

Nutritional status of Palestinian preschoolers in the Gaza Strip: a cross-sectional study

S. G.Massad^{1§}, F.J. Nieto², M. Palta², M. Smith², R.Clark³, A. Thabet⁴

¹ Faculty of Gender and Development Studies, BirZeit University, BirZeit, Palestinian Territory

² Department of Population Health Sciences, University of Wisconsin-Madison; Madison, US

³ Department of Psychology, University of Wisconsin-Madison; Madison, US

⁴ Child Institute, Al Quds University -Gaza Branch, Gaza, Palestinian Territory

[§]Corresponding author

Email addresses:

SGM: salwamassad@yahoo.com

FJN: fjniето@wisc.edu

MP: mpalta@wisc.edu

MS: maureensmith@wisc.edu

RC: rclark@wisc.edu

AT: abdelazizth@yahoo.com

Abstract

Background: The authors examined factors associated with nutritional resilience/vulnerability among preschoolers in the Gaza Strip in 2007, where political violence and deprivation are widespread.

Methods: The study was a cross-sectional survey using random sampling of kindergartens in order to select 350 preschoolers. Binary logistic regression was used to compare resilient (adequate nutrition) and vulnerable (stunted) groups with those with moderate nutrition.

Results: Approximately 37% of the subjects demonstrated nutritional resilience and 15% were vulnerable. Factors associated with nutritional resilience were child age (odds ratio [OR] per 1 month increment= 0.95, 95% confidence interval [CI]: 0.92, 0.98), normal birth weight (OR= 5.85, 95% CI: 1.64, 20.94), actively hand- or spoon-feeding when the child was below two years (OR= 3.23, 95% CI: 1.32, 7.69), and residential stability in the past two years (OR= 1.98, 95% CI: 1.04, 3.77). The only factor associated with nutritional vulnerability was lower total score on the General Health Questionnaire—a marker of maternal mental health (OR= 1.07, 95% CI: 1.01, 1.13).

Conclusions: The study's findings suggests the need for comprehensive interventions addressing the needs of both children and families exposed to political violence and deprivation, targeting maternal mental health as well as child health, and promoting positive feeding practices; active feeding of children below two years.

Background

The extremely challenging living conditions in the Gaza Strip are well known. For example, more than 75% of Palestinians currently live below the poverty line (less than \$2/person/day) [1]. However, the nutritional consequences for children have not received much attention.

Restrictions on the movement of Palestinian goods and people across the borders and within the Palestinian Territory, seriously compromise household welfare resulting in loss of income, decreased quantity and quality of food, and impeded access to health care [2]. As a result, stunting of children under 5 increased by 33% in Palestine in general and by 59% in the Gaza Strip in particular [3].

Undernutrition research in general has been limited by the exclusive focus on vulnerability, i.e., the study of determinants of undernutrition only [4-13]. The study of resilient children acknowledges that the determinants of resilience and vulnerability might be different [14]. Resilience is the individual's ability to resist the potential negative consequences of the risk and develop adequately [15]. Most studies of nutritional resilience in developing countries have focused on children's feeding, hygiene, maternal education, employment, and income, while little is known about the effect of maternal mental health and deprivation [4-6, 16-27].

Growth assessment is widely used and often regarded as the best single measure for health and nutritional status in children [28]. Undernutrition, mostly in its mild or moderate forms, contributes to more than half of the eleven million deaths each year among children under 5 years of age in developing countries, and diminishes capacities among those who survive [28]. Chronic undernutrition is commonly measured by stunting, which is defined as low height-for-

age [28-31]. Stunting weakens immunity, impairs learning capacity and work performance, and affects overall quality of life [32]. Among girls, it increases the risk of obstructed labor and thereby of maternal mortality [32].

The causes of undernutrition are complex and multifaceted and may operate differently in a war zone context. Dietary factors, maternal education, and family socioeconomic and environmental factors all may contribute to the risk of undernutrition in developing countries [9, 10, 33-35].

We sought to describe the variability of nutritional status and its association with various child, socioeconomic and maternal factors in preschoolers 3-6 years old in the Gaza Strip, who comprise 18% of the population [36]. We postulated that larger size of the household, economic deprivation, low birth weight, higher birth order, poor maternal mental health, fair or poor quality of life and low education might be associated with nutritional vulnerability, while timely introduction of complementary food [4], actively feeding the child when he was below 2 years of age [4], not forcing the child to eat [4], hygiene, social support, and residential stability in the past two years are potentially related to nutritional resilience.

