An epidemiological study of childhood disability in Jeddah, Saudi Arabia

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Summary

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Childhood disability is a major health problem that is pronounced in developing countries. The objectives of this study were to identify the maternal risk factors present in our society and their impact on acquiring a disabled child. Data were collected from the six governmental rehabilitation institutes and a sample of normal non-disabled school children in Jeddah City. Information on sociodemographic factors and maternal risk factors was collected by in-person interview and copied from the children's institute records. Logistic regression models were fitted to calculate the adjusted odds ratios in order to demonstrate the impact for the various maternal risk factors on having a disabled child. Our results have shown that certain modifiable maternal risk factors affecting child health still exist in our community, such as early and late-age marriage and childbearing, as well as low education, unemployment, multiparity and consanguineous marriages. All these risks were shown to put the mother at higher risk of having an auditory disabled child. Also, older-age childbearing (≥ 30 years), low education level and multiparity were the maternal risk factors identified that influenced the risk of visual disability in children. Similar maternal risk factors, in addition to unemployment, were more observed among mothers of mentally disabled children. A huge effort is required to discourage the potential risk factors in our community that influence child health.

Introduction

It has been estimated that 85.0% of the world's disabled children under 15 years of age live in developing countries.[1] The burden of childhood disability as a public health problem in these areas of the world remains relatively unrecognised. There is a major information gap in the developing world on the magnitude of the problem and possible implicated risk factors.[2–4]

Saudi Arabia has undergone rapid economic development in the last decades which has been reflected in improved health care services and a decrease in child mortality,[5] such that disabled children have been more likely to survive in greater numbers and come much more to the fore. Studies on the subject have been performed in the Kingdom as investigations of single types of childhood disability, but most of these were unpublished or did not use a uniform definition. A recent national survey in the Kingdom reported the prevalence of major disabilities as around 4.0% of the population.[5] Epidemiological studies tackling the main risk factors specific to our community are still lagging behind.

Analysing the problem of disability in the Kingdom could reflect the potential risk factors that are specific to its traditions and beliefs. This has inspired us to perform this study in order to identify the possible maternal risk factors present in our society and observe the impact of these risk factors on childhood disability.

Materials and methods

Study population and data collection

Four cohorts were considered in this study. The first three cohorts were auditory, visually and mentally disabled children. Data on disabled children were col-

lected from the major governmental rehabilitation institutes in Jeddah City specialised in single disability care. There are three such institutes for boys and a corresponding three for girls. The Al-Amal rehabilitation institutes were established in 1970 for special education of the auditory disabled (deaf-mutes) with an IQ of at least 70, followed in 1983 by the Al-Noor rehabilitation institutes offering special education for visually disabled children with visual acuity not exceeding 6/60 and an IQ of at least 70. For education of mentally disabled children with a minimum IQ of 50 the Al-Tarbyia Al-Fikrayia rehabilitation institutes were established in 1975. All children with a single disablement have equal chance of access to these governmental institutes which cover approximately 60.0% of them. Data on the disabled cohorts were collected during April 1999 on all children in these six institutes in Jeddah. Basic data on sociodemographic status and possible maternal risk factors were copied from the institutes' social, psychological and medical records by trained medical students under direct supervision of medical staff.

Data on the fourth cohort were collected from a sample of normal non-disabled school children in Jeddah City during April 2000. There are 512 boys' schools and 507 girls' schools in Jeddah City in all educational levels (primary, intermediate and secondary). A stratified sample of 42 boys' and 42 girls' schools was obtained by proportional allocation to type of school (boys or girls) and educational level. Classes were selected by simple random technique from each educational level and all students in selected classes were considered. Data collection on normal non-disabled school children was carried out by in-person interview and copied from students' school records.

Data and statistical analysis

Data entry and analysis were carried out using SPSS for windows (version 9.05). Knowing that early marriages exist in our community, a minimum mother's age of 12 years at marriage and 13 years at childbirth were accepted. Parity was defined as the mother's parity at childbirth, excluding the index child. Multiparity was defined as having at least four children prior to the index child.

The chi-square test was used to detect significant differences in proportions between the four cohorts. Logistic regression models were fitted to calculate the adjusted odds ratios for the impact of various maternal risk factors on the risk of having a disabled child for each type of disability.

