

The association of exposure to the 2009 south war with the physical, psychological, and family well-being of Saudi children

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ABSTRACT

الأهداف: تهدف الدراسة إلى التقييم التغذوي والنفسي والسلوكي، والتكيف الأسري والتقييم النفسي للأطفال السعوديين الذين تعرضوا لحرب جازان 2009م-2010م.

الطريقة: أجريت هذه الدراسة الإستيعادية في المملكة العربية السعودية في يوليو 2010 م. تمت دراسة 186 طفل من الذين تعرضوا للحرب في جنوب جازان و 157 طفل في مدينة الملك خالد العسكرية بحفر الباطن لم يتعرضوا للحرب للبحث عن أدلة على سوء التغذية، والمشاكل النفسية باستخدام قائمة جرد سلوك الطفل والمشاكل السلوكية باستخدام مقياس روتر A2، والتكيف الأسري باستخدام جهاز التكيف الأسري لماكماستر للاضطرابات النفسية. كما تمت دراسة تأثير المتغيرات الاجتماعية والاقتصادية المختلفة على النتائج النفسية للمجموعة المكشوفة.

النتائج: كانت تغذية الأطفال المعرضين جيدة، وكان الأطفال المعرضون أكثر قلقاً (ب = 0.044) وأكثر تكيفاً (ب < 0.001) وأقل عدوانية (ب = 0.025) والسلوك المنحرف لديهم كان أقل (ب = 0.007) وفي الأطفال المعرضين كان التكيف الأسري أفضل وقلق ما بعد الصدمة والقلق والكوابيس ورد الفعل بالحزن كانوا أكثر. كانت الإناث أكثر قلقاً (ب = 0.006) وكان السلوك المعادي للمجتمع أكثر في الذكور (ب = 0.02) في الأطفال الأكبر سناً كان السلوك المنحرف أقل (ب = 0.005) والتكيف أحسن (ب = 0.007) والسلوك التخطيبي أفضل (ب < 0.001). وكان السلوك التخطيبي أفضل في أطفال الأمهات الأكبر سناً (ب = 0.039). كان أطفال الأسر الكبيرة أقل عدوانية (ب = 0.049) وكان السلوك العدواني للمجتمع أقل (ب = 0.04).

الخلاصة: كان لدى الأطفال المعرضين للحرب بجازان مزيد من القلق وكانت التغذية جيدة بشكل غير متوقع، وكانوا أكثر تكيفاً والسلوك المعادي للمجتمع أقل والتكيف الأسري أكثر. الوضع الاجتماعي والاقتصادي يؤثر على النتيجة النفسية.

Objectives: To evaluate the nutritional, psychological, behavioral, family adjustment, and psychiatric assessment of Saudi children exposed to the 2009-2010 Jazan war.

Methods: This retrospective cohort study was conducted in Saudi Arabia in July 2010. One hundred and eighty-six children exposed to the South war in Jazan, and 157 unexposed children in King Khaled Military City, Hafr Al Batin were studied for evidence of malnutrition

using physical measures, evaluating psychological problems using the Child Behavior Inventory, behavioral problems using the Rutter Scale A2, family adjustment using the McMaster Family adjustment device, and for psychiatric disorders. The association of different socioeconomic variables with the psychological outcome of the exposed group was also studied.

Results: The exposed children were well nourished, had more anxiety ($p=0.044$), better adaptation ($p<0.001$), less aggression ($p=0.025$), less deviant behavior ($p=0.007$), better family adjustment and had more post traumatic stress disorder, generalized anxiety, nightmares, and grief reaction. In the exposed children, females had more anxiety ($p=0.006$), and males had more antisocial behavior ($p=0.02$). Older children had less deviant behavior ($p=0.005$), better adaptation ($p=0.007$) and better planful behavior ($p<0.001$). Children of elder mothers had better planful behavior ($p=0.039$). Children from bigger families were less aggressive ($p=0.049$), and had less antisocial behavior ($p=0.04$).

Conclusion: This study found that children exposed to the Jazan war had more anxiety. Unexpectedly they were well nourished and had higher adaptation, lower antisocial behavior, and better family adjustment. The socioeconomic status was associated with the psychological outcome.