Methods

Description of target population and sampling design

In the Gaza Strip, the region most adversely affected by the political conflict and deprivation in Palestine, we conducted a cross-sectional kindergarten-based survey of children 3-6 years old. The average household size in Gaza is 7.0 people and the fertility rate is 5.4 births per woman [36]. As previously described [37], we randomly selected ten kindergartens across the Gaza Strip. The random sample of kindergartens included four cities, two villages and two camps. Six of the randomly selected kindergartens were from Gaza City, Der El Balah city, Rafah and Khan Younis cities. Two were selected from Beach camp and Nusirate camp, and two from Beit Hanoun and Zwaida villages. These represent the different types of kindergartens found in Gaza, two are UNRWA, two public, and six are private kindergartens. All preschoolers 3-6 years were selected from the registration books of the ten kindergartens. We randomly selected only one child from each family. The Human Subjects Office, College of Letters and Sciences at UW-Madison approved the study protocol in December 2006.

Recruitment

The field manager called parents using phone numbers in registration books, briefed them about the study, and invited the mothers to come to the kindergartens to participate. As a written consent form is not culturally relevant in Palestine, verbal informed consent was obtained from the mothers following a description of the study. The mothers were given the option to skip any question they did not feel comfortable answering, and to temporarily or permanently stop the interview. The response rate was 100%. This high response rate was

expected as a previous cross-sectional survey and Palestinian Demographic Health Surveys (2000, 2002, 2004, and 2006) had response rates between 95.5 and 98.3% [3, 36, 38-40].

Nutritional status assessment

The main outcomes of interest were nutritional resilience and nutritional vulnerability. Standing height of each child was measured following World Health Organization recommendations [41]. For children up to five years old, we used “WHO ANTHRO 2005” program in the analysis of the anthropometric data [42]. Since “WHO ANTHRO 2005” does not cover children older than 5 years, we used “NutriSurvey for Windows” for six-year-olds for score standardization [43]. We used Z-scores for height-for-age (obtained using “WHO ANTHRO 2005” and “NutriSurvey for Windows”) of less than -2.0 as the cut-off point for nutritional vulnerability [28, 41]. We defined moderate nutrition as Z-scores between -2.0 and 0.0 and nutritional resilience as a Z-score zero or above [44].

Explanatory variables

The main child level explanatory variables were: age, gender, birth order, birth weight, positive feeding practices (active feeding the child and not forcing the child to eat), intake of dietary supplements (iron and vitamin A and D) [45], exclusive breast feeding for 6 months[46], complementary feeding at 6 months [46]; the maternal factors were: mental health, self-rated health, and education; the household factors were: family size, hygiene, residential stability in the past two years, economic deprivation, and social support as defined below.

Variable definitions

Active feeding: Actively hand or spoon feeding the child when he was below two years of age. Measured by asking the mother whether she actively fed her child when he was below two years of age.

Absence of forced feeding: This variable was measured by asking the mother whether she forces her child to eat in the event he/she refuses to eat.

Hygiene: This rating was constructed by summing the responses (Yes=1, No=0) to the following dichotomous items observed by the interviewer: mother's nails and clothes were clean and child's nails and clothes were clean [21].

Deprivation: A rating was constructed as the number of affirmative responses to the following dichotomous items: family did not have enough money for living expenses, did not have money to pay the bills, and the mother felt that her child was deprived [35, 36]. In addition the variables, the family did not have meat or fruits/vegetables most days of the week, the family did not have enough food for at least two days in the week, and the family being on food assistance were used for descriptive purposes.

Social support: The perceived social support factor was drawn from the items on the Social Provisions Scale [47]. Rating was based on the yes/no answer to the following items: mother has someone to count on for help, has friends and family to make her happy and secure, has somebody to trust to talk about problems, and has someone with whom she feels intimacy [48].

Maternal mental health: A rating was based on responses to the General Health Questionnaire (GHQ-28) [49]. The GHQ-28 covers severe depression and suicide risk, anxiety and insomnia, social dysfunction, and somatic symptoms [49]. GHQ-28 scores above the cutoff of 4/5 are considered to identify possible psychiatric 'cases' [50]. A validation study of the GHQ-28, in comparison with the Clinical Interview Schedule, yielded a sensitivity and specificity to

diagnose possible psychiatric cases which were 88.0% and 84.2%, respectively [49]. In a previous study, the Cronbach's alpha for the GHQ-28 was 0.91 and test-retest coefficient after six months was 0.90 [49].

Maternal self-rated health: We measured health perceptions through the question, “at the present time, would you say your health is excellent, very good, good, fair, or poor?” We coded this variable into a binary variable: fair or poor versus good/very good/ or excellent. We translated the study questionnaire into Arabic and then translated it back to English. Subsequently, it was pilot tested among mothers of 35 preschoolers in the Gaza Strip. Finally, we revised the questionnaire and administered it to the study sample following written guidelines.

Statistical analysis

We analyzed our dataset of 350 subjects with SPSS 14.0 (Statistical Package for the Social Sciences). We used means and percentages to describe the characteristics of the study sample. In addition to estimating the overall prevalence of nutritional resilience and vulnerability, we calculated the prevalence by locality (8 localities). Student's t-test and analysis of variance (ANOVA), were performed to examine differences socioeconomic status between the resilient and vulnerable groups. We used binary logistic regression to predict falling in the resilient and vulnerable groups, using those with moderate nutrition as the referent group [4, 51]. We built the model predicting nutritional status by first evaluating the child and household factors and then adding maternal factors. The final model included all variables with $P \leq 0.05$. We calculated Cronbach's alpha for GHQ-28 and the Social Support Scale to examine their reliability in our study sample. Cronbach's alpha was 0.87 and 0.75, respectively.

