The Relationship between the Neighborhood Safety and Nutritional Status of Children in Baghdad City, Iraq

Hasanain Faisal Ghazi, Zaleha Md. Isa, Shamsul Azhar Shah, Mohammed A. Abdal Qader, Tiba Nezar Hasan, and AL-abed Ali AL-abed

Department of Community Health, Universiti Kebangsaan Malaysia Medical Centre, Bandar Tun Razak, Cheras, 56000 Kuala Lumpur, Malaysia

Correspondence should be addressed to Hasanain Faisal Ghazi; dr.hasanainhabasha@gmail.com

Received 13 June 2014; Accepted 19 August 2014; Published 24 August 2014

Academic Editor: Maurizio Muscaritoli

Copyright © 2014 Hasanain Faisal Ghazi et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction. The neighborhoods where the children live play an important role in their development physically and mentally. The objective of this study was to assess the relationship between neighborhood safety and child nutritional status in Baghdad city, Iraq. Methods. A cross-sectional study was carried out in Baghdad city, Iraq, among 400 primary school children from 4 schools. BMI-for-age Z score was used to assess the nutritional status of the children. Newly developed questionnaires on neighborhood safety were distributed to the parents to answer them. Results. In this study, males were more predominant than females with 215 participants compared to 185 females. A total of 49% were normal weight, 38.8% either overweight or obese, and only 12.2% underweight. There was a significant relationship between father education, father and mother working status, family income, and children nutritional status (P = 0.10, 0.009, < 0.001, 0.37), respectively. The association between neighborhood safety variables and child nutritional status was significant except for worrying about child safety and thinking of leaving the neighborhood (P = 0.082, 0.084), respectively. Conclusion. Nutritional status of school children continues to be a public health issue in Iraq especially Baghdad city. There was a significant association between neighborhood safety and children nutritional status.

1. Introduction

Child nutrition remains a serious challenging issue not only in Iraq but also worldwide. As a developing country located in the Middle East, Iraq faced several conflicts starting from 1980 followed by 1991 war then 13 years of economic sanctions and last war in 2003. The problem for Iraqis and especially children is not the war itself but the following years of unstable situation that can impact their daily life and activities.

Environmental factors can include various physical and social elements in people's surroundings that influence their choices for diet and physical activities. School and nearby neighborhood environments are of interest because children spend at least 5–7 hours daily within school boundaries during weekdays and make various health choices while at school [1].

Iraq is a developing country experiencing constraints on economic and social development and most of the environmental factors that affect the physical growth of children before puberty, including poor food consumption patterns, illness, lack of sanitation, poor hygiene practices, and poor health care coverage and resources, are present. Almost half of Iraq's total populations of 27 million are children. United Nations agencies estimate that 1 out of 8 Iraqi children dies before the age of 5 years; one-third are undernourished; one-quarter are born underweight and one-quarter do not have access to safe water. Rates for stunting among children under the age of 5 years in southern and central Iraq peaked in 1996 at 32.0% and then declined to 23.1% in 2002 [2].

ALDoori et al. [3] did a study in Basrah city in south of Iraq following the 1991 war and found that 24% of the children were stunted. Stunting and low weight-for-age were significantly higher among children of low socioeconomic conditions. This situation might have contributed to the overall poor nutritional status of children in Iraq. These findings support the need for policies and programs that address the maternal and child health issues in Iraq.
Table 1: Sociodemographic characteristics of children.

