SOCIO-ECONOMIC DETERMINANTS OF PRE-SCHOOL CHILDREN NUTRITIONAL STATUS: A CASE STUDY OF RURAL AREAS OF DISTRICT RAHIM YAR KHAN

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CERTIFICATE

This is to certify that this thesis entitled: **"SOCIO-ECONOMIC DETERMINANTS OF PRE-SCHOOL CHILDREN NUTRITIONAL STATUS: A CASE STUDY OF RURAL AREAS OF DISTRICT RAHIM YAR KHAN"** submitted by Mr. Muhammad Shahid is accepted in its present form by the Department of Health Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of M. Phil in Health Economics.

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Declaration

I Muhammad Shahid solemnly declare and affirm on oath that, I attended this M.Phil. Thesis with my own work and means and have not used any further means but those which are explicitly mentioned in this research. All the items which are copied form internet or other written sources have been properly mentioned in quotation mark and with a reference to the source of citation.

Muhammad Shahid

Dedication

Dedicated to my beloved
Parents

ACKNOWLEDGMENT

While preparation the thesis, I have received a lot of encouragement, support, advice, suggestions and assistance from many collective sources. Mentioning all of them is necessary.

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Muhammad Shahid

List of Abbreviations

BHU	:	Basic Health Unit
BMI	:	Body Mass Index
CIAF	:	Composite Index of Anthropometric Failure
DHDC	:	District Health Development Center
EDO	:	Executive District Officer
GDP	:	Gross Domestic Product
HAZ	:	Height for Age Scores
HDS	:	Household Deprivation Straus
IMR	:	Infant Mortality Rate
LHW	:	Lady Health Worker
MAM	:	Moderate Acute Malnutrition
MDGs	:	Millennium Development Goals
MICS	:	Multiple Indicator Cluster Survey
MNK	:	Mothers Knowledge on Nutrition
MUAC	:	Mid Upper Arm Circumference
NCHS	:	National Center for Health Statistics
NHANES	:	National Health and Nutrition Examination Survey
NNS	:	National Nutrition Survey
OPD	:	Out Patient Department
PDHS	:	Pakistan Demographic and Health Survey
PEM	:	Protein Energy Malnutrition
PNNS	:	Pakistan National Nutrition Survey
PSLM	:	Pakistan Social and Living Standards Measurements
SAM	:	Severe Acute Malnutrition
SDGs	:	Sustainable Development Goals
UC	:	Union Council
WAZ	:	Weight for Age Score
WHO	:	World Health Organization
WHZ	:	Weight for Height Scores

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ABSTRACT

Improving health of a community is imperative for achieving sustained economic growth rate. Because with better health conditions, the citizen of the country can actively participate in the economic activities. The nutritional status of children is an important indicator of the health status of a community and the human resource development of a new generation. It is track to the 3rd sustainable development goal regarding child mortality. The objective of this study is to examine the impact of socio-economic factors of pre-school children's malnutrition in rural Rahim Yar Khan. The study used primary data. The multi-stage random sampling technique was used. The information is obtained through structured questionnaire from randomly selected 384 rural households which were taken from only rural areas of district Rahim Yar Khan. The anthropometric measurements of total 517 children under five years of age and 384 mothers were assessed. Out of 517 children 286 were male children and 231 female children. In methodology, the study uses four logistic regression models for stunting, wasting, underweight and CIAF (Composite Index of Anthropometric Failure) to examine the probability of malnutrition. The results of study show that in Rahim yar Khan, 46.1% children are underweight, 34.83% are stunted and 15.49% are wasted. While the logistic regression results of four models stunting, wasting, under-weight and CIAF shows that child malnutrition among pre-school children is negatively and significant associated with mother's tongue, sex of child, birth order, mother's nutritional awareness and household deprivation status. While there is positive and significant effect of child age. For policy point of view, Special policies and programs should organize in rural and remote areas to create mother awareness regarding nutrition and government should design policies towards deprived and rural people, so that they can provide healthy and nutritious food to their children.

Keywords: Health Status, Rahim Yar Khan, Malnutrition, HDS, Primary Survey, Binary Logistic Model.

Chapter-1

Introduction

1.1 Background

From last decade, eradication of malnutrition has taken much more importance at the global level. Particularly developing countries including Pakistan have started to progress to provide good nutrition to their children under 5 age group to reduce mortality rate and hunger so that they can achieve Millennium Development Goals (MDG) "eradication of hunger and prevalence of underweight children under five years of age" till 2015 (PDHS 2012-13)

Among the nutrition policy makers and social scientists, nutrition of infant and young child is greater worry. For low and middle-income countries, investment on nutrition and health is vital form of human capital investment. The third Sustainable Development Goal (SDG) emphasizes on the health that to reduce child mortality rates, improve the maternal health, combat HIV/AIDS and stop malaria and other diseases.

Health development across the life span is nutrition which is important pillar of human life. Central motto of WHO is "Health for all" which means people have opportunity and right to maintain highest attainable health level throughout their life anywhere. This cannot achieve if the is malnutrition and issue of food insecurity.

By reducing child mortality rates and disease by improving the nutrition and health, cognitive ability and work capacity will increase and in result productivity and economy increase which further reduces poverty in both economic and health form.

According to Shekar et al (2006) that nutritional poverty persists the cycle of poverty and malnutrition through three main routes; 1- poor physical status decreases productivity by decreasing the work capacity through malnutrition and disease, which is direct loss; 2- cognitive poor development is main cause of loss in schooling, that is because of increase in healthcare costs which is indirect loss; 3- numerous billions of dollars in every year spend on malnutrition and the nation face economic loss in term of loss in GDP. It will take more than a generation for solving this issue if this situation only put on economic growth and market situations. A little investments on nutritional improvement programs can increase the improvement speed not in term of health but in economic also. Britain gross domestic product (GDP) were increased one third of total GDP between the period of 1790 to 1980 and the main cause of this improvement was health improvement more specifically improvement of public health, nutrition and in medical facilities (Fogel, 1994). The economic returns to investing in such programs are very high. According to Hoddinott et.al (2013)

investing one dollar in key interventions for stunting reduce, Pakistan would generate an economics return of 30 dollar.

Nutrition and health have great impact on learning capacity that determines further productivity and economic growth. To leave economically and socially active live, nutrition has great influence. While malnutrition affect the health badly, that affects the life expectancy and cause sickness. For batter living health is important. "Good health" has economic rationale. Good health reduce medical cost of household and government, while illness causes loss in income for poor households and this thing push them to malnutrition and hunger. It is not only a moral imperative to improve nutrition and health of child but it is long term investment and result is economic benefit. For maintenance of health to generation, healthcare is one important input.

Pre-school child malnutrition is directly associated with low family income, large family size and mother's illiteracy that causes higher mortality rate (Nava, 2012). Rate of stunted children under five in Asia more than the half of total stunted children, out of 80% of all stunted children are in low-income and low-middle-income countries, while only 1% of all stunted children live in high-income countries (UNICEF-WHO-The World Bank Group, 2016)[1]. In developing countries almost 147 million pre-school children are affected by a micro nutritional deficiency, i.e. iodine and iron deficiency are single major cause of brain damage and metal disorder (ACC/SCN, 2010). Pakistan is the 6th largest populated country in the world with the highest rate in stillbirth and neonatal mortality (Chan, 2015), and 2nd highest infant mortality and morbidity rate in the South Asia (Gopalan, 2000). Indicators for assessment of nutrition status such as stunting, low birth weight, wasting and vitamin deficiency etc are high in Pakistan still. According to National Nutritional Survey (NNS, 2011), in Pakistan 27% women and 44% children under age five have iron deficiency, 68% women and 54% children under age five have vitamin A deficiency, over 58% women have calcium deficiency and 69% women have vitamin D deficiency. Only three countries in the world India, Bangladesh and Pakistan are increasing the number of malnourished children continuously which is almost one third of malnourished children (Mehrotra 2006, HIrani 2012). In Pakistan less than

[1] http://www.who.int/nutrition/publications/jointchildmalnutrition_2016_estimates/en/

five mortality rate is 72 per 1000 live births which are too higher as compared to other regional countries (Khan 2014).

In infant and neonatal mortality rates, Pakistan lies in bottom in the world which is double than India. This indicates less investment behavior of Pakistan towards health sector. While healthcare is one of the main factor for health of any society, but in medical aid facilitation the condition of Pakistan is worse (ANI, 2016)[2]. In Pakistan, healthcare facilities still unstable. Pakistan is still worse in infant mortality rates. Many countries such as Ghana, Ethiopia and Afghanistan have successes in improvement of infant mortality, even India also have improved these rates by improvements in sanitation and health services but for achieving health targets Pakistan is even still fail for improving the health (ANI, 2016).

According to Punjab health profile[3] more than half of the population of Pakistan is in Punjab and under age 5 mortality rates are 112 per 1000 live birth. There are 4 million children malnourished and about 3rd of all pregnant women are estimated to have iron deficiency in Punjab. The major contribution to infant and maternal death is malnutrition. According to (MICS, 2014), infant mortality in Punjab is 75 per 1000 live birth; while in rural areas is 83 per 1000 live births. According to the workshop on "stunting prevention" arranged by planning and development Punjab on 07 March, 2016, that every 17 in 50 in Punjab are stunted and stunting under age 5 can reduce 5-11 IQ points of a child. So in field of rural pre-school child's nutrition, Punjab is passing through serious threats. According to (MICS-2014) in Punjab 33.5% children are stunted, 17.5% wasted and 33.7% underweight, and the ration of malnutrition is height in rural areas.

In this perspective, currant research study focusses only on rural Rahim Yar Khan District, which is true picture of rural Punjab, having 78.5% population living in rural areas (Census-2017). In this district adult literacy rate is 31% (MICS-2014); which is very low literacy rate, even this rate is low within the division. Rahim Yar Khan is one of the largest district of Southern Punjab and most of the population is in rural areas with poor socio-economic conditions. Rahim Yar Khan consists of three physical features; river side area, canal irrigated area and desert area Cholistan.

[2] http://indianexpress.com/article/world/world-news/world-bank-report-says-paks-infant-mortality-rate-nearly-double-that-of-india/
[3] http://health.punjab.gov.pk/Punjab_Health_Profile

1.2 Overview of Child Health Indicators

WHO recommended the standard measurement of anthropometry such as HAZ, WAZ and WHZ. These three used for standard measurement for child's nutrition status.

The situation of child health indicators in Pakistan (such as stunting, wasting, underweight, infant and under-five child mortality), much worse in rural areas as compared to urban areas. So, currant study concentrations on rural areas in District Rahim Yar Khan that is the most important district of Punjab which captures a clear sketch of Punjab's rural life because it comprises its 78.5 percent people living in rural areas. Moreover Rahim Yar Khan is included in one of the high malnutrition prevalence district among 36 districts in Punjab. The overall situation of child health indicators is presented in tables which are as follows:

Table 1.1: Overall scenario of malnutrition (comparison of malnutrition in R.Y.K with Punjab and Pakistan overall)

Sr. No		Underweight		Stunting		Wasting	
		moderate & severe (below -2 SD)	Severe (below-3SD)	moderate & severe (below -2SD)	Severe (below -3 SD)	moderate & severe (below -2 SD)	Severe (below -3 SD)
1	**Pakistan**	20%	10%	21%	24%	8%	3%
2	**Punjab**	33.7%	11.3%	33.5%	13.3%	17.5%	4.4%
3	**R.Y.K**	46.8%	14%	45.3%	23%	21.6%	6.7%

Source: PDHS-2013 & MICS- 2014

In table 1.1 underweight, stunting and wasting rates in both moderate & severe and severe categories for R.Y.K are relatively high then Punjab and Pakistan overall rates.

Table 1.2: Trends in malnutrition prevalence (urban /rural comparison)

	Pakistan		Punjab		Rahim Yar Khan	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Stunting	48%	37%	36.7%	26.3%	45.9%	38.5%
Wasting	11%	10%	18.2%	16.1%	14%	9.1%
Underweight	33%	24%	36.3%	27.7%	42.9%	23.5%

Source: PDHS-2013 & MICS- 2014

Table 1.2 shows urban/rural comparison for Pakistan, Punjab and Rahim Yar Khan. The stunting, wasting and underweight rates are higher in rural areas in country compared to urban areas.

Table 1.3: Malnutrition rates in two high malnutrition prevalence Divisions of Punjab

Sr. No		Under-weight	Stunting	Wasting
		Moderate and the severe (below-2 SD)	Moderate and the severe (below-2SD)	moderate and the severe (below-2 SD)
1	**Punjab**	33.7%	33.5%	17.5%
2	**Bahawalpur**	42.6%	41.3%	21%
3	**DG. Khan**	43.9%	46.6%	18.8%

Source: MICS- 2014

Table 1.3 compare stunting, wasting and underweight rates within two high malnutrition prevalence divisions of Punjab and explain the divisional malnutrition prevalence comparison with overall Punjab. According to table 1.3; Bahawalpur stood second high underweight and stunting prevalence division in Punjab while in wasting Bahawalpur stood on first high wasting prevalence division in Punjab.

Table 1.4: High malnutrition prevalence Districts of Punjab

Sr. No		Under-weight	Stunting	Wasting
		moderate and the severe (below-2 SD)	moderate and the severe (below-2SD)	moderate and the severe (below-2 SD)
1	**DG. Khan**	53%	58%	19%
2	**M. Garh**	44%	49%	17%
3	**R. Y. K**	42%	46%	19%
4	**Rajanpur**	36%	51%	14%

Source: Punjab Development Statistics- 2015

Table 1.4 shows that in Punjab district Rahim Yar Khan stood third in underweight and stunting prevalence rates while in wasting prevalence Rahim Yar Khan stood first among the high malnourished districts of Punjab.

Table 1.5: Comparison of malnutrition prevalence among the Districts of Division Bahawalpur

	Under-weight		Stunting		Wasting	
	Moderate and the severe	Severe	Moderate and the severe	Severe	Moderate and the severe	Severe
Bahawalpur	34%	13%	40%	18%	14%	3.5%
Bahawalnagar	37%	11%	40%	15%	17%	4%
R. Y. Khan	42%	14%	46%	23%	19%	6.7%

Source: Punjab Development Statistics- 2015

Table 1.5 explains the comparison of stunting, underweight and wasting prevalence between the districts in Bahawalpur division. Bahawalpur consists of three districts. Within these districts, Rahim Yar Khan has high rates in underweight, stunting and wasting prevalence.

Table 1.6: Child malnutrition among the Tehsils of Districts Rahim Yar Khan.

	Underweight		Stunting		Wasting	
	Moderate & severe	Severe	Moderate & severe	Severe	Moderate & severe	Severe
Khan Pur	34.7%	9.7%	43.3%	19.7%	9.6%	2.7%
Liaquat Pur	41.4%	14.3%	49%	25.1%	12.6%	2.8%
R. Y. Khan	40.9%	14.5%	45%	22.4%	13.3%	4.1%
Sadiqabad	39.2%	15.6%	39.4%	20.1%	17.6%	7.3%

Source: MICS Punjab, 2007-08

Table 1.6 explains the comparison of stunting, underweight and wasting prevalence between the tehsils of districts Rahim Yar Khan. Rahim Yar Khan consists of four tehsils. Within these tehsils, Liaquat Pur has high rates in underweight, stunting prevalence.

Table 1.7: Trends in early childhood mortalities (urban/rural comparison)

Sr. No		**Neonatal Mortality rates** per 1000	**Infant's Mortality Rates** per 1000	**Under-five Mortality Rates** per 1000
1	**Pakistan**	55%	74%	89%
	total	62%	88%	106%
	Rural	47%	63%	74%
2	**Punjab**	63%	88%	105%
	total	68%	96%	115%
	Rural	50%	67%	78%

Source: PDHS-2013

Table 1.7 explains the overall urban/rural situation of neonatal, infant and under-five mortalities rates in Pakistan and Punjab. According to this table child mortality rates are higher in rural areas compared with urban areas.

Table 1.8: Trends in early childhood mortalities by Districts (with high rates) in Punjab

Sr. No	**Districts**	**Infant's Mortality Rates** per 1000	**Under-five Mortality Rates** per 1000
1	Pakpattan	130	173
2	Hafizabad	117	154
3	Bahawalpur	100	130
4	**R. Y. Khan**	**98**	**127**
5	Bahawalnagar	96	124
6	DG. Khan	96	124

Source: Punjab Development Statistics- 2015

Table 1.8 shows the comparison among the districts with high rates in infant and under-five mortalities rates in Punjab. In this table district Rahim Yar Khan is fourth high infant and under-five mortalities district in Punjab.

1.3 Significance of the Study

Many factors involved in determining the nutrition level of an individual like availability of food, peoples' purchasing power, employment levels, intra household distribution of food, income distribution, consumption pattern of food, schemes of government and knowledge on nutrition etc. economic development and nourishment have a strong association in two dimensions. If economic development improve then in result nutrition also improve but essentially strong economic growth is derived by nutritional improvement (Measham and Chatterjee, 1999).

As children are the valuable assets of any nation, and their health and welfare is more important for future economic sustained development. Childs development problem refers to the problem of poor health, malnutrition, inadequate psychosocial development and environmental development. For improving the nutrition of children there are three types of economic justifications. The First is that nutrition of child is a public good. Secondly, resource saving can improve children's nutrition. Last third one is that, if the nutrition of infants is batter then their future individual productivity which will further on resulted in investment in human other capital and finally enhances the desirable level.

Pakistan is sixth highly populated country in the world with an estimated growth rate of 2%; its three quarter population mostly consists of women, children and adults whose majority lives in rural areas where poverty, illiteracy and diseases are widespread, and the population density is 231 persons per square kilometer (PDHS 2012-13). In Pakistan, 1/3 part of population live below poverty line and they are unable to provide healthy and nutritious food to their children. Therefore, the malnutrition is alarmingly high below five year of age children, that make child stunted, wasted and underweight and they are unable to participate with full potential in social and economic activities.

In recent times, one of the key objective of vision 2025 (annual plan 2016 – 17) is to reduce the prevalence of diseases, correcting the rural and urban basis and to covering the basic nutritional gap. The eleventh five year plan (2013-18) suggested improving the health and welfare of Pakistanis. It also outlines water, sanitation and hygiene education. These prescribed indicators have also a significant impact upon health of any society. Therefore, the study aims to analyze the impact of socio-economic, maternal, environmental and individual factors on pre-school child's nutrition status in rural Rahim Yar Khan. Better understanding of the socioeconomic background and assessing the health problems facing the households in the district will also be instrumental for policy formulation.

1.4 Research Gap

The review of verious researches (national & international) regarding child malnutrition gives much importance to the factors that afftects the nutrition of pre-school schildren. Review clearly explains that such factors are economic status of the household, mother's employment status, father's employment status, parents education, area of residence, water source, toilet facility available in the household, morbidity of child, age and gender of child, birth order of child, child's birth interval, maternal nutration, medical facility available to households, distance to health services, LHW visits in household, mathers breastfeeding, type of dilevery, electricy and housing type have significant impact on children's nutrition. However, in earlier studies very little attention given to hygine and environment factors in the household. Rare researches emphasise on effect of short term economic migration on child nutritional status. However, only two studies of Srinivasan and Mohanty (2004, 2008) seems that gives much importance on significant influence of household deprivation status on child's nutritional status in India. While none of the studies done earlier in

Pakistan which attempts to correlate deprivational status of household and nutritional status of pre-school children.

Objective of this present new research is to cover the gap which exists in previous litrature in Pakistan giving more importance to enviornmental and hygienic factors. Furthermore, to analzse the relation and impact of household deprivation status and malnutrition among pre-school children of district Rahim Yar Khan by using household deprivation status (HDS) of Sirinivasan and Mohanty (2008). In Pakistan no one has used any household deprivation index which based on socio-economics status of household in child malnutrition. Sirinivasan and Mohanty (2004, 2008) reported that the socio-economic deprivation of household have significant impact on nutrition of pre-school children in case of India. They construct a index which based on the socio-economic deprivation of household. The deprivation index was created on real, physical and social possessions in three dimention. First one is basic economic assets and second one is basic amenities of life and third one is basic communication with outside the world. Currant research is undertaken to measure nutrition status of pre-school children in rural Rahim Yar Khan.

1.5 Statement of the Problem

Most of the rural areas of Punjab province are underdeveloped because of high rural-urban disparities along with the gender disparities in nutrition among the rural pre-schooling children. (MICS, 2014) shows that in Punjab there are 33.7percent are underweight, 33.5percent are stunting and 17.5percent are wasting and comparing this with Rahim Yar Khan where 46.8perecnt are underweight, 45.3percent are stunting and 21.6percent are wasting. MICS (2011, 2014), reports tells that the rural pre-school children are more tentative block in coming-out of "under-nutrition trap" after entering into adolescent and adulthood stage as compared with pre-school urban child. Similarly the vaccination coverage is comparatively high in urban areas of Punjab as compared to its rural areas. This leads to the risk of malnutrition.

This study focuses on rural areas of District Rahim Yar Khan. Rahim Yar Khan is one of the important district of Punjab which captures a clear sketch of Punjab's rural life because it comprises its 78.5% people in rural areas. Due to rural-urban disparities this district suffers severe conditions of malnutrition. Evidently, (MICS 2014) showed that 41.6percent are stunting happens in children of age 48 to 49 months.

The objective of the current study is assess the impact of socio-economic conditions on pre-schooling child's nutrition status in rural areas of Rahim Yar Khan District.

1.6 Objective of the Study

1. To explore the socio-economic determinants of Pre-school children nutritional status in district Rahim Yar Khan.
2. To examine the current status of malnutrition among pre-schooling children in Rahim Yar Khan.
3. To analyze the relation of household deprivation status and malnutrition among pre-school children of district Rahim Yar Khan.

1.7 Hypothesis of the Study

1. In rural Rahim Yar Khan, socio-economic factors affecting pre-school child's nutrition status.
2. There is solid association among the deprivation status of household and pre-school child's nutrition status.

Chapter-2

Literature Review

Healthcare and nutritional of children is one of the important element for assessment of quality life of the people. The key for good health is access to the healthy diet and ideal nutrition. sufficient nutrition is necessary for the walfare of individuals. The is a strong link between adequate nutrition at one side, and health and survival on the other side. Following review of literature focuses on the health concequences of malnutrition among children. The review of litrature is divided into two sections; national and international.

2.1 National Articles Review

Anwer & Awan (2003) examined the differences in life style, nutrition and economic condition among population of Faisalabad by region (rural/urban) and gender of child wise. In 2000-2001, children of both gender between ages 6-12 years were the respondents of study data in primary schools. Total sample were 2042 children (1189 female, 853 male). The objective was to study for being underweight, stunting and wasting. Chi-squared test was used. In results, 36.1 percent children was stunted, under-weight in children was 45.3 percent and further wasting was 25.2 percent in children. In children of urban area this percentage was 33 percent stunting, 32.3 percent was under-weight and 32.7 percent was wasting. These percentages was higher in rural areas compared to urban areas. The results of study revails that malnutrition in female children was higher than male children.

Arif (2004) assessed weight for age and height for Pakistani children focus on two factors malnutrition and morbidity. Pakistan Social-Economic Survey (PSES) data for year 2000-01 were used and the sample size consisted of 4021 households in the study. For under-weight and wasting equations, least square regression was employed. Separate estimation among three age groups which are 0-5, 6-23 and 24-59 months, logistic regression was employed to measure illness among these groups. The result shows that there is positive association among illness and age of child. Child health and immunization also show positive association. Education of mother have great positive impact on nutrition of child. Study concluded that poverty is main cause of malnutrition.

Asma Arif and G. M. Arif (2012) examined the impact of different Socio-economic factors on child health in Pakistan. They used 2004-05 PSLM Survey to measure the factors of child morbidity among the children of age (0-4) years. The total sample of children where 13540. Further they divided the sample divided into nine agro-climatic zones of rural areas and it also includes two classifications of urban

areas: MUCs and OUCs. By using multivariate analysis they concluded that income, land and livestock ownership had much positively impact on child health, especially in rural areas.

Arif et al (2012) conducted a study to measure the trends and determinants of malnutrition in Pakistan. Pakistan panel household survey (PPHS, 2010) was used to measure the empirical results. They mainly focused on children, households and community variables to measure the differences in nutritional status. To understand malnutrition child illness, health status of mother and poverty status of household were used as key variables. Their findings determined that both poverty status of household and its dynamics are not important determinants of children malnutrition due to some basic reasons. Illness like diarrhea reduced the ability of child's body to convert food into energy that severely caused to malnutrition.

Babar et al (2010) piloted a primary survey at Lahore using random systematic sampling technique for sample collection to investigate the impact of socio-economic factors on nutrition status of child among public and private primary school age 5-11 years. For measuring the nutrition status of child, NHANES reference populations were used in relation to BMI. Results show that, nutrition status was batter in those children who belongs to upper socio-economic class family rather than in poor socio-economic status family. Prevalence of malnutrition was high among those children whose mothers were illiterate. Poverty, low literacy rate, food security, food safety, and education of mother were appears important factors which was contributing in poor health status in low socio-economic class.

Cesare et al (2015) analyzed the relationship among food security and socio-economic status of household with nutrition status in Pakistan at district level. He used the data of Pakistan National Nutritional Survey (PNNS-2011). This data was consisted on measurement of anthropometry of 33638 under age five years' children and 24826 women of child bearing age. He used the Bayesian spatial technique to estimate the stunting, underweight and wasting prevalence in children and of under-weight, over-weight and obesity in women for all 143 districts of Pakistan. The results for prevalence of stunting showed that in Pakistan's districts ranged between 22% (95% credible interval 19-26) and 76% (69-83); the lowest figures for wasting and under-weight were both less than 2.5% and the highest were 42% (34-50) for wasting and 54% (49-59) for under-weight. In 106 districts, more women were over-weight

than under-weight. In 49 of these districts, more women were obese than were under-weight.

Fikree (2002) conducted a rural study Balochistan, NWFP and FATA which are the least developed provinces of Pakistan. The main objective of the study was to assess the level and cases of neonatal and post-neonatal mortality. They conducted survey of 54843 households. Verbal autopsy interviews were conducted for infant deaths reported for previous year. The finding of the study indicates that infant mortality rate from all the sites was 99.7 per 1000 live births. Neonatal deaths contribution to all infant deaths was much higher for NWFP (67.2%), while in Balochistan (50.8%) and in FATA (56.8%). Almost 70% deaths occurred in early neonatal period. Three main clinical cases of infant deaths were Diarrhea (21.6%), tetanus (11.7%) and acute respiratory infections (11.6%). Furthermore they gives important to maternal and neonatal health.

Gul and Kibria (2013) conducted across sectional study two rural communities of Peshawar (Sarband and Pishtakhara). They were selected a sample of 200 respondents. Applied maltistage sampling technique to collect sample. To collect data from mothers and under 3 age children for collecting information face-to-face, a re-tested questionnaire were used. The amount of male childern were 121 and female were 79 out of sample of 200 children. In results, malnutrition were observed in 3 grades of 50^{th} percentiles which were antropometric measurements standards of harvard. Majority of children were in age of 0-2 years. Out of 70 malnourished children, 24.3% children were in grade 1 category, while 32.8% children were in grade 2, while 42.8% were in grade 3 category. At end they found socio-economic factors that forces to malnutrition were large family size 87.1%, poor socio-economic status 67.1 %, illiteracy of mothers 60%. Meternal factors were younger age group 41.42%, multiparity of mothers 55.7% and meternal anemia 72%.

Ghazala Mansori (2006) examined the impact of temporary economic migration by a rural household member on child growth by age and sex of child. The study used the data of Pakistan Rural Household Survey (PRHS) 2001-02. Across four provinces, data consist on 16 districts, 143 villages and 2531 rural households. For child growth measures she estimates weight for age (WAZ) and height for age (HAZ) of children. In this study the children were taken between the ages of 6 months to 10 years. The finding of OLS estimates of migration indicate that the girls who were born before first migration in same household was much worse on height for age

(HAZ) compared with the girls who born after the first migration, but this migration has no impact on height for age (HAZ) of boys.

Jamal H. (2012) constructed deprivation index to represent the sectoral deprivation for examined household socio-economic disparities between provinces and districts of pakistan using (PSLM) data for the year 2005, 2009 and 2011. This index consisted on 17 variables and divided into five groups, and they were education, health, housing quality, housing services and household wealth. Overall index for all these five group combined were Multiple Deprivation Index (IMD). Empoyed Geometric mean and found that 30% population were deprived in 2011 and rural IMD were estimated 37.7 while urban IMD remained at 13.7. He found that Rahim Yar Khan district were in high deprived category. The estimated IMD for Rahim Yar Khan were 39 and it stood 33 in provintial rank in Punjab.

Khattak and Shah (2010) assessed the nutritional status and associated risk factors in preschool aged children in district Swabi. The total sample of children was 140 (both male and female) which are assessed for the nutritional outcome. In this study correlation analysis were used for checking the association among malnutrition with income of parents, children's numbers with in family and family size, child's gender and Z-score for the age, weight/age and weight/height. Results of the study showed that there is no significant difference among sex, weight-for-age and with age-for-height. In all the cases weight and height measures was lower than the third percentile and shows that the children are underweight and stunted. In every case, mean Z-scores (i.e, -score for age-height and age-weight, sex-height and sex-weight and height-eight) were different. Furthermore, there was found a strong correlation among malnutrition with size of family, income of parent and number of children in family of rural area.

Khuwaja et al (2005) examined the impact of stunting in rural southern Pakistan between 6-12 age children in schools. The sample size consisted on 32 primary schools of rural Sindh and data on height and weight of 1915 children was taken who were enrolled in these 32 schools. For measuring stunting, under-weight and wasting z-scores was calculated. The results show that, out of 1915 children, stunting in children was 16.5 percent. Stunting prevalence in female child was more as compared to male child. In male children stunting prevalence was high among higher than seven years aged children. Stunting rates was high among those children whose father working status was government employment, farming and shopkeepers

compared with landlords. In rural Sindh working status of father, child's age, gender of child was risk factors which contributing to malnutrition in children.

Mian et al (2002) examined the nutritional status of school-aged children living in an urban squatter settlement in Islamabad, Pakistan. He selected 200 children aged 5-10 years through systematic random sampling technique. The results show that, 29.5% children were under-weight, 35% were stunted and 13% were wasted. Overall 44% children had one or more of under-weight, wasting or stunting. Further he explained that 15.4% children were severely malnourished. Malnutrition prevalence significantly higher among older children than larger, in poor households.

Shah et al (2003) analyzed the impact of stunting prevalence on the base of sex bias in villages of southern Pakistan more focusing on rural remote areas. Employing the stratified random sampling technique, 64 villages was selected and among these villages, data taken from 1878 children of under three year age in rural Sindh. Z-scores for stunting and wasting were estimated. The result shows that out of total children, 26% were wasted, 55% were stunted and 15% children were both stunted and wasted. The results show that stunting prevalence among male children was more compared to female child. Furthermore, stunting was high among the children of illiterate mothers and among those fathers who earn less than 1000 rupees per month.

Uzma Afzal (2012) assessed the child's health and nutritional status in Punjab. She mainly focused on socio-economic factors which affects the child health. She used the data of Multiple Cluster Survey 2007-08 and applied two stage least square approach. The result of the study show that among the other important factors, health knowledge and education of mother are most significant factors.

2.2 International Articles Review

Srinivasan and Mohanty (2008) studied the correlation of household deprivation with the utilization of various health services and health outcomes magnitude that how the household deprivation stages impact on health outcomes, even when controlling the health services availability. They were used the data sets of three National Family and Health surveys of India which are; NFHS-1 (1992-1993), NFHS-2 (1998-1999), and the NFHS-3 (2005-2006) and examined trends in the deprivstion levels over the period from 1992 to 2006 and check the association between household deprivation levels with child health and reproductive health indicators. Household deprivation score (HDS) were found significant correlation

with several health related variables like as; women BMI in a household, nutritional intakes such as milk or other types of proteins, and utilization of health services by member of household. Poor health conditions are significantly affected by deprivation in basic aminities at household level. This HDS created on the base of availability of some basic aminities to a household. It was calculated in term of their usefullness in evaluating the public health utilization and their influence on some basic health indicators like; immunization of child, birth rigistration, child-malnutrition, prevelence of child antenantal care for pregnant women, women nutritional intakes, medical attention at the time of delivery, and use of contraceptives. They analyzed urban and rural area wise for whole india. They checked malnutrition situation spacially in three states of India in three dimensions in health facilities. 1) Tamil Nadu which was found most effective in health systems and in public health programes, in this state prevelence rate of malnutrition was 6.4% between childern under age 3. 2) secondly in Maharastra state which considred middle level in health programes, this rate was 11.9%, 3) thirdly in Uter Pradesh which considred at least effective in public health programes, the rate was 16.4%. they found that HDS was very vital variable that influencing child's nutritional status. By 2005 deprived category, the results of malnutrition in rural areas were 55% children < 3 were malnourished, while in urban the acounts were 54%, and these results were compared with rural urban areas of not deprived category 41% and 28% respectively. These results were pridicts that prevention of malnutrition and child's growth, the capability of some basic amenities at household level contributes significantly. Results also showed that consumption of food and essential proteins were very low in deprived category with compared to not deprived household category. 19.7% Women of rural areas in deprived category never consumed milk or cured, on the other hand these results were 10% in not deprived category. At the end it was found interesting that in relation to child malnutrition in all three states household deprivation remains significant factor.

Srinivasan and Mohanty (2004) In their study 'Health care utilization by source and levels of deprivation in major states of India: Finding from NFHS-2' constructed househod deprivation index using six variables which are i.e. Audult litracy, type of house, electricity facility in house, drinking water facility in rasidence, availability of radio or T.V and land ownership. They examined the validity of this simpler index, how the household distributed by deprivation levels and how the utilization of health services and nutritional status of women and children differ under

the different levels of household deprivations. Cirtified this index with womens and child's nutritional status and food intake in the household to analyze different use of general healthcare and family planning services in urban and rural areas of main states in india from socio-economic class of population. National Family Health Survey (NFHS-2) data were used during the year of 1998-99. The results were that, 4.3% households were in "abject deprivation" in rural areas with none of the six characteristics which were discus in deprivation index and 31.5% households were in "(AD+MD)" deprivation. In the urban areas these proportions were 1.2% and 10.7% respectively. Scores' validation of deprivation were based on malnutrition which were measured in BMI of married women in household, nutritional intake of milk or curd, or pulses or beans by used by the househod. The prevalence of undernutrition in household in rural areas, measured in proportion of women BMI level blow of 18.5 were relatively heigh in deprived households (AD+MD) were at 47-48% and decline gradually for JAD and WAD groups reached nearly to 25.8% with a score 6 between the household. In urban areas, their were steadily decline in undernourishment in children according to deprived score which were from 51.5 % at 0 to 13.5% at score 6. They concluded that deprivation measured in term of social and physical amenities and they relates with consumption of healthy food, consumption of dairy proteins like milk or curd, consuption of vegetable proteins like in form of pulses and beans. These consumption pattrens leads to declines in undernourishment of women which leads to decrease in child malnutrition.

