ORIGINAL ARTICLE

Selection of kin for spouse: Importance of socioeconomic status, reputation and beauty

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Abstract *Objectives:* Kin marriages are often arranged in societies with many kinship groups and this is believed to be related to poverty and associated lack of education and security. We examined (i) whether choice of kin for spouse was affected by the improved socioeconomic and security conditions, and (ii) compare relative importance of family reputation vs. family wealth and social status and physical appearance in selection of future spouse.

Methods: In an electronic survey, 268 Emirati medical students were asked to provide information about their families, biological relation to preferred future spouse and rank the importance of family reputation, family wealth, family social status, and physical appearance in selecting a future spouse. Frequency of kin marriages in two generations was examined within the context of socioeconomic development of the nation.

Results: Kin marriage rate among parents (36.4%, 79/217) and likely future rate among their children (31.4%, 37/118) were similar ($p = 0.35$). Awareness of harms of inbreeding had a small but statistically significant deterring effect on selecting kin for spouse. The respondents ranked family reputation (72.2%) as most important in comparison to that for the family wealth (5.6%) and social status (9.2%) and spouse physical attractiveness (13.0%). However, family reputation was equally important for the participants with different preferences of kin and non-kin for spouse ($p = 0.57$).

Conclusions: The frequency of kin marriages in studied population did not change significantly in the last generation. Knowledge of biological harm of inbreeding has only a small inhibitory effect on choice of kin for spouse. Family reputation was far more important in selection of spouse than family wealth, social status and beauty of spouse, but reputation was uncorrelated with choice of kin for spouse.

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1. Introduction

Marriage is traditionally a social contract between a man and a woman, and in most cases between their families. In tribal societies, marriages are often arranged between members of the extended family (kin marriages). Such unions are especially common in North Africa, the Middle East and South Asia (Bittles, 2012). The basis for this widespread inbreeding is not well understood. A common reason for selection of close kin for a spouse is believed to be the poverty and its associated lack of education, often combined with the need for better family protection (Alwan and Modell, 1997; Bittles, 2012; Hussain, 1999; Khlat, 1997). This explanation was recently questioned (Denic et al., 2011).

According to "mate selection theory" choice of a marriage partner is guided by an inherent human inclination to select future spouse that will maximize fitness, i.e., number of surviving children and grandchildren. Many factors like health, wealth, social status, beauty, religion affect choice of spouse and some differ between men and women (Apostolou, 2010b; Buss and Barnes, 1986; Geary et al., 2004). In consanguineously marrying societies, poor are believed to select close kin for spouse more often to preserve economic wealth which historically was positively correlated with family size (Clark et al., 2014). Similarly, in tribal societies, which are less secure in the absence of protection by a central government, selection of close kin for spouse in theory provides better protection and increases fitness (Denic et al., 2010). The association of poverty and insecurity on one side and human consanguinity on the other is implicitly taken for explanations of human inbreeding in many parts of the world. This explanation was criticized on the grounds that poor in many other parts of the world avoid selection of close kin for spouse and enrichment of some tribal societies have not lowered frequency of kin marriages (Denic et al., 2011). Likewise, lack of awareness of biological harms of inbreeding was suggested as another reason for many parents arranging children's marriages with close kin (Hussain, 1999; Khlat, 1997). However, direct proof is lacking that the absence of knowledge in question affects selection of kin for marriage partner. On the other side, there is a strong association between consanguinity and tribalism (Bittles, 2012). Tribalism and cooperation are recognized as fundamental principles of human social behavior (Nowak and Sigmund, 2005; Wilson, 2013). In general, kin is more cooperative than non-kin and social contracts between kin are more likely to succeed and be productive than those between non-kin. A measure of trust is reputation. Reputation of any individual is based on his/her past history of being (un)cooperative in social contracts; in other words, reputation is a 'score card' of past cooperation and defaults in deals made between people. Reputation-based cooperation increases the odds of success of social contracts. In marriage arrangements, family reputation is potentially the best way to guide choice of a future spouse and in-laws especially in societies in which survival of individual more heavily depends on family-support than self-support.

In this study we examined (i) whether choice of kin for spouse was affected by the improved socioeconomic and security conditions, and (ii) compare relative importance of family reputation vs. family wealth and social status and physical appearance in selection of future spouse.

