Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 4 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 4 (2025)

Association between Household Food Insecurity and Nutritional Status Among Preschool Children in Dir Lower Khyber Pakhtunkhwa Pakistan

[1]Hazrat Umar Khan, [2]Duaa Tariq, [3]Eman Shafqat Abbasi, [4]Azka Sadat, [5]Safa Naseem, [6]Abdus Salam, [7]Javeria Maqbool, [8]Maryam Iqbal

Article Details

Key words: Nutritional status, Under-weight, stunting, wasting, household food insecurity, Timergara.

Hazrat Umar Khan
Department of Public Health and Nutrition, University of Haripur
Duaa Tariq
Department of Human Nutrition and Dietetics, Faculty of Food Science and Nutrition, Bahauddin Zakariya University Multan, Pakistan
Eman Shafqat Abbasi
Doctor of Physical Therapy, Margalla Institute of Health Sciences(MIHS), Rawalpindi
Azka Sadat
Department of Public Health and Nutrition, University of Haripur
Safa Naseem
Department of Public Health and Nutrition, University of Haripur
Abdus Salam
MBBS, Multan Medical and Dental College (MMDC), Multan
Javeria Maqbool
Department of Biochemistry, Government College University(GCU), Faisalabad
Maryam Iqbal
Department of Biochemistry, Abdul Wali Khan University (AWKUM), Mardan

ABSTRACT

To examine the effect of household food insecurity on the nutritional status of children and to determine the prevalence of stunted, wasted and under-weight children in the city, Timergara. A cross-sectional study was performed among 286 families from Timergara using simple random sampling. Mothers or caregivers were interviewed by the researcher himself to assess the household food insecurity and anthropometric measurements were administered. World Health Organization (WHO) Anthro Plus survey Analyzer and SPSS were utilized to analyze the data.The prevalence of severely underweight, severely stunted, and severely wasted were 1.7%, 0.7% and 3.5 respectively. Among the samples, 46.2 %, 0.7%, 19.6% and 33.6% were food secure, mildly, moderate & severe food insecure respectively.Household insecurity (Food security, Mild food insecurity, moderate food insecurity & severe food insecurity) and weight for age (Severely underweight, underweight, normal weight) as $\chi 2$ (9) =20.87; p=.002 were significantly associated.All things considered, it's deduced that household food security and availability of food can enhance child's development, maturation, nutriments, and nutritional condition.

INTRODUCTION

Household food insecurity (HFI) happens when people do not have, at all times, physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (WHO 2015). HFI is a global epidemic that can lead to hunger and malnutrition. The FAO estimates that 795 million people are undernourished globally (FAO 2015).HFI is known to be associated with insufficient or inadequate food intake (Adda AA et al,. 2011) and this low intake of healthy foods and micronutrients is associated with worse health status, both in developed and developing countries (Szeto KL et al. 2004)

About 2 billion people in the world experience moderate or severe food insecurity. (FAO, 2019).More than 820 million people in the world are still hungry today, underscoring the immense challenge of achieving the Zero Hunger target by 2030 (FAO, 2019). Household food security is key in achieving healthy child development. Therefore, unless food security among these vulnerable groups is achieved, it will be difficult to attain the Sustainable Development Goals (SDGs) which target to end all forms of malnutrition by 2030 (FAO, 2019).

A key component of food insecurity is lack of access to a sufficient quantity of nutritious food, which is a potential risk factor for malnutrition in children and adults (Gubert et al. (2016). However, evidence on the association between household or individual food insecurity and malnutrition is not conclusive in the existing literature. Establishing a causal effect of food insecurity on nutritional consequences is a challenging task, due to several methodological concerns related to study design, analytical techniques, the diversity of food insecurity and malnutrition indicators used, and above all, the limited availabilityof high quality micro-level data from large scale surveys (Gundersen, C. et al,. 2011).

Malnutrition is a condition that can occur because of eating a type of diet that either gives too less or too many nutrients, as a result it can cause health problems like under-nutrition (underweight, stunting and wasting), obesity, micro-nutrient deficiencies like vitamins and minerals deficiency and some other diet related diseases (Betebo, Ejajo, Alemseged, & Massa, 2017).

Nutrition determines the fitness, health of each person, health of all people, wealthy, rich and poor. On the other side, malnutrition constructs us more vulnerably and leaves us at more risk

of disease and untimely death. This is a destructing problem, specifically for the necessitous and deprived as poverty- stricken is the rudimentary origin of household food uncertainty and insecurity and consequently malnutrition is one of the major health problem that affects children (NNS 2018).Under-nutrition is basically narrated as deficiency of nutrients. Nearly 45% children under 5 years of age deaths are due to under-nutrition. According to WHO Report in 2016 almost 155 million children below the age of five were stunted & 41 million were obese and over-weight (world health organization, 2018).