Anwar et al (2013) studied the relationship between mother education and nutrition status of children in Bangladesh by using demographic and health survey of country. Through BDHS 2007 all indicators of malnutrition estimated separately for all six divisions of country. In the study only education of ever married women was taken for measurement that has at least one alive child. Various parameters, such as socio-economic status, health knowledge, attitude towards the utilization of health care services, women empowerment and reproductive variable were used to measure the nutritional status of children. Results through descriptive statistics determined that 71%mothers were illiterate or have less than primary education and 65% children were stunted. Results through logistic regression determined that higher maternal education reduced the risk of stunting.

Alasfoor et al (2007) were completed a study to measure result of national survey for protein energy malnutrition among children in Oman. PEM (the Protein

Energy Malnutrition) were considered as most deadly form of the malnutrition. It is considered that PEM is major health problem in Oman. For the calculation of national health sample of 0-5 year children was selected from each region of Oman and in each region data was collected randomly from district hospital local hospital an two large and small health centers. Total sample size was 19440 children that were measured according to UNICEF standard survey method. The results of the study revealed that average rate of stunting, wasting and underweight among different age group children were 10.6%, 7.0% and 17.9% respectively. Regional estimation determined that malnutrition varied from one region to another region.

Bantamen et al (2014) assessed the factors associated with malnutrition among children less than five year of age in Machakel Woreda, Ethiopia. Structured questionnaire was designed to collect information about child characteristics, socio-demographic factors, child caring practices and environmental factors and consecutive sampling technique was employed to collect data. Logistic regression analysis was employed to measure the consequences. Result determined that 201 control and 102 cases were included in the study. Majority of the mother occupation both in case and control were housewife 90(88.20%) and 139(69.20%) respectively. Those children whose family used drinking water from unprotected sources was 3 time more malnourished as compared to other who were using clean drinking water. Children with father illiteracy were 5 times more likely to have malnutrition and diarrhea was a leading cause of mortality among children through dehydration and malnutrition.

Babatunde et al (2011) studied the determinants and prevalence of malnutrition in Kawara state of Nigeria among farming household children. In Nigeria malnutrition is high due to provision of inadequate food supply and differences vary from rural to urban area of country. They collected data from 40 rural villages of the states. For the calculation of empirical results they used the method of descriptive regression analysis on the sample of 127 children. Following determinants were used to measure malnutrition such as gender age, education and body mass index of mother, calories intake by households, access to clean drinking water and toilet facility. The results revealed that almost 23.6% children were stunted, 22% were wasted and 14.2% were underweight in Kawara state. Results concluded with two implications that through mother education and excess to clean drinking water can reduce malnutrition at some extent.

Choudhary et al (2003) conducted the community based study to assess the nutritional status of adolescent girls in Varanasi district of India. Total sample size of the study was 267 children and cross sectional data was used for measurement. Various tools such as anthropometric and BMI measurement were used to examine nutritional status children. Results of study revealed that almost 2/3 children were undernourished and almost 1/3 children were experiencing CED grade 3(BMI<16) and almost 1/3 of the children were suffering in anemia and was significantly more in non-menstruating girls that was causes to footwear defection. Results of clinical estimation determined that almost 53% adolescent girls were surviving normally. While 13.70% have vitamin A deficiency. Another most common assessment method, anthropometric indices indicated that almost 68.5% girls were undernourished according to WHO criteria of malnutrition estimation.

Choudhury et al (2000) studied malnutrition in Bangladeshi children in rural areas. The main purpose in study was to measure association among nutrition of child and in gender inequality by using socio-economic demographic and health factors. Total area of the study was based on five unions for the collection of data. Systematic random sampling was used in which 6-60 months children were included and measurement of mid-upper arm circumference was taken from 2016 children aged less than 5 year. MUAC was used as indicator to measure the child's nutrition status. These children were categorized into two groups. Severally malnourished with MUAC less than or equal to 125mm and others were not severely malnourished with MUAC greater than 125mm. independent variables were based on children characteristics (age, sex etc.) and household characteristics. For the analysis of data both bivariate and multivariate techniques were used. Results were categorized into four parts. Results reveal that compared to boys the girls are much more severe malnourished. Furthermore children who not received DPTI was more malnourished as compared to those children who receive DPTI. Education and age of mother was significantly correlated with severe malnutrition in children. Similarly, the independent variable of gender inequality irrespective of age, acceptance of immunization and education of household etc. causes to severe malnutrition.

El- Syed et al (2001) conducted a study in Alexandria, Egypt to measure malnutrition among pre-school children aged 6-71 months and to determine its collateral. For this purpose cross sectional study was conducted in 1998 in Alexandria. Two stage cluster sampling technique was used to collect data that was

based on the probability proportionate to the size of population. To extract data on socio-economic factors, environmental factors, gastrointestinal morbidity and respiratory morbidity scores, principal component factor analysis was applied. Total sample size of the study was included 1217 children in which required sample size was 1200 children. Findings through logistic regression technique determined that underweight was observed 7.3% and lower risk of underweight was associated with higher socio-economic status. 15% 0f the children were stunted (16.8% male, 13.1% female) increased birth order and poor environmental conditions were associated with higher rate of stunting. The increased age of children and living in non-squatter areas were highly associated with lower prevalence of wasting. In this study wasting was measured 3.6 %(3.8% male, 3.4% females). At the end it was recommended that improvements in socio-economic and environmental factors are necessary to reduce protein energy malnutrition (PEM).

Harika & Vijayasree (2016) examined the study in which they assessed the nutritional status and mental development of the preschool children at Guntur District, Andhra Pradesh, India. They collected the data from 25 preschool children in the age group of 3-6 years preschool children. They were conducted Games, storytelling, Rhymes telling and Quize programmes etc. for psychological developments in children through human development strategies. Diet survey was carried out by weighing method. The average dietary intake of food per item was calculated and compared with the Recommended Dietary Allowances of India. The results show that in physiological development 24.05% of the Children were active, 40.0% were normal and remaining 36.0% were dull. In emotional development 32.0% of the children was seemed to be fear full, 12.0% was anger and 56.0 % were in normal. In intellectual developments 20.0% of the children showed lack of concentration, 28.0% were showed lack of attention, 20.0% of the children were shown span of attention in a given time and 32.0% children were showed memory power. In social developments 28.0 % of the children were showed cooperation, 24.0% were showed Friendliness, 40.0 % of the children were mingling with others and only 8.0% of the children had helping nature.

Harishankar et al (2004) conducted a study to measure malnutrition among children less than 6 year of age. To assess the magnitude of malnutrition, factors associated with malnutrition and determination of preventative measures to combat the problem of malnutrition were three major objectives of the study. Stratified

multistage sampling technique was designed to collected data from selected study units and data was collected from the rural area of Allahabad in 2002. Anthropometric measure like height and weight were used to measure outcomes and some background characteristics like caste, religion, socio-economic status, environmental factors and sources of drinking water were used as explanatory variable. Total sample size of the study was 436 children in whom 427 were Hindu children and 9 were Muslim child. Results determined that overall prevalence of malnutrition was 32.2% in age group 13-24 months and maximum prevalence of grade 1 malnutrition was found in 37-72 months children. Mother education and child birth order was positively related to malnutrition. Malnutrition increased with increase in birth order. It was 43.5% in birth order three and 20.5% in birth order one. Paper was ended with several policy measures e.g. excess of safe drinking water, improvement in women education and health awareness program.

Khan & Raza (2014) examined the determinants of Bangladeshi children nutrition status by using CIAF index. The main purpose to conduct study was to analyze factors that affect rural and urban area child's nutrition. 1831 observation of urban and 3427 observations of rural area children were taken from BDHS to analyze the results. Several dependent variables such as wealth index, mother education, BMI, number of children, mother feeding, incidence of Diarrhea and household size were used as major determinants. Cumulative measure CIAF was used as dependent variable to measure the stunting, wasting and underweight. Binary logistic model was chosen for empirical estimation. Results determined that in country there exists high rural-urban disparity that causes to difference in results in both regions. 47.9% of malnutrition existed in urban area and 58.7% in rural area. Wealth index and BMI (thinnest) showed positive impact in both rural and urban area. Diarrhea and lower duration of breastfeeding enhance the probability of malnutrition in both regions. Results were ended with recommendation that longer duration of mother feeding and good nutritional status of mother can help to eliminate malnutrition.

Shahjada et al (2014) studied the effects of birth interval on nutritional status of children in Peri-urban area of Madhya Pradesh, India. Major purpose of her research was to find association among birth interval with nutrition of children. Shorter birth interval affected adversely on infant micro-nutrient and Brest milk intake. Cross sectional study was designed for calculation of empirical results in which urban health and training center, index medical college hospital and research

center Indore (M.P), India were major practice areas for calculation of data. Total sample size of 500 children was taken in which 1-5 years of children were included in which 248 were male child and 252 were female child. Results revealed that most of the undernourished children were due to lower birth interval (<24 months) . children with lower birth interval <24 prevailed stunting, wasting and underweight of 51.03%, 42.78% and 57.21% respectively as compared to children who have birth interval more than 48 month and contain stunting, wasting and underweight of 29.62%, 22.22% and 25.92% respectively. These result showed that longest birth interval is positively related to good nutrition status.

Irena et al (2011) studied that diarrhea causes to acute malnutrition and kill children in Lusaka, Zambia. In sub-Saharan Africa child mortality due to acute malnutrition is unacceptably high. Cohort study was designed by involving children under age 6-59 months who were suffered in Severely Acute Malnutrition (SAM) admitted to Zambia university teaching hospital from August to September 2009. Data was collected by using instrument that was used for weight for age measurement and through structured questionnaire. Results showed that 55.3% of the admitted children were boys and in these children quarter were 6-12 months old. While, Median age of cohort was 17 months and median length of the cohort was 9 days. Almost 67.3% children were suffered in diarrhea in which one half of the children 69.9% were suffered in edematous form of malnutrition. Result determined that 97.0% children showed HIV positive. Results through Multivariate logistic regression described that sex age and admission fever had not affected on survival. HIV infection was associated independently with mortality after adjusting for nutritional status and diarrhea. Despite to all possible measures, the limitation of this research was, mostly children in the sample size were less than 18 month and lack of Key socio-demographic data causes to serious short coming in the results and HIV results used for measurement of results were not confirmed by PCR.

Njuguna and Muruka (2011) studied the relationship between diarrhea and malnutrition in Kenya district by correlational study. For this purpose study was designed on the basis of routinely available data collected by Kenya government. The data was gathered on a range of issues including the proportion of children less than 5 years that were at the risk for malnutrition. The data was analyzed by using descriptive and correlation analysis. Results determined that mean distance to the nearest water source was 4.3 km and 24.7% children contained the risk of

malnutrition.8.7% children suffered in diarrhea each month and only12.8%of household have accessed to latrine at the end of 2009. The partial correlation results determined that there exist positive and strong correlation between diarrhea and malnutrition.

Silveira et al (2010) investigated the malnutrition in children in Maceio, Brazil who living in substandard settlements and further the relationship among malnutrition and environmental factors and nutrition of mothers. Population based cross sectional study was organized by using a probability sample of mothers and children. Assessment variable was child malnutrition that was measured by a z-score $\leq$-2 for the height for age. Results determined that 8.6% children were suffered in moderate and severe malnutrition. With regard to mother nutritional status 38.8% were short heighted and 45.6% were overweight. Mother sorter height caused to double burden of malnutrition in their children.

Ibrahim &Alsheikh (2010) conducted a study in the Kharton to measure the impact of feeding practices on the prevalence of under nutrition among children under age 6-59 months. Cross sectional community based descriptive study was designed to measure the prevalence of under nutrition due to feeding practices. Data was collected by using two stage clusters sampling to take interview and fill questionnaire from household and caretakers. Total sample of 786 household was selected for data analysis. Anthropometric measurement technique that was categorized according to WHO guidelines to measure the nutritional status of children is used for analysis. They used several factors such as improper washing food, washing hand after cough, food exposed to insects and not washing hand after handling rubbish etc. were used to measure nutritional status. Results revealed that prevalence of acute malnutrition was 19%, Underweight was 35% and chronically malnourished children were 51%. Results also determined that poor feeding practices may also cause to higher risk of prevailing malnutrition. Results showed that wasting among breastfeed children was 8% while non-breastfed children was 25%, underweight among non-breastfed children was 41% that was much higher than the children with breastfed 21%and stunning among non-breastfeed children was 48%.

Rayhan & Khan (2006) studied the factor that causes malnutrition among children in Bangladesh. The nutritional status of children is most sensitive indicator for both country economic condition and health status. They have used Bangladesh

demographic and health survey (BDHS 1999-2000) to measure impact of social, economic, demographic, health and environmental factor that effect on the nutrition of children. Multivariate regression technique 'Cox's linear logistic regression model' was used to measure the results. Their findings suggested that mother feeding, mother education, father occupation and environmental factor such as no excess to safe drinking water and toilet facility were strongly related to cause stunting, wasting and underweight.

Mahgoub et al (2006) organized a case study of Botswana to measure the factor that effect of the prevalence of malnutrition in 3 years of age children. Malnutrition is a common phenomenon in developing countries that effect on physical growth, cognitive development, reproduction, mortality ad working capacity of children. Their major objective was to evaluate the social, economic and demographic factors of household on nutrition of children. To measure results they collected cross sectional data from 23 states of Botswana in which 400 households and mothers contributed in the survey. Results determined that malnutrition was significantly lower among girls as compared to boys and mother education was inversely related to malnutrition. Finally they concluded the results with suggestions that factor related to development outcomes such as maternal income, maternal education and creation of employment opportunities can reduce malnutrition.

2.3 Conclusion of Literature Review

The review of verious researches (national & international) regarding child malnutrition gives much importance to the factors that afftects the nutrition of pre-school schildren. Review clearly explains that such factors are economic status of the household, mother's employment status, father's employment status, parents education, area of residence, water source, toilet facility available in the household, morbidity of child, age and gender of child, birth order of child, child's birth interval, maternal nutration, medical facility available to households, distance to health services, LHW visits in household, mathers breastfeeding, type of dilevery, electricy and housing type have significant impact on children's nutrition. However, in earlier studies very little attention given to hygine and environment factors in the household. Rare researches emphasise on effect of short term economic migration on child nutritional status. However, only two studies of Srinivasan and Mohanty (2004, 2008) seems that gives much importance on significant influence of household deprivation status on child's nutritional status in India. While none of the studies done earlier in

Pakistan which attempts to correlate deprivational status of household and nutritional status of pre-school children.

Chapter-3

Theoretical and Conceptual Framework

For health life and health access to healthy and batter diet and optimal nutrients are important. Optimal nutrients means batter immune system, lesser illness and diseases and strong and batter health. Developing countries like Pakistan are suffering from under-nutrition and micronutrients malnutrition. The adverse externalities are uncountable particularly in young are group. The main public health concerns of developing countries are infectious diseases among pre-school children and deprivation in nutrition (UNICEF, 1998; WHO, 1999; Kuate- Defo, 2001). In poor communities and countries, poor nutrition and poor health of child causes the long-term economic and human development cost. It is not only a moral duty to improve child's nutrition and health but it is also a long-term rational investment. Pre-school children are vulnerable group of society, so the current study focuses on this age group.

3.1 Theoretical Framework

To understand the etiology of malnutrition is difficult. In children poor nutrition is caused by my factors such as environment, health related factors, psychological, economic and social factors. This study uses the utility maximization model of household's theoretical framework to assess the nutrition status in children. For the modeling for determinants of nutrition status of children, the assumption set that each children live in a unit called household, further the household maximize a utility function as follows:

$$U = u\,(H^i, F^i, Z^i, L^i) \ldots\ldots\ldots (1)$$

According to this model, utility of household depends on individual's nutritional health (H^i), consumption of food and nonfood expenditures (F^i, Z^i) and individual's leisure (L^i). All these factors are defined in several dimensions (Garcia & Alderman 1989). Maximization model of utility based on several constraints such as income or budget constraints and health-nutrition production function. Several implicit and explicit characteristics are related to produce health and nutrition of children Health-nutrition production function depend on consumption of food (F^i), the time devoted for the child care (T^i), individual child's characteristics (C^i) i.e. age, gender and genetic endowments etc, parental and household characteristics (M^i) i.e. mother education, head of household, income of household, Community level characteristics (E^i) i.e. place and region of residence and environmental factors sanitation and sewerage facilities, and (u^i)is a random term (Arif 2004, Garcia & Alderman 1989, Arif et.al 2012).

However, the health-nutrition production function for child is formalized as follows,

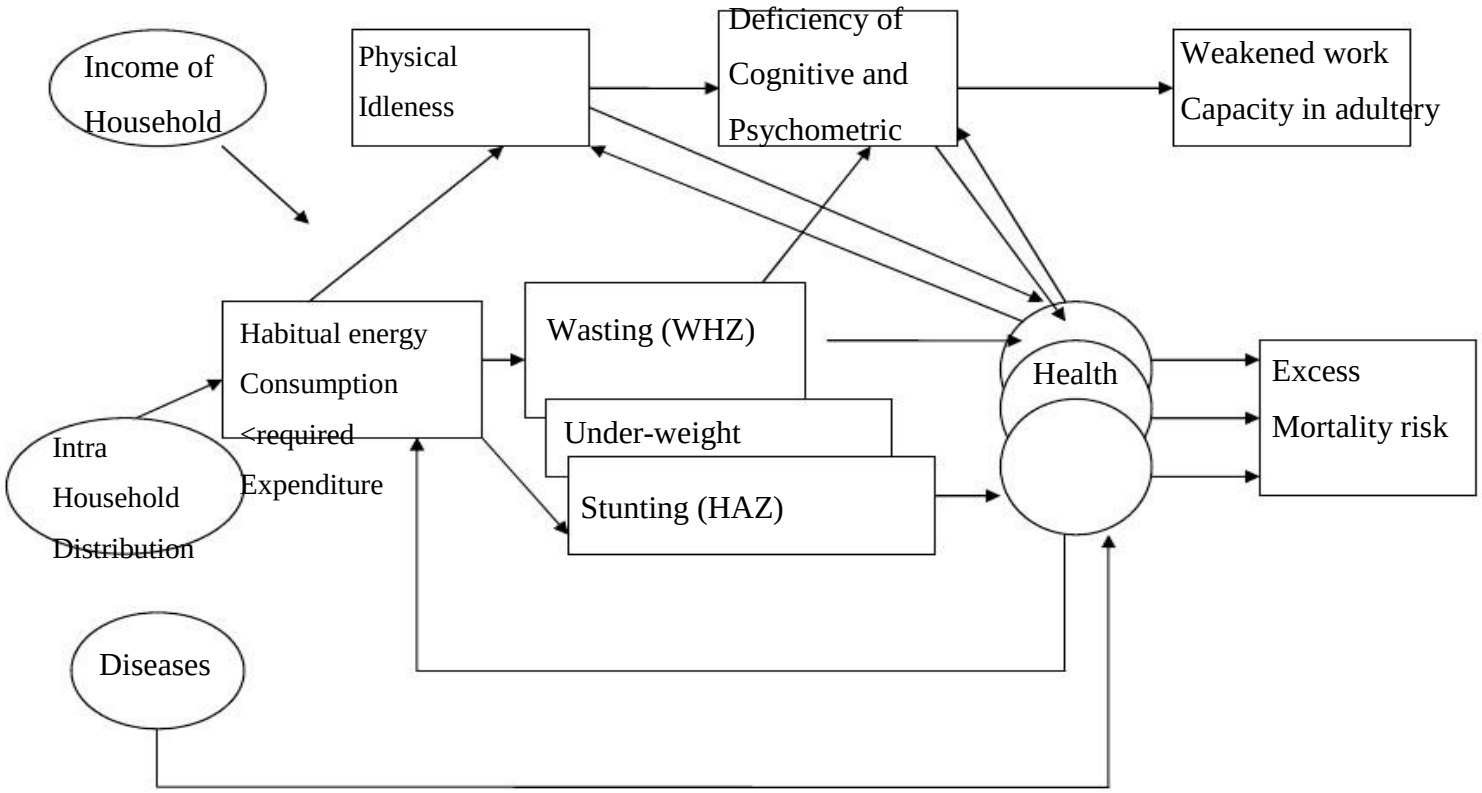
$$N^i = n\,(F^i, T^i, C^i, M^i, E^i, u^i) \ldots\ldots \quad (2)$$

(N^i) is taken as standard measurement of anthropometry, height for age z-score (HAZ), weight for age z-score (WAZ) and weight for height z-score (WHZ). These three are used as standard measure of nutritional status of children recommended by World Health Organization (WHO).

3.1.1 Under-Nutritional Measurement Approaches

Under nutrition is assessed by different approaches given in the following figure. Column 1 in the figure in the left side, measures the causes for under nutrition in individuals by different indicators. Different factors are listed in column 2-4, which affect the under-nutrition. Energy balance of a person's is explained by three levels. In column 2, one is to estimate the energy intake or direct expenditures and the second one is to illuminate the anthropometric calculations and their reasons which are indirectly reveal an inadequate energy balance. In column-3, third is to catch the measurable factors of adverse consequences of low energy balance. While in four column, the complete figure reveals casual relations in economic-nutritional-health-complex (Svedberg, 2000).

Figure 3.1: Reasons, Consequences and Symptoms of Under nutrition



Source: Peter Svedberg (2000) Poverty and Under-nutrition: Theory, Measurement and Policy.

3.2 Methodological Issues

Measure the malnutrition prevalence in vulnerable groups of community, two approaches are mainly used. (i) Nutrition or calories consumption approach (Sukhatme, 1977, 1982; Gopalan, 1992; Seckler, 1982), and the second one is (ii) Anthropometric approach or health outcome (Strauss and Thomas, 1995; Kakwani, 1997; Svedberg, 2001; Pal, 1999; Osmani, 1992). First approach which is calories intake approach reflects one nutritional component only energy contents in food items. While for long-term and over the years second measurement approach which is anthropometric approach is better measurement approach than the first one. Present study only use anthropometric approach for child's nutritional measurements because this approach considered as more reliable than calories consumption approach on following estates.

1. In energy/calorie consumption approach, data on major food consumption items from last 7 or 30 days taken from households. Calories intake approach ignore/overlooks the calories requirements of an individual in term of gender and age. It ignore the variation of some aspects such as work nature, current health situation of an individual concerned and body weight etc.
2. In this approach a person considered as undernourished if required energy consumption is below the standard. It does not value the possessions of inter-personal and intrapersonal energy requirement differences. In a specific and given period energy intake requirements of one person may be differ from time to time because of change in the work pattern changings, climate conditions and health condition of an individual. This intake requirements may be vary because of genetic differences within the same age and gender group.
3. Energy intake diet is basically is not a balanced diet which contains adequate protein amount and other nutrients such as minerals and vitamins etc.

Nutritional measurement through energy intake approach is poor tool to assess the nutritional status of children because nutritionists argues that this tool is weak because it depends not only on nutrition intake but also depends on non-nutrients food attributes (Martorell and Ho, 1984). It is suggested that malnutrition assessment would be based on outcome measurement but not on input measure. Recommended outcome based measurements contains anthropometric measurements, biochemical factors, signs of malnutrition in clinical way and physical activity. More closely

related to the health are outcome indicators. Clinical and biochemical indicators are only useful in case of extreme level of malnutrition otherwise anthropometric measures are outcome measures that are sensitive in even minor level of malnutrition.

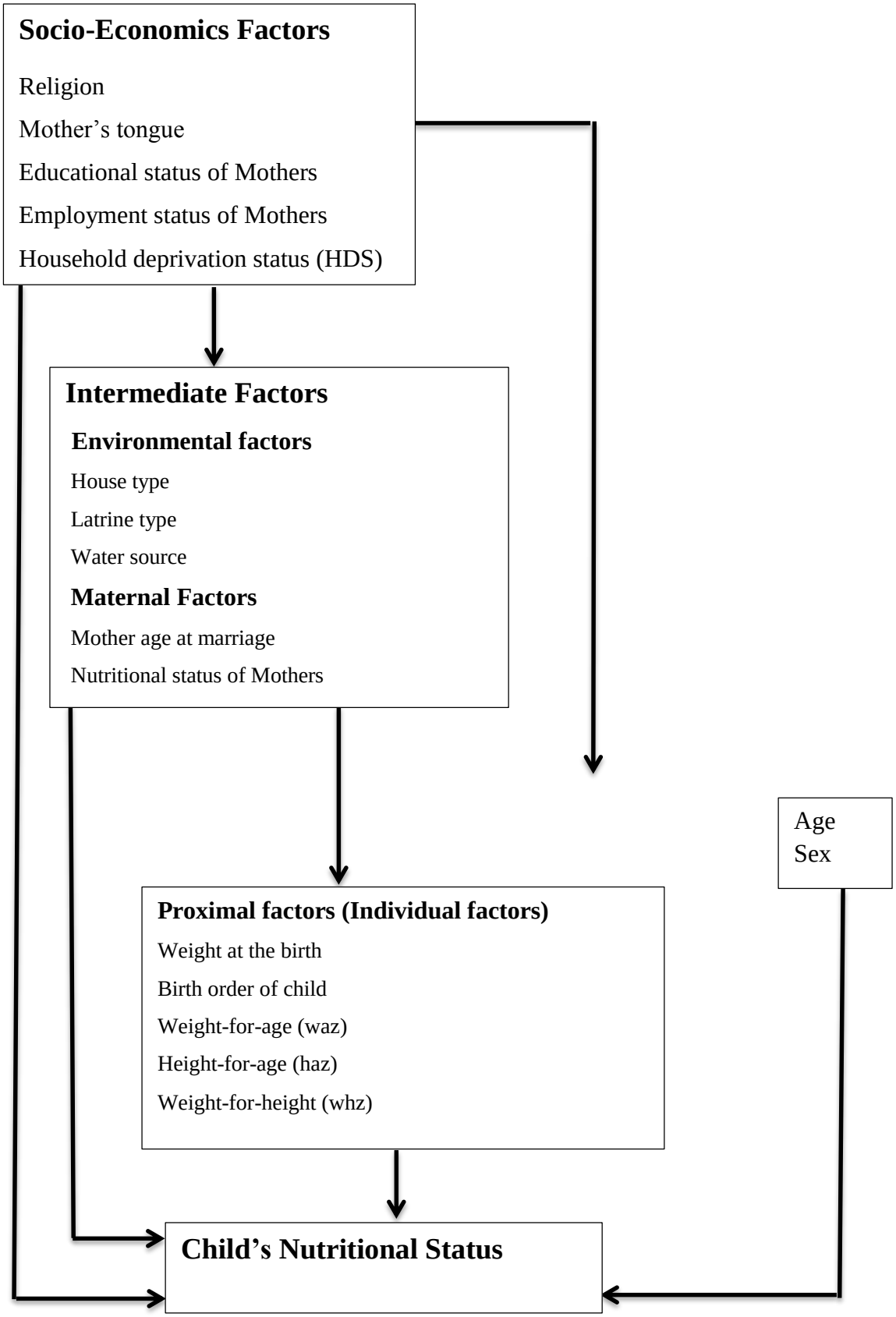
Most of the modern nutritionists and development economists argues that calories intake approach is not a good and standard tool for measurement of under-nutrition, so this approach should not apply for detecting malnutrition in individuals. They believe that measurement of anthropometric deliver more reliable and useful signs of nutritional status measurements.

On the base of above arguments, anthropometry approach is more consistent and reliable than energy intake approach, it also counter past nutrition status in term of under-weight, stunting, wasting, body mass index and mid upper arm circumference. It is agreed that anthropometric approach give more reliable and consistent estimates than calories intake approach in nutritional status measurement of children and infants (Sen, 1984; Svedberg, 2000).

3.3 Conceptual Framework

Reasons of malnutrition are complex in children, extending from social and biological to environment factors (Mosley and Chen, 1994; Engle and Haddad, 1999; Smith and Haddad, 2000; Wamani et al, 2005). Mostly in less developed countries, for controlling the complex hierarchical inter-relationship among the threat dynamics of children's ill health, Victoria et al suggested a model and framework to study and forecast the risk factors of health outcome (Victoria, 1997). They constructed a conceptual framework here for nutritional status effecting factors, on the base of earlier research studies on causes of malnutrition. Distribution of variables in this framework is in three group types: socio-economic factors, intermediate causes containing maternal factors and environmental factors, and proximal factors. In short, pre-school child's nutritional status may be affected by these factors.

Figure 3.2: Conceptual Framework for determinants of Child Malnutrition



3.4 Household Deprivation Score (HDS)

Reasons of nutritional deprivation are multi-sectorial and linked with the biological, social, economic and cultural factors and role at several level like child, family, household, society and nation. People can be called deprived, if they are lack in diet types, clothing, health, housing, household facilities, environmental, educational, social conditions, working activities and facilities which are customary, or at least widely encouraged and approved in the societies in which they live (Townsend, 1987).

This new research built a household deprivation status (HDS) founded on the socio-economic position of household. The simple measurement of this HDS index is based on three dimensions of household deprivation which are as follows: 1- basic economic possessions/assets, 2- basic amenities of life, 3- basic communication with world. The deprivation index HDS is not directly measure of economic condition for the household like total expenditure, per capita income or living standard index but it extent measure of which household in above of the three dimensions is deprived. According to Srinivasan and Mohanty (2004, 2008) that in the modern market oriented economy, social and physical necessities of life at different level of deprivation can be considered as basis of dividing line. The gain from such classificatory system is that it is based on social, physical and real possessions (i.e. adult literacy) rather income data, and it can be used to measure deprivation ranks. It is not incidence data such as consumption or expenditure, but it is a prevalence data. Expenditure above the last 30 days of his/her might forget by a respondent, but he/she makes no error in declaring his basic possession (Srinavasan and Mohanty, 2004, 2008). In all three dimensions in HDS, the variables are in binary form. Adding of these six variables which are in HDS shows the total scores and the range of scores is 0 to 6. Those which have none of any item from six possessions or just have 1 or 2 items, includes in HDS-1 and called “moderate deprivation (MD)” that shows deprived segments of the population. “Just above the deprivation (JAD)” indicates those which have 3 possessions include in HDS-2. In HDS-3, those who have 4 or 6 items, it indicates “well above the deprivation (WAD)”. On this base, our research examines HDS and its impact on nutritional status of child regardless their individual characteristics.

Table 3.1: Variables for computing the Household Deprivation Status (HDS)

Variables in HDS	**Description of Variables**	**Based on total score, categorization of the households on deprivation**
1. literacy of adult	0 = there is adult literate in the household 1 = the presence of any literate adult in the household	0: Abject deprivation (AD)
2. House type	0 = house is Katcha 1 = house is Semi Pucca/ Pucca	1-2: Moderate deprivation (MD)
3. Electricity availability	0=the house is not electrified 1 = the house is electrified	3:Just above deprivation (JAD)
4.Drinking water facility	0 = Have no arrangement in the residence 1 = have own arrangement within the residence	4-6:Well above deprivation (WAD)
5. Radio or T.V or Newspaper	0 = Have no radio or T.V or newspaper 1 = among these at least have one item	
6. Status of Land Holding	0 = Have no land 1 = Having some land	

Source: Srinivasan & Mohanty, 2004, 2008.

Chapter-4

Data and Methodology

4.1 Study Area and Sampling Design

This study covers all the four Tehsils of District Rahim Yar Khan namely Liaquat Pur, Rahim Yar Khan, Sadiqabad and Khan Pur. Sample size calculator was used to estimate sample size for District Rahim Yar Khan. Keeping the confidence interval as 5% and confidence level as 95%, the estimated sample comprised of 384 households. The total sample size was proportionally allocated among four tehsils of District Rahim Yar Khan. The sample were further be allocated to union councils proportionally at the next stage. Due to financial and time constraints the study included only three Union Councils from each of the above four Tehsil. Union Councils was selected randomly and included Bagho Bahar, Azeem Shah and Kotla Pathan in Khan Pur Tehsil, Ghooka, Shedani, Trinda Gurgaij in Tehsil Liaquat Pur, Kot Sanjer Khan, Muhammad Pur and Roshan Bhet from Sadiqabad tesil, while Bahishti, Sonak, and Chak No. 84/P selected from Rahim Yar Khan Tehsil. All the Union Councils were selected randomly from the four tehsils of District Rahim Yar Khan. The detail is given below:

4.1.1 Structure of Sample Design

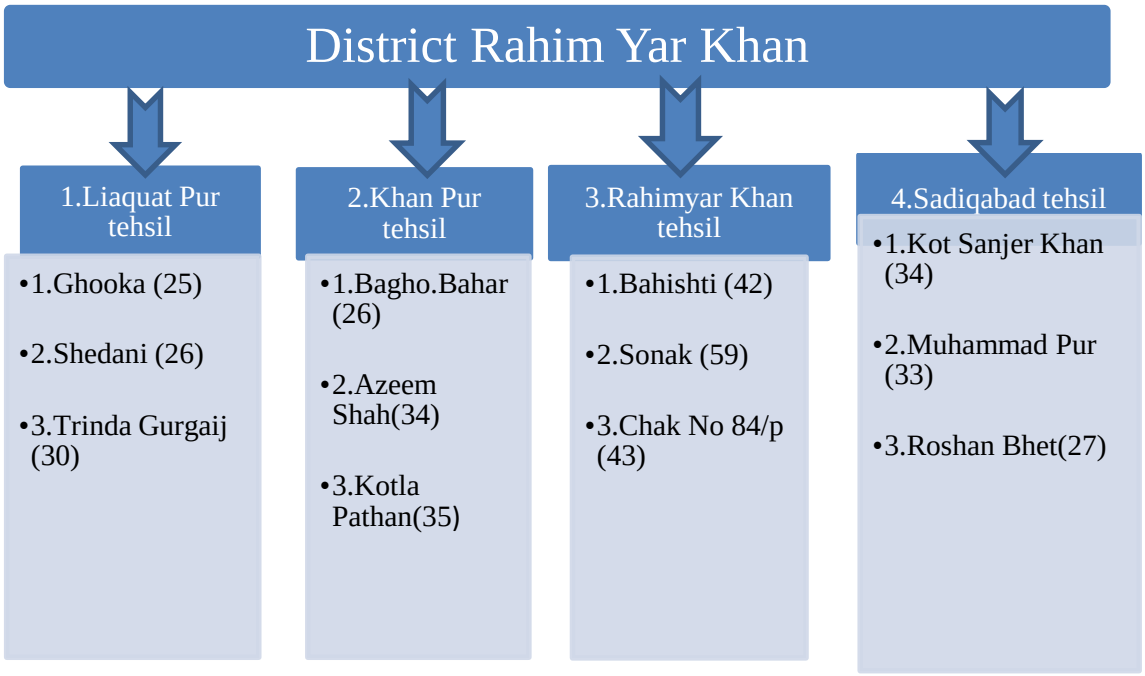


Table 4.1: Tehsil wise projected population, household size and sample size

Tehsil	Rural Population	Household Size	Sample size at 5%
Khan Pur	786090	104812	96
Liaquat Pur	672439	89659	81
Rahim Yar Khan	948348	126446	115
Sadiqabad	779999	104000	92
Total	**3186876**	**424917**	**384**

Source: Data provided by (District profile Rahim Yar Khan, 2016), HH size & sample size computed by author.