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War is a traumatic event that has its grave physical and psychological impact on civilians due to exposure to violence, stress, loss of jobs, homes and properties, and change of the society structure of the displaced refugees. Traumatic events also include witnessing mutilated bodies on TV and hearing sonic sounds from jetfighters.¹ Thabet et al² reported a correlation between traumatic events and post traumatic stress disorder (PTSD), anxiety and coping strategies. The psychological impact of war is due to trauma-related problems, changes in the financial and living conditions, and worry about the future.³ Mels et al,⁴ found that young age, female gender, parental death, and exposure to war-related violence and daily stressors were predisposing factor to the war induced psychiatric symptoms. Exposure to war trauma impacts on both parents' and children's mental health, whose emotional responses are interrelated.⁴ Post traumatic stress disorder is a combination of dissociative symptoms of general disturbance in normal mental functions and re-experiencing symptoms.⁵ Risk factors to develop PTSD include; female gender,⁶ intense or long-lasting trauma, military personnel, history of mental health problems, such as anxiety or depression, in the victim, or in his blood relatives, and lack of good support from family and friends.⁷ Prior trauma is one of the biggest risk factors to develop PTSD.⁸ According to Barnett and Hamblen,⁹ young children exposed to war violence may show fear of strangers, have sleep problems, or bad dreams, may repeat themes of the trauma in their play, and might go back to earlier habits like sucking their thumb. Early trauma can lead to changes in the parts of the brain that control and manage feelings.⁹ The impact of early abuse often extends into later childhood, teen, and even adult years.¹⁰ Brennen et al,¹¹ reported that trauma exposure in childhood impairs the ability to recall specific autobiographical memories in late adolescence, that is, recall of general rather than specific events. Bergland¹² reported that chronic stress of young people triggers long-term changes in the brain structure and function, and induce mental problems, such as anxiety and mood disorders, and learning

difficulties later in life. Coping strategies include family support and religious practice.^{13,14} Thabet et al² reported a correlation between tendency to solve family problem and fewer PTSD symptoms, and a correlation between ventilating feelings, developing social support, engaging in demanding activities, and seeking spiritual support and less anxiety. Qouta et al¹⁵ reported parental love, wise guidance, social support, and good peer relations as coping strategies. Children often face malnutrition more than adults due to their rapid development.¹⁶ The community infrastructure such as piped water, flushable toilets, and garbage collection systems contribute to improving the nutritional status of children.¹⁷ Internally displaced persons are exposed to abrupt change in their socioeconomic living conditions. The province of Jazan that lies in the southwest of Saudi Arabia has a population number of approximately 1.2 million. Jazan is the poorest among the Saudi Arabia provinces.¹⁸ Saudi Arabia was involved from November 2009 to January 2010 in a military conflict along its southern border against Al Hotheieen, a religious group of Yemeni exteriors. The Saudi government hosted the 50,000 internally displaced Saudis in furnished houses, or in refugees' camps, and provided each of them with 3 free meals daily. The association of exposure to the 2009 south War with the physical, psychological, and family well-being of Saudi children was not studied before. The study aimed to assess the Saudi children exposed to the 2009-2010 war against Al Hotheieen in Jazan for malnutrition, psychological disturbances and deviant behavior, also to assess the adjustment of their families compared to children living in King Khaled Military City, and to explore the association of different demographic and socioeconomic factors on the psychological outcome of the exposed children. The results of the study will help to assess the outcome of the supportive programs and to plan for future preventive intervention strategies, including actionable research and initiatives to deal with these consequences and to prevent them in any future conflict.

Methods. This observational study was conducted in July 2010, 6 months after the end of the 100-day Jazan war. The study was conducted in Jazan province, at the Saudi Yemen border in the southern area of Saudi Arabia and in the King Khaled Military City (KKMC), Hafr Al Batin in the western area of Saudi Arabia. The study was carried out in cooperation between the Northern Area Armed Forces Hospital (NAAFH) staff and the Jazan Military Hospital staff. The exposed

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group consisted of internally displaced children after the Jazan war to person's camp in Ahad El Masarhah camp, or to settlement housing in the Jazan province. The unexposed group consisted of children living in KKMC. Children were excluded if they were less than 5 years age, or their father was not willing to give consent. The study proposal was approved by the Medical Services Division of the Ministry of Defense in Saudi Arabia. Father's consent for participation of his children and wife in the study was obtained. Respondents were compensated for the interviews.

