ORIGINAL ARTICLE

# NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG CHILDREN LESS THAN FIVE YEARS OF AGE IN TEHSIL ZARGHOON TOWN, DISTRICT QUETTA, BALUCHISTAN

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**Background:** Globally, more than one-third of mortalities in children under five years of age are attributable to malnutrition. The prevalence of malnourished children in Pakistan is inclining. A knowledge gap exists due to availability of limited literature about the nutritional status of children in rural Baluchistan. Therefore, this study assessed the magnitude and factors associated with nutritional status of children of less than five years of age in Tehsil Zarghoon Town of District Quetta. **Methods:** A community based cross-sectional study was conducted in two rural union councils of Tehsil Zarghoon Town of District Quetta, selected randomly. An existing questionnaire was modified and three research assistants were hired to collect data from 104 children, selected systematically. Data analysis was done using SPSS-20 and World Health Organization (WHO) Anthro software. **Results:** Results showed that the proportion of stunting and wasting in children comprising the study population was 48.1% and 9.7% respectively. A significant association was demonstrated between stunting and wasting and socio-demographic characteristics, child health characteristics and maternal health characteristics. **Conclusion:** It was concluded that the nutritional status of children under five years of age in Tehsil Zarghoon Town of district Quetta was unsatisfactory. Thus, community mobilization and incorporation of nutrition related activities in primary health care are recommended.

**Keywords:** Children, Stunting, Wasting, Baluchistan, Pakistan, Nutritional status

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## INTRODUCTION

Malnutrition is defined as the dearth of sufficient nutrition resulting from deficient food, unbalanced nourishment through diet or incomplete absorption of nutrients.[1] Malnutrition is clinically described by insufficient availability of various macronutrients and micronutrients in the diet which is followed by incessant infections.[2] Almost half of all mortalities taking place in children less than five years of age are ascribable to under-nutrition.[3] Malnutrition is considered as the major solitary causative factor of diseases in the world.[4]

It has been estimated that nearly 805 million persons of the 7.3 billion persons in the world, or one in nine were afflicted by chronic undernutrition in 2012–2014.[5] It was estimated in 2013 that globally 161 million children less than five years of age were stunted. Nearly half of all children who were stunted resided in Asia and more than one third of them resided in Africa.[6] In 2013 worldwide, 51 million (8%) children less than 5 years of age were wasted and 17 million (3%) were severely wasted. About two thirds of all wasted children lived in Asia and nearly one third of them were residents of Africa.[6]

The National Nutrition Survey (NNS) conducted in Pakistan in 2011 demonstrated that the proportion of stunted and wasted children less than five years of age was 43.7% and 15.1% respectively.[7] The proportion of stunting among male and female children was 43.8% and 42% respectively.[8]

Studies conducted in America, Brazil, China, Iran, Bangladesh, Ethiopia and Pakistan have assessed the nutritional status of under five children and related factors. Undernutrition was established as the causative factor of child mortalities related with diarrhoea, malaria, measles and pneumonia.[9] Social disparities among children below five years of age were not correlated to malnutrition.[10] There was a greater likelihood of undernutrition in boys as compared to girls.[11] Lower income of family, lower maternal literacy, dwelling in urban areas and shortage of water supply were distinguished as substantial predisposing factors of stunting and wasting in childhood.[12] It was demonstrated that the literacy rate of fathers was greater than that of mothers and displayed significant relation with stunting and wasting.[13] Likewise, occurrence of diarrhoea in the last two weeks and not availing methods of family planning, were correlated to wasting.[14] Among the causative factors of stunting, ethnicity and time period of less than two years between births, revealed a significant correlation.[15] Stunting and wasting were identified to have a significant correlation with dwelling in rural area, low socioeconomic status, lower education of parents, greater number of siblings and crowded houses.[16]

