

Regional variations in the prevalence of consanguinity in Saudi Arabia

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ABSTRACT

Objective: To report on the prevalence of consanguinity in each region of the Kingdom of Saudi Arabia including the variation in prevalence between urban and rural settlements.

Methods: The study was conducted over 2 years (2004-2005). A cross-sectional sample determined by multistage random probability sampling of Saudi households from each of the 13 regions of the Kingdom. As part of survey questionnaire, the mother of each household was asked on the relationship to her husband to choose one of 3 answers: first-degree cousin, more distant relationship, or no relation.

Results: The overall prevalence of consanguinity was 56% with the first-degree cousin (33.6%) being more common than all other relations (22.4%). The overall prevalence was significantly more common in rural (59.5%) than in urban settlements (54.7%) ($p=0.000$). There are regions with high prevalence of 67.2% such as Madina, and regions with significantly lower prevalence of 42.1% such as Al-Baha ($p=0.000$).

Conclusion: The national prevalence of consanguinity in the Kingdom of Saudi Arabia remains high. In addition, there are significant variations in the prevalence of consanguinity between certain regions as well as between rural and urban settlements that should be taken into consideration in further studies.

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In Middle Eastern and Gulf countries in particular, the prevalence of consanguinity is reported to be high. For example, a prevalence of more than 50% has been reported from The United Arab Emirates, Kuwait, and Qatar.¹⁻³ In Saudi Arabia, several studies reported similarly high prevalence rates.⁴⁻⁷ However, most of these studies involved a limited urban population and therefore are not representative. Data on the prevalence of consanguinity in a nationally- representative sample of the country are scarce. The present report documents a national prevalence of consanguinity with regional as well as urban versus rural variations, which should be taken into consideration in further studies, especially those addressing the impact of consanguineous mating on the health of children.

Methods. The data were collected during the period 2004-2005. The Health Profile of Saudi Children and Adolescent Project provided the opportunity to include questions on consanguinity into the questionnaire. The sample for that project was calculated to be representative of the Saudi population. The Saudi households were selected randomly from each of the 13 regions of the Kingdom by a multistage probability sampling of the population. The field teams interviewed the mothers directly during household visits. The mother was asked on the family relation to her husband and given the choice among 3 answers (first-degree cousin "all types," more distant other relations, no relation). The type of settlement (urban versus rural) was recorded according to the classification of the Directorate of Population Statistics in Saudi Arabia.

The data were analyzed using the Statistical Package for Social Sciences (SPSS) to determine frequencies. The z-test (2 tailed) was used to compare percentages drawn from samples. A statistically significant difference is assumed when the p -value is less than 0.025.

Results. The response rate to the question on consanguinity was high 11554/11874 (97%). The overall prevalence of consanguinity is presented in **Table 1**,

indicating a national prevalence of 56% with the first-cousin relationship being more common than all types of relationship. The overall urban was 54.7% and rural prevalence was 59.5%, indicating a significantly higher prevalence in rural settlements ($p=0.000$). There were 8466/11554 (73.3%) of the families living in urban settlements. The regional variation in the overall prevalence of consanguinity is shown in **Table 2**. Indicating a significant difference between the lowest prevalence in the region of Al-Baha and the highest in Madina ($p=0.000$). There were also significant differences in prevalence between other regions such as Assir and Najran with a p -value of 0.000. However, no significant difference was found between other regions such as Madina and Najran ($p=0.862$). When first cousin mating alone is considered, the prevalence follows a similar pattern of significant difference between Madina

and Al-Baha ($p=0.000$) but not significant between Assir and Najran ($p=0.137$).

The effect of the type of settlement on the prevalence of consanguinity is depicted in **Table 3**. Although the overall prevalence was higher in rural settlements as mentioned above, there are important variations between regions. The difference is significant in the regions of Riyadh, Makkah, Assir, Qassim, Northern Borders, and Tabuk, whereas it was not significant in the other 7 regions ($p>0.025$). However, the difference in the prevalence of first cousin relationship between rural and urban settlement is significant only in the regions of Qassim, Al-Baha, and Northern Borders ($p<0.01$).