Using OpenEpi software, the sample size based on Kelsey equation to achieve a 95% confidence level and 80% power using an exposed:unexposed ratio in the sample of 1:1, where the estimated prevalence of PTSD among those exposed to war was 17%,¹⁹ and an average of 6.6% in the general population - calculated as the mean of prevalence of 9.7% in women,²⁰ and 3.6% in men,²¹ the estimated required sample size was 150 for the exposed, and 150 for the unexposed. In this study, all subjects were sponsored by their parents, and were referred to as children. Out of approximately 50,000 internally displaced people, 186 exposed children were randomized to be enrolled in the study. Of the 100,000 people at KKMC, 157 unexposed children were enrolled in the study as a control group. Children of both groups were selected from a list of school students. The subjects were invited with their parents for the study in NAAFH and in the primary health care clinic in Jazan where interviews, clinical assessments, and blood sampling were carried out. Children were interviewed in attendance of at least one of their parents. Data of each child was recorded in a separate notebook with a child-specific serial number that is used to identify all data collected for the same patient throughout the study. Data were then transferred to an Excel spread sheet. A semi-structured questionnaire was used to collect demographic data, social data regarding displacement status, educational performance, parental loss, paternal work, parental education, and number of siblings and family members, economic data as the income per capita, and medical data on chronic illnesses.

For clinical assessment of malnutrition; body weight, height, mid arm circumference, and triceps skin fold thickness were recorded, and the body mass index (BMI) and percentile BMI were calculated. Laboratory parameters of malnutrition included hematological parameters (hemoglobin concentration and hematocrit) and chemical parameters (serum albumin, cholesterol, iron, and iron saturation). Daily dietary intake was

assessed by a 24-hour diet recall, and calculation of daily protein and carbohydrate intake using dietary tables. The psychological and behavior assessment was conducted by 2 research teams who had previous experience in interviewing people for social science/mental health research. Three instruments were used for psychological and behavioral assessment of the studied children. The Arabic version of the Child Behavior Inventory (CBI) was used to assess the psychopathological status in the study group.¹⁹ The questionnaire was completed by interviewing mothers of children below 10 years of age, while children aged 10-16 years were interviewed face-to-face. The Arabic version has 42 questions that inquire about the child's behavior 6 months prior to the assessment. Each question is scored on a 4-alternative, forced-choice format, ranging from 0-3. The items were grouped into 5 domains; 3 mental health symptoms (aggression, depression, anxiety) and 2 adaptation outcomes (prosocial and planful behavior). Aggression contains items, such as gets angry easily and verbally aggressive. Depression contains items, such as appears sad, or unhappy. Anxiety contains items as jumpy and reacts with fear to non-frightening things or situations. Prosocial behavior includes for example, helpfulness towards other children and adults, and showing concern or care for others. Planful behavior includes for example taking the lead in initiating activities, planning and thinking ahead, and skillful in solving problems. High scores for the mental health items indicate pathology. High adaptation scores indicate positive adaptation. The Arabic version of Rutter Scale A-2-parent's version²² was used to assess behavioral problems of children aged 6-16 years. This scale consists of 31 statements concerning the child's behavior. Each statement is scored from 0-2. The scale is divided into 3 subscales; health problems, habits, and statements on behavior. Health problems subscale contains 8 items that include for example, headache, stomach ache, wets bed, temper tantrums, and truants from school. Habits subscale includes 5 items that include for example, stammers/stutters, steals things, eating problems, and so forth. Statements on behavior subscale include 18 items from which neurotic and antisocial subscales can be extracted. Tears on arrival at school and sleep problems are scored for a neurotic subscale. Steals things, disobedient, and tell lies are scored for the antisocial subscale. Each item is scored on a scale of 0, 1, or 2. The subscale scores are computed by adding the ratings for each item. The cut-off point for a deviant behavior is 13 or more. Higher scores indicate pathology. The McMaster Family

