Nutritional Status Assessment of Internally Displaced Children in “Dream City”- Iraq

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Abstract: Malnutrition is one of the major public health challenges in developing countries especially those experiencing security instability. Not much is known of the nutritional status of displaced children in Iraq. The objective of this study was to assess the nutritional status of internally displaced children in Dream city-Salaheddin-Iraq to provide a validated baseline information for further humanitarian responses to help those children. The “Dream city” in Salaheddin governorate was chosen for it represents a large collection of displaced families. A total of 788 children (less than 5 years) was surveyed. Height, weight and mid-upper arm circumference were measured. Under-nutrition was found in 19.2% of them according to body mass index, and 19.5% when using mid-upper arm circumference index. The prevalence of wasting was 14.6% and severe wasting 6.9%. There was a significant association between under-nutrition and number of the children in the family, age of the child, and father’s and mother’s education. A noticeable percentage of children were hardly consuming meat, eggs or fruits (only once or none per week). About one child in every five displaced children is undernourished. The percentiles of different anthropometric measurements for height, weight, body mass index, and mid upper arm circumference for those children were below the standard measurements reported by WHO and NCHS growth charts for the corresponding age.

Keywords: Nutrition, Assessment, Children, Internally Displaced, Dream City, Iraq

1. Introduction

Conflict will inevitably cause loss of lives, physical injuries, widespread mental distress, a worsening of existent malnutrition (particularly among children) and outbreaks of communicable diseases, especially among internally displaced and refugee populations. It also reduces people’s personal security and restrict their access to food, medicines and medical supplies, clean water, sanitation, shelter and health services. [1]

Iraq currently has about four million internally displaced persons (IDPs), 10.8% of its population and 10% of IDPs worldwide. [2] The Islamic State in Iraq and Syria (ISIS) assault into Iraq displaced an estimated 480,000 persons from Al Anbar governorate in the first half of 2014. [3, 4] During June and July of 2014, a further 505,482 persons were displaced, mostly from Mosul, Iraq’s second city, [5, 6] and further numbers from military attacks in Salaheddin area. Some of the displaced live in rented houses or are staying with host families while others live in “critical shelters”, [7, 8] those are among the most vulnerable of the displaced. Only 8% of IDPs are housed in organized camps, with an estimated 2.5 million living outside of camps. [9, 10]

In response to the massive displacements from the ISIS assaults; the Inter Agency Standing Committee (IASC)
declared Iraq a level 3 (L3) emergency, setting out a “Whole of Iraq” assistance strategy with the escalating crisis in 2014. [6] The people of Iraq face a mixture of health hazards associated with poverty and insufficient food intake. Internally displaced or refugee populations face additional risks to their security and health: they are more vulnerable to disease. Those involved in conflict, as well as organizations responsible for humanitarian assistance, need to liaise with local authorities to manage the additional risks faced by such populations. [1]

Malnutrition is one of the major public health challenges in developing countries especially those experiencing civil wars, security instability and unrest conditions. Unfortunately, not much is known of the nutritional status of displaced children in Iraq. While international agencies may have less presence, local civil society organizations have come together spontaneously to provide assistance to IDPs. The number of the undernourished people in the world in 2014 was 795 million, [11] despite the fact that the world already produces enough food to feed everyone-7 billion people-and could feed more than that-12 billion people. [12] Hunger and inadequate nutrition can cause impaired physical and brain development of young children and contributes to early deaths (about one third of all child deaths). [13]

The rationale of this study was to assess the impact of the National disaster of ISIS occupation on the nutritional status of the internally displaced children through measuring the mid-upper arm circumference of those children (<5 years), height and weight, and calculating the body mass index (BMI). This will help make recommendations to achieve certain types of interventions in order to improve the nutritional status, and to decrease morbidity (susceptibility to infectious diseases, wasting, stunting, and other nutritional diseases like marasmus and kwashiorkor) that may lead to increase disability adjusted life years (DALY). While displacement is the leading cause of nutritional problems, its consequences (insufficient supplies of food, infectious diseases, and inaccessibility to health services) can also contribute to worsen the condition.