Results

Sample characteristics

Of the children studied, 49% were female (table 1). Almost 7% of the children had low birth weight, of which 36% were premature. Approximately 37% of the subjects demonstrated nutritional resilience and 15% were vulnerable. The prevalence of nutritional resilience (22-53%) and nutritional vulnerability (3-27%) varied significantly ($P < 0.001$) by locality. Mean maternal age was 31 years, and 10% had elementary schooling or less (i.e. a 6th grade or lower level of education). Almost 32% of the mothers rated their health as fair or poor, and 60% had potential mental health problems based on the GHQ-28. More than half of the study participants had no money to pay bills; had no meat, fish, fruits, or vegetables most days of the week; or were on food assistance (table 2).

Children labeled as resilient came from the same environment as those labeled as vulnerable; they experienced the same conditions yet have a different outcome. As shown in Table 3, the resilient and vulnerable groups are comparable in terms of maternal education and employment and household factors: deprivation, average monthly income, family did not have enough food for at least 2 days in the past month, being on food assistance, size of the household, number of rooms in the house, and living in direct military confrontation area.

Factors associated with nutritional resilience and vulnerability

Factors associated with nutritional resilience (Table 4)

The factors that emerged as significantly associated with nutritional resilience were the age of the child (odds ratio [OR] per one month increment= 0.95, 95% confidence interval: 0.92,

0.98), normal birth weight (≥ 2.5 Kg) (OR= 5.85, 95% CI: 1.64, 20.94), actively hand- or spoon-feeding when the child was below 2 years of age (OR= 3.23, 95% CI: 1.32, 7.69), and residential stability in the past 2 years (OR= 1.98, 95% CI: 1.04, 3.77). Child gender, birth order, child dietary supplements, timely introduction of complementary food (at 6 months), exclusive breastfeeding for 6 months, hygiene and social support were not associated with nutritional resilience.

Factors associated with nutritional vulnerability

Based on logistic regression (Table 4), the only factor associated with nutritional vulnerability was lower total score on GHQ-28 (OR= 1.07, 95% CI: 1.01, 1.13). Adjusting for gender, child dietary supplements, timely introduction of complementary food, exclusive breastfeeding for 4-6 months, and deprivation did not substantively change the magnitude or significance of the associations. Larger size of the household, economic deprivation, low birth weight, higher birth order, fair or poor quality of life and low education were not associated with nutritional vulnerability.

Discussion

In line with earlier findings that some children show nutritional resilience despite adversity [4, 52], 37% of the children in our study were nutritionally resilient. We believe that our estimate of 15% vulnerable children may be an underestimate of the true prevalence of undernutrition, as only one third of children 3-6 years old go to kindergartens. Those who fail to enroll do so most often because their families cannot afford it, or because they live in violent areas and their families are worried about their safety [53, 54]. However, our results are similar to those obtained by the Palestinian Demographic Health Survey (DHS 2006) (data collected Nov 2006-

January 2007). In this survey, 4673 children under five were examined in the Gaza Strip yielding a prevalence of vulnerability of 13% [36].

We examined both the resilient and vulnerable groups to understand how families succeed and how they fail in maintaining child nutrition in the face of adversity. In agreement with previous studies undertaken in the Philippines and Tanzania [55, 56], low birth weight children were less likely to show nutritional resilience compared to those with normal birth weight and equally more likely to show vulnerability, although the latter association was not statistically significant, possibly due to the smaller number of vulnerable children.

Maternal low level of education was not associated with nutritional vulnerability, a finding that contradicts with previous studies in China [12, 57], Indonesia [20], Bangladesh [58], India [9], Nepal [10], and Thailand [7]. This may be due to sample size, as the odds ratio for maternal education was 2.0 but p-value 0.14. Poor maternal mental health was associated with nutritional vulnerability, a finding that is in agreement with other studies in India and Pakistan that found maternal postpartum depression to be associated with undernutrition in children [59, 60]. Similarly, a study in Brazil found that poor maternal mental health was associated with a 3-fold increase in the risk of nutritional vulnerability [61]. Another study in rural Chad showed that maternal psychosocial characteristics were among the best predictors of child height-for-age (France Be´gin, 1999). Poor maternal involvement in childcare may be one of the explanations of the association between maternal depression and child undernutrition [62, 63]. Depressed mothers are more likely to be withdrawn, passive, and less responsive to their children, as well as less able to establish and maintain positive interactions [62, 63]. In