The determinants of food insecurity is lack of financial resources. Bad house conditions, high number of household members, overcrowded areas, poor sanitation system, unhygienic environment and poor quality of drinking water are main hazards of nutritional status of slum children. Poverty and population growth is increasing day by day as compared to economy. This is the major factor of access to healthy, balanced, and nutritious enough food to meet the person's body needs and this ultimately leads to under-nutrition.

MATERIALS AND METHODS

STUDY DESIGN

It was a community-based research and cross-sectional survey to scrutinize the interconnection between household diet insufficiency/insecurity and nutritional status of 24-59 months of age children. A random sampling procedure was applied to gather the data from 286 households of Timergara city District Dir Lower. Only one child was selected from one household to avoid intra household correlation. To assess the target population's household food insecurity, nutritional status a cross-sectional study methodology was adopted. This research was conducted in city Timergara, district Dir Lower province of Khyber Pakhtunkhwa Pakistan. Timergara city is located on east bank of Panjkora River. According to 2017 census report of Pakistan Timergara's city population is 520985.

SAMPLE SIZE CALCULATION

The sample size of research is based on the National Nutrition Survey 2018 Findings Report. According to NNS household food insecurity prevalence of Khyber Pakhtunkhwa is 70.9%. Therefore 70.9% prevalence is availed in the estimation of sample size using formula with 95% CI (value z=1.96) and margin error of 5% (value 0.05) and it gives the sample size 335.

Sample size is estimated by using this formula:

Prevalence = 70.9% = 0.709

Z = 1.96

d =0.05

z square = 3.8416

1-P = 0.324

d square = 0.0025

Sample size = z^2 P (1-P)/d^2

So,

n = 3.8416* 0.709 (0.324)/0.0025

Sample Size =352

But Sample size reduced due to limited resources **286.**

SAMPLE SELECTION

INCLUSION & EXCLUSION CRITERIA

- The target population of this research was mothers or guardians of children with the mentioned criteria:
- Mothers or guardians of children who are the age of 24-59 months were ready to contribute to the research.
- Only one child was selected from one household to avoid the inter-household correlation.
- Children aged less than 24 months and greater than 59 months.

DATA COLLECTION PROCEDURE

Data was collected through a coded questionnaire from mothers or caretakers to give information about socio-demographic characteristics, household income, and Food insecurity, manner of life, anthropometric measures, and attitudes toward nutrition using a pre-structured and validated questionnaire.

HOUSEHOLD FOOD INSECURITY ACCESS SCALE (HFIAS)

Household food insufficiency was estimated by using the certified Food insecurity access scale (HFIAS) (Coates, Swindale, & Bilinsky, 2007). Nine questions were interrogated from mothers or caretakers regarding household food insecurity. These nine questions were asked from mothers to estimate the household food insecurity of insufficiency. These questions were related to accessibility of food and anxiety, insufficient quality, and quantity of food. From these

Questions households categorized into 4 categories. Food security, mild food insecurity, moderate food insecurity & severe food insecure by summing the scores of all the questions.

ANTHROPOMETRIC MEASUREMENTS

Children's weight and Height calculated by following the standard approved techniques. Anthropometric measurements carried out by weighing scale and by stadiometer for all those who can stand steadily. Data was collected by research team of three members, researcher herself and two Lady Health workers.

The nutritional status benchmark was height for age (HAZ) weight for age (WAZ), and WHZ and compared with the recommendations of WHO (Group, 2006). Weight for age, height for age & weight for height less than −3SD is categorized as severely underweight, severely stunted, and severely wasted respectively. Weight for age and height for age between −3SD and −2SD is ranked as moderately underweight and moderately stunted respectively. Children with weight for age, height for age and weight for height between −2SD and + 2SD were classified as normal weight, normal height respectively. Weigh for age, height for age, and weight for height more than +2SD are indicator of overweight, tall height, and obesity.

NUTRITIONAL STATUS ASSESSMENT

The nutrition status of the study population was determined by assessing their weight and height. The following formula was used to determine the body mass index:

$$\textit{Body mass index} = \textit{weight in kg} / \textit{height in meters}^2$$

The Body mass index values were then categorized in accordance with the criteria already approved by WHO for nutrition status.

MUAC was also evaluated using a measuring tap to evaluate pregnant females' leanness and fat fat-free mass, and results were analyzed using statistics.

DATA ANALYSIS

Statistical examination was administered with SPSS 22 software. Chi-square test was used to find the association between family food insufficiency and reliant variables: nutritional rank in normal and malnourished. After collecting and entering all data, SD of weight for age, height for age and weight for height was calculated with the help of WHO Anthro Plus software to estimate and examine the nutritional rank of the children. Ranges with all described categories of these three variables; weight for age, height for age and weight for height.

