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FOOD AND NUTRITIONAL SECURITY IN INDIA- AN INTER ZONAL ANALYSIS

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Abstract: *India has been registered significant economic growth in recent years, the country still existing great efforts amidst of widespread poverty and hunger to sustain the tempo of development. India's poor population amounts to more than 300 million people, with almost 30 percent of India's rural population living in poverty (World Bank 2012). According to government of India official estimates, poverty declined from 37.2% in 2004-05 to 29.8% in 2009-10. Rural poverty declined by 8 percentage points from 41.8% to 33.8% and urban poverty by 4.8 percentage points from 25.7% to 20.9% over the same period (World Bank 2012). India is home to 25 percent of the world's hungry population. An estimated 43 per cent of children under the age of five years are malnourished (WFP 2012). India remains an important global agricultural player; despite the fact that agriculture's share in the country's economy is declining. It has the world's largest area under cultivation for wheat, rice, and cotton, and is the world's largest producer of milk, pulses, and spices (World Bank 2012). But still part of the people are suffering from severe anemic and Chronic Energy Deficiency specially women and children. In this background this paper is an attempt to analyze of food consumption and nutritional status of men, women and children across the states. Correlation method is used for analyzing food consumption and anemic status in India. And ANOVA is used for find out the disparities among the regions in nutritional status in India. This work confirms that the East and West region has higher undernutrition rate compare to other regions of the country. And food consumption pattern also influence on anemic status.*

Key Words*: Anemic, Disparities, Food consumption, Nutrition, Zonal,*

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INTRODUCTION

"Food is the moral right of all who are born into this world"

- Norman Borlaug

India's economic growth has passed through major phases over the past 60 years. And India was emerged to a new phase with a broad objective of "Inclusive Growth" in the 11th five year plan. Food security is one of the main objectives in inclusive growth in agriculture in India. Traditionally, India was built with strong agrarian economy; the majority of the people derive their livelihood directly or indirectly from agriculture, even as the share of agriculture has sharply diminished. During the 11th five year plan the expected target was reached i.e. 257 millions tonnes total food grains was produced. Despite substantial improvement in health and well-being since the country's independence in 1947, under-nutrition remains a silent emergency in India, where almost half of all children under the age of three are underweight, 30 percent of newborns born with low birth weight, and 52 percent of women and 74 percent of children are anemic (UNICEF repot 2008). Other major nutritional deficiencies of public health importance in the country are Vitamin A deficiency and iodine deficiency. And 8.3 million infants born at low birth weight in India out of 19 millions infants in developing world have low birth weight.(UNICEF: A World Fit for Children Statistical Review 2007). Prevalence of wasting in children under five in India in is 20%.Poor nutrition is a major cause of other health problems in the country, including high infant and maternal mortality. The national costs of undernutrition are very high: a vicious cycle of poor health, high death rates, poor quality of life, decreased mental capacity and finally above said issues are reduced worker productivity. Productivity losses are estimated at more than 10 per cent of lifetime earnings for individuals and 2-3 per cent of gross domestic product for the nation. This means that improvements in nutrition are important for a healthy and productive life as was well as for continued economic growth and development. Preventing under-nutrition has emerged as one of the most critical challenges to India's development planners in recent times.

Under-nutrition is the underlying cause for about 50% of the 2.1 million Under-5 deaths in India each year. The prevalence of undernutrition is the highest in Madhya Pradesh (55%), Bihar (54%), Orissa (54%), Uttar Pradesh (52%) and Rajasthan (51%), while Kerala (37%) and Tamil Nadu (27%) have lower rates.

General under-nutrition, characterized by under-weight among children is more prevalent amongst rural children, scheduled castes and tribes, and amongst children with illiterate mothers. The contributing factors for under-nutrition are household food insecurity and intra-household food distribution, imbalanced diet, inadequate preventative and curative health services, and insufficient knowledge of proper care and infant feeding practices. Malnutrition amongst women is one of the prime causes of low birth-weight babies and poor growth. Low birth weight is a significant contributor to infant mortality. Moreover, low birth-weight babies who survive are likely to suffer growth retardation and illness throughout their childhood, adolescence and into adulthood, and growth-retarded adult women are likely to carry on the vicious cycle of malnutrition by giving birth to low birth-weight babies.