The prevalence of stunting, wasting and severe wasting in children less than five years of age is 52.2%, 16% and 7% respectively in Baluchistan, which is the highest as compared to other provinces.[7] There are two tehsils namely Chilton Town and Zarghoon Town and 67 union councils in District Quetta.[17] A reference population was used to compare our data.[18] There is availability of limited information and literature about the nutritional status of residents of rural areas of District Quetta. Majority of studies conducted in Baluchistan are focused only on prevalence of malnutrition in urban dwellers. Therefore there is a knowledge gap regarding the extent and correlation of demographic, social and economic factors to malnutrition in District Quetta. Hence, this study was aimed at bridging this afore mentioned gap. Children of all ages are predisposed to malnutrition but its prevalence is greatest among children less than five years of age, particularly in the period when weaning diet is started and afterwards.[2]

This study will help to assign priority to programmes and initiatives at district level. It will also have significant implications related to policy making and implementation for the government, in order to improve the nutritional status of children in the surveyed areas.

The aim of this study was to improve the nutritional status of children less than five years of age in Tehsil Zarghoon Town of District Quetta. The objectives of this study were to assess the nutritional status of children less than five years of age and to explore the factors associated with malnutrition in children less than five years of age in Tehsil Zarghoon Town.

## MATERIAL AND METHODS

It was a community based, observational cross-sectional study conducted in two rural union councils of Tehsil Zarghoon Town, District Quetta and was completed in three months. Tehsil Zarghoon Town consists of 37 union councils out of which 4 are rural union councils.19 The study population consisted of all children less than five years of age residing in rural union councils of Tehsil Zarghoon Town of District Quetta. All children up to 59 months of age, with their mothers available to give verbal consent for data collection, residing in rural areas of Tehsil Zarghoon Town, were included in the study. Critically ill children, those suffering from congenital anomalies were excluded from the study.

Two-stage random sampling technique was used. During the first stage of sampling, two rural union councils namely Kotwal and Hanna, out of four rural union councils were selected randomly. In the second stage, among the two rural union councils, 104 children less than five years of age were selected systematically, by using the list of children maintained by lady health workers of the union council. The sample size was calculated using the formula for estimation of a single proportion and the following assumptions were made: 43.1% of children beneath five years of age are stunted (P)7, with 95% confidence interval (CI), 10% margin of error (d) and Z value of 1.96. The calculated sample size was 94. Allowance of 10% was added for non-responses and the total sample size was computed to be equal to 104.

An existing tool titled “Child nutritional status and determinants at household level in Blue Hora Woreda of Borena Zone, South Ethiopia” was modified.14 The questionnaire was translated into Urdu and Pushto languages for convenience of study participants. Pre-testing of the questionnaire was done at a Basic Health Unit located in a rural union council other than the union councils selected for the survey. The tool was edited accordingly.

Three female university students were hired as research assistants. They were trained to introduce the questionnaire to mothers of children and take anthropometric measurements. The recumbent length was measured for children beneath two years of age and standing height was measured for children above two years of age by using a wooden board and measuring tape. Salter’s spring weighing scale and standing weighing scale were used to measure the weights of infants and toddlers. The translated versions of questionnaires were filled under the principal researcher’s supervision.

Data analysis was done using SPSS 20 version and WHO Anthro software. Descriptive statistics such as frequencies and percentages were calculated for categorical variables. Means and standard deviations were calculated for continuous variables. Malnutrition was assessed as undernutrition only. Z score cut-off point of less than -2 standard deviation (-2SD) was used to classify malnutrition on the basis of standard anthropometric indicators, that is height for age and weight for height. Children whose height for age Z score was below -2 but above -3 standard deviation from the median of that reference population were considered as moderately stunted. Children whose height for age Z score was below -3 standard deviation from the median of that reference population were classified as severely stunted.18 Children whose weight for height Z score was below -2 but above -3 standard deviation from the median of that reference population were classified as moderately wasted. Children whose

weight for height Z score was below -3 standard deviation from the median of that reference population were considered as severely wasted.[18] Chi-square test was used to measure the association of malnutrition with study variables.

Proposal was approved by the Internal Review Board of Health Services Academy. Verbal consent was obtained from all care givers, after being informed about the nature and purpose of the study. Confidentiality of data was ensured at all levels. No risk or benefit was involved in this study and monetary compensation was not provided.