Assessment Device (FAD) was used to assess the family adjustment.²³ The standard guidelines for using the questionnaire, recommend its administration in face-to-face interview to children who were over 12 years of age. In this study, the questionnaire was difficult to understand even for these old children; hence, one of the parents was interviewed for all the children, irrespective of their age. The 53 items are statements a person could make regarding his/her family. Each family member rates his/her agreement with how well an item describes the family by selecting among the 4 response options: strongly agree, agree, disagree, and strongly disagree. Higher scores indicate unhealthy family adjustment. The McMaster FAD is made up of 7 subscales, which measure the individual's perception of how well the family is adjusted in problem solving, communication, family roles, affective responsiveness, affective involvement, behavior control and general functioning domains. Participants were psychiatrically evaluated. Diagnosis was according to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-RT)⁵ Assessment involved open questions that allowed the child to express his experience in exposure to violence. In this study, the primary endpoints were objective, including clinical, and laboratory nutritional parameters, scores of the psychological tests, and psychiatric diagnosis.

The coded data were transferred to an Excel spread sheet then to a Statistical Package for the Social Science (SPSS) spread sheet. Data were statistically analyzed. Descriptive statistics were used to summarize the data. Frequencies were used when appropriate. For comparing means of a continuous data in the 2 study groups, independent samples t-test was performed. For comparing categorical data, Chi square (χ^2) test was performed. $P < 0.05$ was considered statistically significant. All statistical calculations were carried out using computer programs Microsoft Excel version 7 (Microsoft Corporation, NY, USA) and SPSS (SPSS Inc, Chicago IL, USA) statistical program. Calculations of BMI and percentile BMI were carried out by Group BMI Calculator Metric version 1 (Centers for Disease Control and Prevention, Atlanta, GA, USA).

Results. Demographic and socioeconomic data were analyzed. The Jazan group included 186 children with a male:female ratio of 1.6:1, and age range from 5-16 years, with a mean of 12.43 years (standard deviation [SD] = 2.78). The KKM group included 157 children with a male:female ratio of 1.1:1, and age range from 5-17 years, with a mean of 10.14 years (SD = 2.96). There was no significant difference in gender ($p=0.132$),

or in the mean age of the studied groups. The exposed children had significantly bigger families; higher number of siblings, and higher total family members ($p < 0.05$) compared to the unexposed children. One of the studied exposed families had 35 members, including the father, his 4 wives, and their children. The unexposed children had significantly better paternal and maternal employment, and satisfaction with their income ($p < 0.001$). The income per capita was below 1,120 Saudi Riyal (SR) in 46 out of the 52 exposed children (88.5%), and 55 out of the 92 unexposed children (59.7%) ($p=0.0003$) (risk ratio=1.48) (95% confidence interval [CI] 1.219 - 1.797). Thirty-seven out of 105 fathers of the exposed children claimed to be jobless compared to none of the unexposed children. Forty-two of the exposed children were displaced to camps, and 76 to temporary secure houses while

Table 1 - Comparison in the housing conditions in the exposed and unexposed groups of children in the Jazan war in a study in Saudi Arabia.

Variables	Exposed	Unexposed	Total	Significance
<i>Sanitary drain</i>				
No	27	4	31	$X^2 = 23.56$ df = 1
Yes	92	143	235	
Total	119	147	266	$p < 0.001$
<i>Painted rooms</i>				
No	32	1	33	$X^2 = 39.58$ df = 1
Yes	86	146	232	
Total	118	147	265	$p < 0.001$
<i>Good relation with neighbors</i>				
No	4	0	4	$X^2 = 3.2$ df = 1
Yes	109	147	256	
Total	113	147	260	$p = 0.035$
<i>Housing telephone</i>				
No	113	31	144	$X^2 = 150.3$ df = 1
Yes	2	114	116	
Total	115	145	260	$p < 0.001$
<i>Housing DSL</i>				
No	115	78	193	$X^2 = 67.8$ df = 1
Yes	0	67	67	
Total	115	145	260	$p < 0.001$
<i>Private car</i>				
No	44	41	85	$X^2 = 2.88$ df = 1
Yes	70	106	176	
Total	114	147	261	$p = 0.038$
<i>Near main road</i>				
No	52	85	137	$X^2 = 0.216$ df = 1
Yes	41	57	98	
Total	93	142	235	$p = 0.337$
<i>Income satisfactory</i>				
No	62	23	85	$X^2 = 21.2$ df = 1
Yes	32	112	144	
Total	94	135	229	$p < 0.001$

