



## Food and Nutritional Security in the Koch Bihar District, West Bengal, India

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### Abstract

*Food and nutrition security (FNS) is not only an ethical and moral topic but more importantly is a right based issue which deals with the relation of the natural-cultural ecology with food and nutrition in different dimensions. The paper focuses on the food and nutrition condition analysis in the Koch Bihar district and tries to reveal very fundamental aspects of food and nutrition security in the district. Though the region lies in the Ganga Plain, it has a dwindling pattern of FNS because of the impact of market economy, changing pattern of crop diversity and other socio-cultural factors. This block level study based on the secondary data will point out the block level variations in the food and nutrition security and explain these micro variations with reference to the logical reasons. FNS pattern and female literacy pattern correlation is also discussed in this paper. Per capita food and nutrition availability is calculated with reference to different crops that clearly point out the share of different crops in the food and nutrition security for the people's diet diversity. The paper also presents some micro level sustainable policy measures and suggestions to improve the FNS in the Koch Bihar district.*

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### Introduction

Food and nutrition security (FNS) is as important as any other figure of security. Food and nutrition security means perennial availability of nutritive food of sufficient quantity and quality to each and every person of an area. Food security has two dimensions: the physical availability of food, and the capacity of people to pay for the food they need as well as access by all people, at all times, to enough food for an active, healthy life. It includes at a minimum: a) the ready availability of nutritionally adequate and safe foods and b) the assured ability to acquire acceptable food in socially acceptable ways e.g., without resorting to emergency food supplies, scavenging, stealing, and other coping strategies (Life Sciences Research Office, Federation of American Societies for Experimental Biology, 1990). Food security is achieved "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 1996). To achieve such a situation requires concerted action at individual, household, national, regional, and

global levels (FAO 1996). Experiences from India and other countries have shown that even when the national level food security is achieved, individuals and groups in the country can still go hungry because they do not have the means to access food (Clay, 1989). Nutritional security is defined as the condition when every people have a diet, nutritionally adequate in quantity as well as in quality and food consumed is biologically utilized for a healthy living. Food security is achieved when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy (FAO World Food Summit, 1996).

### Objectives

The following objectives have been taken in to consideration for the study:

1. To examine the food and nutritional status of the Koch Bihar district of West Bengal.
2. To measure the intra- block difference in the food and nutritional pattern in study area.
3. To find out the factors that affect and control the

variations in food and nutrition security in different blocks.

### Study Area

The district lies between 25°57'40" and 26°32'20" North latitude and between 88°47'40" and 89°54'35" East longitude. The district is surrounded by Jalpaiguri District in the North, Goalpara District of Assam and Rangpur district of Bangladesh in the East and International Boundary of Bangladesh in South & West. Physiographically the district belongs to the Barind tract of the Lower Ganga Plain which lies between the peninsular plateau in the south and Himalaya in the north where the Terai kind of vegetation prevails on the northern side. The major rivers in Koch Bihar flow in a slanting course from north-west to south east. All of them rise in the Himalayas and enter the district from Western Dooars of the district of Jalpaiguri except one which enters from the Gumma Duars.

The river system of the area under study is well developed. The six river systems cut through the district flowing in a south easterly direction. From the west to the east these are: (1) The Tista System, (2) The Jaldaka System, (3) The Torsha System, (4) The Kaljani System, (5) The Raidak System, and (6) The Gadadhar System. The soils of the Koch Bihar district is of alluvial formation and most part is sandy and lousy. The soil of Koch Bihar district looks various from its place to place. This kind of soil is of light texture and can retain moisture and easily give it up. The climate of the district is damp and malarial. The moist west wind which blows during the greater part of the year which is injurious to health. Dry west wind which blows during the spring, is the best current of air available in the district. In Koch Bihar District, seasonal variations include the presence of winter, summer, autumn and the rainy season which cyclically occur every year.