| Variables                  | Underweight | Nutritional status | Overweight and obese | P value |
|----------------------------|-------------|--------------------|----------------------|---------|
|                            | N (%)       | Normal N (%)       | N (%)                |         |
| Gender                     |             |                    |                      |         |
| Male                       | 23 (10.7)   | 109 (50.7)         | 83 (38.6)            | 0.551a  |
| Female                     | 26 (14.1)   | 87 (47.0)          | 72 (38.9)            |         |
| Mother education           |             |                    |                      |         |
| Low                        | 10 (16.9)   | 28 (47.5)          | 21 (35.6)            | 0.448a  |
| High                       | 39 (11.5)   | 166 (49.0)         | 134 (39.5)           |         |
| Father education           |             |                    |                      |         |
| Low                        | 4 (8.7)     | 32 (69.6)          | 10 (21.7)            |         |
| High                       | 36 (10.7)   | 155 (46.3)         | 144 (43.0)           |         |
| Mother working status      |             |                    |                      |         |
| Housewife                  | 35 (16.8)   | 101 (48.6)         | 72 (34.6)            | 0.009a  |
| Working                    | 14 (7.4)    | 93 (48.9)          | 83 (43.7)            |         |
| Father working status      |             |                    |                      |         |
| Not working                | 6 (42.9)    | 6 (42.9)           | 2 (14.2)             | <0.001a |
| Working                    | 34 (9.3)    | 181 (49.3)         | 152 (41.4)           |         |
| Family income              |             |                    |                      |         |
| Mean ± SD                  | 615,673.46 ± 361,872.29 | 763,418.36 ± 546,916.34 | 810,225.80 ± 356,521.04 | 0.037b  |

*a Chi Square test was performed; b Student t-test was performed, level of significance at P value <0.05.

households. Comparison of these data with an earlier nutritional survey in the area showed the nutritional status of children in Basrah city has deteriorated as a result of successive armed conflicts.

Another study done by Guerrero-serdan [4] in Iraq assumed the war has affected the physical growth of children, where the young born after the war in high-intensity conflict areas had lower height-for-age Z-scores than children born in less violent areas. Also the weight-forage Z-scores increased in 2004 but decreased in 2006. These results suggest that children are not losing weight but rather are not growing properly in length in high violence affected areas.

The links between neighborhood and nutritional status can be because of many reasons such as safety concerns (crime; unstable political situation), the environment (lack of parks, playgrounds, and walkable destinations such as restaurants and supermarkets), and access to and affordability of healthy foods [5–9].

The objective of this study was to assess the effects of unstable neighborhood in the last 8 years in Baghdad city on child nutritional status.

2. Methods

A cross-sectional study was conducted among 400 respondents aged between 7 and 8 years from four different primary schools in Baghdad city in 2011. Baghdad is divided into two sides by Tigris river, so 2 schools from each side were chosen randomly. Subsequently, a complete list of student names in each selected school was obtained. A total of 100 children from each school were then identified by stratified random sampling according to grade. Questionnaires on neighborhood safety and standardized measurements for weight and height were used in this study. Self-administered questionnaires were distributed to respondents’ parents during the monthly meeting at schools.

BMI for age Z-score was used to assess the nutritional status of the children based on WHO 2007 growth references cut-off points [10]. Weight and height of the respondents were measured by using calibrated weighing machine to be compared to WHO cut-off points. Weight was measured using digital weighing scale manufactured by Beurer Company in Germany. Children were weighed after taking off their shoes.

Height was measured by using tape measure to the nearest 0.5 cm by standing with their back touching the wall and their head in upright position. Then BMI-for-Age Z score is recategorized into three groups, underweight, normal weight, and overweight or obese children in one group.

Neighborhood safety in this study was defined as the place where the child’s family is living. The questionnaire consists of 10 items, each with three response options: never (2), sometimes (1), and a lot of times (0). The maximum total score was 20. A score of 10 was taken as the cut-point because if the respondents were to answer “sometimes” for all questions, the total score is 10. Any score less than 10 indicated unsafe neighborhood, whereas a score equal to or above 10 indicated safe neighborhood.

A questionnaire validation was carried out using face validity, factor analysis, and back-to-back translation. After that a pretest was done by distributing the questionnaires to 50 parents to ensure that the questions are easily understandable and validated. Living environment scale has a good internal consistency, with Cronbach’s alpha coefficient of 0.820.

This study was approved by the Research and Ethics Committee of Universiti Kebangsaan Malaysia Medical Center.
### 3. Results

The response rate in this study was 85.1% (400/470). The results show that the mean body weight of the children was $25.20 \pm 5.6$ kg. The average standing height of the children was $121.00 \pm 8.8$ cm. The most common nutritional status was normal (49.0%) followed by overweight and obese (38.8%) and underweight (12.2%).