Results

A total of 3405 normal non-disabled school children, 421 auditory disabled, 178 visually disabled and 666 mentally disabled children were enrolled in the study. Their ages ranged from 6 to 20 years (mean = 13.7 years, SD = 3.1). There was a higher proportion of children under 10 years in the disabled cohorts than in the normal cohort children, but the year of birth did not have any impact on the frequency of the maternal

Table 1. Sociodemographic characteristics of children in Jeddah by type of disablement

	Normal (n = 3405) No. (%)	Auditory (n = 421) No. (%)	Visual (n = 178) No. (%)	Mental (n = 666) No. (%)	All (n = 4670) No. (%)
Age (years)					
<10	77 (2.3)	50 (11.9)	36 (20.2)	125 (18.8)	288 (6.2)
10–14	2021 (59.4)	131 (31.1)	80 (44.9)	352 (52.9)	2584 (55.3)
≥15	1307 (38.4)	240 (57.0)	62 (34.8)	189 (28.4)	1798 (38.5)
Sex					
Boy	1325 (38.9)	113 (26.8)	78 (43.8)	483 (72.5)	1999 (42.8)
Girl	2080 (61.1)	308 (73.2)	100 (56.2)	183 (27.5)	2671 (57.2)
Nationality					
Saudi	2628 (77.2)	345 (81.9)	148 (83.1)	592 (88.9)	3713 (79.5)
Non-Saudi	777 (22.8)	76 (18.1)	30 (16.9)	74 (11.1)	957 (20.5)
Residence					
Jeddah	3319 (97.5)	306 (72.7)	142 (79.8)	572 (85.9)	4339 (92.9)
Outside	86 (2.5)	115 (27.3)	36 (20.2)	94 (14.1)	331 (7.1)

Maternal risk factors	Normal (n = 3405) No. (%)	Auditory (n = 421) No. (%)	Visual (n = 178) No. (%)	Mental (n = 666) No. (%)	All (n = 4670) No. (%)
Marital age[a] (years)					
<16	435 (12.8)	65 (15.4)	20 (11.2)	51 (7.7)	571 (12.2)
16–19	2276 (66.8)	126 (29.9)	62 (34.8)	167 (25.1)	2631 (56.3)
20–29	605 (17.8)	188 (44.7)	72 (40.4)	317 (47.6)	1182 (25.3)
≥30	89 (2.6)	42 (10.0)	24 (13.5)	131 (19.7)	286 (6.1)
Childbirth age[a] (years)					
<16	107 (3.1)	24 (5.7)	6 (3.4)	8 (1.2)	145 (3.1)
16–19	1333 (39.1)	88 (20.9)	36 (20.2)	88 (13.2)	1545 (33.1)
20–29	1736 (50.9)	217 (51.5)	90 (50.6)	352 (52.9)	2395 (51.2)
≥30	229 (6.7)	92 (21.9)	46 (25.8)	218 (32.7)	585 (12.5)
Education[a]					
Never	1126 (33.1)	268 (63.7)	80 (44.9)	327 (49.1)	1801 (38.6)
Primary	569 (16.7)	68 (16.2)	33 (18.5)	129 (19.4)	799 (17.1)
Intermediate	493 (14.5)	48 (11.4)	31 (17.4)	102 (15.3)	674 (14.4)
Secondary	392 (11.5)	26 (6.2)	19 (10.7)	65 (9.8)	502 (10.7)
University+	825 (24.2)	11 (2.6)	15 (8.4)	43 (6.5)	894 (19.1)
Working status[a]					
Housewife	2944 (86.5)	416 (98.8)	159 (89.3)	638 (95.8)	4157 (89.0)
Working	461 (13.5)	5 (1.2)	19 (10.7)	28 (4.2)	513 (11.0)
Parity					
0	719 (21.1)	95 (22.6)	41 (23.0)	136 (20.4)	991 (21.2)
1	661 (19.4)	78 (18.5)	38 (21.3)	127 (19.1)	904 (19.4)
2	600 (17.6)	63 (15.0)	25 (14.0)	109 (16.4)	797 (17.1)
3	463 (13.6)	65 (15.4)	16 (9.0)	83 (12.5)	627 (13.4)
4+	962 (28.3)	120 (28.5)	58 (32.6)	211 (31.7)	1351 (28.9)
Consanguinity[a]					
No	1864 (54.7)	170 (40.4)	98 (55.1)	348 (52.3)	2480 (53.1)
First degree	845 (24.8)	199 (47.3)	62 (34.8)	230 (34.5)	1336 (28.6)
Others	696 (20.4)	52 (12.4)	18 (10.1)	88 (13.2)	854 (18.3)