### Data Base and Methodology

In the present study, data have been taken from many sources. All indicators which are used in this paper relate to Koch Bihar district and India only. Present study is mainly based on secondary sources of data which have been obtained from Cooch Behar District Statistical Hand Book 2010- 2011, Bureau of Applied Economics and Statistics, Government of West Bengal, The Hindu Survey of Indian Agriculture (2000), Census of India, 2011 and Indian Nutrition profile, Ministry of Human resource Development, Government of India. All data was processed, analyzed and then logical and rational conclusions were made as well as presented through tables, graph etc. as and when required.

The district has a total population of 2819086, according to 2011 census and share 3.09% of the state's total population. This is in sharp contrast to the region's share of 3.82% of the state's geographical area, which is suggestive of a situation of very high population density (775/ sq km). On the other hand

among different blocks there is a wide variation, ranging from as low as 514 people per Sq Km in Mekhliganj block and highest in the block of Dinhata (1024/ sq km).

Literacy rate is one of the important indicators for food and nutrition security. Literacy rate among female adults is an important social development indicator, and it is also important for child feeding practices and hence for improving child nutrition and health (Guldan et al. 1993). Generally, both the cultural and the agricultural factors control the variation pattern of FNS in an area. But a detailed analysis of the block level data for Koch Bihar district reveals that the block level FNS pattern is well explained by the agricultural factors like area under food grains, production of food grains, and yield etc. in comparison to the social factors like female literacy, overall literacy, SC/ST population etc. The block Sitalkuchi has the highest overall per capita calorie intake (33494.88) followed by Tufanganj-I (27371.74) Mathabhanga-I (27238.02). Cooch Behar-II has the lowest overall per capita intake (19193.93) among all blocks.

Agricultural production data present a clear picture of the food availability in the area and is an important indicator of FNS because the food production pattern generally governs the pattern of food and nutrition security. Mathabhanga-I has the highest area under production while Tufanganj has highest production and Sitai block has the highest yield. The high production with high food accessibility and high food utilization determine the food and nutrition security level in the particular block.

Temporal pattern in agricultural data indicate that the blocks have facing the mark change in area, production and yield and thus affecting the food and nutrition security. The data comparison between 2001 and 2010 indicate that the Cooch Behar-I, Cooch Behar-II, Dinhata-I, Mathabhanga-II and Tufanganj-I have experienced reduction in the area of production. While other blocks have recorded increase in the area of production.

Other important agricultural indicators such as net sown area, cropping intensity also explain the food security pattern. The data table analysis indicates that except the net sown area, Tufanganj block records the highest crop diversity, total cropped area and cropping intensity while these values are the lowest for the block Haldibari. Net sown area is highest in Cooch Bihar block and lowest in Sitai block. The area cultivation data indicate that its share is highest in the Mathabhanga-I block followed by Sitai and Sitalkuchi blocks. The production is highest in the Tufanganj block and lowest in the Cooch Bihar block. Yield is highest in the Sitai block while lowest in the Mathabhanga block. These values govern the pattern of FNS in the blocks.

Block wise crop production for different crops indicate that rice are produced maximum in the block Dinhata-I (72004) while Haldibari block has the lowest rice production. The wheat production is highest in

Cooch Behar II while Maize production is highest in the Tufanganj block. Among the cash crops, production of jute is produced maximum in the Cooch Behar I block, while highest production of potato is recorded in the Mathabhanga I block. The cash crops value is also considered to understand the impact of accessibility of purchasing power of the people on food security because they are the source of good income and thus increase the accessibility resources in the area.

The data availability of different food crops per head indicate that the rice, wheat, maize, cereals, pulses availability is highest in the blocks Dinhata II, Mekhliganj, Tufanganj, Dinhata II and Tufanganj respectively. This data clearly indicate the positive relation between the highest production and highest per capita availability of different crops. As block Dinhata I has highest rice production so also has the highest per head availability of rice in the block in comparison to the other blocks.