This has created new challenges the relief community has yet to address. Digging for the needs of this vulnerable group could result in agencies being better able to assist them. If found to be effective, the nutritional assessment maintained on widespread sustainable basis in emergency settings to improve the nutritional status of the displaced children in the whole country, which would represent a major contribution to the humanitarian health evidence base in conflict-affected countries.

Objective: To assess the nutritional status of internally displaced children in Dream city-Salaheddin to provide a validated baseline information for further humanitarian responses that open the door for more interventional projects to help improve the health condition of this vulnerable group.

2. Methods

2.1. Settings

This cross-sectional study (with an analytic element) was conducted in January 2017.

The “Dream city” is a residential compound built in 2012 with 312 houses that shelter 1100 displaced families with a total population of 8100 person. In most of the houses three or four families live together using simple partitions. All the households that have a less than five year child were included in the sample. We chose this settlement for that all its inhabitants were internally displaced families.

2.2. Sample

Salaheddin was chosen for it is one of the governorates that suffered repeated aggressive attacks of violence during the last years, besides, it was the first governorate to set free from ISIS, so that thousands of families fled to it from other governorates like Anbar and Mosul seeking a safe shelter.

All children under five years of age were surveyed excluding those who were diagnosed to have mal-absorption diseases and those less than one month of age for they are too young to show the effect of malnutrition, they may, rather, indicate malnutrition of the mothers.

2.3. Research Instruments

A questionnaire form has been developed depending on previous works in this field. It enquired about some demographic information of the family and the child including: age, gender, education and employment of the parents, date and times of displacements, source of income, source of water, attacks of diarrhea or upper respiratory tract infections, and food items available (and consumed) by the family-and the child- for the last week (meat, milk and milk products, eggs, fruits, and cereals).

Height was measured (using the UNICEF sliding caliber) to the nearest 0.5 cm, by asking the child to stand straight next to the wall and barefooted. For children less than two years of age; length was measured. Weight was recorded to the nearest 0.1 kg (with the child wearing light clothing) using a mechanical beam balance scale. For those less than two years; the weight was measured by “mother lifting the child” method (UNICEF weight scale). Mid-upper arm circumference was measured using a non-stretchable measuring tape, at the point halfway between the shoulder and the elbow. The results of the readings were compared to the standard WHO child scales of BMI, weight for height, and weight for age, for both males and females. IMCI growth curves for under five children were used to match Z-score according to WHO reference standard taking -2SD as a cutoff point for underweight and wasting. A team of well-trained interviewers performed the data collection. The time needed for filling the questionnaire and doing the measurements for each child was 7-10 minutes.

2.3.1. Ethical Issue

The principal data giver was the senior women in the family after taking their consent and assuring them that all the information will be kept strictly confidential, and will not be used for any purposes other than research work.
2.3.2. Data Computing and Analysis

The data were treated using the statistical package for social sciences (SPSS version 20) and (Anthro and Anthro+ programs) to calculate the prevalence of malnourishment in different categories of the sample according to the WHO standard growth scales. Cross tabulations with some of the surveyed variables were constructed.

3. Results

The current study included 469 households with a total of 788 under five year children. The families fled mainly from the peripheries of Anbar, Salaheddin and Ninawa governorates.

Table 1 shows the demographic characteristics of the surveyed families including the distribution of children by age (in months), gender, number of children in each family and parental characteristics. The majority of families had one to two under five children (87%), with an almost equal percentages of males and females (48.1 and 51.9%). Most of the children have both parents alive (96.6%). Most of the families (83.1%) reported two years or more of displacement, frequent displacements (two times or more) was seen in 46.4%. Under five children of the IDP families experienced repeated attacks of diarrhea and upper respiratory tract infection in large proportion (63.3% and 94.2% respectively).

