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The Nutritional Indices Patterns of Children Under 5 Years Old in Sana'a City, Capital of Yemen

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Abstract: **The aim of this study is to determine the Nutritional indicators by Districts and age groups of children in Sana'a City, Capital of Yemen. A sample of study was 1534 children aged under 5 years that was taken from the raw data of Household Budget Survey (HBS) 2005/2006 in Yemen. Height-for-age z score (HAZ), Weight-for-height z score (WHZ), and Weight-for-age z score (WAZ) indicators were used to measure the nutritional status of children. The prevalence of stunting was about 45.7%, and of them, 22.2% were severely stunting, 33.2% of children were considered as severely and moderately underweight, while 15.1% of children had wasting, of which 9.6% had severely wasting in Sana'a City. The results of chi-square and analysis of variance revealed that highly significant stunting among children in Sanhan District when compared to others (P < 0.01), while risk of wasting among Snahan's children was likely to be lower significant as compared to other districts. In addition, risk of wasting and underweight among children of Al-sabeen District was likely to be lower significant as compared to other districts. Risk of stunted significantly was higher more in old children (12 - 59) compared to youngest (0 - 11) (P < 0.01), underweight was more highly significant prevalent among (36 - 59) months old children, while risk of severe and moderate wasting were higher among (0 - 11) months youngest children as compared to (24 - 35) months old children (P < 0.01).**

Keywords: **HAZ, WHZ, WAZ, Analysis of Variance, Chi square Test.**

1. INTRODUCTION

In Sana'a City, the results of National Poverty Survey 1999 show about 62% % of households were available from her maternal and childhood centers and 77% were available with hospitals and health services, and 90 % of households had clinics services were available. Therefore, about 90% of children received BCG against tuberculosis, 84% received three doses of Polio vaccine, 83% had three doses of DPT, while 78% had one dose of measles vaccine. Although, there were 12.2% and 41.3% of children in Sana'a City were suffered from severe and moderate stunting, respectively, while 8.2% had severe underweight and 37.6% were moderately underweight, and 18.0% had wasting, of them 4.4% were severe wasting (Ministry of Planning and Development and Central of Statistical Organization, 2001).

In addition, YHFS (Yemeni Health Family Survey) 2003 showed that the infant mortality rate and the under 5 mortality rate was 47.9 and 54.4 death per 1000 in Sana'a City (Ministry of Public Health and Population and Central of Statistical Organization, 2004). These figures are still high when compared to other nations (UNICEF, 1998).

Naturally, there are several reasons that make these figures high, so understanding the nutritional patterns of children could help in studying these reasons deeply and therefore could help in setting up some solution strategies.

The nutritional patterns of children in Sana'a City usually investigated through studying their heights and weights in relation to their sexes and ages, that recommended by the World Health Organization/Centers for Disease Control and Prevention/National Center for Health Statistics (Waterloo, et al, 1977; Dibley, et al, 1987).

It is known that the first five years of life are considered the most important stage of health and growth of a child. So, the present study focuses on children under five years of age because this group is the most vulnerable to adverse health risks within the immediate family and community environment. Therefore, in this study, it is very important to focus on the children who are less than five years old. So, the study will aim to review the nutritional indicators by District areas and by age groups of children in Sana'a City.

2. STUDY OBJECTIVES

The main objectives of the present research are:

- to determine the nutritional indicators of children in Sana'a City
- to examine the relationship between nutritional indicators as District areas of children
- to examine the relationship between nutritional indicators of children by their age groups
- to study the mean differences of nutritional indicators of children due to their Districts
- to study the mean differences of nutritional indicators of children due to their age groups
- using the findings of this study as indicators for policy recommendations for nutrition interventions

3. NUTRITIONAL INDICATORS OF CHILDREN

To assess the nutritional status of children, three anthropometric based on the World Health

Organization/Centers for Disease Control and Prevention/National Center for Health Statistics (WHO/CDCP/NCHS) reference were used (Waterloo, et al, 1977; Dibley, et al, 1987). These are Height-for-Age (HA), Weight-for-Height (WH), and Weight-for-Age (WA). HA, WH, and WA were calculated using reference medians recommended by the WHO and classified according to standard deviation units (z-scores), based on the WHO criteria (WHO, 2006), that refer to as HAZ, WHZ, and WAZ. A cut-off point for malnutrition of -2 SD below the median for the NCHS reference population was used (Waterloo, et al, 1977; Dibley, et al, 1987; WHO, 2000).