[a]$P < 0.001$.

demographic risk factors considered. Approximately 42.8% were boys and 57.2% were girls. The majority was of Saudi nationality (79.5%) and resident in Jeddah City (92.9%). Table 1 shows the sociodemographic characteristics of the children in Jeddah City by type of disability.

The current mother's age ranged from 19 to 60 years (mean = 36.3 years, SD = 6.8). As shown in Table 2, mothers who married before their 16th birthday accounted for 12.2% and those who gave birth before that age accounted for 3.1%. At the other extreme, mothers who reported marriage at an age of 30 years or over accounted for 6.1%, whereas those who gave birth in this age group accounted for 12.5%. Young maternal marital age and childbearing were observed mainly among auditory disabled children, whereas late marriages and childbirth were also prominent among the visually and mentally disabled (P < 0.001) Approximately 38.6% of mothers never attended school and 89.0% never worked. Illiteracy and unemployment were still more marked among the three disabled cohorts, especially the auditory disabled (P < 0.001). Multiparity at childbirth accounted for 28.9% and was marked mainly among the visually and mentally disabled, but results did not reach statistical significance. Consanguineous marriages were reported in around 46.9% of cases and 61.0% of these were among first-degree relatives. First-degree consanguineous marriages were observed mainly among mothers of the disabled cohorts (P < 0.001).

The impact of maternal risk factors on having a disabled child became more apparent after adjustment.

Table 3. Logistic regression analysis to detect the impact of maternal risk factors on acquiring an auditory disabled child

Maternal risk factors	Auditory disability		
	OR	[95% CI]	*P*-value
Age at childbirth (years)			<0.001
<16	1.6	[1.1, 2.5]	
16–19y	0.4	[0.3, 0.5]	
20–29	1.0	Reference	
≥30	3.4	[2.5, 4.6]	
Education			<0.001
Never	13.3	[7.2, 27.8]	
Primary	13.0	[6.7, 25.0]	
Intermediate	7.2	[3.6, 13.9]	
Secondary	4.7	[2.2, 9.4]	
University+	1.0	Reference	
Working status			<0.001
Housewife	14.0	[5.7, 34.6]	
Working	1.0	Reference	
Multiparity at childbirth			<0.001
No	1.0	Reference	
Yes	2.5	[1.9, 3.3]	
Consanguinity			<0.001
No	1.0	Reference	
Yes	1.7	[1.4, 2.1]	

Being <16 years of age or ≥30 years at childbirth, of low education level, jobless, multiparous and married to a relative, put the mother at a significantly higher risk of having an auditory disabled child (Table 3). Older-age (≥30 years) at childbearing, low education level and multiparous mothers were at a significantly higher risk of having a visually disabled child (Table 4). In the same way, older-age at childbearing (≥30 years), low education level, jobless, multiparous mothers were at a significantly higher risk of having a mentally disabled child (Table 5).

Discussion

Childhood disability is a public health concern as it affects the health and economic status of nations. The disabled child is an outcome of multiple intervening factors. Many researchers have postulated that while proximate determinants directly influence a child's morbidity and mortality, socio-economic determinants are the over-riding factors in a child's health.[6,7]

This study has emphasised certain maternal risk factors that exist in our society and influence child health. They include extreme maternal age (early and late) of marriage and childbearing, as well as low education, unemployment, multiparity and consanguineous marriages. Our results have shown that 12.2% of mothers married before their 16th birthday and 3.1% delivered in this age group. Early childbearing is fraught with insecurities as the mother is biologically and psychologically immature to cope with pregnancies and deliveries.[8–10] Early childbearing was shown from our results to increase the risk of having an auditory disabled child. Arab countries as a whole are known to have high rates of early maternal marriage, a practice related to traditions and beliefs.[11–13] It is true that early marriage and childbearing save the population from many health hazards but an age limit for the marriages and consequently childbearing should be decided, taking into account the biological maturity of females.