2. Material and methods

2.1. Ethics approval

The study was approved by the Al Ain Medical District Human Research Ethics Committee, Al Ain, Abu Dhabi, UAE (Protocol No. 12/43).

2.2. Study setting and population

The study was conducted in the United Arab Emirates (UAE), which is a confederation of seven emirates. The population is multi-ethnic. About 15% (~one million) are Arab nationals (citizens), most of whom are members of one of an estimated 67 tribes and sub tribes; the rest (85%) of the population are temporary foreign workers (Heard-Bey, 2001). The country's GDP at $49,800 per capita is one of the highest in the world and is due to newly acquired oil wealth (CIA, 2013).

2.3. Study design

As per 2012 UAE population census, size of national population was 947,997. We estimated that a sample of 260 would provide correct information about families within a 6% margin of error at 95% confidence level. A cohort of 491 national medical students at the College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, Abu Dhabi, UAE, was found to be representative of the population distribution in seven emirates (Table 1). Thus all 491 students in the College were invited to participate in the study. They were informed about the purpose of the survey, the voluntary nature of participation, and the anonymity of their responses. All students use a free-of-charge University email system upon which a commercial online service (https://www.surveymonkey.com/) was used for the survey. In an email, they were asked to participate in a survey and complete web-based questionnaire with an estimated completion time of 15 min.

2.4. Types of marriages

Marriages of UAE nationals are arranged by parents, and half of them are between second and closer cousins (close kin) (Al-Gazali et al., 1997). In Arab societies, consanguineous marriages can be arranged between cousins, but unions between kin closer than cousin (e.g., uncle and niece) are considered incestuous and illegal (Denic et al., 2010). All intra-tribal marriages by definition are kin marriages and endogamous. However, the distinction between close and distant kin (cousin) is often arbitrary and unclear, and the unions between second and closer cousins are customarily called consanguineous, while those of more distant cousins are referred to as endogamous. However, second cousin unions result in a negligible and often undetectable excess of morbidity and mortality in the offspring, so counting them as consanguineous could be misleading because consanguinity rate is often used as a proxy measure of biological harm from inbreeding (Bittles, 2012). Thus, in the present study second cousin unions were not counted as consanguineous and marriages were classified as follows: (i) close kin (consanguineous) marriages, i.e. those arranged between first cousins, double first cousins, and first

Table 1 The distribution of invited and responded students according to their geopolitical unit (emirate) of origin.

Emirate	Invited		Responded		Population[*]	
	N	%	N	%	N	%
Abu Dhabi	227	46.2	131	48.9	404,546	42.7
Ajman	17	3.5	6	2.2	42,186	4.5
Fujairah	62	12.6	35	13.1	64,860	6.8
Dubai	44	9.0	22	8.2	168,029	17.7
Ras al-Khaimah	54	11.0	28	10.5	97,529	10.3
Sharjah	50	10.2	23	8.6	153,365	16.2
Umm al-Quwain	4	0.8	2	0.7	17,482	1.8
Not declared	33	6.7	21	7.8		
All	491		268		947,997	

[*] National bureau of statistics at http://www.uaestatistics.gov.ae.

cousins once removed; (ii) distant kin (endogamous) marriages, arranged between second and more distant cousins; (iii) non kin marriages.

2.5. Electronic questionnaire

The survey questions were designed to collect data on demographics (e.g., age, sex, academic year), socioeconomic status, family structure, type of marriage (biological relation of spouses) of subject's parents, biological relation of preferred future mate of unmarried subjects when given full autonomy to choose a mate for themselves and for a sibling, and the respondent's estimate of the odds of health problems in the offspring of first cousin and non-cousin marriages. Socioeconomic status was determined using a five-point Likert-type scale in which participants could indicate their status as very high, high, mid, low or very low. The correct odds of biological harm (e.g., congenital malformation) of recessive deleterious allele in the offspring of first cousin unions were defined as 1 in 25 and those in offspring of non-cousin unions as 1 in 50 (Bittles, 2012; Charlesworth and Willis, 2009). In selecting a family/spouse for their sibling, students were asked about the importance of the following selection criteria: family reputation, family economic wealth, family social status and physical appearance of a potential mate. As all marriages in UAE society are arranged within the same religion, family religion was not included in spouse selection criteria. Three Emirati nationals who were staff members and had been students at the College were consulted during the development and vetting of the questions. All questions were in English. Relationships in human families are complex and Arabic language provides the most precise kinship terminology system in the world (Haviland et al., 2013). Accordingly, questions related to biological relationships of spouses and ranking of criteria for spouse selection were provided in both English and Arabic to prevent any potential misunderstanding. One of the authors (OB) translated the questions into Arabic and an official translator at the University validated the translation.