Stunting, represented by low HAZ score, results from extended periods of inadequate food intake, poor dietary quality, increased morbidity, or a combination of these factors. A HAZ of < -2SD defines chronic malnutrition (stunting). Wasting is measured by WHZ score that indicates thinness. It is usually the result of recent nutritional deficiency and is affected by seasonal shifts associated with availability of foods and/or prevalence of disease. A WHZ of < -2SD defines the presence of acute malnutrition (wasting). WAZ score is essentially a composite of WHZ and HAZ, thus a measure of both acute and chronic malnutrition. A WAZ of < -2SD is used for defining a child as underweight. A z-score for HAZ, WHZ, and WAZ of < -3SD defines severe levels of each of the indices (Waterloo, et al, 1977; Dibley, et al, 1987; WHO, 2000).

Therefore, nutritional indicators of children were classified as into the following categories status:

Normal: scores of HAZ, WHZ, and WAZ > -2SD of the median of the reference population

Moderate: scores of HAZ, WHZ, and WAZ in (-3SD , -2SD) of the median of the reference population

Severe: scores of HAZ, WHZ, and WAZ < -3SD of the median of the reference population

4. DATA SOURCE

Several surveys have been conducted in Yemen to reveal the malnutrition of the children. These were Yemen Demographic Maternal and Children Health Survey 1991/1992 (YDMCHS), YDMCHS 1997, YHFS 2003, and Household Budget Survey (HBS) 2005/2006. The final survey was Yemen National Health and Demographic Survey 2013 (YNHDS), unfortunately its data is not available. So, the raw data of Household Budget Survey (HBS) 2005/2006 in Yemen was used for the purpose of this study (Household Budget Survey 2005/2006). The sample data of study was 1534 children aged under five years in Sana'a City, Capital of Yemen. SPSS 21 statistical package was used for analysis.

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5. METHODS

It should be noted districts, age groups, and nutritional indicators variables of the study are categorical. Therefore, chi square test was used for assessing the significance of nutritional indicators and (HAZ, WHZ, WAZ) by the districts of Sana'a City and age group of children. In addition, the purpose of study to know if there is a significant differences between mean nutritional indicators due to districts or age groups of children, analysis of variance is a suitable procedure. Therefore, the nutritional indicators were considered as continuous dependent variables in separate with age groups and districts of children in Sana'a City.

6. RESULTS

Table 1. Descriptive Statistics of Nutritional Indices in Sana'a City

Nutritional Index	N	Minimum	Maximum	Mean	Std. Deviation
HAZ	1534	-5.5	5.9	-1.77	1.76
WHZ	1534	-5.4	3.9	-.38	1.69
WAZ	1534	-5.0	4.5	-1.37	1.29

The mean values of height-for-age, weight-for-height, and weight-for-age expressed as z-scores of the reference population, are given in Table 1. The distribution of z-scores for each of the indices and values of HAZ ranged from -5.5 to 5.9, values of WHZ ranged from -5.4 to 3.9, while values of WAZ ranged from -5.0 to 4.5 in the sample study. The negative values of the mean for z scores, HAZ (-1.77), WHZ (-0.38), and WAZ (-1.37) indicate that children in the sample were shorter and thinner than children in the NCHS reference population standard. The high values of standard deviations reveal that data were not homogenous.

Table 2. Frequencies and Percentage of Malnutrition Prevalence in Sana'a City

Category	Stunting		Wasting		Underweight	
	N	%	N	%	N	%
Normal	832	54.2	1303	84.9	1025	66.8
Moderate	361	23.5	84	5.5	137	8.9
Severely	341	22.2	147	9.6	372	24.3
Total	1534	100%	1534	100%	1534	100%

In general, the results revealed that the prevalence of malnutrition among (0 - 59) months children in the study were 5.5% for moderate wasting, while 9.6% were severely wasted. Severely stunting was observed in 22.2% and while 23.5% were moderately stunted, for underweight 24.3% were severely underweight, whereas 8.9% were moderate underweight (Table 2). It noted that about 45.7% of children in the sample were considered as moderately or severely stunted, 33.2% were suffered from moderately or severely underweight, while 15.1% of children had moderate or severe wasting.