## RESULTS

The percentage of male and female children in the study population was 51.9% and 49.1% respectively. The socio-demographic characteristics of the study population have been delineated in table-1. The results revealed that a major proportion of the study population, 70 (67.3%) had total family size greater than five. A greater proportion of the study population, 48 (46.2%) had two children less than five years of age living in the household. Most of the fathers worked as daily labourers, 32 (30.8%). A greater proportion of families did not own livestock, 55 (52.9%). The minimum and maximum monthly incomes of families were Rupees 8000 and Rupees 50000 respectively, with mean of 13668±6609.

Characteristics of children constituting the study population have been depicted in table-2. The minimum and maximum ages of children comprising the study population were 2 months and 59 months respectively, expressing a mean age of 17.74±11.81 months. The number of male children in the study population was 54, representing a greater proportion of 51.9% as compared to female children. The frequency of children delivered at health care facility was 77 (74%). The proportion of immunized children was greater than non-immunized children, 76 (73.1%). The number of fully vaccinated children was also greater, 58 (55.8%).

Characteristics of maternal health have been depicted in table-3.The results revealed that the one third of mothers was between 33–34 years of age. The occurrence of mothers who were between 20–24 years of age at marriage was 61 (58.7%). The frequency of women with less than four children ever born to them was 64 (61.5%). Antenatal care at a health care facility was used by 99 mothers, (95.2%), whereas 40 mothers (38.5%) started antenatal care during 1st to 3rd months of pregnancy.

The occurrence of mothers who practiced abstinence as a method of family planning was 56 (53.8%). The results displayed that the frequency of children with normal height or length for age was 54 (51.9%). The frequency of moderately stunted and severely stunted children was 11 (10.6%) and 39 (37.5%) respectively. The results disclosed that the frequency of normal weight for height or length in children was 94 (90.4%). The frequency of moderately wasted and severely wasted children was 1 (1%) and 9 (8.7%) respectively. The results displayed in table-4, 5, 6, and 7 show association of dependent variables with independent variables.

**Table-1: Socio-demographic characteristics**

| Variable | Frequency | Percentage |
|---|---|---|
| **Mother's education** | | |
| 1.Illieterate | 80 | 76.9% |
| 2.Primary (1–5 years) | 16 | 15.4% |
| 3.Secondary (6–10 years) | 3 | 2.9 |
| 4.Above matric (>10 years) | 5 | 4.9% |
| **Father's education** | | |
| 1.Illieterate | 52 | 50% |
| 2.Primary (1–5 years) | 15 | 14.4% |
| 3.Secondary (6–10 years) | 8 | 7.7% |
| 4.Above matric (>10 years) | 25 | 27.9% |
| **Source of drinking water** | | |
| 1.Tap water | 15 | 14.4% |
| 2.Well water/boring | 23 | 22.1% |
| 3.Canal or pond | 66 | 63.5% |
| **Amount of water used in household per day ( in litters)** | | |
| 1. <20 litters | 57 | 54.8% |
| 2. 20–40 litters | 33 | 31.7% |
| 3. >40 litters | 14 | 13.5% |
| **Availability of latrine in household** | | |
| 1.Yes | 32 | 30.8% |
| 2.No | 72 | 69.2% |
| **Type of latrine in household** | | |
| 1.Flush latrine | 15 | 14.4% |
| 2.Piped sewer system | 5 | 4.8% |
| 3.Septic tank | 9 | 8.7% |
| 4.Field | 59 | 56.7% |
| 5.Pit | 13 | 15.4% |
| **Type of housing** | | |
| 1.Mud house | 88 | 84.6% |
| 2.Brick house | 11 | 10.6% |
| 3.Cemented house | 5 | 4.8% |