The block wise caloric availability is an important indicator that points out the performance of the agriculture sector to maintain the food and nutrition security in the area. The data table indicates that the block Sitalkuchi has the highest overall per capita calorie intake (33494.88) followed by Tufanganj-I (27371.74) Mathabhanga-I (27238.02). Cooch Behar-II has the lowest overall per capita intake (19193.93) among all blocks. While the caloric availability from rice only is highest in Sitalkuchi and for wheat it is highest in Mekhliganj block and for maize it is highest in the Tufanganj-I block. The data thus indicate that people derive their major source of calorie mainly from rice in all blocks which is followed by the wheat. The high production of rice in the area is the major reason that people have their caloric availability mainly from rice.

Data table of the average nutrition availability per head for different crops indicates the nutritional values of different crops. The table is calculated on the basis of the scientific institutions recommendation. It shows that the rice has highest value in terms of energy. Lowest FNS pattern in Cooch Bihar II is due to its deficit in the area under food crops and food grains production. As, Cooch Bihar II district in 2001 records an area of 35180 under cultivation which reduced to the level of nearly 1/3 in the year 2011. Similarly, the production of food grains also reduced from 55410 tons in 2001 to 25380 tones (nearly half) in 2011. The reason for this marked reduction in the food grain production and area is due to the high rate of agricultural land conversion into urban land. The urban land conversion leads to the replacement of food grains cultivation with horticulture crops.

India's food grain production, which was 82 million tonnes in 1960-61 reached to about 203 million tonnes in 1998-99. It had increased at the rate of 2.68 per cent per annum during this period which is a significant achievement. India has now become self-sufficient in food grains production from near famine

situation prevailing during mid-sixties (J. Hoddinott and Y. Yohannes 2002). Public investment in irrigation and other rural development infrastructures together with improved crop production techniques such as high yielding variety seeds, chemical fertilizers, plant protection measures, etc. have significantly helped to expand the food production (**Goyal and Singh**). The data of availability of different food crops per head indicate that the rice, wheat, maize, cereals, pulses availability is highest in the blocks Dinhata II, Mekhliganj, Tufanganj, Dinhata II and Tufanganj respectively. This data clearly indicate the positive relation between the highest production and highest per capita availability of different crops. As block Dinhata-I has the highest rice production so also does it have the highest per head availability of rice in the block in comparison to the other blocks. The cash crops value is also considered to understand the impact of accessibility of purchasing power of the people on food security. It is important to raise awareness at all levels of the implications of not making food security and nutrition a priority. Research, especially operational research, is needed to enable a fuller understanding of the living conditions of rural people and their nutritional needs.

The Koch Bihar district of West Bengal is under developed and is perpetually dependent for its food and other requirements on the other parts of the state and the country. The food grains availability is high as compared to the whole country but the availability of other cereals is not satisfactory. There are a number of constraints arresting the crop productivity in the district. This district faces several physical and socio-economic and technological constraints including remoteness and inaccessibility, physical and climatic variability, marginal lands, low risk bearing capacity of the cultivators, poor market infrastructure, converted nature of cultivation from family oriented to market oriented, lack of technology and knowledge etc. Technology will have to be essentially developed, befitting to such socio-economic setting in order to have impact on production, processing, choice of crops and over all development etc. Majority of the people is dependent on agriculture. More than seventy percent people live in villages and agriculture is their primary occupation. More than 60 percent of them are cultivators and 15 percent are agricultural labourers. Maximum farmers are marginal as their lands are less than one hectares.

### Measures to improve the FNS

Securing the FNS in an area is a major well-being indicator of governmental plans and policies for welfare. The government should have the understating of the local factors that determine the food and nutrition security pattern in the area to directly intervene in improvements of FNS. The district also has micro level local variations to pattern out the FNS condition in the different blocks. The holistic dimension of food security and related resources should be dealt with integrally to improve the condition of FNS. The accessibility and

utilization dimension is most backward at micro and macro level so, we should adopt sustainable measures to secure the economic and health resources to the population. The climate change is a recent phenomenon, threatening the food security. It affects the holistic dimensions of the FNS so we should focus on integrating those measures that can provide the resilience to mitigate the food and nutrition security in the area.