Nutritional Indices by Districts:

Table 3. Results of Analysis of Variance for Mean Differences of Nutritional Indicators by Districts of Sana'a City

Districts	HAZ		WHZ		WAZ	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Old Sana'a	-1.89	1.67	-.41	1.61	-1.40	1.44
Shoub	-1.77	1.93	-.40	1.59	-1.38	1.13
Azal	-1.63	1.79	-.80	1.45	-1.56	1.17
Al-safiah	-1.80	2.17	-.07	1.92	-1.28	1.33
Al-sabeen	-1.64	1.65	.09	1.71	-.85	1.38
Al-wahdeh	-1.36	1.80	-0.96	1.64	-1.58	1.32
Al-tahrir	-2.10	1.70	-.48	2.19	-1.40	1.72
Maain	-1.79	1.63	-.64	1.61	-1.63	1.15
Al-thawrah	-1.64	1.39	-.51	1.36	-1.37	1.04
Bani Al-harith	-1.91	1.71	-.49	1.14	-1.52	1.09
Hamdan	-1.00	2.36	-.82	1.99	-1.65	1.21
Sanhan	-2.49	1.36	.42	1.87	-1.23	1.41
F-test	3.781		6.724		4.724	
P-value	0.000		0.000		0.000	

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Table 3 shows the results of analysis of variance to distinguish the significant differences between means of nutritional indicators by districts of Sana'a City.

It should be noted that values of the mean for Z scores, HAZ, WHZ, and WAZ in all districts in Sana'a City were negative which indicate that children in the sample were shorter and thinner than those children in the NCHS reference standard. It reveals that most children in Al-tahrir and Sanhan regions were more shorter and suffering from malnutrition than others because their means HAZ scores less than -2. High values of standard deviations due to heterogeneity of data values inside each districts (also, P-value of Levene Statistic for test of homogeneity of variance is < 0.01).

The results of analysis of variance indicate that the differences between means for indices due to districts highly significant (P < 0.01) for all three nutritional indicators.

Because of the heterogeneity of the data values inside each district, Games-Howell test was used to study the multiple comparisons between means of nutritional indicators due to any district versus others which present in Table 4.

Table 4. Results of Games-Howell Tests for Mean Differences

HAZ			WAZ		
District(i)-District(j)	**Mean Differences**	**P-value**	**District(i)-District(j)**	**Mean Differences**	**P-value**
Sanhan-Shoub	-0.722	.007	Al-sabeen-Shoub	0.528	.002
Sanhan-Azal	-0.866	.008	Al-sabeen-Azal	0.711	.000
Sanhan-Al-sabeen	-0.852	.000	Al-sabeen-Al-wahdeh	0.725	.001
Sanhan-Al-wahdeh	-1.134	.000	Al-sabeen-Maain	0.781	.000
Sanhan-Maain	-0.702	.006	Al-sabeen-Al-thawrah	0.515	.006
Sanhan-Al-thawrah	-0.851	.000	Al-sabeen-Bani Al-harith	0.663	.000
Sanhan-Hamdan	-1.489	.002	Al-sabeen-Hamdan	0.792	.003
WHZ					
District(i)-District(j)	**Mean Differences**	**P-value**	**District(i)-District(j)**	**Mean Differences**	**P-value**
Sanhan-Shoub	0.823	.005	Sanhan-Bani Al-harith	0.908	.000
Sanhan-Azal	1.216	.000	Al-sabeen-Azal	0.886	.000
Sanhan-Old Sana'a	0.832	.039	Al-sabeen-Al-wahdeh	1.046	.000
Sanhan-Al-wahdeh	1.376	.000	Al-sabeen-Maain	0.730	.002
Sanhan-Maain	1.061	.000	Al-sabeen-Al-thawrah	0.599	.019
Sanhan-Al-thawrah	0.929	.001	Al-sabeen-Bani Al-harith	0.578	.007
Sanhan-Hamdan	1.243	.008	Al-safiah-Al-wahdeh	0.884	.040
Sanhan-Al-tahrir	0.904	.041			

The prevalence of stunting among Sanhan's children was significantly (p < 0.01) higher when compared to children in Shoub, Azal, Al-wahdeh, Maain, Al-thawrah, and Hamdan districts (Table 4). On the other side, the prevalence of wasting among Sanhan's children was significantly (p < 0.01) lower when compared to children in Shoub, Azal, Old Sana's, Al-wahdeh, Maain, Al-thawrah, Hamdan, Al-tahrir, and Bani Al-harith districts. In addition, the prevalence of wasting and underweight among children in Al-sabeen were significantly (p < 0.01) lower when compared to children in Azal, Al-wahdeh, Maain, Al-thawrah, and Bani Al-harith districts.