**Table-2: Child characteristics**

| Variable | Frequency | Percentage |
|---|---|---|
| **Occurrence of diarrhoea in last two weeks** | | |
| 1.Yes | 90 | 85.6% |
| 2.No | 14 | 13.5% |
| **Occurrence of diarrhoea in last three months** | | |
| 1.Yes | 98 | 94.2% |
| 2.No | 6 | 5.8% |
| **Number of diarrheal episodes in last three months** | | |
| 1. Once | 14 | 13.5% |
| 2. Twice | 53 | 51.0% |
| 3. 3-4 times | 29 | 27.9% |
| 4. >5 times | 3 | 2.9% |
| 5. Not applicable | 5 | 4.8% |
| **Occurrence of fever in last two months** | | |
| 1.Yes | 98 | 94.2% |
| 2.No | 6 | 5.8% |
| **Occurrence of measles in last one year** | | |
| 1.Yes | 52 | 50.0% |
| 2.No | 52 | 50.0% |

**Table-3: Maternal health characteristics**

| Variable | Frequency | Percentage |
|---|---|---|
| **Birth interval between children** | | |
| 1. <24 months | 80 | 76.9% |
| 2. ≥24 months | 24 | 23.1% |
| **Number of antenatal care visits during pregnancy** | | |
| 1. <3 times | 63 | 60.6% |
| 2. ≥3 times | 38 | 36.5% |
| 3. Not applicable | 3 | 2.9% |
| **Mother's knowledge of family planning** | | |
| 1.Yes | 48 | 46.2% |
| 2.No | 56 | 53.8% |
| **Mother ever used family planning methods** | | |
| 1.Yes | 38 | 36.5% |
| 2.No | 66 | 63.5% |
| **Number of meals in pregnancy in one day** | | |
| 1. <2 meals | 63 | 0.6% |
| 2. 2 meals | 29 | 27.9% |
| 3. >2 meals | 12 | 11.5% |

**Table-4: Association of stunting with socio-demographic characteristics**

| Variable | Normal | Stunted | Chi-Square | *p*-Value |
|---|---|---|---|---|
| **Total Family Size** | | | | |
| 1.2–5 | 34, 100% | 0, 0.0% | 46.772 | 0.000* |
| 2.>5 | 20, 28.6% | 50, 71.4% | | |
| **Children under 5 years of age living in household** | | | | |
| 1.<2 | 54, 54.5% | 45, 45.5% | 5.673 | 0.017* |
| 2.≥2 | 0, 0.0% | 5, 100.0% | | |
| **Mother's Education** | | | | |
| 1.Illiterate | 30, 37.5% | 50, 62.5% | 28.889 | 0.000* |
| 2.Literate | 24, 100.0% | 0, 0.0% | | |
| **Father's Education** | | | | |
| 1.Illiterate | 14, 26.9% | 38, 73.1% | 26.039 | 0.000* |
| 2.Literate | 40, 76.9% | 12, 23.1% | | |
| **Source of drinking water** | | | | |
| 1.Tap water | 15, 100.0 5 | 0, 0.0% | 16.230 | 0.000* |
| 2.Canal/Pond | 39 , 43.8% | 50, 56.2% | | |
| **Amount of water used in household per day (litters)** | | | | |
| 1. < 20 litters | 9,15.8% | 48, 84.2% | 65.968 | 0.000* |
| 2. ≥ 20 litters | 45, 95.7% | 2, 4.3% | | |
| **Availability of latrine in household** | | | | |
| 1. Yes | 32, 100.0% | 0, 0.0% | 42.798 | 0.000* |
| 2. No | 22, 30.6% | 50, 69.4% | | |
| **Type of latrine in household** | | | | |
| 1.Flush latrine | 15, 100.0% | 0, 0.0% | 16.230 | 0.000* |
| 2.Other(field/pit) | 39, 43.8% | 50, 56.2% | | |

**Table-5: Association of stunting with child characteristics**

| Variable | Normal % | Stunted % | Chi-Square | *p* |
|---|---|---|---|---|
| **Place of delivery** | | | | |
| 1. Home | 7,25.9 | 20,74.1 | 9.873 | 0.002* |
| 2. Health care facility | 47,61.0 | 30,39.0 | | |
| **Child Ever been immunized** | | | | |
| 1. Yes | 49,64.5 | 27,35.5 | 17.812 | 0.000* |
| 2.No | 5,17.9 | 23,81.2 | | |
| **Occurrence of diarrhoea in last 2 weeks** | | | | |
| 1.Yes | 41,45.6 | 49,54.4 | 10.859 | 0.001* |
| 2.No | 13,92.9 | 1,7.1 | | |
| **Occurrence of measles in last 1 year** | | | | |
| 1.Yes | 9,17.3 | 43,82.7 | 50.056 | 0.000* |
| 2.No | 45,86.5 | 7,13.5 | | |