Discussion. The overall prevalence of consanguinity in Saudi Arabia found in this study remains high compared to all previous reports. Although not as

Table 1 - Overall prevalence of consanguinity.

Settlement	Consanguinity: n (%)			No relation n (%)	Total n (%)
	1 st DC*	Others	All types		
Urban	2880 (34.0)	1752 (20.7)	4632 (54.7)	3834 (45.3)	8466 (73.3)
Rural	1002 (32.4)	836 (27.1)	1838 (59.5)	1250 (40.5)	3088 (26.7)
Total	3882 (33.6)	2588 (22.4)	6470 (56.0)	5084 (44.0)	11554 (100)

*First-degree cousins (all types)

Table 2 - The regional prevalence of consanguinity in Saudi Arabia.

Regions	Consanguinity: n (%)			No relation n (%)	Total n (%)
	1 st DC*	Other relations	All types		
Riyadh	1068 (42.3)	446 (17.7)	1514 (60.0)	1008 (40.0)	2522 (100)
Makkah	738 (32.4)	535 (23.5)	1273 (55.9)	1005 (44.1)	2278 (100)
Gizan	186 (33.0)	116 (20.5)	302 (53.5)	263 (46.5)	565 (100)
Eastern Province	344 (33.3)	253 (24.5)	597 (57.8)	435 (42.2)	1032 (100)
Assir	205 (24.6)	166 (19.9)	371 (44.5)	462 (55.5)	833 (100)
Qassim	211(29.6)	122 (17.1)	333 (46.7)	380 (53.3)	713 (100)
Hail	127 (25.1)	120 (23.8)	247 (48.9)	258 (51.1)	505 (100)
Madinah	242 (39.2)	173 (28.0)	415 (67.2)	203 (32.8)	618 (100)
Al-Baha	141(29.0)	64 (13.1)	205 (42.1)	282 (57.9)	487 (100)
Northern Borders	158 (31.4)	164 (32.5)	322 (63.9)	182 (36.1)	504 (100)
Tabuk	122 (28.3)	137 (31.7)	259 (60.0)	173 (40.0)	432 (100)
Najran	134 (28.4)	181(38.3)	315 (66.7)	157 (33.3)	472 (100)
Al-Jouf	206 (34.8)	111 (18.7)	317 (53.5)	276 (46.5)	593 (100)

*First-degree cousins (all types).

representative as ours, the most comparable study reported an overall rate of consanguinity of 57.7% with a first cousin rate of 28.4%.⁵ These figures are comparable to our findings of 56% for overall and 33.6% for first cousin prevalence. However, regional comparisons may be more appropriate because of the regional and urban nature of most previous reports. For example, in 2 studies carried out in urban Riyadh and reported in 1990, a prevalence of 54.3% and 1997 a prevalence of 51.3% were found.^{4,6} These figures compare with a higher prevalence of 58.4% found in the urban Riyadh region in this report (**Table 3**). In another report from an urban settlement in the Eastern region (Dammam), a prevalence of 52.0% was reported in 1998,⁷ comparing with 58% reported in this study

(**Table 3**), indicating again an increase in prevalence. It is possible that the difference between the prevalence in the present and previous studies could be due to variation in the type of study sample. However, the same trend of increasing prevalence of consanguinity has been reported from other Gulf countries. In Dubai, an urban settlement of the United Arab Emirates, the prevalence of consanguinity has increased from 39% to 50.5% in one generation.¹ Similarly, the consanguinity rate in the State of Qatar has increased from 41.8% to 54.5% in one generation.³ This tendency is similar to that reported from Yemen,⁸ but contrasts with no change in prevalence reported from Pakistan over 3-4 decades.⁹ These findings contrast even more with decreasing prevalence rates reported from other