RESULTS

Table No. 1 shows that among 286 participants, there were total 97.6% male family heads while 2.4% female family heads. Mother's age was assessed in 5 categorizations; there was no mother less than age 20, while 6.3% mother were in the range of 20 to 24, 28.3% mothers were in the range of 25 to 29, 46.2% mothers were in the range of 30 to 34 and 19.2% mothers were greater than age 35. Among all participants 97.6% mothers were married while 1% was separated and 1.4% mothers were widowed. As for Mother's educational status 36.7% mothers were uneducated while 63.3% mothers were educated till primary and secondary level from grade 1 to 5. Number of family members was also divided in 3 categories; 25.2% families have less than 5 members, 43% families have 5 to 8 members while 31.8% families have greater than 8 members. Sex of the child was also asked. 55.9% children were male while 44.1% were female children. Age of child was assessed in 3 categories. 62.6% children were with age 24 to 35 months; 20.6%children were with the age of 36 to 47 months while 10.7%children were with the age of 48 to 59 months. Household income was asked in 3 categories. 23.8% families had income less than 25000 while 36.7% families had income within the range of 25000 to 50000 and 38.1% families had more than 50000 household incomes.

In Table No. 2 anthropometric measures have been explained. Malnutrition was further divided in further 3 categories. (i). Weight for age: It is further divided in three categories. Among 286 samples, 1.7% sample was severely underweight, 6.3% sample fell under the category of underweight & 92.0% were Normal. (ii). Height for age: It is further divided in three categories. According to the calculation of current sample, .7% was severely stunted, 8.4% were stunted and 90.9% had normal height. (iii). Weight for height: It is further divided in six categories. 3.5% sample was severely wasted, 6.3% sample was considered as wasted, 75.9 % sample has normal weight for height while 8.7% sample was considered to be risk of overweight, 4.2 % as considered to be over-weight and only 1.4% sample was obese.

Among the sample's 46.2% sample have food security, 0.7% have mildly food insecurity, 19.6% sample have moderate food insecurity while 33.6% have severe food insecurity.

It was hypothesized that household food insufficiency/insecurity is significantly interconnected with Weight for age (severely underweight, moderately underweight, normal weight, overweight) among 24 to 59 month of age children. Both variables have categories

among which relationship must assess. Therefore, chi square test of association was used.

RESULTS ARE EXPLAINED IN TABLE NO. 4

Results reported in table 4.4 showed that there is significant association among household insecurity (Food secure. Mild food insecurity access, moderate food insecurity access and severe food insecurity access) and weight for age (Severely underweight, underweight, and normal weight as χ^2 (9) =20.87; (p=.002). To find the strength of relationship, Cramer's V is also accessed which shows strong association among both variables (Cramer's value=.191, p<0.05).

Result reported table No. 5 showed that there is significant association among household insecurity (Food secure. Mild food insecurity access, moderate food insecurity access and severe food insecurity access) and height for age (Severely stunted stunted, normal height, tall stature) as χ^2 (9) =5.87; (p=.43). No significant association was found between Household insecurity and height for age therefore Cramer's V is also not calculated.

It was hypothesized that household food insufficiency/insecurity is significantly interrelated with weight for height among 24 to 59 month of age children. Both variables have categories among which relationship must assess. Therefore, chi square test of association was used. Results are explained in table 5.6.

Results reported in table 5.6 showed that there is not significant association among household insecurity (Food secure. Mild food insecurity access, moderate food insecurity access and severe food insecurity access) and weight for height (obesity, overweight, risk of overweight, Normal, wasted, severely wasted) as χ^2 (9) =23.30 ;(p=0.78). No significant association was found between Household insecurity and weight for height therefore Cramer's V is also not calculated.

Additional analysis has been done with one important demographic variable i.e., No. of family size; that is considered as strongly associated with household food insecurity. There are three categories of Number of family size while household insecurity has four categories. Both variables are in categories therefore, Chi square test of association have been used to find the association. Results are reported in table 5.7.

Results reported in table 5.7 showed that there is significant association among household insecurity (Food secure. Mild food insecurity access, moderate food insecurity access and severe food insecurity access) and number of family members (family having less than 5

members, family having 5 to 8 members, family having greater than 8 members) as χ^2 (9) =15.64; (p=.016).To find the strength of relationship, Cramer's V is also accessed which shows strong association among both variables (Cramer's V value=.16, p<.05).