addition, higher scores on maternal depression have been found to be associated with persistent food refusal behavior by the child [64]. However, in this study, the relation between maternal mental health and child nutritional vulnerability was not mediated by feeding behaviors forced feeding the child, and help feeding the child when was below 2 years, as both variables did not affect the significance of the association between maternal mental health and nutritional vulnerability (data not shown). The association between poor maternal mental health and nutritional vulnerability may be explained by temporal bias; potentially mothers have poor mental health because their children are undernourished. However, an evaluation of a five-month psychosocial intervention program for mothers in war-torn Bosnia and Herzegovina showed positive effects on children's weight [65]. Another study among 221 infants found that infants of mothers with depressive symptoms experience poor linear growth when followed for 6 months [66]. There was no association between maternal mental health and maternal feeding behaviors; helping the child to eat when he was below 2 years of age and forcing the child to eat, therefore, feeding behavior does not explain the association between maternal mental health and child nutritional status.

We did not find an association between the absence of forced feeding of the child and nutritional resilience, as had been reported by earlier studies [4, 21, 67, 68]. This disagreement may be because food is not always available in the Gaza Strip, thus food refusal may not being an issue. Contrary to previous studies in developing countries,[5, 69-71] our data did not demonstrate an association between intake of supplements, birth order, exclusive breast feeding, timely introduction of complementary food, and economic deprivation and the child's nutritional status. One possible explanation is that other factors such as maternal mental health may be more critical to children's growth when exposed to adversity. Lack of association between

intake of dietary supplements and child nutritional status, may be due to temporal bias, as malnourished children are more likely to take dietary supplements when they were younger. In contrast to our expectations, social support was not associated with child nutritional status.

In agreement with a previous study in Gaza that found no significant gender differences in nutritional status and feeding patterns among infants in the Gaza Strip [72], our study did not find significant gender differences in nutritional vulnerability. In general, the literature shows mixed results on gender and nutritional vulnerability, with some studies reporting higher risk in males [23, 73], and others in females [74].

Undernutrition is a serious public health problem in the Gaza Strip. As today's malnourished children cannot wait for desired structural changes; the ending of violence and alleviation of poverty; we examined both resilient and vulnerable children to address the immediate causes of undernutrition. Timely interventions may prevent and reverse undernutrition among preschoolers [75]. If circumstances permit, further confirmatory studies should be conducted that include children from the West Bank to see if the association holds, and to examine the impact of the political changes, and the increased intensity of violence in the Gaza Strip on children's nutritional status. We also recommend replicating the study among other deprived populations, and those exposed to domestic and neighborhood violence, to see if the findings are consistent with our findings in the context of political violence.

The cross-sectional design of the study precludes examination of causality. As undernutrition is one of the main factors contributing to children mortality [76], our estimate of the prevalence of nutritional vulnerability might have been low compared to the true prevalence at a younger

age, due to survival bias. Similarly, the estimate of resilience may be high. Another possible limitation of our study is that, as it is not culturally acceptable in Palestine, we were unable to measure mother's weight and height to control for maternal nutritional status, a variable that has been associated with the risk of childhood undernutrition in other studies [57].

This study is unique in several respects. First, it examined both nutritional resilience and vulnerability of preschoolers exposed to political violence and deprivation in particular. Second, it accounted for the maternal mental health and social support in studying children's nutritional status. Third, it assessed the effect of several risk factors simultaneously, which is important in identifying the combinations of factors that increase nutritional vulnerability of children. Fourth, the study context provided a unique opportunity to examine the impact of both chronic and acute exposure to political violence on children's health.

Conclusions

The study identified modifiable risk factors that can promote resilience and reduce vulnerability in children exposed to political violence and deprivation. The high prevalence of nutritional vulnerability, on the one hand, and the high prevalence of poor maternal mental health and its strong association with undernutrition on the other hand, call for psychosocial interventions that can have positive effects on the mental health of the mothers as well as the nutritional status of their children. Such interventions should promote the development and well-being of the children through parental involvement and support. The study also highlights the importance of promoting good feeding practices to promote nutritional resilience. It is hoped that these findings will assist in the revision of children and family oriented programs

and policies in areas of armed conflict, in order to reduce mortality and morbidity in children and contribute to their well-being. It is not too late to intervene, as a longitudinal study among 1674 children found no significant difference between early (stunted at 6–18 months of age) and concurrent stunting (stunted at 4.5–6 years of age) on cognitive ability. This suggests that preventing stunting should not only focus on the under 2s but include children up to 5 years of age [13].

List of Abbreviations

UNRWA: United Nations Relief and Works Agency for Palestine Refugees in the Near East;

GHQ: General Health Questionnaire;

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

SGM made contribution to the study design, data collection, statistical analysis, interpretation of data and the drafting of the manuscript. FJN contributed to the study design, statistical analysis, interpretation of data and drafting of the manuscript. MP contributed to the study design, guided the statistical analysis and contributed to the interpretation of results and to writing and editing the manuscript. MS contributed to study design, data collection, interpretation of data, and manuscript writing and editing. RC contributed to interpretation of data, and manuscript writing and editing. AT contributed to the study design and data collection. All authors read and approved the final manuscript.