Table 1. Demographic and displacement characteristics of the surveyed under five children.

|                                | No  | %   |
|--------------------------------|-----|-----|
| Number of families with (one, two or three) under 5 years children | 1   | 225 | 48.0 |
|                                | 2   | 183 | 39.0 |
|                                | 3 or 4 | 61  | 13.0 |
|                                | <6 | 42  | 5.3  |
|                                | 6--- | 61  | 7.7  |
| Age (months)                   | 12--- | 104 | 13.2 |
|                                | 24--- | 171 | 21.7 |
|                                | 36--- | 192 | 24.4 |
|                                | >48 | 218 | 27.7 |
|                                | Male | 379 | 48.1 |
|                                | Female | 409 | 51.9 |
| Parental status                | Both father & mother alive | 761 | 96.6 |
|                                | Either Father/Mother dead | 27  | 3.4  |
|                                | Illiterate | 250 | 31.7 |
| Father education               | Read & write | 180 | 22.8 |
|                                | Primary | 264 | 33.5 |
|                                | Secondary & Higher | 94  | 11.9 |
|                                | Illiterate | 398 | 50.5 |
| Mother education               | Read & write | 95  | 12.1 |
|                                | Primary | 256 | 32.5 |
|                                | Secondary & Higher | 39  | 4.9  |
|                                | Governmental | 45  | 5.8  |
| Father employment              | Non-governmental/ Private | 277 | 35.2 |
|                                | No work | 466 | 59.1 |
| Duration of displacement (months) | <12 | 86  | 11.0 |
|                                | 12- <24 | 39  | 4.9  |
|                                | 24- <36 | 392 | 49.7 |
|                                | >36 | 271 | 34.4 |
| Number of Displacements        | 1   | 93  | 11.8 |
|                                | 2   | 329 | 41.8 |
|                                | 3   | 195 | 24.7 |
|                                | >4 | 171 | 21.8 |
| Source of income               | Salary | 53  | 6.7  |
|                                | Govern assist | 32  | 4.1  |
|                                | NGO | 97  | 12.3 |
|                                | Saved | 5   | 0.6  |
|                                | Others (not declared) | 601 | 76.3 |
| Repeated attacks of diarrhea    | Yes | 499 | 63.3 |
|                                | No | 289 | 36.7 |
| Repeated attacks of URTI        | Yes | 742 | 94.2 |
|                                | No | 46  | 5.8  |
| Source of water supply          | Pipes | 597 | 75.8 |
|                                | Tankers | 191 | 24.2 |

Table 2 demonstrates the food items consumed by the children; meat, eggs, and fruits were the least consumed and in many families those items were not available (at least for the last week) as 52.8%, 34.6% and 65.1% of the families reported that they did not have meat, eggs or fruits respectively in their meals during the last week.
Figure 1 shows the overall nutritional status according to body mass index (BMI) and middle upper arm circumference (MAC), 19.2% of them were malnourished according to BMI and about the same proportion when using MAC index (19.5%). Weight for height measurements revealed that the percentage of wasting was 14.6%, and of severe wasting was 6.9%.

A significant association was found between undernutrition (using BMI) and the number of children in the family, the higher the number of children the more the probability of having an undernourished child (or more). Children less than six months of age were the most vulnerable group for malnutrition. A significant association was also found between under-nutrition and father’s education, the less educated the father the more possibility of having malnutrition among his children, while the significant association with mother’s education revealed that the categories that showed more child under-nutrition were the illiterate and those with secondary or higher education. The same significant association was seen when analyzing the relation between wasting and the mentioned variables (number of children, age of the child, father’s and mother’s education), while using the MAC index revealed a significant association only with age. No significant association was found between under-nutrition and gender of the child, number and duration of displacements, parental death, or frequency of attacks of diarrhea or upper respiratory tract infections as shown in tables 3, 4 and 5.
Table 3. Association of nutritional status by BMI with demographic characteristics of IDP children.