Table 5 reveals that Severe stunting was found in 33.0% of children, while 9.6% were severe underweight and 3.2% were severely wasted in Al-safiah. Severely stunting among children belonged to Al-safiah, Bani Al-harith, Hamdan, Sanhan, and Al-tahrir were 33.0%, 30.4%, 29.8%, 29.6%, and 27.6%, respectively, when compared to others districts. The prevalence of moderately stunting among children in Sanhan, Old Sana'a, and Al-sabeen were 35.7%, 28.7%, and 26.0%, respectively, as compared to others, the differences were highly significant stunting among children in Al-safiah, Bani Al-harith, Hamdan, Sanhan, Old Sana'a, and Al-tahrir districts than others (P < 0.01). Severely wasting was found 15.8% and 12.9% among children in Hamdan and Al-tahrir districts, while 20.6%, 14.0%, and 10.5% of children in Maain, Al-wahdeh, and Hamdan districts, respectively, were suffered from moderately wasting as compared to other districts. The

differences were highly significant wasting among children in Maain, Hamdan, Al-wahdeh, and Al-tahrir districts than others.

Table 5. Prevalence of Malnutrition among Children aged 0-59 months in Sana'a City

Districts	Stunting Status			Wasting Status			Underweight Status		
	Severe	Moderate	Normal	Severe	Moderate	Normal	Severe	Moderate	Normal
Old Sana'a	23.0	28.7	48.3	6.9	8.0	85.1	11.5	19.5	69.0
Shoub	24.0	21.6	54.4	3.9	5.9	90.2	6.4	24.0	69.6
Azal	25.3	22.1	52.6	8.4	9.5	82.1	9.5	23.2	67.4
Al-safiah	33.0	12.8	54.3	3.2	8.5	88.3	9.6	28.7	61.7
Al-sabeen	17.6	26.0	56.4	2.0	9.3	88.7	2.9	22.1	75.0
Al-wahdeh	16.1	18.3	65.6	9.7	14.0	76.3	14.0	20.4	65.6
Al-tahrir	27.6	21.6	50.9	12.9	9.5	77.6	17.2	19.8	62.9
Maain	18.2	24.1	57.6	3.5	20.6	75.9	11.8	27.6	60.6
Al-thawrah	16.7	20.3	63.0	6.5	5.1	88.4	5.1	23.9	71.0
Bani Al-harith	30.4	16.1	53.4	1.9	9.3	88.8	8.1	26.7	65.2
Hamdan	29.8	14.0	56.1	15.8	10.5	73.7	12.3	33.3	54.4
Sanhan	29.6	35.7	34.8	3.5	4.3	92.2	8.7	24.3	67.0
χ^2	55.825			79.552			39.120		
P-value	0.000			0.000			0.014		

Severe underweight in17.2%, 14.0%, 12.3%, 11.8%, and 11.5% of children belong to Al-tahrir, Al-wahdeh, Hamdan, Maain, and Old Sana'a, respectively, while 33.3%, 28.7%, 27.6%, and 26.7% of children in Hamdan, Al-safiah, Maain, and Bani Al-harith, respectively, were more suffered from moderately underweight as compared to other children. The differences were significantly underweight among children in Hamdan, Al-safiah, Maain, Bani Al-harith, and Sanhan districts as compared to others.

Nutritional Indices by Age Groups:

Table 6. Results of Analysis of Variance for Mean Differences of Nutritional Indicators by Age of Children In Sana'a City

Age Group in Months	**HAZ**		**WHZ**		**WAZ**	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
0 - 11	-.94	2.12	-.59	1.98	-1.07	1.63
12 - 23	-1.79	1.75	-.50	1.65	-1.34	1.23
24 - 35	-2.10	1.69	-.16	1.55	-1.34	1.24
36 - 47	-2.11	1.58	-.30	1.63	-1.52	1.15
48 - 59	-2.12	1.31	-.36	1.59	-1.59	1.09
F - test	24.558		3.107		7.681	
P-value	0.000		0.015		0.000	

Table 6 shows the means and standard deviations of nutritional indicators with age groups of children in Sana'a City. It should be observed that all values of means for nutritional indicators were negative, indicated that children had malnutrition. Old Children, whose ages (24 - 35), (36 - 47), and (48 - 59) months, were more stunting than youngest children, because their mean of HAZ scores was below -2 SD from the median of the reference population. The high values of standard deviations indicate to the inhomogeneous of data values inside each group (P-value of Levene Statistic for test of homogeneity of variance is < 0.01).