2.6. Statistical analysis

Of 491 medical students asked to participate in the study, 268 (54.3%) responded. The data were then exported electronically from the survey provider database to SPSS program (Windows, version 20.0, Armonk, NY: IBM Corp.) for statistical analysis. The responders who answered survey questions were as follows: demographics 268 (100%), family socioeconomic status 181 (67.5%), marriage of sibling 264 (98.5%), biological relationships of parents 221 (82.5%), selection criteria for future spouse 264 (98.5%), preference of cousin for future spouse 173 of 257 (67.3%) of unmarried responders. Knowledge question about the risk of disorder in offspring of first cousins and biologically unrelated parents was answered by 184 (68.7%) respondents. The missing data were omitted and the analysis was performed on what remains as a complete case analysis. The differences between groups were compared using the Pearson Chi square (χ^2)-test and the non-parametric Mann–Whitney U-test where appropriate. A two-tailed p-value of < 0.05 was considered to be statistically significant. The mean coefficient of inbreeding (F) was calculated as an average of coefficients of inbreeding (probability of homozygosis by common descent for any autosomal allele) for each family as follows: double first cousin, 0.125; first cousin, 0.0625; first cousin once removed, 0.03125; second cousin, 0.015625; non cousin, $\rightarrow 0$. For more distant than second cousin unions, the coefficient of inbreeding was estimated as half of that for a second cousin union, i.e., 0.0068125.

3. Results

3.1. Study participants: demographics and socioeconomics

The socioeconomic status of 268 participants (67 males and 201 females) was as follows: very high 5.6% (15), high 17.9% (48), middle 42.5% (114), low 1.5% (4), very low 0% (0) and 32.5% (87) were undeclared. Mean ($\pm$SD) age of the subjects was 21 (± 2.16) years, and 4.5% (12/268) were married.

3.2. Frequency of kin marriages in two generations: parents and their children

The biological relationships between parents of 217 participants and their mean coefficient of inbreeding are shown in Table 2. Overall, the rate of kin marriages (close and distant kin combined) among parents was 36.4% (79/217).

Of the twelve married students (ten females and two males), two were wedded to first cousins, five to second or more distant cousins, four to non-cousins, and one did not respond to the question. The preferred biological relationship with a future spouse among 173 unmarried medical students is shown in Table 3. Males preferred to marry a first cousin more often (19.4%, 7/36) than females (5.8%, 8/137, $p = 0.001$), whereas females preferred a non-cousin more often (70.8%, 97/137) than males (47.2%, 17/36, $p = 0.008$). Overall, the rate of kin (close and distant cousin) marriages among parents (36.4%, 79/217) and predicted rate for children (31.4%, 37/118) were similar ($p = 0.35$).

3.3. Awareness of biological harms of inbreeding and selection of kin for spouse

Overall, 84.2% (155/184) of students indicated that offspring of close cousin unions are more likely to have health problems than offspring of biologically unrelated parents. First- and

second-year students (82.6%, 71/86) and fifth- and sixth-year students (87.5%, 35/40), were similarly aware of this potential harm to offspring ($p = 0.48$). All subjects who preferred a first or more distant cousin, or had no preference between cousin and non-cousin for their future spouse were grouped into the "pro-kin" marriage group, and all others (for whom a cousin was an unacceptable spouse choice) were combined into the "against-kin" marriage group. In the pro-kin group, the subjects were less often (76.3%, 45/59) aware of potential harm to offspring of close cousin families than subjects from the against-kin marriage group (88.6%, 101/114), $p = 0.034$.

The estimates of odds of biological problems related to inbreeding in the offspring of first cousin and non-cousin families are shown in Table 4. The rates of a correct estimate of odds were relatively low and did not differ between the pro-kin and against-kin marriage group. The against-kin group more often overestimated health problems in offspring of first cousin family, which may have affected their choice of a kin for mate. On the other hand, the pro-kin group overestimated the risk of harm in offspring of non-cousin family, which did not affect their choice of kin for mate.