df - degrees of freedom, DSL - direct service line, X^2 - Chi square test

all the unexposed children were living in their native permanent houses. The number of rooms (or tents) per capita in the exposed group (0.46 rooms per capita) was significantly lower than the unexposed group. Table 1 shows a comparison between the housing conditions in both groups, using the χ^2 test. It shows that the unexposed children had significantly better housing conditions (as sanitary drainage, room painting, presence of land line telephone, and DSL lines) and better relation to the neighbors compared to the exposed group. The school performance in the 2 studied groups was compared using χ^2 test. Table 2 shows that the unexposed children achieved higher education grade and higher school performance than the unexposed children. As shown in Table 3, a comparison of the socioeconomic difference in the families using the χ^2 test revealed that the difference in the military rank between the exposed and the unexposed military fathers was not significant. Fathers and mothers of the exposed children have a significantly lower education level, and

Table 2 - Comparison in school performance in the exposed and unexposed groups of children in the Jazan war in a study in Saudi Arabia.

Variables	Exposed	Unexposed	Total	Significance
<i>School grade</i>				
Not educated	22	8	30	$X^2 = 13.03$ df = 4 $p=0.011$
Primary school graduate	71	104	175	
Intermediate school graduate	22	29	51	
Secondary school graduate	13	9	22	
University	1	0	1	
Total	129	150	279	
<i>School performance</i>				
Bad	12	3	15	$X^2 = 18.3$ df = 3 $p<0.001$
Good	61	80	141	
Excellent	28	57	85	
Delayed	7	1	8	
Total	108	141	249	

X^2 - Chi square test, df - degrees of freedom

Table 3 - Comparison of the socioeconomic difference in the families in the exposed and unexposed groups of children in the Jazan war in Saudi Arabia.

Variables	Exposed group	Unexposed group	Total	Significance
<i>Parents alive</i>				
None	1	0	1	$X^2 = 21.56$ df = 2 $p<0.001$
One only	15	0	15	
Both of them	100	147	246	
Total	116	147	263	
<i>Father's job</i>				
Not working	37	0	37	$X^2 = 154$ df = 5 $p<0.001$
Civilian	25	21	46	
Military retired	15	28	43	
Military not fighter	3	52	55	
Military fighter	0	48	48	
Irregular job	25	0	25	
Total	105	149	254	
<i>Father's education</i>				
Not educated	27	2	29	$X^2 = 74.69$ df = 4 $p<0.001$
Primary school graduate	21	16	37	
Secondary school graduate	3	42	45	
Intermediate school graduate	13	55	68	
University graduate	2	7	9	
Total	66	122	188	
<i>Father's rank</i>				
Soldier	16	89	105	$X^2 = 0.867$ df = 2 $p=0.648$
Noncommissioned officers	1	12	13	
Officer	0	2	2	
Total	17	103	120	
<i>Mother's education</i>				
Not educated	40	19	59	$X^2 = 74.61$ df = 5 $p<0.001$
Primary school graduate	3	28	31	
Intermediate school graduate	2	25	27	
Secondary school graduate	1	28	29	
Diploma	1	13	14	
University graduate	0	12	12	
Total	47	125	172	
<i>Mother's job</i>				
Not working	44	92	136	$X^2 = 10.47$ df = 1 $p=0.001$
Employee	1	29	30	
Total	45	121	166	

X^2 - Chi square test, df - degrees of freedom

Table 4 - Comparison of the nutritional parameters between the 2 groups of children in a study in Saudi Arabia.