On the other hand, late maternal marriage and childbearing was also recognised, as 6.1% reported marriage at 30 years or over, and 12.5% gave birth in this age group. This shows that late childbearing is mainly the result of multiple childbearing. Multiparity was

Table 4. Logistic regression analysis to detect the impact of maternal risk factors on acquiring a visually disabled child

Maternal risk factors	Visual disability		
	OR	[95% CI]	*P*-value
Age at childbirth (years)			<0.001
<16	0.9	[0.4, 2.2]	
16–19	0.4	[0.3, 0.6]	
20–29	1.0	Reference	
≥30	4.0	[2.7, 5.9]	
Education			0.001
Never	3.7	[2.1, 6.6]	
Primary	3.7	[1.9, 6.9]	
Intermediate	3.4	[1.8, 6.4]	
Secondary	2.6	[1.3, 5.2]	
University+	1.0	Reference	
Working status			0.305
Housewife	1.3	[0.8, 2.3]	
Working	1.0	Reference	
Multiparity at childbirth			0.002
No	1.0	Reference	
Yes	1.8	[1.2, 2.6]	
Consanguinity			0.940
No	1.0	Reference	
Yes	1.0	[0.7, 1.4]	

Table 5. Logistic regression analysis to detect the impact of maternal risk factors on acquiring a mentally disabled child

Maternal risk factors	Mental disability		
	OR	[95% CI]	P-value
Age at childbirth (years)			<0.001
<16	0.3	[0.1, 0.6]	
16–19	0.2	[0.2, 0.3]	
20–29	1.0	Reference	
≥30	5.1	[4.0, 6.5]	
Education			<0.001
Never	5.5	[3.8, 8.1]	
Primary	5.1	[3.6, 7.2]	
Intermediate	4.0	[2.7, 5.9]	
Secondary	2.9	[1.9, 4.4]	
University+	1.0	Reference	
Working status			<0.001
Housewife	4.1	[2.7, 6.2]	
Working	1.0	Reference	
Multiparity at childbirth			<0.001
No	1.0	Reference	
Yes	2.6	[2.1, 3.3]	
Consanguinity			<0.813
No	1.0	Reference	
Yes	1.0	[0.8, 1.2]	

reported by 28.9%. Older-age childbearing and multiparity were shown from our results to increase the risk of having an auditory, visually and mentally disabled child. Also, high parity and thus old-age pregnancies are typical for the Middle East region as documented in several studies.[11, 13–16]

Illiteracy and unemployment are other factors previously reported in the region.[12,13] Previous investigations have shown that an infant whose mother is illiterate is more likely to die during the postneonatal period than one whose mother is literate, even after adjustment for economic conditions.[17,18] The mother's education level and employment status probably influence child health through several mechanisms, including better perinatal care, improved household and personal hygiene, which are consequently reflected in the duration of gestation and fetal growth and development.[17–19] In this study, the prevalence of low maternal education was very high, as 38.6% of mothers had never attended school. The risk of having a disabled child showed a significant sharp decline with increase in maternal education level; this was seen for the three disabled cohorts. Unemployment among

mothers accounted for 89.0% and was more pronounced among mothers of auditory and mentally disabled children.

Consanguineous marriage is the dominant marriage pattern in many developing countries particularly in the Arab World[11,14,20–24] and is a widespread practice in the Kingdom, present in about 46.9% of our study families. These related marriages were mainly among first-degree relatives. In our analysis, consanguineous marriages increased the risk of having an auditory disabled child.

We conclude that a number of modifiable maternal risk factors influencing child health exist in our community. Change in many of these practices, which result from our traditions and beliefs, will require major effort on various fronts. However, the result will be better life prospects for future generations.

References

1 Helander EAS. *Prejudice and Dignity: an Introduction of Community-Based Rehabilitation*. New York: United Nations Development Program, 1993.