SUMMARY OF THE RESULTS

- Household insecurity (Food secure. Mild food insecurity access, moderate food insecurity access and severe food insecurity access) is significantly associated with weight for age (Severely overweight, overweight, normal weight), and number of family members (family have less than 5 members, family have 5 to 8 members, family have greater than 8 members).
- No remarkable relation was found between Household food insufficiency and height for age (Severely stunted, stunted, normal height, tall stature) and weight for height (obesity, overweight, and risk of overweight, normal, wasted and severely wasted).

DISCUSSION

The present research was aimed to explore the alliance between household food insecurities (Food security, mild food insecurity access, moderate food insecurity & severe food insecurity access) and malnutrition (weight for height, weight for age & height for age) among 24-59 months of age children. Different analyses were applied according to hypotheses to test them.

While reviewing the descriptive statistics for demographic variables it became clear that the average weight for the children with average age (49 months) is 11.89 kgs. Global research showed that the average weight for children with age 49 months is 16.3 kgs and height should be 102.5 cm. One of the main causes of malnutrition is the household insecurities. If we review the Pakistani societies, it becomes clear that if a family has only one- or two-income earner and total family members are more than 5. Hence, it becomes difficult for them to give a enough nutritious and heathy food to their family members. According to descriptive statistics, the current study revealed that the income of most of the family falls under average range.

While reviewing the literature, there are many causing factors for such malnutrition of children which are gestation, pregnancy, genetic conditions, environment, gender, mother-feeding, hormones, medications, health issues, sleep cycle, nurturing, physical activities etc . If a child is provided with proper conditions, necessary for his growth, then a child between age 24-36 months and 36-48 months will normally grow. So, the present study also showed that many

environment conditions are causing malnutrition in children. Food security has been affected by conflicts and one of its outcomes can be the compromise to assess to food. From the places where such conflicts arise and this causes low access to their business and firm, market and other local food production houses. Climate change has also linked with the malnutrition in children. One of the leading cause of malnutrition in children worldwide, is the lack of knowledge about enough feeding from parents (Mandel, 2020).

In many countries, emphasis has been made on small family size. The reason for this is family can easily provide all the food (nutrition) sufficient enough for the proper growth of a child. If a child is not provided with the sufficient food, then there are chances that he/she can lead towards physical abnormalities or diseases. A research showed the supportive evidence that child rearing operations, household food insecurity and family size have significant effect on malnutrition. (Ajao, Ojofeitimi, Adebayo, Fatusi, & Afolabi, 2010).

It was supposed that household insecurity is remarkabely linked with Weight for age (severely underweight, underweight and normal weight) among 24 to 59 month of age children. Study outcome suggest that there is noteworthy interrelation between household insecurity and weight for age among 24-59 months of age children. While reviewing the literature, supportive evidence (Gillespie & Haddad, 2001) showed that when an individual has this sense that he has the reliably enough access to sufficient food both in quantity and quality for himself and his family also, this leads to food security in them and in this manner, they can enjoy healthy and active life. A family can be food secure in two main ways: food production and food purchase. This requires suitable income and resources. When there is a discrepancy between food production and food purchase, this insecurity leads to malnutrition in children. Further early childhood nutrition can also be accredited to scarcity and lack of income resources (Begin, Frongillo Jr, & Delisle, 1999).

Similarly a research with multiethnic sample (Hispanic, non-Hispanic African American, non-Hispanic white), showed 27% household food insecurity. The results showed that except 25 to 36 months, neither child nor household food insecurity was related with slenderness, underweight, or stunting, but they were linked with increase chances of poor health and developmental risks at different age period (Drennen et al., 2019). The duration of Infancy, early toddlerhood and early preschool (0–4 years) shows the period of effective brain

development and rapid body growth. Changes in early nutritional position of children can have enduring consequences that extend into the following generation. As early childhood is the vital period of healthy growth and brain development. These can be threatened by household food insecurity. Literature showed food insecurity and weight status among adults have a nonlinear relationship. While overweight can also be resulted from moderate food insecurity whereas severe food insecurity has consequences in the reductions of food quality and quantity that can further resulted in overweight or underweight in different contexts(Dhurandhar, 2016).

Another research has used the large and nationally represented sample of young school children to examine the interconnection between family food insecurity and overweight status. Results suggests the contradictory results such as 20% children from food-insecure households are less likely to be overweight than their food-secure partners. Comparative outcomes on the food-weakness/overweight connection was found over a scope of various models and articulations for key factors. Positive indicators of overweight status included low actual action, TV viewing for 2 hours/day, high birth weight, dark or Latino nationality, and low pay (Rose & Bodor, 2006).

