prevalence was significantly more common in rural.                                                                             |
**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, among 16197 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 Ḩawardī 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 ($\chi^2 = 279.177; P = 0.000$) (22). A similar finding was reported to Oulhaça and Beni Abbès 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 contracted consanguineous marriages compared to 49% of women with less than elementary education (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 ($\chi^2 = 229267$) (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

**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 ($\chi^2 = 229267$) (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).
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 labor 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 socio-economic 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.

Acknowledgements

This research did not receive any funding.

Conflict of interests

The authors declare that there is no conflict of interest.

References

1. Belhadj M (2003). Choix du conjoint et stratégies matrimoniales de jeunes femmes françaises d’origine algérienne. REMI, 19(1):195-222.
2. Cavalli-Sforza LL, Kimura M, Barrai I (1966). The probability of consanguineous marriages. Genetics, 54(1): 37-60.
3. Bou-Assy F, Dumont S, Saillant F (2003). Représentations sociales du mariage endogame et de ses conséquences biologiques sur la santé des descendants chez des fiancés apparentés: Cas de deux villages chiites au Liban. Service social, 50(1):174.
4. Akrami SM, Osati Z (2007). Is consanguineous marriage religiously encouraged? Islamic and Iranian considerations. J Biosoc Sci, 39(2): 313-
6. Bittles AH (2002). The impact of consanguinity on the Indian population. *India - National Family Health Survey*, 8:45-51.

5. Ben Hounet Y (2009). *Parenté et Anthropologie Sociale*, 2nd ed. Ginkgo éditeur. Paris

7. Bittles AH (1998). Empirical Estimates of the Global Prevalence of Consanguineous Marriage in Contemporary Societies. Morrison Institute for Population and Resources Studies Working Report 74, Stanford: Stanford University. https://researchrepository.murdoch.edu.au/id/eprint/13494/1/empirical_estimates.pdf

8. Jaber I., Halpern GJ, Shohat M (1998). The impact of consanguinity worldwide. *Community Genet*, 1(1):12-7.

9. Bittles AH (2008). A community genetics perspective on consanguineous marriage. *Community Genet*, 11: 324-30.

10. Bener A, Alali KA (2006). Consanguineous marriage in a newly developed country: the Qatari population. *J Biosoc Sci*, 38(2):239-46.

11. Bittles AH, Hamamy HA (2010). Endogamy and consanguineous marriage in Arab populations. In: Teebi AS. Ed, Genetic Disorders of the Middle East: nature versus nurture. *The Open Complementary Medicine Journal*, 5:1-10.

12. Al-Gazali I, Hamamy H (2014). Consanguinity and dysmorphology in Arabs. *Hum Hered*, 77(1-4): 93-107.

13. Bowirrat A, Armaly Z (2013). Consanguineous marriage in the Middle East: nature versus nurture. *The Open Complementary Medicine Journal*, 5:1-10.

14. Oniya O, Neves K, Ahmed B, et al (2019). A review of the reproductive consequences of consanguinity. *Eur J Obstet Gynecol Reprod Biol*, 232: 87-96.

15. Hamamy H, Antonarakis SE, Cavalli-Sforza LL, et al (2011). Consanguineous marriages, pearls and perils: Geneva International Consanguinity Workshop report. *Genet Med*, 13(9):841-7.

16. Liberati A, Altman DG, Tetzlaff J, et al (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *BMJ*, 339:b2700.

17. Cuschieri S (2019). The STROBE guidelines. *Saudi J Anaesth*, 13(Suppl 1): S31–S34.

18. Al-Arrayed S, Hamamy H (2012). The changing profile of consanguinity rates in Bahrain, 1990–2009. *J Biosoc Sci*, 44(3):313-9.

19. Yahyaa BT, Al-sammarai MAM, Jadoo SAA (2019). Prevalence and Perception of Women about Consanguineous Marriage in Al-Ramadi City. *Indian Journal of Public Health Research & Development*, 10(4): p567-57.

20. Shawky RM, El-Awady MY, Elsayed SM, et al (2011). Consanguineous matings among Egyptian population. *Egyptian Journal of Medical Human Genetics*, 12(2):157-63.

21. Ministry of Health (2018). Enquête Nationale sur la Population et la Santé Familiale. Morocco. https://www.sante.gov.ma/Documents/2020/03/Rapport%20ENPSF%202021%20C3%A9me%20Edition.pdf

22. Abbad Z, Drissi A, Soulaimani A, et al (2016). Études Des Caractéristiques Et Des Détecteurs Des Mariages Consanguins Dans La Ville De Tiflet (Maroc). *E3J*, 12(9):221.

23. Hajjaji M, Khadmaoui AE, Soulaymani AE, et al (2018). Consanguinité, Isonymie et Age Précoce au Mariage dans les deux Provinces de Tétouan et M’diq-fniadeq (Maroc). *E3J*, 14(25):63.