Note: 1. Population is projected District Government and data taken by EDO health office DHDC (District Health Development Center) wing Rahim Yar Khan. Note: 2. the average household size in district Rahim Yar Khan is 7.5 in (District profile Rahim Yar Khan, 2016). Note: 3. the population is projected keeping the population growth rate at 1.89% (Pakistan Economic Survey 2015-16, 2016).

$$\text{Sample size} = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal (.5 used for sample size needed)

c = confidence interval,

expressed as decimal (e.g.,

.04 = ±4)

$$\text{Sample size} = \frac{(1.96)^2 * (0.5) * (1-0.5)}{(0.05)^2} = 384.16$$

4.2 Proportional Sampling Allocation Technique

The proportional allocation sampling technique (Chaudhry, 1997) was used to determine the sample size that came to be (n=384) at the rate of 5 percent from the above twelve Union Councils as detailed below:

4.2.1 Tehsil Khan Pur

Table 4.2: Proportional sample size allocation from tehsil to UC's, Khan Pur

Union Councils of Khan Pur Tehsil	Population of UC	Sample size for UC= pop uc1/total Pop of 3 uc's* sample size of Khan Pur
UC1- Bagho Bahar	24349	24349/90811*96= 25.47= 26 approx.
UC2- Azeem Shah	32876	32876/90811*96= 34.39= 34 approx.
UC3- Kotla Pathan	33586	33586/90811*96= 35.14 36 approx.
Total P	**90811**	**96**

4.2.2 Tehsil Liaquat Pur

Table 4.3: Proportional sample size allocation from tehsil to UC's, Liaquat Pur

Union Councils of Liaquat Pur Tehsil	Population of UC	Sample size for UC= pop uc1/total Pop of 3 uc's* sample size of LQP
UC4- Ghooka	39367	39367/126573*81= 25.02= 25 approx.
UC5- Shadani	40990	40990/126573*81= 26.23= 26 approx.
UC6-Trinda Gurgaij	46216	46216/126573*81= 29.57= 30 approx.
Total P	**126573**	**81**

4.2.3 Tehsil Rahim Yar Khan

Table 4.4: Proportional sample size allocation from tehsil to UC's, Rahim Yar Khan

Union Councils of Rahim Yar Khan Tehsil	Population of UC	Sample size for UC= pop uc1/total Pop of 3 uc's* sample size of RYK
UC7- Bahishti	32870	32870/111793*115= 34.34= 34 approx.
UC8- Sonak	45423	45423/111793*115= 45.51= 46 approx.
UC9- Chak No. 84/P	33500	33500/111793*115= 35.15= 35 approx.
Total P	**111793**	**115**

4.2.4 Tehsil Sadiqabad

Table 4.5: Proportional sample size allocation from tehsil to UC's Sadiqabad

Union Councils of Sadiqabad Tehsil	Population of UC	Sample size for UC= pop uc1/total Pop of 3 uc's* sample size of Sadiqabad
UC10- Kot Sanjer Khan	31543	31543/88105*92= 32.65= 33 approx.
UC11- Muhammad Pur	31269	31269/88105*92= 32.36= 32 approx.
UC12- Roshan Bhet	25293	25293/88105*92= 26.98= 27 approx.
Total P	**88105**	**92**

4.3 Data Collection

The study used primary data. The information is obtained through structured questionnaire from randomly selected 384 households which were taken from only rural areas of District Rahim Yar Khan. The sample size allocated proportionally to each tehsil and then each union council on the base of rural area. More specifically, the multi-stage random sampling technique was used. The questionnaire covered the required information such as socio-economic profiles, environmental, maternal, individual, and housing characteristics etc. Child under five year age were target group and the respondents of questionnaire was their mothers, because child health is much depends on their mothers and mothers have greater concern with the growth of their child. For the study, the data was gathered during three months in study area from November, 2017 to January, 2018. The survey was consisted of 384 households in which total 517 children under five years of age were assessed. Out of 517 children 286 (56%) were male children while 231(44%) female children were assessed in this survey.

4.4 Method of Analysis

4.4.1 Bivariate and the Multivariate Analysis for the pre-school Child's Nutritional status

To identify the stunting, under-weight and wasting determinants, bivariate and multivariate analysis are used in this study. These analysis emphasis on the pre-school's nutritional status in two way outcome; weather the child is under-nourished or not. The main objective is to identify the risks of malnutrition in pre-school children. The numeric form of dependent variables is binary and coded as if the child is under-nourished than it coded as 1 and if child is not under-nourished than coded as 0. Furthermore a new variable of child's nutritional status was made consisting of two categories on the base of WHO cutoffs, which indicates either child is normal or stunted/under-weight/wasted. Data on age, height and gender of child is taken from rural areas of district Rahim Yar Khan. To measure stunting, wasting and under-weight, Z-scores are constructed on the base of gender and age of child. Furthermore, the socio-economic and demographic features were controlled statistically. Variables that were controlled are: mothers' tongue, mother's education, father's education, mother's employment status, father's employment status, household deprivation score (which is measured on the base of adult literacy, house type, electricity, facility of drinking water, media access holding of land, that is used

as proxy of economic status for the household), gender of child, child's age, mother's nutritional awareness status and child's birth order number. The data on anthropometric measurements was collected from 384 households in rural areas in district Rahim Yar Khan. Binary logistic regression technique was employed to predict not only the success probability but also to identify risk features of malnutrition.

4.4.2 Logistic Regression Analysis

In the bivariate analysis, cross-tabulation were used for measuring the association in each of the explanatory variable and child's nutritional status which is measured as stunting, wasting and under-weight. Furthermore p-value <0.05 is considered for checking significant level. The binary logistic regression predicts the probability of success for depending variable. The binary logistic regression is employed when dependent variable response is in binary form (i.e. 0 or 1). Explanatory variable may be categorical, quantitative or mixed. Suppose, occurrence probability of an event

Y, [P (Y=1)] which depends on many explanatory variables X1, X2, X3, ….., Xk

Functional form for logistic regression is as follow:

$$P = P\left[Y = \frac{1}{x1, x2, x3, \ldots\ldots, xk}\right] = \frac{e^z}{1 + e^z} = \frac{\exp(z)}{1 + \exp(z)}$$

Where Z, is a linear function of a set of predictor variables, X1, X2, X3, …. Xk , given by

Z = bo + boX1 + b2X2 + …….. + bkXk,

b0, b1, b2, ….. . bk are the coefficients in regression.

By taking the natural log, logit of P is derived which is, log [(p/1–p)] = Z

The quantity [(p/1–p)] is called the odds and hence log [(p/1–p)], the log odds.

The coefficients b0, b1, b2,…..bk are similar to regression coefficients and are called logit regression coefficients.

4.4.3 Econometric Models

According to WHO standard 2006 these three indices are measured in the form of z-score under children below age 5. These three indices are expressed as below,

- Stunning if height for age Z-score < -2 standard deviation (SD)

- Wasting if weight for height Z-score < -2 SD and
- Underweight if weight for age Z-score < -2 SD

Yi=f(X1, X2, X3, X4 …)

Where Yi denote child malnutrition, Y is equal to 1, if the child is malnourished and Y is equal to 0, if child is not malnourished. X1, X2, X3, X4 and so on; are the various factors that affect the child malnutrition positively or negatively. Following four models are estimated in our research:

Model-1(Stunting)

$Stunting_{ij} = \beta_0 + \beta_1 GOC_{ij} + \beta_2 CAM_{ij} + \beta_3 BON_{ij} + \beta_4 MAGE_{ij} + \beta_5 MAGEB_{ij} + \beta_6 MKN_{ij} + \beta_7 MBMI_{ij} + \beta_8 TOH_{ij} + \beta_9 TOL_{ij} + \beta_{10} SOW_{ij} + \beta_{11} MES_{ij} + \beta_{12} MEDUS_{ij} + \beta_{13} HDS_{ij} + \beta_{14} COH_{ij} + \beta_{15} ROH_{ij} + \beta_{16} MT_{ij} + \varepsilon_{ij}$----------(**I**)

Stunting or height-for-age (HAZ) = the long-term malnutrition in which a child fails to achieve the expected height for his/her age

1= if child is stunted, while 0=if the child is not stunted

Model-2(Wasting)

$Wasting_{ij} = \beta_0 + \beta_1 GOC_{ij} + \beta_2 CAM_{ij} + \beta_3 BON_{ij} + \beta_4 MAGE_{ij} + \beta_5 MAGEB_{ij} + \beta_6 MKN_{ij} + \beta_7 MBMI_{ij} + \beta_8 TOH_{ij} + \beta_9 TOL_{ij} + \beta_{10} SOW_{ij} + \beta_{11} MES_{ij} + \beta_{12} MEDUS_{ij} + \beta_{13} HDS_{ij} + \beta_{14} COH_{ij} + \beta_{15} ROH_{ij} + \beta_{16} MT_{ij} + \varepsilon_{ij}$----------(**II**)

Wasting or weight-for-height (WHZ) =A consequence of malnutrition in which a child fails to achieve the expected weight for his/her height

1= if child is wasted, while 0=if the child is not wasted

Model-3(Underweight)

$Underweight_{ij} = \beta_0 + \beta_1 GOC_{ij} + \beta_2 CAM_{ij} + \beta_3 BON_{ij} + \beta_4 MAGE_{ij} + \beta_5 MAGEB_{ij} + \beta_6 MKN_{ij} + \beta_7 MBMI_{ij} + \beta_8 TOH_{ij} + \beta_9 TOL_{ij} + \beta_{10} SOW_{ij} + \beta_{11} MES_{ij} + \beta_{12} MEDUS_{ij} + \beta_{13} HDS_{ij} + \beta_{14} COH_{ij} + \beta_{15} ROH_{ij} + \beta_{16} MT_{ij} + \varepsilon_{ij}$------(**III**)

Underweight or weight-for-age (WAZ) =A consequence of malnutrition in which a child fails to achieve the expected weight for his/her age

1= if child is underweight, while 0=if the child is not underweight

But these three measures may not provide a comprehensive estimation individually since they can overlap. A child who is stunted could be underweight or wasted or both (Mandal & Bose 2010). However, CIAF is an aggregate measure of prevalence of under nutrition and incorporate all undernourished children either they are stunted, wasted or underweight as a single variable. It identifies seven groups of children (Anjum et al. 2012).

A. Stunted (Low Height for age) only
B. Wasted (Low weight for height) only
C. Underweight(Low weight for age) only
D. Stunted and wasted
E. Stunted and underweight
F. Wasted and underweight
G. Stunted, wasted and underweight.
H. No failure

But Svedberg who originally proposed this model introduce six groups of anthropometric failure since he did not added the group in which only underweight children exist, letter Nandy et al. added this additional group in its model but Bose and Mundal also added another group named no failure in the model that they develop (Bose &Mandal 2010).

Model-4 CIAF (Composite index of Anthropometric Failure)

$CIAF_{ij} = \beta_0 + \beta_1 GOC_{ij} + \beta_2 CAM_{ij} + \beta_3 BON_{ij} + \beta_4 MAGE_{ij} + \beta_5 MAGEB_{ij} + \beta_6 MKN_{ij} + \beta_7 MBMI_{ij} + \beta_8 TOH_{ij} + \beta_9 TOL_{ij} + \beta_{10} SOW_{ij} + \beta_{11} MES_{ij} + \beta_{12} MEDUS_{ij} + \beta_{13} HDS_{ij} + \beta_{14} COH_{ij} + \beta_{15} ROH_{ij} + \beta_{16} MT_{ij} + \varepsilon_{ij}$------(**IV**)

CIAF (Composite Index of Anthropometric Failure) = CIAF is used for estimating the prevalence of malnutrition in children. We divide children into seven groups according to CIAF classification which are group A, B, C, D, E, F, G, and H. The total measure of child malnutrition prevalence is calculated by combinations of all six groups except the group H.

1= if child is malnourished, while 0=if the child is not malnourished

4.5 Statistical Analysis

STATA and Microsoft Excel (2013) were used in this study for statistical analysis and significance level is set at $P<0.05$.

4.6 Limitations of the Study

1. There are two approaches to compute the prevalence of malnutrition among the pre-school children. One is caloric intake approach and the other one is anthropometric measurement approach. This current study emphases only on the anthropometric measurement approach and it completely discounts the importance of energy intake approach.

2. To reflect socio-economic condition of household, household deprivation status (HDS) is designed. For HDS development, different variables were used. The values assigned to these variables has been fixed.
3. Only that household was taken for interview in which at least one child under five year present. Maximum five children from a household were taken if there are more children under five year of age.
4. During survey one married couple and their children considered as a family or household. If a household consists on joint families this was considered more than one households.

Chapter-5

Health Outcome (Malnutrition Status) of Pre-School Children for District Rahim Yar Khan (Anthropometry)

Malnutrition amongst the poorest groups of the population in developing countries remain a prevalent issue. There are many causes of malnutrition such as infection that harms the body ability to absorb food and inadequacy in food intake etc. Malnutrition especially hits the growth of child, the cause behind the brain damage is malnutrition, low birth weight, and many other birth flaws and further it also the main cause of cognitive and physical developmental retardation, due to malnutrition risk of death and infection increased specially in children. There are different models and approaches for assessment of nutrition in children but most common, low cost and nonintrusive approach is anthropometry because it based on physical measurement of body that are weight or height related to gender and age of child. This anthropometry approach can be used further at individual as well as population level for assessment of nutrition status, at individual level assessment of nutritional wellbeing can judged through anthropometry, and at population level like society, region or at country level to assess the nutrition of children. For assessing the response to interventions and for screening children for interventions, for both purpose this approach is valuable. This anthropometry not only use for the assessment of nutrition status in an individual, country or socio-economic groups but it also study the consequences and determinants of malnutrition. This form of monitoring is valuable for both the design and the targeting of health and nutrition interventions.

This fifth chapter discusses on the anthropometric indicators of District Rahim Yar Khan, with an emphasis on children under age of five years.

5.1 Assessment of the Nutrition Status Using the Anthropometric Approach

For measurement of anthropometry, data on weight and height by structured questionnaire were gathered in rural Rahim Yar Khan. Total 384 households take part in this survey in which height and weight of total 384 mothers and 517 children under five years of age were measured. Out of 517 children 286 (56%) were male children while 231(44%) female children. Furthermore anthropometric indicators (stunting, wasting and underweight) are constructed based on comparison with a “healthy” reference population (recommended by WHO), so out of total 517 children 316 children were included in measurement of anthropometrics after calculating z-scores and 201 children Skipped because of over range from (less than -5 and greater than +5).

For pre-school children nutrition status determinants, measurement on anthropometry by WHO standard (WHO, 1995) and National Center for Health Statistics (NCHS) were used. Furthermore, the standard deviation score was calculated for weight-for-height (whz), weight-for-age (waz) and height-for-age (haz). The formula for calculation of z-scores (SD scores) is as follows:

Z-scores = individual value-median value of the reference population / Standard Deviation value of reference population.

Cutoff point (-2 standard deviation) below the median of that reference population of WHO/NCHS were used for each anthropometric indicator of malnutrition. In assessment of nutrition the anthropometry has vital place (Jelliffe and Jelliffe, 1989; Gibson, 1990), and setting of clinical (Gibson, 1990) and it is used in monitoring, investigation and screening of nutrition. Interpretation and the measurement of anthropometry in nutrition status of child, the literature used in (Cameron, 1984; Lohman et al, 1988; Jelliffe and Jelliffe, 1989; Gibson, 1990; Norton and Olds, 1996; Ulijaszek, 1997). For assessing the growth competency/adequacy in children, the main and important criteria are anthropometric indices.

1. **Stunting (HAZ) or Height-for-age**

Chronic malnutrition recognizes by low height for age index. Indicator for stunting is HAZ and the result of HAZ is chronic malnutrition. HAZ cannot assess the short-term malnutrition changes. It is associated with long-term factors such as frequent infection, poverty, feeding practices including with nutrition intake and chronic insufficient protein.

2. **Underweight (WAZ) or Weight-for-age**

For a specific age, underweight condition identifies by low weight for age. It shows both acute under-nutrition as well as chronic under-nutrition. This indicator assessed the degree of malnutrition over the time, because this index is a composite measure for wasting and stunting.

3. **Wasting (WHZ) or Weight-for-height**

This index shows wasting or thinness. It occurs due to acute undernourishment or severe disease and the result is short term malnutrition which is wasting, but chronic dietary shortage can also be its result. Failure in actual weight loss or weight gain, acute or currant malnutrition occurs which is wasting. The causes of wasting may be different such as feeding practices, poor food intake, infection or disease etc. For assessment of child’s nutrition status three indices HAZ, WAZ and WHZ are used in

this study. Z-scores of height for age equates height of a child for a certain age with median height of a healthy reference population of that age group and weight for age does the same work for height. Furthermore, this same procedure weight for age z-scores, weight for age z-scores further compares weight of a certain child height with reference median weight for the child of same height. For the estimation of a child's malnutrition status, a cutoff point of -2 z-scores was used. Z-scores is the deviation of observed value to an individual from the median reference population, and further divided by the standard deviation of reference population. US National Center for Health Statistics (NCHS) developed this standard references measurement and it is recommended for standardized measurement, WHO further recommended this for international use.

Basic hypothesis is that a child comes from the healthy population. The objectives of cut-off points to classify the child according to nutrition status. To classify a child as moderate stunting, wasting and under-weight, deviation from reference population z-scores <-2 SD were used, and further deviation of the z-scores <-3 SD place the child in category of severe under nutrition.

WHO cutoff system

Less than -1 to greater than -2 z-scores: mild malnutrition

Less than -2 to greater than -3 z-scores: moderate malnutrition

Less than -3 z-scores: severe malnutrition

5.2 Scenario of the Anthropometric Indicators in Rahim Yar Khan District

Rahim Yar Khan is one of the important district of Punjab which captures a clear sketch of Punjab's rural life because it comprises its 78.5 percent people living in rural areas. Moreover Rahim Yar Khan is included in one of the high malnutrition prevalence district among 36 districts in Punjab.

As the previous reports shows the worse situation of child health in Rahim Yar Khan. The present study was undertaken on District Rahim Yar Khan. For this purpose survey was conducted to assess the nutritional status of children. In this survey the nutritional status of total 517 children were assessed, after calculating the z-scores out of total 517 children 316 children are remain for measurement of anthropometry and 201 children Skipped because of over range from (less than -5 and greater than +5).

The overall situation of child health indicators is presented in tables which are as follows:

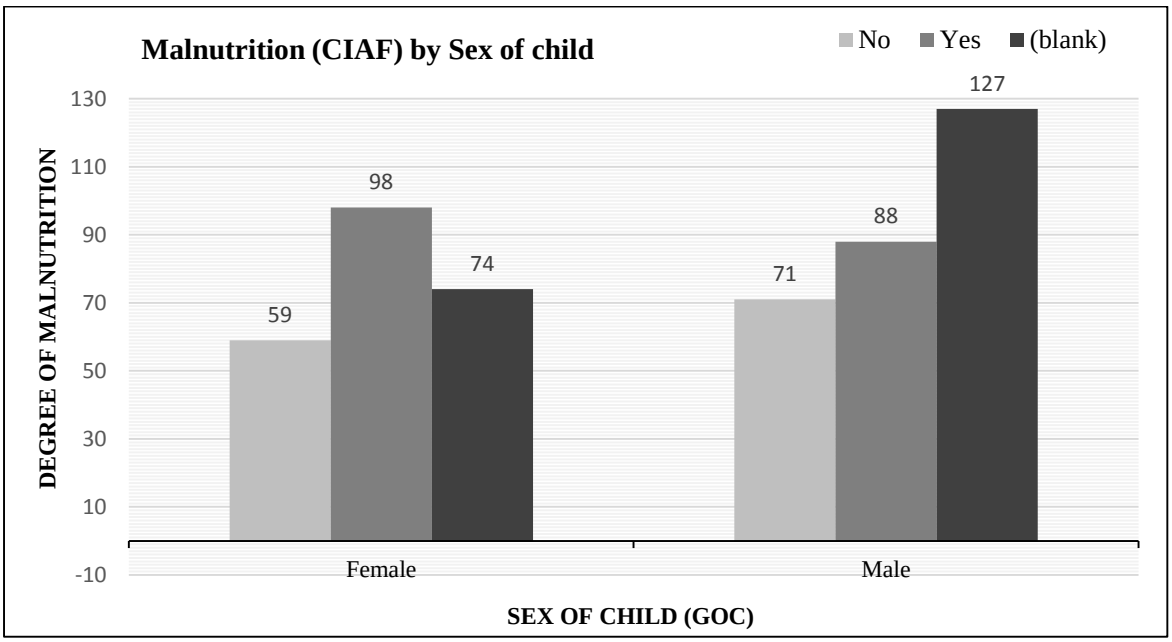
Table 5.1: Comparison of malnutrition prevalence by Child Sex

Gender of Child	CIAF (Malnutrition)				
	Normal	**Malnourished**	**Total child in analysis**	Skipped (over range from <-5 and >+5)	**Grand Total**
Female	59 (18.67%)	98 (31.01%)	157 (49.68%)	74	231
Male	71 (22.47%)	88 (27.85%)	159 (50.32%)	127	286
Total	**130 (41.14%)**	**186 (58.86%)**	**316 (100%)**	**201**	**517**

Source: Survey data

In table 5.1 CIAF explain the situation of overall malnutrition by sex of child. Table briefly explains that 31.01% female children and 27.85% male children are malnourished. Total 58.86% combine male and female children are malnourished.

Figure 5.1: Malnutrition (CIAF) by sex of child



Source: Author

Figure 5.1 explains frequency of table 5.1. In this figure 201 skipped children are included which are over range (less than -5 and greater than +5).

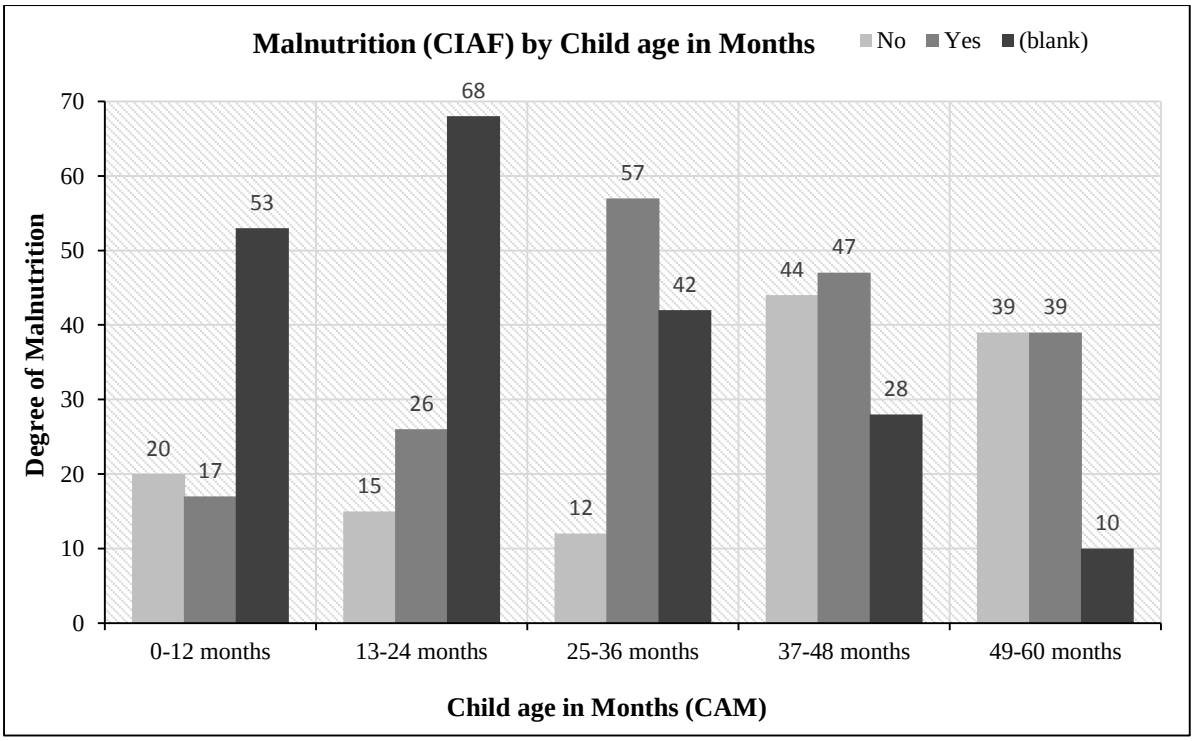
Table 5.2: Comparison of malnutrition (CIAF) prevalence by Child age in Months

Gender of Child	**Malnutrition Prevalence**				
	No	**Yes**	**Total child in analysis**	Skipped (over range from <-5 and >+5)	**Grand total**
0-12 months	20 (6.33%)	17 (5.38%)	37 (11.71%)	53	90
13-24 months	15 (4.75%)	26 (8.22%)	41 (12.97%)	68	109
25-36 months	12 (3.79%)	57 (18.05%)	69 (21.84%)	42	111
37-48 months	44 (13.93%)	47 (14.87%)	91 (28.80%)	28	119
49-60 months	39 (12.34%)	39 (12.34%)	78 (24.68%)	10	88
Total	**130 (41.14%)**	**186 (58.86%)**	**316 (100%)**	**201**	**517**

Source: Survey data

Table 5.2 explain the comparison of overall malnutrition (CIAF) prevalence by child age in months. Table shows that 5.38% malnourished children belongs to child age 0-12 month's group. While 8.22% children are malnourished in group 13-24 months, 18.05% children are malnourished in group 25-36 months, 14.87% children are malnourished in group 37-48 months and 12.34% children are malnourished in group 49-60 months.

Figure 5.2: Malnutrition (CIAF) by child age in months



Source: Author

Figure 5.2 explains frequency of table 5.2. In this figure 201 skipped children are included which are over range (less than -5 and greater than +5).

Table 5.3: Comparison of Stunting, wasting and underweight prevalence by Sex of Child

	Underweight		**Stunting**		**Wasting**	
	Moderate	Severe	Moderate	Severe	Moderate	Severe
Female	12.27%	21.56%	18.73%	17.98%	11.27%	7.04%
Male	12.64%	24.54%	16.11%	16.85%	18.31%	8.45%
Total	24.91%	46.1%	34.84%	34.83%	29.58%	15.49%

Source: Survey data

Table 5.3 shows underweight, stunting and wasting rates in both moderate and severe categories for Rahim Yar Khan by child's gender. In case of male child's underweight and male child's wasting rates in both categories (moderate & severe) are greater than female while in females stunting rates are high.

Table 5.4: Comparison of Stunting, wasting and underweight prevalence by sex of Child (Overall)

	Underweight	**Stunting**	**Wasting**
	Moderate & severe Total	Moderate & severe Total	Moderate & severe Total
Female	33.83%	36.71%	18.31%
Male	37.18%	32.96%	26.76%

Source: Survey data

Table 5.4 shows the overall underweight, stunting and wasting rates for Rahim Yar Khan by child's sex. While in case of male child, underweight and wasting rates are high than female while in females stunting rates are high than males.

5.2 Assessment of other anthropometric Indicators

Although stunting, wasting and underweight are the most common indicators for assessment of child's nutritional status. But BMI and MUAC can also be used as an alternative of anthropometry to measure the nutrition status of children in a situations in which data on height, age and weight is difficult to collect.

1- Body Mass Index (Calculation of Catch-Up-Growth Using BMI)

There is no certain definition for catch-up growth. It could defined as accelerated growth after a period of retardation. Catch-up growth is likely to restore growth to normal levels for that age. BMI is a simple ratio of weight and height. We can categorize individuals into being underweight, normal, overweight or obese on the basis of BMI. BMI can be used for all ages.

BMI = weight/ (height) 2

Table 5.5: Classification of BMI

Classification	**BMI Range**
Under-weight	Less than 18.5
Normal Weight	18.5 to 24.9
Overweight	25 to 29.9
Obesity	BMI of 30 or greater

Source: WHO

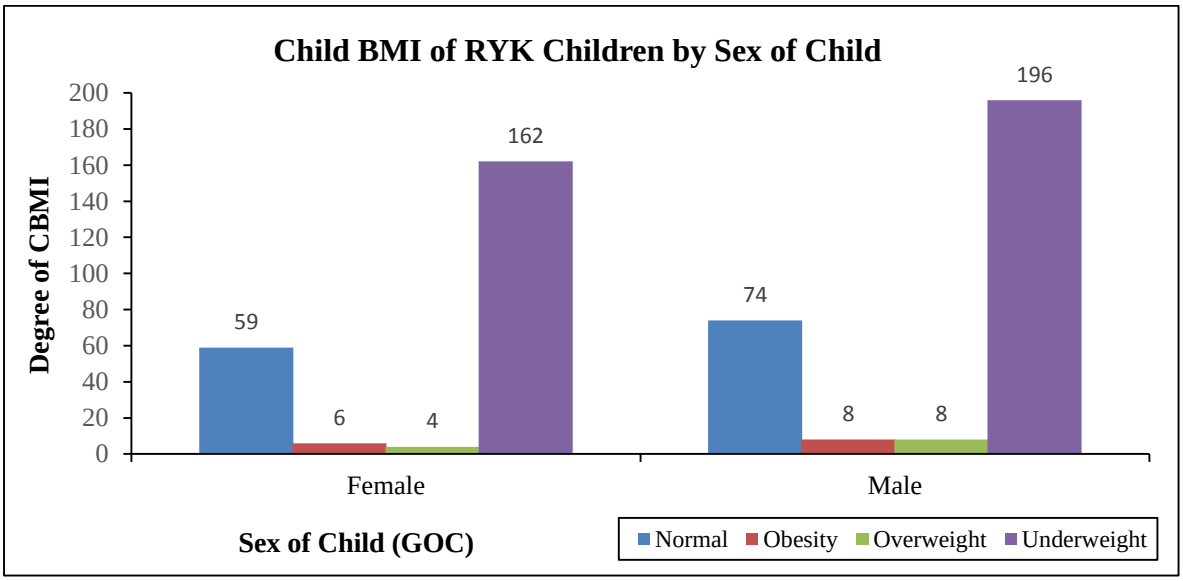
Table 5.6: Body Mass Index of Rahim Yar Khan Children by Sex of Child

Sex of Child	Normal	Underweight	Overweight	Obesity	Grand Total
Female	59 (11.41%)	162 (31.33%)	4 (0.78%)	6 (1.16%)	**231 (44.68%)**
Male	74 (14.31%)	196 (37.91%)	8 (1.55%)	8 (1.55%)	**286 (55.32%)**
Grand Total	**133 (25.72%)**	**358 (69.24%)**	**12 (2.33%)**	**14 (2.71%)**	**517 (100%)**

Source: Survey data

Table 5.6 shows the rates of child BMI for Rahim Yar Khan by child's sex. While in case of underweight overweight and the obesity, BMI rates in male children are greater than the female children. This analysis of child's BMI includes 517 children.

Figure 5.3: Child BMI for Rahim Yar Khan by sex of child



Source: Author

Figure 5.3 explains frequency of table 5.6. In this figure analysis of child's BMI includes 517 children.

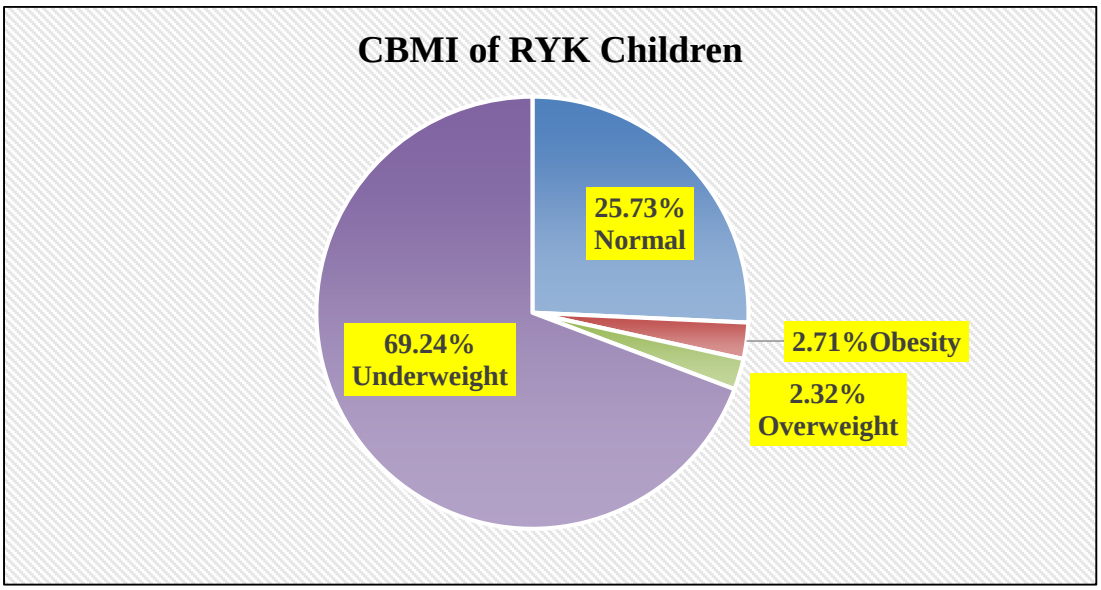
Table 5.7: Child's Body Mass Index (CBMI) of Rahim Yar Khan

Sex of Child	Frequency	Percentage
Normal	133	25.73%
Underweight	358	69.25%
Overweight	12	2.32%
Obesity	14	2.71%
Grand Total	**517**	**100%**

Source: Survey data

Table 5.7 shows the rates of child BMI for Rahim Yar Khan overall. 69.25% children are underweight, 2.32% children are overweight while 2.71% children lies in obesity. This analysis of child BMI includes 517 children.