**Table-6: Association of stunting with maternal health characteristics:**

| Variable | Normal | Stunted | Chi-Square | *p* |
|---|---|---|---|---|
| **Birth interval** | | | | |
| 1.≤24 months | 30, 37.5% | 50, 62.5% | 28.889 | 0.000* |
| 2.>24 months | 24, 100.0% | 0, 0.0% | | |
| **Antenatal care visits during pregnancy** | | | | |
| 1. <3 times | 17, 25.8% | 49, 74.2% | 50.494 | 0.000* |
| 2. ≥3 times | 37, 97.4% | 1, 2.6% | | |
| **Mother's knowledge of family Planning** | | | | |
| 1.Yes | 48, 46.1% | 0, 0.0% | 82.540 | 0.000* |
| 2.No | 6, 5.76 % | 50, 48.07% | | |
| **Mother ever used family planning methods** | | | | |
| 1.Yes | 33, 86.8% | 5, 13.2% | 29.248 | 0.000* |
| 2.No | 21, 31.8% | 45, 68.2% | | |
| **Method of family planning** | | | | |
| 1.Contraceptive pills | 31, 96.9% | 1, 3.1% | 37.4 | 0.000* |
| 2.Abstinence | 23, 31.9% | 49, 68.1% | | |
| **Meals taken during pregnancy per day** | | | | |
| 1. <2 meals per day | 13, 20.6% | 50, 79.4% | 62.6 | 0.000* |
| 2. ≥2 meals per day | 41, 100.0% | 0, 0.0% | | |

**Table-7: Association of wasting with socio-demographic characteristics**

| Variable | Normal | Wasting | Chi-Square | *p* |
|---|---|---|---|---|
| **Total Family Size** | | | | |
| 1.2-5 | 34, 100.0% | 0, 0.0% | 5.374 | 0.020* |
| 2.>5 | 60, 85.7% | 0, 14.3% | | |
| **Children under 5 years of age living in household** | | | | |
| 1. ≤2 | 93, 93.9% | 6, 6.1% | 29.941 | 0.000* |
| 2. >2 | 1, 20.0% | 4, 80.0% | | |
| **Father's Education** | | | | |
| 1.Illiterate | 42, 80.8% | 10, 19.2% | 11.064 | 0.001* |
| 2.Literate | 52, 100.0% | 0, 0.0% | | |
| **Mother's Education** | | | | |
| 1.Illiterate | 70, 87.5% | 10, 12.5% | 3.319 | 0.068* |
| 2.Literate | 24, 100.0% | 0, 0.0% | | |
| **Amount of water used in household per day** | | | | |
| 1. <20 litters | 47, 82.5% | 10, 17.5% | 9.123 | 0.003* |
| 2. ≥20 litters | 47, 100.0 | 0, 0.0 | | |
| **Availability of latrine in household** | | | | |
| 1. Yes | 32, 100.0% | 0, 0.0% | 4.917 | 0.027* |
| 2. No | 62, 86.1% | 10, 13.9% | | |

**Table-8: Association of wasting with child characteristics**

| Variable | Normal % | Wasting % | Chi-Square | *p* |
|---|---|---|---|---|
| **Child Ever been immunized** | | | 6.152 | 0.013* |
| 1. Yes | 72, 94.7% | 4, 5.3% | | |
| 2.No | 22, 76.8% | 6,21.4 % | | |
| **Occurrence of diarrhoea in last 2 weeks** | | | 1.721 | 0.190 |
| 1.Yes | 80, 88.9% | 10,11.1% | | |
| 2.No | 14, 100.0 | 0,0.0% | | |