24. Hami H, Soulaimani A, Mokhtari A (2009). Les Déterminants des Mariages Consanguins dans la Région de Rabat-Salé-Zemmour-Zaer (Morocco). *Antropo*, 18:27-35.

25. Sidi-Yakhlaf A, Metri AA (2013). Etude Anthroposociologique de la consanguinité dans la population de Ouïlaâcha dans l’Ouest Algérien. *Antropo*, 30:45-59.

26. Benkou F, Aouar A, Chaïf O (2018). Caractérisation anthroso-socioculturelle de la population endogame des Monts de Traras (Beni Ourrous) dans l’Ouest Algérien par la consanguinité et le lien de parenté. *Antropo*, 39:49-58.

27. Moussouni A, Metri AA, Chaïf O, et al (2019). Etude anthropo-sociologique des mariages consanguins dans la population de sabra (Ouest-Algérien). *Leban Sci J*, 20(2): 323-341.

28. Bachir S, Aouar A, Moussouni A (2017). Etude Anthropo-sociologique de la consanguinité dans la population de "Beni Abbé" dans le sud-ouest Algérien. *Antropo*, 37: 69-82.

29. Ahmed Gunaid A, Ali Hummad N, Abdallah Tanim K (2004). Consanguineous marriage in the capital city Sana’a, Yemen. *J Biosoc Sci*, 36(1): 111–21.
30. Al Ali KA (2005). Consanguinity and Associated Socio-Demographic Factors in Qatari Population. *Qatar Med J*, 14(1):16-19.
31. Al-Kandari YY, Al-Kandari YY (2018). Consanguineous Marriage and its Relationship with Sociocultural Variables in Urban and Bedouin Geographical Regions in Kuwait. *Arabian Humanities*, (10).
32. Lafta FM (2010). Consanguineous Marriages and Some Reproductive Health Parameters for Sample from Families in Baghdad, Iraq, *Al Mustansiriyah J Sci*, 21 (5):344-354.
33. Islam MM, Ababneh FM, Khan MHR (2018). Consanguineous Marriage in Jordan: An Update. *J Biosoc Sci*, 50(4):573-578.
34. Sirdah MM (2014). Consanguinity profile in the Gaza Strip of Palestine: large-scale community-based study. *Eur J Med Genet*, 57(2-3):90-4.
35. Assaf S, Khawaja M (2009). Consanguinity trends and correlates in the Palestinian Territories. *J Biosoc Sci*, 41(1), 107-24.
36. Mahboub SM, Alsaqabi AA, Allwimi NA, et al (2020). Prevalence and pattern of consanguineous marriage among educated married individuals in Riyadh. *J Biosoc Sci*, 52(5):768-775.
37. Kanaan ZM, Mahfouz R, Tamim H (2008). The prevalence of consanguineous marriages in an underserved area in Lebanon and its association with congenital anomalies. *Genet Test*, 12(3): 367-72.
38. Jurdi R, Saxena PC (2003). The prevalence and correlates of consanguineous marriages in Yemen: similarities and contrasts with other Arab countries. *J Biosoc Sci*, 35(1): 1-13.
39. Ahmed SM (2017). Consanguineous marriage among Egyptian youth: secondary analysis of survey of young people in Egypt. *Egypt J Community Med*, 35:85-94.
40. Barbour B, Salameh P (2009). Consanguinity in Lebanon: prevalence, distribution and determinants. *J Biosoc Sci*, 41(4): 505-17.
41. Kerkeni E, Monastiri K, Saket B, et al (2006). Association among Education Level, Occupation Status, and consanguinity in Tunisia and Croitina. *Croat Med J*, 47:656-661
42. Islam MM (2012). The practice of consanguineous marriage in Oman: prevalence, trends and determinants. *J Biosoc Sci*, 44(5): 571-94.
43. El Mouzan MI, Al Salloum AA, Al Herbish AS, et al (2007). Regional variations in the prevalence of consanguinity in Saudi Arabia. *Saudi Med J*, 28(12):1881-4.
44. Khalil AM, Daradka HM (2015). Survey of community perception of genetic implications of consanguineous marriage in almadina almunawwarah area in Saudi Arabia. *J Investig Genomics*, 2(4):90-94.
45. Hamamy H, Alwan S (2016). The Sociodemographic and Economic Correlates of Consanguineous Marriages in Highly Consanguineous Populations. *Genomics and Society*, 335-361.
46. Heidari F, Dastgiri S, Akbari R, et al (2014). Prevalence and Risk Factors of Consanguineous Marriage. *Eur J Gen Med*, 11(4):248-255.
47. Clark G (2014). *The Son also Rises: Surnames and the History of Social Mobility*. Princeton University Press, Princeton, New Jersey.
48. Benhamadi B., Les déterminants de l'endogamie au Maroc [PhD thesis]. Montreal University, Canada; 1997.
49. Yamamah G, Abdel-Raouf E, Talaat A, et al (2013). Prevalence of consanguineous marriages in South Sinai, Egypt. *J Biosoc Sci*, 45(1): 31-39.

Available at:  http://ijph.tums.ac.ir