Acknowledgements and Funding

The first author holds an International Fellowship from the American Association of University Women Educational Foundation. This study was supported by funds from the Department of Population Health Sciences and a grant from the Center for Global Health at the University of Wisconsin School of Medicine and Public Health. We are also grateful for helpful comments from Dr. David Kaplan, Tim Connolly, Dr. Carol Ryff, Dr. Adrian Davis, Dr. Lewis Leavitt, and Dr. Cynthia Haq.

Tables

Table 1: Characteristics of the study sample (N=350), Gaza, 2007

| | % (unless otherwise indicated) |
|---|--------------------------------|
| <hr/> | |
| Child factors | |
| Age in months (mean [SD]) | 59 (8) |
| Females | 49% |
| Low birth weight (<2.5 Kg) | 7% |
| Received iron syrup | 60% |
| Received vitamins A &D | 57% |
| Exclusively breast fed for 4-6 months | 80% |
| Complementary food at 6 months | 68% |
| Resilient ¹ | 37% |
| Vulnerable ² | 15% |
| Maternal factors | |
| Age (mean [SD]) | 31 (6) |
| Elementary Schooling only | 10% |
| Employed | 7% |
| Perceived health | |
| - Excellent | 13% |
| - Very good | 23% |
| - Good | 32% |
| - Fair or poor | 32% |
| Potential mental health problem ³ | 60% |
| Household factors | |
| Living in a direct military confrontation area | 25.1% |
| Family moved in the past 2 years | 19% |
| Average household income in US dollars ⁴ (mean [SD]) | 205 (174) |
| Reported any form of social support ⁵ | 38% |
| Family size (mean [SD]) | 8 (4) |

Crowding (mean [SD])⁶

3 (1)

¹ Height-for-age Z-score ≥ 0 (adequately nourished)

² Height-for-age Z-score < -2 (stunted)

³ Total score on General Health Questionnaire ≥ 5

⁴ The estimate is based on 120 households

⁵ The mother had someone to trust, to count on for help, had someone with whom she feels intimacy, or had family and friends that make her happy and secure.

⁶ Number of persons living at home/room (excluding bathroom and kitchen)

Table 2: Frequency of material and food deprivation in the Gaza Strip, 2007 three months prior the survey (N=350)

| | % |
|--|----|
| No meat/chicken/fish most days of week | 56 |
| No fruits and vegetables most days of week | 61 |
| Insufficient food most days of the week | 42 |
| On food assistance | 51 |
| Shortage of money for living expenses | 12 |
| No money to pay bills | 18 |
| Mother thought her child was deprived | 16 |

Table 3: Mean differences between resilient and vulnerable groups in socioeconomic status (N=350)

| | Resilient (N=130) | Vulnerable (N=52) | p-value |
|---|----------------------|----------------------|--------------------|
| Maternal factors | | | |
| Elementary Schooling only | 8.5% | 17.3% | 0.086 ¹ |
| Employed | 4.6% | 5.8% | 0.750 ¹ |
| Household factors | | | |
| Living in a direct military confrontation area | 26.1% | 23.1% | 0.668 ¹ |
| On food assistance | 50.0% | 52.0% | 0.783 ¹ |
| Family did not have enough food for at least 2 days in the past month | 40.0% | 40.4% | 0.962 ¹ |
| Deprivation score ³ (mean [SD]) | 1.3 [1.2] | 1.6 [1.4] | 0.165 ² |
| Average household income in US dollars ⁴ (mean [SD]) | 205 [134] | 197 [200] | 0.89 ² |
| Family size (mean [SD]) | 7.9 [3.9] | 9.1 [4.4] | 0.083 ² |
| Number of rooms (mean [SD]) | 3.1 [1.3] | 3.1 [1.1] | 0.889 ² |

1:Based in Anova test

2: Based on student's t-test

3: A rating was constructed as the number of affirmative responses to the following dichotomous items: family did not have enough money for living expenses, did not have money to pay the bills, and the mother felt that her child was deprived

4: Only 31% and 29% of families of vulnerable and resilient children reported income

Table 4: Factors associated with resilience and vulnerability¹, Gaza, 2007

| Variable | Resilience | | Vulnerability | |
|--|-----------------|---------------------|---------------|------------|
| | OR ² | 95% CI ³ | OR | 95% CI |
| Age (month) | 0.95 | 0.92, 0.98 | | |
| Normal birth weight | 5.85 | 1.64, 20.94 | | |
| Mother helped feeding the child when he was younger than 2 years | 3.23 | 1.32, 7.69 | | |
| Residential stability in past 2 years | 1.98 | 1.04, 3.77 | | |
| Total score on GHQ-28 | | | 1.07 | 1.01, 1.13 |

¹: Based on Binary logistic regression, with the moderate nutritional status as a referent group, and $P < 0.05$.