| Nutritional status (BMI>13.5) | Malnourished (<13.5) | Well nourished (≥13.5) | P value |
|------------------------------|-----------------------|-------------------------|---------|
|                              | No        | %       | No       | %       |         |
| Number of children under 5  |            |         |           |         |         |
| 1                            | 41        | 18.2    | 184      | 81.8    | 0.023*  |
| 2                            | 26        | 14.2    | 157      | 85.8    |         |
| 3 or 4                       | 18        | 36.0    | 43       | 64.0    |         |
| <6                           | 12        | 28.6    | 30       | 71.4    | 0.036*  |
| ≥6                           | 10        | 16.4    | 51       | 83.6    |         |
| Age (months)                 |            |         |           |         |         |
| 12---                        | 21        | 20.2    | 83       | 79.8    |         |
| 24---                        | 23        | 13.5    | 148      | 86.5    |         |
| 36---                        | 31        | 16.1    | 161      | 83.9    |         |
| >48                          | 54        | 24.8    | 164      | 75.2    |         |
| Gender                       |            |         |           |         |         |
| Male                         | 72        | 19.0    | 307      | 81.0    | 0.910   |
| Female                       | 79        | 19.3    | 330      | 80.7    |         |
| Parental status              |            |         |           |         |         |
| Both alive                   | 142       | 18.7    | 619      | 81.3    | 0.057   |
| Either dead                  | 9         | 33.3    | 18       | 66.7    |         |
| Illiterate                   | 62        | 24.8    | 188      | 75.2    | 0.001*  |
| Read & write                 | 43        | 23.9    | 137      | 76.1    |         |
| Primary                      | 34        | 12.9    | 230      | 87.1    |         |
| Secondary & Higher           | 12        | 12.8    | 82       | 87.2    |         |
| Illiterate                   | 93        | 23.4    | 305      | 76.6    | 0.010*  |
| Read & write                 | 15        | 15.8    | 80       | 84.2    |         |
| Primary                      | 34        | 13.3    | 222      | 86.7    |         |
| Secondary & Higher           | 9         | 23.1    | 30       | 76.9    |         |
| Governmental                 | 7         | 15.6    | 38       | 84.4    | 0.743   |
| Father education             |            |         |           |         |         |
| Non-governmental            | 49        | 17.6    | 228      | 82.4    |         |
| No work                      | 95        | 20.4    | 371      | 79.6    |         |
| Duration of displacement (months) |            |         |           |         |         |
| <24                          | 17        | 13.6    | 108      | 86.4    | 0.085   |
| ≥24                          | 134       | 20.2    | 529      | 79.8    |         |
| 1                            | 15        | 16.1    | 78       | 83.9    |         |
| Number of displacements      |            |         |           |         |         |
| 2                            | 68        | 20.7    | 261      | 79.3    | 0.720   |
| 3                            | 38        | 19.5    | 157      | 80.5    |         |
| ≥4                           | 30        | 17.5    | 141      | 82.5    |         |
| Salary                       | 9         | 17.0    | 44       | 83.0    | 0.659   |
| Govern assist                | 5         | 15.6    | 27       | 84.4    |         |
| Source of income             |            |         |           |         |         |
| NGO                          | 16        | 16.5    | 81       | 83.5    |         |
| Saved                        | -         | -       | 5        | 100     |         |
| Others                       | 121       | 20.1    | 480      | 79.9    |         |
| Repeated attacks of diarrhea |            |         |           |         |         |
| Yes                          | 97        | 19.4    | 402      | 80.6    | 0.796   |
| No                           | 54        | 18.7    | 235      | 81.3    |         |
| Repeated attacks of URTI     |            |         |           |         |         |
| Yes                          | 142       | 19.1    | 600      | 80.9    | 0.943   |
| No                           | 9         | 19.6    | 37       | 80.4    |         |
| Source of water              |            |         |           |         |         |
| Pipes                        | 110       | 18.4    | 487      | 81.6    | 0.353   |
| Tankers                      | 41        | 21.5    | 150      | 78.5    |         |