**Table-9: Association of wasting with maternal health characteristics**

| Variable | Normal % | Wasted % | Chi-Square | *p* |
|---|---|---|---|---|
| **Use of antenatal care at health care facility** | | | 5.580 | 0.018* |
| 1. Yes | 91, 91.9 | 8,8.1 | | |
| 2.No | 3,60.0 | 2,40.0 | | |
| **Mother's knowledge of family Planning** | | | 9.483 | 0.002* |
| 1.Yes | 48,100.0 | 0,0.0 | | |
| 2.No | 46,82.1 | 10,17.9 | | |
| **Mother ever used family planning methods** | | | 6.370 | 0.012* |
| 1.Yes | 38,100.0 | 0, 0.0 | | |
| 2.No | 56,84.4 | 10,15.2 | | |
| **Number of meals taken during pregnancy per day** | | | 7.200 | 0.007* |
| 1. <2 meals per day | 53.84.1 | 10,15.9 | | |
| 2. ≥2 meals per day | 41,100.0 | 0,0.0 | | |

# DISCUSSION

The results displayed that the total proportion of stunted, wasted and severely wasted children in the study population was equivalent to 48.1%, 1% and 8.7% respectively, which is lesser than the proportion of stunted (52.2%), wasted (16%) and severely wasted (7%) children in Baluchistan, according to National Nutritional Survey 2011.[7]

Children whose fathers were illiterate were more likely to be stunted and wasted when compared with children whose fathers were literate. Similarly, children of illiterate mothers had greater chances of being stunted as compared to children of literate mothers. There was no significant relation demonstrated between maternal literacy and wasting. This is comparable to a study of Bangladesh in 2011.[13] Source of drinking water , amount of water consumed in one day and availability of latrine in household revealed a significant association with stunting and wasting. This is consistent with a study conducted in South Ethiopia in 2014.[14]

The occurrence of diarrheal morbidity in the last two weeks, occurrence of measles in the last one year and whether the child was ever immunized or not, were identified as risk factors for stunting and wasting. This is in accordance with a study carried out in America in 2011.[9] This study demonstrated that short birth interval between children predisposes them to stunting. Mother's knowledge of family planning and whether the mother ever used family planning methods were established as causative factors of stunting and wasting. This is in accordance with a study carried out in Pakistan in 2010.[15] It has been revealed through this study that the children of mothers who took less than two meals per day during pregnancy were more likely to be stunted and wasted than those children whose mothers took two or more meals per day. This is comparable to a study conducted in Malaysia in 2014.[20]

This study provides data derived from community, regarding the nutritional status of children less than five years of age in Tehsil Zarghoon Town of District Quetta. The findings of this study can be utilized as baseline data for more studies. Moreover, the results of this study may assist in policy formulation and strategy making. However, this study had some limitations. Since it was a cross-sectional study, therefore cause and effect relationship could not be established. The study was completed in three months and covered the population of one tehsil only, therefore its findings cannot be generalized to any other region. Potential recall bias may be present due to certain questions related to past events. Availability of limited resources was also an obstacle.

# CONCLUSION

The study has clearly revealed that the nutritional status of children less than five years of age was unsatisfactory and the prevalence of stunting and wasted children was high. A significant association was demonstrated between stunting and wasting and socio-demographic, child health and maternal health characteristic. Community mobilization through community participation may be done, in order to identify and demand improved nutrition for children. Integration of nutrition related services as part of mother, newborn and child health services (MNCH), can play a pivotal role in the improvement of nutritional status of children. Incorporation of activities related to nutrition in primary health care network and institutionalization of nutrition as a discipline through creation of appropriate infrastructure may be done. Therefore, both the government and non-government organizations should give priority to such communities in order to improve their nutritional status and health.

# AUTHOR'S CONTRIBUTION

Both the authors contributed equally to conception and design of this study, data acquisition, data analysis and interpretation. In addition, the article was drafted and revised critically through equivalent

involvement of the authors. Final approval of the version to be published was achieved through equal input. Both the authors of this article agree to be accountable for all aspects of the work.