FACTS RELATING TO UNDERNUTRITION

1. 20 per cent of children under five years of age suffer from wasting due to acute undernutrition. More than one third of the world's children who are wasted live in India.
2. Forty three per cent of Indian children under five years are underweight and 48 per cent (i.e. 61 million children) are stunted due to chronic undernutrition, India accounts for more than 3 out of every 10 stunted children in the world.
3. Undernutrition is substantially higher in rural than in urban areas. Short birth intervals are associated with higher levels of undernutrition.
4. The per cent age of children who are severely underweight is almost five times higher among children whose mothers have no education than among children whose mothers have 12 or more years of schooling.
5. Undernutrition is more common for children of mothers who are undernourished themselves (i.e. body mass index below 18.5) than for children whose mothers are not undernourished.
6. Measure and the high prevalence of wasting in this group (28 per cent) is of particular concern.
7. India has the highest number of low birth weight babies per year at an estimated 7.4 million.
8. Only 25 per cent of newborns were put to the breast within one hour of birth.

9. Less than half of children (46 per cent) under six months of age are exclusively breastfed.
10. Only 20 per cent children age 6-23 months are fed appropriately according to all three recommended practices for infant and young child feeding.
11. 70 per cent children age 6- 59 months are anemic. Children of mothers who are severely anemic are seven times as likely to be severely anemic as children of mothers who are not anaemic.
12. Only half (51 per cent) of households use adequately iodized salt.
13. Only one third (33 per cent) Indian children receive any service from an anganwadi centre; less than 25per cent receive supplementary foods through ICDS; and only 18 per cent have their weights measured in an AWC.

(Source NFHS 3, 2005-2006)

FOOD SECURITY SYSTEM IN INDIA

Food security at the national level refers mainly to availability in the country of sufficient stocks of food to meet domestic demand, either through domestic supply or through imports. Attainment of self-sufficiency in food grains at the national level is one of the country's major achievements in the post-independence period. After remaining a food deficit country for about two decades after independence, India became largely self-sufficient in food grain production at the macro level. Food grain production in the country increased from about 50 million tonnes in 1950-51 to around 254 million tonnes in 2011-2012

The following table 1 shows that all India total production food. Total rice production has significantly increased from (74.29 mt to 104.2 mt since 1991-2012). And wheat, total coarse cereal and cereals production has been increased by year after years. But total pulses production has not significantly increased from 1991-2012.

Table 1 Total Production of Food

	FoodGrains				
	Total Rice	Wheat	Total Coarse Cereals	Total Cereals	Total Pulses
	Production	Production	Production	Production	Production
Year	Million Tonnes	Million Tonnes	Million Tonnes	Million Tonnes	Million Tonnes
1990-1991	74.29	55.14	32.7	162.13	14.26
1991-1992	74.68	55.69	25.99	156.36	12.02
1992-1993	72.86	57.21	36.59	166.67	12.82
1993-1994	80.3	59.84	30.82	170.96	13.3
1994-1995	81.81	65.77	29.88	177.46	14.04
1995-1996	76.98	62.1	29.03	168.11	12.31
1996-1997	81.74	69.35	34.1	185.19	14.24
1997-1998	82.53	66.35	30.4	179.28	12.98
1998-1999	86.08	71.29	31.34	188.7	14.91
1999-2000	89.68	76.37	30.33	196.38	13.42
2000-2001	84.98	69.68	31.08	185.74	11.08
2001-2002	93.34	72.77	33.38	199.48	13.37
2002-2003	71.82	65.76	26.07	163.65	11.13
2003-2004	88.53	72.16	37.6	198.28	14.91
2004-2005	83.13	68.64	33.47	185.23	13.13
2005-2006	91.79	69.35	34.07	195.22	13.39
2006-2007	93.36	75.81	33.92	203.08	14.2
2007-2008	96.69	78.57	40.76	216.01	14.76
2008-2009	99.18	80.68	40.03	219.9	14.57
2009-2010	89.09	80.8	33.55	203.45	14.66
2010-2011	95.32	85.93	42.22	223.47	18.09
2011-2012	103.41	90.23	41.91	235.54	17.02
2012-2013	104.22	93.62	39.52	237.36	18