There was a significant relationship between father education, father and mother working status, family income, and children nutritional status ($P = 0.10, 0.009, <0.001, 0.37$), respectively, as shown in Table 1.

For neighborhood safety variables, the relationship between thinking of unstable situation, hearing gun shots, hearing explosions, saying dead bodies, child witnessing explosions, difficulties in going to school, thinking neighborhood is unsafe, child missing school days, and nutritional status was significant ($P = 0.034, <0.001, 0.023, <0.001, 0.024, <0.001, 0.030, <0.001$), respectively, as shown in Table 2.

---

**Table 2: Relationship between neighbourhood safety variables and children nutritional status.**

| Variables                           | Underweight N (%) | Normal N (%) | Overweight and obese N (%) | $P$ value$^a$ |
|-------------------------------------|-------------------|--------------|-----------------------------|---------------|
| Did that unstable security situation affect your daily life? |                   |              |                             |               |
| A lot of times                       | 15 (19.7)         | 30 (39.5)    | 31 (40.8)                   | 0.034         |
| Sometimes                           | 29 (10.8)         | 131 (48.7)   | 109 (40.5)                  |               |
| Never                               | 5 (9.1)           | 35 (63.6)    | 15 (27.3)                   |               |
| Did you hear gun shots in your neighborhood during the last month? |                   |              |                             | <0.001        |
| A lot of times                       | 8 (13.1)          | 26 (42.6)    | 27 (44.3)                   |               |
| Sometimes                           | 37 (14.0)         | 146 (55.3)   | 81 (30.7)                   |               |
| Never                               | 4 (5.3)           | 24 (32.0)    | 47 (62.7)                   |               |
| Did you hear explosions in your neighborhood during the last month? |                   |              |                             | 0.023         |
| A lot of times                       | 8 (13.1)          | 29 (47.5)    | 24 (39.4)                   |               |
| Sometimes                           | 38 (15.2)         | 125 (50.0)   | 87 (34.8)                   |               |
| Never                               | 3 (3.4)           | 42 (47.2)    | 44 (49.4)                   |               |
| Did you see any dead bodies in your neighborhood during the last month? |                   |              |                             | <0.001        |
| A lot of times                       | 2 (33.3)          | 4 (66.7)     | 0 (0.0)                     |               |
| Sometimes                           | 27 (30.7)         | 37 (42.0)    | 24 (27.3)                   |               |
| Never                               | 20 (6.5)          | 155 (50.7)   | 131 (42.8)                  |               |
| Did your child witness any explosions in your neighborhood? |                   |              |                             | 0.024         |
| A lot of times                       | 4 (40.0)          | 4 (40.0)     | 2 (20.0)                    |               |
| Sometimes                           | 27 (14.8)         | 84 (45.9)    | 72 (39.3)                   |               |
| Never                               | 18 (8.7)          | 108 (52.2)   | 81 (39.1)                   |               |
| Did your child face any problems like closed roads in going to school during the last month? |                   |              |                             | <0.001        |
| A lot of times                       | 12 (54.5)         | 6 (27.3)     | 4 (18.2)                    |               |
| Sometimes                           | 25 (13.2)         | 82 (43.1)    | 83 (43.7)                   |               |
| Never                               | 12 (6.4)          | 108 (57.4)   | 68 (36.2)                   |               |
| Do you worry about child safety when they go to school? |                   |              |                             | 0.082         |
| A lot of times                       | 23 (18.4)         | 57 (45.6)    | 45 (36.0)                   |               |
| Sometimes                           | 17 (8.5)          | 99 (49.2)    | 85 (42.3)                   |               |
| Never                               | 9 (12.2)          | 40 (54.0)    | 25 (33.8)                   |               |
| Did your child miss any school days because of neighborhood safety issues? |                   |              |                             | 0.030         |
| A lot of times                       | 6 (37.4)          | 5 (31.3)     | 5 (31.3)                    |               |
| Sometimes                           | 27 (11.0)         | 119 (48.4)   | 100 (40.6)                  |               |
| Never                               | 16 (11.6)         | 72 (52.2)    | 50 (36.2)                   |               |
| Do you ever think of leaving your neighborhood? |                   |              |                             | 0.084         |
| A lot of times                       | 9 (20.5)          | 22 (50.0)    | 13 (29.5)                   |               |
| Sometimes                           | 26 (12.7)         | 90 (44.1)    | 88 (43.2)                   |               |
| Never                               | 14 (9.2)          | 84 (55.3)    | 54 (35.5)                   |               |
| Do you think that your neighborhood area is insecure? |                   |              |                             | <0.001        |
| A lot of times                       | 10 (37.0)         | 10 (37.0)    | 7 (26.0)                    |               |
| Sometimes                           | 21 (10.1)         | 88 (42.3)    | 99 (47.6)                   |               |
| Never                               | 18 (10.9)         | 98 (59.4)    | 49 (29.7)                   |               |