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The results of analysis of variance indicate that the differences between means of HAZ and WAZ indicators due to age groups highly significant ($P < 0.01$) and significantly for WHZ indicator ($P < 0.05$).

Since of inhomogeneous of data values inside each age group, Games-Howell test used to reveal the significant differences between means of nutritional indicators due to any age group versus others.

Table 7. Results of Games-Howell Tests for Mean Differences

WAZ			WHZ		
Group(i) - Group(j)	Mean Differences	P-value	Group(i) - Group(j)	Mean Differences	P-value
(0-11)-(36-47)	0.454	0.001	(0-11)-(24-35)	-0.428	0.022
(0-11)-(48-59)	0.525	0.000			
HAZ					
Group(i) - Group(j)	Mean Differences	P-value	Group(i) - Group(j)	Mean Differences	P-value
(0-11)-(12-23)	0.852	.000	(0-11)-(36-47)	1.171	.000
(0-11)-(24-35)	1.032	.000	(0-11)-(48-59)	1.132	.000

Results of Games-Howell tests indicated that the prevalence of stunting among youngest children (0 - 11) was likely significantly lower than older children (12 - 23, 24 - 35, 48 - 59) ($P < 0.01$) (Table 7). In addition, those children (their ages in (0 - 11)) had likely lower underweight when compared to children whose age intervals were (36 - 47) and (48 - 59) ($P < 0.01$). By contrary, risk of wasting among youngest children (0 - 11) was significant as compared to children whose age between 24 and 35 months ($P - < 0.05$).

Table 8: Distribution of Malnutrition Prevalence among Different Age Groups

Age Groups	Stunting Status			Wasting Status			Underweight Status		
	Severe	Moderate	Normal	Severe	Moderate	Normal	Severe	Moderate	Normal
0 - 11	14.6	17.2	68.3	10.0	11.7	78.3	10.0	21.0	68.9
12 - 23	24.7	21.8	53.6	6.2	12.0	81.8	8.1	23.7	68.2
24 - 35	26.9	20.8	52.3	2.8	7.6	89.6	8.9	22.0	69.1
36 - 47	29.9	21.2	48.9	4.0	8.8	87.2	9.9	26.6	63.5
48 - 59	22.2	30.1	47.8	4.4	7.9	87.7	7.9	28.2	63.9
χ^2	45.475			27.017			7.345		
P-value	0.000			0.001			0.500		

Table 8 shows the distribution of proportions of nutritional indicators by age groups of children in Sana'a City. The prevalence of severe stunting was found 29.9%, 26.9%, and 24.7% among children aged (36 - 47), (24 - 35), and (12 - 23) months, respectively. In general, stunting peaked (52.3%) was observed in children aged 48-59 months, and compared to other age-groups, stunting was significantly ($P < 0.01$) more likely in children aged (48 - 59) months.

The prevalence of severe wasting was most common among children aged (0 - 11) months (10.0%), wasting peaked (21.7%) was found among children aged (0 - 11) months, and compared to other age-groups, wasting was significantly ($P < 0.01$) more likely in children aged (0 - 11) months. Children aged (0 - 11) and (36 - 47) months had the greatest likelihood of being severely underweight, but these differences were not significant.

7. DISCUSSION

The sample size of the study was 1534 children aged (0 - 59) months which comes from Household Budget Survey (HBS) 2005/2006 that conducted in Yemen. The values of the sample were compared with the NCHS/WHO reference data in order to facilitate comparisons with other studies (Waterloo, at el, 1977; Waterloo, 1980). A cut-off point for malnutrition of -2 SD below the median for the reference population was used. This value appears to have biological implications for nutritional status, and below this level mortality rates increase (Kielmann and McCord, 1978).