Variables	Exposed group		Unexposed group		P-value
	n	Mean \pm SD	n	Mean \pm SD	
Serum albumin	63	40.97 \pm 5.21	52	40.46 \pm 2.64	0.52520
Serum Iron	63	13.25 \pm 5.80	51	12.31 \pm 5.54	0.38175
Iron saturation	63	61.68 \pm 11.47	52	61.77 \pm 8.74	0.96434
Hemoglobin	152	12.71 \pm 1.30	55	12.90 \pm 1.24	0.33731
Hematocrit	152	38.78 \pm 3.91	55	37.70 \pm 3.47	0.07172
Serum cholesterol	157	4.02 \pm 0.89	54	4.03 \pm 0.70	0.95081
BMI percentile calculator	116	44.58 \pm 34.61	41	35.04 \pm 34.62	0.13109

SD - standard deviation, BMI - body mass index

mothers of the exposed children had significantly lower employment. A comparison of the nutritional outcome using the t-test revealed no significant difference in the mean caloric intake between the 2 groups, and a significantly higher mean protein intake in the exposed group compared to the unexposed group (Table 4). There was no significant difference in the biochemical parameters of malnutrition (serum albumin, cholesterol, serum iron and iron saturation) in the hematological parameters of malnutrition (HB and hematocrit), and in the percentile BMI between the 2 studied groups.

Table 5 - Outcome of the Rutter Scale A2 for the exposed and unexposed groups using the Chi-square test.

Variables	Exposed group	Unexposed group	P-value
Normal behavior	88	57	$\chi^2 = 6.208$ degrees of freedom = 1 $p=0.012$
Neurotic	15	18	
Antisocial	8	13	
Equivocal	2	4	
Deviant behavior, n (%)	25 (22.1)	35 (38.0)	
Total examined	113	92	

Table 6 - Outcome of the McMaster Family Assessment Device test for the exposed and unexposed groups.

Variables	Exposed (n = 77) Means \pm SD	Unexposed (n=67) Means \pm SD	P-value
Problem solving	11.30 \pm 6.22	17.01 \pm 2.64	<0.001
Communication	13.52 \pm 7.01	18.46 \pm 3.25	<0.001
Roles	18.23 \pm 8.82	22.25 \pm 3.88	<0.001
Affective responsiveness	13.04 \pm 5.88	14.78 \pm 3.40	0.035
Affective involvement	16.00 \pm 8.20	17.36 \pm 4.72	0.234
Behavioral control	18.29 \pm 7.15	22.72 \pm 3.71	<0.001
General functioning	27.06 \pm 13.5	32.85 \pm 5.01	<0.001

Table 7 - The psychiatric outcome in the exposed and unexposed groups.

Variables	Exposed group n (%)	Unexposed group n (%)	P-value
Normal	48 (37.8)	94 (83.1)	
Post-traumatic stress disorder	17 (13.0)	2 (1.7)	<0.001
Major depression	10 (7.8)	5 (4.4)	0.143
Generalized anxiety	20 (15.6)	3 (2.6)	<0.001
Grief reaction	8 (6.3)	2 (1.8)	0.044
Nightmares	19 (15.0)	5 (4.4)	0.003
Nocturnal enuresis	5 (4.0)	2 (1.8)	0.177
Total examined	127 (100)	113 (100)	

None of the participants was exposed to physical injury. The CBI was used to study 131 exposed children and 142 unexposed children. The Jazan children had a significantly higher anxiety subscale ($p=0.044$), non-significant higher depression subscales ($p=0.065$), and significantly lower aggression subscale ($p=0.025$). The difference in the sum of these 3 subscales, namely the mental health score was not significant ($p=0.582$). High scores for the mental health items indicate pathology. The exposed children had a significantly higher prosocial subscale ($p<0.001$), and planful behavior ($p<0.001$), and significantly higher sum of both subscales, namely the adaption scale ($p<0.001$). High scores of adaption scores indicate positive adaptation. Rutter Scale A-2 was used to study 113 exposed children and 92 unexposed children. The number of children with deviant behavior was compared in the 2 studied groups, using the χ^2 test. As shown in Table 5, the number of children with deviant behavior was significantly higher in the unexposed group. The RR for a deviant behavior was 0.8518 (95% CI: 0.3771 - 0.8968).

Table 8 - Comparison between the mean of the Child Behavior Inventory scores in the exposed below the poverty line and the exposed above the poverty line.