$^a$Pearson Chi Square test was performed; level of significance is at $P < 0.05$. 
Table 3: The relationship between neighborhood safety status and children nutritional status.

| Neighborhood safety | Underweight  | Nutritional status | Overweight and obese | P value |
|---------------------|--------------|--------------------|----------------------|---------|
|                     | N (%)        | Normal N (%)       |                      |         |
| Unsafe              | 23 (271)     | 39 (45.8)          | 23 (271)             | <0.001* |
| Safe                | 26 (8.3)     | 157 (49.8)         | 132 (41.9)           |         |

*Pearson Chi Square test was performed; level of significance is at P < 0.05.

There was a significant association between neighborhood safety status and nutritional status of the children (P < 0.001) as shown in Table 3, which means children living in unsafe neighborhood have more risk to be overweight or obese as they tend to be physically inactive.

4. Discussion

In this study, the neighborhood safety status reflects the daily life of Iraqi families and their children. There was some improvement in the living environment due to changes in the security situation in the capital Baghdad in the last 2 years as more than two-thirds of the children’s parents were found to live in a good environment according to our cut-off point. The nutritional status of the children was affected by the unstable living environment in Baghdad city in the last 10 years after the end of 2003 war. The association between neighborhood safety status and child nutritional status was significant, which means children who live in bad living environment have more risk to be overweight and obese compared to those living in acceptable living environment and this may be due to lack of physical activity as the children cannot play outside the house in the playground and also cannot walk to school because parents are concerned about their safety.

Tol et al. [11] noted that exposure to violence is a risk factor for adverse outcomes of child development in low-income settings, and that childhood mental health problems are difficult to address within the contexts of ongoing poverty and political instability. Parental perception of neighborhood safety likely operates more strongly than that of the child in altering lifestyle because parents exert significant control over young children’s activities [12, 13].

The results of this study were supported by similar studies done in armed conflicts zones elsewhere in the world, such as one study done following the conflict in Guinea-Bissau [14]. They found that in a noncamp setting, residents may be more malnourished and have higher mortality than refugees. Major improvements in nutritional status and a reduction in mortality occurred in resident and refugee children as soon as refugees returned home despite the fact that there was no improvement in food availability.

Previous study done in Basrah city in south of Iraq following the 1991 war [3] found that 24% of the children were stunted. Stunting and low weight-for-age were significantly higher among children of low socioeconomic households. Comparison of these data with an earlier nutritional survey in the area showed the nutritional status of children in Basrah city has worsened as a result of successive armed conflicts.

Latest study done to assess the effects of the 2003 war in Iraq on nutrition and health [4] concluded that the war had affected the physical growth of children, where young cohorts born after the war in high-intensity conflict areas had lower height-for-age Z-scores than children born in less violent areas. Also the weight-for-age Z-scores increased in 2004 but decreased in 2006. These results suggest that children are not losing weight but rather are not growing properly in length in high violence affected areas.

There were some limitations in this study. First of all, its cross-sectional design only measured the prevalence at specific point of time in specified areas. Second, is the recall bias of the respondents’ parents, especially in their evaluation of the security situation in their living neighborhood. Lastly, is the logistic issues because of unstable security situation.