²: Odds ratio;

³: Confidence interval of the Odds ratio

References

1. Palestinian Central Bureau of Statistics. **On the Eve of the International population Day-Press Release**
[http://www.pcbs.gov.ps/Portals/_pcbs/PressRelease/PeopleDay_2010E.pdf]
2. Palestinian Central Bureau of Statistics: **Child Health in the Palestinian Territory**. Ramallah; 2002.
3. Palestinian Central Bureau of Statistics: **Demographic and Health Survey 2004**. In *Press Release*. Ramallah; 2004.
4. Zeitlin M: **Nutritional resilience in a hostile environment: positive deviance in child nutrition**. *Nutr Rev* 1991, **49**(9):259-268.
5. Davis Pea: **Water, KoKo and Appetite- Complementary Feeding Practices in Kumasi, Ghana**. . USAID; 2003.
6. Pryer JA, Rogers S, Rahman A: **The epidemiology of good nutritional status among children from a population with a high prevalence of malnutrition**. *Public Health Nutr* 2004, **7**(2):311-317.
7. Mongkolchati A TB, Mo-Suwan L, Chittchang U, Choprapawon C **Prevalence and incidence of child stunting from birth to two years of life in Thai children: based on Prospective Cohort Study of Thai Children (PCTC)**. *J Med Assoc* 2010, **93**(12):1368-78).
8. Zottarelli LK ST, Rajaram S **Influence of parental and socioeconomic factors on stunting in children under 5 in Egypt**. *East Mediterr Health J* 2007, **13**(6):1330-1342.
9. Biswas S BK: **Sex differences in the effect of birth order and parents' educational status on stunting: a study on Bengalee preschool children from eastern India**. *Homo* 2010, **61**(4):271-276.
10. Pramod Singh GC NM, Grubestic RB, Connell FA: **Factors associated with underweight and stunting among children in rural Terai of eastern Nepal**. *Asia Pac J Public Health* 2009, **21**(2):144-152.
11. de Novaes Oliveira M MR, Nguyen P: **Risk factors associated with hemoglobin levels and nutritional status among Brazilian children attending daycare centers in Sao Paulo City, Brazil**. *Arch Latinoam Nutr* 2010, **60**(1):23-29.
12. Yang XL YR, Zheng JC, Jin L, Liu JM, Ren AG: **Analysis of influencing factors for stunting and underweight among children aged 3-6 years in 15 countries of Jiangsu and Zhejiang provinces**. *Zhonghua Liu Xing Bing Xue Za Zhi* 2010, **31**(5):506-509.
13. Crookston BT, Dearden KA, Alder SC, Porucznik CA, Stanford JB, Merrill RM, Dickerson TT, Penny ME: **Impact of early and concurrent stunting on cognition**. *Maternal & Child Nutrition*:no-no.
14. Ryff C, Singer, BH: **Flourishing under fire: Resilience as a prototype of Challenged thriving**. In *Flourishing: Positive Psychology and the Life Well-lived*. Edited by Keyes CLM HJ. Washington,: American Psychological Association; 2003:15-36.
15. Engle PL, Castle S, Menon P: **Child development: vulnerability and resilience**. *Soc Sci Med* 1996, **43**(5):621-635.
16. Townsend P: **Deprivation**. *SocPol* 1987, **16**(2):125-146.
17. Arimond M: **Assessing Care: Progress Towards the measurement of Selected Childcare and Feeding Practices, and Implications for Programs**. In *Food And Nutrition Technical Assistance*. USAID; 2002.