Scores	Exposed below the poverty line (n=45)	Exposed above the poverty line (n=6)	P-value
	Means \pm SD		
Mental score	23.8 \pm 9.8	24.3 \pm 6.9	0.88
Depression subscale	8.9 \pm 4.7	11.7 \pm 4.8	0.23
Aggression subscale	5.6 \pm 4.8	4.9 \pm 2.8	0.62
Anxiety subscale	9.3 \pm 3.3	7.8 \pm 3.5	0.36
Adaptational score	45.3 \pm 8.6	38.3 \pm 10.6	38.3
Prosocial subscale	23.3 \pm 4.5	20 \pm 6.5	0.27
Planful behavior	21 \pm 4.6	18.3 \pm 4.6	0.23

Table 9 - Comparison between the mean of the Child Behavior Inventory scores in the unexposed below the poverty line and the unexposed above the poverty line.

Scores	Unexposed below the poverty line (n=56)	Unexposed above the poverty line (n=30)	P-value
	Means \pm SD		
Mental score	22 \pm 10.5	19.4 \pm 8.2	0.2
Depression subscale	7 \pm 4.8	5.9 \pm 3.5	0.23
Aggression subscale	6 \pm 5.2	6.4 \pm 5.3	0.73
Anxiety subscale	9 \pm 4.1	7 \pm 3.4	0.018
Adaptational score	42 \pm 10	37.2 \pm 11.9	0.65
Prosocial subscale	23 \pm 5.2	19.1 \pm 6.7	0.008
Planful behavior	18 \pm 7	18 \pm 6.2	1.0

Seventy-seven families of exposed children and 67 families of unexposed children were interviewed with the FAD. The mean of the score of the FAD test in both groups was compared using the t-test. It shows that the exposed children's families had a significantly better general functioning, and better 6 out of 7 McMaster family adjustment subscales compared to the unexposed families (Table 6). The exposed children were further analyzed for the impact of different socioeconomic factors. Using the t-test to compare the mean score of different CBI subscales revealed that females had higher mean CBI anxiety subscale score than males ($p=0.006$). Males had more antisocial behavior than the females ($p=0.02$). Older children had less deviant behavior ($p=0.005$), better adaptation ($p=0.007$) and better planful behavior ($p<0.001$). Children of elder mothers had better planful behavior ($p=0.039$). Children from bigger families were less aggressive ($p=0.049$) and had less antisocial behavior ($p=0.044$) (Table 7). The mean of the CBI scores of children below the poverty line was compared with that of children above the poverty line, in both the exposed group (Table 8) and in the unexposed group (Table 9), using the t-test.

Discussion. Saudi Arabia has the tenth lowest poverty rate worldwide, and ranks the highest among the Arab region in terms of minimizing poverty. The estimated poverty rate in Saudi Arabia ranges from 12.7%²⁴ to 30%.²⁵ The World Bank's estimate of the poverty line in 2008 is \$1.25.²⁶ Jazan, with its limited natural resources is among the poorest provinces in Saudi Arabia.¹⁸ The economic status of Jazan people deteriorated after the war due to the loss of jobs and properties.

The success of the nutritional support program in preventing malnutrition and improving the nutritional status of the Jazan children in spite of their lower socioeconomic status may suggest the implementation of a similar national program to directly supervise, and support the nutrition of children. This study revealed that the exposed children showed less aggressive behavior, probably because they were not directly involved in the military procedures, and did not suffer from physical injury. Mousa and Madi²⁷ reported aggressive behavior in 46% of Palestinian children who were directly involved in a military conflict after the second intifada. Aggression of the unexposed children may be related to the life style as playing video games, and more access to the internet. More studies are needed to assess the association between the life style and the aggressive behavior in the unexposed male children in

KKMC. Ayazi et al,²⁸ in a cross-sectional community study reported high rates of anxiety disorders other than PTSD distress related to exposure to traumatic events in the post-conflict population in South Sudan. This study revealed high anxiety subscale scores and generalized anxiety in the exposed children, which goes with studies that reported that the prevalence of symptoms of anxiety in Afghanistan was 72.2% of respondents in one study,¹³ and 52.8% of respondents in another study.¹⁴ Thabet et al,² studied anxiety in 358 Palestinian adolescents exposed to war in Gaza using Spence Children's Anxiety Scale. They reported that the mean total anxiety was 41.18. This study has not shown a significantly higher depressive score, or a significantly higher incidence of major depression in the exposed children compared to the unexposed children, whereas other studies reported symptoms of depression in Afghanistan in 67.7% of respondents in one study,¹³ in 38.5% of respondents in another study,¹⁴ in 32% of the Rwandese refugees, and in 48.1% of the Somali refugees.²⁹ The findings in this study of significantly higher anxiety subscale in females are compatible with findings of Thabet et al² which reported more anxiety problems, and PTSD in girls compared to boys.