5. Conclusion

Nutritional status of school children continues to be a public health issue in Iraq especially Baghdad city. There was a significant association between neighborhood safety and children nutritional status. There is a transition from undernutrition among children during the economic sanctions in the 90s to rapid increase in overweight and obesity prevalence in Iraq. Children living in safe area tend to be more overweight and obese.

Conflict of Interests

Authors declare no conflict of interests.

Acknowledgment

This study was funded by the Universiti Kebangsaan Malaysia Medical Centre Fundamental Research Grant, Code no. FF-180-2011, without which the study would not have been possible.

References

[1] S. Park, B. Y. Choi, Y. Wang, E. Colantuoni, and J. Gittelsohn, “School and neighborhood nutrition environment and their association with students' nutrition behaviors and weight status in seoul, South Korea,” Journal of Adolescent Health, vol. 53, pp. 655–662, 2013.

[2] A. J. Al-Saffar, “Stunting among primary-school children: A sample from Baghdad, Iraq,” Eastern Mediterranean Health Journal, vol. 15, no. 2, pp. 322–329, 2009.
[3] W. AlDoor, N. Armijo-Hussein, W. W. Fawzi, and M. G. Herrera, “Child nutrition and armed conflicts in Iraq,” *Journal of Tropical Pediatrics*, vol. 40, no. 1, pp. 32–36, 1994.

[4] G. Guerrero-Serdan, “The effects of the war in Iraq on nutrition and health: an analysis using anthropometric outcomes of children,” Royal Holloway College, University of London, 2009, http://mpra.ub.uni-muenchen.de/14056.

[5] D. Rose and R. Richards, “Food store access and household fruit and vegetable use among participants in the US Food Stamp Program,” *Public Health Nutrition*, vol. 7, no. 8, pp. 1081–1088, 2004.

[6] B. Giles-Corti and R. J. Donovan, “Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment,” *Preventive Medicine*, vol. 35, no. 6, pp. 601–611, 2002.

[7] N. Humpel, N. Owen, and E. Leslie, “Environmental factors associated with adults’ participation in physical activity: a review,” *The American Journal of Preventive Medicine*, vol. 22, no. 3, pp. 188–199, 2002.

[8] I. Kawachi and L. Berkman, “Social cohesion, social capital, and health,” in *Social Epidemiology*, L. Berkman and I. Kawachi, Eds., pp. 174–190, Oxford University Press, New York, NY, USA, 2000.

[9] L. V. Moore, A. V. Diez Roux, K. R. Evenson, A. P. McGinn, and S. J. Brines, “Availability of recreational resources in minority and low socioeconomic status areas,” *The American Journal of Preventive Medicine*, vol. 34, no. 1, pp. 16–22, 2008.

[10] World Health Organization, *Development of a WHO Growth Reference for School-Aged Children and Adolescents*, WHO, Geneva, Switzerland, 2007.

[11] W. A. Tol, I. H. Komproe, D. Susanty, M. J. D. Jordans, R. D. Macy, and J. T. V. M. De Jong, “School-based mental health intervention for children affected by political violence in Indonesia: a cluster randomized trial,” *Journal of the American Medical Association*, vol. 300, no. 6, pp. 655–662, 2008.

[12] R. O’Neil, R. D. Parke, and D. J. McDowell, “Objective and subjective features of children’s neighborhoods: relations to parental regulatory strategies and children’s social competence,” *Journal of Applied Developmental Psychology*, vol. 22, no. 2, pp. 135–155, 2001.

[13] N. E. Hill and M. A. Herman-Stahl, “Neighborhood safety and social involvement: associations with parenting behaviors and depressive symptoms among African American and Euro-American mothers,” *Journal of Family Psychology*, vol. 16, no. 2, pp. 209–219, 2002.

[14] P. Aaby, J. Gomes, M. Fernandes, Q. Djana, I. Lisse, and H. Jensen, “Nutritional status and mortality of refugee and resident children in a non-camp setting during conflict: follow up study in Guinea-Bissau,” *British Medical Journal*, vol. 319, no. 7214, pp. 878–881, 1999.