### Conclusion

Thus the data analysis clearly gives an impression that the intra block variation in the FNS pattern in the Koch Bihar district is highly localized in nature and not governed by the broad and general controlling social and physical factors. A detailed analysis of the block level data for Koch Bihar district reveals that the block level FNS pattern is well explained by the agricultural factors like area under food grains, production of food grains, and yield etc. in comparison to the social factors like female literacy, overall literacy, SC/ST population etc.

The social factors, especially the female literacy does not appear as the strongest determining factor in FNS variation. Nearly all the blocks have the equal female literacy rate ranging from 42-44 percentages. This means that the basic food availability (per capita calorie intake) is not so related to the female education. Rather it is more correlated to the availability and accessibility in the household as on average. Though, it does not mean that female education has no role in household food and nutrition security rather female awareness increases the efficiency of food utilization and raises the standard of health and nutrition security. Thus female education is more positively correlated to the nutritional or health aspect of FNS in comparison to the per capita caloric availability. The overall education and FNS also do not show any positive relation in the controlling of FNS variation. Lowest FNS pattern in Cooch Bihar II is due to its marked reduction in the area under food crops and food grains production. As, Cooch Bihar II district in 2001 recorded an area of 35180 under cultivation which reduced by nearly 1/3 in the year 2011. Similarly, the production of food grains also reduced from 55410 tons in 2001 to 25380 tones (nearly half) in 2011. The reason for this marked reduction in the food grain production and area is due to the high rate of agricultural land conversion into urban land. The urban land conversion leads to the replacement of food grains cultivation with horticulture crops. Thus the food and nutrition security in

the district and influence of the agriculture production is highly correlated.

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Table – 1: Block Wise Population Statistics of Koch Bihar District, West Bengal

Blocks	Total	Male	Female	Total SC	Male SC	Female SC	Total ST	Male ST	Female ST
Haldibari	103969	52851	51118	63609	32515	31094	313	164	149
Mekhliganj	155250	80052	75198	110595	57113	53482	1918	1006	912
Mathabhanga - I	218191	112497	105694	150056	77333	72723	140	64	76
Mathabhanga - II	227397	117100	110297	147623	75928	71695	2974	1471	1503
Cooch Behar - I	326558	168185	158373	129873	67239	62634	1225	655	570
Cooch Behar - II	343901	179591	164310	154656	80176	74480	3429	1930	1499
Tufanganj - I	248595	128415	120180	115000	59290	55710	378	208	170
Tufanganj - II	186726	96222	90504	100378	51659	48719	3966	1994	1972
Dinhata - I	286269	147602	138667	125873	64992	60881	1171	593	578
Dinhata - II	244066	126663	117403	106859	55811	51048	1237	614	623
Sitai	110333	56016	54317	72924	37026	35898	215	99	116
Sitalkuchi	185353	94277	91076	101009	51318	49691	259	122	137

Source: Census of India, 2011

Table – 2: Block Wise Population Density and Literacy Rate in Koch Bihar District, West Bengal

Blocks	Population Density (/ sq km)	Growth Rate (2001 – 11: %)	Literacy Rate (%)		
			Total	Male	Female
Haldibari	682	10.76	60.44	55.56	44.44
Mekhliganj	514	16.49	59.78	57.06	42.94
Mathabhanga - I	683	16.89	61.65	56.87	43.13
Mathabhanga - II	734	15.81	63.37	56.25	43.75
Cooch Behar - I	904	14.74	67.02	55.36	44.64
Cooch Behar - II	892	15.41	72.20	55.62	44.39
Tufanganj - I	784	11.43	65.06	55.94	44.06
Tufanganj - II	703	11.51	67.05	55.94	44.06
Dinhata - I	1024	12.40	64.18	55.50	44.50
Dinhata - II	988	18.74	63.54	56.07	43.93
Sitai	686	14.52	54.01	55.92	44.08
Sitalkuchi	706	13.22	60.73	55.69	44.31