The absence of significantly higher depression score and the presence of higher adaptation, lower antisocial behavior, less deviant behavior, and better family adjustment in the Jazan children may reflect effective social adaptive mechanisms, with the expected stronger family bonds, and troop values of the native inhabitants of Jazan, compared to the urban, and less stable inhabitants of the military city. The study revealed that in the exposed children, males had more antisocial behavior than females, young children had more deviant behavior, less planful behavior, and an overall less adaptation and children of younger mothers had less planful behavior. These demographic risk factors have to be considered during assessment of children exposed to the stress of war and during planning for the psychological support programs.

The study showed an association between the lower income, and both anxiety and better adaptation in the unexposed children but not in the exposed children. This study revealed that exposed children from bigger families were less aggressive and had less antisocial behavior. Salama et al³⁰ reported that those who were living alone or in small families were more prone to psychiatric morbidity, which reflects a protective role of intra-family relation in big families. This study revealed more vulnerability of the exposed females to anxiety, compared to the exposed males. A study⁶ reported a

lifetime rate of anxiety disorders of 33% in women, compared to 22% in men. As the study revealed no association between the displacement site and the psychological or behavioral outcomes, selection of the displacement site should be decided according to financial and safety factors.

The proportion of children with PTSD exposed to war (13%) in this study was lower than that observed in other studies. Onyut et al,²⁹ reported a higher prevalence of PTSD in 32% of the Rwandese refugees, and in 48.1% of the Somali refugees, and reported that mental health consequences of conflicts remain long after the events are over. Thabet et al² reported that 31% of the participants had partial PTSD, and 29.8% had full PTSD. Severe PTSD requiring intervention was observed in 20.4% of respondents in Afghanistan in one study,¹³ and in 42% of respondents in another study.¹⁴ The relatively lower prevalence of PTSD reported in this study may be explained by the exposure of Jazan children to a short duration of stress of few months, and less stressful events, whereas the conflict in Palestine and in Afghanistan was more aggressive and extended for 50 years in Palestine and 30 years in Sri Lanka.³ Higher rates of symptoms are associated with the higher number of traumatic events.^{13,23}

The internally displaced children in Jazan received effective socioeconomic and nutritional support, but none of them received psychological assessment or support, whereas a mental health outreach program was initiated based on the study of Onyut et al in 2009.²⁹ Short-term psychotherapy carried out by lay counselors with limited training can be effective to treat war-related PTSD in a refugee settlement.³¹ Hasanović et al³² in 2009 reported that psychosocial support to students with PTSD in postwar Bosnia Herzegovina has resulted in a significant reduction of PTSD symptoms' severity. It is recommended to establish PTSD clinics in areas of military conflict to provide psychological screening, assessment and supportive services and to study different risk and protective demographic and socioeconomic factors in children exposed to stress of war.

The study has several limitations. The retrospective nature of the study hindered assessment of the "impact" of the war, but allowed correlation of the outcomes to the exposure and to the association between the outcome to different socioeconomic risk factors. The study was horizontal and lacks a long term follow-up of psychopathological changes in the exposed children. The control group was KKMC children who were in some way "displaced" from their native residential

areas; they were of higher socioeconomic standard, and were not subjected to psychological assessment prior to this study. The KKMC children showed unexpected psychological and behavioral problems. Another limitation of the study was that the family assessment was not carried out in the presence of one or both parents, also other family members were not examined.

According to Georgiades et al,³³ assessments available only from single respondents should be taken with caution. It is recommended to study the protective mechanisms of Jazan children and their families, and to carry out psychological and family adjustment assessment of the resettled Jazan children. Verification and explanation of the antisocial and aggressive behavior of KKMC children and the lower family adjustment are other interesting scopes for further studies.

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