Source:EPWRFITS

The following table 2 shows that per capita availability of food grains in India in kilogram per year. In 1991-92, 1995-96 and 1997-98 the availability of total food grain186.2 kg/annum, 180 kg/annum and 183 kg/annum respectively. But in subsequent year's availability per capita total food grains significantly reduced.

Table 2 Per capita Availability of food grains in India kg/annum

Year	Rice (Kgs. per year)	Wheat (Kgs. per year)	Cereals (Kgs. per year)	Pulses (Kgs. per year)	Foodgrains (Kgs. per year)
1951-1952	58	24	122	22.1	144.1
1956-1957	68.7	22.5	131.9	25.7	157.6
1961-1962	73.4	28.9	145.9	25.2	171.1
1966-1967	59.1	34.8	131.4	17.6	149
1971-1972	70.3	37.8	152.4	18.7	171.1
1976-1977	68.5	29.1	13.8	18.5	155.3
1981-1982	72.2	47.3	152.3	13.7	166
1985-1986	68.9	50.6	151.6	13.9	165.5
1990-1991	77.4	48.4	157.5	15	172.5
1991-1992	80.9	60	171	15.2	186.2
1992-1993	79.2	57.9	158.6	12.5	171.1
1993-1994	73.4	51.2	156.2	13.2	169.4
1994-1995	75.7	58.2	158.4	13.6	172
1995-1996	80.3	63	167	13.8	180.8
1996-1997	74.6	64.3	161.5	12	173.5
1997-1998	78.1	65.4	170.1	13.5	183.6
1998-1999	73.1	55.3	151.2	12	163.2
1999-2000	74.2	59.2	156.7	13.3	170
2000-2001	74.3	58.4	154.3	11.6	165.9
2001-2002	69.5	49.6	141	10.9	151.9
2002-2003	83.5	60.8	167.4	12.9	180.4
2003-2004	66.2	65.8	149.1	10.6	159.7
2004-2005	71.3	59.2	155.8	13.1	168.9
2005-2006	64.7	56.3	142.7	11.5	154.2
2006-2007	72.3	56.3	150.7	11.8	162.5
2007-2008	70.8	57.6	148.7	12.9	161.6
2008-2009	64	53	143.9	15.3	159.2
2009-2010	68.8	56.5	148.6	13.5	162.1
2010-2011	66.4	61.4	146.6	12.9	159.5
2011-2012	68.9	60.1	154.6	14.4	169

Source:EPWRFITS

Table 3 per capita Availability and Deficit of Milk, Egg and Meat

Food Items	Per capita Availability	ICMR dietary guidelines for Indians	Per capita deficit
Milk	281grams/day	300 mililiter/day	34 grams/day
Egg	54 eggs/annum	180 eggs/annum	126 eggs/annum
Meat 3.24 Meat	Meat 3.24	10.95 kg/annum	7.71 kg/annum

Source:EPWRFITS

Table 3 provides per capita availability and deficit of milk, egg and meat. It shows the need for increase in availability of non-cereal food. In terms of non-cereal food like fruits, vegetables, milk, meat and fish, India has not achieved self- sufficiency in terms of per capita availability.

NUTRITIONAL SECURITY:

Despite an apparent surplus of food grains at the national level, malnutrition persists. The above highlights that national level food production or availability (food security) alone is not sufficient to attain to nutrition security, especially at the household and individual level. Nutrition security as dependent on several inter-related factors such as food production, community and household level food distribution, poverty, equity, access to health services, education levels, and access to good nutritional status is widely accepted as an important indicator of national development. There are many determinants of malnutrition, which can be grouped as economic, environmental, agricultural, cultural, health and political factors. Some key factors are listed below.