Source: Census of India, 2011

Table – 3: Area Production and Yields of Total Food Grains in Koch Bihar District  
(Area in Ha; Production in Tones; Yield in Kg/Ha)

Blocks	2001-02			2010-2011		
	Area	Production	Yield	Area	Production	Yield
Cooch Behar-I	33550	62980	7921	16440	36110	7578
Cooch Behar-II	35180	55410	7296	11452	25380	6728
Dinhata-I	30490	42910	8409	25252	62330	7601
Dinhata-II	26980	52810	8073	27887	58860	7655
Sitai	15260	17200	5264	28683	66930	10185
Mathabhanga-I	29270	54930	7685	32232	70580	6257
Mathabhanga-II	29460	42710	6692	26889	70980	8366
Sitalkuchi	22070	35620	6725	28495	70330	10059
Tufanganj-I	29240	51330	8097	21122	54430	10056
Tufanganj-II	17790	29650	8644	27153	72580	7814
Mekhliganj	25030	33170	6533	26816	63990	6860
Haldibari	10560	14170	6651	12191	25420	9401
Total	304860	493790	87990	284612	677900	98560

Source: Cooch Behar District Statistical Hand Book 2001-02 and 2010-11, Bureau of Applied Economics &amp; Statistics, Government of West Bengal.

Table – 4: Net and Gross Cropped Area in different Blocks in Koch Bihar District

Blocks	Net Sown Area (ha)	Area sown more than once (ha)	Total Cropped Area (ha)	Cropping Intensity (%)
Haldibari	12522	1932	14454	115.43
Mekhliganj	22071	8502	30573	138.52
Mathabhanga - I	26594	14043	40637	152.81
Mathabhanga - II	22201	12021	34222	154.15
Cooch Behar - I	26881	12064	38945	144.88
Cooch Behar - II	27581	12034	39615	143.63
Tufanganj - I	24844	21600	46444	186.94
Tufanganj - II	18412	9974	28386	154.17
Dinhata - I	22495	6710	29205	129.83
Dinhata - II	21427	5130	26557	123.94
Sitai	11414	5964	17378	152.25
Sitalkuchi	20562	5415	25977	126.34

Source: As in Table No. 3

Table – 5: Blockwise Production of Various Crops, Koch Behar District 2011

Blocks	Rice	Wheat	Maize	Jute	Masur	Maskalai	Khesri	Musterd	Potato
Mekhliganj	33137	2966	0	35690	0	0	0	15	72487
Haldibari	25046	330	0	31801	0	0	0	0	28128
Mathabhanga-I	62104	233	0	78447	0	03	116	315	91681
Mathabhanga-II	57297	1623	0	60705	21	19	0	477	129648
Sitalkuchi	64291	2837	32	113769	0	12	0	179	35742
Cooch Behar-I	65444	5137	0	123324	195	45	25	994	59083
Cooch Behar-II	68320	3229	0	69588	12	60	165	1063	43364
Tufanganj-I	67699	1880	1001	33113	63	31	239	1131	38395
Tufanganj-II	53277	789	5	15789	03	0	0	620	14535
Dinhata-I	72004	576	0	79354	0	30	0	219	78692
Dinhata-II	62489	1496	0	43487	09	01	41	398	52863
Sitai	25755	403	267	27613	0	0	0	208	6142

Source: As in Table No. 3

Table – 6: Blockwise Per-Capita Availability of Different Crops in Koch Bihar District

(gram/head/day)