It was also hypothesized that household food insecurity is remarkabley associated with malnutrition (Height for age) among 24 to 59 month of age children. Present study outcomes revealed that there is no significant interconnection between household insecurity and malnutrition (height for age) among 24-59 months of age children. A research was administered to find the relation between indicator of nutrition level of children and house hold food insecurity. Results indicated that moderately food insecure households was 23.2% and severe food insecure households was 19%. Height for age z- score was 41.6%, wasting ; weight for height z-score was 11.5% and underweight; weight for age z-score 30.1% (Sreeramareddy et al., 2015).

Household food insecurity and its relation with nutritional levels of children have not been studied well in advanced countries, much less in emanent countries. Association may vary from one population to another.

Another supporting research revealed that frequency of stunting was 42.1%, while prevalence of underweight was 37.5% and prevalence of wasting was 18.7%. Prevalence of overweight was

9.8% or obese 1.3%. Research reported that stunting and under-weight has an opposite relationship with household food insecurity: higher the food insecurity greater the risk of wasting and under-weight, but no significant relationship with wasting and risk of wasting. Higher the food insecurity, greater risk of wasting and under-weight (Hackett et al., 2009). In Pakistan, a significant association reported between household food uncertainity and stunting in children (height for age) (Baig-Ansari et al., 2006). A study showed that under-weight child of food insecure household was 3times more as compared to food secure household but stunting had no significant association with household food insecurity (Oh & Hong, 2003). Stunting (height-for-age) builds the danger for low school accomplishment, intellectual shortfalls, and constant illness in adulthood (Drennen et al., 2019). In general, the stunting frequency was high, but the wasting prevalence was lower in this area, which normally does not encounter food emergency circumstances (Organization, 1999).

It was hypothesized that household insufficiency is significantly interconnected with weight for height among 24 to 59 month of age children.Present study outcomes showed that there is non-noteable association among household insecurity (Food security, Mild food inscurity, moderate food insecurity access and severe food insecuity) and weight for height (obesity,overweight,risk of overweight,normal,wasted and severely wasted) among 24-59 months of age children.

A research showed supportive evidence that the relationship between Family unit Food Uncertainty (HFI) and Weight File for age z-score in a delegate test of kids 0-60 months old enough (n=3,433) in five Brazilian topographical locales was non-huge (Kac, Schlüssel, Pérez-Escamilla, Velásquez-Melendez, & da Silva, 2012).

The results of different researches showed discrepancies in their findings. One of the main reasons for this discrepancy is the geographical differentiation and availability of resources. When an individual is provided with all the sufficient nutrition for his better physical growth as well as brain development, risk is low for getting any serious physical ailments.

The food secure individuals had essentially lesser children and smaller family as compared to the food insecure individuals. The mean family unit income, income per capita and food consumption significantly diminished as the food insecurity intensified. The food-secure individual had a noteworthy higher Malaysian HEI scores for grains and cereals, just as for

meat, poultry and eggs as compared to the food- insecure individuals. The child-hunger group had altogether higher obesity and sodium ranges than the food- secure and family unit household food-insecure individuals. Collated to the household food insecure and child hunger individuals, it was demonstrated that the food secure individuals were remarkably associated with a higher Malaysian HEI score while the household food-insecure were notably correlated with a greater BMI in the wake of controlling for age. A large number of the local nuclear families confronted food instability. Food instability at individual and youngster levels was seen to bring down nature of diet; notwithstanding, food uncertainty at family unit level was identified with their higher body weight. Thus, a significant exertion by all partners is insisted to improve food precariousness among the less lucky individuals. The result proposes a critical requirement for nourishing interventions to upgrade dietary admission among low pay families (Pei et al., 2018).

In the light of above discussion it became evident that there is a noteable association among household food insecurities & malnutrition (weight for age) (Rose & Bodor, 2006) (Dhurandhar, 2016) (Drennen et al., 2019) (Ali Naser et al., 2014) (Begin et al., 1999) (Gillespie & Haddad, 2001).Furthermore there is a non-significant alliance between household food uncertainity and malnutrition (height for age) (Khan et al., 2019) (Drennen et al., 2019; Hackett et al., 2009) (Baig-Ansari et al., 2006) (Sreeramareddy et al., 2015). It also became clear evident that there is non significant relation found between household food insufficiency and weight for height for 24–59 months of age children (Kac et al., 2012) (Pei et al., 2018).

In Pakistan, many families have living their lives under scarcitic conditions, such as, food, shelter, income etc. The number of family members are also a prime factor for scarcity of resources. Emphasis has been given on the less family members by birth control awareness programs. The reason behind this is that when there will be less family members then they can enjoy their resources to their fullest. The physical growth and brain development is relatively good in children of less number of family members and with no household insecurity as compared to the those who have more family members and with household food insecurity. Child anthropometric indicators and household food insecurity is highly context specific. So the findings of the present study enabled us to clearly identify the relationships between these variables.