Table 3. Consanguinity and type of settlement in Saudi Arabia

Region	Settlement	Type of consanguinity: n (%)			P-value (2 tailed)
		1 st DC*	Others	All types	
Riyadh	Urban	972 (43.0)	349 (15.4)	1321 (58.4)	0.000
	Rural	96 (36.5)	97 (36.9)	193 (73.4)	
Makkah	Urban	616 (32.1)	405 (21.1)	1021 (53.2)	0.000
	Rural	122 (34.1)	130 (36.3)	252 (70.4)	
Gizan	Urban	54 (32.1)	24 (14.3)	78 (46.4)	0.0295
	Rural	132 (33.2)	92 (23.2)	224 (56.4)	
Eastern Province	Urban	323 (33.9)	229 (24.1)	552 (58.0)	0.755
	Rural	21 (26.3)	24 (30.0)	45 (56.2)	
Assir	Urban	92 (21.9)	66 (15.7)	158 (37.5)	0.000
	Rural	113 (27.4)	100 (24.3)	213 (51.7)	
Qassim	Urban	108 (23.3)	70 (15.1)	178 (38.4)	0.000
	Rural	103 (41.4)	52 (20.9)	155 (62.2)	
Hail	Urban	60 (27.3)	53 (24.1)	113 (51.4)	0.326
	Rural	67 (23.5)	67 (23.5)	134 (47.0)	
Madinah	Urban	215 (39.3)	155 (28.3)	370 (67.6)	0.488
	Rural	27 (38.0)	18 (25.4)	45 (63.4)	
Al-Baha	Urban	23 (19.3)	17 (14.3)	40 (33.6)	0.026
	Rural	118 (32.0)	47 (12.8)	165 (44.8)	
Northern Borders	Urban	88 (26.4)	92 (27.6)	180 (54.0)	0.000
	Rural	70 (40.9)	72 (42.1)	142 (83.0)	
Tabuk	Urban	107 (28.1)	111 (29.1)	218 (57.2)	0.000
	Rural	15 (29.4)	26 (51.0)	41 (80.4)	
Najran	Urban	77 (31.5)	90 (36.9)	167 (68.4)	0.420
	Rural	57 (25.0)	91 (29.9)	148 (64.9)	
Al Jouf	Urban	145 (33.1)	91 (20.8)	236 (53.9)	0.731
	Rural	61 (39.3)	20 (12.9)	81 (52.3)	

*First-degree cousins (all types).

countries. In a report from Jordan, although dealing with a selected clinic population, the proportion of paternal parallel first cousin marriages showed a steady decline over 3 generations.¹⁰ A report from the United Kingdom indicates a drop of the prevalence of first cousin marriages from 1.12% for marriages in the late 19th century to 0.32% for marriages during the year 1920.¹¹

In almost all reports, first cousin mating (third-degree relatives) is the most common form of relationship. In the present report, first cousin mating accounted for 3882/6470 (60%) of consanguineous marriages and for 33.6% of all marriages in this nationally representative sample. This pattern is the same for all regions, rural or urban. This trend is also similar to all reports from the Gulf countries, Pakistan, and Jordan mentioned earlier in this report. A high prevalence of consanguinity with a predominance of first-degree cousin relationship has also been reported from other countries. In Iran, the rate of consanguineous marriages was 38.6% with the first cousin marriages being the most common (27.9%).¹² However, in 1983, a low rate of 3.9% for consanguinity and 1.6% for first cousin were reported from Japan.¹³

The regional variation in prevalence of consanguinity from 42.1 in Al-Baha to 67.2 in Madina is documented in this study. Such variation, which has not been emphasized in previous reports, should be taken into consideration in future studies especially those originating from a single region or city. The urban/rural variation is also reported in this study. Generally, the overall prevalence of consanguinity is higher in rural settlements. However, when the regional variation is considered, only 6 regions have a significantly higher prevalence in rural settlements.

In conclusion, the national prevalence of consanguinity in a representative sample of the Saudi population is increasing. Regional as well as urban versus rural variations are significant and should be taken into consideration in future studies.

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