3.4. Importance of family reputation, wealth and status and beauty in selection of kin for spouse

We investigated the importance of family reputation, family economic wealth, family social status and physical appearance in the respondent's selection of a spouse for sisters and brothers. As male's and female's spouse selection strategies often differ, the responses of male and female students were compared (Buss and Barnes, 1986; Geary et al., 2004). By far the most important criterion in the selection of a spouse was reputation of the future spouse's family: for a future husband 69.3% (183/264) and for a future wife 75.0% (201/268), $p = 0.14$ (Table 5). The responses of male and female students were not different in selection of future husbands ($p = 0.46$) or future wives ($p = 0.12$).

In contrast, the economic wealth of the family of a future spouse was five times more important ($p < 0.001$) in the selection of future husbands (9.3%, 25/268) than selection of future wives (1.9%, 5/264). The responses of male and female students were not different in the selection of either future husbands ($p = 0.72$) or future wives ($p = 0.42$).

The physical appearance of a future spouse was three times more important in the selection of a wife (20.1%, 53/264) than a husband (6.0%, 16/268), $p < 0.001$; the responses of male and female students were not different in selecting either a

Table 2 Biological relationships and coefficients of inbreeding among parents of 217 participants.

Biological relation	N	%	F
Double first cousin	9	4.1	0.12500
First cousin	37	17.1	0.06250
First cousin once removed	5	2.3	0.03125
Second and more distant cousin	28	12.9	$\leqslant 0.015625$
Non cousin	138	63.6	$\rightarrow 0$
All	217	100	0.018[*]

F, coefficient of inbreeding; [*]mean coefficient of inbreeding.

Table 3 Preference of cousin vs. non-cousin for future spouse by unmarried participants.

Preferred future spouse	Total		Male		Female		p
	N	%	N	%	N	%	
First cousin	12	6.9	6	16.7	6	4.4	0.01
More distant cousin	8	4.6	2	5.6	6	4.4	0.77
Non-cousin	114	65.9	17	47.2	97	70.8	0.008
No preference	39	22.5	11	30.6	28	20.4	0.19
Total	173		36		137		

future husband ($p = 0.47$) or wife ($p = 0.55$) for their sisters and brothers, respectively.

Overall, social status of the potential spouse's family was equally important in the selection of a future husband (9.7%, 26/268) and wife (8.7%, 23/264), $p = 0.69$. However, male students more often than female students preferred that a future wife be from a high social status family ($p = 0.0014$) but there was no gender difference in the selection of a future husband ($p = 0.25$) for their sisters.

Family reputation was equally important for spouse selection among the participants who preferred cousins (75%, 15/20) and non-cousins (77%, 88/144) for spouse as well as those without cousin vs. non-cousin preference (85%, 33/39), $p = 0.57$ (Fig. 1).

4. Discussion

We examined whether likelihood of kin marriage changed as the UAE society became richer, socially more secure and people better educated. Kin marriage rates among parents (36.4%) and possible kin marriage rates among their children (34.1%) did not change ($p = 0.35$). The GDP of the country in interim 25 years has doubled and social security increased as part of a progressive overall development (Abdel Majid et al., 2003; CIA, 2013). Socioeconomic status of groups for which kin marriage rates were compared (parents and children) were the same but relatively higher than in general population. This could explain lower coefficient of inbreeding (0.018) than that in general UAE population (0.022) recently reported (Denic et al., 2013). However, that coefficient of inbreeding in general population is the same as that reported one generation earlier in another study (Al-Gazali et al., 1997). Similarly high rates of consanguinity are present in the near-by oil and gas rich countries of Qatar, Saudi Arabia and Kuwait (Radovanovic et al., 1999; Sandridge et al., 2010). The persistence of consanguinity was also observed in societies with a more gradual and moderate socioeconomic development (Jurdi and Saxena, 2003). Taken together, these observations indicate, in a contrast to the prevailing explanation in the literature, that economic prosperity does not much affect the likelihood of human inbreeding.

Interestingly, the female respondents were more averse to kin marriage than males (Table 3). Women invest in offspring more (through pregnancies and postnatal child care) than men and with the loss of every child they lose more than men. For that reason it was proposed that females are likely to be more averse to inbreeding than males and our finding confirms this prediction (Trivers, 2000).

Table 4 The estimates of expected biological harms in offspring of first cousins and offspring of biologically unrelated parents by 181 participants.