18. McGauhey PJ, Starfield B, Alexander C, Ensminger ME: **Social environment and vulnerability of low birth weight children: a social-epidemiological perspective.** *Pediatrics* 1991, **88**(5):943-953.
19. Wamani H, Astrom AN, Peterson S, Tumwine JK, Tylleskar T: **Predictors of poor anthropometric status among children under 2 years of age in rural Uganda.** *Public Health Nutr* 2006, **9**(3):320-326.
20. Toyama N, Wakai S, Nakamura Y, Arifin A: **Mother's working status and nutritional status of children under the age of 5 in urban low-income community, Surabaya, Indonesia.** *J Trop Pediatr* 2001, **47**(3):179-181.
21. Sternin Mea: **Designing a Community-Based Nutrition Program Using the Hearth Model and the Positive Deviance Approach- A field Guide.** Save the children;1998.
22. Simondon KB, Simondon F, Costes R, Delaunay V, Diallo A: **Breast-feeding is associated with improved growth in length, but not weight, in rural Senegalese toddlers.** *Am J Clin Nutr* 2001, **73**(5):959-967.
23. Agueh VD, Makoutode M, Diallo P, Soton A, Ouendo EM: **[Infant malnutrition and associated maternal factors in a secondary city south of Benin, Ouidah].** *Rev Epidemiol Sante Publique* 1999, **47**(3):219-228.
24. Bloss E, Wainaina F, Bailey RC: **Prevalence and predictors of underweight, stunting, and wasting among children aged 5 and under in western Kenya.** *J Trop Pediatr* 2004, **50**(5):260-270.
25. Biondi D, Kipp W, Jhangri GS, Alibhai A, Rubaale T, Saunders LD: **Risk Factors and Trends in Childhood Stunting in a District in Western Uganda.** *Journal of Tropical Pediatrics*, **57**(1):24-33.
26. Engle P: **Maternal mental health: program and policy implications.** *Am J Clin Nutr* 2009, **89**(3):963S-966S.
27. Meshram II AN, Balakrishna N, Laxmaiah A, Mallikarjun Rao K, Gal Reddy C, Ravindranath M, Sharad Kumar S, Brahmam GN.: **Prevalence and Determinants of Undernutrition and its Trends among Pre-School Tribal Children of Maharashtra State, India.** *J Trop Pediatr* 2011 May 4. [Epub ahead of print].
28. WHO/OMS: **Child Malnutrition.** 1998.
29. Shah SM, Selwyn BJ, Luby S, Merchant A, Bano R: **Prevalence and correlates of stunting among children in rural Pakistan.** *Pediatr Int* 2003, **45**(1):49-53.
30. Villalpando S, Lopez-Alarcon M: **Growth faltering is prevented by breast-feeding in underprivileged infants from Mexico City.** *J Nutr* 2000, **130**(3):546-552.
31. Mendez MA, Adair LS: **Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood.** *J Nutr* 1999, **129**(8):1555-1562.
32. UNICEF: **UNICEF oPT Consolidated Report.** 2004.
33. Olaniyan O: **The Effects of Household Resources and Community Factors on Child Health: Evidence from Nigeria.** In *CSAE Conferance.* St. Catherine's College,Oxford; 2002.
34. Lutter CK, Mora JO, Habicht JP, Rasmussen KM, Robson DS, Sellers SG, Super CM, Herrera MG: **Nutritional supplementation: effects on child stunting because of diarrhea.** *Am J Clin Nutr* 1989, **50**(1):1-8.
35. Kikafunda JK, Walker AF, Collett D, Tumwine JK: **Risk factors for early childhood malnutrition in Uganda.** *Pediatrics* 1998, **102**(4):E45.

36. Palestinian Central Bureau of Statistics: **Palestinian Family Health Survey, 2006-Preliminary Report**. Ramallah; 2007:1-60.
37. Massad S, Nieto FJ, Palta M, Smith M, Clark R, Thabet A: **Mental Health of Palestinian Children in Kindergartens: Resilience and Vulnerability**. *Child and Adolescent Mental Health* 2009, **14**(2):89-96.
38. Thabet A, Karim K, Vostanis P, P V: **Trauma exposure in pre-school children in a war zone**. *Br J Psychiatry* 2006 **188**:154-158.
39. Palestinian Central Bureau of Statistics: **Nutrition Survey-2002 User's Guide**. Ramallah; 2002:1-16.
40. Palestinian Central Bureau of Statistics: **Health Survey-2000 Users Guide**. Ramallah; 2000:1-14.
41. WHO: **Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee**. *World Health Organ Tech Rep Ser* 1995, **854**:1-452.
42. **WHO ANTHRO 2005** [<http://www.who.int/childgrowth/software/en/>]
43. **NutriSurvey for Windows** [<http://www.nutrisurvey.de/vac/vac.htm>]
44. Zeitlin M: **Nutritional Resilience in a Hostile Environment: Positive Deviance in Child Nutrition**. *Nutrition Reviews* 1991, **49**(9):259-268.
45. Bryce J, Coitinho D, Darnton-Hill I, Pelletier D, Pinstrup-Andersen P: **Maternal and child undernutrition: effective action at national level**. *The Lancet* 2008, **371**(9611):510-526.
46. Wuehler SE, Hess SY, Brown KH: **Accelerating improvements in nutritional and health status of young children in the Sahel region of Sub-Saharan Africa: review of international guidelines on infant and young child feeding and nutrition**. *Maternal & Child Nutrition*, **7**:6-34.
47. Cutrona C, Russell, D.W.: **The provision of social relationships and adaptation to stress**. *Advances in Personal Relationships* 1987, **1**:37-67.
48. Crooks C: **Predicting positive outcomes in Junior Kindergarten Children at Risk for Behavior Problems: Gender differences in the pathways to resilience**. Queen's University, Arts; 1997.
49. Dowell IM: *Measuring Health: A Guide to Rating Scales & Questionnaires*. 3 rd edition. New York: Oxford University Press; 2006.
50. Kent GN, Stuckey BG, Allen JR, Lambert T, Gee V: **Postpartum thyroid dysfunction: clinical assessment and relationship to psychiatric affective morbidity**. *Clin Endocrinol (Oxf)* 1999, **51**(4):429-438.
51. Zeitlin M: *Positive deviance in child nutrition-With emphasis on psychosocial and behavioral aspects and implications for development*: Tokyo: United Nations University; 1990.
52. **Linguistic validation of PedsQL™ - a Quality of Life Questionnaire** [www.pedsq.org/PedsQL-Linguistic-Validation-Guidelines.doc]
53. Cederstrom T: **Addressing the Immediate Causes of Malnutrition: The positive Deviance Approach to Household Food Security**. *Nutritional Anthropology* 1999, **22**(2):10-14.
54. Palestinian Central Bureau of Statistics: **Palestinian Human Development Report 2004**. 2004.
55. Save the Children: **Growing up under Curfew- Safeguarding the basic rights of Palestinian children**. Sweden; 2003:1-35.