CONCLUSION

This study gives the information and accurate picture of prevalence of under-weight, stunting & wasting in 24-59 months of age children. This study also gives information about household food insufficiency and household food sufficiency prevalence in city Timergara, district Dir Lower, Khyber Pakhtunkhwa. The outcome of the study revealed that household food insecurity/insufficiency is predictor of wasting & underweight. Stunting is not associated with household food insecurity. It's concluded that household food insufficiency/insecurity is linked with child's poor nutritional level and their poor growth. By improving the household food security, nutritional status can also improve and ultimately their growth can improve. Policy makers can use this information to plan nutritional interventions to overcome this bad nutritional level of children, poverty and malnutrition in the country. They can furthermore improve food security status by promoting the nutritional and household food security.

LIMITATION AND SUGGESTIONS

- Indigenously developed assessment measures should be used for the assessment of study variables.
- Sample size should be increased to generalize the findings of research. The sample was taken only from one city. A diversity of sample would be achieved if it was taken nationwide.
- Parents of the children might have exaggerated the responses on the self-report measure to normalize their behavior. This can affect the reliability of the assessment measure. Child anthropometric indicators and household food insufficiency and are highly context specific.

REFERNCES

Addo AA, Marquis GS, Lartey AA et al. (2011) Food insecurity and perceived stress but not HIV infection are independently associated with lower energy intakes among lactating Ghanaian women. Matern Child Nutr 7, 80–91.

Ajao, K., Ojofeitimi, E., Adebayo, A., Fatusi, A., & Afolabi, O. (2010). Influence of family size, household food security status, and child care practices on the nutritional status of under-five children in Ile-Ife, Nigeria. *African journal of reproductive health*, *14*(4).

Alaimo, K., Briefel, R. R., Frongillo Jr, E. A., & Olson, C. M. (1998). Food insufficiency exists in the United States: results from the third National Health and Nutrition Examination Survey (NHANES III). *American Journal of Public Health*, *88*(3), 419-426.

Ali Naser, I., Jalil, R., Wan Muda, W. M., Wan Nik, W. S., Mohd Shariff, Z., & Abdullah, M. R. (2014). Association between household food insecurity and nutritional outcomes among children in Northeastern of Peninsular Malaysia. *Nutrition research and practice*, *8*(3), 304-311.

Baig-Ansari, N., Rahbar, M. H., Bhutta, Z. A., & Badruddin, S. H. (2006). Child's gender and household food insecurity are associated with stunting among young Pakistani children residing in urban squatter settlements. *Food and Nutrition Bulletin*, *27*(2), 114-127.

Begin, F., Frongillo Jr, E. A., & Delisle, H. (1999). Caregiver behaviors and resources influence child height-for-age in rural Chad. *The Journal of nutrition*, *129*(3), 680-686.

Betebo, B., Ejajo, T., Alemseged, F., & Massa, D. (2017). Household food insecurity and its association with nutritional status of children 6–59 months of age in east Badawacho District, south Ethiopia. *Journal of environmental and public health*, *2017*.

DEMOGRAPHIC AND HEALTH SURVEY,. (2017-18, januay 2019). Retrieved from https://dhsprogram.com/pubs/pdf/FR354/FR354.pdf

Dhurandhar, E. J. (2016). The food-insecurity obesity paradox: A resource scarcity hypothesis. *Physiology & behavior*, *162*, 88-92.

Drennen, C. R., Coleman, S. M., de Cuba, S. E., Frank, D. A., Chilton, M., Cook, J. T., . . . Black, M. M. (2019). Food insecurity, health, and development in children under age four years. *Pediatrics*, *144*(4), e20190824.

Food and Agriculture Organization of the United Nations (2015) The State of Food Insecurity in the World. Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress. Rome: FAO.

Food and Agriculture Organization of the United, U. N. I. C. E. F, Programme, W. F., & Development, I. F. for A. (2018). *The State of Food Security and Nutrition in the World 2018: Building climate resilience for food security and nutrition*. Food & Agriculture Org.

Frongillo Jr, E. A. (1997). Factors contributing to household food insecurity in a rural upstate New York county. *Family Economics and Nutrition Review*.

Frongillo Jr, E. A., de Onis, M., & Hanson, K. M. (1997). Socioeconomic and demographic factors are associated with worldwide patterns of stunting and wasting of children. *The Journal of nutrition*, *127*(12), 2302-2309.

Gelu, A., Edris, M., Derso, T., & Abebe, Z. (2018). Undernutrition and associated factors among children aged 6–59 months living in slum areas of Gondar city, northwest Ethiopia: a cross-sectional study. *Pediatric health, medicine and therapeutics*, *9*, 81.