Figure 5.4: Child BMI (overall) for Rahim Yar Khan



Source: Author

Figure 5.4 explains the percentages of table 5.7. In this figure 517 children are includes in analysis.

2- Mid-Upper Arm Circumference (MUAC)

Mid-upper arm circumference (MUAC) is a degree of the diameter of the upper arm and measures both muscle mass and fat reserve. MUAC can also use to assess the nutrition status of pregnant women but it specifically used to assess the nutrition of children. It requires minimal equipment, so measurement of MUAC is very simple.

This index proposed as an alternative index of nutritional status, in particular in situations in which data on height, weight and age are difficult to collect.

Table 5.8: Classification of MUAC

Classification	Color on tape	BMI Range
> 12.5 cm	Green	Normal
11.5-12.5 cm	Yellow	Borderline/moderate (MAM)
< 11.5 cm	Red	Malnourished (SAM)

Source: WHO

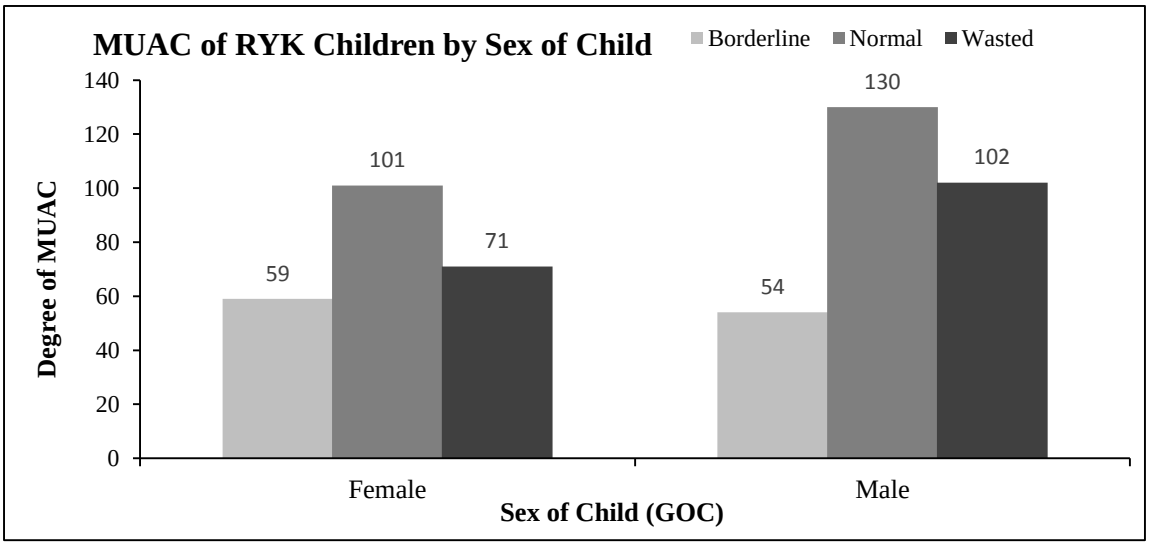
Table 5.9: MUAC of Rahim Yar Khan Children by Sex of Child

Sex of Child	Normal	Moderate/borderline	Malnourished	Grand Total
Female	101 (19.54%)	59 (11.41%)	71 (13.73%)	231 (44.68%)
Male	130 (25.14%)	54 (10.45%)	102 (19.73%)	286 (55.32%)
Grand Total	**231 (44.68%)**	**113 (21.86%)**	**173 (33.46%)**	**517 (100%)**

Source: Survey data

Table 5.9 shows the rates of child MUAC for Rahim Yar Khan by sex of child. The rates of malnutrition in male child are greater than female child while in case of moderate/borderline rates of male child less than female child. This analysis of child's BMI includes 517 children.

Figure 5.5: Child MUAC for Rahim Yar Khan by sex of child



Source: Author

Figure 5.5 explains frequency of table 5.9. In this figure analysis of child's MUAC includes 517 children.

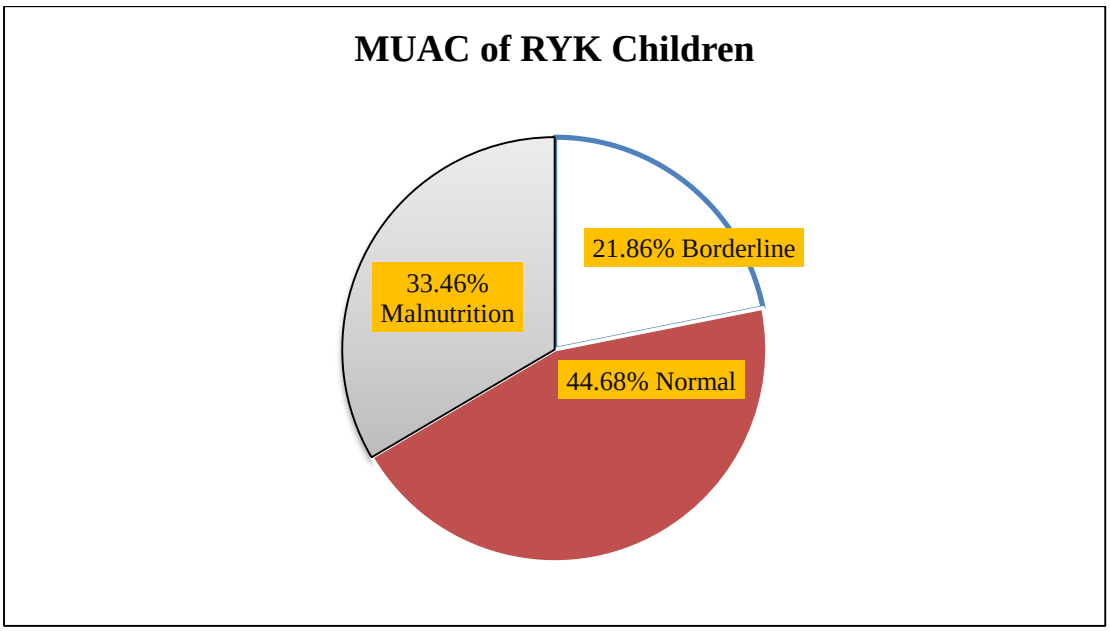
Table 5.10: Mid-upper Arm Circumference (MUAC) of Rahim Yar Khan

Sex of Child	Frequency	Percentage
Normal	231	44.68%
Moderate/borderline	113	21.86%
Malnourished	173	33.46%
Grand Total	**517**	**100%**

Source: Survey data

Table 5.10 shows the rates of child MUAC for Rahim Yar Khan overall. 21.86% children are moderate/borderline while 33.46% children are malnourished. This analysis of child's MUAC includes 517 children.

Figure 5.6: Child MUAC (overall) for Rahim Yar Khan



Source: Author

Figure 5.6 explains the percentages of table 5.10. In this figure 517 children are includes in analysis.

5.3 Analyzing the Anthropometric for Rahim Yar Khan

By comparing the relevant measures in regard of gender and age of child with comparable individuals in reference population of healthy children, on this base anthropometric indices are created. For expressing these comparisons there are three ways which are as follow:

a. Z-scores (standard deviation score): The difference between the value for an individual and the median value of the reference population for the same sex and age (or height), divided by the standard deviation of the reference population.

b. Percent of Median: Ratio of measured value for an individual to the median value of the reference data for the same sex and age (or height).

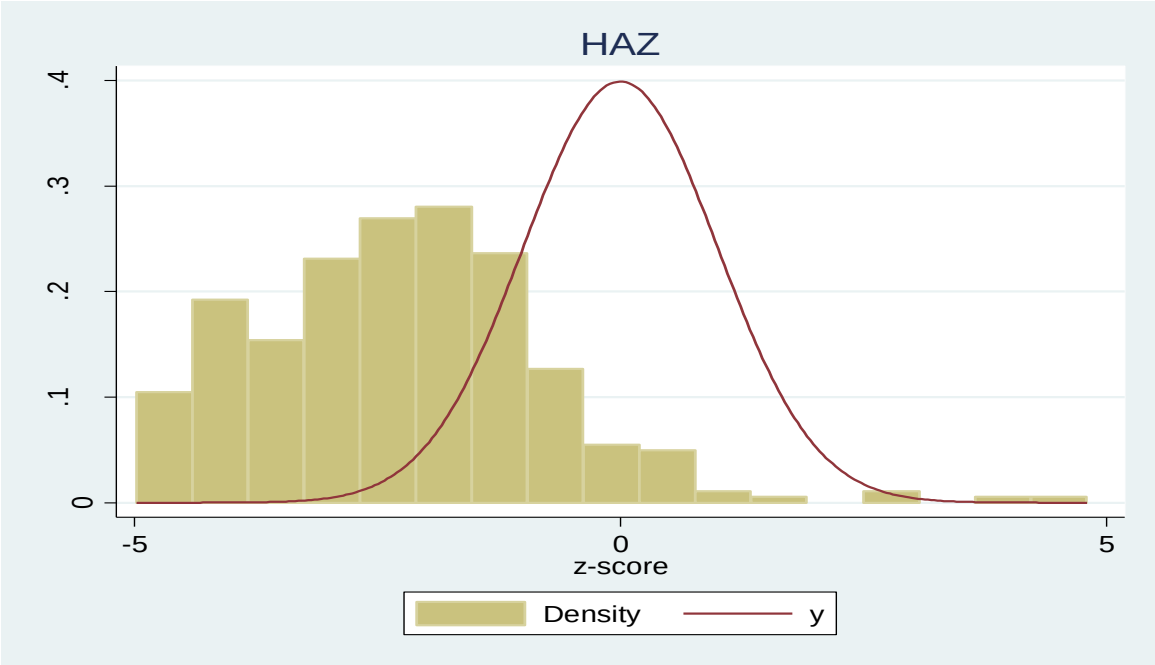
c. Percentile: Rank position of an individual on a given reference distribution, stated in regard to what percentage of the group the individual equals or exceeds.

Z-score is most common and easy way for expression of anthropometric indices. Advantages of this method are numerous. It can also use to measure summary statistics for any given population. But percentile cannot do this easily. Detection of large changes cannot be possible to eradicate by change in percentile value in case of extreme of distribution. The percent of median is relative to the z-score in this way that it expresses deviation from the reference median without standardizing for the variability in the reference population. For defining the abnormal anthropometry z-scores are commonly used for cutoff, value for cutoff is -2 SD below the reference median. So in this study z-scores are used and further anthropometric indices are constructed with those of comparable individuals (in regard to age and sex) for comparison with reference population of "healthy" children.

The number of children whose height-for-age, weight-for-age and weight-for-height Z-Score is less than -3.0 standard deviations (SD) below than mean on the NCHS/WHO international reference called severely stunted, underweight and wasted and the number of children below -2.0 SD are called moderately stunted, underweight and wasted respectively.

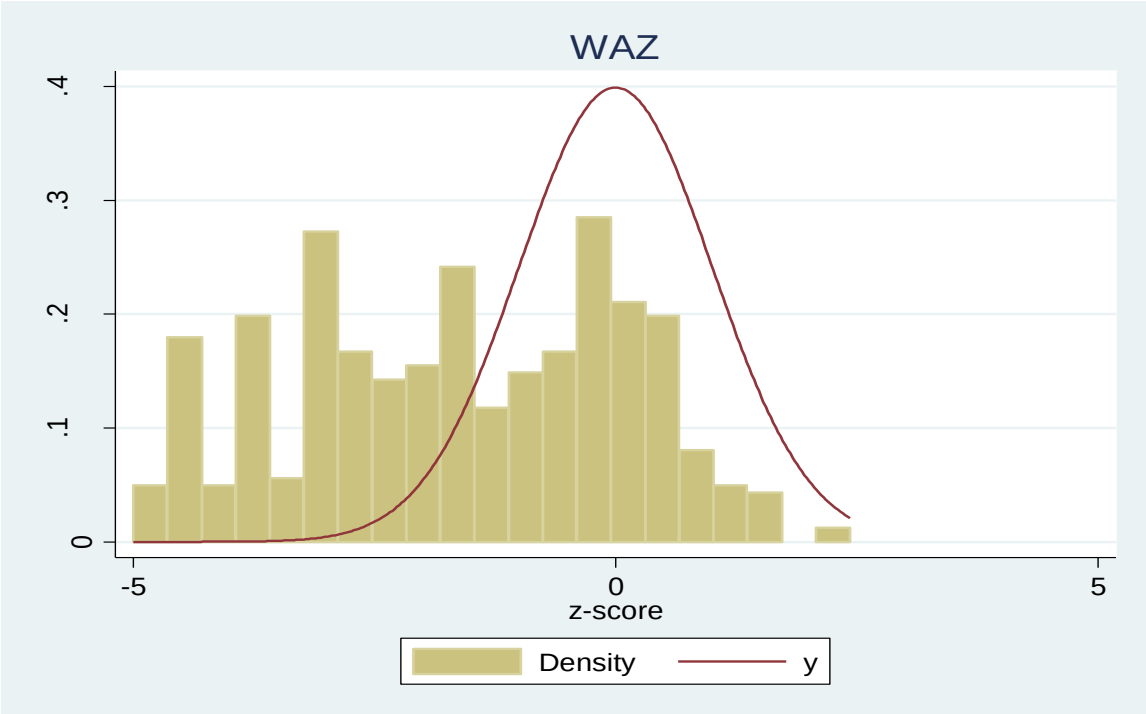
The first step is to look at the distribution of the z-scores and the overall prevalence of malnourishment and comparison with the distribution of z-scores in the reference population. The results of different dimensions of nutritional status in Rahim Yar Khan can be seen from the figures 5.7.a, 5.7.b and 5.7.c.

Figure 5.7: Distribution of Z-Scores in district Rahim Yar Khan



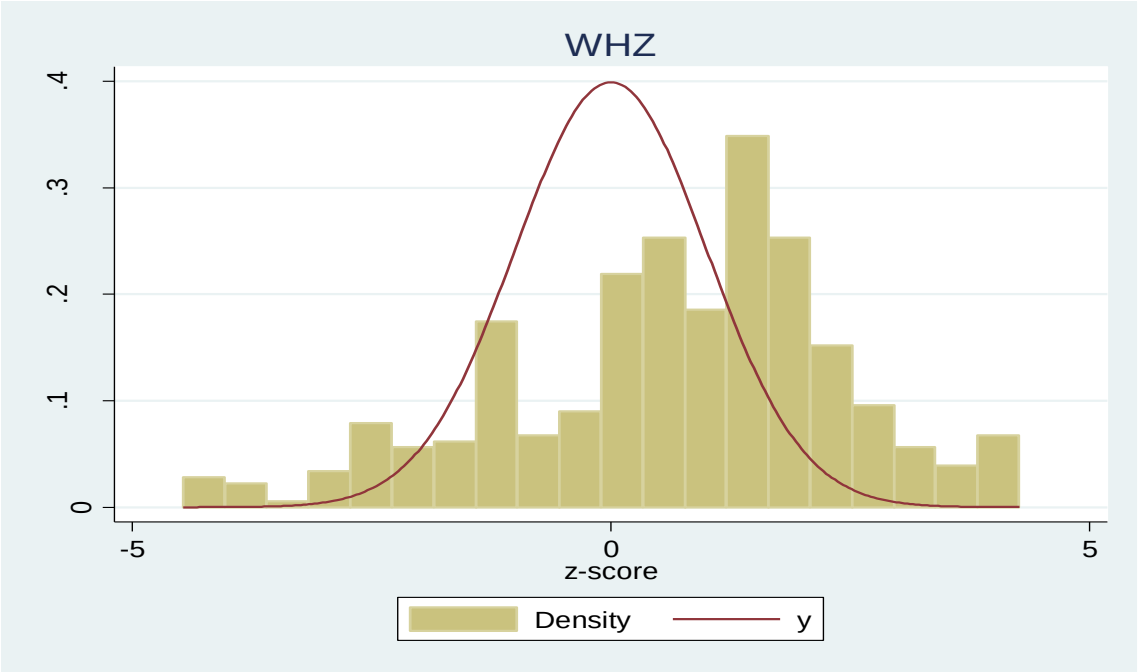
Source: Author

Figure 5.8: Distribution of Z-Scores in district Rahim Yar Khan



Source: Author

Figure 5.9: Distribution of Z-Scores in district Rahim Yar Khan

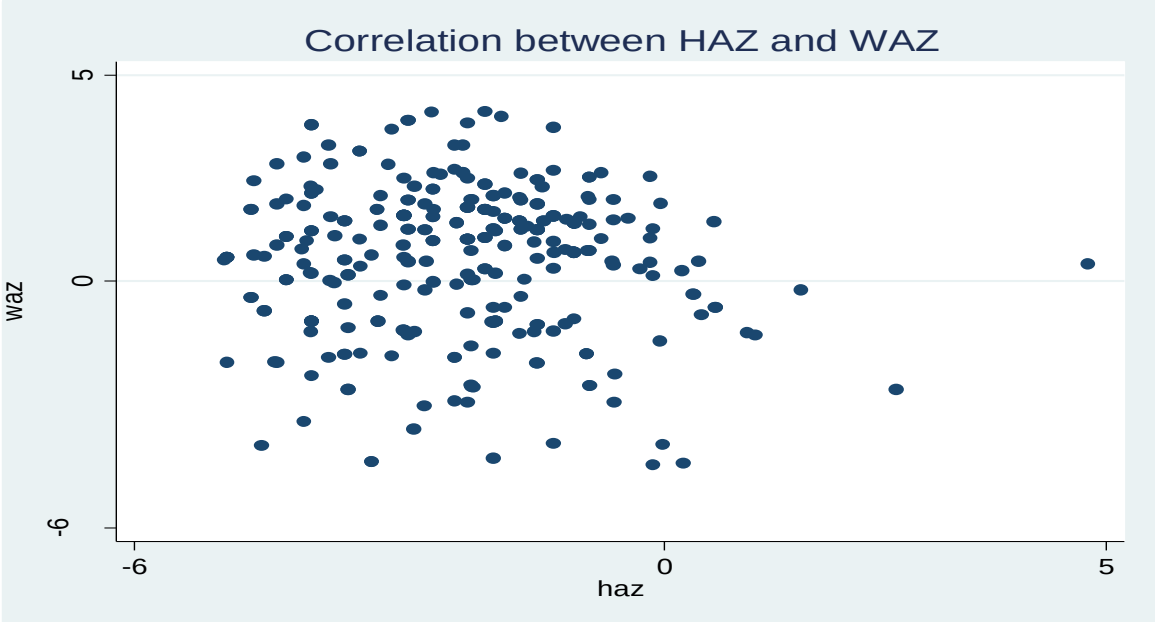


Source: Author

Figure 5.7, 5.8 and 5.9 explains that there are deficits in HAZ and WAZ while only very limited evidence of WHZ (wasting) is present.

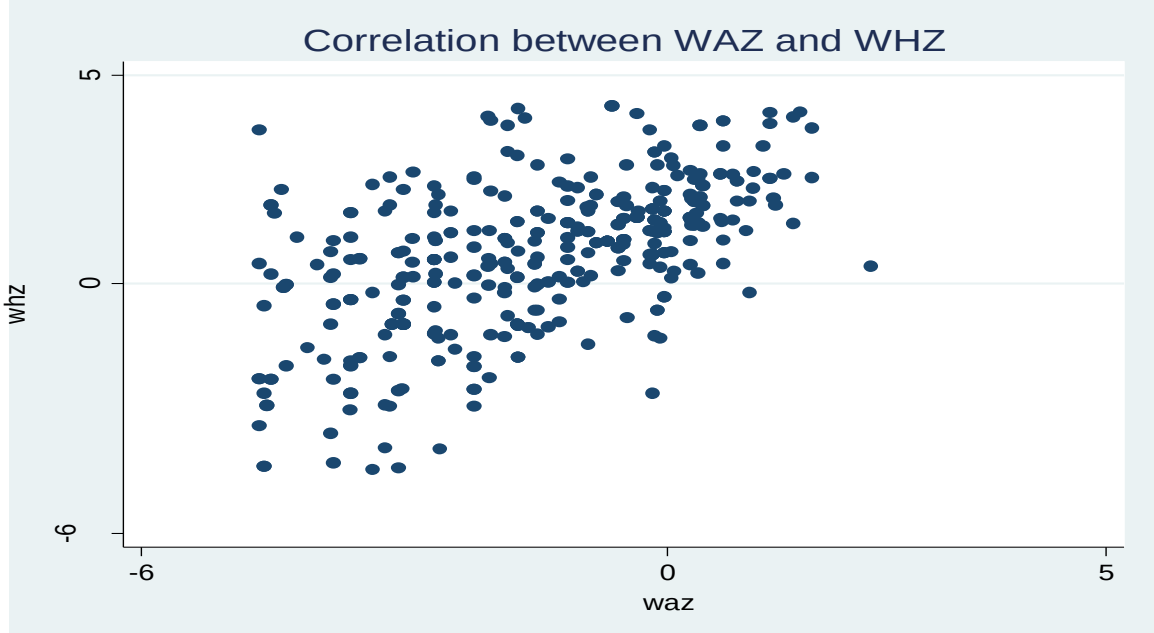
It is also useful to look graphically at relationship between different anthropometric indicators.

Figure 5.10: Correlation between stunting and underweight in Rahim Yar Khan District



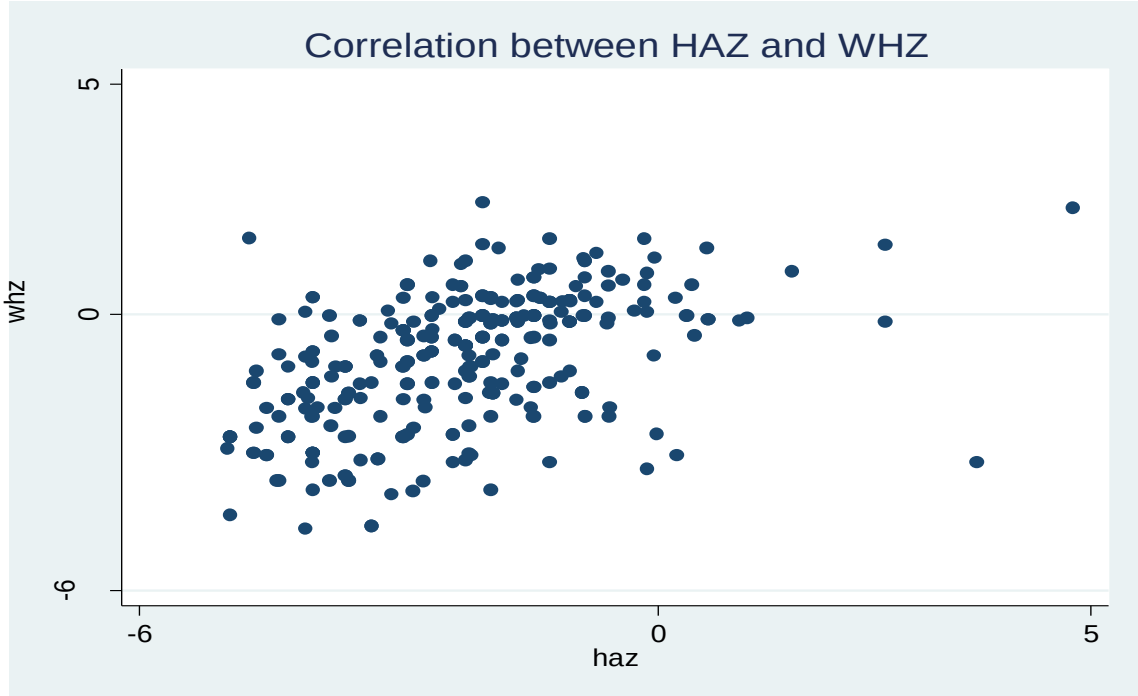
Source: Author

Figure 5.11: Correlation between wasting and underweight in Rahim Yar Khan District



Source: Author

Figure 5.12:. Correlation between stunting and wasting in Rahim Yar Khan District



Source: Author

Figure 5.10, 5.11 and 5.12 explains that there is no correlation between HAZ and WAZ while there is a little bit positive correlation between HAZ and WHZ and between WAZ and WHZ.

5.4 Analyzing the Relation of Household Deprivation Status and Anthropometrics among Pre-School Children of Rahim Yar Khan.

In this present research pre-school child's nutrition status in Rahim Yar Khan were assessed by height for age, weight for age and weight for height, and further z-score for these three indices was calculated. Then further, pre-school child's nutrition status were assessed for different variables related to socio-economics. So it is also important to analyze that how anthropometric indicators are related to different socio-economic characteristics of household or community. So an important perspective in this regard is to assess the socio-economic deprivation/inequality in nutritional status of preschool children for district Rahim Yar Khan. This section attempts the objective to examine the prevalence of malnutrition across the household socio-economic deprivation for district Rahim Yar Khan.

5.4.1 Components of the Household Deprivational Status

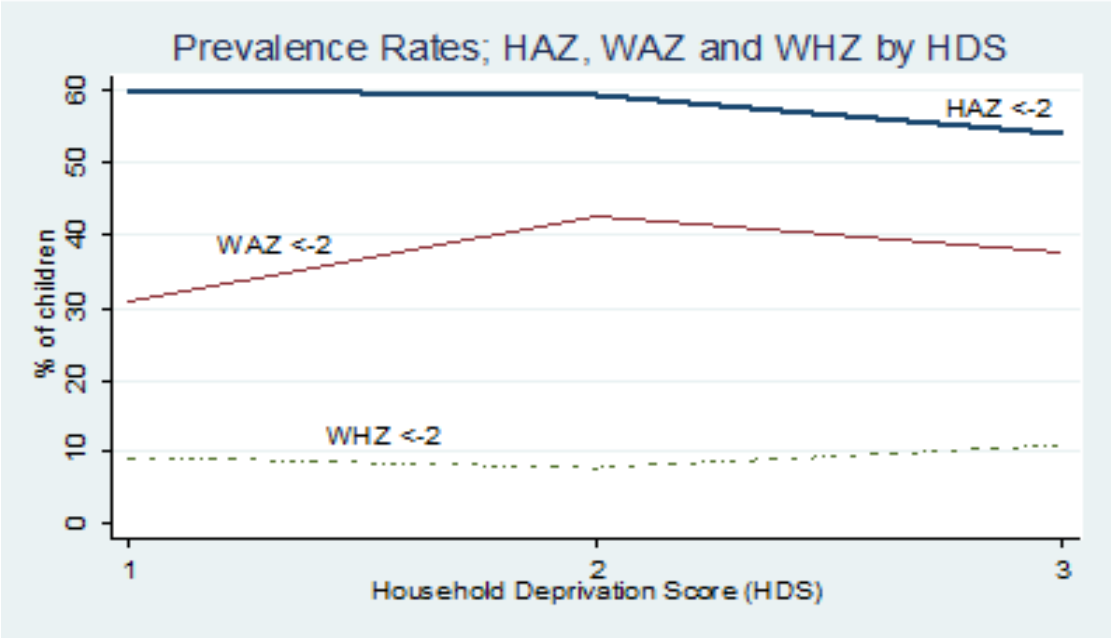
Many different researches concludes that there is a strong impact of deprivation status of household on nutrition status of child among the children of pre-school age (Srinivasan and Mohanty 2004, Srinivasan et al 2007). Within this context, the objective of the current study is to construct a Household Deprivation Score (HDS) which based on household socio-economic status. The simple measurement of this HDS index is based on three dimensions of household deprivation which are as follows: 1- basic economic possessions/assets, 2- basic amenities of life, 3- basic communication with world. The deprivation index HDS is not directly measure of economic condition for the household like total expenditure, per capita income or living standard index but it extent measure of which household in above of the three dimensions is deprived. In all three dimensions in HDS, the variables are in binary form. Adding of these six variables which are in HDS shows the total scores and the range of scores is 0 to 6. Those which have none of any item from six possessions or just have 1 or 2 items, includes in HDS-1 and called "moderate deprivation (MD)" that shows deprived segments of the population. "Just above the deprivation (JAD)" indicates those which have 3 possessions include in HDS-2. In HDS-3, those who have 4 or 6 items, it indicates "well above the deprivation (WAD)". On this base, our

research examines HDS and its impact on nutritional status of child regardless their individual characteristics.

In HDS 6 variables are used which are as follows: 1- household has a katcha house type or have pucca/semi-pucca, 2- some land holding by household or not, 3- electricity facility is available in the house or not, 4- within the residence of household is drinking facility available or not, 5- any one member in the household is literate or not, 6- keeping T.V, radio or newspaper in the house or not.

Prevalence rates of stunting, wasting and underweight for three groups of household deprivation status in Rahim Yar Khan are graphed in figure 5.9, with disaggregation by sex of child for malnutrition in figures 5.10.a and 5.10.b.

Figure 5.13: Prevalence rates of HAZ, WAZ and WHZ by HDS



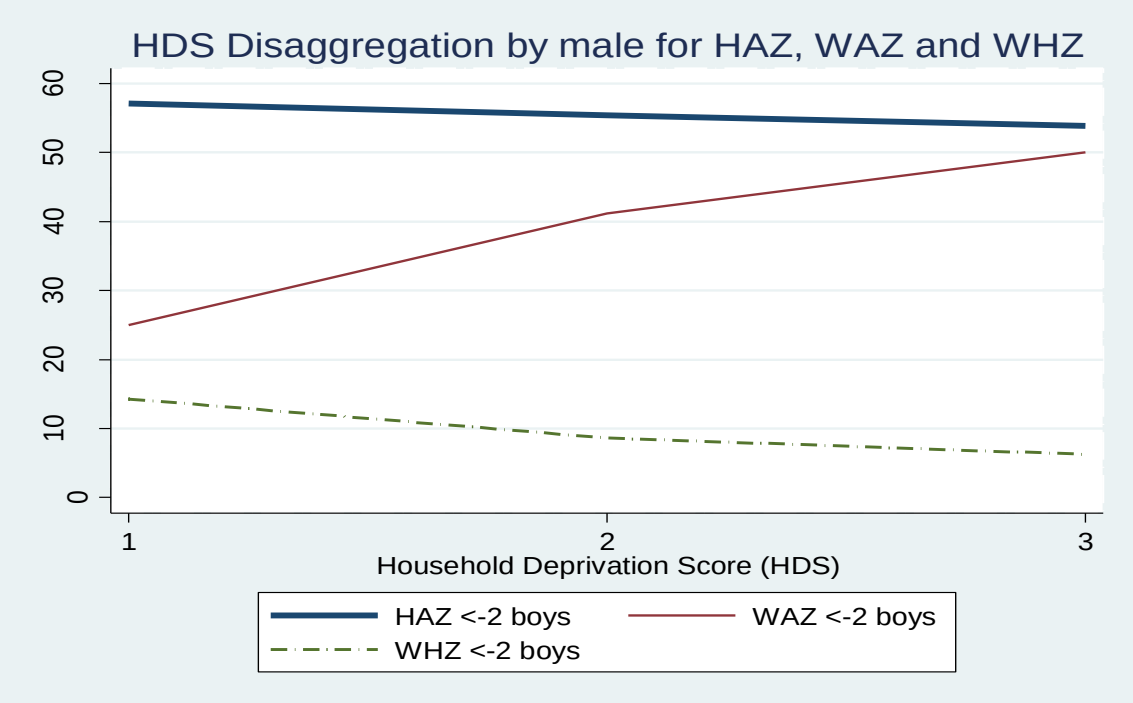
Source: Author

Figure 5.13 shows that the expected tendency for malnutrition is worse for HDS-1 which is the most deprived segment of Rahim Yar Khan. As the household shifts from HDS-1 to HDS-2 and HDS-3 prevalence rates of stunting (HAZ) and underweight (WAZ) decrease while increase in household socio-economic status has no impact in case of wasting (WHZ). Wasting remains constant in all three groups.

Figure 5.13 shows that the expected tendency of malnutrition for male child by HDS. As the household shifts from HDS-1 to HDS-2 and HDS-3 prevalence rates of stunting (HAZ) and wasting (WHZ) decrease while increase in household socio-economic status has inverse impact in case of underweight (WAZ).

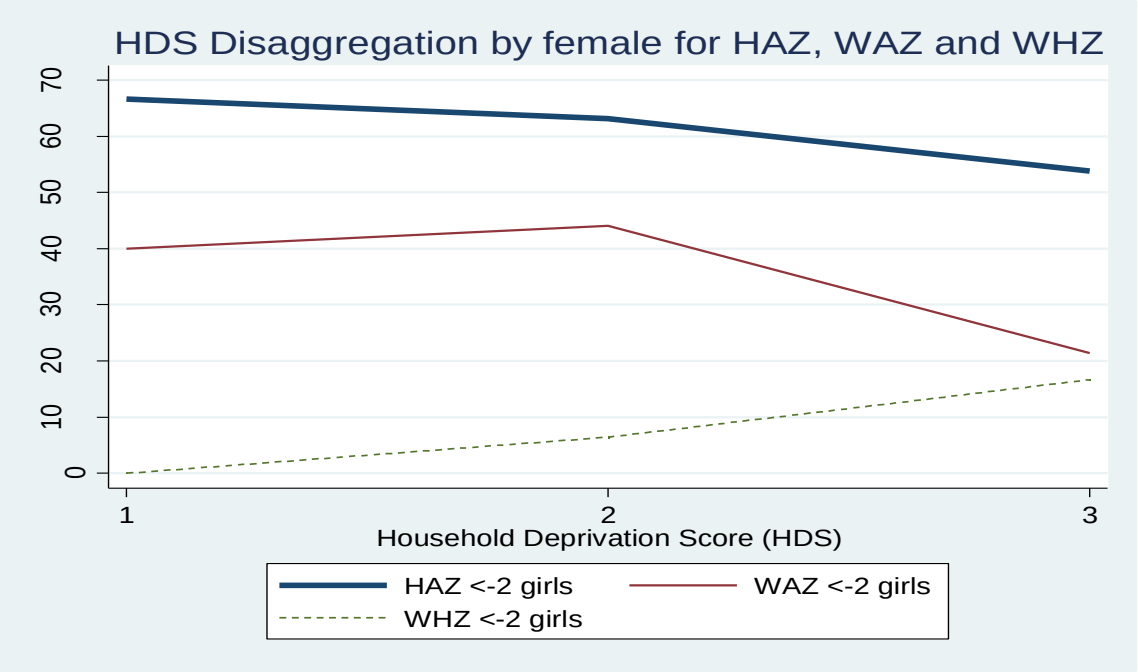
Figure 5.14 shows that the expected tendency of malnutrition for female child by HDS. As the household shifts from HDS-1 to HDS-2 and HDS-3 prevalence rates of stunting (HAZ) and underweight (WAZ) decrease while increase in household socio-economic status has inverse impact in case of wasting (WHZ).