Economic: poor purchasing power, poverty, livelihood insecurity, major inequities in asset distribution and control, including gender inequities

Environmental: lack of safe drinking water, poor sanitation, poor hygiene practices

Agricultural: failure to include nutrition concerns in major cropping and farming systems, leading to limited availability of nutrient rich foods, seasonal food shortages, inequities in food distribution, conversion to cash crops, and decreases in home gardening.

Cultural :inadequate knowledge of nutrition, cultural beliefs and practices that lead to poor nutrition (e.g., expelling colostrum's, restricting food consumption during pregnancy or sickness), cultural shifts to prefer less micronutrient rich foods, discriminatory intra-familial food distribution, high workload for women, inadequate time available for infant and young

child feeding and care, early marriage, discrimination against girls and women, other forms of discrimination

Health: weak health service systems, inadequate human resources, especially in public health nutrition, weak health and nutrition educational systems,

A Leadership Agenda for Action poor utilization of services, recurrent infections, low immunization rates, lack of awareness of nutrition issues (such as which foods are the most nutritious, or proper infant and young child feeding practices), and many of the poor and vulnerable left "unreached".

In this back ground this paper analyzes the following objectives

OBJECTIVES:

1. To investigate the child undernutrition in India.
2. To study disparities between the regions in relation to undernutrition among women and men.
3. To investigate the consumption of food types and aneamic status of men and women.

HYPOTHESES

Based on the above objectives this paper framed the following hypotheses.

1. H0= There is a disparity between regions in undernutrition among men and women.
2. H1= there is no disparity between regions in undernutrition among men and women
3. H0=There is significant relationship between food types and aneamic status of men and women.
4. H1= there is no significant relationship between food types and aneamic status of men and women

METHODOLOGY

This study is based on secondary data which is obtained by National Family Health Survey _3, journals, research articles, epwrfits, published and unpublished books. A second hypothesis is being tested one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of two or more independent (unrelated) groups that is men and women undernutrition and aneamic status. It is important to realize that the one-way ANOVA is a *collection* test statistic and cannot tell which specific region were significantly different from each other regions in undernutrition

and aneamic status; for this, we using a post-hoc test, in post hoc test we used Tukey LSD test in one way Anova. And third hypothesis is being tested by Pearson correlation method to find out the relationship between food consumption pattern and aneamic status of Women and Men.

RESULTS AND DISCUSSIONS

Child Undernutrition:

The following table explains that the child undernutrition under three years in India. According Gomez classification the child undernutrition is classified into three variables such as underweight, stunted and wasted.

Table 4 Child Undernutrition (%)

Measure of Nutrition	NFHS 2	NFHS 3
Underweight	43	40
Stunted	51	45
Wasted	20	23

Source NFHS3

The above table clearly shows that the proportion of children who are wasted rapidly increased by 20 to 23%. And the proportion of children who are underweight and stunted rapidly decreased.

Table 5 Anaemia Prevalence in Children

% of children age 6-35 months

	Urban	**Rural**
NFHS 2	74	79
NFHS 3	73	81

Source-NFHS 3 2005-06, NFHS 2 199

The above table explains that the prevalence of anaemia in children is more in rural area rather than urban area. May be the reasons are several such as low level of mother education, inadequate knowledge of nutrition, cultural beliefs and practices that lead to poor nutrition (e.g., expelling colostrums, restricting food consumption during pregnancy or sickness), cultural shifts to prefer less micronutrient rich foods, discriminatory intra-familial food distribution, high workload for women, inadequate time available for infant and young child feeding and care, early marriage, discrimination against girls and women, other forms of discrimination are correlated each other.

ANALYSIS OF REGION WISE UNDERNUTRITION DISPARITY

This section provides region wise disparity of undernutrition and anemic status among men and women. The following table 6 clearly shows that Anova test results of undernutrition and aneamic disparity among men and women.