Gillespie, S., & Haddad, L. (2001). *Attacking the double burden of malnutrition in Asia and the Pacific*: Asian Development Bank.

Gubertet al. (2016) Cross-sectional study using Brazilian DHS 2006; food insecurity estimate was based on the Brazilian Food Insecurity Security Scale (EBIA).

Gulliford, M. C., Mahabir, D., & Rocke, B. (2003). Food insecurity, food choices, and body mass index in adults: nutrition transition in Trinidad and Tobago. *International journal of epidemiology*, *32*(4), 508-516.

Gundersen, C., Kreider, B. & Pepper, J. 2011. The Economics of Food Insecurity in the United States. Applied Economic Perspectives and Policy, Vol. 33 No. (3): pp. 281 303. http://dx.doi.org/10.1093/aepp/ppr022].

Hackett, M., Melgar-Quiñonez, H., & Álvarez, M. C. (2009). Household food insecurity associated with stunting and underweight among preschool children in Antioquia, Colombia. *Revista Panamericana de Salud Pública*, *25*, 506-510.

Kac, G., Schlüssel, M. M., Pérez-Escamilla, R., Velásquez-Melendez, G., & da Silva, A. A. M. (2012). Household food insecurity is not associated with BMI for age or weight for height among Brazilian children aged 0–60 months. *Plos One*, *7*(9), e45747.

Khan, S., Zaheer, S., & Safdar, N. F. (2019). Determinants of stunting, underweight and wasting among children< 5 years of age: evidence from 2012-2013 Pakistan demographic and health survey. *BMC Public Health*, *19*(1), 358.

Mandel, A. (2020). Cause of Malnutrition. Retrieved from https://www.news-medical.net/health/Causes-of-malnutrition.aspx

Oh, S.-Y., & Hong, M. (2003). Food insecurity is associated with dietary intake and body size of Korean children from low-income families in urban areas. *European journal of clinical nutrition*, *57*(12), 1598-1604.

Organization, W. H. (1999). *Complementary feeding of young children in Africa and the Middle East.* Retrieved from PAKISTAN

Pei, C. S., Appannah, G., & Sulaiman, N. (2018). Household food insecurity, diet quality, and weight status among indigenous women (Mah Meri) in Peninsular Malaysia. *Nutrition research and practice*, *12*(2), 135-142.

Rose, D., & Bodor, J. N. (2006). Household food insecurity and overweight status in young school children: results from the Early Childhood Longitudinal Study. *Pediatrics*, *117*(2), 464-473.

Saaka, M., & Osman, S. M. (2013). Does household food insecurity affect the nutritional status of preschool children aged 6–36 months? *International Journal of Population Research*, *2013*.

Sreeramareddy, C. T., Ramakrishnareddy, N., & Subramaniam, M. (2015). Association between household food access insecurity and nutritional status indicators among children aged< 5 years in Nepal: results from a national, cross-sectional household survey. *Public health nutrition*, *18*(16), 2906-2914.

Stuff JE, Casey PH, Szeto KL et al. (2004) Household food insecurity is associated with adult health status. J Nutr 134, 2330–2335

Unger, A. (2013). Children's health in slum settings. *Archives of disease in childhood*, *98*(10), 799-805.

United Nations World Food Programme (2015) Food security analysis. http://www.wfp.org/food-security (accessed September 2015).

USAID. (2013). USAID. Retrieved from https://www.usaid.gov/sites/default/files/documents/1861/Food_Security.pdf world health organization. (2018). Malnutrition. Retrieved from https://www.who.int/news-room/fact-sheets/detail/malnutrition

TABLE LEGEND

TABLE 1: EMOGRAPHIC CHARACTERISTICS OF THE SAMPLE (N=286)

Variables	Frequency	Percent
Sex Of Household Head		
Male Head	279	97.6
Female Head	7	2.4
Mother's age (years)		
Less than 20 years	0	0
20-24	18	6.3
25-29	81	28.3
30-34	132	46.2
Greater than 35	55	19.2
Mother's present marital status		
Married	279	97.6
Separated	3	1
Widowed	4	1.4
Mother's Education		
None	105	36.7
Primary and secondary Education (Grade 1-12th)	181	63.3
Size of the household Family		
Less than 5	72	25.2
5-8	123	43.0
Greater than 8	91	31.8
Child Sex		
Male	160	55.9
Female	126	44.1
Child's Age (Months)		

24-35	179	62.6
36-47	59	20.6
48-59	48	16.8
Household income		
less than 25000	68	23.8
25000-50000	105	36.7
50000 or above	109	38.1

TABLE 2: ANTHROPOMETRIC MEASUREMENTS OF CHILD (N=286)

Variable	Mean	SD
Age (Months)	34.88	10.6
Weight (kg)	12.74	2.27
Height (cm)	90.67	6.91