Figure 5.14: Prevalence rates of HAZ, WAZ and WHZ for HDS, disaggregation by sex of child



Source: Author

Figure 5.15: Prevalence rates of HAZ, WAZ and WHZ for HDS, disaggregation by sex of child.



Source: Author.

Chapter 5 attempts the complete picture for health outcome of preschool children of district Rahim Yar Khan with second objective of relationship of anthropometry and household deprivation. To understand the descriptive statistics and the contribution of different socio-economic factors in determining nutritional status, a multivariate framework is required. To attempt this objective a logistic regression technique was employed. So the discussion on descriptive statistics and results of logistics regression for stunting, wasting, underweight and CIAF is explained in chapter 6.

Chapter 6

Relationship between Household Deprivation and the Nutrition Status of Pre-School Children in the Rural Areas of Rahim Yar Khan District

6.1 Introduction

Almost half of the deaths of children in all over the world is directly or indirectly linked with malnutrition. Thousands of the children in the world fail to survive and fall in chronic malnutrition and in result they loss their physical and cognitive abilities. This situation put economic burden on the families and entire country as a whole. Pre-school age group is vulnerable to malnutrition, this is the stage of child development and rapid growth, so they need more attention.

6.2 Nutrition Status of Child and Household Deprivation Status

Relationship among socio-economic variables and malnutrition is explained by many researches in Pakistan. One of the main objective of this research is to measure the nutrition status of pre-school age children in rural Rahim Yar Khan. Z-score was computed for child's nutrition indicators such as stunting, wasting and under-weight. Furthermore, this pre-school child's nutrition status was evaluated for different socio-economic and demographic variables which are included in models in present study. The results of the study are presented in following tables. In this study, 517 children of pre-school age was participated in which 286 children were boys and 231 children were girls.

6.3 Weight-for age and Household Deprivation Status

The linkage among under-nutrition in term of weight for age and deprivation status of household is briefly shown in table 6.1. Previously it is explained that deprivation status of household (HDS) is created on six possessions. Out of six possessions, house type is best indicator of household economic status. The results of study show that 98.51 % families having puuca/semi-puuca houses and out of total only 1.49 % families have kutcha house. The results further explains that 24.91 % families living in pucca/semi-pucca house, in these families moderate and severe under-nutrition prevalence was high which is 24.91% and 45.35% respectively. Another important indicator for deprivation of household is household land holding status. The results for household landholding status show that almost 100% of the household have no land. Moderate and severe under-weight prevalence was high among those families who have no land, which are 24.91% and 45.35% respectively. Furthermore the results says that 98.51% households have electricity facility within house and the rates of moderate and severe under-weight prevalence among the children of these families are high which are 24.91% and severe 45.35%.

Table 6.1: Association among weight for age and Household Deprivation Status

Variables in HDS	**Weight-for-age**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
House type				
Katcha	2 (0.75%)	0 (0%)	2 (0.75%)	4 (1.49%)
Semi-Pucca/Pucca	76 (28.25%)	67 (24.91%)	122 (45.35%)	265 (98.51%)
Landholding status of households				
Have some land	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No land	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
Electricity				
House is electrified	76 (28.25%)	67 (24.91%)	122 (45.35%)	265 (98.51%)
House is not electrified	2 (0.75%)	0 (0%)	2 (0.75%)	4 (1.49%)
Facility of drinking water				
Facility within house	74 (27.51%)	67 (24.91%)	120 (44.61%)	261(97.03%)
No facility within house	4 (1.49%)	0(0%)	4 (1.49%)	8 (2.97%)
Adult Literacy				
Presence of adult literate	8 (2.97%)	6 (2.23%)	6 (2.23%)	20 (7.43%)
No adult literate	70(26.02%)	61(22.68%)	118(43.87%)	249 (92.57%)
Access of Media				
At least one of these	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No TV/radio/newspaper	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)

Source: Primary data from survey.

The results for families having facility of drinking water within house says that 97.03% families have the facility of drinking water in their houses. The moderate and severe under-weight prevalence rates among the children of these families are high which are 24.91% and severe 44.61% respectively. Presence of literate adult in the family is another important indicator of deprivation of household. It shows that 92.57% families have no literate adults and the rates of moderate and severe under-weight prevalence among the children of these families are high which are 22.68%

and for severe 43.87%. In case of household access to media, almost 100% families do not have newspaper/radio/TV.

6.4 Height-for-age and Household Deprivation Status

Association among malnutrition in term of height for age and deprivation status of household is briefly shown in table 6.2. The results of study show that 34.46% families having puuca/semi-puuca houses and out of total only 0.38% families have kutcha house. Moderate and severe stunting prevalence among those families who have no land was equally same (34.83%). The proportion of moderate stunting of children in those families which have own water arrangement within the residence was (33.61%) and severe (33.61%), while this proportion of moderate stunting was low in those families which have no water arrangement within the residence was (1.12%) and severe (1.12%). In case of adult literacy, the proportion of moderate stunting of children in those families where no adult literate was (32.21%) and severe (32.21%), while this proportion of moderate stunting was low in where literate adult was present was same in both moderate and severe (2.62%). Prevalence of stunting was high in those households which have no radio/TV/newspaper.

Table 6.2: Association among height for age and Household Deprivation Status

Variables in HDS	**height-for-age**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
House type				
Katcha	2 (0.75%)	1 (0.38%)	3 (1.13%)	6 (2.25%)
Semi-Pucca/Pucca	79 (29.59%)	92 (34.46%)	90 (33.71%)	261 (97.75%)
Landholding status of households				
Have some land	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No land	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
Electricity				
House is electrified	79 (29.59%)	92 (34.46%)	90 (33.71%)	261 (97.75%)
House is not	2 (0.75%)	1 (0.38%)	3 (1.13%)	6 (2.25%)

electrified				
Facility of drinking water				
Facility within house	78 (29.13%)	90 (33.61%)	90 (33.61%)	258 (96.36%)
No facility within house	3 (1.12%)	3 (1.12%)	3 (1.12%)	9 (3.37%)
Adult Literacy				
Presence of adult literate	6 (2.25%)	7 (2.62%)	7 (2.62%)	20 (7.49%)
No adult literate	75 (28.09%)	86 (32.21%)	86 (32.21%)	247 (92.51%)
Access of Media				
At least one of these	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No radio/TV/newspaper	81 (30.34%)	93 (34.83%)	93 (34.83%)	265 (100%)

Source: Primary data from survey.

6.5 Weight for height and Household Deprivation Status

Association among wasting and deprivation status of household is briefly described in table 6.3. The results of moderate and severe wasting prevalence was high which is 28.17% and severe 15.49% respectively, among the families living in pucca/semi-pucca house.

Table 6.3: Association among weight for height and Household Deprivation Status

Variables in HDS	**weight-for-height**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
House type				
Katcha	1 (1.41%)	1 (1.41%)	0 (0%)	2 (2.82%)
Semi-Pucca/Pucca	38 (53.52%)	20 (28.17%)	11 (15.49%)	69 (97.18%)
Landholding status of households				
Have some land	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No land	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

Electricity				
House is electrified	38 (53.52%)	20 (28.17%)	11 (15.49%)	69 (97.18%)
House is not electrified	1 (1.41%)	1 (1.41%)	0 (0%)	2 (2.82%)
Facility of drinking water				
Facility within house	38 (53.52%)	20 (28.17%)	11 (15.49%)	69 (97.18%)
No facility within house	1 (1.41%)	1 (1.41%)	0 (0%)	2 (2.82%)
Adult Literacy				
Presence of adult literate	3 (4.23%)	2 (2.82%)	1 (1.41%)	6 (8.45%)
No adult literate	36 (50.70%)	19 (26.76%)	10 (14.08%)	65 (91.55%)
Access of Media				
At least one of these	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No radio/TV/newspaper	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

Source: Primary data from survey.

The prevalence of moderate wasting in those families which have no land was equally same (29.59%) and severe (15.49%). The proportion of moderate wasting of children in those families which have own water arrangement within the residence was (28.17%) and severe (15.49%), while this proportion of moderate wasting was low in those families which have no water arrangement within the residence was (1.41%) and severe (0%). In case of adult literacy, the proportion of moderate wasting of children in those families where no adult literate was (26.76%) and severe (14.08%), while this proportion of moderate wasting was low in where literate adult was present was same in both moderate (2.82%) and severe (1.41%). Prevalence of wasting was high in those households which have no radio/TV/newspaper.

6.6 Nutrition status of child and Household Deprivation Status

For assessing the nutrition status of child, z-scores for nutrition indices such as height for age, weight for age and weight for height was computed.

Table 6.4: Association among Nutrition of child and Household Deprivation Status

HDS	Nutrition Status of Child			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
HDS-1	4 (50%)	0 (0%)	4 (50%)	8 (100%)
HDS-2	66 (27.39%)	61 (25.31%)	114 (47.30%)	241 (100%)
HDS-3	8 (40%)	6 (30%)	6 (30%)	20 (100%)
(haz) Height for age				
HDS-1	3 (33.33%)	3 (33.33%)	3 (33.33%)	9 (100%)
HDS-2	72 (30.25%)	83 (34.87%)	83 (34.87%)	238 (100%)
HDS-3	6 (30%)	7 (35%)	7 (35%)	20 (100%)
(whz) Weight for height				
HDS-1	1 (50%)	1 (50%)	0 (0%)	2 (100%)
HDS-2	35 (55.56%)	18 (28.57%)	10 (15.87%)	63 (100%)
HDS-3	3 (50%)	2 (33.33%)	1 (16.67%)	6 (100%)

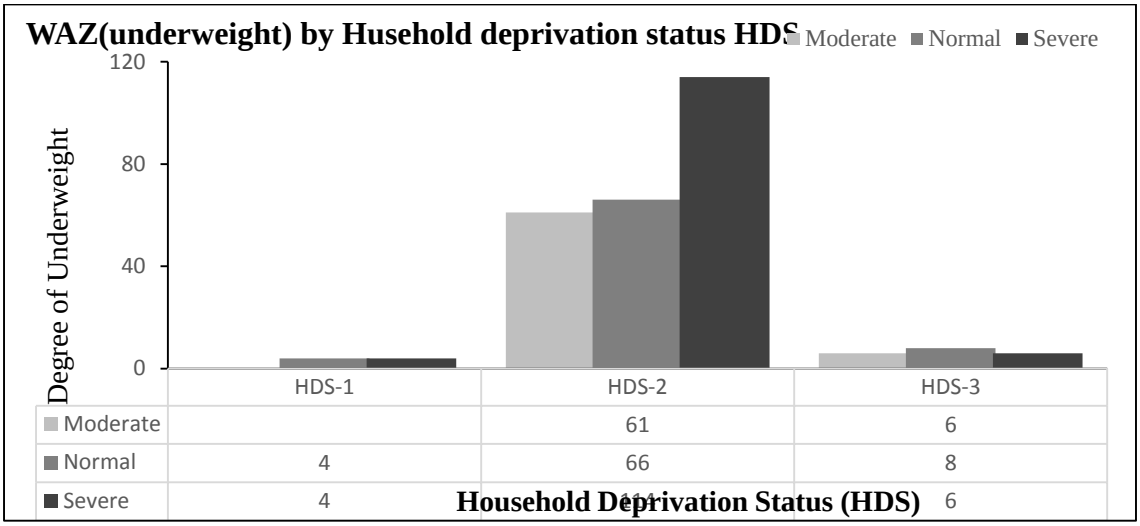
Source: Primary data from survey.

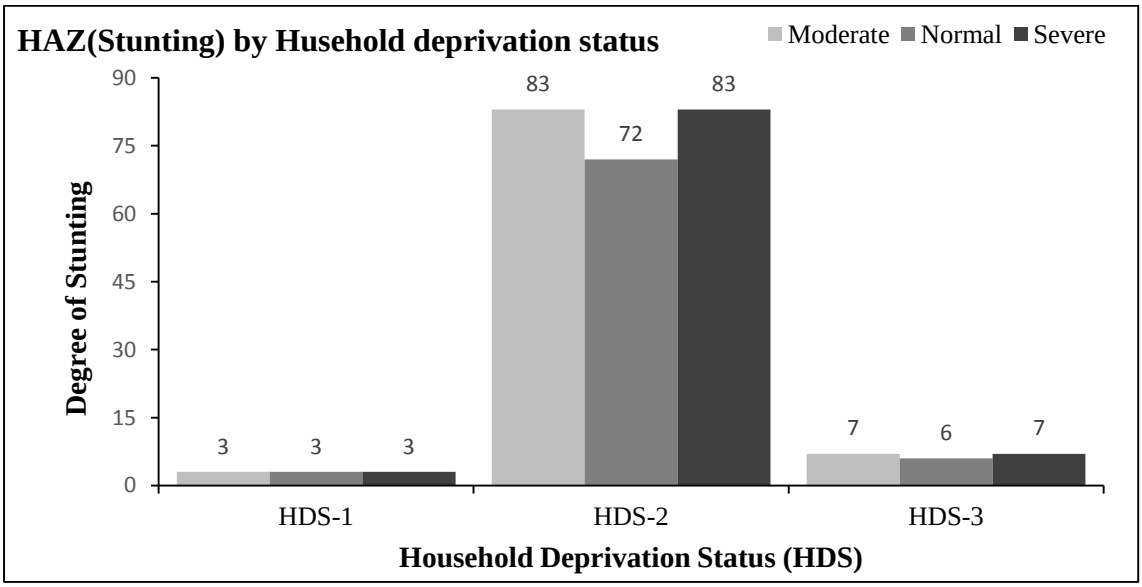
This table 6.4 explains the association among all three indices of child nutrition status with deprivation of household. According to classification of weight for age, moderate under-weight in all the three groups which are HDS-1, HDS-2 and HDS-3 was 0%, 25.31% and 30%, while severe under-weight prevalence in all three groups in pre-school children was 50%, 47.30 and 30% respectively.

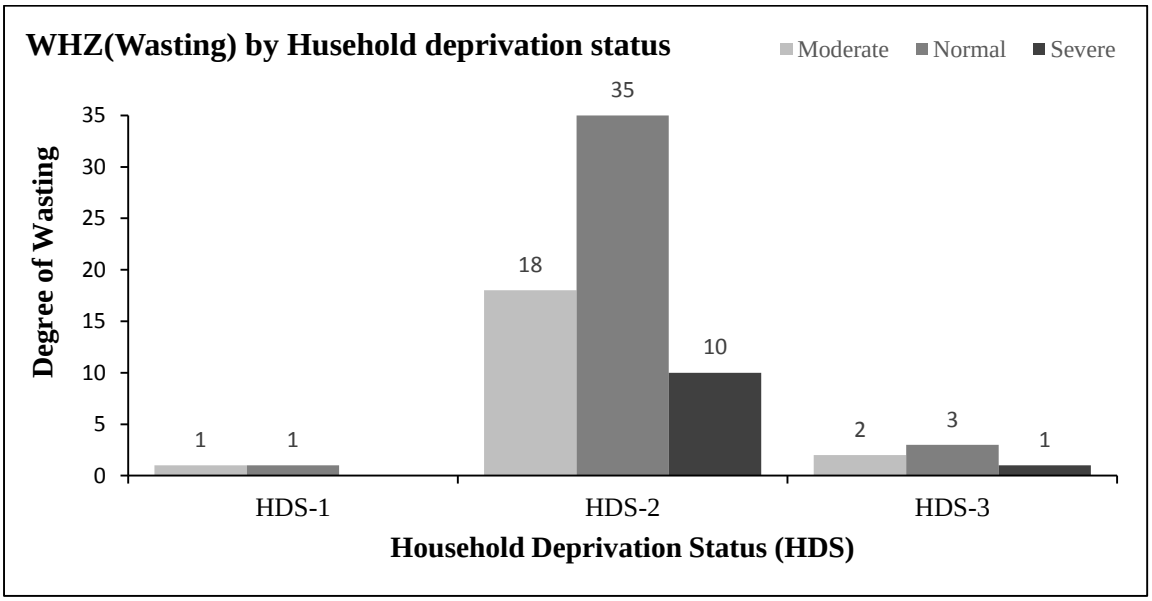
For classification of height for age, moderate stunting prevalence in all the three groups was 33.33%, 34.87% and 35%, this rate of prevalence for severe stunting was also same in all three groups in pre-school children.

Furthermore in weight for height classification, prevalence rates of moderate wasting in all the three groups was 50%, 28.57% and 33.33%, while in case of severe wasting in all three groups in pre-school children was 0%, 15.87 and 16.67% respectively.

Figure 6.1: Malnutrition by Household Deprivation Status (HDS)







6.7 Child Nutritional status and Mother Tongue

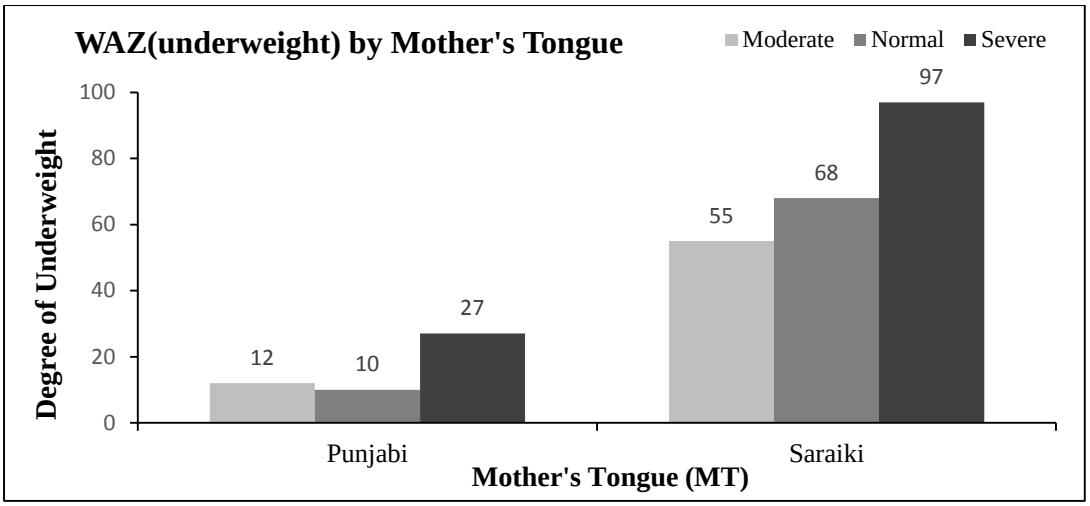
Table 6.5: Association among Mother Tongue and Nutrition Status of Child

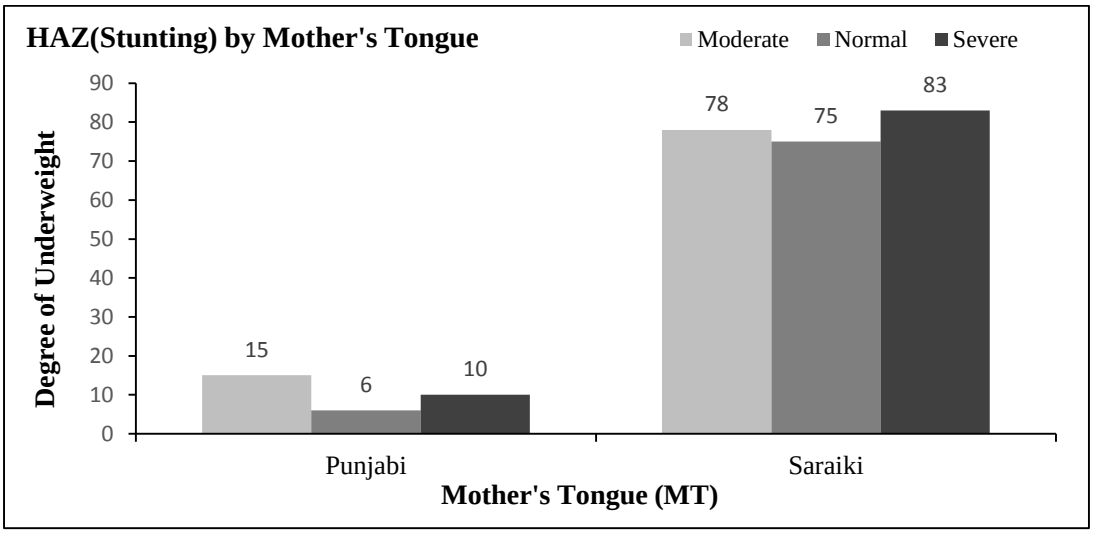
Mother Tongue	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for Age				
Punjabi	10 (3.72%)	12 (4.46%)	27 (10.04%)	49 (18.22%)
Saraiki	68 (25.28%)	55 (20.45%)	97 (36.05%)	220 (81.78%)
Total	78 (29%)	67 (24.91%)	124 (46.09%)	269(100%)
(haz) Height for Age				
Punjabi	6 (2.25%)	15 (5.62%)	10 (3.74%)	31 (11.61%)
Saraiki	75 (28.09%)	78 (29.21%)	83 (31.09%)	236 (88.39%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for Height				
Punjabi	6 (8.45%)	5 (7.04%)	1 (1.41%)	12 (16.90%)
Saraiki	33 (46.48%)	16 (22.54%)	10 (14.08%)	59 (83.10%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

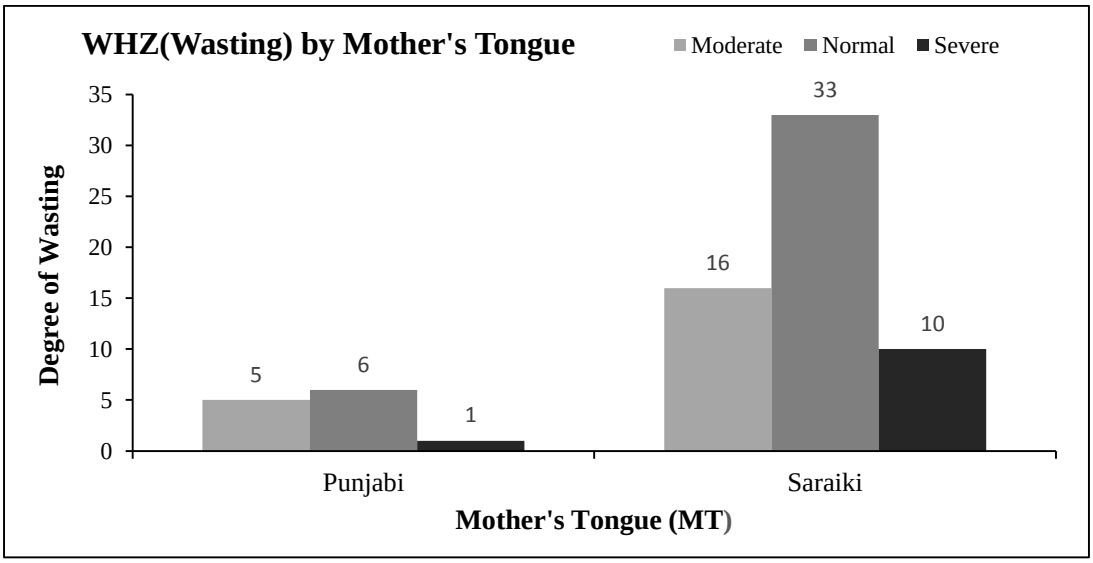
Source: Primary data from survey.

Association among child's nutrition status and mother tongue is discussed in table 6.5. On the basis of weight-for-age classification, the proportion of children in moderate underweight was 4.46% in Punjabi and 20.45% in Saraiki while in case of severe underweight the proportion of Saraiki children is higher than Punjabi children which was 10.04% in Punjabi and 36.05% in Saraiki. The proportion of children in moderate stunting was 5.62% in Punjabi and 29.21% in Saraiki while in case of severe stunting the proportion of Saraiki children is higher than Punjabi children which was 3.74% in Punjabi and 31.09% in Saraiki. The proportion of children in moderate wasting was 7.04% in Punjabi and 22.54% in Saraiki while in case of severe stunting the proportion of Saraiki children is higher than Punjabi children which was 1.41% in Punjabi and 14.08% in Saraiki.

Figure 6.2: Malnutrition by Mother's Tongue (MT)







6.8 Child Nutritional status and Age of child

Prevalence of malnutrition in children varies by age which is explained in many research studies.

Table 6.6: Association among age of child and nutrition status of child

Age of Child (in months)	**Child Nutritional Status**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
0-12 months	9 (3.34%)	15 (5.58%)	20 (7.44%)	44 (16.36%)
13-24 months	14 (5.21%)	8 (2.97%)	40 (14.87%)	62 (23.05%)
25-36 months	26 (9.67%)	23 (8.55%)	32 (11.89%)	81 (30.11%)
37-48 months	14 (5.21%)	15 (5.58%)	20 (7.43%)	49 (18.22%)
49-60 months	15 (5.57%)	6 (2.23%)	12 (4.47%)	33 (12.27%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
0-12 months	8 (3.00%)	4 (1.50%)	13 (4.87%)	25 (9.36%)
13-24 months	9 (3.37%)	11 (4.12%)	15 (5.62%)	35 (13.11%)
25-36 months	9 (3.37%)	14 (5.24%)	43 (16.11%)	66 (24.72%)
37-48 months	31 (11.61%)	35 (13.11%)	12 (4.49%)	78 (29.21%)
49-60 months	24 (8.99%)	29 (10.86%)	10 (3.75%)	63 (23.60%)
Total	81 (30.34%)	93 (33.83%)	93 (33.83%)	267 (100%)
(whz) Weight for height				
0-12 months	10 (14.08%)	3 (4.22%)	3 (4.22%)	16 (22.53%)
13-24 months	4 (5.63%)	6 (8.45%)	2 (2.82%)	12 (16.90%)
25-36 months	8 (11.27%)	3 (4.23%)	3 (4.23%)	14 (19.72%)
37-48 months	7 (9.86%)	7 (9.86%)	1 (1.41%)	15 (21.13%)
49-60 months	10 (14.09%)	2 (2.82%)	2 (2.82%)	14 (19.72%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

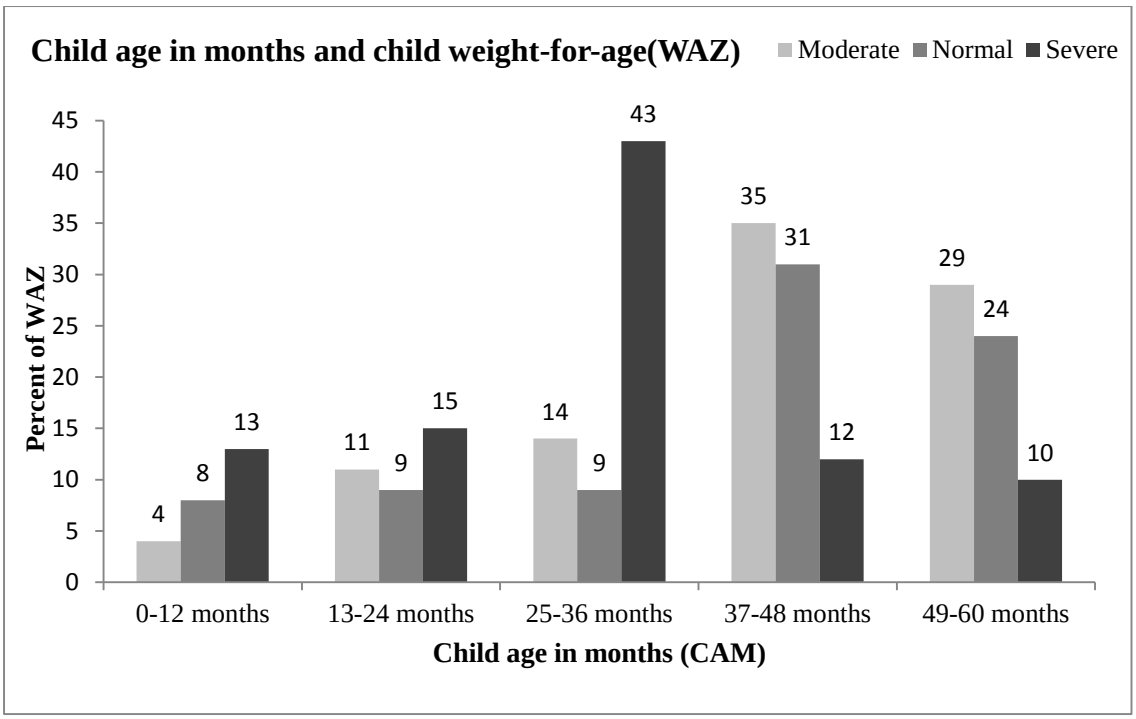
Source: Primary data from survey.

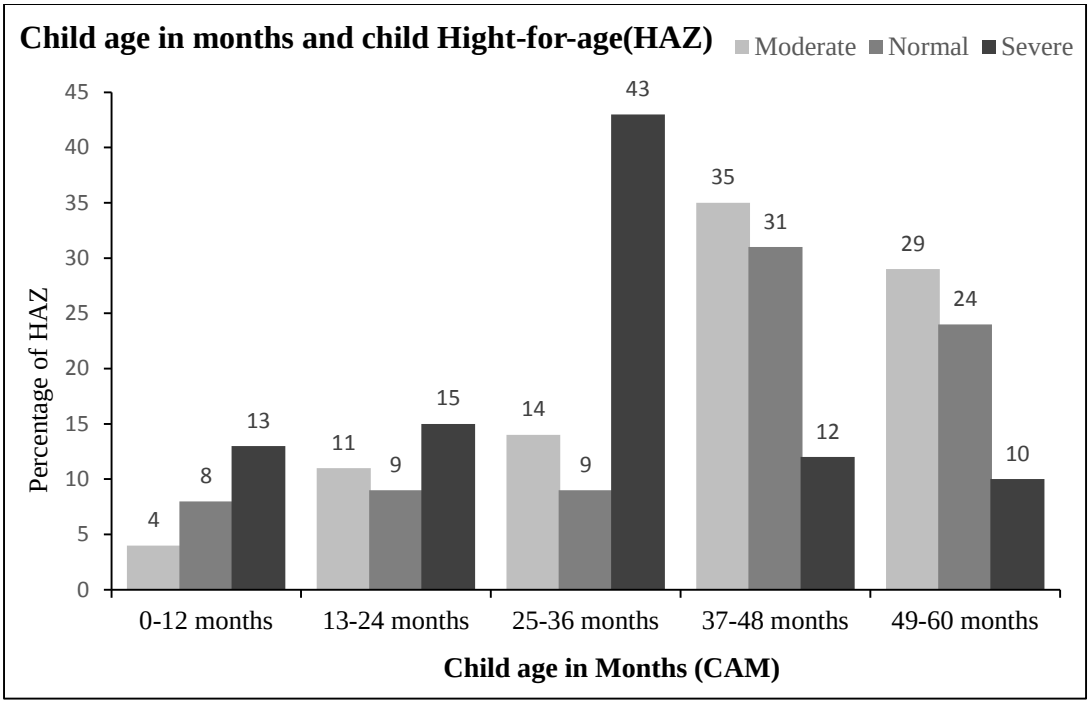
In table 6.6 relationship between child age in months and child nutritional status is stated. According to weight-for-age classification, the moderate underweight is 24.91% and severe underweight is 46.10%. In case of weight-for-age severe cases are more than moderate cases. Results of severe cases was high in 13-24 and 25-36 moths age category, which was 14.87% and 11.89% respectively.

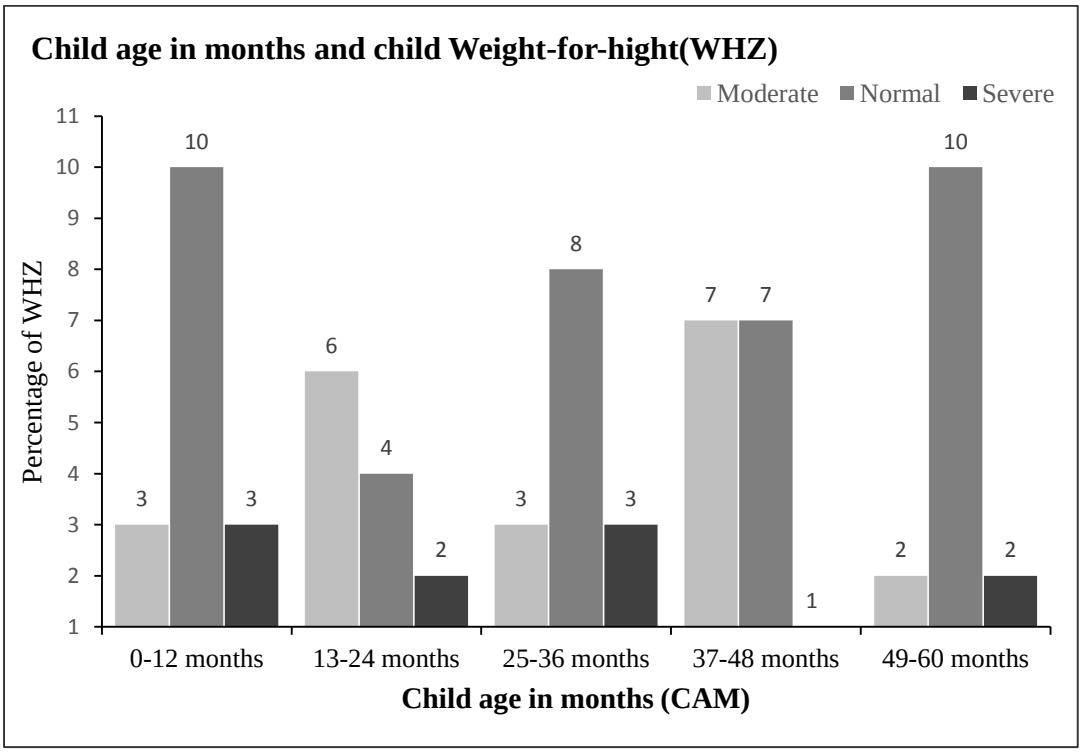
Furthermore in term of height for age classification the prevalence rates of moderate and severe stunting are same that are 33.83%. In 37-48 and 49-60 months age category, rates of moderate stunting are higher which are 13.11% and 10.86% respectively. While in case of severe stunting, the prevalence rates in 25-36 months age category are high that are 16.11%

Furthermore in weight for height classification the prevalence rate of moderate wasting is 29.58%, while in case of severe wasting this rate is 15.49%. In 13-24 and 37-48 months age category, rates of moderate wasting are higher which are 8.48% and 9.86%.