Table 6 ANOVA test result of undernutrition and aneamic status of men and women

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
womennutri	Between Groups	521.319	5	104.264	6.982	.000
	Within Groups	343.486	23	14.934		
	Total	864.806	28			
mennutri	Between Groups	255.788	5	51.158	3.284	.022
	Within Groups	358.261	23	15.577		
	Total	614.050	28			

Here the above table 6 Anova test results shows that women nutrition has significant difference between the groups and within groups, the last column of the table shows that the significance value .000 it clearly shows that there is a significant difference if we considered the F value which also shows the same result of significance, calculated F value is greater than the table value (6.982>5.80) hence null hypothesis is rejected, there is a statistically significant difference (.000) between groups and within groups of women in undernutrition. And also for men malnutrition the calculated F value is greater than table value (3.284>5.80) hence the null hypothesis is accepted and H1 rejected, there is an insignificant difference (0.22) between groups and within the groups of men in undernutrition. This means that men undernutrition is less, compare to women undernutrition

Post –Hoc Test

Table 7 Regional disparity in undernutrition among Men and Women

Multiple Comparisons

LSD

Dependent Variable	(I) Regions	(J) Regions	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Women nutrition	1	2	-6.60000*	2.66674	.021	-12.1166	-1.0834
		3	-7.22500*	2.42219	.007	-12.2357	-2.2143
		4	3.96250	2.00006	.060	-.1749	8.0999
		5	-5.70000*	2.66674	.043	-11.2166	-.1834
		6	-2.60000	2.42219	.294	-7.6107	2.4107
	2	1	6.60000*	2.66674	.021	1.0834	12.1166
		3	-.62500	2.95154	.834	-6.7307	5.4807
		4	10.56250*	2.61626	.001	5.1503	15.9747
		5	.90000	3.15533	.778	-5.6273	7.4273
		6	4.00000	2.95154	.189	-2.1057	10.1057
	3	1	7.22500*	2.42219	.007	2.2143	12.2357
		2	.62500	2.95154	.834	-5.4807	6.7307
		4	11.18750*	2.36650	.000	6.2920	16.0830
		5	1.52500	2.95154	.610	-4.5807	7.6307
		6	4.62500	2.73260	.104	-1.0278	10.2778
	4	1	-3.96250	2.00006	.060	-8.0999	.1749
		2	-10.56250*	2.61626	.001	-15.9747	-5.1503
		3	-11.18750*	2.36650	.000	-16.0830	-6.2920
		5	-9.66250*	2.61626	.001	-15.0747	-4.2503
		6	-6.56250*	2.36650	.011	-11.4580	-1.6670
	5	1	5.70000*	2.66674	.043	.1834	11.2166
		2	-.90000	3.15533	.778	-7.4273	5.6273
		3	-1.52500	2.95154	.610	-7.6307	4.5807
		4	9.66250*	2.61626	.000	4.2503	15.0747
		6	3.10000	2.95154	.304	-3.0057	9.2057
	6	1	2.60000	2.42219	.294	-2.4107	7.6107
		2	-4.00000	2.95154	.189	-10.1057	2.1057
		3	-4.62500	2.73260	.104	-10.2778	1.0278
		4	6.56250*	2.36650	.011	1.6670	11.4580
		5	-3.10000	2.95154	.304	-9.2057	3.0057
Men nutrition	1	2	-3.98571	2.72349	.157	-9.6197	1.6483
		3	-2.46071	2.47374	.330	-7.5780	2.6566
		4	4.12679	2.04262	.055	-.0987	8.3523