	All		Undeclared		Pro-kin		Against-kin		p
	N	%	N	%	N	%	N	%	
First cousin family									
Correct estimate	44	27.3	3	27.3	15	25.9	26	23.2	0.703
Under estimate	98	63.6	7	63.6	37	63.8	54	48.2	0.054
Over estimate	39	9.1	1	9.1	6	10.3	32	28.6	0.007
Non cousin family									
Correct estimate	14	9.1	1	9.1	3	5.2	10	8.9	0.384
Under estimate	137	63.6	7	63.6	40	69.0	90	80.3	0.098
Over estimate	30	27.3	3	27.3	15	25.8	12	10.8	0.011
Total	181		11		58		112		

Pro-kin group was defined as those who prefer to marry first or more distant cousin or have no preference between cousin and non-cousin. Against-kin group was defined as those for whom cousin was unacceptable choice for spouse. Correct estimate is a likelihood of biological harm which was defined as 1 in 50 offspring from non-cousin families and 1 in 25 offspring from first cousin families.

Table 5 Criteria for selection of future spouse voted as most important.

| Criterion for spouse selection	Future wife		Future husband		p
	N	%	N	%	
Reputation of family	183	69.3	201	75.0	0.14
Economic wealth of family	5	1.9	25	9.3	< 0.001
Social status of family	23	8.7	26	9.7	0.69
Physical appearance of spouse	53	20.1	16	6.0	< 0.001
Total	264		268		

We also found evidence that better education is unlikely to have much effect on choice of kin for spouse. Overall, 84% of medical students were aware of biological harms of inbreeding although their rates of correct estimates of risks were relatively low and unrelated to biological relation of their preferred future spouse (Table 4). The participants for whom cousin was an unacceptable spouse choice were statistically significantly more often aware of health risk of inbreeding than those who preferred or did not mind marrying a cousin. This difference (88.6% vs. 76.3%) however is small and argues against a widely held belief that the lack of education is one of important causes of human consanguinity. Overall our study results suggest that socioeconomic development and improved education have little effect on selection of kin for spouse.

In second part of the study we explored the relative importance of reputation vs. that of wealth, social status and physical attractiveness on the selection of kin for spouse. In selecting spouses for their brothers and sisters, the respondents ranked the importance of family reputation higher than that of family wealth, family social status and spouse physical attractiveness. In fact, family reputation was weighted five times more than family economic wealth and social status combined (Table 5). The importance of family reputation in spouse selection in tribal populations has been noted by others (Apostolou, 2010b; Coelho, 2005; Deward and Walker, 1998). Reputation-based cooperation is a uniquely human form of behavior

(Nowak and Sigmund, 2005), which has been credited with contributing to socioeconomic development of rich nations (Inglehart, 2000), and its relevance in social affairs is universally acknowledged. The importance of family reputation implies that the responders overall preferred a more cooperative rather than a less cooperative family/spouse for their sibling. Conceivably, the aggregate benefits of life-long successful cooperation (between the newlywed and their in-laws as well as between other members of the two extended families) could exceed the benefits from family wealth and social status. In our study, family reputation was ranked as the most important mate selection criterion by both participants who preferred to marry kin and non-kin and was similarly ranked by those without kin vs. non-kin preference (Fig. 1). This indicates that reputation (i.e., human cooperation) is overall an important spouse selection criterion and is not specific for those with a preference of kin for mate.

The reputation and tribalism could be causally related. Reputation is a measure of human past cooperation and the cooperation between kin (e.g., within kinship groups) is generally higher than cooperation between non-kin in society at large. Hence, a population with a generally low level of cooperation between its members will tend to divide along kinship lines. Theoretically this could happen when most individuals consider each other's reputation before arrangement of social contracts. On the other side, selection of kin for spouse could be explained by the small size of pools of marriageable individuals in tribes and the ban of inter-tribal marriages. Thus, in the absence of non-kin (or distant kin) for spouse, union with kin is arranged. Such unions prevent childlessness of individuals (i. e., total loss of fitness) and are comparably of low cost in terms of loss of fitness due to inbreeding (Bittles, 2012). Moreover, kin families are more supportive than non-kin families (Denic et al., 2010) and their added benefits may compensate for added cost of inbreeding. Our finding that awareness of harms of inbreeding in general population has only a small negative effect of on the selection of kin for spouse is in a general agreement with this view.