Figure 6.3: Malnutrition by Child Age in Months (CAM)




Child age in months and child Hight-for-age(HAZ)
Moderate
Normal
Severe
Percentage of HAZ
45
40
35
30
25
20
15
10
5
0
4
8
13
11
9
15
14
9
43
35
31
12
29
24
10
0-12 months
13-24 months
25-36 months
37-48 months
49-60 months
Child age in Months (CAM)


Child age in months and child Weight-for-hight(WHZ)
Moderate
Normal
Severe
Percentage of WHZ
11
10
9
8
7
6
5
4
3
2
1
3
10
3
6
4
2
3
8
3
7
7
1
2
10
2
0-12 months
13-24 months
25-36 months
37-48 months
49-60 months
Child age in months (CAM)

6.9 Child Nutritional status and Sex of child

Table 6.7: Association among gender of child and nutrition status of child

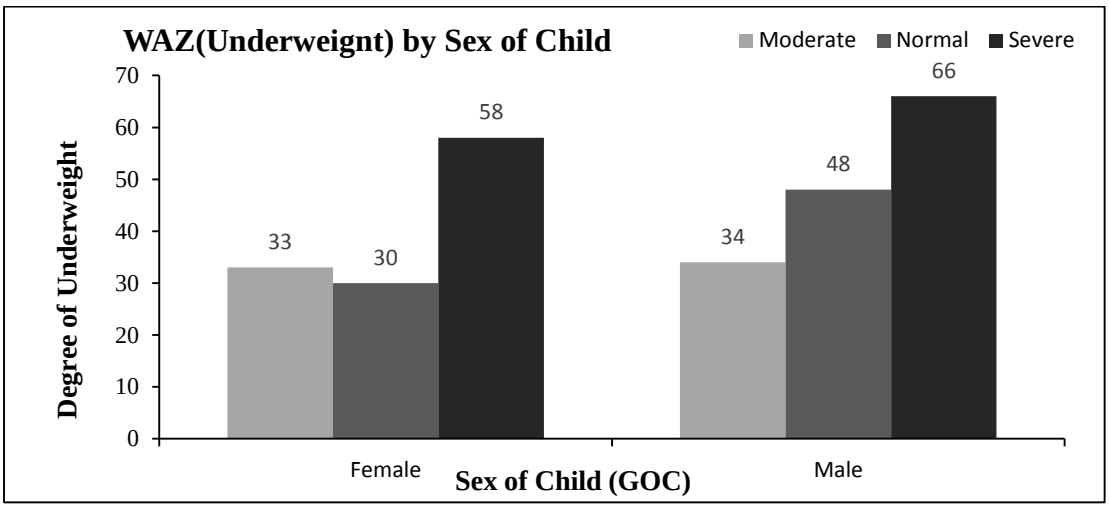
Sex of Child	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Female	30 (11.15%)	33 (12.27%)	58 (21.56%)	121 (44.98%)
Male	48 (17.84%)	34 (12.64%)	66 (24.54%)	148 (55.02%)
Total	78 (29.0%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Female	28 (10.48%)	50 (18.73%)	48 (17.98%)	126 (47.19%)
Male	53 (19.85%)	43 (16.11%)	45 (16.85%)	141 (52.81%)
Total	81 (30.34%)	93 (34.84%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Female	18 (25.35%)	8 (11.27%)	5 (7.04%)	31 (43.66%)
Male	21 (29.58%)	13 (18.31%)	6 (8.45%)	40 (56.34%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

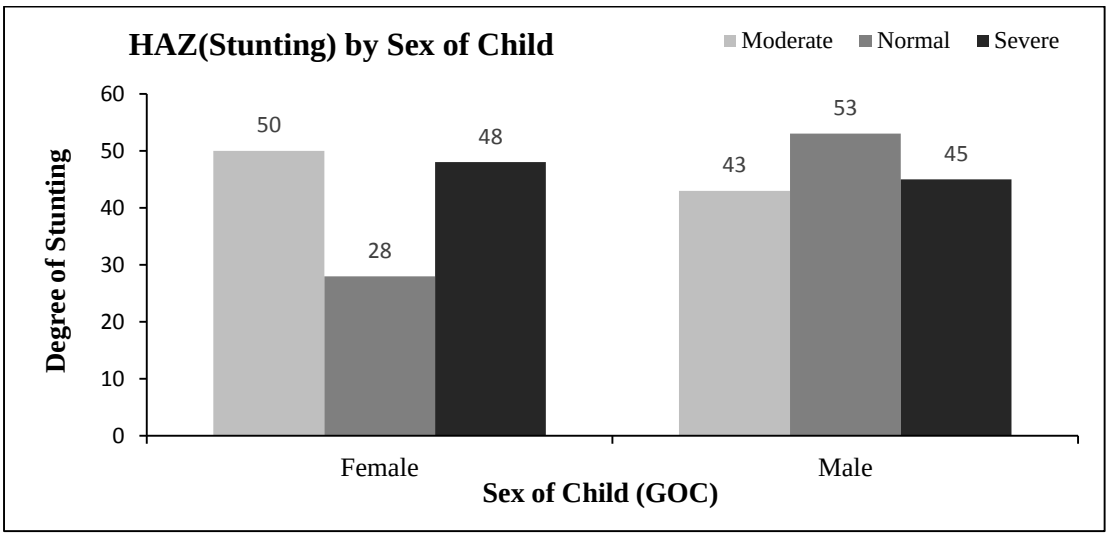
Source: Primary data from survey.

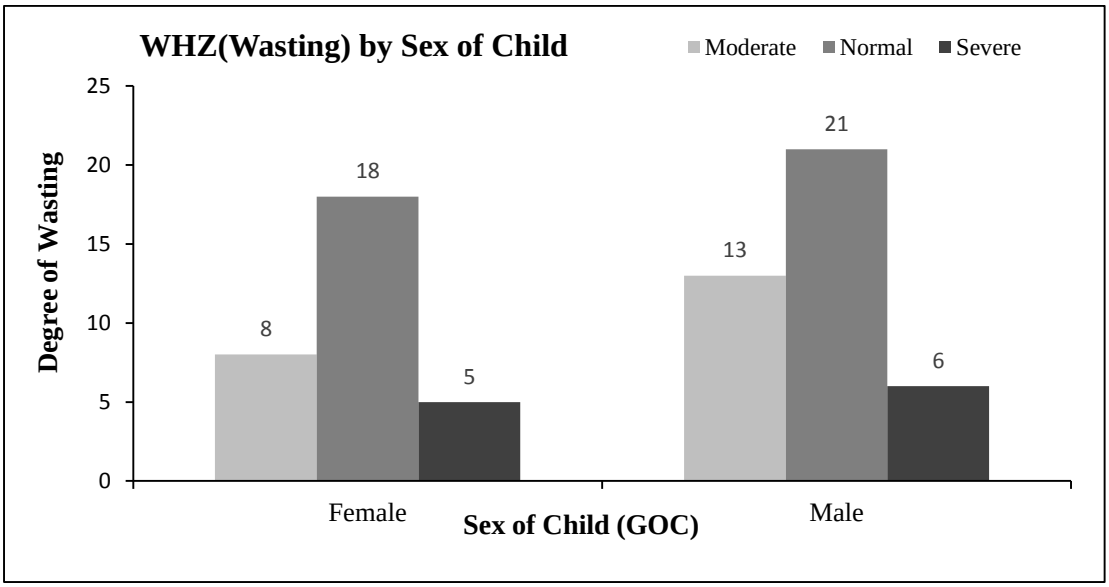
Relationship among gender of child and the nutrition status of child explained in table 6.7. Based on weight-for-age classification, the proportion of female children in moderate underweight was 12.27% and 12.64% in male children while in case of severe underweight the proportion of male children is higher than female children which was 21.56% in female children and 24.54% in male children. The proportion of children in moderate stunting was 18.73% in female children and 16.11% in male children while in case of severe stunting the proportion of female children is slightly higher than male children which was 17.98% in female children and 16.85% in male children. The proportion of children in moderate wasting was 11.27% in female children and 18.31% in male children while in case of severe stunting the proportion of male children is slightly higher than female children which was 7.04% in female and 8.45% in male children. Prevalence of wasting and under-weight in both

categories moderate and severe is high in male children while in case of height-for-age classification, prevalence of stunting between female children is slight high.

Figure 6.4: Malnutrition by Sex of Child (GOC)







6.10 Child Nutritional status and Birth order of child

Table 6.8: Association among birth order and Nutrition status of child Birth

Birth order	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
1	28 (10.41%)	10 (3.72%)	34 (12.64%)	72 (26.77%)
2 or 3	21 (7.81%)	31 (11.53%)	54 (20.08%)	106 (39.41%)
4 or 5	17 (6.32%)	20 (7.43%)	21 (7.81%)	58 (21.56%)
6 or higher	12 (4.46%)	6 (2.23%)	15 (5.58%)	33 (12.27%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
1	20 (7.49%)	25 (9.36%)	28 (10.49%)	73 (27.34%)
2 or 3	27 (10.11%)	40 (14.98%)	30 (11.24%)	97 (36.33%)
4 or 5	27 (10.11%)	17 (6.37%)	24 (8.99%)	68 (25.47%)
6 or higher	7 (2.64%)	11 (4.12%)	11 (4.12%)	29 (10.86%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
1	11 (15.50%)	3 (4.23%)	1 (1.41%)	15 (21.13%)
2 or 3	9 (12.68%)	11 (15.49%)	6 (8.45%)	26 (36.62%)
4 or 5	13 (18.31%)	6 (8.45%)	1 (1.41%)	20 (28.17%)
6 or higher	6 (8.45%)	1 (1.41%)	3 (4.22%)	10 (14.08%)
Total	39 (54.98%)	21 (29.58%)	11 (15.49%)	71 (100%)

Source: Primary data from survey.

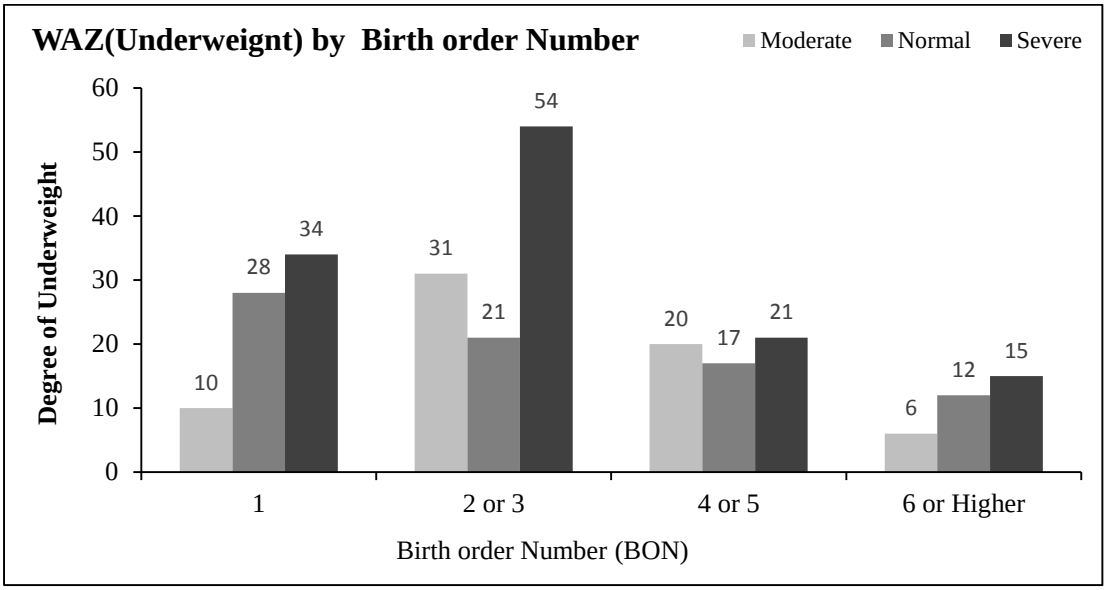
The table 6.8 shown the relationship between birth order number and child nutritional status. With reference to the weight for age classification, the moderate underweight is 24.91% and severe underweight is 46.10%. In case of weight-for-age severe cases are more than moderate cases. The birth order wise moderate and severe

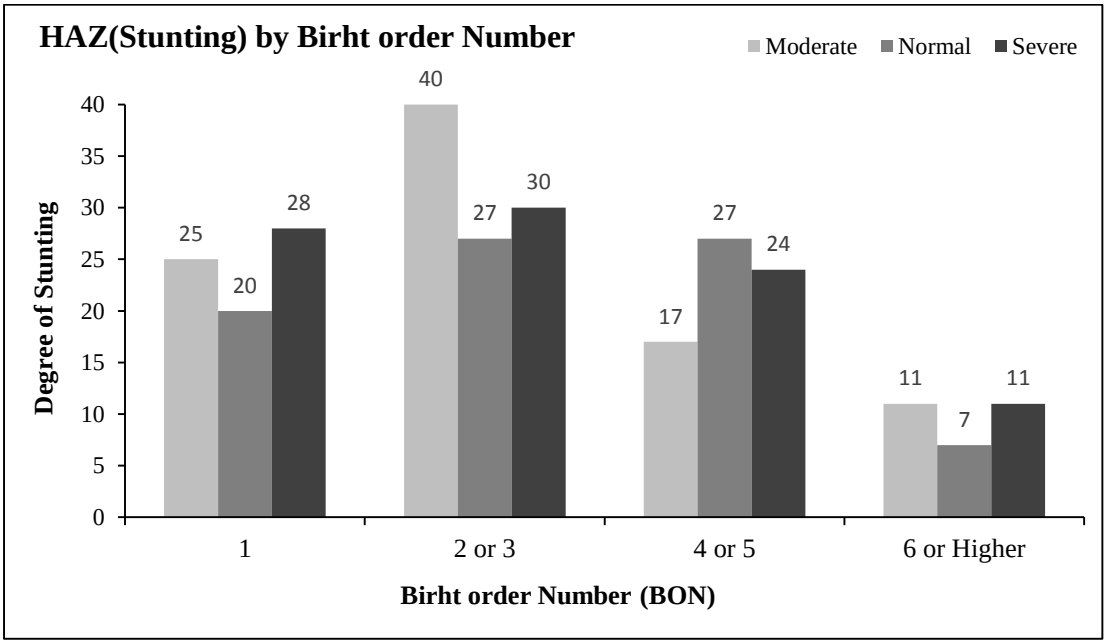
classification, underweight was higher among children with birth order one and two or three.

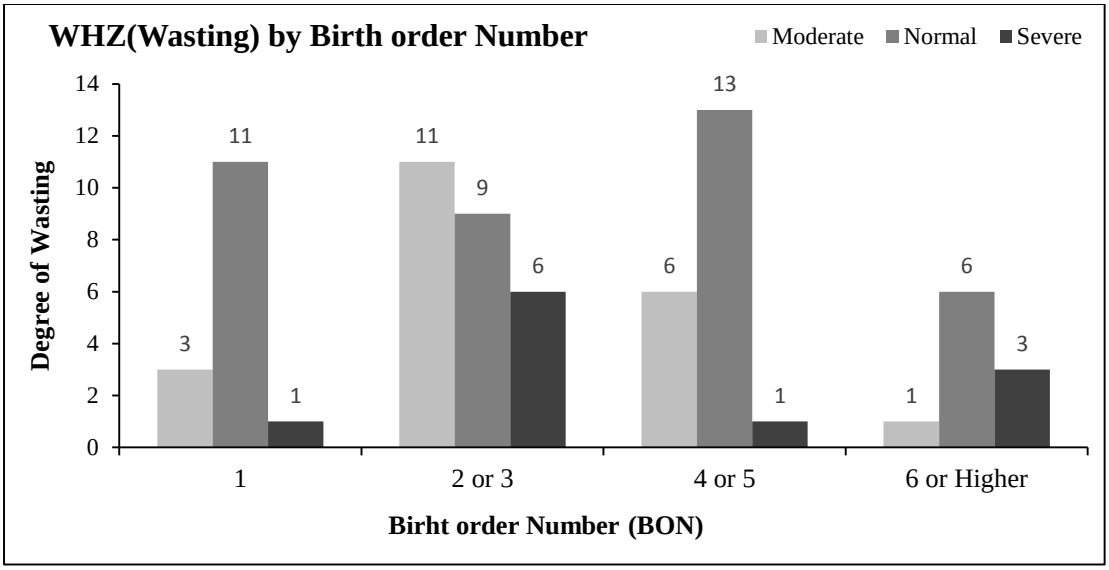
According to the height-for-age classification, Moderate and severe stunting of preschool children in sample population is same (34.83%). Moderate stunting is high between the children of birth order one and two or with three.

In weight-for-height classification, moderate wasting is (29.58%) and severe is (15.49%). Moderate wasting is high between children of birth order two or with three.

Figure 6.5: Malnutrition by Birth Order Number (BON)







6.11 Child Nutritional status and Maternal Education

Table 6.9: Association among mother's educational status and nutrition status of child

Maternal Education	**Nutrition status of child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Illiterate	58 (21.56%)	50 (18.59%)	92 (34.20%)	200 (74.35%)
Primary	8 (2.97%)	4 (1.49%)	15 (5.58%)	27 (10.04%)
Middle	7 (2.60%)	10 (3.72%)	8 (2.97%)	25 (9.29%)
Matric	5 (1.86%)	2 (0.74%)	7 (2.60%)	14 (5.20%)
FA & Higher	0 (0%)	1 (0.37%)	2 (0.75%)	3 (1.12%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Illiterate	53 (19.85%)	74 (27.71%)	68 (25.47%)	195 (73.03%)
Primary	15 (5.62%)	9 (3.37%)	11 (4.12%)	35 (13.11%)

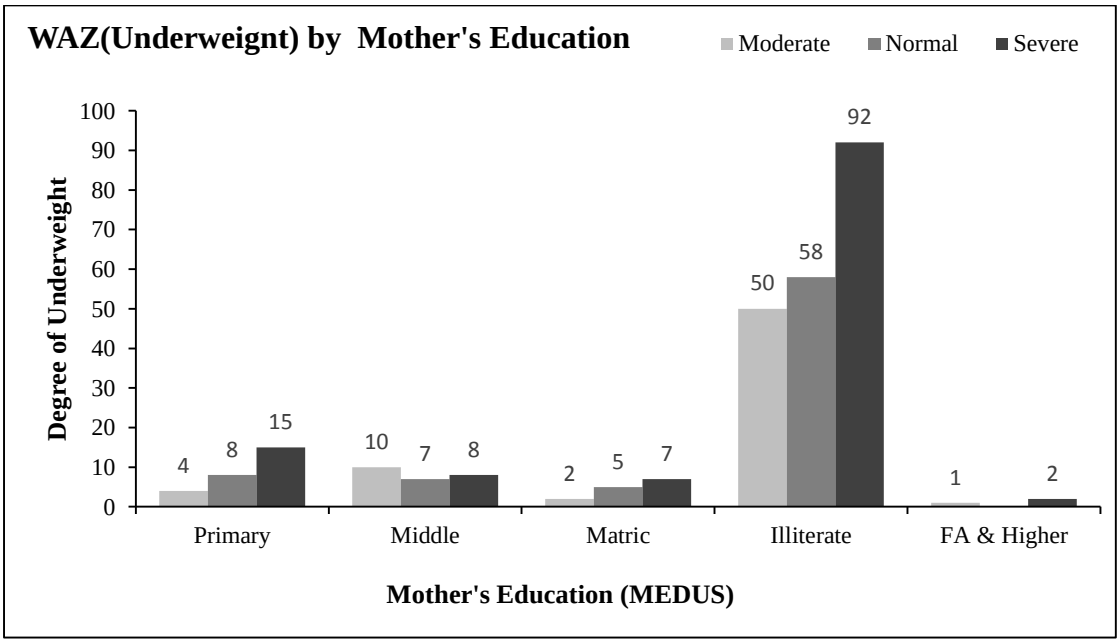
Middle	6 (2.25%)	4 (1.50%)	8 (3.00%)	18 (6.74%)
Matric	7 (2.62%)	3 (1.12%)	5 (1.87%)	15 (5.62%)
FA & Higher	0 (0%)	3 (1.13%)	1 (0.83%)	4 (1.50%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Illiterate	27 (38.03%)	14 (19.72%)	8 (11.27%)	49 (69.01%)
Primary	7 (9.86%)	4 (5.63%)	0 (0%)	11 (15.49%)
Middle	2 (2.82%)	0 (0%)	2 (2.82%)	4 (5.63%)
Matric	2 (2.82%)	2 (2.82%)	1 (1.41%)	5 (7.04%)
FA & Higher	1 (1.41%)	1 (1.41%)	0 (0%)	2 (2.82%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

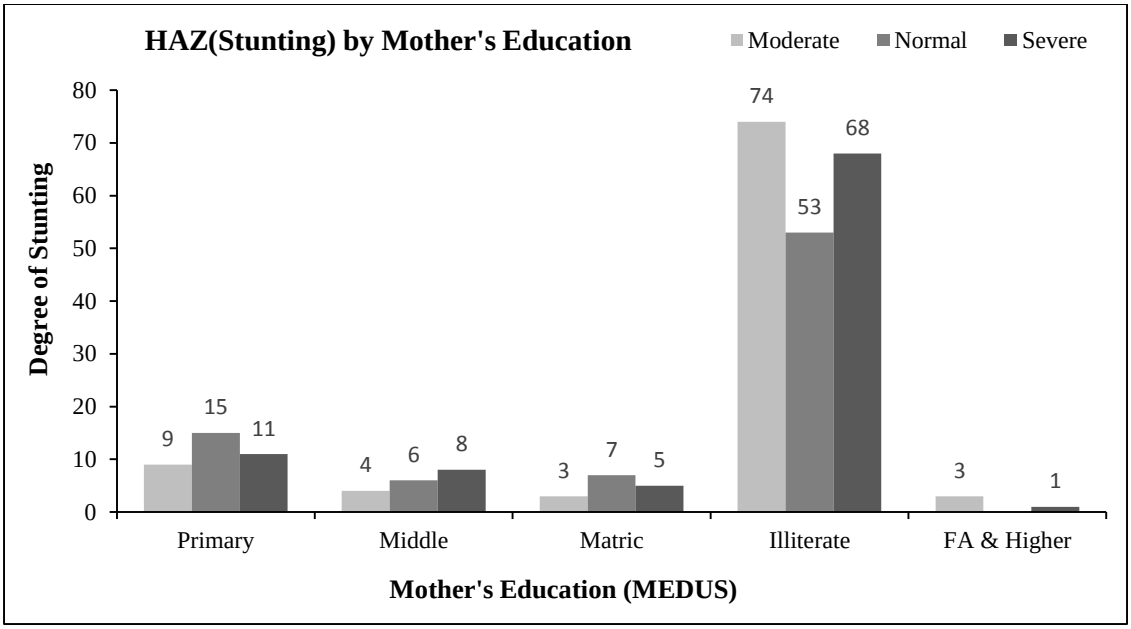
Source: Primary data from survey.

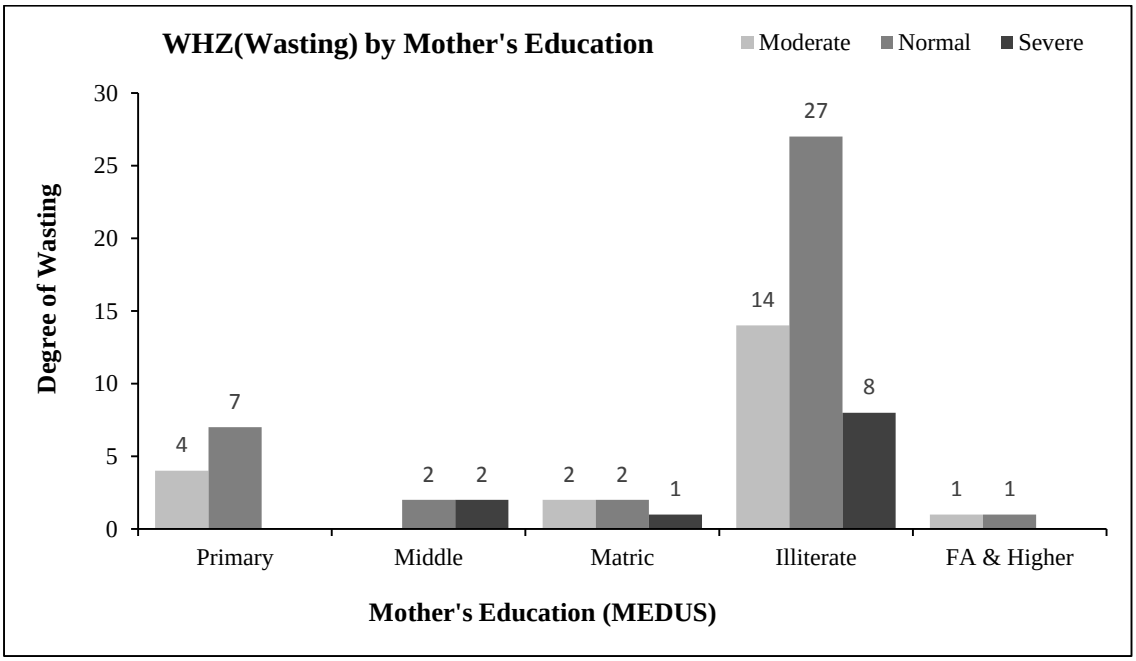
Nutrition status of pre-school child much depend on mothers because mother is prime provider of basic child's nutritional need and care. This care depend on mother's knowledge and education especially on health and nutrition (Yasoda Devi and Geervani, 1998).

Table 6.9 shown the relationship between mother's educational status and child nutritional status. Table shows that underweight, stunting and wasting in both moderate and severe cases was higher among the children of those mothers who are illiterate.

Figure 6.6: association among mother education and Nutrition status of child




HAZ(Stunting) by Mother's Education
Moderate
Normal
Severe
Degree of Stunting
80
70
60
50
40
30
20
10
0
9
15
11
4
6
8
3
7
5
74
53
68
3
1
Primary
Middle
Matric
Illiterate
FA & Higher
Mother's Education (MEDUS)


WHZ(Wasting) by Mother's Education
Moderate
Normal
Severe
Degree of Wasting
30
25
20
15
10
5
0
4
7
2
2
2
2
1
14
27
8
1
1
Primary
Middle
Matric
Illiterate
FA & Higher
Mother's Education (MEDUS)

6.12 Child's Nutrition status and Father Education

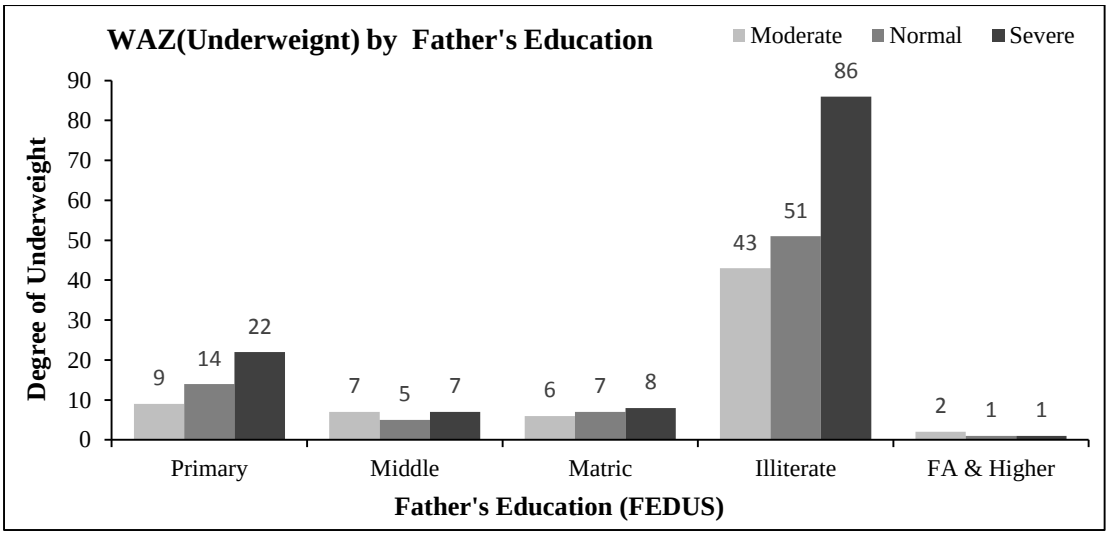
Table 6.10: Association among nutrition status of child and education of father

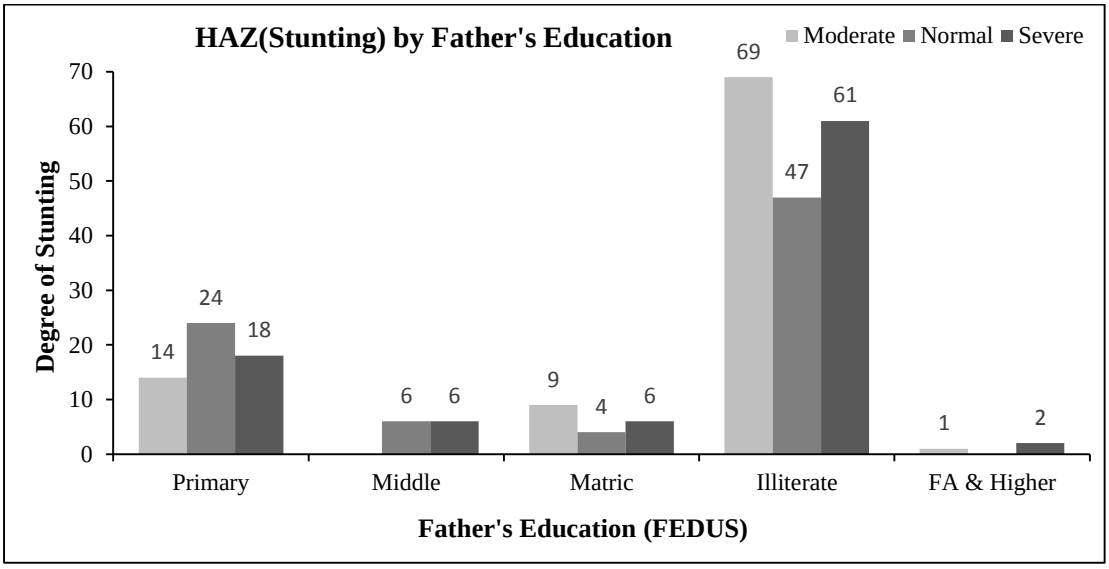
Father's Education	**Nutrition status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Illiterate	51 (18.96%)	43 (15.98%)	86 (31.97%)	180 (66.91%)
Primary	14 (5.20%)	9 (3.35%)	22 (8.18%)	45 (16.73%)
Middle	5 (1.86%)	7 (2.60%)	7 (2.60%)	19 (7.06%)
Matric	7 (2.60%)	6 (2.23%)	8 (2.98%)	21 (7.81%)
FA & Higher	1 (0.37%)	2 (0.75%)	1 (0.37%)	4 (1.49%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Illiterate	47 (17.60%)	69 (25.84%)	61 (22.85%)	177 (66.29%)
Primary	24 (8.99%)	14 (5.24%)	18 (6.74%)	56 (20.97%)
Middle	6 (2.25%)	0 (0%)	6 (2.25%)	12 (4.49%)
Matric	4 (1.50%)	9 (3.37%)	6 (2.25%)	19 (7.12%)
FA & Higher	0 (0%)	1 (0.37%)	2 (0.75%)	3 (1.12%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Illiterate	23 (32.39%)	13 (18.31%)	7 (9.86%)	43 (60.56%)
Primary	9 (12.68%)	3 (4.23%)	2 (2.82%)	14 (19.72%)
Middle	2 (2.82%)	2 (2.82%)	0 (0%)	4 (5.63%)
Matric	4 (5.64%)	3 (4.23%)	2 (2.82%)	9 (12.68%)
FA & Higher	1 (1.41%)	0 (0%)	0 (0%)	1 (1.41%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

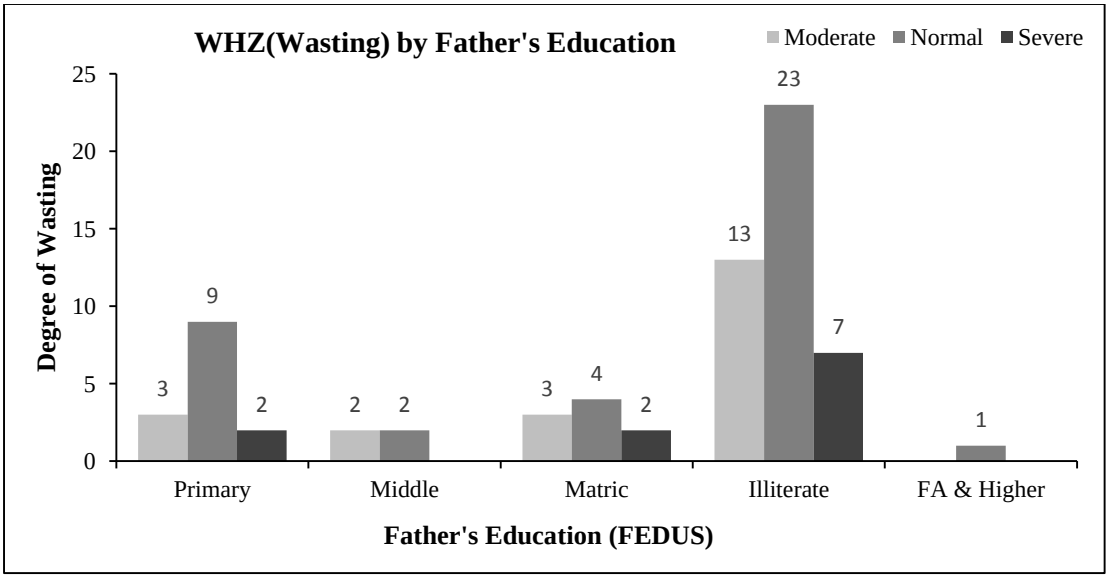
Source: Primary data from survey.

The table 6.10 shown the relationship between father's educational status and child nutritional status. Table shows that underweight, stunting and wasting in both moderate and severe cases was higher among those children whose fathers have had no formal education (illiterate).