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## REFERENCES

1. Collin's English Dictionary. [Internet]. [cited 2015 Nov 15]. Available from: www.collinsdictionary.com
2. WHO. Children's environmental health. Environmental risks. [Internet]. WHO. [cited 2015 Nov 15]. Available from: http://www.who.int/ceh/risks/en/
3. United Nations International Children's Emergency Fund. (UNICEF) .Nutrition: Current Status and Progress. 2015. [Internet]. [cited 2015 Nov 15]. Available from: http://www.unicef.org/search/search.php?q_en=United+Nation+international+children+emergency+fund+%28UNICEF%29+2015.+Acute+Malnutrition%3A+Classification&go.x=8&go.y=10
4. What is malnutrition? WFP. United Nations World Food Programme - Fighting Hunger Worldwide [Internet]. [cited 2015 Nov 15]. Available from: http://www.wfp.org/hunger/malnutrition-old
5. Food and Agriculture Organization of the United Nations [Internet]. [cited 2015 Nov 15]. Available from: http://www.fao.org/home/en/
6. United Nation International children's Emergency Fund.(UNICEF). Levels and Trends in Child Malnutrition 2014. [Internet]. [cite 2015 Nov 15]. Available from: http://www.unicef.org/media/files/Levels_and_Trends_in_Child_Mortality_2014.pdf
7. Govt. of Pakistan. National Nutritional Survey 2011. [Internet]. [cited 2015 Nov 15]. Available from: http://pakresponse.info/LinkClick.aspx?fileticket=Ao4s-rwdFVI%3D&tabid=117&mid=752
8. de Onis M. The World Health Organization Global Database on Child Growth and Malnutrition: methodology and applications. Int J Epidemiol 2003;32(4):518–26.
9. Thuilliez J. Fever, malaria and primary repetition rates amongst school children in Mali: combining demographic and health surveys (DHS) with spatial malariological measures. Soc Sci Med 2010:71(2).314–23.
10. Correia LL, Silva AC, Campos JS, Andrade FM, Machado MM, Lindsay AC, *et al*. Prevalence and determinants of child undernutrition and stunting in semiarid region of Brazil. Rev Saúde Pública 2014;48(1):19–28.
11. Pei L, Ren L, Yan H. A survey of undernutrition in children under three years of age in rural Western China. BMC Public Health 2014;14:121.
12. Kavosi E, Hassanzadeh Rostami Z, Kavosi Z, Nasihatkon A, Moghadami M, Heidari M. Prevalence and determinants of under-nutrition among children under six: a cross-sectional survey in Fars province, Iran. Int J Health Policy Manag 2014;3(2):71–6.
13. Jesmin A, Yamamoto SS, Malik AA, Haque MA. Prevalence and determinants of chronic malnutrition among preschool children: a cross-sectional study in Dhaka City, Bangladesh. J Health Popul Nutr 2011;29(5):494–9.
14. Asfaw M, Wondaferash M, Taha M, Dube L. Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Blue Hora district, South Ethiopia. BMC Public Health 2015;15:41.
15. Farid-ul-Hasnain S, Sophie R. Prevalence and risk factors for Stunting among children under 5 years: a community based study from Jhangara town, Dadu Sindh. J Pak Med Assoc 2010;60(1):41–4.
16. Mushtaq MU, Gull S, Khurshid U, Shahid MA, Shad MA, Siddiqui AM. Prevalence and socio-demographic correlates of stunting and thinness among Pakistani primary school children. BMC Public Health 2011;11:790.
17. Planning & Development Department Government of Balochistan, UNICEF. District Development Profile, 2011. [Internet]. [cited 2015 Nov 15]. Available from: www.unicef.org/pakistan
18. United Nation international children emergency fund (UNICEF). Acute Malnutrition: Classification. 2015. [Internet]. [cited 2015 Nov 15]. Available from: www.unicef.org
19. United States Aid Agency (USAID). District Health Profile, District Quetta 2009. [Internet] (cited 2015 Nov15). Available from: http://paiman.jsi.com/Resources/Docs/district-health-profile-quetta.pdf
20. Ali Naser I, Jalil R, Wan Muda WM, Wan Nik WS, Mohd Shariff Z, Abdullah MR. Association between household food insecurity and nutritional outcomes among children in Northeastern of Peninsular Malaysia. Nutr Res Pract 2014;8(3):304–11.

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