As shown in Table 1, means of HAZ, WHZ, and WAZ indicators are negative, indicated that children had malnutrition and were shorter and thinner than children in the NCHS reference standard. The extent of overall prevalence of stunting was about 45.7%, and of them, 22.2% were severely stunting, 33.2% of children were considered as severely and moderately underweight, while 15.1% of children had wasting, of which 9.6% had severely wasting in Sana'a City. So, nutritional indicators in Sana'a City (Capital of Yemen) were still high among children in comparison with previous surveys' results (Ministry of Planning and development and Central of Statistical Organization, 1998), however, these indicators were lower than those indicators that appeared in Khartoum study (Sudan) (Ibrahim and Alshiek, 2010) or studies that conducted in Bangladesh (Pasricha and Biggs, 2010) or in India (Meshram, et al, 2012).

Obviously, all means of HAZ, WHZ, and WAZ indicators are negative in all districts of Sana'a City, except mean values of WHZ of Al-sabeen and Sanhan districts, which imply children belonged to these were suffering from malnutrition (Table 3). Risk of stunting was observed more among children lived in Sanhan and Al-tahrir districts than others, where mean of HAZ score were -2.5 and -2.1, respectively. Test of the significant differences between mean HAZ, WHZ, and WAZ indicators by districts of Sana'a City studied using one-way analysis of variance. The results showed that risk of prevalence of stunting was a higher more significant among Sanhan's children when compared to Shoub, Azal, Al-sabeen, Al-wahdeh, Maain, Al-thawrah and Hamdan districts of Sana'a City ($P < 0.01$). In additional, results of chi-square reveal that highly significant stunting among children in Sanhan when compared to others ($P < 0.01$). This finding may be due to many reasons such as Sanhan district is considered as rural area with respect to Sana'a City, lack of sanitary conditions or health services, no general hospitals, and about 65% of its children were stunted. On the other hand, the risk of prevalence of wasting was highly lower significant among Sanhan's children when compared to Shoub, Azal, Al-sabeen, Al-wahdeh, Maain, Al-thawrah, old Sana'a, Al-tahrir, Hamdan, and Bani Al-harith districts of Sana'a City ($P < 0.01$), where 7.8% of children in Sanhan were wasted. In addition, the prevalence of risk wasting and underweight among children of Al-sabeen district were likely to be lower significant as compared to children of Azal, Al-wahdeh, Maain, Al-thawrah, and Bani Al-harith districts of Sana'a City ($P < 0.01$). This may be due to that the facilities of the sanitary conditions or the health services in Al-sabeen district, where there are 3 General Hospitals, 4 Health Centers, and 4 Maternity and Childhood Centers (Ministry of Planning and International Cooperation, 2008). Also, the prevalence of wasting and underweight among Al-sabeen's children was 11.3% and 25%, respectively.

Also, purpose of the study to analyze the HAZ, WHZ, and WAZ by age groups of children. Values of means for HAZ, WHZ, and WAZ are negative with each age group of children, indicated that children suffered from malnutrition. Obviously, risk of stunting was more likely prevalent among children aged (12 - 59) months (Table 6), the proportions of severe and moderate stunting increased as age intervals of children, and risk of stunted significantly was higher more in old children (12 - 59) compared to youngest (0 - 11) ($P < 0.01$) (Table 7, 8), which was supported by other studies (Olack, et al, 2011; Meshram, et al, 2012). By contrary, risk of severe and moderate wasting were higher among (0 - 11) months youngest children as compared to (24 - 35) months old children ($P < 0.01$) (Table 7, 8), which was supported by other studies (Meshram, et al, 2012). The result of analysis of variance for WAZ indicator revealed that underweight were more highly significant prevalent among (36 - 59) months old children as compared to (0 - 11) months children (Table 7), as it was observed by other authors (Kamiya, 2011).

Finally, it was noted that, after the first year of life, there was a rapid increase in the prevalence of stunting. In the second year of life, with introduction to the family diet, children become more responsible for feeding themselves but often do not have access to adequate amounts of solid food (Olack, et al, 2011). Finding of the present study is the highest prevalence of stunting in children aged (24 - 35), (36 - 47), and (48 - 59) months. This finding could be attributed to poor weaning and complementary feeding practices, which contribute to inadequate energy and protein intake (Mittal, 2007).

Therefore, deep study should be conducted to assess the effect of breastfeeding and feeding practices on the nutritional indicators. In additional, maternal knowledge about feeding and care during illness are all important determinants of nutritional indicators that need further study to explore their association. Also, action needs to be taken in order to improve socio-economic conditions such as wealth index, food for work program, improved maternal education along with maternal health promotion, improved sanitation and provision on the safety of drinking water to prevent diarrhea and other infections.

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