Figure 6.7: Association in father education and Nutrition status of child







6.13 Nutrition status of child and Maternal Employment

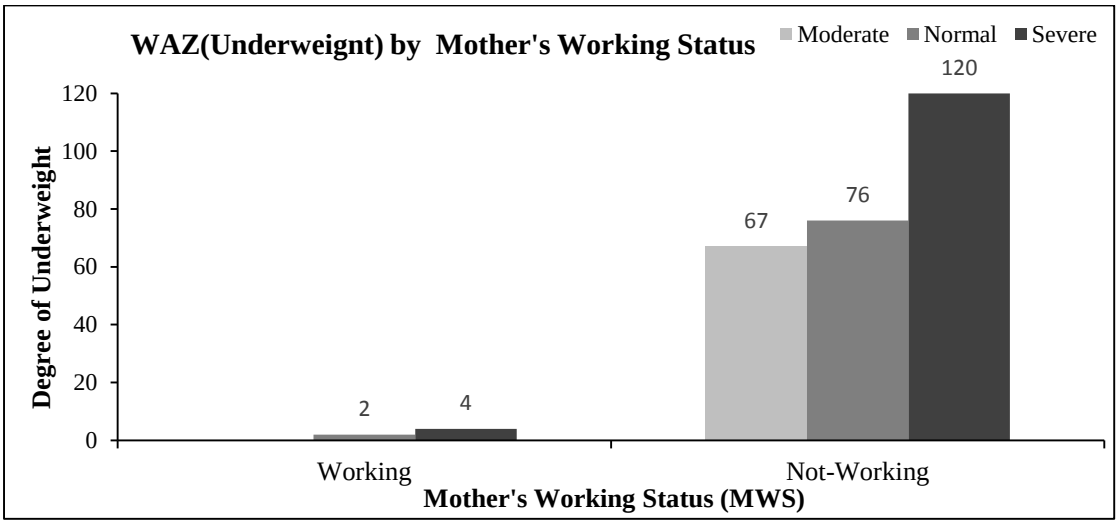
Table 6.11: Association among maternal employment nutrition status of child

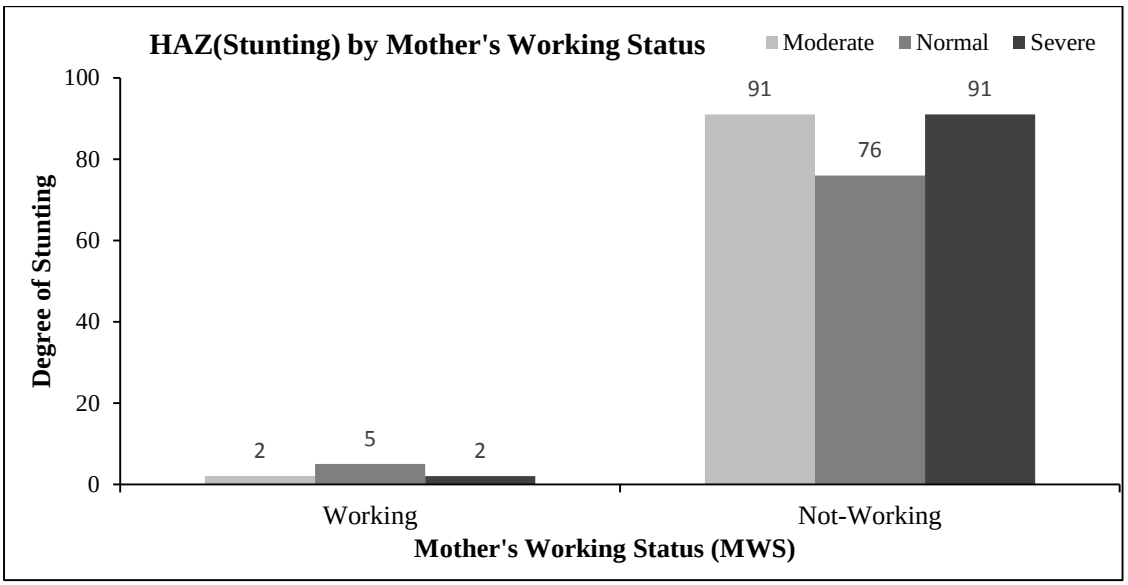
Maternal Employment Status	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Working	2 (0.74%)	0 (0%)	4 (1.49%)	6 (2.23%)
Not-working	76 (28.25%)	67 (24.91%)	120 (44.61%)	263 (97.77%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Working	5 (1.87%)	2 (0.75%)	2 (0.75%)	9 (3.37%)
Not-working	76 (28.69%)	91 (34.35%)	91 (34.35%)	258 (96.63%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Working	2 (2.82%)	1 (1.41%)	0 (0%)	3 (4.23%)
Not-working	37 (52.11%)	20 (28.17%)	11 (15.49%)	68 (95.77%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

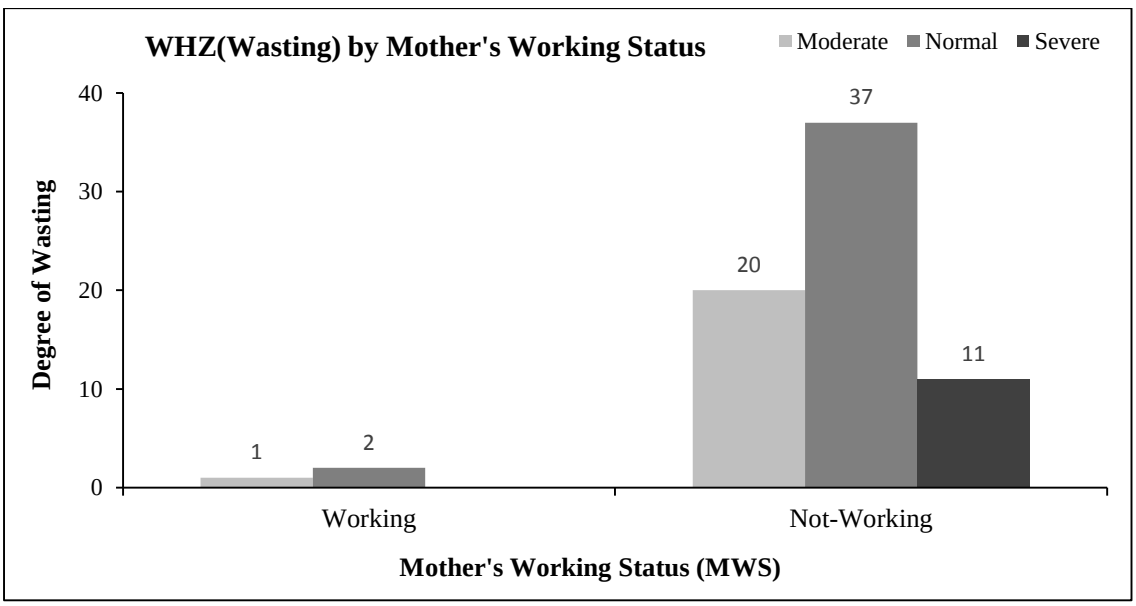
Source: Primary data from survey.

Table 6.11 shown the relationship between mother's working status and child nutritional status. Table shows that underweight, stunting and wasting in both moderate and severe cases was higher among those children whom mother's was not working.

Figure 6.8: Association among nutrition status of child and working status of mother







6.14 Child Nutrition status and Employment of Father

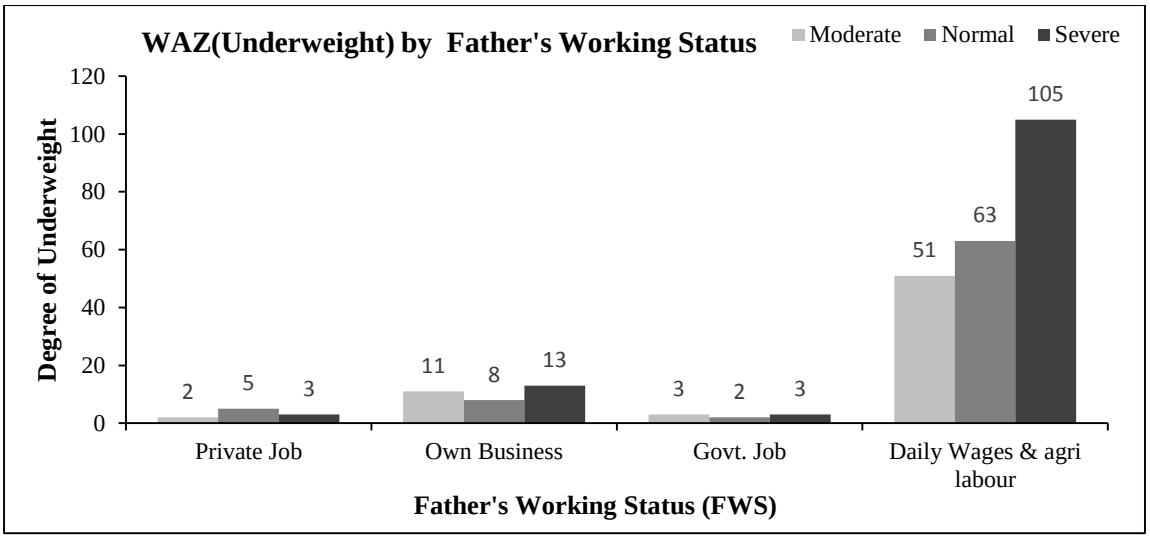
Table 6.12: Association among nutrition status of child and employment of father

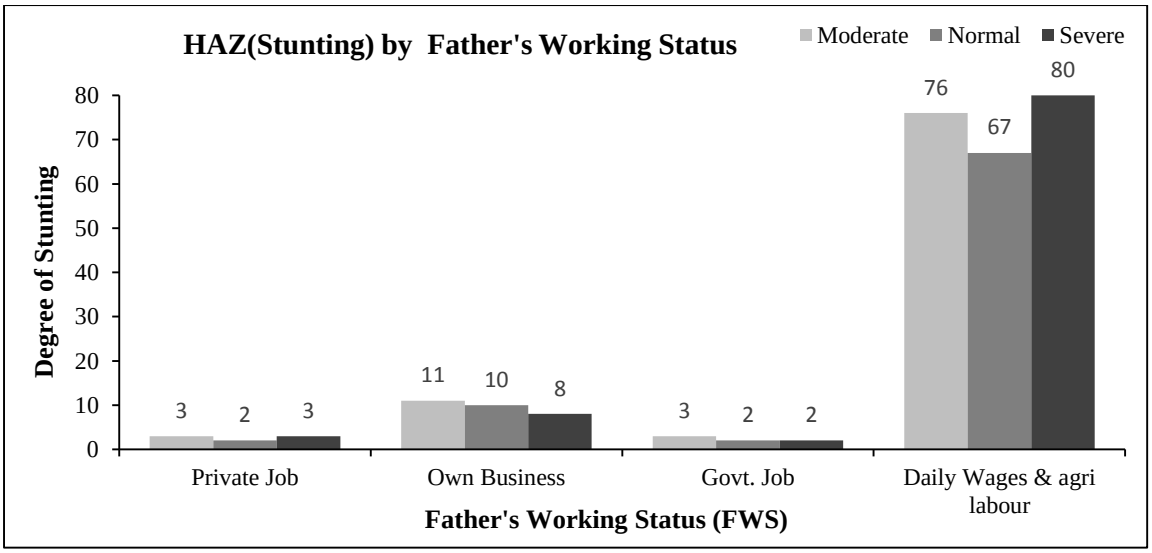
Father Employment Status	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Govt. Job	2 (0.74%)	3 (1.11%)	3 (1.11%)	8 (2.97%)
Private Job	5 (1.86%)	2 (0.74%)	3 (1.12%)	10 (3.72%)
Own Business	8 (2.98%)	11 (4.09%)	13 (4.83%)	32 (11.90%)
Daily wages & agriculture	63 (23.42%)	51 (18.96%)	105 (39.03%)	219 (81.41%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Govt. Job	2 (0.75%)	3 (1.12%)	2 (0.75%)	7 (2.62%)
Private Job	2 (0.75%)	3 (1.13%)	3 (1.13%)	8 (3.0%)
Own Business	10 (3.74%)	11 (4.12%)	8 (3.00%)	29 (10.86%)
Daily wages & agriculture	67 (25.09%)	76 (28.46%)	80 (29.96%)	223 (83.52%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Govt. Job	2 (2.82%)	2 (2.82%)	1 (1.41%)	5 (7.04%)
Private Job	0 (0%)	2 (2.82%)	0 (0%)	2 (2.82%)
Own Business	8 (11.27%)	3 (4.23%)	4 (5.63%)	15 (21.13%)
Daily wages & agriculture	29 (40.90%)	14 (19.74%)	6 (8.46%)	49 (69.10%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

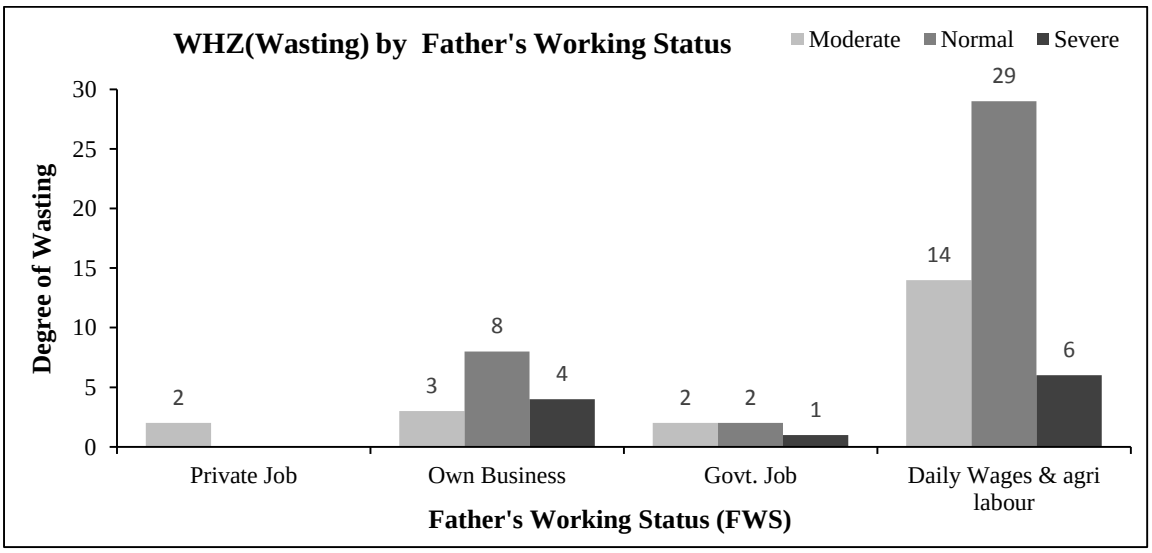
Source: Primary data from survey.

The table 6.12 shown the relationship between father's working status and child nutritional status. Table shows that underweight, stunting and wasting in both moderate and severe cases was higher among those children whom father's working status was daily wages and agriculture labor.

Figure 6.9: Association among child's nutrition and father's working status







6.15 Child Nutritional status and Mother's Knowledge on Nutritional

Table 6.13: Association among child's nutrition status and nutritional knowledge of mother

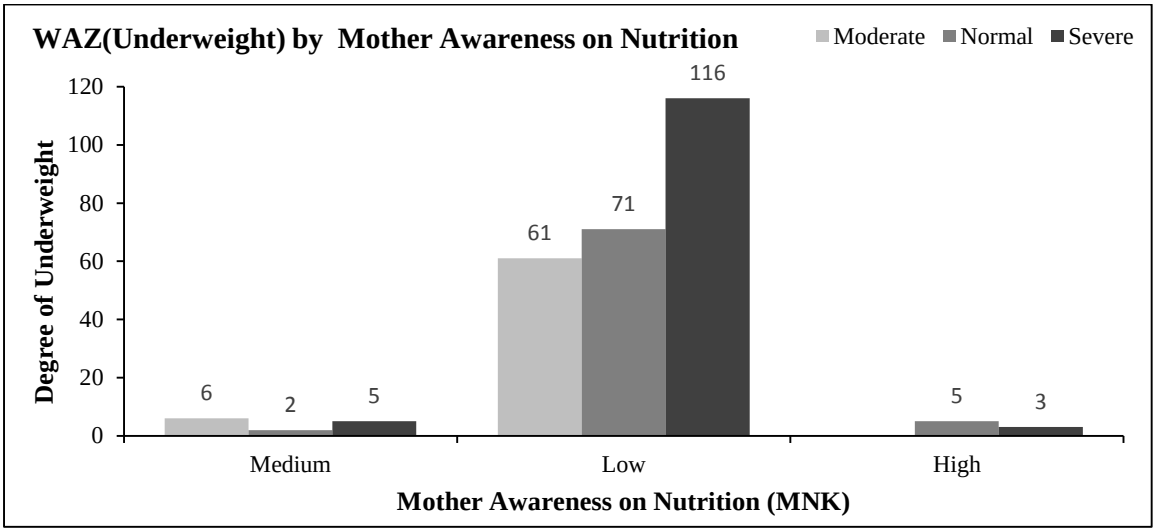
Nutritional Knowledge of Mother	**Nutrition Status of Child**			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
Low	71 (26.39%)	61 (22.68%)	116 (43.12%)	248 (92.19%)
Medium	2 (0.75%)	6 (2.23%)	5 (1.86%)	13 (4.83%)
High	5 (1.86%)	0 (0%)	3 (1.11%)	8 (2.97%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
Low	69 (25.84%)	87 (32.58%)	87 (32.58%)	243 (91.01%)
Medium	4 (1.53%)	5 (1.91%)	2 (0.77%)	11 (4.12%)
High	8 (3.00%)	1 (0.37%)	4 (1.50%)	13 (4.87%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
Low	31 (43.66%)	17 (23.94%)	9 (12.68%)	57 (80.28%)
Medium	6 (8.45%)	3 (4.22%)	2 (2.82%)	11 (15.49%)
High	2 (2.82%)	1 (1.41%)	0 (0%)	3 (4.23%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

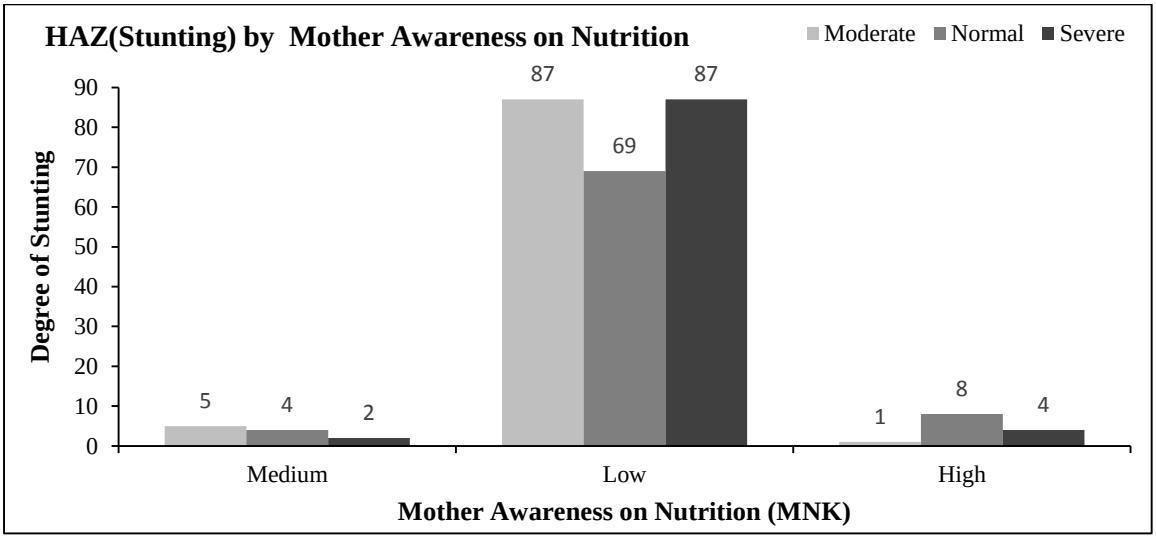
Source: Primary data from survey.

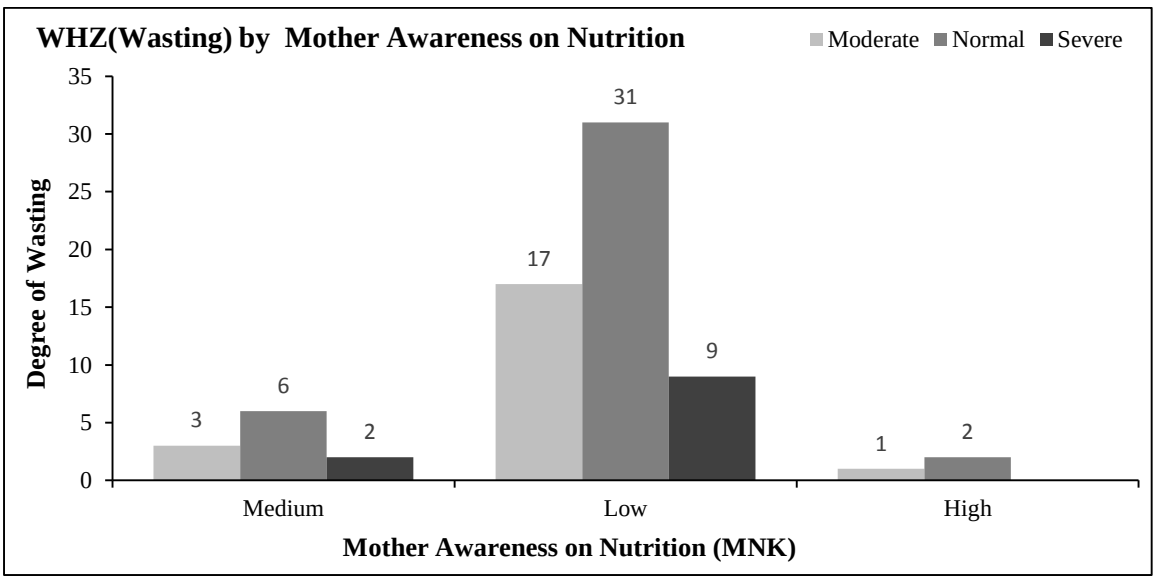
In this current study, an index is constructed based on mother nutritional knowledge (MNK) which consists of six questions regarding attitudes and awareness of mothers on nutrition. This index (MNK) is in binary form, if answer of mother to the question is 'yes' it assigned equal to 1 otherwise 0 if answer is 'No'. Further this index is categorized into three groups; low, medium and high awareness of mother on nutrition. The value range for low MNK group from 0-2 and for medium MNK group is 3 only and further for higher MNK group the range of value is 4-6. MNK high category shows that mothers have good knowledge of child health and nutrition.

The table 6.13 shows that in low MNK category, stunting, wasting and under-weight prevalence is high.

Figure 6.10: Association among child's nutrition status and awareness of mothers on nutrition







6.16 Child Nutrition status and Mother's Age at Marriage

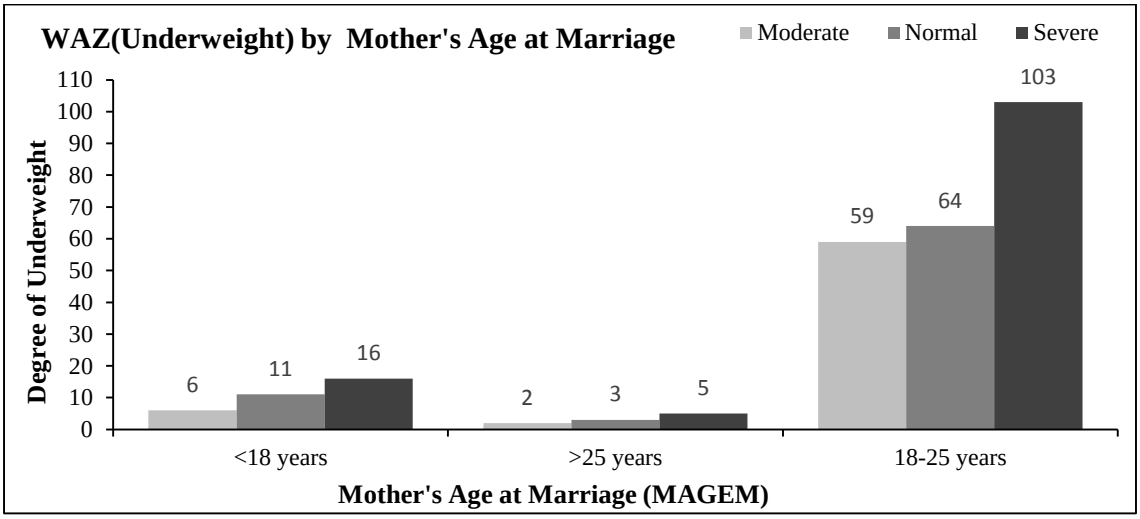
Table 6.14: Association among child's nutrition status and age of mothers at marriage

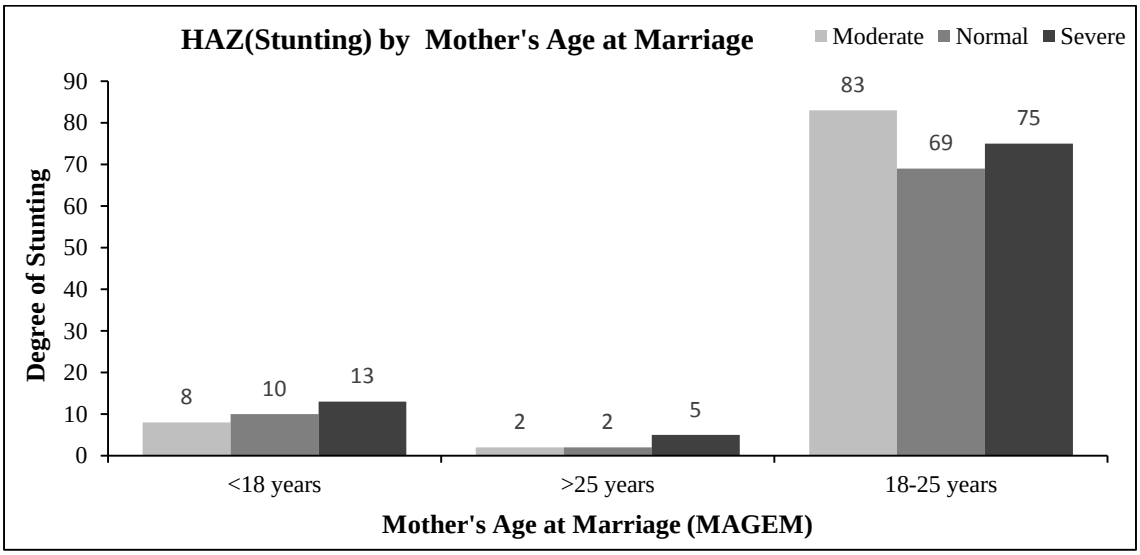
Age of Mother at Marriage	Nutrition Status of Child			
	Normal (less than -1 to greater than -2 z-score)	**Moderate** (less than-2 to greater than -3 z-score)	**Severe** (less than-3 z-score)	**Total**
(waz) Weight for age				
< 18 years	11 (4.09%)	6 (2.23%)	16 (5.95%)	33 (12.27%)
18-25 years	64 (23.79%)	59 (21.93%)	103 (38.29%)	226 (84.01%)
> 25 Years	3 (1.12%)	2 (0.74%)	5 (1.86%)	10 (3.72%)
Total	78 (29%)	67 (24.91%)	124 (46.10%)	269 (100%)
(haz) Height for age				
< 18 years	10 (3.75%)	8 (3.00%)	13 (4.87%)	31 (11.61%)
18-25 years	69 (25.84%)	83 (31.09%)	75 (28.09%)	227 (85.02%)
> 25 Years	2 (0.75%)	2 (0.75%)	5 (1.87%)	9 (3.37%)
Total	81 (30.34%)	93 (34.83%)	93 (34.83%)	267 (100%)
(whz) Weight for height				
< 18 years	6 (8.45%)	1 (1.41%)	5 (7.04%)	12 (16.90%)
18-25 years	32 (45.07%)	18 (25.35%)	5 (7.04%)	55 (77.46%)
> 25 Years	1 (1.41%)	2 (2.82%)	1 (1.41%)	4 (5.63%)
Total	39 (54.93%)	21 (29.58%)	11 (15.49%)	71 (100%)

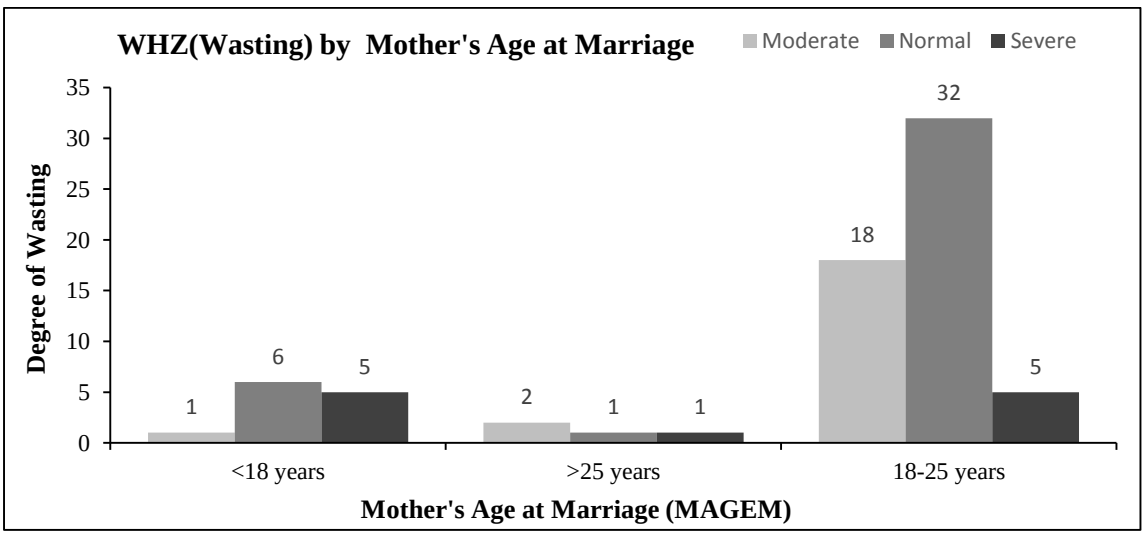
Source: Primary data from survey.

Table 6.14 shown the relationship between mother's age at marriage and child nutritional status. Table shows that underweight, stunting and wasting in both moderate and severe cases was higher among those children whom mother's age at marriage was 18-25 years age category.

Figure 6.11: Association among child's nutrition status and age of mothers at marriage







6.17 The bivariate and multivariate analysis of pre-school Child Nutrition Status

Table 6.15: Description of variables and their percentages in rural Rahim Yar Khan to the distribution of pre-school child nutrition status

Lis of Variables	Description of variable	Percentage
Mother's Tongue (MT)		
Saraiki	Children live in a household whose head belongs to Saraiki language family	15.86
Punjabi	Children live in a household whose head belongs to Punjabi language family	84.14
Gender of Child (GOC)		
Male	Male child	55.32
Female	Female child	44.68
Child's Age (CAM)		
0 to 12 month	Child's age lies in 0 to 12 month	17.41
13 to 24 month	Child's age lies in 13 to 24 month	21.08
25 to 36 month	Child's age lies in 25 to 36 month	21.47
37 to 48 month	Child's age lies in 37 to 48 month	23.02
49 to 60 month	Child's age lies in 49 to 60 month	17.02
Birth order (BON)		
1	Child birth order 1	28.24
2 or 3	Child birth order 2 or 3	38.10
4 or 5	Child birth order 4 or 5	23.21
6 or higher	Child birth order 6 or higher	10.44
Mother's Literacy (MEDUS)		
Illiterate	Literate mother	74.85
Primary	Literate of mother with primary education	11.22
Middle	Mother is literate with middle education	7.16
Matric	Mother is literate with matric education	5.42
FA & Higher	Mother is literate with FA & Higher education	1.35
Education of Father (FEDUS)		
Illiterate	Father is illiterate	69.83
Primary	Father is literate with primary education	17.79
Middle	Father is literate with middle education	5.42
Matric	Father is literate with matric education	5.80
FA & Higher	Father is literate with FA & Higher education	1.16
Work Status of Mother (MWS)		
Working	Mother work status either govt or private employee, daily wages worker or agriculture allied laborer	3.29

Not- Working	Housewife or nothing to do	96.71
Work Status of Father (FWS)		
Govt. Job	Government employee	2.51
Private Job	Private employee	3.09
Own Business	Has own business or shop	8.51
Daily wages & agriculture	Daily wages worker or linked with agriculture work	85.88
Mother's Age at Marriage (MAGEM)		
< 18 years	Mother's age at the time of marriage < 18 years	9.48
18-25 years	Mother's age at the time of marriage 18-25 years	87.04
> 25 Years	Age of mother at the time of marriage is greater than 25 Years	3.48
Mother Awareness on Nutrition (MNK)		
Low	Mother has low awareness on nutrition	92.84
Medium	Mother has medium awareness on nutrition	3.68
High	Mother has high awareness on nutrition	3.48
Household Deprivation Status (HDS)		
HDS-1	Deprivation of household is low	2.71
HDS-2	Deprivation of household is medium	90.91
HDS-3	Deprivation of household is high	6.38

Source: Primary data from survey.

6.18 Analysis of Logistic Regression for Malnourishment among Pre-School Children

To identify the determinants and casus of malnutrition more specifically for stunting, under-weight and CIAF in pre-school children in district Rahim Yar Khan, multivariate analysis is employed. For multivariate analysis, logistic regression was used which predicts the success probability of dependent variable.

We used four logistic regression models and the results are almost same. So the interpretation of the results are same for four models; Model-1 (stunting), Model-2 (wasting), Model-3 (underweight) and Model-4 (CIAF). Our sample size is 316 children under age 5 years in all four models. The summary results of four models presented in table 6.16, 6.17, 6.18 and 6.19.