56. Adair LS, Guilkey DK: **Age-specific determinants of stunting in Filipino children.** *J Nutr* 1997, **127**(2):314-320.
57. Lu B, Zhai F, Jin S, Popkin BM: **[The impact of maternal education on the dietary and nutritional status of preschool children--a case study in 8 provinces of China].** *Wei Sheng Yan Jiu* 1998, **27**(5):328-331.
58. Ismail A, Campbell MJ, Ibrahim HM, Jones GL: **Health related quality of life in Malaysian children with thalassaemia.** *Health Qual Life Outcomes* 2006, **4**(1):39.
59. Dybdahl R: **Children and mothers in war: an outcome study of a psychosocial intervention program.** *Child Dev* 2001, **72**(4):1214-1230.
60. Anoop S, Saravanan B, Joseph A, Cherian A, Jacob KS: **Maternal depression and low maternal intelligence as risk factors for malnutrition in children: a community based case-control study from South India.** *Arch Dis Child* 2004, **89**(4):325-329.
61. Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R: **Impact of maternal depression on infant nutritional status and illness: a cohort study.** *Arch Gen Psychiatry* 2004, **61**(9):946-952.
62. Carvalhaes MA, Benicio MH: **[Mother's ability of childcare and children malnutrition].** *Rev Saude Publica* 2002, **36**(2):188-197.
63. Richter LM: **Poverty, underdevelopment and infant mental health.** *J Paediatr Child Health* 2003, **39**(4):243-248.
64. Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, Carter JA: **Child development: risk factors for adverse outcomes in developing countries.** *Lancet* 2007, **369**(9556):145-157.
65. Hop LT, Gross R, Giay T, Sastroamidjojo S, Schultink W, Lang NT: **Premature complementary feeding is associated with poorer growth of Vietnamese children.** *J Nutr* 2000, **130**(11):2683-2690.
66. Maureen M Black AHB, K Zaman, Shams El Arifeen and Robert E Black: **Maternal depressive symptoms and infant growth in rural Bangladesh.** *American Society for Clinical Nutrition* 2009, **89** (3):951S-957S.
67. Mamiro PS, Kolsteren P, Roberfroid D, Tatala S, Opsomer AS, Van Camp JH: **Feeding practices and factors contributing to wasting, stunting, and iron-deficiency anaemia among 3-23-month old children in Kilosa district, rural Tanzania.** *J Health Popul Nutr* 2005, **23**(3):222-230.
68. Batsell WR, Jr., Brown AS, Ansfield ME, Paschall GY: **"You will eat all of that!": a retrospective analysis of forced consumption episodes.** *Appetite* 2002, **38**(3):211-219.
69. Horning L: **Resilience in Preschoolers and Toddlers from Low-Income Families.** *Early Childhood Education Journal* 2002, **29**(3):155-159.
70. Aruna M, Vazir S, Vidyasagar P: **Child rearing and positive deviance in the development of preschoolers: a microanalysis.** *Indian Pediatr* 2001, **38**(4):332-339.
71. Begin F, Frongillo EA, Jr., Delisle H: **Caregiver behaviors and resources influence child height-for-age in rural Chad.** *J Nutr* 1999, **129**(3):680-686.
72. Amine EK, Fawzia A. Al-Awadi: **Nutritional status survey of preschool children in Kuwait.** *Eastern Mediterranean Health Journal* 1996, **2**(3):386-395.
73. Islam MA, Rahman MM, Mahalanabis D: **Maternal and socioeconomic factors and the risk of severe malnutrition in a child: a case-control study.** *Eur J Clin Nutr* 1994, **48**(6):416-424.

74. Schoenbaum M, Tulchinsky TH, Abed Y: **Gender differences in nutritional status and feeding patterns among infants in the Gaza Strip.** *Am J Public Health* 1995, **85**(7):965-969.
75. Lopriore C GY, Briend A, Branca F: **Spread fortified with vitamins and minerals induces catch-up growth and eradicates severe anemia in stunted refugee children aged 3–6 y.** *Am J Clin Nutr* 2004, **80**:973– 981.
76. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J: **Maternal and child undernutrition: global and regional exposures and health consequences.** *Lancet* 2008.