*Significant difference between proportions using Pearson Chi-square test at 0.05 level

Table 4. Association of nutritional status by MAC with different demographic characteristics.

| Nutritional status (MAC>135) | Malnourished (<135mm) | Malnourished (≥135mm) | P value |
|------------------------------|-----------------------|-----------------------|---------|
|                              | No        | %       | No       | %       |         |
| Number of children under 5  |            |         |           |         |         |
| 1                            | 41        | 18.2    | 184      | 81.8    | 0.823   |
| 2                            | 27        | 14.8    | 156      | 85.2    |         |
| 3 or 4                       | 10        | 17.1    | 51       | 82.9    |         |
| <6                           | 37        | 88.1    | 5        | 11.9    | 0.0001* |
| ≥6                           | 33        | 54.1    | 28       | 45.9    |         |
| Age (months)                 |            |         |           |         |         |
| 12---                        | 33        | 31.7    | 71       | 68.3    |         |
| 24---                        | 29        | 17.0    | 142      | 83.0    |         |
| 36---                        | 14        | 7.3     | 178      | 92.7    |         |
| ≥48                          | 8         | 3.7     | 210      | 96.3    |         |
| Gender                       |            |         |           |         |         |
| Male                         | 65        | 17.2    | 314      | 82.8    | 0.103   |
| Female                       | 89        | 21.8    | 320      | 78.2    |         |
| Parental status              |            |         |           |         |         |
| Both alive                   | 152       | 20.0    | 609      | 80.0    | 0.106   |
| Either dead                  | 2         | 7.4     | 25       | 92.6    |         |
| Father education             |            |         |           |         |         |
| Illiterate                   | 50        | 20.0    | 200      | 80.0    | 0.530   |
| Read & write                 | 40        | 22.2    | 140      | 77.8    |         |
### Table 5: Relation between wasting and demographic characteristics of IDP children.

| Nutritional status (MAC>135) | Malnourished (<135mm) | Malnourished (≥135mm) | P value |
|------------------------------|------------------------|------------------------|---------|
|                              | No  | %    | No  | %    |         |
| Primary                      | 50  | 18.9 | 214 | 81.1 |         |
| Secondary & Higher           | 14  | 14.9 | 80  | 85.1 | 0.007*  |
| Illiterate                   | 92  | 23.1 | 306 | 76.9 |         |
| Read & write                 | 23  | 24.2 | 72  | 75.8 |         |
| Primary                      | 34  | 13.3 | 222 | 86.7 |         |
| Secondary & Higher           | 5   | 12.8 | 34  | 87.2 |         |
| Governmental                 | 4   | 8.9  | 41  | 91.1 | 0.071   |
| No                           | 60  | 20.4 | 217 | 79.6 |         |
| No work                      | 90  | 19.3 | 376 | 80.7 |         |
| Duration of displacement (months) |       |       |     |       |         |
| <24                          | 20  | 16.0 | 105 | 84.0 | 0.276   |
| ≥24                          | 134 | 20.2 | 529 | 79.8 |         |
| 1                            | 16  | 17.2 | 77  | 82.8 | 0.507   |
| 2                            | 72  | 21.9 | 257 | 78.1 |         |
| 3                            | 33  | 16.9 | 162 | 83.1 |         |
| ≥4                           | 33  | 19.3 | 138 | 80.7 |         |
| Salary                       | 2   | 3.8  | 51  | 96.2 | 0.033*  |
| Govern assist                 | 6   | 18.8 | 26  | 81.3 |         |
| Source of income             | 21  | 21.6 | 76  | 78.4 |         |
| NGO                          | 5   | 30.8 | 72  | 69.2 |         |
| Others                       | 125 | 20.8 | 476 | 79.2 |         |
| Repeated attacks of diarrhea |       |       |     |       |         |
| Yes                          | 89  | 17.8 | 410 | 82.2 | 0.112   |
| No                           | 65  | 22.5 | 224 | 77.5 |         |
| Repeated attacks of URTI     | 147 | 19.8 | 595 | 80.2 | 0.446   |
| Yes                          | 7   | 15.2 | 39  | 84.8 |         |
| No                           | 119 | 19.9 | 478 | 80.1 | 0.626   |
| Source of water              | 21  | 13.3 | 138 | 86.7 |         |
| Pipe                         | 119 | 19.9 | 478 | 80.1 |         |
| Tanker                       | 35  | 18.3 | 156 | 81.7 |         |