Model-1 (Stunting)

Table 6.16: Result summary of Logit Model for Stunting among the children of pre-school age by socio-economic features

List of Variable	Coefficients	Standard Error	Z- value	P-value
Mother's Tongue (MT)				
Saraiki	-.9665224	.462973	-2.09	0.037**
Sex of Child (GOC)				
Male	-.4599083	.2641963	-1.74	0.082*
Age of Child (CAM)				
13-24 months	.9210111	.5518074	1.67	0.095*
25-36 months	1.957075	.5070996	3.86	0.000***
37-48 months	.2382068	.4306306	0.55	0.580
49-60 months	.1578265	.4403024	0.36	0.720
Birth order (BON)				
2 or 3	-.6099067	.3450526	-1.77	0.077*
4 or 5	-.795861	.3629249	-2.19	0.028**
6 or higher	-.2555082	.471151	-0.54	0.588
Education of Mother (MEDUS)				
Primary	.358807	.8647054	0.41	0.678
Middle	.3489022	.9123221	0.38	0.702
Matric	-.3208042	1.038236	-0.31	0.757
Education of Father (FEDUS)				
Primary	-.6747556	.8268684	-0.82	0.414
Middle	.1346552	.9733493	0.14	0.890
Matric	.9964417	.9133251	1.09	0.275
FA & Higher	1.117042	1.489962	0.75	0.453
Work Status of Mother (MWS)				
Not- Working	-.2797458	1.092423	-0.26	0.798
Work Status of Father (FWS)				
Private Job	.6371277	1.248033	0.51	0.610
Own Business	.6732664	1.171136	0.57	0.565
Daily wages & agriculture	.6927485	1.320652	0.52	0.600
Mother's Age at Marriage (MAGEM)				
18-25 years	-.611511	.5062267	-1.21	0.227

> 25 Years	.1730493	.9153868	0.19	0.850
Nutritional Awareness of Mother (MNK)				
Medium	-.4960361	.8355682	-0.59	0.553
High	-3.988926	1.543125	-2.58	0.010***
Household Deprivation Status (HDS)				
HDS-2	-2.9685	1.460822	-2.03	0.042**
HDS-3	-3.488887	1.73585	-2.01	0.044**
No. of observations= 312		**Prob>Chi^2= 0.0001**		
Likelihood ratio test χ2 (26)= 61.91		**Pseudo R^2= 0.1461**		
Significance level: ***p < 0.01, **p < 0.05, *p < 0.1				
Reference category: Punjabi, Female, Age lies 0 to 12 months, Birth order number 1, Illiterate (both in case of mother and father education), working, Govt. job, mother's age < 18 years, Low MNK, HDS-1				

Source: Primary data from survey.

Model-2 (Wasting)

Table 6.17: Result summary of Logit Model for Wasting among the children of pre-school age by socio-economic features

List of Variable	Coefficients	Standard Error	Z- value	P-value
Mother's Tongue (MT)				
Saraiki	-.9665224	.462973	-2.09	0.037**
Sex of Child (GOC)				
Male	-.4599083	.2641963	-1.74	0.082*
Age of Child (CAM)				
13-24 months	.9210111	.5518074	1.67	0.095*
25-36 months	1.957075	.5070996	3.86	0.000***
37-48 months	.2382068	.4306306	0.55	0.580
49-60 months	.1578265	.4403024	0.36	0.720
Birth order (BON)				
2 or 3	-.6099067	.3450526	-1.77	0.077*
4 or 5	-.795861	.3629249	-2.19	0.028**
6 or higher	-.2555082	.471151	-0.54	0.588
Education of Mother (MEDUS)				
Primary	.358807	.8647054	0.41	0.678
Middle	.3489022	.9123221	0.38	0.702
Matric	-.3208042	1.038236	-0.31	0.757

Education of Father (FEDUS)				
Primary	-.6747556	.8268684	-0.82	0.414
Middle	.1346552	.9733493	0.14	0.890
Matric	.9964417	.9133251	1.09	0.275
FA & Higher	1.117042	1.489962	0.75	0.453
Work Status of Mother (MWS)				
Not- Working	-.2797458	1.092423	-0.26	0.798
Work Status of Father (FWS)				
Private Job	.6371277	1.248033	0.51	0.610
Own Business	.6732664	1.171136	0.57	0.565
Daily wages & agriculture	.6927485	1.320652	0.52	0.600
Mother's Age at Marriage (MAGEM)				
18-25 years	-.611511	.5062267	-1.21	0.227
> 25 Years	.1730493	.9153868	0.19	0.850
Nutritional Awareness of Mother (MNK)				
Medium	-.4960361	.8355682	-0.59	0.553
High	-3.988926	1.543125	-2.58	0.010***
Household Deprivation Status (HDS)				
HDS-2	-2.9685	1.460822	-2.03	0.042**
HDS-3	-3.488887	1.73585	-2.01	0.044**
No. of observations= 312			**Prob>Chi^2= 0.0001**	
Likelihood ratio test χ2 (26)= 61.91			**Pseudo R^2= 0.1461**	
Significance level: ***p < 0.01, **p < 0.05, *p < 0.1				
Reference category: Punjabi, Female, Age lies 0 to 12 months, Birth order number 1, Illiterate (both in case of mother and father education), working, Govt. job, mother's age < 18 years, Low MNK, HDS-1				

Source: Primary data from survey.

Model-3 (Underweight)

Table 6.18: Result summary of Logit Model for Under-weight among the children of pre-school age by socio-economic features

List of Variable	Coefficients	Standard Error	Z- value	P-value
Mother's Tongue (MT)				
Saraiki	-.9665224	.462973	-2.09	0.037**
Sex of Child (GOC)				
Male	-.4599083	.2641963	-1.74	0.082*
Age of Child (CAM)				
13-24 months	.9210111	.5518074	1.67	0.095*
25-36 months	1.957075	.5070996	3.86	0.000***
37-48 months	.2382068	.4306306	0.55	0.580
49-60 months	.1578265	.4403024	0.36	0.720
Birth order (BON)				
2 or 3	-.6099067	.3450526	-1.77	0.077*
4 or 5	-.795861	.3629249	-2.19	0.028**
6 or higher	-.2555082	.471151	-0.54	0.588
Education of Mother (MEDUS)				
Primary	.358807	.8647054	0.41	0.678
Middle	.3489022	.9123221	0.38	0.702
Matric	-.3208042	1.038236	-0.31	0.757
Education of Father (FEDUS)				
Primary	-.6747556	.8268684	-0.82	0.414
Middle	.1346552	.9733493	0.14	0.890
Matric	.9964417	.9133251	1.09	0.275
FA & Higher	1.117042	1.489962	0.75	0.453
Work Status of Mother (MWS)				
Not- Working	-.2797458	1.092423	-0.26	0.798
Work Status of Father (FWS)				
Private Job	.6371277	1.248033	0.51	0.610
Own Business	.6732664	1.171136	0.57	0.565
Daily wages & agriculture	.6927485	1.320652	0.52	0.600
Mother's Age at Marriage (MAGEM)				
18-25 years	-.611511	.5062267	-1.21	0.227

> 25 Years	.1730493	.9153868	0.19	0.850
Nutritional Awareness of Mother (MNK)				
Medium	-.4960361	.8355682	-0.59	0.553
High	-3.988926	1.543125	-2.58	0.010***
Household Deprivation Status (HDS)				
HDS-2	-2.9685	1.460822	-2.03	0.042**
HDS-3	-3.488887	1.73585	-2.01	0.044**
No. of observations= 312		**Prob>Chi^2= 0.0001**		
Likelihood ratio test χ2 (26)= 61.91		**Pseudo R^2= 0.1461**		
Significance level: ***p < 0.01, **p < 0.05, *p < 0.1				
Reference category: Punjabi, Female, Age lies 0 to 12 months, Birth order number 1, Illiterate (both in case of mother and father education), working, Govt. job, mother's age < 18 years, Low MNK, HDS-1				

Source: Primary data from survey.

Model-4 (CIAF)

Table 6.19: Result summary of Logit Model for CIAF among the children of pre-school age by socio-economic features

List of Variable	Coefficients	Standard Error	Z- value	P-value
Mother's Tongue (MT)				
Saraiki	-.9665224	.462973	-2.09	0.037**
Sex of Child (GOC)				
Male	-.4599083	.2641963	-1.74	0.082*
Age of Child (CAM)				
13-24 months	.9210111	.5518074	1.67	0.095*
25-36 months	1.957075	.5070996	3.86	0.000***
37-48 months	.2382068	.4306306	0.55	0.580
49-60 months	.1578265	.4403024	0.36	0.720
Birth order (BON)				
2 or 3	-.6099067	.3450526	-1.77	0.077*
4 or 5	-.795861	.3629249	-2.19	0.028**
6 or higher	-.2555082	.471151	-0.54	0.588
Education of Mother (MEDUS)				
Primary	.358807	.8647054	0.41	0.678
Middle	.3489022	.9123221	0.38	0.702
Matric	-.3208042	1.038236	-0.31	0.757

Education of Father (FEDUS)				
Primary	-.6747556	.8268684	-0.82	0.414
Middle	.1346552	.9733493	0.14	0.890
Matric	.9964417	.9133251	1.09	0.275
FA & Higher	1.117042	1.489962	0.75	0.453
Work Status of Mother (MWS)				
Not- Working	-.2797458	1.092423	-0.26	0.798
Work Status of Father (FWS)				
Private Job	.6371277	1.248033	0.51	0.610
Own Business	.6732664	1.171136	0.57	0.565
Daily wages & agriculture	.6927485	1.320652	0.52	0.600
Mother's Age at Marriage (MAGEM)				
18-25 years	-.611511	.5062267	-1.21	0.227
> 25 Years	.1730493	.9153868	0.19	0.850
Nutritional Awareness of Mother (MNK)				
Medium	-.4960361	.8355682	-0.59	0.553
High	-3.988926	1.543125	-2.58	0.010***
Household Deprivation Status (HDS)				
HDS-2	-2.9685	1.460822	-2.03	0.042**
HDS-3	-3.488887	1.73585	-2.01	0.044**
No. of observations= 312			**Prob>Chi^2= 0.0001**	
Likelihood ratio test χ2 (26)= 61.91			**Pseudo R^2= 0.1461**	
Significance level: ***p < 0.01, **p < 0.05, *p < 0.1				
Reference category: Punjabi, Female, Age lies 0 to 12 months, Birth order number 1, Illiterate (both in case of mother and father education), working, Govt. job, mother's age < 18 years, Low MNK, HDS-1				

Source: Primary data from survey.

The logistic regression results of four models stunting, wasting, under-weight and CIAF shows that child malnutrition among pre-school children is negatively and significant associated with mother's tongue, sex of child, birth order, mother's nutritional awareness and household deprivation status. While there is positive and significant effect of child age (in months). Out of total eleven variables, six show significant results in all four models. In all four models, these factors are significant

statistically. Likelihood ratio test explains the overall significance for logit model, this value is same and significant in four models $\chi 2$ (26) =61.91 (p-value=0.0001).

6.18.1 Mother's Tongue

The results show that the Saraiki children are less likely to be malnourished as compare to their Punjabi counterpart. The results reflects that in total sample which is taken for study, the rate of malnutrition prevalence in children in Punjabis is higher than the Saraiki children. Because the average total income of Punjabis is less than the average total income of Saraikis in district Rahim Yar khan. Income can be a factor to increase malnutrition in Punjabi children.

6.18.2 Sex of Child

Generally, boys are considered to be favored by mothers, so their probability to be malnourished is supposed to be less than the girls. The results are same in our analysis. The results show that the male children are less likely to be malnourished as compare to their female counterpart. There has been evidence of a better nutritional status of female children compared to males in several studies (Moussa *et al*, (1995); El –Sayed *et al*. (2001); Marcoux, (2002); Babatunde et al. (2011); and Kabubo-Mariara et al. (2006).

6.18.3 Child Age (in months)

Food and care requirements of a child vary with the child's age. As child's age increases, the probability of malnutrition also increases as shown by our results. Our results are consistent with Garcia and Alderman (1989); Wamani, et al. (2004); Rahman and Chowdhury (2007); Hien and Hoa (2009); and Das and Rahman (2011). It reflects that most of parents are failing to fulfill prime food requirements of their children by increase in child's age. The other reason may be that these children do not recover soon due to poor health facilities in rural areas.

6.18.4 Birth Order Number

The results show that the birth-order is negatively related with risk of being malnourished in rural areas of district Rahim Yar Khan. Out of three birth order categories only two are negatively and significant while third category is insignificant. The result reveals that more children a woman bears, the probability of child malnutrition for the child with birth order will not be higher. But it might not have linear relation with increase in birth order. It may reflects that most of the parents are fulfilling prime food requirements of their children because in rural areas natural food items like Milk, fruits and vegetables etc. are cheap and easy to access.

6.18.5 Mother Awareness on Nutrition

The results show significant negative relation among mother nutritional awareness and probability of child being malnourished. Nutrition status of pre-school child much depend on mothers because mother is prime provider of basic child's nutritional need and care. This care depend on mother's knowledge and education especially on health and nutrition. It is predicted that mother can take batter nutritional care of her child if she is more aware regarding signs and causes of nutrition deficiency and further requirements of nutrition rather than the educated mothers. Many researches (Jelliffe, 1957; Gopalan, 1967; Pascaul, 1972) endorsed that if parent's show nutritional ignorance, the frequency of malnutrition among their children remain high. In another research which is done in Philippines, mothers of those children who lie in normal category have batter nutritional knowledge than those mothers whose children lie in severe category of malnutrition (Aquillion et al, 1982). The children who had nutrition disorder, their mothers' performance on nutrition knowledge was poorer significantly than those mothers whose children have no nutrition disorder (Srikantia and Sastry, 1972).

6.18.6 Household Deprivation Status

The study results show that the household deprivation status is negatively significant related with risk of being malnourished in rural areas of district Rahim Yar Khan. In context of many researches, poor nutrition status is the cause of household poor economic status and further poor the economic level, higher malnutrition level in children (Ravishankar, 2002; Susmitha Bharati et al, 2001; Elangovan and Shanmugan, 2002). Study results are similar to previous research findings. Household deprivation status (HDS) has impact on nutrition of child. It leads the child towards malnutrition and in result work capacity reduced in adultery that push towards poverty and this circle shifts to next generation. It is most important factor for child malnutrition in Rahim Yar Khan. With the improvement in social and economic status, mothers have more resources to provide their children with food and nutrition as well as proper medication in case of any disease. Hence it can concluded that poor the socio-economic status is main cause for malnutrition in children among preschool age.

Chapter 7

Conclusion and Policy Recommendations

7.1 Conclusion

The logistic regression results of four models shows that some factors such as mother's tongue, age of child, sex of child, birth order, mother's nutritional awareness and household deprivation status contribute in malnutrition of children to large extent, but these features are controllable. Improvement can attained in child's nutrition status by producing mother's awareness for child's health and on nutritional status of mothers, child's care, hygienic care (personal food, water and environment) and investing on human development in study area to get rid them from social and economic deprivation.

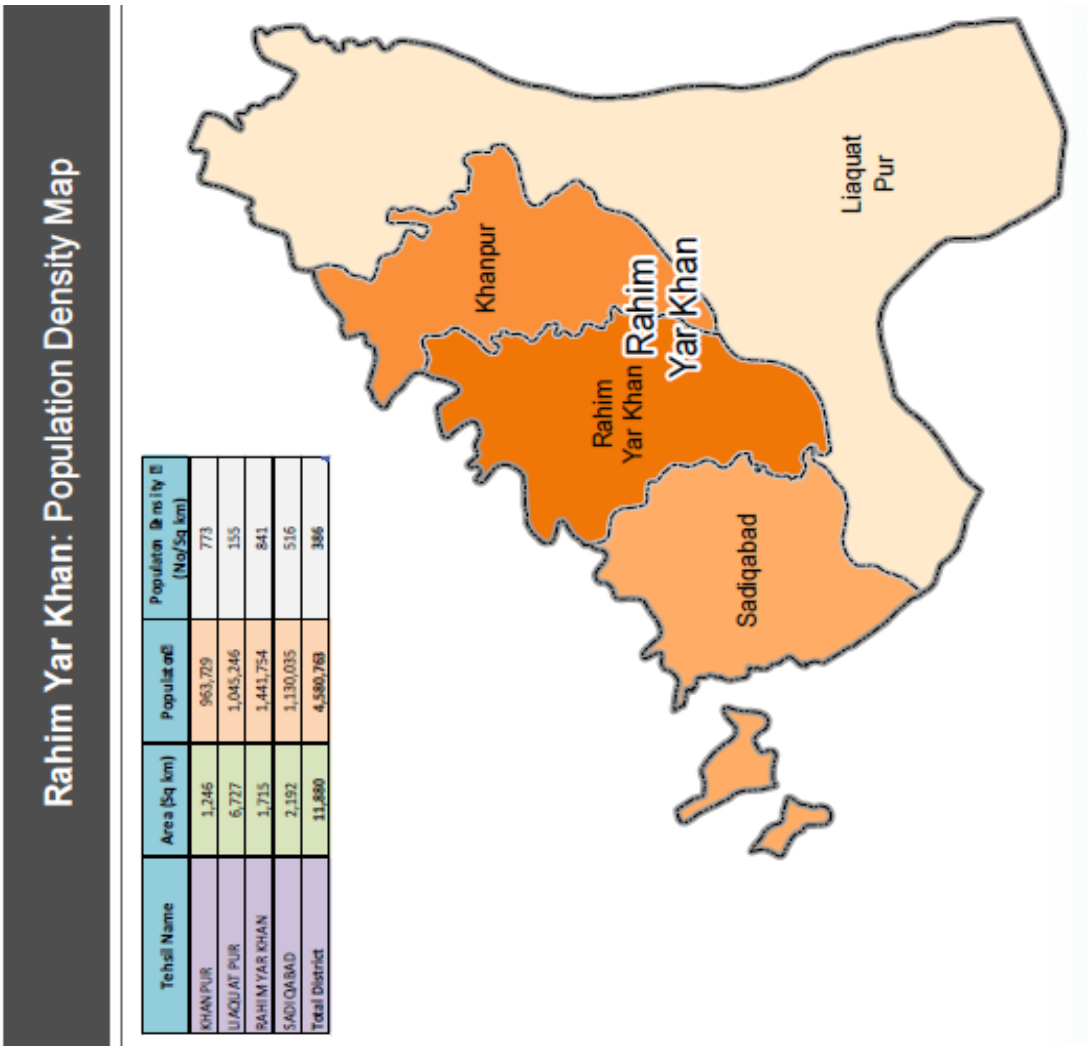
The finding of the study stress on social and economic empowerment of the households in study area, mother's awareness on nutrition regarding child and maternal (this can be achieved by providing them quality education, as results shows that most of the mothers are illiterate) and provision of quality healthcare. In this way pre-school child's nutrition status will achieve in the rural areas of Rahim Yar Khan District.

7.2 Policy Recommendations

There are some recommendations to improve the child's nutrition in rural Rahim Yar Khan which are as follows.

- Mother Nutritional awareness is essential for their own as well as child health. As the study results show that most of the mothers have low awareness on nutrition. So, it is the institutional responsibility to give awareness to mothers about nutrition. Special policies and programs should organize in rural and remote areas to create mother awareness regarding nutrition. Government should also promote actively support programs in rural areas to reduce gender differentials in health and nutrition. Nutrition issues is addressed by the health department through providing the nutritional supplement for covering the nutritional inadequacy. The health department should be more active in provision of healthcare and nutrition to the people in rural areas.
- According to study survey, most of the families lies in HDS-1 category which show that they are deprived in economic and social wellbeing. Social and economic deprivation push them into health poverty. Government should design policies towards deprived and rural people, so that they can provide healthy and nutritious food to their children.

Tehsil Name	Area (Sq km)	Population	Population Density (No/Sq km)
KHANPUR	1,246	963,729	773
LIAQUAT PUR	6,727	1,045,246	155
RAHIM YAR KHAN	1,715	1,441,754	841
SADIQABAD	2,192	1,130,035	516
Total District	**11,880**	**4,580,763**	**386**



Source: Naeem Ahmad, et al. (September 2012). Pakistan Emergency Situation Analysis: District Rahim Yar Khan

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Appendices

Appendix A

```
. logit underw i.MT i.GOC i.CAM i.BON i.MEDUS i.FEDUS i.MWS i.FWS i.MAGEM i.MNK i.HDS

note: 5.MEDUS != 0 predicts success perfectly
      5.MEDUS dropped and 4 obs not used
Iteration 0:   log likelihood = -211.9083
Iteration 1:   log likelihood = -181.67695
Iteration 2:   log likelihood = -180.95807
Iteration 3:   log likelihood = -180.95569
Iteration 4:   log likelihood = -180.95569
Logistic regression                             Number of obs     =        312
                                                LR chi2(26)       =      61.91
                                                Prob > chi2       =     0.0001
Log likelihood = -180.95569                     Pseudo R2         =     0.1461
------------------------------------------------------------------------------
underw      Underweight |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------------------------------------------------------------
                     MT |
                Saraiki |  -.9665224    .462973    -2.09   0.037    -1.873933   -.0591119
                    GOC |
                   Male |  -.4599083   .2641963    -1.74   0.082    -.9777236    .0579071
                    CAM |
           13-24 months |   .9210111   .5518074     1.67   0.095    -.1605116    2.002534
           25-36 months |   1.957075   .5070996     3.86   0.000     .9631776    2.950971
           37-48 months |   .2382068   .4306306     0.55   0.580    -.6058137    1.082227
           49-60 months |   .1578265   .4403024     0.36   0.720    -.7051503    1.020803
                    BON |
                 2 or 3 |  -.6099067   .3450526    -1.77   0.077    -1.286197     .066384
                 4 or 5 |   -.795861   .3629249    -2.19   0.028    -1.507181   -.0845413
           6 or Higher  |  -.2555082    .471151    -0.54   0.588    -1.178947    .6679308
                  MEDUS |
                Primary |    .358807   .8647054     0.41   0.678    -1.335984    2.053598
                 Middle |   .3489022   .9123221     0.38   0.702    -1.439216    2.137021
                 Matric |  -.3208042   1.038236    -0.31   0.757    -2.355709      1.7141
                  FEDUS |
                Primary |  -.6747556   .8268684    -0.82   0.414    -2.295388    .9458768
                 Middle |   .1346552   .9733493     0.14   0.890    -1.773074    2.042385
                 Matric |   .9964417   .9133251     1.09   0.275    -.7936427    2.786526
           FA & Higher  |   1.117042   1.489962     0.75   0.453    -1.803229    4.037312
                    MWS |
           Not-Working  |  -.2797458   1.092423    -0.26   0.798    -2.420855    1.861364
                    FWS |
           Private Job  |   .6371277   1.248033     0.51   0.610    -1.808972    3.083227
          Own Business  |   .6732664   1.171136     0.57   0.565    -1.622118    2.968651
Daily Wages& agri labour |   .6927485   1.320652     0.52   0.600    -1.895682    3.281179
                  MAGEM |
           18-25 years  |   -.611511   .5062267    -1.21   0.227    -1.603697    .3806751
             >25 years  |   .1730493   .9153868     0.19   0.850    -1.621076    1.967175
                    MNK |
                Medium  |  -.4960361   .8355682    -0.59   0.553     -2.13372    1.141647
                  High  |  -3.988926   1.543125    -2.58   0.010    -7.013396   -.9644561
                    HDS |
                 HDS-2  |    -2.9685   1.460822    -2.03   0.042    -5.831659   -.1053406
                 HDS-3  |  -3.488887    1.73585    -2.01   0.044    -6.891091   -.0866834
                        |
                  _cons |   4.565443   2.656275     1.72   0.086    -.6407609    9.771647
------------------------------------------------------------------------------
```

```
. logit stunt i.MT i.GOC i.CAM i.BON i.MEDUS i.FEDUS i.MWS i.FWS i.MAGEM i.MNK i.HDS


note: 5.MEDUS != 0 predicts success perfectly
      5.MEDUS dropped and 4 obs not used
Iteration 0:   log likelihood =  -211.9083
Iteration 1:   log likelihood = -181.67695
Iteration 2:   log likelihood = -180.95807
Iteration 3:   log likelihood = -180.95569
Iteration 4:   log likelihood = -180.95569
Logistic regression                             Number of obs     =        312
                                                LR chi2(26)       =      61.91
                                                Prob > chi2       =     0.0001
Log likelihood = -180.95569                     Pseudo R2         =     0.1461
------------------------------------------------------------------------------
       stunt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          MT |
    Saraiki  |  -.9665224    .462973    -2.09   0.037    -1.873933   -.0591119
         GOC |
        Male  |  -.4599083   .2641963    -1.74   0.082    -.9777236    .0579071
         CAM |
 13-24 months  |   .9210111   .5518074     1.67   0.095    -.1605116    2.002534
 25-36 months  |   1.957075   .5070996     3.86   0.000     .9631776    2.950971
 37-48 months  |   .2382068   .4306306     0.55   0.580    -.6058137    1.082227
 49-60 months  |   .1578265   .4403024     0.36   0.720    -.7051503    1.020803
         BON |
       2 or 3  |  -.6099067   .3450526    -1.77   0.077    -1.286197     .066384
       4 or 5  |   -.795861   .3629249    -2.19   0.028    -1.507181   -.0845413
  6 or Higher  |  -.2555082    .471151    -0.54   0.588    -1.178947    .6679308
       MEDUS |
     Primary  |    .358807   .8647054     0.41   0.678    -1.335984    2.053598
      Middle  |   .3489022   .9123221     0.38   0.702    -1.439216    2.137021
      Matric  |  -.3208042   1.038236    -0.31   0.757    -2.355709      1.7141
       FEDUS |
     Primary  |  -.6747556   .8268684    -0.82   0.414    -2.295388    .9458768
      Middle  |   .1346552   .9733493     0.14   0.890    -1.773074    2.042385
      Matric  |   .9964417   .9133251     1.09   0.275    -.7936427    2.786526
  FA & Higher  |   1.117042   1.489962     0.75   0.453    -1.803229    4.037312
         MWS |
  Not-Working  |  -.2797458   1.092423    -0.26   0.798    -2.420855    1.861364
         FWS |
  Private Job  |   .6371277   1.248033     0.51   0.610    -1.808972    3.083227
 Own Business  |   .6732664   1.171136     0.57   0.565    -1.622118    2.968651
Daily Wages & agri labour  |   .6927485   1.320652     0.52   0.600    -1.895682    3.281179
       MAGEM |
 18-25 years  |   -.611511   .5062267    -1.21   0.227    -1.603697    .3806751
   >25 years  |   .1730493   .9153868     0.19   0.850    -1.621076    1.967175
         MNK |
      Medium  |  -.4960361   .8355682    -0.59   0.553     -2.13372    1.141647
        High  |  -3.988926   1.543125    -2.58   0.010    -7.013396   -.9644561
         HDS |
       HDS-2  |    -2.9685   1.460822    -2.03   0.042    -5.831659   -.1053406
       HDS-3  |  -3.488887    1.73585    -2.01   0.044    -6.891091   -.0866834
              |
       _cons  |   4.565443   2.656275     1.72   0.086    -.6407609    9.771647
------------------------------------------------------------------------------
```

```
. logit wast i.MT i.GOC i.CAM i.BON i.MEDUS i.FEDUS i.MWS i.FWS i.MAGEM i.MNK i.HDS

note: 5.MEDUS != 0 predicts success perfectly
      5.MEDUS dropped and 4 obs not used

Iteration 0:   log likelihood =  -211.9083
Iteration 1:   log likelihood = -181.67695
Iteration 2:   log likelihood = -180.95807
Iteration 3:   log likelihood = -180.95569
Iteration 4:   log likelihood = -180.95569

Logistic regression                             Number of obs     =        312
                                                LR chi2(26)       =      61.91
                                                Prob > chi2       =     0.0001
Log likelihood = -180.95569                     Pseudo R2         =     0.1461

------------------------------------------------------------------------------
                wast |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------
                  MT |
            Saraiki  |  -.9665224    .462973    -2.09   0.037    -1.873933   -.0591119
                 GOC |
                Male  |  -.4599083   .2641963    -1.74   0.082    -.9777236    .0579071
                 CAM |
        13-24 months  |   .9210111   .5518074     1.67   0.095    -.1605116    2.002534
        25-36 months  |   1.957075   .5070996     3.86   0.000     .9631776    2.950971
        37-48 months  |   .2382068   .4306306     0.55   0.580    -.6058137    1.082227
        49-60 months  |   .1578265   .4403024     0.36   0.720    -.7051503    1.020803
                 BON |
              2 or 3  |  -.6099067   .3450526    -1.77   0.077    -1.286197     .066384
              4 or 5  |   -.795861   .3629249    -2.19   0.028    -1.507181   -.0845413
           6 or Higher  |  -.2555082    .471151    -0.54   0.588    -1.178947    .6679308
               MEDUS |
             Primary  |    .358807   .8647054     0.41   0.678    -1.335984    2.053598
              Middle  |   .3489022   .9123221     0.38   0.702    -1.439216    2.137021
              Matric  |  -.3208042   1.038236    -0.31   0.757    -2.355709      1.7141
               FEDUS |
             Primary  |  -.6747556   .8268684    -0.82   0.414    -2.295388    .9458768
              Middle  |   .1346552   .9733493     0.14   0.890    -1.773074    2.042385
              Matric  |   .9964417   .9133251     1.09   0.275    -.7936427    2.786526
           FA & Higher  |   1.117042   1.489962     0.75   0.453    -1.803229    4.037312
                 MWS |
          Not-Working  |  -.2797458   1.092423    -0.26   0.798    -2.420855    1.861364
                 FWS |
          Private Job  |   .6371277   1.248033     0.51   0.610    -1.808972    3.083227
        Own Business  |   .6732664   1.171136     0.57   0.565    -1.622118    2.968651
Daily Wages & agri labour  |   .6927485   1.320652     0.52   0.600    -1.895682    3.281179
                MAGEM |
           18-25 years  |   -.611511   .5062267    -1.21   0.227    -1.603697    .3806751
             >25 years  |   .1730493   .9153868     0.19   0.850    -1.621076    1.967175
                 MNK |
              Medium  |  -.4960361   .8355682    -0.59   0.553     -2.13372    1.141647
                High  |  -3.988926   1.543125    -2.58   0.010    -7.013396   -.9644561
                 HDS |
               HDS-2  |    -2.9685   1.460822    -2.03   0.042    -5.831659   -.1053406
               HDS-3  |  -3.488887    1.73585    -2.01   0.044    -6.891091   -.0866834
                      |
               _cons  |   4.565443   2.656275     1.72   0.086    -.6407609    9.771647
------------------------------------------------------------------------------
```

```
. logit CIAF i.MT i.GOC i.CAM i.BON i.MEDUS i.FEDUS i.MWS i.FWS i.MAGEM i.MNK i.HDS

note: 5.MEDUS != 0 predicts success perfectly
      5.MEDUS dropped and 4 obs not used

Iteration 0:   log likelihood =  -211.9083
Iteration 1:   log likelihood = -181.67695
Iteration 2:   log likelihood = -180.95807
Iteration 3:   log likelihood = -180.95569
Iteration 4:   log likelihood = -180.95569

Logistic regression                             Number of obs     =        312
                                                LR chi2(26)       =      61.91
                                                Prob > chi2       =     0.0001
Log likelihood = -180.95569                     Pseudo R2         =     0.1461

------------------------------------------------------------------------------
        CIAF |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          MT |
    Saraiki  |  -.9665224    .462973    -2.09   0.037    -1.873933   -.0591119
         GOC |
        Male  |  -.4599083   .2641963    -1.74   0.082    -.9777236    .0579071
         CAM |
  13-24 months  |   .9210111   .5518074     1.67   0.095    -.1605116    2.002534
  25-36 months  |   1.957075   .5070996     3.86   0.000     .9631776    2.950971
  37-48 months  |   .2382068   .4306306     0.55   0.580    -.6058137    1.082227
  49-60 months  |   .1578265   .4403024     0.36   0.720    -.7051503    1.020803
         BON |
       2 or 3  |  -.6099067   .3450526    -1.77   0.077    -1.286197     .066384
       4 or 5  |   -.795861   .3629249    -2.19   0.028    -1.507181   -.0845413
   6 or Higher  |  -.2555082    .471151    -0.54   0.588    -1.178947    .6679308
       MEDUS |
     Primary  |    .358807   .8647054     0.41   0.678    -1.335984    2.053598
      Middle  |   .3489022   .9123221     0.38   0.702    -1.439216    2.137021
      Matric  |  -.3208042   1.038236    -0.31   0.757    -2.355709      1.7141
       FEDUS |
     Primary  |  -.6747556   .8268684    -0.82   0.414    -2.295388    .9458768
      Middle  |   .1346552   .9733493     0.14   0.890    -1.773074    2.042385
      Matric  |   .9964417   .9133251     1.09   0.275    -.7936427    2.786526
   FA & Higher  |   1.117042   1.489962     0.75   0.453    -1.803229    4.037312
         MWS |
  Not-Working  |  -.2797458   1.092423    -0.26   0.798    -2.420855    1.861364
         FWS |
   Private Job  |   .6371277   1.248033     0.51   0.610    -1.808972    3.083227
  Own Business  |   .6732664   1.171136     0.57   0.565    -1.622118    2.968651
Daily Wages & agri labour  |   .6927485   1.320652     0.52   0.600    -1.895682    3.281179
         MAGEM |
   18-25 years  |   -.611511   .5062267    -1.21   0.227    -1.603697    .3806751
     >25 years  |   .1730493   .9153868     0.19   0.850    -1.621076    1.967175
         MNK |
     Medium  |  -.4960361   .8355682    -0.59   0.553     -2.13372    1.141647
       High  |  -3.988926   1.543125    -2.58   0.010    -7.013396   -.9644561
         HDS |
      HDS-2  |    -2.9685   1.460822    -2.03   0.042    -5.831659   -.1053406
      HDS-3  |  -3.488887    1.73585    -2.01   0.044    -6.891091   -.0866834
             |
       _cons |   4.565443   2.656275     1.72   0.086    -.6407609    9.771647
------------------------------------------------------------------------------
```

Appendix B

Picture During Survey

During survey, we take many pictures. It is necessary to share these pictures in study.

1 Measuring the Health Status of Children and Mothers in Rahim Yar Khan

Source: Author (picture was taken in UC Ghooka during household survey)

Source: Author (picture was taken in UC Ghooka during household survey)

Source: Author (picture was taken in UC Shedani during household survey)

Source: Author (picture was taken in UC Bagho Bahar during household survey)

Source: Author (picture was taken in UC Azeem Shah during household survey)

Source: Author (picture was taken in UC Sonak during household survey)

Source: Author (picture was taken in UC Bahishti during household survey)

Source: Author (picture was taken in UC Bahishti during household survey)

Source: Author (picture was taken in UC Ghokha during household survey)

Source: Author (picture was taken in UC Muhammad Pur during household survey)

Source: Author (picture was taken in UC Roshan Bhet during household survey)

Source: Author (picture was taken in UC Chack No 84/p during household survey)

Source: Author (picture was taken in UC Kot Sanjer Khan during household survey)

Appendix C

Housing and Environment Conditions

Source: Author (picture was taken in UC Ghokha during household survey)

Source: Author (picture was taken in UC Shedani during household survey)

Source: Author (picture was taken in UC Ghokha during household survey)

Source: Author (picture was taken in UC Shedani during household survey)

Source: Author (picture was taken in UC Kotla Pathan during household survey)