Variable	Ranges of SD	Frequency	Percentage
Weight for Age			
Severely underweight	below -3 SD	5	1.7
Under-weight	-2 to -3 SD	18	6.3
Normal	-2 to +3 SD	263	92.0
Total		286	100.0
Height for Age	Below -3 SD	2	.7
Severely Stunted			
Stunted	< -2 SD to -3	24	8.4
Normal Height	SD		
Very tall		260	90.9
Total	-2 to +3 SD		
	> +3 SD	286	100

Weight for Height				
Obesity	Above +3 SD		4	1.4
Over-weight	3SD to 2 SD	12		4.2
Risk of over-weight	2 SD to 1 SD	25		8.7
Normal	1SD to < -2	217		75.9
Wasted	SD	18		6.3
Severely Wasted	-2 SD to -3	10		3.5
Total	SD	286		100.0
	Below -3 SD			

TABLE 5.3: CATEGORIES OF HOUSEHOLD INSECURITY AND PERCENTAGES (N=286)

Household insecurity	**F (%)**
Food secures	132 (46. 2)
Mild food insecure access	2 (.7)
Moderate food insecure access	56 (19.6)
Severe food insecure access	96 (33.6)

TABLE 5.4: ASSOCIATION AMONG HOUSEHOLD INSECURITY AND WEIGHT FOR AGE (N=286)

	Weight for age					
Household insecurity	Severely overweight	Overweight	Normal	Total	$\chi 2$ (9)	*P*
	f (%)	f (%)	f (%)	f (%)		
Food secures	0(0.0)	3(1.0)	129(45.1)	**132(46.2)**		
Mild food insecure access	0(0.0)	0(0.0)	2(0.7)	**2(0.7)**	20.87	.002
Moderate food insecure access	0(0.0)	3(1.0)	53(18.5)	**56(19.6)**		
Severe food insecure access	5(1.7)	12(4.2)	79(27.6)	**96(33.6)**		
Total	**5(1.7)**	**18(6.3)**	**263(92.0)**	**286(100.0)**		

TABLE 5.5: ASSOCIATION AMONG HOUSEHOLD INSECURITY AND HEIGHT FOR AGE (N=286)

Household insecurity	Height for age					
	Severely Stunted	Stunted	Normal Height	Total	χ^2 (9)	*P*
	f(%)	*f(%)*	*f(%)*	*f(%)*		
Food secures	1(0.3)	7(2.4)	124(43.4)	**132(46.2)**		
Mild food insecure access	0(0)	0(0)	2(0.7)	**2(0.7)**	5.87	.43
Moderate food insecure access	0(0)	4(1.4)	52(18.2)	**56(19.6)**		
Severe food insecure access	1(0.3)	13(4.5)	82(28.7)	**96(33.6)**		
Total	**2(0.7)**	**24(8.4)**	**260(90.9)**	**286(100)**		

TABLE 5.6: ASSOCIATION AMONG HOUSEHOLD INSECURITY AND WEIGHT FOR HEIGHT (N=286)

Household insecurity	Weight for height								
	Obesity	overweight	Risk of overweight	Normal	Wasted	Severely wasted	*Total*	χ^2 (9)	*p*
	f(%)	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*			
Food secures	1 (0.3)	6 (2.1)	13 (4.5)	106(37.1)	6 (2.1)	0 (0.0)	**132(46.2)**		
Mild food insecure	0(0.0)	0 (0.0)	0(0.0)	1(0.3)	1 (0.3)	0 (0.0)	**2(0.7)**	23.30	.078
Moderate food insecure	2(0.7)	3 (1.0)	3 (1.0)	41 (14.3)	5 (1.7)	2 (0.7)	**56(19.6)**		

Severe food insecure	1 (.3)	3 (1.0)	9 (3.1)	69 (24.1)	6(2.1)	8(2.8)	**96(33.6)**
Total	**4(1.4)**	**12(4.2)**	**25(8.7)**	**217(75.9)**	**18(6.3)**	**10(3.5)**	**286(100.0)**

TABLE 5.7: ASSOCIATION AMONG HOUSEHOLD INSECURITY AND NUMBER OF FAMILY MEMBERS (N=286)

Household insecurity	**Number of family members**			$\chi^2(9)$	*p*
	Less than 5	**5-8**	**Greater than 8**		
	f(%)	*f(%)*	*f(%)*		
Food secure	44(15.4)	47(16.4)	41(14.3)	15.64	.016
Mildly food insecure access	0(0)	2(0.7)	0(0)		
Moderately food insecure access	12(4.2)	31(10.8)	13(4.5)		
Severe food insecure access	16(5.6)	43(15)	37(12.9)		