*Significant difference between proportions using Pearson Chi-square test at 0.05 level
Table 6 showed that the association of under nutrition with food items was significant only with milk and milk products.

Table 7 demonstrates the percentile distribution of different anthropometric measurements of the IDP under five children for height (meter), weight (kilogram), BMI (kilogram/square meter), and MAC (centimeter) in which all percentiles were below the standard measurements reported by WHO and NCHS growth charts for the corresponding age for both males and females.
4. Discussion

Forced displacement is now occurring more commonly in conflict-affected countries especially in the middle-income settings of the East Mediterranean Region where most displaced populations live outside camps, and can become “out-of-sight” and not readily visible. Children, on account of their young age, are more exposed to the difficulties and risks associated with displacement. Their health needs are not fully addressed particularly in perspectives of malnutrition and immunization. [14] World Health Organization (WHO) reported that 54% of all childhood mortality is attributed directly or indirectly to malnutrition. [15]

The WHO food survey in Iraq (launched in 2008) revealed that an estimated 930 000 people (3% of the total population) were food insecure. An additional 6.4 million people (22% of the population) were extremely dependent on food rations, without which they could become food insecure. [16] Iraq Multiple Indicator Cluster Survey (MICS-4) in 2011 found that 8% of under-five children were moderately or severely underweight, and 4% of them were severely underweight. [17]

The results of the current study showed that the prevalence of under-nutrition was 19.2% measured by BMI and 19.5% measured by MAC. This prevalence is considered high when compared to the regional communities like Iran in which the prevalence of malnutrition was found to be 11.1% and of wasting 7.2%, [18] or other countries like Nepal where the prevalence of malnutrition was 18.9% and 7% wasting. [19] It is higher even than previous studies in Iraq, like the study in Kurdistan Region where the prevalence of malnutrition and wasting was found to be 7% and 3.7% respectively, [20] and a study about nutritional status among less than five year Syrian refugees in Al-Anbar governorate-Iraq where the prevalence of malnutrition and wasting was shown to be 7.6% and 4.8% respectively. [21]

No gender difference was found, and this is consistent with other previous studies in Iraq. [22]

Wasting or thinness (Low weight-for-height) indicates a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. However, wasting may also be the result of a chronic unfavorable condition. Provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries. It is well known that a prevalence exceeding 5% is alarming given a parallel increase in mortality that soon becomes apparent. [23, 24] On the severity index, prevalence between 10-14% is regarded as serious, and above or equal to 15% as critical. [25]

The prevalence of wasting in the current study was 14.6%, (and severe wasting 6.9%), this is a disastrous finding that approaching the critical level. Iraq multiple indicator cluster survey (MICS) 2011 revealed that the prevalence of underweight was found to be 7.1%, of wasting 5.8%, and of severe wasting it was 2.7%. [26]

5. Conclusion

It can be concluded from this study that under nutrition (including wasting) is overwhelmed among the internally displaced children. About one child in every five displaced children is undernourished. The percentiles of different anthropometric measurements for weight for height, BMI, and MAC for those children were below the standard measurements reported by WHO and NCHS growth charts for the corresponding age and for both males and females. This is a human crisis that needs a rapid and effective intervention to help improve the health status of those children and save their lives.

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