2 Rehabilitation International. Childhood disability: its prevention and rehabilitation. *Assignment Children* 1981; **53/54**:43–75.

3 Frayers T. *The Epidemiology of Severe Intellectual Impairment: The Dynamic of Prevalence*. Academic Press, 1986.

4 Milaat W. Public health around the world: Saudi Arabia. *Public Health Medicine* 1999; **1**:34–38.

5 Al-Turaiki MH. *National Project For Disability And Community Rehabilitation*. Riyadh: King Fahad National Library, 1997.

6 Hertz E, Hebert JR, Landon J. Social and environmental factors and life expectancy, infant mortality and maternal morbidity rates: results of a cross-national comparison. *Social Science and Medicine* 1994; **39**:105–114.

7 Koch-Weser D, Yankauer A. What makes infant mortality rates fall in developing countries? *American Journal of Public Health* 1991; **81**:12–13.

8 Victora CG, Huttly SRA, Barros FC, Lombardi C, Vaughan JP. Maternal education in relation to early and late child health outcomes: findings from a Brazilian cohort study. *Social Science and Medicine* 1992; **34**:889–905.

9 Senanayake P. *Adolescent Fertility. Health Care of Women and Children*. Third Party Publishing Company, 1990; pp. 470–475.

10 Hayes L, Crovitz E, Durham NC. Adolescent pregnancy. *Southern Medical Journal* 1979; **72**:869–874.

11 Harfouche JK, Verhoestrate LJ. Child Health. *The State of Child Health in the Eastern Mediterranean Region*. WHO/EMRO Technical Publication 1983; **9**:131–163.

12 El Hamamsy L. *Early Marriage and Reproduction in Two Egyptian villages*. Occasional Monograph. Cairo: The Population Council/UNFPA,1994.

13 Shawky S, Milaat W. Cumulative impact of early maternal marital age during the childbearing period. *Paediatric and Perinatal Epidemiology* 2001; **15**:27–33.

14 Milaat WA, Du V Florey CH. Perinatal mortality in Jeddah, Saudi Arabia. *International Journal of Epidemiology* 1992; **21**:82–90.

15 Omran AR, Standely CC, Bone MR. Family formation and social structure. Introduction. In: *Family Formation Patterns and Health. Further Studies. An International Collaborative Study in Colombia, Egypt, Pakistan and Syria.* Editors: Omran AR, Standley CC. Geneva: WHO, 1981; pp. 101–102.

16 Hammam HM, Zaraour AHA, El-Amine M, El Sharbini AF. Family formation and pregnancy outcome. Egypt. In: *Family Formation Patterns and Health. Further Studies. An International Collaborative Study in Colombia, Egypt, Pakistan and Syria.* Editors: Omran AR, Standley CC. Geneva: WHO, 1981; pp. 112–121.

17 Bicego GT, Boerma JT. Maternal education and child survival: a comparative study of survey data from 17 countries. *Social Science Medicine* 1993; **36**:1207–1227.

18 Becerra J, Atrash H, Perez N, Saliceti JA. Low birthweight and infant mortality in Puerto Rico. *American Journal of Public Health* 1993; **83**:1572–1576.

19 O'Brian M, Smith C. Women's views and experiences of antenatal care. *Practitioner* 1981; **225**:123–125.

20 Al-Salem M, Rawashdeh N. Consanguinity in North Jordan: prevalence and pattern. *Biosococial Science* 1993; **25**:553–556.

21 Gevi D, Nathan R, Freudilich M. Consanguinity and congenital heart disease in the rural Arab population in Northern Israel. *Human Heredity* 1986; **36**:213–217.

22 Hamamy HA, Al-Bayat N, Al-Qubaisy W. Consanguineous matings in the Iraq urban population and the effect of pregnancy outcome on infant mortality. *Iraq Medical Journal* 1986; **34**:65–80.

23 Saha N, Hammad RE, Mohamed S. Inbreeding effects on reproductive outcome in a Sudanese population. *Human Heredity* 1990; **40**:208–212.

24 Saha N, Al-Shaykh F. Inbreeding levels in Sudan. *Biosocial Science* 1998; **20**:333–336.