	5	-3.71905	2.72349	.185	-9.3530	1.9149
	6	-1.33571	2.47374	.594	-6.4530	3.7816
2	1	3.98571	2.72349	.157	-1.6483	9.6197
	3	1.52500	3.01436	.618	-4.7107	7.7607
	4	8.11250*	2.67194	.006	2.5852	13.6398
	5	.26667	3.22248	.935	-6.3995	6.9329
	6	2.65000	3.01436	.388	-3.5857	8.8857
3	1	2.46071	2.47374	.330	-2.6566	7.5780
	2	-1.52500	3.01436	.618	-7.7607	4.7107
	4	6.58750*	2.41686	.012	1.5878	11.5872
	5	-1.25833	3.01436	.680	-7.4940	4.9773
	6	1.12500	2.79075	.691	-4.6481	6.8981
4	1	-4.12679	2.04262	.055	-8.3523	.0987
	2	-8.11250*	2.67194	.006	-13.6398	-2.5852
	3	-6.58750*	2.41686	.012	-11.5872	-1.5878
	5	-7.84583*	2.67194	.007	-13.3732	-2.3185
	6	-5.46250*	2.41686	.034	-10.4622	-.4628
5	1	3.71905	2.72349	.185	-1.9149	9.3530
	2	-.26667	3.22248	.935	-6.9329	6.3995
	3	1.25833	3.01436	.680	-4.9773	7.4940
	4	7.84583*	2.67194	.007	2.3185	13.3732
	6	2.38333	3.01436	.437	-3.8523	8.6190
6	1	1.33571	2.47374	.594	-3.7816	6.4530
	2	-2.65000	3.01436	.388	-8.8857	3.5857
	3	-1.12500	2.79075	.691	-6.8981	4.6481
	4	5.46250*	2.41686	.034	.4628	10.4622
	5	-2.38333	3.01436	.437	-8.6190	3.8523

*. The mean difference is significant at the 0.05 level.

North[1], Central[2], East[3], North East[4], West[5], South[6]

All India Women undernutrition 25%, All India Men Undernutrition is 9%

The following table7 explains that using a one-way ANOVA post hoc test was conducted to compare the undernutrition among men and women between the regions.

Here, the above table 7 clearly shows that, North region is compare to all other regions, which shows that there is statistically insignificant difference in all regions except East (.000) and West (.000) regions in women undernutrition are statistically significant. Hence the women undernutrition is same in North, Central, North East and South except East and West regions which are undernourished than other regions.

And men undernutrition are statistically insignificant in all regions that is North(.594), central (.330) East (.055), South East (.185), West(.594) and South (.157).

CONSUMPTION OF FOOD TYPES AND ANAEMIC STATUS OF MEN AND WOMEN

The following table 8 is clearly shows that consumption pattern of food items are directly related with aneamic status men and women.

Table 8. Relationship Between Food Consumption and Status of Anaemic among Women and Men

	Milk or curd	Pulses or beans	Dark green, Leafy Vegetables	Fruits	Eggs	Fish	Chicken or meat	Fish or chicken/meat
Women	-0.232	-0.054	0.287	-0.315	-0.068	-0.038	0.173	0.164
Sig.2-tailed	0.616	0.908	0.532	0.491	0.884	0.936	0.711	0.725
Men	-0.592	-0.173	-0.472	-0.493	-0.302	-0.405	0.188	0.172
Sig.2-tailed	0.161	0.711	0.284	0.261	0.51	0.368	0.686	0.712

Correlation is significant at 0.01 levels

The above table 8 has clearly shows the relationship between consumption food and aneamic status of men and women. Consumption of milk or curd, pulses of beans and fruits are negatively correlated with status of aneamic among women. And consumption of dark green leafy vegetables, eggs, fish, chicken or meat and fish/chicken/meat are positively correlated with status of aneamic among women.

Consumption of milk or curd, pulses or beans, dark green leafy vegetables and fruits are negatively correlated with status of aneamic among men.And consumption of, eggs, fish, chicken or meat and fish/chicken/meat are positively correlated with status of aneamic among men.

Consumptions pulses, eggs and fish are moderately correlated with status of aneamic and consumptions of milk or curd, fruits, dark green leafy vegetables, chicken and meat are highly correlated with status of aneamic.

FINDINGS AND CONCLUSION

The above results and discussion clearly shows that regional disparity in undernutrition and aneamic status among men and women in India. In India there is a wide disparity between men and women in undernutrition. Women are more suffered from undernutrition than

men. Among regions wise disparity the East and West regions are acute undernutrition both men and women.

Aneamic status is highly influenced by food consumption pattern. Consumption of milk or curd, pulses or beans and fruits are negative correlated. This shows that iron tablets, folic acid tablets and some other medicated issues are need for needy persons (especially pregnant women, adolescent's girls and breast feed mothers).

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