Blocks	Rice	Wheat	Maize	Cereals	Masur	Mashkalai	Khesri	Pulses	Oilseeds
Mekhliganj	873.21	78.16	0	951.36	0	0	0	0	0.40
Haldibari	441.99	5.82	0	447.82	0	0	0	0	0
Mathabhanga-I	779.81	2.93	0	782.74	0	0.04	1.46	1.49	3.96
Mathabhanga-II	690.33	19.55	0	709.88	0.25	0.23	0	0.48	5.75
Sitalkuchi	539.38	23.80	0.27	563.45	0	0.10	0	0.10	1.50
Coochbehar-I	521.37	40.92	0	562.29	1.55	0.36	0.20	2.11	7.92
Coochbehar-II	752.94	35.59	0	788.53	0.13	0.66	1.82	2.61	11.72
Tufanganj-I	993.31	27.58	14.69	1035.58	0.92	0.45	3.51	4.89	16.59
Tufanganj-II	509.89	7.55	0.05	517.48	0.03	0	0	0.03	5.93
Dinhata-I	808.27	6.47	0	814.74	0	0.34	0	0.34	2.46
Dinhata-II	1551.69	37.15	0	1588.84	0.22	0.02	1.02	1.27	9.88
Sitai	380.69	5.96	3.95	390.59	0	0	0	0	3.07
Koch Bihar	736.91	24.29	1.58	762.78	0.26	0.18	0.67	1.11	5.76
All India				183				15.33	23.36
Requirements				179				19.35	36.50

Source: Calculated by Authors

Table – 7: Blockwise Caloric Availability of Food grains in Koch Bihar District  
(calorie/ head/ day)

Blocks	Rice	Wheat	Maize	Total
Mekhliganj	20408.64	404.08	0	20812.72
Haldibari	23033.88	67.13	0	23101.01
Mathabhanga-I	27215.44	22.59	0	27238.02
Mathabhanga-II	24092.38	150.96	0	24243.34
Sitalkuchi	33165.24	323.73	5.91	33494.88
Cooch Behar-I	19162.05	332.72	0	19494.77
Cooch Behar-II	18995.34	198.59	0	19193.93
Tufanganj-I	26038.89	159.95	137.90	26336.74
Tufanganj-II	27281.46	89.37	0.92	27371.74
Dinhata-I	24049.99	42.56	0	24092.55
Dinhata-II	24480.98	129.64	0	24610.63
Sitai	22319.72	77.25	82.87	22479.85
Mekhliganj	20408.64	404.08	0	20812.72
Haldibari	23033.88	67.13	0	23101.01

Source: Calculated by Authors

Table – 8: Average Nutrition Availability of Various Crops in Koch Bihar District  
(calorie/head/ day)

Crops	Protein	Fat	Energy	Calcium	Iron
Rice	505.9	27.7	24187.0	693.0	194.1
Wheat	25.5	3.5	166.5	91.9	10.6
Maize	0.7	0.1	19.0	0.3	0.2
Musur	0.6	0.2	8.1	1.6	0.2
Mashkalai	0.3	0.1	5.8	3.3	0.1
Khesri	1.4	0.4	17.5	4.6	0.3

Source: Calculated by Authors

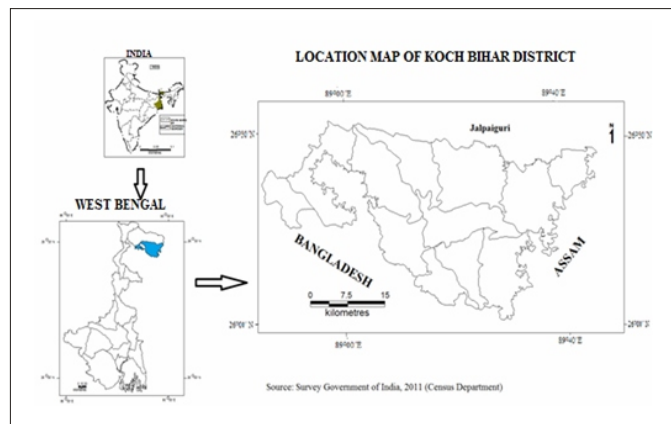


Fig. 1: Location of the Study Area



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