A possible limitation of the present study is that participants were asked to play the role of parents when choosing a family/spouse for their sibling. This is mitigated by the ability
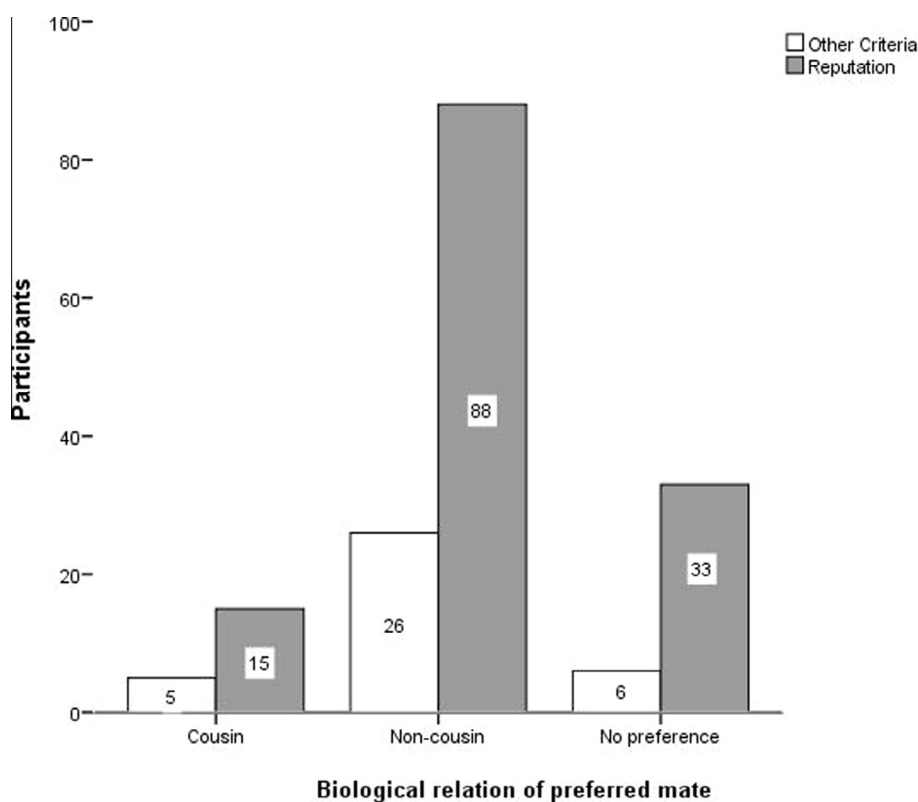
Figure 1 Family reputation and other criteria (combined family wealth, family social status and physical attractiveness of mate) voted as most important by participants preferring cousin and non-cousin for future spouse.

of humans to put themselves in the minds of others (Frith and Frith, 2010). Furthermore, the coefficients of relatedness of parent-offspring and sibling-siblings pairs were the same (0.5) suggesting that perceived benefits and costs of selecting a particular spouse for one's offspring and sibling would be similar. This in part supports the same responses produced by female- and male- students who ranked the family economic wealth to be more important for selection of a husband than a wife, and the physical attractiveness be more important in selection of a wife than a husband – which agrees with other studies on spouse selection (Apostolou, 2010a; Buss and Barnes, 1986; Geary et al., 2004). Our study was conducted on a relatively well-off population from a rich society and future studies need to confirm the findings in socioeconomically less developed tribal societies.

An unexpected finding in our study is that the male respondents more often than female respondents preferred spouses for their brothers from families with high social status. In general, men are less concerned with the social status of their spouse and women prefer those from the same or higher social strata of society (Buss and Barnes, 1986; Geary et al., 2004). One possible explanation for our finding is that in a society in which polygamy is legal and polyandry illegal, man attaining a higher social status through marriage improves his future prospects with other females while a married woman's social status is inconsequential to her prospects with other males. We cannot exclude a confounding effect from a relatively small sample size on this result. An alternative explanation is that in an environment in which men are deprived of information about a women's attractiveness due to the prevalent dress code, social status is given a greater weight (Apostolou, 2011).

5. Conclusion

In the studied population socioeconomic development and improved education have little if any effect on selection of kin for marriage partner. Family reputation was far more important in selection of spouse than family wealth, social status and spouse physical appearance. A possible relation between the reputation and trust and the principle of cooperation, population structure and selection of kin for spouse was discussed.

Acknowledgements

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